DEPARTMENT OF ENVIRONMENTAL AFFAIRS

NO. 575 **27 MAY 2016**

NATIONAL ENVIRONMENTAL MANAGEMENT: BIODIVERSITY ACT, 2004 (ACT NO. 10 OF 2004)

NON-DETRIMENT FINDINGS

I, Bomo Edith Edna Molewa, Minister of Environmental Affairs, hereby publish the non-detriment findings made by the Scientific Authority in terms of section 62(1) of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) and set out in the Schedule hereto.

BOMO EDITH EDNA MOLEWA
MINISTER OF ENVIRONMENTAL AFFAIRS

SCHEDULE

NON-DETRIMENT FINDINGS

Non-detriment finding for *Encephalartos aemulans*

Reference Number: Enc_aem_May2015

Date: 28 May 2015

Issued by the Scientific Authority of South Africa

Summary of finding

Encephalartos aemulans (Ngotshe cycad) is included in Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). As an Appendix I species, the export of specimens for commercial purposes is prohibited (Article III). However, specimens artificially propagated for commercial purposes are deemed to be specimens of species included in Appendix II (Article VII) of CITES and therefore may be traded. 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 export will not be detrimental to the survival of that species. This document details the undertaking of a non-detriment finding (NDF) for *E. aemulans* and is based on the best available information, current as of May 2015.

Encephalartos aemulans is listed as Critically Endangered by the IUCN (the International Union for Conservation of Nature), meaning that it is considered to be facing an extremely high risk of extinction in the wild. The species is located on a hill in KwaZulu-Natal in a single population of an estimated 600 adult plants. Overuse/exploitation for horticultural purposes is the major factor threatening the survival of *E. aemulans* and although the rate of population decline is uncertain, adult plants continue to be lost from the wild due to poaching.

The harvest of wild cycads has been prohibited throughout South Africa since February 2007. Prior to this, any harvesting, possession or conveyance of cycads required permits in terms of provincial legislation enacted in the 1970s. No permits were reportedly issued for the wild harvest of *E. aemulans* plants or seed since its description in 1990, except to allow for the once-off collection of seed for research purposes in 2005. In general there has been an exponential increase in *ex situ* cultivated cycads, which are regulated by provincial conservation ordinances/Acts and the National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEMBA): Threatened or Protected Species (TOPS) Regulations. Enforcement of the strict protection measures afforded to cycads has been hampered by the human resource and budgetary constraints facing the provincial conservation authorities that are mandated to enforce provincial and national environmental legislation, and ongoing illegal harvest of

wild cycads is a countrywide problem. In Gauteng for example, where the demand for illegally harvested wild cycads is ultimately centered, reportedly 40% of posts within the Biodiversity Enforcement division of the Gauteng Department of Agriculture and Rural Development were vacant in the 2011/2012 financial year.

Past ineffective implementation of conservation legislation in the provinces of KwaZulu-Natal, the Eastern Cape and particularly Gauteng, where the requirements for cycad possession permits have not been consistently enforced, has facilitated the entry of illegally harvested cycads into the legal trade. Wild-sourced plants have been and continue to be legalized and incorporated into private collections and their use as parental stock for the propagation of seedlings for both the domestic and international cycad trade cannot be ruled out. International trade in *E. aemulans* started in 1995 just five years after its description, and coinciding with the weakening of cycad protection measures in Gauteng. By 2011, 869 specimens (with an estimated total value of R695 000 and an average annual value of around R48 000 ± R45 000) had been exported from South Africa. No conservation benefit for the species or its habitat is derived from the trade in *E. aemulans*.

Micro-chips inserted into wild plants have proven to be largely ineffective for establishing wild origins of cycads and have failed to deter poachers. The failure of the legal protection measures has been further exacerbated by prosecutors and magistrates who are not well informed about South Africa's cycad extinction crisis and the small fines issued and minimal jail sentences passed for cycad related offenses are ineffective deterrents.

In 2004 a management plan was developed for all cycads in KwaZulu-Natal, but it is now obsolete. A Biodiversity Management Plan for the Critically Endangered and Endangered cycads will soon be published in terms of section 43 of the NEMBA, however it will be a while before its effectiveness can be evaluated.

The species' biology, which is characterized by a poor dispersal ability and slow growing long-lived adults that regenerate predominantly from seed, renders *E. aemulans* particularly vulnerable to overutilization. This, together with the species' extremely poor conservation status, the ongoing poaching pressure, the capacity and budgetary constraints that prevent conservation authorities from curbing poaching, the lack of conservation incentives and the continuing ineffective implementation of the existing strict protection measures for cycads on a national basis, presents a scenario that is unfavourable for the survival of *E. aemulans* in the wild and the species is at an extremely high risk of unsustainable utilization (Figure 1). In order to decrease the risk to this species and prevent its imminent extinction, a concerted effort to address all of these factors is essential.

Current trade in artificially propagated specimens of *E. aemulans* is detrimental (Figure 2). The Scientific Authority, in reviewing the factors presented above, is unable to state with any confidence that parental stock is cultivated (as defined in the CITES Resolution Conf. 11.11 (Rev. CoP15)) in all cases of export since (1) evidence of legal acquisition is dubious and (2) the data at hand suggest that some parental stock has been obtained in a manner detrimental to the wild population. It is therefore recommended that *E. aemulans* seedlings may only be exported if the nursery is registered in accordance with the CITES Resolution Conf. 9.19 (Rev. CoP15), and

i. The seedlings are artificially propagated in accordance with the CITES Resolution Conf. 11.11 (Rev. CoP15), or

ii. The seedlings have been grown from wild harvested seed in accordance with the conditions specified in the CITES Resolution Conf. 11.11 (Rev. CoP15) and within the framework of a Biodiversity Management Plan published in terms of section 43 of the NEMBA.

Each nursery applying for CITES registration must be audited in accordance with a decision tree to be developed by the Scientific Authority within 3 months of the publication of this NDF, and regular follow up audits must be conducted in order to monitor seedling propagation. All parental plants must

i. Be accompanied by TOPS possession permits and affidavits from the owner stating that the plants are not of wild origin, and

ii. Not exhibit any characteristics typical of wild origin. Guidelines for the identification of wild characteristics will be developed by the Scientific Authority within 3 months of the publication of this NDF.

The export of large artificially propagated specimens (with a stem diameter of more than 15 cm) is prohibited (Government Notice 371, May 2012).

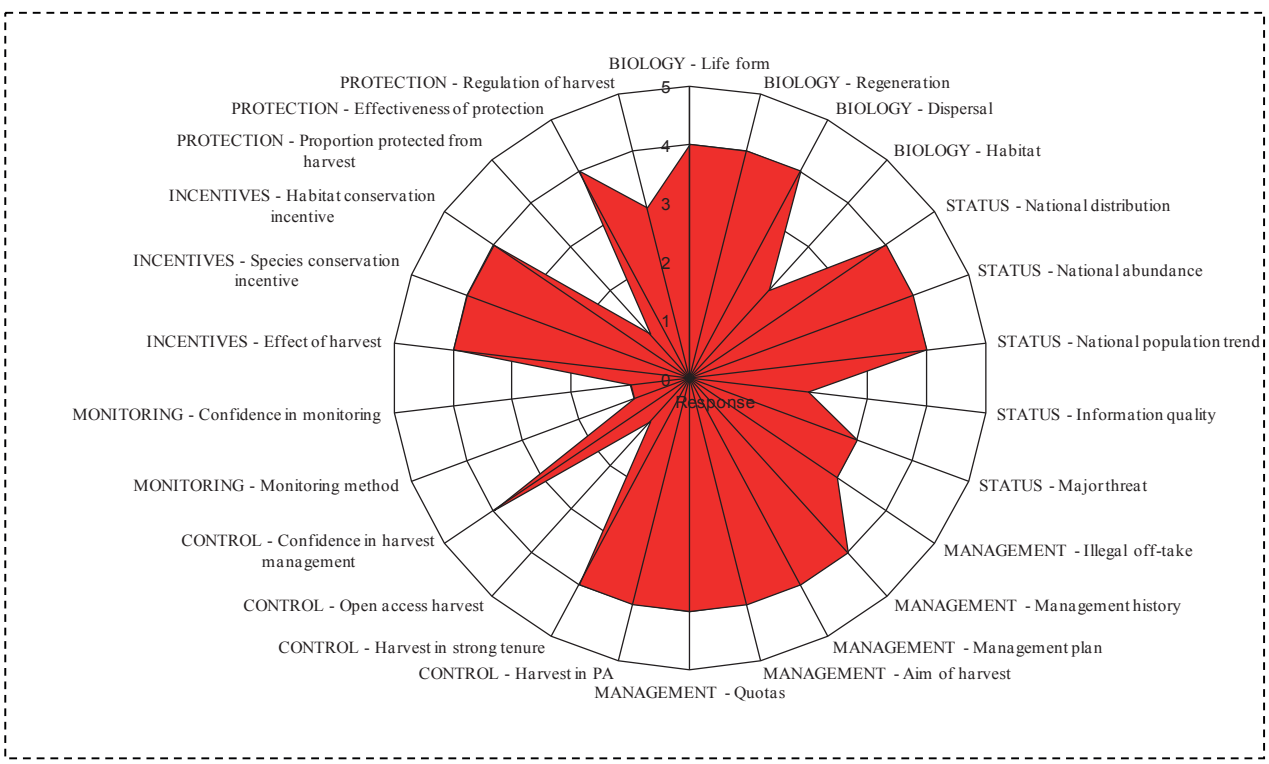

Figure 1. Radar chart summarizing the non-detriment finding assessment undertaken for *Encephalartos aemulans* in accordance with the CITES NDF checklist. Explanations of scores given

are detailed in Table 1. Higher scores are indicative of higher risks to the species. The extensive shaded area in the radar chart demonstrates an overall high risk to the species.

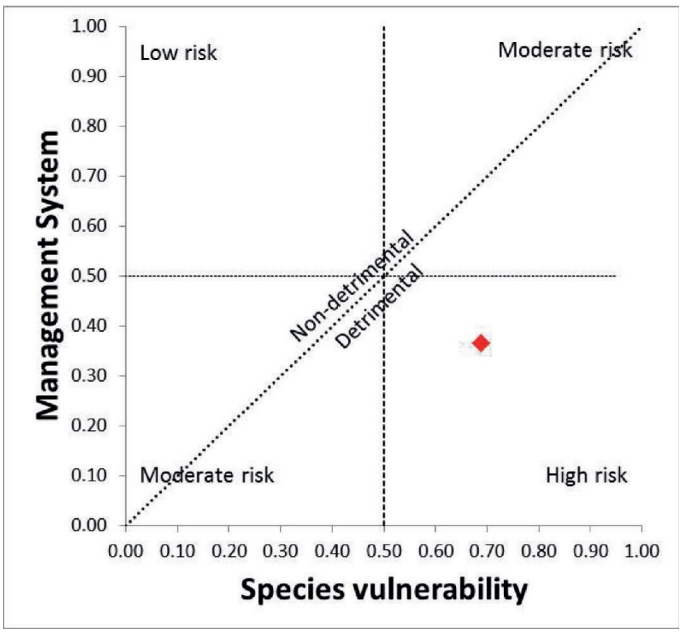

Figure 2. The risk of trading in *Encephalartos aemulans* as represented by the relationship between species vulnerability (biology and status) (0 = low vulnerability; 1 = high vulnerability) and the management system to which the species is subjected (management, control, monitoring, incentives and protection) (0 = weak management system; 1 = strong management system). The figure shows that the species is at high risk and trade is detrimental.

Table 1. Non-detriment finding assessment for *Encephalartos aemulans* 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
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
The cycad life history is characterized by long-lived adults that regenerate predominantly from seed. Plants do produce suckers, but they are relatively unimportant for the regeneration of cycad		

populations, with 95% of species regenerating from seed only. Suckers remaining behind after the main plant has been harvested do sometimes survive. The numerous seedlings in the wild population of E. aemulans *indicate that recruitment is healthy.*		
3. Dispersal efficiency: How efficient is the species' dispersal mechanism?	Very good	1
	Good	2
	Medium	3
	Poor	**4**
	Uncertain	5
The location of E. aemulans *on a single hill is evidence of its poor dispersal abilities. The dispersal abilities of cycads are not well understood but are generally regarded as poor. Even if seed were dispersed to new sites, the concomitant dispersal of species-specific pollinators would be highly unlikely thus rendering population recovery after local extirpation impossible. Colonization of new sites is improbable due to a number of reproductive limitations, such as limited seed production or non-viable seeds, irregular coning and male biases in populations. There has been no observed change / expansion in the distribution of any cycad species.*		
4. Habitat: What is the habitat preference of the species?	Disturbed open	1
	Undisturbed open	**2**
	Pioneer	3
	Disturbed forest	4
	Climax	5
The plants preferentially grow on south facing sandstone cliffs in short grassland, but also occur below the cliffs in humus-rich scree under shadier conditions. The occasional natural fire characterizes the habitat of E. aemulans *and although recruitment is absent under disturbance, the species is fairly tolerant of disturbance.*		
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
E. aemulans *is located on a single hill in KwaZulu-Natal. The landowner is supportive towards the conservation of this species.*		
6. National abundance: What is the abundance nationally?	Very abundant	1
	Common	2
	Uncommon	3
	Rare	**4**
	Uncertain	5
An aerial survey in 2012 indicated that there are approximately 600 E. aemulans *adult plants in the wild. The species is not commonly found in private collections and gardens but this may be due to difficulties with identification.* Encephalartos aemulans *is currently listed in the IUCN Red List category of Critically Endangered (B1ab(v)+2ab(v);C2a(ii) (IUCN version 3.1)).*		
7. National population trend: What is the recent national population	Increasing	1
	Stable	2

trend?	Reduced, but stable	3
	Reduced and still decreasing	**4**
	Uncertain	5
Although the rate of population decline is uncertain, adult plants continue to be lost from the wild due to poaching. A very small part of the population occurs in a private nature reserve, but many of these plants have been poached and only about five remain.		
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 population size estimate is based on an aerial survey carried out in 2012 and not on ground counts. GPS positions of some plants were recorded in 2011.		
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
Overuse/exploitation for horticultural purposes is the major factor threatening the survival of E. aemulans*. Wild* E. aemulans *plants bear no evidence of bark stripping relating to medicinal use. In general around 30-50% of cycads removed from the wild die within a few years.*		
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
According to the landowner, poaching of wild plants is ongoing but it is difficult to apprehend the poachers. In a recent incident, 50 plants were illegally harvested from the wild and plants (of an unknown number) were also recently found for sale on the side of a road in KwaZulu-Natal. Cases involving illegal plants of E. aemulans *are seldom encountered in Gauteng or Mpumalanga.*		
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
Illegal harvesting of wild cycads has been occurring in South Africa for the past 40 years, becoming more prevalent from the 1990s onwards in spite of various legislative interventions. Since the 1970s all cycad species have been protected in provincial nature conservation ordinances, with the harvest of any plants or seed requiring a permit (in addition to other activities such as possessing, conveying, selling, etc.). Apart from a permit issued to collect seed for research purposes in 2005, reportedly no permits were ever issued for the wild harvest of E. aemulans*. In general there has been an exponential increase in* ex situ *cultivated cycads, which are currently regulated by provincial conservation ordinances/Acts and the National Environmental Management: Biodiversity Act*		

(NEMBA): Threatened or Protected Species Regulations (TOPS). In February 2007 the harvest of cycads from the wild was prohibited nationally in terms of Regulation 25 of the Threatened or Protected Species Regulations (subsequently replaced by Government Notice 371 in May 2012). Poaching is nevertheless ongoing.

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

In 2004 a management plan was developed for all cycads in KwaZulu-Natal with a poster that was disseminated to District Conservation Officers and to some police stations and prosecutors. The management plan is however now obsolete. A Biodiversity Management Plan for the Critically Endangered and Endangered cycads will be published in 2015 in terms of section 43 of the NEMBA.

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
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 are no quotas for any of South Africa's cycad species – all harvesting is illegal.

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

Harvesting of wild cycads is illegal throughout South Africa.

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

Harvesting of wild cycads is illegal throughout South Africa.

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 *de facto* or actual open access?	**None**	**1**
	Low	2
	Medium	3
	High	4
	Uncertain	5
The harvest of wild cycads is prohibited throughout South Africa.		
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 no management plan for E. aemulans*. The provincial conservation authorities that are mandated to protect wild cycad populations from illegal harvesting are currently experiencing capacity constraints relating to shortages of human resources and budget. Frequent arrests and confiscations are indicative that the system intended to protect wild cycad populations is inadequate. Most cycad populations occur outside of state-controlled protected areas, but even those within protected areas are not secure from poaching activities.*		
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
Ezemvelo KwaZulu-Natal Wildlife is aiming to monitor E. aemulans *every second year.*		
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
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
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
23. Incentives for habitat conservation: At the national level, how much habitat conservation	High	1
	Medium	2
	Low	3

benefit is derived from harvesting?	**None**	**4**
	Uncertain	5
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
Government Notice 371 published in May 2012 in terms of section 57(2) of the National Environmental Management: Biodiversity Act (NEMBA) of 2004 prohibits the harvest of wild cycads throughout South Africa, unless required for conservation or enforcement purposes. Encephalartos aemulans is also listed as Specially Protected in the KwaZulu-Natal Nature Conservation Ordinance (No. 15 of 1974).		
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
The cycad trade is very complex and in order to monitor all the legal and illegal activities related to this trade, substantial resources would be required. Although providing for a solid legal framework, the Threatened or Protected Species Regulations have been difficult to implement by resource constrained provinces. The provincial conservation authorities that are mandated to enforce the strict protection measures pertaining to cycads are currently experiencing capacity constraints relating to shortages of human resources and budget. In Gauteng, where the demand for illegally harvested wild cycads is ultimately centered, reportedly 4 out of 10 posts within the Biodiversity Enforcement division of the Gauteng Department of Agriculture and Rural Development were vacant in the 2011/2012 financial year, a vacancy rate of 40%. Even cycads within state-controlled protected areas are not secure from poaching activities, with protected areas often understaffed. Enforcement of the legislation is further weakened by inexperienced officials without the necessary skills to identify the different species. (Identification of E. aemulans *is particularly problematic.) Prosecutors and magistrates are infrequently exposed to cycad related cases and are therefore not well informed about South Africa's cycad extinction crisis. Consequently cases relating to cycads seldom result in large fines and/or jail sentences.* *Provincial conservation legislation pertaining to cycads has been ineffectively implemented in the past in both Gauteng and KwaZulu-Natal. Neither province consistently enforced the requirements for possession permits, although all adult ("size-determined") cycads exported from KwaZulu-Natal had to be micro-chipped. In Gauteng, where most cycad enthusiasts live (50% of the Cycad Society's members reside in Gauteng with between 10% and 12% of members residing in each of the Western Cape, KwaZulu-Natal and Mpumalanga provinces), possession permits were not required for cycads between 1994 and 2001, with the regulatory authority only requiring the presentation of documentary proof of legal possession. Similarly, the legal requirement for cycad possession permits was only strictly enforced in the Eastern Cape from 1 April 2004 and property owners in possession of unpermitted cycads after this date were instead issued with cycad site registration letters. Up until 31 March 2004, people in possession of unpermitted cycads were given amnesty based on submission of affidavits and documentary proof of legal origin. (*Encephalartos latifrons *and* E. arenarius *were excluded from this amnesty.) Conservation legislation in three out of the four provinces that were designated out of the former Transvaal province is weak, providing for adequate control over the*		

possession and movement of only those cycad species indigenous to the former Transvaal province (the exception being Limpopo where all South African cycads are Specially Protected). This ineffective implementation of legislation has allowed the entry of illegally harvested plants into the legal trade. In the past, a number of syndicates involved in poaching activities moved illegally harvested cycads into Gauteng where possession permits were not required, laundering them into the trade with the required documentary proof. Such operations apparently continue until today due to the delayed implementation of new national legislation (Threatened or Protected Species Regulations).

Due to the impossibility of tracing the origin of these cycads and/or proving wild origin to the satisfaction of a court (proof of wild origin over and above a reasonable suspicion is required), these plants have been and continue to be legalized through the issuing of possession permits and are subsequently incorporated into private collections. Since 2002, and most notably in 2005 and 2008, Ezemvelo KwaZulu-Natal Wildlife has issued possession permits for approximately 150 adult E. aemulans *plants, but the origin of these plants is dubious as harvesting of this species was never allowed in the province. Possession permits were apparently erroneously issued for illegally harvested* E. aemulans *plants which were then moved into Gauteng on export permits. The use of these plants as parental stock for the propagation of seedlings for both the domestic and international cycad trade cannot be ruled out. In 2008 a record number of 177* E. aemulans *seedlings were exported from South Africa (CITES Trade Database, UNEP World Conservation Monitoring Centre, Cambridge, UK), almost double the previous high of 94 seedlings exported in 2000. International trade in* E. aemulans *started in 1995, coinciding with the weakening of cycad protection measures in Gauteng. By 2011, 869 specimens (estimated total value of R695 000) had been exported from South Africa. The average annual value of* E. aemulans *exports is estimated at around R48 000 ± R45 000 (assuming exports of 3-year old seedlings at 2012-2013 prices).*

Micro-chips inserted into wild cycads as a measure of proving wild origin are often destroyed or removed and it has been suggested that they are even sometimes replaced with legal micro-chips previously inserted into legally owned ex situ *cycads, effectively laundering plants of wild origin. It has also been suggested that legal micro-chips are inserted into un-chipped wild plants to prove legal ownership. Suckers are seldom micro-chipped and are therefore particularly vulnerable to poaching.*

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

Harvesting of wild cycads is prohibited throughout South Africa, yet this restriction remains ineffective.

Supporting documents

1. The IUCN Species Survival Commission Guidance for CITES Scientific Authorities. Checklist to assist in making non-detriment findings for Appendix II exports. Occasional Paper of the IUCN Species Survival Commission No. 27 (2002). A. Rosser and M. Haywood.
2. Donaldson, J.S. 2010. *Encephalartos aemulans*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.1. <www.iucnredlist.org>. Downloaded on 30 August 2012.

3. Hugo, C. 2012. Identification of indigenous cycads of South Africa. p. 142. 4 images. Totiusdal. South Africa.

Non-detriment finding for *Encephalartos cerinus*

Reference Number: Enc_cer_May2015

Date: 28 May 2015

Issued by the Scientific Authority of South Africa

Summary of finding

Encephalartos cerinus (waxen cycad) is included in Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). As an Appendix I species, the export of specimens for commercial purposes is prohibited (Article III). However, specimens artificially propagated for commercial purposes are deemed to be specimens of species included in Appendix II (Article VII) of CITES and therefore may be traded. 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 export will not be detrimental to the survival of that species. This document details the undertaking of a non-detriment finding (NDF) for *E. cerinus* and is based on the best available information, current as of May 2015.

A rare species restricted to central KwaZulu-Natal, *E. cerinus* has been listed as Critically Endangered by the IUCN (the International Union for Conservation of Nature), meaning that it is considered to be facing an extremely high risk of extinction in the wild. Within 6 months of *E. cerinus* being described in 1989, most of the population (a couple of hundred plants) was illegally harvested for horticultural/ornamental purposes. The species may now be extinct, although some reports indicate that there are four or five plants remaining in the wild.

The harvest of wild cycads has been prohibited throughout South Africa since February 2007. Prior to this, any harvesting, possession or conveyance of cycads required permits in terms of provincial legislation enacted in the 1970s. No permits were reportedly issued for the wild harvest of *E. cerinus* plants or seed since its description in 1989, except to allow for the once-off collection of seed for research purposes in 2005. In general there has been an exponential increase in *ex situ* cultivated cycads, which are regulated by provincial conservation ordinances/Acts and the National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEMBA): Threatened or Protected Species (TOPS) Regulations. Enforcement of the strict protection measures afforded to cycads has been hampered by the human resource and budgetary constraints facing the provincial conservation authorities that are mandated to enforce provincial and national environmental legislation, and ongoing illegal harvest of wild cycads is a countrywide problem. In Gauteng for example, where the demand for illegally harvested wild cycads is ultimately centered, reportedly 40% of posts within the Biodiversity Enforcement division of the Gauteng Department of Agriculture and Rural Development were vacant in the 2011/2012 financial year.

Past ineffective implementation of conservation legislation in the provinces of KwaZulu-Natal, the Eastern Cape and particularly Gauteng, where the requirements for cycad possession permits have not been consistently enforced, has facilitated the entry of illegally harvested cycads into the legal trade. Wild-sourced plants have been and continue to be legalized and incorporated into private collections and their use as parental stock for the propagation of seedlings for both the domestic and international cycad trade cannot be ruled out. In 1996, approximately 6 years after the wild population of *E. cerinus* had been decimated by poachers, the international trade in this species started with the highest number of specimens exported in 1997. The inception of trade in *E. cerinus* coincided with the weakening of cycad protection measures in Gauteng and a total of 1800 specimens (with an estimated total value of R1 296 000 and an average annual value of around R46 000 $\pm$ R23 000) had been exported from South Africa by 2011. No conservation benefit for the species or its habitat is derived from the trade in *E. cerinus*.

Micro-chips inserted into wild plants have proven to be largely ineffective for establishing wild origins of cycads and have failed to deter poachers. The failure of the legal protection measures has been further exacerbated by prosecutors and magistrates who are not well informed about South Africa's cycad extinction crisis and the small fines issued and minimal jail sentences passed for cycad related offenses are ineffective deterrents.

In 2004 a management plan was developed for all cycads in KwaZulu-Natal, but it is now obsolete. A Biodiversity Management Plan for the Critically Endangered and Endangered cycads will soon be published in terms of section 43 of the NEMBA, however it will be a while before its effectiveness can be evaluated.

The species' biology, which is characterized by a poor dispersal ability and slow growing long-lived adults that regenerate predominantly from seed, renders *E. cerinus* particularly vulnerable to overutilization. This, together with the species' extremely poor conservation status, the capacity and budgetary constraints that prevent Ezemvelo Kwazulu-Natal Wildlife from curbing poaching, the lack of conservation incentives and the continuing ineffective implementation of the existing strict protection measures for cycads on a national basis, presents a scenario that is unfavourable for the survival of *E. cerinus* in the wild and the species is at an extremely high risk of unsustainable utilization (Figure 1). In fact trade in the 1990s followed the decimation of the wild population approximately 6 years earlier. In order to decrease the risk to this species and bring about an improvement in its conservation status, a concerted effort to address all of these factors is essential.

Current trade in artificially propagated specimens of *E. cerinus* is detrimental (Figure 2). The Scientific Authority, in reviewing the factors presented above, is unable to state with any confidence that parental stock is cultivated (as defined in the CITES Resolution Conf. 11.11 (Rev. CoP15)) in all cases of export since (1) evidence of legal acquisition is dubious and (2) the data at hand suggest that some parental stock has been obtained in a manner detrimental to the wild population. It is therefore recommended that *E. cerinus* seedlings may only be exported if the nursery is registered in accordance with the CITES Resolution Conf. 9.19 (Rev. CoP15), and

i. The seedlings are artificially propagated in accordance with the CITES Resolution Conf. 11.11 (Rev. CoP15), or

ii. The seedlings have been grown from wild harvested seed in accordance with the conditions specified in the CITES Resolution Conf. 11.11 (Rev. CoP15) and within the framework of a Biodiversity Management Plan published in terms of section 43 of the NEMBA.

Each nursery applying for CITES registration must be audited in accordance with a decision tree to be developed by the Scientific Authority within 3 months of the publication of this NDF, and regular follow up audits must be conducted in order to monitor seedling propagation. All parental plants must

i. Be accompanied by TOPS possession permits and affidavits from the owner stating that the plants are not of wild origin, and

ii. Not exhibit any characteristics typical of wild origin. Guidelines for the identification of wild characteristics will be developed by the Scientific Authority within 3 months of the publication of this NDF.

The export of large artificially propagated specimens (with a stem diameter of more than 7 cm) is prohibited (Government Notice 371, May 2012).

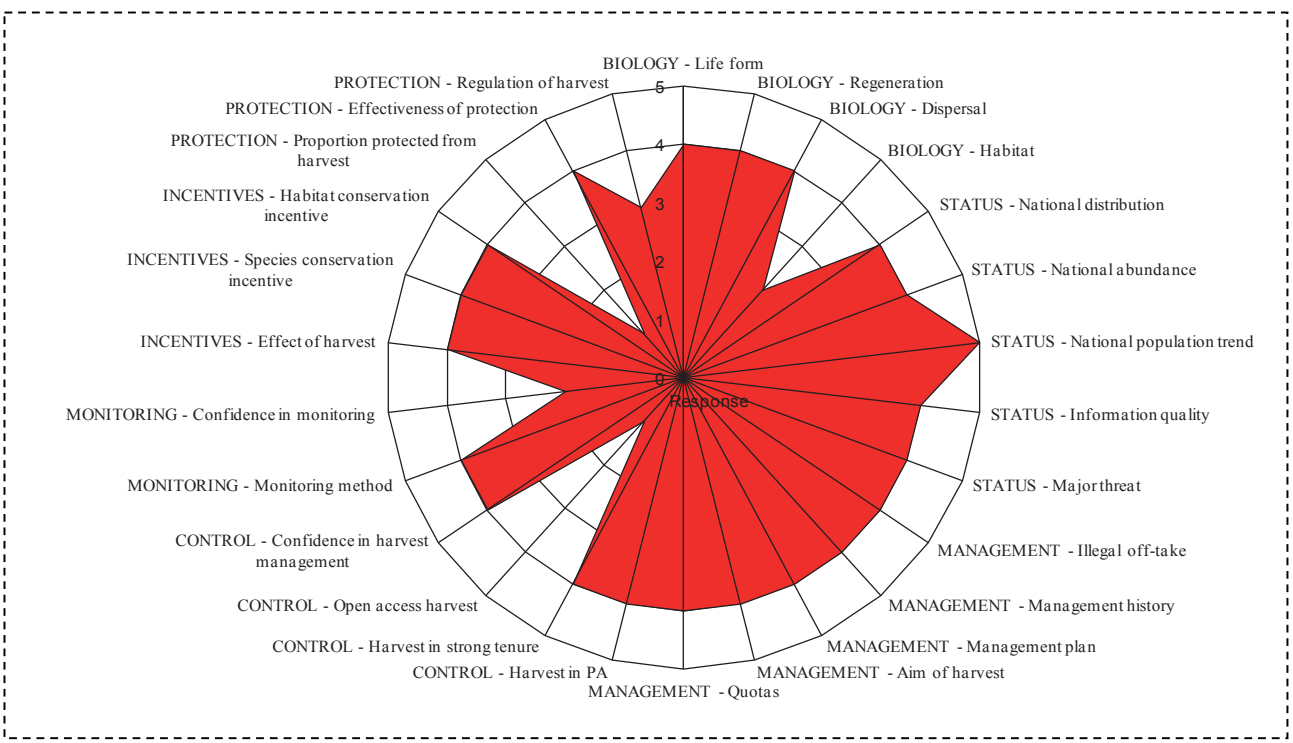

Figure 1. Radar chart summarizing the non-detriment finding assessment undertaken for *Encephalartos cerinus* in accordance with the CITES NDF checklist. Explanations of scores given are detailed in Table 1. Higher scores are indicative of higher risks to the species. The extensive shaded area in the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

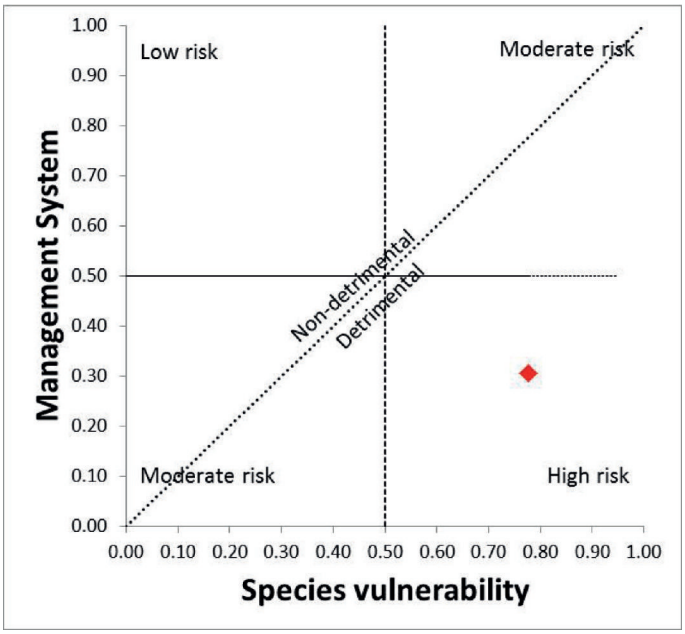

Figure 2. The risk of trading in *Encephalartos cerinus* as represented by the relationship between species vulnerability (biology and status) (0 = low vulnerability; 1 = high vulnerability) and the management system to which the species is subjected (management, control, monitoring, incentives and protection) (0 = weak management system; 1 = strong management system). The figure shows that the species is at high risk and trade is detrimental.

Table 1. Non-detriment finding assessment for *Encephalartos cerinus* 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
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
The cycad life history is characterized by long-lived adults that regenerate predominantly from seed. Plants do produce suckers, but they are relatively unimportant for the regeneration of cycad populations, with 95% of species regenerating from seed only. Suckers remaining behind after the main plant has been harvested do sometimes survive. Relative to other Encephalartos *species,* E. cerinus *grows well and cones rapidly.*		

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

The dispersal abilities of cycads are not well understood but are generally regarded as poor. Even if seed were dispersed to new sites, the concomitant dispersal of species-specific pollinators would be highly unlikely thus rendering population recovery after local extirpation impossible. Colonization of new sites is improbable due to a number of reproductive limitations, such as limited seed production or non-viable seeds, irregular coning and male biases in populations. There has been no observed change / expansion in the distribution of any cycad species. The isolated occurrence of E. cerinus *may be evidence of its poor dispersal abilities.*

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

Plants of E. cerinus *grow predominantly on east-facing sheer cliffs in valleys with dry savanna vegetation.*

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

The species is restricted to central KwaZulu-Natal.

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

The species is extremely rare and may even be extinct, although some reports indicate that there are four or five plants remaining in the wild.

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**

Within 6 months of E. cerinus *being described in 1989, most of the population (a couple of hundred plants) was illegally harvested. The current status of the remaining plants is uncertain.* Encephalartos cerinus *is currently listed in the IUCN Red List category of Critically Endangered (A2abcd;B1ab(i,ii,iv,v)+2ab(i,ii,iv,v);C2a(ii) (IUCN version 3.1)).*

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
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
Severe poaching in the past for horticultural/ornamental purposes has caused the possible extinction of E. cerinus*. In general around 30-50% of cycads removed from the wild die within a few years.*		
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
The poaching pressure on the wild population of this species has been severe and these cycads are now stolen from private collections and ex situ *botanical gardens. This is one of the smaller cycads to be targeted by poachers in recent times (in the last 20 years).*		
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
Illegal harvesting of wild cycads has been occurring in South Africa for the past 40 years, becoming more prevalent from the 1990s onwards in spite of various legislative interventions. Since the 1970s all cycad species have been protected in provincial nature conservation ordinances, with the harvest of any plants or seed requiring a permit (in addition to other activities such as possessing, conveying, selling, etc.). Apart from a permit issued to collect seed for research purposes in 2005, reportedly no permits were ever issued for the wild harvest of E. cerinus*. In general there has been an exponential increase in* ex situ *cultivated cycads, which are currently regulated by provincial conservation ordinances/Acts and the National Environmental Management: Biodiversity Act (NEMBA): Threatened or Protected Species Regulations (TOPS). In February 2007 the harvest of cycads from the wild was prohibited nationally in terms of Regulation 25 of the Threatened or Protected Species Regulations (subsequently replaced by Government Notice 371 in May 2012). Poaching is nevertheless ongoing.*		
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
In 2004 a management plan was developed for all cycads in KwaZulu-Natal with a poster that was		

disseminated to District Conservation Officers and to some police stations and prosecutors. The management plan is however now obsolete. A Biodiversity Management Plan for the Critically Endangered and Endangered cycads will be published in 2015 in terms of section 43 of the NEMBA.		
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
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 are no quotas for any of South Africa's cycad species – all harvesting is illegal.		
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
Harvesting of wild cycads is illegal throughout South Africa.		
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
Harvesting of wild cycads is illegal throughout South Africa.		
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 *de facto* or actual open access?	**None**	**1**
	Low	2
	Medium	3
	High	4
	Uncertain	5
The harvest of wild cycads is prohibited throughout South Africa.		
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 no management plan for E. cerinus. *The provincial conservation authorities that are mandated to protect wild cycad populations from illegal harvesting are currently experiencing capacity constraints relating to shortages of human resources and budget. Frequent arrests and confiscations are indicative that the system intended to protect wild cycad populations is inadequate. Most cycad populations occur outside of state-controlled protected areas, but even those within protected areas are not secure from poaching activities.*		
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
Ezemvelo KwaZulu-Natal Wildlife intends monitoring all cycad populations on a 5 year basis.		
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
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
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
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
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
Government Notice 371 published in May 2012 in terms of section 57(2) of the National Environmental Management: Biodiversity Act (NEMBA) of 2004 prohibits the harvest of wild cycads throughout South Africa, unless required for conservation or enforcement purposes. Encephalartos cerinus *is also listed as Specially Protected in the KwaZulu-Natal Nature Conservation Ordinance (No. 15 of 1974).*		

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

The cycad trade is very complex and in order to monitor all the legal and illegal activities related to this trade, substantial resources would be required. Although providing for a solid legal framework, the Threatened or Protected Species Regulations have been difficult to implement by resource constrained provinces. The provincial conservation authorities that are mandated to enforce the strict protection measures pertaining to cycads are currently experiencing capacity constraints relating to shortages of human resources and budget. In Gauteng, where the demand for illegally harvested wild cycads is ultimately centered, reportedly 4 out of 10 posts within the Biodiversity Enforcement division of the Gauteng Department of Agriculture and Rural Development were vacant in the 2011/2012 financial year, a vacancy rate of 40%. Even cycads within state-controlled protected areas are not secure from poaching activities, with protected areas often understaffed. Enforcement of the legislation is further weakened by inexperienced officials without the necessary skills to identify the different species. Prosecutors and magistrates are infrequently exposed to cycad related cases and are therefore not well informed about South Africa's cycad extinction crisis. Consequently cases relating to cycads seldom result in large fines and/or jail sentences.

*Provincial conservation legislation pertaining to cycads has been ineffectively implemented in the past in both Gauteng and KwaZulu-Natal. Neither province consistently enforced the requirements for possession permits, although all adult ("size-determined") cycads exported from KwaZulu-Natal had to be micro-chipped. In Gauteng, where most cycad enthusiasts live (50% of the Cycad Society's members reside in Gauteng with between 10% and 12% of members residing in each of the Western Cape, KwaZulu-Natal and Mpumalanga provinces), possession permits were not required for cycads between 1994 and 2001, with the regulatory authority only requiring the presentation of documentary proof of legal possession. Similarly, the legal requirement for cycad possession permits was only strictly enforced in the Eastern Cape from 1 April 2004 and property owners in possession of unpermitted cycads after this date were instead issued with cycad site registration letters. Up until 31 March 2004, people in possession of unpermitted cycads were given amnesty based on submission of affidavits and documentary proof of legal origin. (*Encephalartos latifrons *and* E. arenarius *were excluded from this amnesty.) Conservation legislation in three out of the four provinces that were designated out of the former Transvaal province is weak, providing for adequate control over the possession and movement of only those cycad species indigenous to the former Transvaal province (the exception being Limpopo where all South African cycads are Specially Protected). This ineffective implementation of legislation has allowed the entry of illegally harvested plants into the legal trade. In the past, a number of syndicates involved in poaching activities moved illegally harvested cycads into Gauteng where possession permits were not required, laundering them into the trade with the required documentary proof. Such operations apparently continue until today due to the delayed implementation of new national legislation (Threatened or Protected Species Regulations).*

Due to the impossibility of tracing the origin of these cycads and/or proving wild origin to the satisfaction of a court (proof of wild origin over and above a reasonable suspicion is required), these plants have been and continue to be legalized through the issuing of possession permits and are subsequently incorporated into private collections. The use of these plants as parental stock for the propagation of seedlings for both the domestic and international cycad trade cannot be ruled out. Encephalartos cerinus *was not exported from South Africa until 1996 and in 1997, approximately 7*

years after the wild population had been decimated by poachers, 853 specimens were exported (CITES Trade Database, UNEP World Conservation Monitoring Centre, Cambridge, UK), the highest number ever when compared with the average number of specimens exported in subsequent years (61 ± 33). In total 1800 specimens of E. cerinus *have been exported between 1996 and 2011 (estimated total value of R1 296 000). The average annual value of* E. cerinus *exports is estimated at around R46 000 ± R23 000 (assuming exports of 3-year old seedlings at 2012-2013 prices). The inception of trade in* E. cerinus *coincided with the weakening of cycad protection measures in Gauteng.*

Micro-chips inserted into wild cycads as a measure of proving wild origin are often destroyed or removed and it has been suggested that they are even sometimes replaced with legal micro-chips previously inserted into legally owned ex situ *cycads, effectively laundering plants of wild origin. It has also been suggested that legal micro-chips are inserted into un-chipped wild plants to prove legal ownership. Suckers are seldom micro-chipped and are therefore particularly vulnerable to poaching.*

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

Harvesting of wild cycads is prohibited throughout South Africa, yet this restriction remains ineffective.

Supporting documents

1. The IUCN Species Survival Commission Guidance for CITES Scientific Authorities. Checklist to assist in making non-detriment findings for Appendix II exports. Occasional Paper of the IUCN Species Survival Commission No. 27 (2002). A. Rosser and M. Haywood.
2. Donaldson, J.S. 2010. *Encephalartos cerinus*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.1. <www.iucnredlist.org>. Downloaded on 30 August 2012.
3. Hugo, C. 2012. Identification of indigenous cycads of South Africa. p. 142. 4 images. Totiusdal. South Africa.

Non-detriment finding for *Encephalartos cupidus*

Reference Number: Enc_cup_May2015

Date: 28 May 2015

Issued by the Scientific Authority of South Africa

Summary of finding

Encephalartos cupidus (Blyde River cycad) is included in Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). As an Appendix I species, the export of specimens for commercial purposes is prohibited (Article III). However, specimens artificially propagated for commercial purposes are deemed to be specimens of species included in Appendix II (Article VII) of CITES and therefore may be traded. 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 export will not be detrimental to the survival of that species. This document details the undertaking of a non-detriment finding (NDF) for *E. cupidus* and is based on the best available information, current as of May 2015.

A rare and localized species, *E. cupidus* has been listed as Critically Endangered by the IUCN (the International Union for Conservation of Nature), meaning that it is considered to be facing an extremely high risk of extinction in the wild. Despite occurring on a provincial nature reserve in Mpumalanga, severe declines have been observed for this species from estimates of 1110 plants in 1984, to 861 plants in 1999 to approximately 50 plants today. In 2004 the species was confirmed extinct in Limpopo. These declines have been caused by poaching for horticultural/ornamental and medicinal purposes. The recovery of large numbers of illegally harvested *E. cupidus* plants between 2004 and 2010 are further evidence of the severity of the poaching pressure on this species.

The harvest of wild cycads has been prohibited throughout South Africa since February 2007. Prior to this, any harvesting, possession or conveyance of cycads required permits in terms of provincial legislation enacted in the 1970s. No permits were reportedly ever issued for the wild harvest of *E. cupidus* plants or seed, but plants may have been harvested from the wild prior to the enactment of provincial legislation and seedlings were also available from the Hartebeesthoek nursery which operated between 1975 and 1998. In general there has been an exponential increase in *ex situ* cultivated cycads, which are regulated by provincial conservation ordinances/Acts and the National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEMBA): Threatened or Protected Species (TOPS) Regulations. Enforcement of the strict protection measures afforded to cycads has been hampered by the human resource and budgetary constraints facing the provincial conservation authorities that are mandated to enforce provincial and national environmental legislation, and ongoing illegal harvest of wild cycads is a countrywide problem. In Gauteng for example, where the demand for illegally harvested wild cycads is ultimately centered, reportedly 40% of posts within the Biodiversity Enforcement division of the Gauteng Department of Agriculture and Rural Development were vacant in

the 2011/2012 financial year. The Mpumalanga Tourism and Parks Agency is primarily responsible for the *in situ* protection and management of *E. cupidus*. However 2011/2012 vacancy rates within this agency were reported to be 51% and 64% within the Wildlife Protection Services and the Scientific Services divisions, respectively. Furthermore, reportedly 73% of the field ranger posts for the nature reserve on which *E. cupidus* occurs were vacant in 2011/2012. From 2011 to 2014 the Mpumalanga Tourism and Parks Agency had no operational budget.

Past ineffective implementation of conservation legislation in the provinces of KwaZulu-Natal, the Eastern Cape and particularly Gauteng, where the requirements for cycad possession permits have not been consistently enforced, has facilitated the entry of illegally harvested cycads into the legal trade. Wild-sourced plants have been and continue to be legalized and incorporated into private collections and their use as parental stock for the propagation of seedlings for both the domestic and international cycad trade cannot be ruled out. International trade in *E. cupidus* started in 1986 and 1180 specimens (with an estimated total value of R850 000 and an average annual value of around R57 000 $\pm$ R36 000) had been exported from South Africa by 2011, the trade showing an increasing trend after 1998, the same time period over which the severe decline in the wild population was observed. The bulk of the trade (92%) occurred after 1995 when cycad protection measures in Gauteng were particularly weak. No conservation benefit for the species or its habitat is derived from the trade in *E. cupidus*.

Micro-chips inserted into wild plants have proven to be largely ineffective for establishing wild origins of cycads and have failed to deter poachers. The failure of the legal protection measures has been further exacerbated by prosecutors and magistrates who are not well informed about South Africa's cycad extinction crisis and the small fines issued and minimal jail sentences passed for cycad related offenses are ineffective deterrents.

Outdated (20 years old) conservation plans exist for all Mpumalanga's cycad species. Although some of these plans are currently being implemented, parts have collapsed altogether and they are in dire need of major revision. None of these plans address harvest management. A Biodiversity Management Plan for the Critically Endangered and Endangered cycads will soon be published in terms of section 43 of the NEMBA, however it will be a while before its effectiveness can be evaluated. While regular monitoring of *E. cupidus* does take place, continuation of monitoring programmes is uncertain due to the severe capacity constraints facing the Mpumalanga Tourism and Parks Agency.

The species' biology, which is characterized by a poor dispersal ability and slow growing long-lived adults that regenerate predominantly from seed, renders *E. cupidus* particularly vulnerable to overutilization. This, together with the species' extremely poor conservation status, the severe ongoing poaching pressure, the outdated conservation plan, the capacity and budgetary constraints that prevent the Mpumalanga Tourism and Parks Agency from effectively managing and monitoring the species, the lack of conservation incentives and the continuing ineffective implementation of the existing strict protection measures for cycads on a national basis, presents a scenario that is unfavourable for the survival of *E. cupidus* in the wild and the species is at an extremely high risk of unsustainable utilization (Figure 1). In order to decrease the risk to this species and prevent its imminent extinction, a concerted effort to address all of these factors is essential.

Current trade in artificially propagated specimens of *E. cupidus* is detrimental (Figure 2). The Scientific Authority, in reviewing the factors presented above, is unable to state with any confidence that parental stock is cultivated (as defined in the CITES Resolution Conf. 11.11 (Rev. CoP15)) in all cases of export since (1) evidence of legal acquisition is dubious and (2) the data at hand suggest that some parental \ stock has been obtained in a manner detrimental to the wild population. It is therefore recommended that *E. cupidus* seedlings may only be exported if the nursery is registered in accordance with the CITES Resolution Conf. 9.19 (Rev. CoP15), and

i. The seedlings are artificially propagated in accordance with the CITES Resolution Conf. 11.11 (Rev. CoP15), or
ii. The seedlings have been grown from wild harvested seed in accordance with the conditions specified in the CITES Resolution Conf. 11.11 (Rev. CoP15) and within the framework of a Biodiversity Management Plan published in terms of section 43 of the NEMBA.

Each nursery applying for CITES registration must be audited in accordance with a decision tree to be developed by the Scientific Authority within 3 months of the publication of this NDF, and regular follow up audits must be conducted in order to monitor seedling propagation. All parental plants must

i. Be accompanied by TOPS possession permits and affidavits from the owner stating that the plants are not of wild origin, and
ii. Not exhibit any characteristics typical of wild origin. Guidelines for the identification of wild characteristics will be developed by the Scientific Authority within 3 months of the publication of this NDF.

The export of large artificially propagated specimens (with a stem diameter of more than 7 cm) is prohibited (Government Notice 371, May 2012).

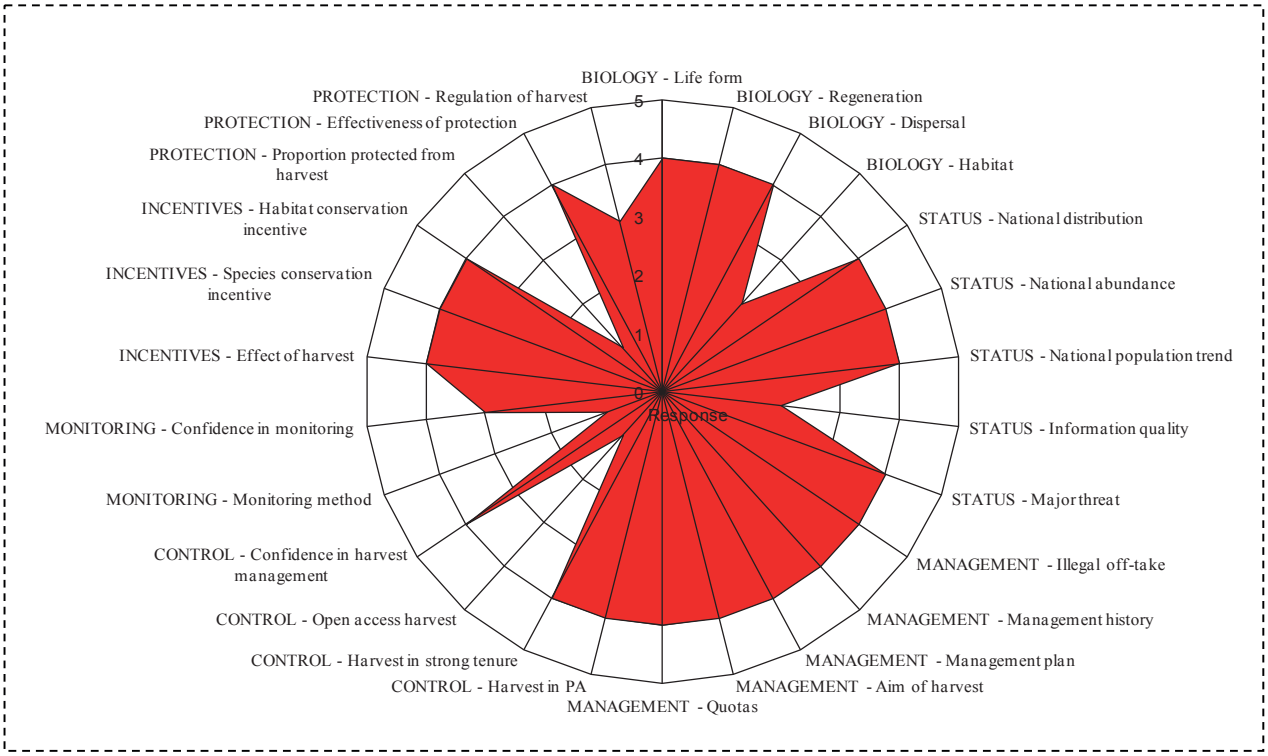

Figure 1. Radar chart summarizing the non-detriment finding assessment undertaken for *Encephalartos cupidus* in accordance with the CITES NDF checklist. Explanations of scores given are detailed in Table 1. Higher scores are indicative of higher risks to the species. The extensive shaded area in the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

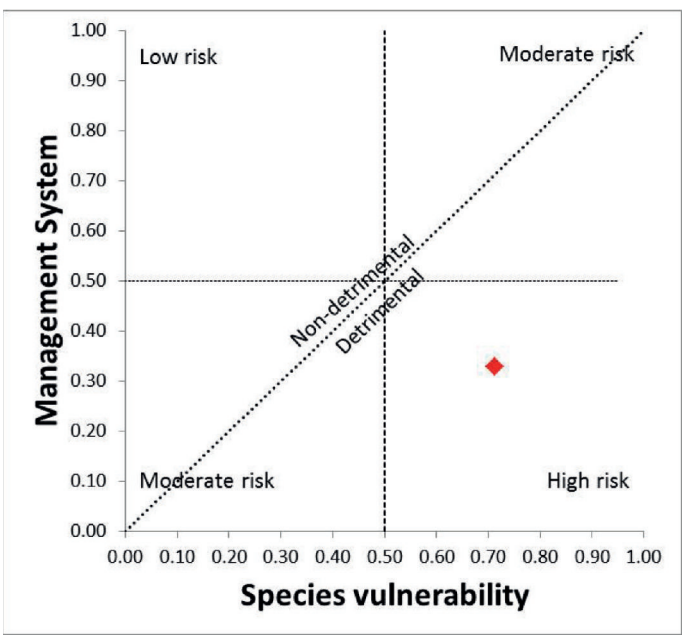

Figure 2. The risk of trading in *Encephalartos cupidus* as represented by the relationship between species vulnerability (biology and status) (0 = low vulnerability; 1 = high vulnerability) and the management system to which the species is subjected (management, control, monitoring, incentives

and protection) (0 = weak management system; 1 = strong management system). The figure shows that the species is at high risk and trade is detrimental.

Table 1. Non-detriment finding assessment for *Encephalartos cupidus* 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
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
The cycad life history is characterized by long-lived adults that regenerate predominantly from seed. Plants do produce suckers, but they are relatively unimportant for the regeneration of cycad populations, with 95% of species regenerating from seed only. Suckers remaining behind after the main plant has been harvested do sometimes survive.		
3. Dispersal efficiency: How efficient is the species' dispersal mechanism?	Very good	1
	Good	2
	Medium	3
	Poor	**4**
	Uncertain	5
The dispersal abilities of cycads are not well understood but are generally regarded as poor. Even if seed were dispersed to new sites, the concomitant dispersal of species-specific pollinators would be highly unlikely thus rendering population recovery after local extirpation impossible. Colonization of new sites is improbable due to a number of reproductive limitations, such as limited seed production or non-viable seeds, irregular coning and male biases in populations. There has been no observed change / expansion in the distribution of any cycad species.		
4. Habitat: What is the habitat preference of the species?	Disturbed open	1
	Undisturbed open	**2**
	Pioneer	3
	Disturbed forest	4
	Climax	5
Encephalartos cupidus *grows in open grassy positions on steep to precipitous rocky slopes or cliffs. Plants are also sometimes found along seepage areas bordering gallery forest as well as in dry forest.*		
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
6. National abundance: What is the abundance nationally?	Very abundant	1
	Common	2
	Uncommon	3
	Rare	**4**
	Uncertain	5

Approximately 50 E. cupidus *plants remain in the wild, all within a provincial protected area in Mpumalanga.*

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

In 1984 the Transvaal Provincial Administration reported approximately 1110 E. cupidus *plants growing on a provincial nature reserve. Surveys in 1999 indicated that the number of plants had declined to approximately 861. Known localities of* E. cupidus *were recently visited by officials of the Mpumalanga Tourism and Parks Agency (MTPA). Although formal surveys were not undertaken, evidence of further declines was apparent, e.g. holes in the ground where plants had been removed. At two separate localities where there were approximately 200 and 61 plants in 1999, only 19 plants (comprising of 9 juveniles and 10 adults) and 30 plants (comprising of 21 juveniles and 9 adults) respectively, were recently counted. A visit by the South African National Biodiversity Institute's Threatened Species Programme in October 2010 similarly yielded only two juveniles in a search of 5 hours in duration and signs of continued harvesting were evident. The few plants which historically occurred outside the nature reserve were poached many years ago. The species was confirmed to be extinct in Limpopo in 2004.* Encephalartos cupidus *is currently listed in the IUCN Red List category of Critically Endangered (A2acd;B1ab(ii,iii,iv,v)+2ab(ii,iii,iv,v) (IUCN version 3.1)).*

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
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

Poaching for horticultural/ornamental purposes has had a severe impact on wild populations of this species. It is estimated that hundreds of E. cupidus *plants have also been illegally harvested for medicinal purposes. In general around 30-50% of cycads removed from the wild die within a few years.*

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
An undercover operation lasting 3 years and ending in 2007 recovered 548 illegally harvested E. cupidus *plants. These plants are now in the possession of MTPA and the Lowveld National Botanical Garden. A breeding colony was created within a protected area in Mpumalanga to generate seed but since the plants are quite young and are not yet reproductive, the production of seed is yet to be realized. Plants in this colony are slowly being pilfered by corrupt officials. The plants in possession of the Lowveld National Botanical Garden yield approximately 1000 seed per year. A case in 2007 recovered 35* E. cupidus *plants worth R350 000, which all later died at the Walter Sisulu National Botanical Garden, and a case in 2009 recovered 11 plants.* Encephalartos cupidus *plants are often encountered during routine inspections of cycad collections and in late 2010 seven illegal plants were found.*		
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
Illegal harvesting of wild cycads has been occurring in South Africa for the past 40 years, becoming more prevalent from the 1990s onwards in spite of various legislative interventions. Since the 1970s all cycad species have been protected in provincial nature conservation ordinances, with the harvest of any plants or seed requiring a permit (in addition to other activities such as possessing, conveying, selling, etc.). Reportedly no permits were ever issued for the wild harvest of E. cupidus *plants or seed. Plants may however have been harvested from the wild prior to the enactment of provincial legislation or obtained from the Hartebeesthoek nursery which operated in the former Transvaal province between 1975 and 1998. In general there has been an exponential increase in* ex situ *cultivated cycads, which are currently regulated by provincial conservation ordinances/Acts and the National Environmental Management: Biodiversity Act (NEMBA): Threatened or Protected Species Regulations (TOPS). In February 2007 the harvest of cycads from the wild was prohibited nationally in terms of Regulation 25 of the Threatened or Protected Species Regulations (subsequently replaced by Government Notice 371 in May 2012). Poaching is nevertheless ongoing.*		
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
Outdated (20 years old) conservation plans do exist for all Mpumalanga's cycad species. These plans are all very similar, having being based on the same template, and address propagation and restoration but not harvest. Although components of the plans have collapsed altogether (e.g. ex situ *propagation at the Hartebeesthoek nursery), some of the conservation plans are still being implemented. The plans are however in dire need of major revision, especially as the situation pertaining to cycads has changed significantly since they were drafted. These revisions would however be hampered by a lack of human resources within the Mpumalanga Tourism and Parks*		

Agency. The 2011/2012 vacancy rate within the Scientific Services division for example was reportedly 64% and not a single botanist is currently employed in the province. *A Biodiversity Management Plan for the Critically Endangered and Endangered cycads will be published in 2015 in terms of section 43 of the NEMBA.*		
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
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 are no quotas for any of South Africa's cycad species – all harvesting is illegal.		
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
Harvesting of wild cycads is illegal throughout South Africa.		
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
Harvesting of wild cycads is illegal throughout South Africa.		
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 *de facto* or actual open access?	**None**	**1**
	Low	2
	Medium	3
	High	4
	Uncertain	5
The harvest of wild cycads is prohibited throughout South Africa.		
18. Confidence in harvest management: Do budgetary and other factors allow effective	High confidence	1
	Medium confidence	2
	Low confidence	3

implementation of management plan(s) and harvest controls?	**No confidence**	**4**
	Uncertain	5
The provincial conservation authorities that are mandated to protect wild cycad populations from illegal harvesting are currently experiencing capacity constraints relating to shortages of human resources and budget. The nature reserve on which E. cupidus *occurs has 26 field ranger posts, and only 7 of these were reported to be filled in the 2011/2012 financial year, a vacancy rate of 73%. From 2011 to 2014 the Mpumalanga Tourism and Parks Agency had no operational budget. Frequent arrests and confiscations are indicative that the system intended to protect wild cycad populations is inadequate. Most cycad populations occur outside of state-controlled protected areas, but even those within protected areas (e.g.* E. cupidus*) are not secure from poaching activities.*		
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
Due to the difficulty of traversing the terrain, regular monitoring has been underway in stages since 2010.		
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
The Mpumalanga Tourism and Parks Agency is currently experiencing severe budgetary constraints as well as a lack of human resources. In the 2011/2012 financial year, the Scientific Services division reportedly had a vacancy rate of 64%, and from 2011 to 2014 the Mpumalanga Tourism and Parks Agency had no operational budget.		
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
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
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
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

Government Notice 371 published in May 2012 in terms of section 57(2) of the National Environmental Management: Biodiversity Act (NEMBA) of 2004 prohibits the harvest of wild cycads throughout South Africa, unless required for conservation or enforcement purposes. Encephalartos cupidus *is also listed as Specially Protected in the Mpumalanga Nature Conservation Act (No. 10 of 1998). The largest population of* E. cupidus *occurs in a state-controlled protected area.*

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

The cycad trade is very complex and in order to monitor all the legal and illegal activities related to this trade, substantial resources would be required. Although providing for a solid legal framework, the Threatened or Protected Species Regulations have been difficult to implement by resource constrained provinces. The provincial conservation authorities that are mandated to enforce the strict protection measures pertaining to cycads are currently experiencing capacity constraints relating to shortages of human resources and budget. The 2011/2012 vacancy rate within the Wildlife Protection Services of the Mpumalanga Tourism and Parks Agency was reported to be 51% and from 2011 to 2014 the Agency had no operational budget. In Gauteng, where the demand for illegally harvested wild cycads is ultimately centered, reportedly 4 out of 10 posts within the Biodiversity Enforcement division of the Gauteng Department of Agriculture and Rural Development were vacant in the 2011/2012 financial year, a vacancy rate of 40%. Even cycads within state-controlled protected areas (e.g. E. cupidus*) are not secure from poaching activities, with protected areas often understaffed (e.g. the nature reserve on which* E. cupidus *occurs reportedly with a vacancy rate of 73%). Enforcement of the legislation is further weakened by inexperienced officials without the necessary skills to identify the different species. Prosecutors and magistrates are infrequently exposed to cycad related cases and are therefore not well informed about South Africa's cycad extinction crisis. Consequently cases relating to cycads seldom result in large fines and/or jail sentences.*

*Provincial conservation legislation pertaining to cycads has been ineffectively implemented in the past in both Gauteng and KwaZulu-Natal. Neither province consistently enforced the requirements for possession permits, although all adult ("size-determined") cycads exported from KwaZulu-Natal had to be micro-chipped. In Gauteng, where most cycad enthusiasts live (50% of the Cycad Society's members reside in Gauteng with between 10% and 12% of members residing in each of the Western Cape, KwaZulu-Natal and Mpumalanga provinces), possession permits were not required for cycads between 1994 and 2001, with the regulatory authority only requiring the presentation of documentary proof of legal possession. Similarly, the legal requirement for cycad possession permits was only strictly enforced in the Eastern Cape from 1 April 2004 and property owners in possession of unpermitted cycads after this date were instead issued with cycad site registration letters. Up until 31 March 2004, people in possession of unpermitted cycads were given amnesty based on submission of affidavits and documentary proof of legal origin. (*Encephalartos latifrons *and* E. arenarius *were excluded from this amnesty.) Conservation legislation in three out of the four provinces that were designated out of the former Transvaal province is weak, providing for adequate control over the*

possession and movement of only those cycad species indigenous to the former Transvaal province (the exception being Limpopo where all South African cycads are Specially Protected). This ineffective implementation of legislation has allowed the entry of illegally harvested plants into the legal trade. In the past, a number of syndicates involved in poaching activities moved illegally harvested cycads into Gauteng where possession permits were not required, laundering them into the trade with the required documentary proof. Such operations apparently continue until today due to the delayed implementation of new national legislation (Threatened or Protected Species Regulations).

Due to the impossibility of tracing the origin of these cycads and/or proving wild origin to the satisfaction of a court (proof of wild origin over and above a reasonable suspicion is required), these plants have been and continue to be legalized through the issuing of possession permits and are subsequently incorporated into private collections. The use of these plants as parental stock for the propagation of seedlings for both the domestic and international cycad trade cannot be ruled out. Trade statistics (derived from the CITES Trade Database, UNEP World Conservation Monitoring Centre, Cambridge, UK) indicate an increasing trend ($R^2 = 0.38$; $P = 0.03$*) in the international trade of* E. cupidus *since 1998, the same time period over which the severe decline in the wild population was observed. International trade in* E. cupidus *started in 1986 and 1180 specimens (estimated total value of R850 000) had been exported from South Africa by 2011, the bulk of the trade (92%) taking place after 1995 when cycad protection measures in Gauteng were particularly weak. The average annual value of* E. cupidus *exports is estimated at around R57 000 ± R36 000 (assuming exports of 3-year old seedlings at 2012-2013 prices).*

Micro-chips inserted into wild cycads as a measure of proving wild origin are often destroyed or removed and it has been suggested that they are even sometimes replaced with legal micro-chips previously inserted into legally owned ex situ *cycads, effectively laundering plants of wild origin. It has also been suggested that legal micro-chips are inserted into un-chipped wild plants to prove legal ownership. Suckers are seldom micro-chipped and are therefore particularly vulnerable to poaching.*

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

Harvesting of wild cycads is prohibited throughout South Africa, yet this restriction remains ineffective.

Supporting documents

1. The IUCN Species Survival Commission Guidance for CITES Scientific Authorities. Checklist to assist in making non-detriment findings for Appendix II exports. Occasional Paper of the IUCN Species Survival Commission No. 27 (2002). A. Rosser and M. Haywood.
2. Donaldson, J.S. 2010. *Encephalartos cupidus*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.1. <www.iucnredlist.org>. Downloaded on 30 August 2012.
3. Flora Conservation Plan. *Encephalartos cupidus* (1984). Transvaal Provincial Administration. Nature Conservation Division. Compiled by S. Fourie (Head of Flora and Environmental Conservation Subsection).

4. Hugo, C. 2012. Identification of indigenous cycads of South Africa. p. 142. 4 images. Totiusdal. South Africa.

Non-detriment finding for *Encephalartos dolomiticus*

Reference Number: Enc_dol_May2015

Date: 28 May 2015

Issued by the Scientific Authority of South Africa

Summary of finding

Encephalartos dolomiticus (Wolkberg cycad) is included in Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). As an Appendix I species, the export of specimens for commercial purposes is prohibited (Article III). However, specimens artificially propagated for commercial purposes are deemed to be specimens of species included in Appendix II (Article VII) of CITES and therefore may be traded. 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 export will not be detrimental to the survival of that species. This document details the undertaking of a non-detriment finding (NDF) for *E. dolomiticus* and is based on the best available information, current as of May 2015.

Encephalartos dolomiticus has been listed as Critically Endangered by the IUCN (the International Union for Conservation of Nature), meaning that it is considered to be facing an extremely high risk of extinction in the wild. It is a rare species localized in the southeastern region of Limpopo province. An aerial survey conducted in 2012 verified the presence of a very small population of <250 individuals. It is presumed that the wild population of this species is declining and the threat of illegal harvesting for horticultural and medicinal purposes is severe, as the population is bordered by poor rural communities and all cycads in the Drakensberg mountain range within Limpopo are targeted by poachers. *Encephalartos dolomiticus* is a highly sought after and expensive cycad in the horticultural trade.

The harvest of wild cycads has been prohibited throughout South Africa since February 2007. Prior to this, any harvesting, possession or conveyance of cycads required permits in terms of provincial legislation enacted in the 1970s. No permits were reportedly ever issued for the wild harvest of *E. dolomiticus* plants or seed, but plants may have been harvested from the wild prior to the enactment of provincial legislation and seedlings were also available from the Hartebeesthoek nursery which operated between 1975 and 1998. In general there has been an exponential increase in *ex situ* cultivated cycads, which are regulated by provincial conservation ordinances/Acts and the National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEMBA): Threatened or Protected Species (TOPS) Regulations. Enforcement of the strict protection measures afforded to cycads has been hampered by the human resource and budgetary constraints facing the provincial conservation authorities that are mandated to enforce provincial and national environmental legislation, and ongoing illegal harvest of wild cycads is a countrywide problem. In Gauteng for example, where the demand for illegally harvested wild cycads is ultimately centered, reportedly 40% of posts within the Biodiversity Enforcement division of the Gauteng Department of Agriculture and Rural Development were vacant in

the 2011/2012 financial year. The Limpopo Department of Economic Development, Environment and Tourism is primarily responsible for the *in situ* protection and management of *E. dolomiticus*. However this department is experiencing severe capacity constraints, for example vacancy rates for the 2011/2012 financial year were reported to be 65% for the Biodiversity Management division and 68% for the Enforcement division. There is furthermore no botanist in this province to provide strategic direction for the conservation of the species.

Past ineffective implementation of conservation legislation in the provinces of KwaZulu-Natal, the Eastern Cape and particularly Gauteng, where the requirements for cycad possession permits have not been consistently enforced, has facilitated the entry of illegally harvested cycads into the legal trade. As owners of *E. dolomiticus* plants are typically able to provide documentary proof of legal possession (the sole legal requirement in Gauteng between 1994 and 2001), wild-sourced plants have been and continue to be legalized and incorporated into private collections. Their use as parental stock for the propagation of seedlings for both the domestic and international cycad trade cannot be ruled out. International trade in *E. dolomiticus* started in 1996 when the cycad protection measures in Gauteng were particularly weak and by the end of 2011 a total of 477 specimens (with an estimated total value of R2 862 000 and an average annual value of around R160 000 $\pm$ R105 000) had been exported from South Africa. No conservation benefit for the species or its habitat is derived from the trade in *E. dolomiticus*.

Micro-chips inserted into wild plants have proven to be largely ineffective for establishing wild origins of cycads and have failed to deter poachers. The failure of the legal protection measures has been further exacerbated by prosecutors and magistrates who are not well informed about South Africa's cycad extinction crisis and the small fines issued and minimal jail sentences passed for cycad related offenses are ineffective deterrents.

There is an outdated conservation plan for *E. dolomiticus* that is in considerable need of revision. A Biodiversity Management Plan for the Critically Endangered and Endangered cycads will soon be published in terms of section 43 of the NEMBA, however it will be a while before its effectiveness can be evaluated. The wild population of this species was not monitored between 2004 and 2011 due to capacity constraints, although a monitoring programme has very recently been re-initiated.

The species' biology, which is characterized by a poor dispersal ability and slow growing long-lived adults that regenerate predominantly from seed, renders *E. dolomiticus* particularly vulnerable to overutilization. This, together with the species' extremely poor conservation status, the presumed ongoing poaching pressure, the capacity and budgetary constraints that prevent the Limpopo Department of Economic Development, Environment and Tourism from curbing poaching, the lack of conservation incentives and the continuing ineffective implementation of the existing strict protection measures for cycads on a national basis, presents a scenario that is unfavourable for the survival of *E. dolomiticus* in the wild and the species is at an extremely high risk of unsustainable utilization (Figure 1). In order to decrease the risk to this species and prevent its imminent extinction, a concerted effort to address all of these factors is essential.

Current trade in artificially propagated specimens of *E. dolomiticus* is detrimental (Figure 2). The Scientific Authority, in reviewing the factors presented above, is unable to state with any confidence that parental stock is cultivated (as defined in the CITES Resolution Conf. 11.11 (Rev. CoP15)) in all cases of export since (1) evidence of legal acquisition is dubious and (2) the data at hand suggest that some parental stock has been obtained in a manner detrimental to the wild population. It is therefore recommended that *E. dolomiticus* seedlings may only be exported if the nursery is registered in accordance with the CITES Resolution Conf. 9.19 (Rev. CoP15), and

i. The seedlings are artificially propagated in accordance with the CITES Resolution Conf. 11.11 (Rev. CoP15), or
ii. The seedlings have been grown from wild harvested seed in accordance with the conditions specified in the CITES Resolution Conf. 11.11 (Rev. CoP15) and within the framework of a Biodiversity Management Plan published in terms of section 43 of the NEMBA.

Each nursery applying for CITES registration must be audited in accordance with a decision tree to be developed by the Scientific Authority within 3 months of the publication of this NDF, and regular follow up audits must be conducted in order to monitor seedling propagation. All parental plants must

i. Be accompanied by TOPS possession permits and affidavits from the owner stating that the plants are not of wild origin, and
ii. Not exhibit any characteristics typical of wild origin. Guidelines for the identification of wild characteristics will be developed by the Scientific Authority within 3 months of the publication of this NDF.

The export of large artificially propagated specimens (with a stem diameter of more than 15 cm) is prohibited (Government Notice 371, May 2012).

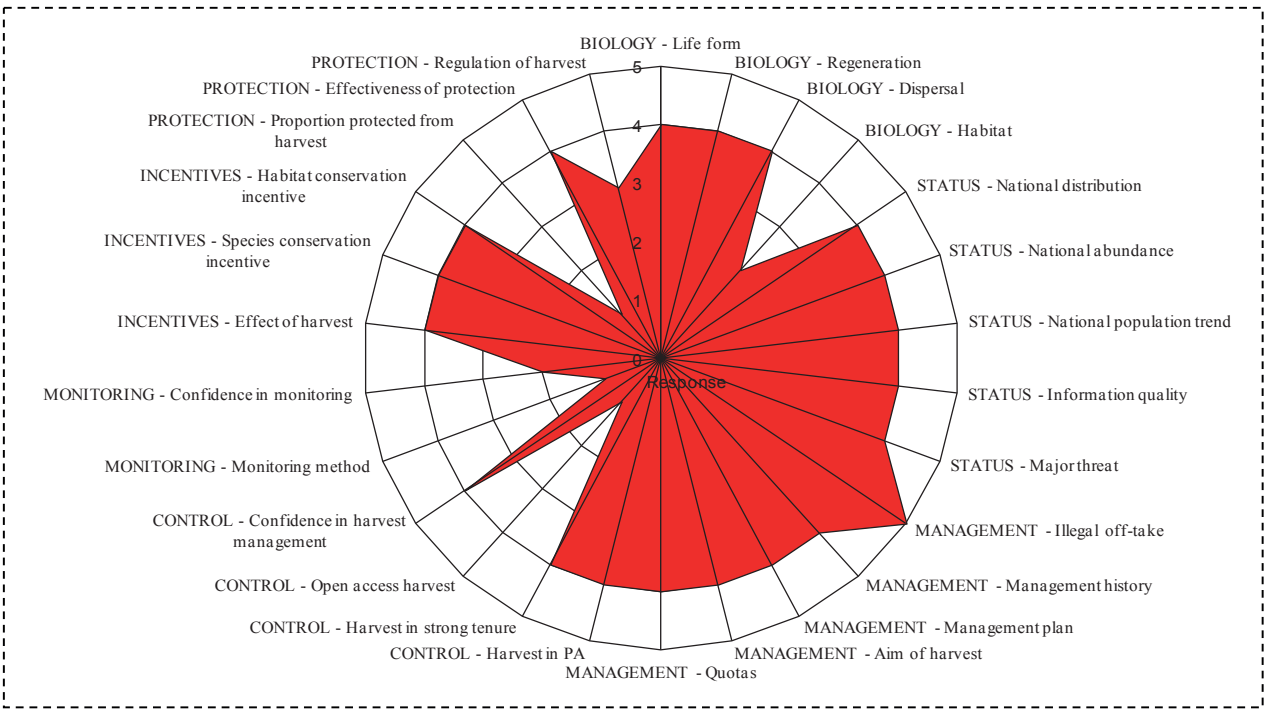

Figure 1. Radar chart summarizing the non-detriment finding assessment undertaken for *Encephalartos dolomiticus* in accordance with the CITES NDF checklist. Explanations of scores given are detailed in Table 1. Higher scores are indicative of higher risks to the species. The extensive shaded area in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

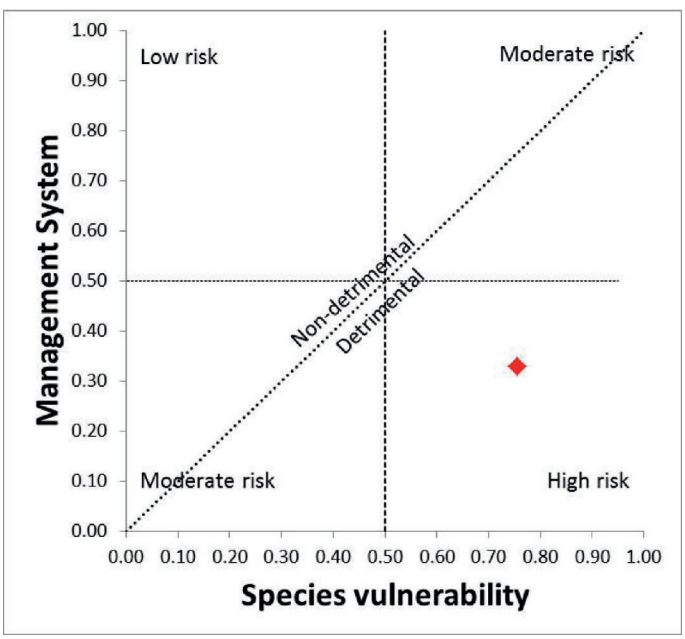

Figure 2. The risk of trading in *Encephalartos dolomiticus* as represented by the relationship between species vulnerability (biology and status) (0 = low vulnerability; 1 = high vulnerability) and the management system to which the species is subjected (management, control, monitoring, incentives

and protection) (0 = weak management system; 1 = strong management system). The figure shows that the species is at high risk and trade is detrimental.

Table 1. Non-detriment finding assessment for *Encephalartos dolomiticus* 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
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
The cycad life history is characterized by long-lived adults that regenerate predominantly from seed. Plants do produce suckers, but they are relatively unimportant for the regeneration of cycad populations, with 95% of species regenerating from seed only. Suckers remaining behind after the main plant has been harvested do sometimes survive.		
3. Dispersal efficiency: How efficient is the species' dispersal mechanism?	Very good	1
	Good	2
	Medium	3
	Poor	**4**
	Uncertain	5
The dispersal abilities of cycads are not well understood but are generally regarded as poor. Even if seed were dispersed to new sites, the concomitant dispersal of species-specific pollinators would be highly unlikely thus rendering population recovery after local extirpation impossible. Colonization of new sites is improbable due to a number of reproductive limitations, such as limited seed production or non-viable seeds, irregular coning and male biases in populations. There has been no observed change / expansion in the distribution of any cycad species.		
4. Habitat: What is the habitat preference of the species?	Disturbed open	1
	Undisturbed open	**2**
	Pioneer	3
	Disturbed forest	4
	Climax	5
Encephalartos dolomiticus *grows in grassland on shallow soils over dolomite ridges.*		
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
Encephalartos dolomiticus *is localized in the southeastern region of Limpopo province.*		
6. National abundance: What is the abundance nationally?	Very abundant	1
	Common	2
	Uncommon	3
	Rare	**4**
	Uncertain	5
Results of a 2012 survey, which involved an aerial count of visible crowns combined with ground counts in places where time and accessibility of plants permitted, verified the presence of a very small population of <250 individuals.		
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
It is presumed that the wild population of this species is declining as all cycads in the Drakensberg mountain range within Limpopo have been and continue to be targeted by poachers. In 1997 the size of the population was estimated to be between 175 and 250 plants. Aerial surveys undertaken in 2004 and 2012 indicated that the population had since declined. Some of the E. dolomiticus *plants originally mapped by the former Transvaal Provincial Administration could not be located again, but this may have been due to mapping inaccuracies. There has been a significant increase in the prices of* E. dolomiticus *and there may therefore be an increased demand for wild plants.* Encephalartos dolomiticus *is currently listed in the IUCN Red List category of Critically Endangered (A2d;C1 (IUCN version 3.1)).*		
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
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
Poaching for ornamental/horticultural and medicinal purposes is considered to be the major threat facing E. dolomiticus*. Based on the observed poaching pressure on other cycad species in the Drakensberg mountain range within Limpopo, it is presumed that this threat is severe, especially as the population of* E. dolomiticus *is bordered by poor rural communities and these cycads are extremely expensive and highly desirable in the horticultural trade. This species is rarely encountered in nurseries. Seedlings are difficult to produce as seed germination success is around 5%, in spite of high seed viabilities. In general around 30-50% of cycads removed from the wild die within a few years.*		
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**
Encephalartos dolomiticus *is a highly sought after cycad, but the scale of illegal removal from wild populations has not been established.*		
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
Illegal harvesting of wild cycads has been occurring in South Africa for the past 40 years, becoming more prevalent from the 1990s onwards in spite of various legislative interventions. Since the 1970s all cycad species have been protected in provincial nature conservation ordinances, with the harvest of any plants or seed requiring a permit (in addition to other activities such as possessing, conveying, selling, etc.). Reportedly no permits were ever issued for the wild harvest of E. dolomiticus *plants or seed. Plants may have however been harvested from the wild as* E. eugene-maraisii *(prior to its description in 1988,* E. dolomiticus *was considered to be part of the* E. eugene-maraisii *complex)* prior *to the enactment of provincial legislation or obtained from the Hartebeesthoek nursery which operated in the former Transvaal province between 1975 and 1998. In general there has been an exponential increase in* ex situ *cultivated cycads, which are currently regulated by provincial conservation ordinances/Acts and the National Environmental Management: Biodiversity Act (NEMBA): Threatened or Protected Species Regulations (TOPS). In February 2007 the harvest of cycads from the wild was prohibited nationally in terms of Regulation 25 of the Threatened or Protected Species Regulations (subsequently replaced by Government Notice 371 in May 2012). Poaching is nevertheless ongoing.*		
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 an outdated conservation plan for E. dolomiticus *that is in considerable need of revision. A Biodiversity Management Plan for the Critically Endangered and Endangered cycads will be published in 2015 in terms of section 43 of the NEMBA.*		
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
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 are no quotas for any of South Africa's cycad species – all harvesting is illegal.		
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
Harvesting of wild cycads is illegal throughout South Africa.		
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
Harvesting of wild cycads is illegal throughout South Africa.		
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 *de facto* or actual open access?	**None**	**1**
	Low	2
	Medium	3
	High	4
	Uncertain	5
The harvest of wild cycads is prohibited throughout South Africa.		
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 an outdated conservation plan for E. dolomiticus *that is in considerable need of revision. The provincial conservation authorities that are mandated to protect wild cycad populations from illegal harvesting are currently experiencing capacity constraints relating to shortages of human resources and budget. Reportedly 65% and 68% of posts within the Biodiversity Management and Enforcement divisions respectively of the Limpopo Department of Economic Development, Environment and Tourism were vacant in 2011/2012, and there is no botanist in this province to provide strategic direction for the conservation of the species. Frequent arrests and confiscations are indicative that the system intended to protect wild cycad populations is inadequate. Most cycad populations occur outside of state-controlled protected areas, but even those within protected areas are not secure from poaching activities.*		
Monitoring of harvest		
19. Methods used to monitor the harvest: What is the principal	**Direct population estimates**	**1**
	Quantitative indices	2

method used to monitor the effects of the harvest?	Qualitative indices	3
	National monitoring of exports	4
	No monitoring or uncertain	5
There has been no monitoring of wild cycad populations in Limpopo province between 2004 and 2011. The Limpopo Department of Economic Development, Environment and Tourism has however very recently re-initiated a monitoring programme for E. dolomiticus*, involving aerial surveys on an annual basis.*		
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
Sixty-five percent of posts within the Biodiversity Management division of the Limpopo Department of Economic Development, Environment and Tourism were reportedly vacant in 2011/2012. There is no botanist currently employed in Limpopo and this vacant post is unlikely to be filled soon.		
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
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
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
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
Government Notice 371 published in May 2012 in terms of section 57(2) of the National Environmental Management: Biodiversity Act (NEMBA) of 2004 prohibits the harvest of wild cycads throughout South Africa, unless required for conservation or enforcement purposes. Encephalartos dolomiticus *is also listed as Specially Protected in the Limpopo Environmental Management Act (No. 7 of 2003).*		
25. Effectiveness of strict protection measures: Do budgetary and other factors give confidence in	High confidence	1
	Medium confidence	2
	Low confidence	3

the effectiveness of measures taken to afford strict protection?	**No confidence**	**4**
	Uncertain	5

The cycad trade is very complex and in order to monitor all the legal and illegal activities related to this trade, substantial resources would be required. Although providing for a solid legal framework, the Threatened or Protected Species Regulations have been difficult to implement by resource constrained provinces. The provincial conservation authorities that are mandated to enforce the strict protection measures pertaining to cycads are currently experiencing capacity constraints relating to shortages of human resources and budget. Sixty-eight percent of posts within the Enforcement division of the Limpopo Department of Economic Development, Environment and Tourism were reportedly vacant in the 2011/2012 financial year. In Gauteng, where the demand for illegally harvested wild cycads is ultimately centered, reportedly 4 out of 10 posts within the Biodiversity Enforcement division of the Gauteng Department of Agriculture and Rural Development were vacant in the 2011/2012 financial year, a vacancy rate of 40%. Even cycads within state-controlled protected areas are not secure from poaching activities, with protected areas often understaffed. Enforcement of the legislation is further weakened by inexperienced officials without the necessary skills to identify the different species. Prosecutors and magistrates are infrequently exposed to cycad related cases and are therefore not well informed about South Africa's cycad extinction crisis. Consequently cases relating to cycads seldom result in large fines and/or jail sentences.

*Provincial conservation legislation pertaining to cycads has been ineffectively implemented in the past in both Gauteng and KwaZulu-Natal. Neither province consistently enforced the requirements for possession permits, although all adult ("size-determined") cycads exported from KwaZulu-Natal had to be micro-chipped. In Gauteng, where most cycad enthusiasts live (50% of the Cycad Society's members reside in Gauteng with between 10% and 12% of members residing in each of the Western Cape, KwaZulu-Natal and Mpumalanga provinces), possession permits were not required for cycads between 1994 and 2001, with the regulatory authority only requiring the presentation of documentary proof of legal possession. Similarly, the legal requirement for cycad possession permits was only strictly enforced in the Eastern Cape from 1 April 2004 and property owners in possession of unpermitted cycads after this date were instead issued with cycad site registration letters. Up until 31 March 2004, people in possession of unpermitted cycads were given amnesty based on submission of affidavits and documentary proof of legal origin. (*Encephalartos latifrons *and* E. arenarius *were excluded from this amnesty.) Conservation legislation in three out of the four provinces that were designated out of the former Transvaal province is weak, providing for adequate control over the possession and movement of only those cycad species indigenous to the former Transvaal province (the exception being Limpopo where all South African cycads are Specially Protected). This ineffective implementation of legislation has allowed the entry of illegally harvested plants into the legal trade. In the past, a number of syndicates involved in poaching activities moved illegally harvested cycads into Gauteng where possession permits were not required, laundering them into the trade with the required documentary proof. Such operations apparently continue until today due to the delayed implementation of new national legislation (Threatened or Protected Species Regulations).*

Due to the impossibility of tracing the origin of these cycads and/or proving wild origin to the satisfaction of a court (proof of wild origin over and above a reasonable suspicion is required), these plants have been and continue to be legalized through the issuing of possession permits and are subsequently incorporated into private collections. (Officials seldom encounter E. dolomiticus *plants during inspections but when they do, the owners are able to provide documentary proof of legal possession.) The use of these plants as parental stock for the propagation of seedlings for both the domestic and international cycad trade cannot be ruled out. International trade in* E. dolomiticus *started in 1996 when cycad protection measures in Gauteng were particularly weak and by 2011*

altogether 477 specimens (estimated total value of R2 862 000) had been exported from South Africa (CITES Trade Database, UNEP World Conservation Monitoring Centre, Cambridge, UK). The average annual value of E. dolomiticus *exports is estimated at around R160 000 ± R105 000 (assuming exports of 3-year old seedlings at 2012-2013 prices).*

Micro-chips inserted into wild cycads as a measure of proving wild origin are often destroyed or removed and it has been suggested that they are even sometimes replaced with legal micro-chips previously inserted into legally owned ex situ *cycads, effectively laundering plants of wild origin. It has also been suggested that legal micro-chips are inserted into un-chipped wild plants to prove legal ownership. Suckers are seldom micro-chipped and are therefore particularly vulnerable to poaching.*

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

Harvesting of wild cycads is prohibited throughout South Africa, yet this restriction remains ineffective.

Supporting documents

1. The IUCN Species Survival Commission Guidance for CITES Scientific Authorities. Checklist to assist in making non-detriment findings for Appendix II exports. Occasional Paper of the IUCN Species Survival Commission No. 27 (2002). A. Rosser and M. Haywood.
2. Cousins, S. 2012. The trade in South African *Encephalartos* species for traditional medicine: Added pressure to the cycad extinction crisis. Encephalartos, 107, 39-43.
3. Donaldson, J.S. 2010. *Encephalartos dolomiticus*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.1. <www.iucnredlist.org>. Downloaded on 30 August 2012.
4. Hugo, C. 2012. Identification of indigenous cycads of South Africa. p. 142. 4 images. Totiusdal. South Africa.

Non-detriment finding for *Encephalartos dyerianus*

Reference Number: Enc_dye_May2015

Date: 28 May 2015

Issued by the Scientific Authority of South Africa

Summary of finding

Encephalartos dyerianus (Lowveld cycad / Lillie cycad) is included in Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). As an Appendix I species, the export of specimens for commercial purposes is prohibited (Article III). However, specimens artificially propagated for commercial purposes are deemed to be specimens of species included in Appendix II (Article VII) of CITES and therefore may be traded. 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 export will not be detrimental to the survival of that species. This document details the undertaking of a non-detriment finding (NDF) for *E. dyerianus* and is based on the best available information, current as of May 2015.

Encephalartos dyerianus has been listed as Critically Endangered by the IUCN (the International Union for Conservation of Nature), meaning that it is considered to be facing an extremely high risk of extinction in the wild. The species is confined to a single granite mountain in Limpopo province and the wild population is small (<500 adult plants). Despite its occurrence within a provincial nature reserve, limited poaching of wild plants for horticultural/ornamental purposes is resulting in a continuing decline of the population. Because of the small size of the population, any illegal harvest of this species will have a severe impact on its survival in the wild.

The harvest of wild cycads has been prohibited throughout South Africa since February 2007. Prior to this, any harvesting, possession or conveyance of cycads required permits in terms of provincial legislation enacted in the 1970s. No permits were reportedly ever issued for the wild harvest of *E. dyerianus* plants or seed, but seedlings were available from the Hartebeesthoek nursery which operated between 1975 and 1998. In general there has been an exponential increase in *ex situ* cultivated cycads, which are regulated by provincial conservation ordinances/Acts and the National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEMBA): Threatened or Protected Species (TOPS) Regulations. Enforcement of the strict protection measures afforded to cycads has been hampered by the human resource and budgetary constraints facing the provincial conservation authorities that are mandated to enforce provincial and national environmental legislation, and ongoing illegal harvest of wild cycads is a countrywide problem. In Gauteng for example, where the demand for illegally harvested wild cycads is ultimately centered, reportedly 40% of posts within the Biodiversity Enforcement division of the Gauteng Department of Agriculture and Rural Development were vacant in the 2011/2012 financial year. The Limpopo Department of Economic Development, Environment and

Tourism is primarily responsible for the *in situ* protection and management of *E. dyerianus*. However this department is experiencing severe capacity constraints, for example vacancy rates for the 2011/2012 financial year were reported to be 65% for the Biodiversity Management division and 68% for the Enforcement division. There is furthermore no botanist in this province to provide strategic direction for the conservation of the species. All of the field ranger posts for the nature reserve on which *E. dyerianus* occurs are reportedly vacant, although the *E. dyerianus* population is currently guarded by field rangers deployed from a neighbouring protected area.

Past ineffective implementation of conservation legislation in the provinces of KwaZulu-Natal, the Eastern Cape and particularly Gauteng, where the requirements for cycad possession permits have not been consistently enforced, has facilitated the entry of illegally harvested cycads into the legal trade. Wild-sourced plants have been and continue to be legalized and incorporated into private collections. Their use as parental stock for the propagation of seedlings for both the domestic and international cycad trade cannot be ruled out. International trade in *E. dyerianus* started in 1995, coinciding with the weakening of cycad protection measures in Gauteng. Altogether 1359 specimens (with an estimated total value of R3 262 000 and an average annual value of around R200 000 $\pm$ R188 000) had been exported from South Africa by 2011, with trade levels peaking in 1999 and then again in 2007/2008. No conservation benefit for the species or its habitat is derived from the trade in *E. dyerianus*.

Micro-chips inserted into wild plants have proven to be largely ineffective for establishing wild origins of cycads and have failed to deter poachers. The failure of the legal protection measures has been further exacerbated by prosecutors and magistrates who are not well informed about South Africa's cycad extinction crisis and the small fines issued and minimal jail sentences passed for cycad related offenses are ineffective deterrents.

There is currently no management plan for *E. dyerianus*. A Biodiversity Management Plan for the Critically Endangered and Endangered cycads will soon be published in terms of section 43 of the NEMBA, however it will be a while before its effectiveness can be evaluated. The wild population of this species is monitored regularly.

The species' biology, which is characterized by a poor dispersal ability and slow growing long-lived adults that regenerate predominantly from seed, renders *E. dyerianus* particularly vulnerable to overutilization. This, together with the species' extremely poor conservation status, the continuing incidences of poaching, the capacity and budgetary constraints that prevent the Limpopo Department of Economic Development, Environment and Tourism from curbing poaching, the lack of conservation incentives and the continuing ineffective implementation of the existing strict protection measures for cycads on a national basis, presents a scenario that is unfavourable for the survival of *E. dyerianus* in the wild and the species is at an extremely high risk of unsustainable utilization (Figure 1). In order to decrease the risk to this species and prevent its imminent extinction, a concerted effort to address all of these factors is essential.

Current trade in artificially propagated specimens of *E. dyerianus* is detrimental (Figure 2). The Scientific Authority, in reviewing the factors presented above, is unable to state with any confidence that parental stock is cultivated (as defined in the CITES Resolution Conf. 11.11 (Rev. CoP15)) in all cases

of export since (1) evidence of legal acquisition is dubious and (2) the data at hand suggest that some parental stock has been obtained in a manner detrimental to the wild population. It is therefore recommended that *E. dyerianus* seedlings may only be exported if the nursery is registered in accordance with the CITES Resolution Conf. 9.19 (Rev. CoP15), and

i. The seedlings are artificially propagated in accordance with the CITES Resolution Conf. 11.11 (Rev. CoP15), or
ii. The seedlings have been grown from wild harvested seed in accordance with the conditions specified in the CITES Resolution Conf. 11.11 (Rev. CoP15) and within the framework of a Biodiversity Management Plan published in terms of section 43 of the NEMBA.

Each nursery applying for CITES registration must be audited in accordance with a decision tree to be developed by the Scientific Authority within 3 months of the publication of this NDF, and regular follow up audits must be conducted in order to monitor seedling propagation. All parental plants must

i. Be accompanied by TOPS possession permits and affidavits from the owner stating that the plants are not of wild origin, and
ii. Not exhibit any characteristics typical of wild origin. Guidelines for the identification of wild characteristics will be developed by the Scientific Authority within 3 months of the publication of this NDF.

The export of large artificially propagated specimens (with a stem diameter of more than 15 cm) is prohibited (Government Notice 371, May 2012).

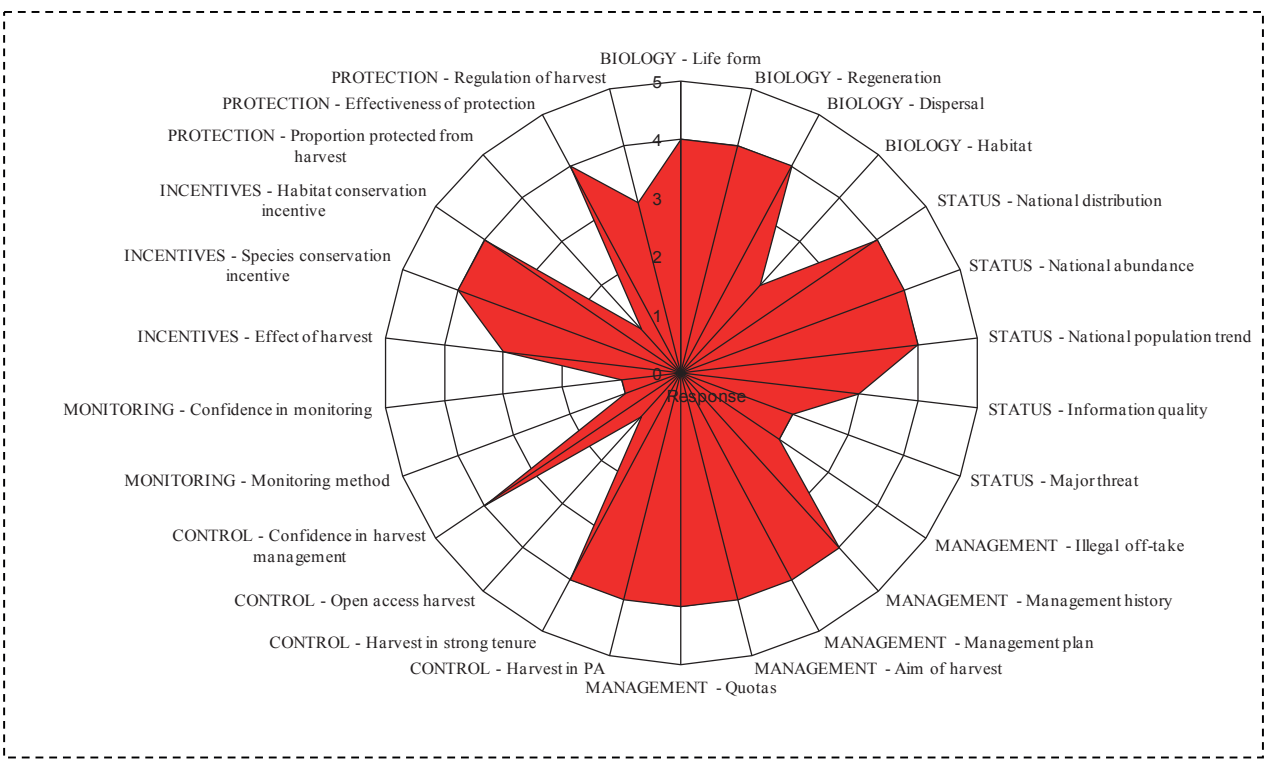

Figure 1. Radar chart summarizing the non-detriment finding assessment undertaken for *Encephalartos dyerianus* in accordance with the CITES NDF checklist. Explanations of scores given are detailed in Table 1. Higher scores are indicative of higher risks to the species. The extensive shaded area in the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

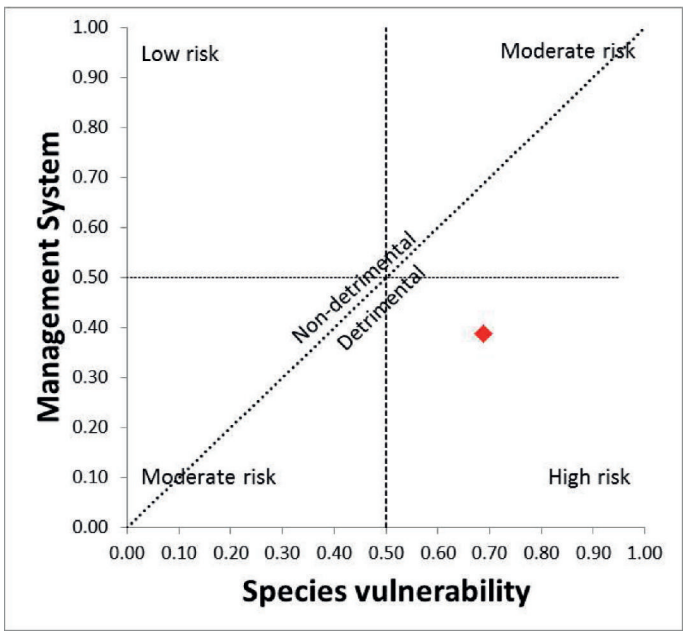

Figure 2. The risk of trading in *Encephalartos dyerianus* as represented by the relationship between species vulnerability (biology and status) (0 = low vulnerability; 1 = high vulnerability) and the management system to which the species is subjected (management, control, monitoring, incentives and protection) (0 = weak management system; 1 = strong management system). The figure shows that the species is at high risk and trade is detrimental.

Table 1. Non-detriment finding assessment for *Encephalartos dyerianus* 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
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
The cycad life history is characterized by long-lived adults that regenerate predominantly from seed. Plants do produce suckers, but they are relatively unimportant for the regeneration of cycad populations, with 95% of species regenerating from seed only. Suckers remaining behind after the main plant has been harvested do sometimes survive.		
3. Dispersal efficiency: How efficient is the species' dispersal mechanism?	Very good	1
	Good	2
	Medium	3
	Poor	**4**
	Uncertain	5
The dispersal abilities of cycads are not well understood but are generally regarded as poor. Even if seed were dispersed to new sites, the concomitant dispersal of species-specific pollinators would be highly unlikely thus rendering population recovery after local extirpation impossible. Colonization of new sites is improbable due to a number of reproductive limitations, such as limited seed production or non-viable seeds, irregular coning and male biases in populations. There has been no observed change / expansion in the distribution of any cycad species.		
4. Habitat: What is the habitat preference of the species?	Disturbed open	1
	Undisturbed open	**2**
	Pioneer	3
	Disturbed forest	4
	Climax	5
Encephalartos dyerianus *plants grow in open shrubland and grassland on the slopes of a single low granite hill.*		
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
Encephalartos dyerianus *is known from a single granite mountain in Limpopo province, occupying an area of about 10 ha. Most of the population is confined within a provincial nature reserve, although a few plants do occur outside.* Encephalartos dyerianus *is currently listed in the IUCN Red List category of Critically Endangered (B1ab(v)+2ab(v) (IUCN version 3.1)).*		
6. National abundance: What is the abundance nationally?	Very abundant	1
	Common	2
	Uncommon	3
	Rare	**4**
	Uncertain	5
Less than 500 adult plants were counted during a survey in 2008.		
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
Some poaching of wild plants is taking place, resulting in a continuing decline in the population.		
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
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
The poaching that is taking place is limited and, since the species occurs in a nature reserve, is also reversible provided that the nature reserve is afforded adequate protection. Possible reproductive failure due to the small size of the population is an additional potential threat.		
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
In 2008, between 78 and 107 plants were illegally harvested. A permanent guard has since been placed at the site. The plants that were stolen were re-introduced plants originating from the Hartebeesthoek nursery and therefore may not have been genetically pure. Two plants have been encountered in the illegal trade in Gauteng, while E. dyerianus *plants are seldom encountered in Mpumalanga and in the Eastern Cape. Changes in ownership of these plants occur frequently and the plants are relatively inexpensive. Because of the small size of the population, any illegal harvest of this species will have a severe impact on its survival in the wild.*		
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
Illegal harvesting of wild cycads has been occurring in South Africa for the past 40 years, becoming more prevalent from the 1990s onwards in spite of various legislative interventions. Since the 1970s all cycad species have been protected in provincial nature conservation ordinances, with the harvest of any plants or seed requiring a permit (in addition to other activities such as possessing, conveying, selling, etc.). Reportedly no permits were ever issued for the wild harvest of E. dyerianus *plants or seed. As the species was only described in 1988, it is unlikely that plants were harvested from the wild prior to the enactment of provincial legislation. However, seedlings were available from the Hartebeesthoek nursery which operated in the former Transvaal province between 1975 and 1998. In general there has been an exponential increase in* ex situ *cultivated cycads, which are currently regulated by provincial conservation ordinances/Acts and the National Environmental Management: Biodiversity Act (NEMBA): Threatened or Protected Species Regulations (TOPS). In February 2007 the harvest of cycads from the wild was prohibited nationally in terms of Regulation 25 of the*		

Threatened or Protected Species Regulations (subsequently replaced by Government Notice 371 in May 2012). Poaching is nevertheless ongoing.		
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
A Biodiversity Management Plan for the Critically Endangered and Endangered cycads will be published in 2015 in terms of section 43 of the NEMBA.		
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
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 are no quotas for any of South Africa's cycad species – all harvesting is illegal.		
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
Harvesting of wild cycads is illegal throughout South Africa.		
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
Harvesting of wild cycads is illegal throughout South Africa.		
17. Harvesting in areas with open access: What percentage of the legal national harvest occurs in areas where there is no strong local control,	**None**	**1**
	Low	2
	Medium	3
	High	4

giving *de facto* or actual open access?	Uncertain	5
The harvest of wild cycads is prohibited throughout South Africa.		
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
The provincial conservation authorities that are mandated to protect wild cycad populations from illegal harvesting are currently experiencing capacity constraints relating to shortages of human resources and budget. Reportedly 65% and 68% of posts within the Biodiversity Management and Enforcement divisions respectively of the Limpopo Department of Economic Development, Environment and Tourism were vacant in 2011/2012, and there is no botanist in this province to provide strategic direction for the conservation of the species. In 2011/2012 all of the 10 field ranger posts for the nature reserve on which E. dyerianus *occurs were vacant. Two rangers deployed from a neighbouring nature reserve are however always present. Frequent arrests and confiscations are indicative that the system intended to protect wild cycad populations is inadequate. Most cycad populations occur outside of state-controlled protected areas, but even those within protected areas are not secure from poaching activities (e.g.* E. dyerianus*). There is currently no management plan for* E. dyerianus*.*		
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
Three surveys have been completed since 1999.		
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
Sufficient budget is allocated towards the monitoring of E. dyerianus*. There is no botanist currently employed in Limpopo and this vacant post is unlikely to be filled soon.*		
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
22. Incentives for species conservation: At the national level, how much conservation benefit to this	High	1
	Medium	2
	Low	3

species accrues from harvesting?	**None**	**4**
	Uncertain	5
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
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
Government Notice 371 published in May 2012 in terms of section 57(2) of the National Environmental Management: Biodiversity Act (NEMBA) of 2004 prohibits the harvest of wild cycads throughout South Africa, unless required for conservation or enforcement purposes. Encephalartos dyerianus *is also listed as Specially Protected in the Limpopo Environmental Management Act (No. 7 of 2003). The only known population of* E. dyerianus *occurs in a state-controlled protected area.*		
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
The cycad trade is very complex and in order to monitor all the legal and illegal activities related to this trade, substantial resources would be required. Although providing for a solid legal framework, the Threatened or Protected Species Regulations have been difficult to implement by resource constrained provinces. The provincial conservation authorities that are mandated to enforce the strict protection measures pertaining to cycads are currently experiencing capacity constraints relating to shortages of human resources and budget. Sixty-eight percent of posts within the Enforcement division of the Limpopo Department of Economic Development, Environment and Tourism were reportedly vacant in the 2011/2012 financial year. In Gauteng, where the demand for illegally harvested wild cycads is ultimately centered, reportedly 4 out of 10 posts within the Biodiversity Enforcement division of the Gauteng Department of Agriculture and Rural Development were vacant in the 2011/2012 financial year, a vacancy rate of 40%. Even cycads within state-controlled protected areas (e.g. E. dyerianus*) are not secure from poaching activities, with protected areas often understaffed. Enforcement of the legislation is further weakened by inexperienced officials without the necessary skills to identify the different species. Prosecutors and magistrates are infrequently exposed to cycad related cases and are therefore not well informed about South Africa's cycad extinction crisis. Consequently cases relating to cycads seldom result in large fines and/or jail sentences.* *Provincial conservation legislation pertaining to cycads has been ineffectively implemented in the past in both Gauteng and KwaZulu-Natal. Neither province consistently enforced the requirements for possession permits, although all adult ("size-determined") cycads exported from KwaZulu-Natal had to be micro-chipped. In Gauteng, where most cycad enthusiasts live (50% of the Cycad Society's members reside in Gauteng with between 10% and 12% of members residing in each of the Western Cape, KwaZulu-Natal and Mpumalanga provinces), possession permits were not required for cycads between 1994 and 2001, with the regulatory authority only requiring the presentation of documentary*		

*proof of legal possession. Similarly, the legal requirement for cycad possession permits was only strictly enforced in the Eastern Cape from 1 April 2004 and property owners in possession of unpermitted cycads after this date were instead issued with cycad site registration letters. Up until 31 March 2004, people in possession of unpermitted cycads were given amnesty based on submission of affidavits and documentary proof of legal origin. (*Encephalartos latifrons *and* E. arenarius *were excluded from this amnesty.) Conservation legislation in three out of the four provinces that were designated out of the former Transvaal province is weak, providing for adequate control over the possession and movement of only those cycad species indigenous to the former Transvaal province (the exception being Limpopo where all South African cycads are Specially Protected). This ineffective implementation of legislation has allowed the entry of illegally harvested plants into the legal trade. In the past, a number of syndicates involved in poaching activities moved illegally harvested cycads into Gauteng where possession permits were not required, laundering them into the trade with the required documentary proof. Such operations apparently continue until today due to the delayed implementation of new national legislation (Threatened or Protected Species Regulations).*

Due to the impossibility of tracing the origin of these cycads and/or proving wild origin to the satisfaction of a court (proof of wild origin over and above a reasonable suspicion is required), these plants have been and continue to be legalized through the issuing of possession permits and are subsequently incorporated into private collections. The use of these plants as parental stock for the propagation of seedlings for both the domestic and international cycad trade cannot be ruled out. International trade in E. dyerianus *started in 1995, coinciding with the weakening of cycad protection measures in Gauteng. Since then 1359 specimens (estimated total value of R3 262 000) had been exported from South Africa up until the end of 2011 (CITES Trade Database, UNEP World Conservation Monitoring Centre, Cambridge, UK). After an initial peak in trade in 1999, exports of* E. dyerianus *dropped to low levels, subsequently increasing again (*$R^2 = 0.41$; $P < 0.05$*) and peaking in 2007 and 2008 with the export of 172 and 169 specimens, respectively. The illegal harvesting of 107 wild plants in 2008 thus coincided with peak trade levels for* E. dyerianus. *The average annual value of* E. dyerianus *exports is estimated at around R200 000 ± R188 000 (assuming exports of 3-year old seedlings at 2012-2013 prices).*

Micro-chips inserted into wild cycads as a measure of proving wild origin are often destroyed or removed and it has been suggested that they are even sometimes replaced with legal micro-chips previously inserted into legally owned ex situ *cycads, effectively laundering plants of wild origin. It has also been suggested that legal micro-chips are inserted into un-chipped wild plants to prove legal ownership. Suckers are seldom micro-chipped and are therefore particularly vulnerable to poaching.*

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

Harvesting of wild cycads is prohibited throughout South Africa, yet this restriction remains ineffective.

Supporting documents

1. The IUCN Species Survival Commission Guidance for CITES Scientific Authorities. Checklist to assist in making non-detriment findings for Appendix II exports. Occasional Paper of the IUCN Species Survival Commission No. 27 (2002). A. Rosser and M. Haywood.
2. Donaldson, J.S. 2010. *Encephalartos dyerianus*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.1. <www.iucnredlist.org>. Downloaded on 30 August 2012.
3. Hugo, C. 2012. Identification of indigenous cycads of South Africa. p. 142. 4 images. Totiusdal. South Africa.

Non-detriment finding for *Encephalartos heenanii*

Reference Number: Enc_hee_May2015

Date: 28 May 2015

Issued by the Scientific Authority of South Africa

Summary of finding

Encephalartos heenanii (woolly cycad) is included in Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). As an Appendix I species, the export of specimens for commercial purposes is prohibited (Article III). However, specimens artificially propagated for commercial purposes are deemed to be specimens of species included in Appendix II (Article VII) of CITES and therefore may be traded. 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 export will not be detrimental to the survival of that species. This document details the undertaking of a non-detriment finding (NDF) for *E. heenanii* and is based on the best available information, current as of May 2015.

Encephalartos heenanii has been listed as Critically Endangered by the IUCN (the International Union for Conservation of Nature), meaning that it is considered to be facing an extremely high risk of extinction in the wild. The ongoing poaching pressure on this species in order to supply plants to the horticultural trade and private collections is severe, and a 2013 aerial survey indicated that the population has apparently been reduced to only one surviving plant on a provincial nature reserve in Mpumalanga. According to a survey conducted in 1995, this population numbered approximately 115 plants (comprising of 326 stems) 20 years ago. Despite its occurrence on a protected area owned and controlled by the state, poaching has resulted in a rapid decline in this population, as observed through regular surveys.

The harvest of wild cycads has been prohibited throughout South Africa since February 2007. Prior to this, any harvesting, possession or conveyance of cycads required a permit in terms of provincial legislation enacted in the 1970s. No permits were reportedly ever issued for the wild harvest of *E. heenanii* plants or seed, but plants may have been harvested from the wild prior to the enactment of provincial legislation and seedlings were also available from the Hartebeesthoek nursery which operated between 1975 and 1998. In general there has been an exponential increase in *ex situ* cultivated cycads, which are regulated by provincial conservation ordinances/Acts and the National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEMBA): Threatened or Protected Species (TOPS) Regulations. Enforcement of the strict protection measures afforded to cycads has been hampered by the human resource and budgetary constraints facing the provincial conservation authorities that are mandated to enforce provincial and national environmental legislation, and ongoing illegal harvest of wild cycads is a countrywide problem. In Gauteng for example, where the demand for illegally harvested wild cycads is ultimately centered, reportedly 40% of posts within the Biodiversity

Enforcement division of the Gauteng Department of Agriculture and Rural Development were vacant in the 2011/2012 financial year. The Mpumalanga Tourism and Parks Agency is primarily responsible for the *in situ* protection and management of *E. heenanii*, however 2011/2012 vacancy rates within this agency were reported to be 51% and 64% within the Wildlife Protection Services and Scientific Services divisions, respectively. Furthermore, 43% of the field ranger posts for the nature reserve on which *E. heenanii* grows were reportedly vacant in 2011/2012. From 2011 to 2014 the Mpumalanga Tourism and Parks Agency had no operational budget.

Past ineffective implementation of conservation legislation in the provinces of KwaZulu-Natal, the Eastern Cape and particularly Gauteng, where the requirements for cycad possession permits have not been consistently enforced, has facilitated the entry of illegally harvested cycads into the legal trade. Wild-sourced plants have been and continue to be legalized and incorporated into private collections and their use as parental stock for the propagation of seedlings for both the domestic and international cycad trade cannot be ruled out. International trade in *E. heenanii* started in 1988 and 216 specimens (with an estimated total value of R1 555 000 and an average annual value of around R106 000 ± R91 000) had been exported from South Africa by the end of 2011, the bulk of the trade (93%) showing an increasing trend after 1995, the same time period over which the decline in the wild population was observed and coinciding with the weakening of cycad protection measures in Gauteng. No conservation benefit for the species or its habitat is derived from the trade in *E. heenanii*.

Micro-chips inserted into wild plants have proven to be largely ineffective for establishing wild origins of cycads and have failed to deter poachers. The failure of the legal protection measures has been further exacerbated by prosecutors and magistrates who are not well informed about South Africa's cycad extinction crisis and the small fines issued and minimal jail sentences passed for cycad related offenses are ineffective deterrents.

Outdated (20 years old) conservation plans exist for all Mpumalanga's cycad species. Although some of these plans are currently being implemented, parts have collapsed altogether and they are in dire need of major revision. None of these plans address harvest management. A Biodiversity Management Plan for the Critically Endangered and Endangered cycads will soon be published in terms of section 43 of the NEMBA, however it will be a while before its effectiveness can be evaluated. While regular monitoring of *E. heenanii* does take place, continuation of monitoring programmes is uncertain due to the severe capacity constraints facing the Mpumalanga Tourism and Parks Agency.

The species' biology, which is characterized by a poor dispersal ability and slow growing long-lived adults that regenerate predominantly from seed, renders *E. heenanii* particularly vulnerable to overutilization. This, together with the species' extremely poor conservation status, the severe poaching pressure, the outdated conservation plan, the capacity and budgetary constraints that prevent the Mpumalanga Tourism and Parks Agency from effectively managing and monitoring the species, the lack of conservation incentives and the continuing ineffective implementation of the existing strict protection measures for cycads on a national basis, presents a scenario that is unfavourable for the survival of *E. heenanii* in the wild and the species is at an extremely high risk of unsustainable utilization (Figure 1). In fact the species has already been exploited to the brink of extinction. In order

to decrease the risk to this species and prevent its imminent extinction, a concerted effort to address all of these factors is essential.

Current trade in artificially propagated specimens of *E. heenanii* is detrimental (Figure 2). The Scientific Authority, in reviewing the factors presented above, is unable to state with any confidence that parental stock is cultivated (as defined in the CITES Resolution Conf. 11.11 (Rev. CoP15)) in all cases of export since (1) evidence of legal acquisition is dubious and (2) the data at hand suggest that some parental stock has been obtained in a manner detrimental to the wild population. It is therefore recommended that *E. heenanii* seedlings may only be exported if the nursery is registered in accordance with the CITES Resolution Conf. 9.19 (Rev. CoP15), and

i. The seedlings are artificially propagated in accordance with the CITES Resolution Conf. 11.11 (Rev. CoP15), or
ii. The seedlings have been grown from wild harvested seed in accordance with the conditions specified in the CITES Resolution Conf. 11.11 (Rev. CoP15) and within the framework of a Biodiversity Management Plan published in terms of section 43 of the NEMBA, or
iii. The seedlings have been grown from legal (TOPS possession permits issued prior to May 2012) wild origin parental plants and a portion of the seed / seedlings are made available for the recovery of the species within the framework of a Biodiversity Management Plan published in terms of section 43 of the NEMBA.

Each nursery applying for CITES registration must be audited in accordance with a decision tree to be developed by the Scientific Authority within 3 months of the publication of this NDF, and regular follow up audits must be conducted in order to monitor seedling propagation. All parental plants must

i. Be accompanied by TOPS possession permits and, with the exception of scenario (iii) above, affidavits from the owner stating that the plants are not of wild origin, and
ii. Not exhibit any characteristics typical of wild origin, with the exception of wild origin parental plants considered in scenario (iii) above. Guidelines for the identification of wild characteristics will be developed by the Scientific Authority within 3 months of the publication of this NDF.

The export of large artificially propagated specimens (with a stem diameter of more than 15 cm) is prohibited (Government Notice 371, May 2012).

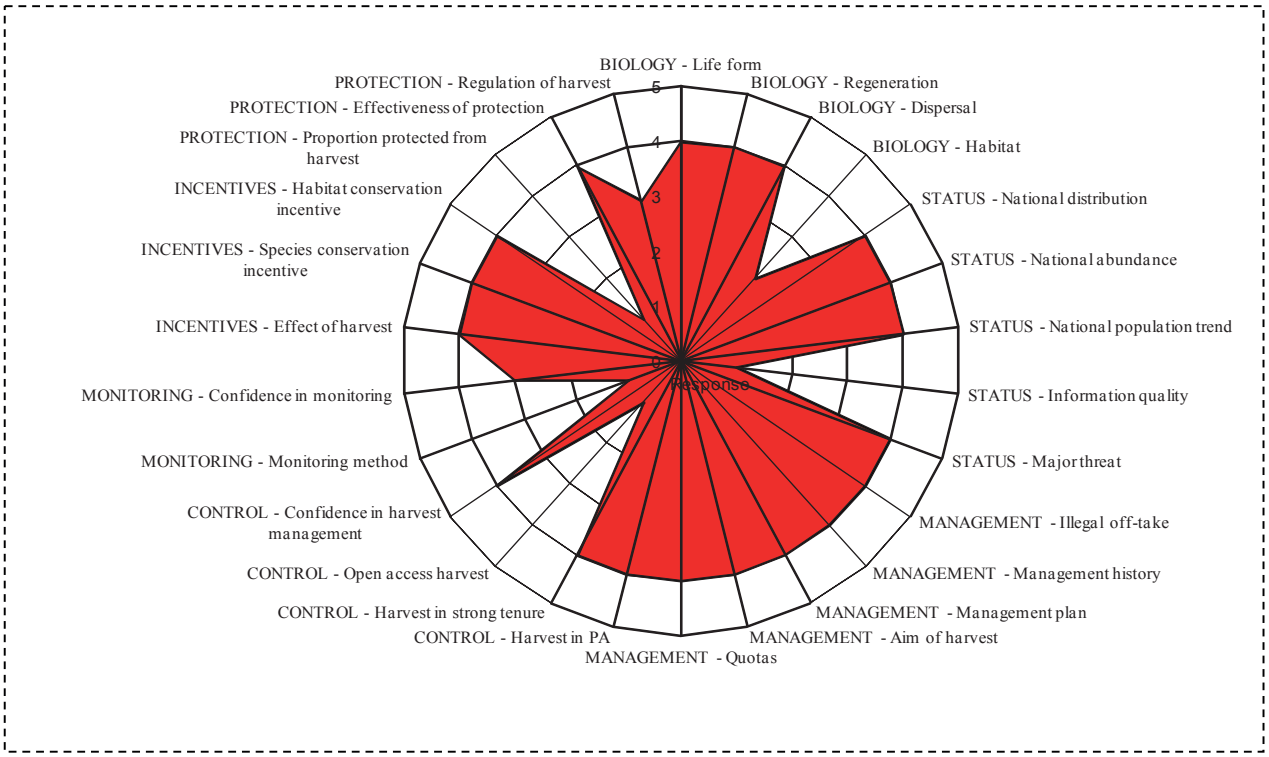

Figure 1. Radar chart summarizing the non-detriment finding assessment undertaken for *Encephalartos heenanii* in accordance with the CITES NDF checklist. Explanations of scores given are detailed in Table 1. Higher scores are indicative of higher risks to the species. The extensive shaded area in the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

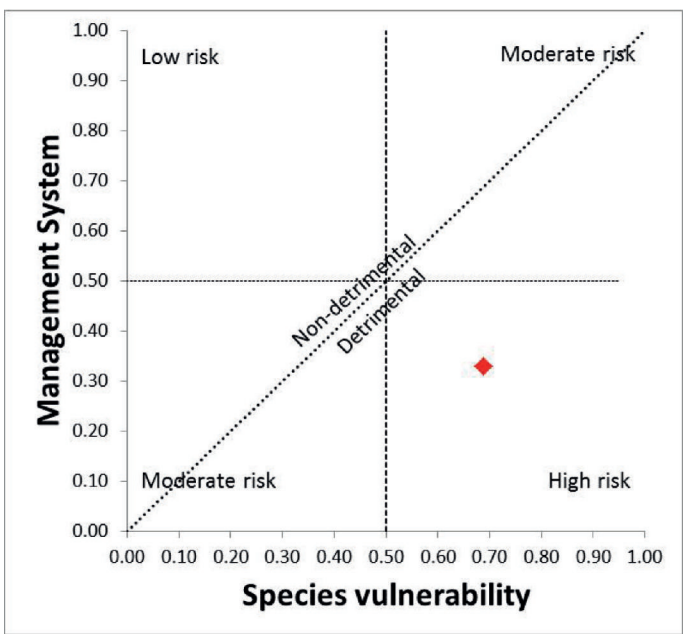

Figure 2. The risk of trading in *Encephalartos heenanii* as represented by the relationship between species vulnerability (biology and status) (0 = low vulnerability; 1 = high vulnerability) and the

management system to which the species is subjected (management, control, monitoring, incentives and protection) (0 = weak management system; 1 = strong management system). The figure shows that the species is at high risk and trade is detrimental.

Table 1. Non-detriment finding assessment for *Encephalartos heenanii* 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
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
The cycad life history is characterized by long-lived adults that regenerate predominantly from seed. Plants do produce suckers, but they are relatively unimportant for the regeneration of cycad populations, with 95% of species regenerating from seed only. Suckers remaining behind after the main plant has been harvested do sometimes survive.		
3. Dispersal efficiency: How efficient is the species' dispersal mechanism?	Very good	1
	Good	2
	Medium	3
	Poor	**4**
	Uncertain	5
The dispersal abilities of cycads are not well understood but are generally regarded as poor. Even if seed were dispersed to new sites, the concomitant dispersal of species-specific pollinators would be highly unlikely thus rendering population recovery after local extirpation impossible. Colonization of new sites is improbable due to a number of reproductive limitations, such as limited seed production or non-viable seeds, irregular coning and male biases in populations. There has been no observed change / expansion in the distribution of any cycad species.		
4. Habitat: What is the habitat preference of the species?	Disturbed open	1
	Undisturbed open	**2**
	Pioneer	3
	Disturbed forest	4
	Climax	5
Encephalartos heenanii *plants grow on very steep slopes in short grassland in deep valleys between indigenous forests.*		
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
The last surviving population of this species occurs on a provincial nature reserve in Mpumalanga. Encephalartos heenanii *is currently listed in the IUCN Red List category of Critically Endangered (B1ab(ii,iv,v)+2ab(ii,iv,v) (IUCN version 3.1)).*		
6. National abundance: What is the abundance nationally?	Very abundant	1
	Common	2
	Uncommon	3
	Rare	**4**
	Uncertain	5
Less than 30 plants, and possibly only one, survive in the wild.		
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
In 1995, 115 plants altogether comprising 326 stems were counted. A survey conducted in 2006 revealed that the population had declined to approximately 24 plants comprising of 45 stems, and an aerial survey in 2013 yielded only one plant. Encephalartos heenanii *plants have also disappeared from the few known sites in Swaziland.*		
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
Regular surveys are undertaken, often by means of a helicopter. The last survey was conducted in 2013.		
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
Encephalartos heenanii *is threatened by illegal harvesting for horticultural/ornamental purposes. As the short-leaved form of this species is more desirable, plants exhibiting this form have been preferentially targeted by poachers and the 24 plants remaining in 2006 were all representative of the long-leaved form. In general around 30-50% of cycads removed from the wild die within a few years.*		
Harvest management		
10. Illegal off-take or trade: How significant is the national problem of illegal or unmanaged off-take or	None	1
	Small	2
	Medium	3

trade?	**Large**	**4**
	Uncertain	5
Poaching of this species for horticultural purposes is a massive problem. The poachers responsible for harvesting at least 100 stems of E. heenanii *were arrested and jailed after an investigation lasting many years. In a 2006 case involving three plants, the perpetrators had attempted to remove fire scars from the plants with an angle grinder (fire scars are characteristic of wild sourced plants). A case involving two plants is currently before the court.*		
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
Illegal harvesting of wild cycads has been occurring in South Africa for the past 40 years, becoming more prevalent from the 1990s onwards in spite of various legislative interventions. Since the 1970s all cycad species have been protected in provincial nature conservation ordinances, with the harvest of any plants or seed requiring a permit (in addition to other activities such as possessing, conveying, selling, etc.). Reportedly no permits were ever issued for the wild harvest of E. heenanii *plants or seed. Plants may however have been harvested from the wild prior to the enactment of provincial legislation or obtained from the Hartebeesthoek nursery which operated in the former Transvaal province between 1975 and 1998. In general there has been an exponential increase in* ex situ *cultivated cycads, which are currently regulated by provincial conservation ordinances/Acts and the National Environmental Management: Biodiversity Act (NEMBA): Threatened or Protected Species Regulations (TOPS). In February 2007 the harvest of cycads from the wild was prohibited nationally in terms of Regulation 25 of the Threatened or Protected Species Regulations (subsequently replaced by Government Notice 371 in May 2012). Poaching is nevertheless ongoing.*		
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
Outdated (20 years old) conservation plans do exist for all Mpumalanga's cycad species. These plans are all very similar, having being based on the same template, and address propagation and restoration but not harvest. Although components of the plans have collapsed altogether (e.g. ex situ *propagation at the Hartebeesthoek nursery), some of the conservation plans are still being implemented. The plans are however in dire need of major revision, especially as the situation pertaining to cycads has changed significantly since they were drafted. These revisions would however be hampered by a lack of human resources within the Mpumalanga Tourism and Parks Agency. The 2011/2012 vacancy rate within the Scientific Services division for example was reportedly 64% and not a single botanist is currently employed in the province. A Biodiversity Management Plan for the Critically Endangered and Endangered cycads will be published in 2015 in terms of section 43 of the NEMBA.*		
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
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 are no quotas for any of South Africa's cycad species – all harvesting is illegal.		
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
Harvesting of wild cycads is illegal throughout South Africa.		
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
Harvesting of wild cycads is illegal throughout South Africa.		
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 *de facto* or actual open access?	**None**	**1**
	Low	2
	Medium	3
	High	4
	Uncertain	5
The harvest of wild cycads is prohibited throughout South Africa.		
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
The provincial conservation authorities that are mandated to protect wild cycad populations from illegal harvesting are currently experiencing capacity constraints relating to shortages of human resources and budget. The provincial nature reserve on which E. heenanii *occurs currently has 40 field ranger posts and only 23 of these were reportedly filled in 2011/2012, a vacancy rate of 43%. From 2011 to 2014 the Mpumalanga Tourism and Parks Agency had no operational budget. Frequent arrests and confiscations are indicative that the system intended to protect wild cycad populations is inadequate. Most cycad populations occur outside of state-controlled protected areas, but even those within protected areas (e.g.* E. heenanii*) are not secure from poaching activities.*		

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
Formal surveys are undertaken relatively frequently.		
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
The Mpumalanga Tourism and Parks Agency is currently experiencing severe budgetary constraints as well as a lack of human resources. In the 2011/2012 financial year, the Scientific Services division reportedly had a vacancy rate of 64%, and from 2011 to 2014 the Mpumalanga Tourism and Parks Agency had no operational budget.		
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
It is anticipated that the few remaining plants could suffer from reproductive failure. Fire is suppressed in the area due to the presence of pine plantations. As E. heenanii *is possibly fire adapted, this may further threaten the survival of the last remaining plants.*		
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
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
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
Government Notice 371 published in May 2012 in terms of section 57(2) of the National Environmental Management: Biodiversity Act (NEMBA) of 2004 prohibits the harvest of wild cycads		

throughout South Africa, unless required for conservation or enforcement purposes. Encephalartos heenanii *is also listed as Specially Protected in the Mpumalanga Nature Conservation Act (No. 10 of 1998). The only remaining population of* E. heenanii *occurs in a state-controlled protected area.*

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

The cycad trade is very complex and in order to monitor all the legal and illegal activities related to this trade, substantial resources would be required. Although providing for a solid legal framework, the Threatened or Protected Species Regulations have been difficult to implement by resource constrained provinces. The provincial conservation authorities that are mandated to enforce the strict protection measures pertaining to cycads are currently experiencing capacity constraints relating to shortages of human resources and budget. The 2011/2012 vacancy rate within the Wildlife Protection Services of the Mpumalanga Tourism and Parks Agency was reported to be 51% and from 2011 to 2014 the Agency had no operational budget. In Gauteng, where the demand for illegally harvested wild cycads is ultimately centered, reportedly 4 out of 10 posts within the Biodiversity Enforcement division of the Gauteng Department of Agriculture and Rural Development were vacant in the 2011/2012 financial year, a vacancy rate of 40%. Even cycads within state-controlled protected areas (e.g. E. heenanii*) are not secure from poaching activities, with protected areas often understaffed (e.g. the provincial nature reserve on which* E. heenanii *occurs with reportedly a vacancy rate of 43%). Enforcement of the legislation is further weakened by inexperienced officials without the necessary skills to identify the different species. Prosecutors and magistrates are infrequently exposed to cycad related cases and are therefore not well informed about South Africa's cycad extinction crisis. Consequently cases relating to cycads seldom result in large fines and/or jail sentences.*

*Provincial conservation legislation pertaining to cycads has been ineffectively implemented in the past in both Gauteng and KwaZulu-Natal. Neither province consistently enforced the requirements for possession permits, although all adult ("size-determined") cycads exported from KwaZulu-Natal had to be micro-chipped. In Gauteng, where most cycad enthusiasts live (50% of the Cycad Society's members reside in Gauteng with between 10% and 12% of members residing in each of the Western Cape, KwaZulu-Natal and Mpumalanga provinces), possession permits were not required for cycads between 1994 and 2001, with the regulatory authority only requiring the presentation of documentary proof of legal possession. Similarly, the legal requirement for cycad possession permits was only strictly enforced in the Eastern Cape from 1 April 2004 and property owners in possession of unpermitted cycads after this date were instead issued with cycad site registration letters. Up until 31 March 2004, people in possession of unpermitted cycads were given amnesty based on submission of affidavits and documentary proof of legal origin. (*Encephalartos latifrons *and* E. arenarius *were excluded from this amnesty.) Conservation legislation in three out of the four provinces that were designated out of the former Transvaal province is weak, providing for adequate control over the possession and movement of only those cycad species indigenous to the former Transvaal province (the exception being Limpopo where all South African cycads are Specially Protected). This ineffective implementation of legislation has allowed the entry of illegally harvested plants into the legal trade. In the past, a number of syndicates involved in poaching activities moved illegally harvested cycads into Gauteng where possession permits were not required, laundering them into the trade with the required documentary proof. Such operations apparently continue until today due to the delayed implementation of new national legislation (Threatened or Protected Species Regulations).*

Due to the impossibility of tracing the origin of these cycads and/or proving wild origin to the satisfaction of a court (proof of wild origin over and above a reasonable suspicion is required), these plants have been and continue to be legalized through the issuing of possession permits and are subsequently incorporated into private collections. The use of these plants as parental stock for the propagation of seedlings for both the domestic and international cycad trade cannot be ruled out. Trade statistics (derived from the CITES Trade Database, UNEP World Conservation Monitoring Centre, Cambridge, UK) indicate an increasing trend ($R^2 = 0.42$; $P < 0.01$*) in the international trade of* E. heenanii *since 1995, the same time period over which the decline in the wild population was observed. International trade in* E. heenanii *started in 1988 and by 2011 altogether 216 specimens (estimated total value of R1 555 000) had been exported from South Africa, the bulk of the trade (93%) taking place after 1995 when the cycad protection measures in Gauteng were particularly weak. The average annual value of* E. heenanii *exports is estimated at around R106 000 ± R91 000 (assuming exports of 3-year old seedlings at 2012-2013 prices).*

Micro-chips inserted into wild cycads as a measure of proving wild origin are often destroyed or removed and it has been suggested that they are even sometimes replaced with legal micro-chips previously inserted into legally owned ex situ *cycads, effectively laundering plants of wild origin. It has also been suggested that legal micro-chips are inserted into un-chipped wild plants to prove legal ownership. Suckers are seldom micro-chipped and are therefore particularly vulnerable to poaching.*

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

Harvesting of wild cycads is prohibited throughout South Africa, yet this restriction remains ineffective.

Supporting documents

1. The IUCN Species Survival Commission Guidance for CITES Scientific Authorities. Checklist to assist in making non-detriment findings for Appendix II exports. Occasional Paper of the IUCN Species Survival Commission No. 27 (2002). A. Rosser and M. Haywood.
2. Donaldson, J.S. 2010. *Encephalartos heenanii*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.1. <www.iucnredlist.org>. Downloaded on 30 August 2012.
3. Feedback: Survey of *Encephalartos heenanii*, Nov 2006. Mpumalanga Tourism and Parks Agency. (Confidential)
4. Status report on *Encephalartos heenanii* R. A. Dyer in Transvaal (1984). Transvaal Provincial Administration.
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Non-detriment finding for *Encephalartos hirsutus*

Reference Number: Enc_hir_May2015

Date: 28 May 2015

Issued by the Scientific Authority of South Africa

Summary of finding

Encephalartos hirsutus (Venda cycad) is included in Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). As an Appendix I species, the export of specimens for commercial purposes is prohibited (Article III). However, specimens artificially propagated for commercial purposes are deemed to be specimens of species included in Appendix II (Article VII) of CITES and therefore may be traded. 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 export will not be detrimental to the survival of that species. This document details the undertaking of a non-detriment finding (NDF) for *E. hirsutus* and is based on the best available information, current as of May 2015.

Encephalartos hirsutus has been listed as Critically Endangered by the IUCN (the International Union for Conservation of Nature), meaning that it is considered to be facing an extremely high risk of extinction in the wild. When the species was first described in 1996, there were three known localities in the Soutpansberg region of the Limpopo province and the size of the wild population was estimated to number between 400 and 500 plants. But the impact of poaching on *E. hirsutus* to supply the horticultural trade and private collections has been so severe that it has resulted in the near extinction of the species. By 2004 the monitored wild population had declined to 219 plants and today only one individual apparently remains in an inaccessible location on a private nature reserve.

The harvest of wild cycads has been prohibited throughout South Africa since February 2007. Prior to this, any harvesting, possession or conveyance of cycads required permits in terms of provincial legislation enacted in the 1970s. No permits were reportedly ever issued for the wild harvest of *E. hirsutus* plants or seed since its description in 1996, and it is highly likely that all *E. hirsutus* plants in collections originate from illegally sourced wild plants. In general there has been an exponential increase in *ex situ* cultivated cycads, which are regulated by provincial conservation ordinances/Acts and the National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEMBA): Threatened or Protected Species (TOPS) Regulations. Enforcement of the strict protection measures afforded to cycads has been hampered by the human resource and budgetary constraints facing the provincial conservation authorities that are mandated to enforce provincial and national environmental legislation, and ongoing illegal harvest of wild cycads is a countrywide problem. In Gauteng for example, where the demand for illegally harvested wild cycads is ultimately centered, reportedly 40% of posts within the Biodiversity Enforcement division of the Gauteng Department of Agriculture and Rural Development

were vacant in the 2011/2012 financial year. The Limpopo Department of Economic Development, Environment and Tourism is primarily responsible for the *in situ* protection and management of *E. hirsutus*. However this department is experiencing severe capacity constraints, for example vacancy rates for the 2011/2012 financial year were reported to be 65% for the Biodiversity Management division and 68% for the Enforcement division. There is furthermore no botanist in this province to provide strategic direction for the conservation of the species.

Past ineffective implementation of conservation legislation in the provinces of KwaZulu-Natal, the Eastern Cape and particularly Gauteng, where the requirements for cycad possession permits have not been consistently enforced, has facilitated the entry of illegally harvested cycads into the legal trade. Wild-sourced plants have been and continue to be legalized and incorporated into private collections. Their use as parental stock for the propagation of seedlings for both the domestic and international cycad trade cannot be ruled out, and it is unlikely that the original parental stock for *E. hirsutus* was obtained legally prior to the enactment of provincial legislation. International trade in *E. hirsutus* started in 1999, just three years after the species had been described and during the years when the cycad protection measures in Gauteng were particularly weak. By the end of 2011, 224 specimens (with an estimated total value of R2 688 000 and an average annual value of around R210 000 ± R207 000) had been exported from South Africa. The trade has shown an increasing trend since its inception in parallel with the observed decline of the wild population. No conservation benefit for the species or its habitat is derived from the trade in *E. hirsutus*.

Micro-chips inserted into wild plants have proven to be largely ineffective for establishing wild origins of cycads and have failed to deter poachers. The failure of the legal protection measures has been further exacerbated by prosecutors and magistrates who are not well informed about South Africa's cycad extinction crisis and the small fines issued and minimal jail sentences passed for cycad related offenses are ineffective deterrents.

There is currently no management plan for *E. hirsutus* and the wild population of this species is not regularly monitored. A Biodiversity Management Plan for the Critically Endangered and Endangered cycads will soon be published in terms of section 43 of the NEMBA, however it will be a while before its effectiveness can be evaluated.

The species' biology, which is characterized by a poor dispersal ability and slow growing long-lived adults that regenerate predominantly from seed, renders *E. hirsutus* particularly vulnerable to overutilization. This, together with the species' extremely poor conservation status, the severe poaching pressure, the capacity and budgetary constraints that prevent the Limpopo Department of Economic Development, Environment and Tourism from curbing poaching, the lack of conservation incentives and the continuing ineffective implementation of the existing strict protection measures for cycads on a national basis, presents a scenario that is unfavourable for the survival of *E. hirsutus* in the wild and the species is at an extremely high risk of unsustainable utilization (Figure 1). In fact with apparently only one plant remaining in the wild, the species has already been exploited to the brink of extinction. In order to decrease the risk to this species and bring about its recovery, a concerted effort to address all of these factors is essential.

Current trade in artificially propagated specimens of *E. hirsutus* is detrimental (Figure 2). The Scientific Authority, in reviewing the factors presented above, is unable to state with any confidence that parental stock is cultivated (as defined in the CITES Resolution Conf. 11.11 (Rev. CoP15)) in all cases of export since (1) evidence of legal acquisition is dubious and (2) the data at hand suggest that some parental stock has been obtained in a manner detrimental to the wild population. It is therefore recommended that *E. hirsutus* seedlings may only be exported if the nursery is registered in accordance with the CITES Resolution Conf. 9.19 (Rev. CoP15), and

i. The seedlings are artificially propagated in accordance with the CITES Resolution Conf. 11.11 (Rev. CoP15), or
ii. The seedlings have been grown from wild harvested seed in accordance with the conditions specified in the CITES Resolution Conf. 11.11 (Rev. CoP15) and within the framework of a Biodiversity Management Plan published in terms of section 43 of the NEMBA, or
iii. The seedlings have been grown from legal (TOPS possession permits issued prior to May 2012) wild origin parental plants and a portion of the seed / seedlings are made available for the recovery of the species within the framework of a Biodiversity Management Plan published in terms of section 43 of the NEMBA.

Each nursery applying for CITES registration must be audited in accordance with a decision tree to be developed by the Scientific Authority within 3 months of the publication of this NDF, and regular follow up audits must be conducted in order to monitor seedling propagation. All parental plants must

i. Be accompanied by TOPS possession permits and, with the exception of scenario (iii) above, affidavits from the owner stating that the plants are not of wild origin, and
ii. Not exhibit any characteristics typical of wild origin, with the exception of wild origin parental plants considered in scenario (iii) above. Guidelines for the identification of wild characteristics will be developed by the Scientific Authority within 3 months of the publication of this NDF.

The export of large artificially propagated specimens (with a stem diameter of more than 15 cm) is prohibited (Government Notice 371, May 2012).

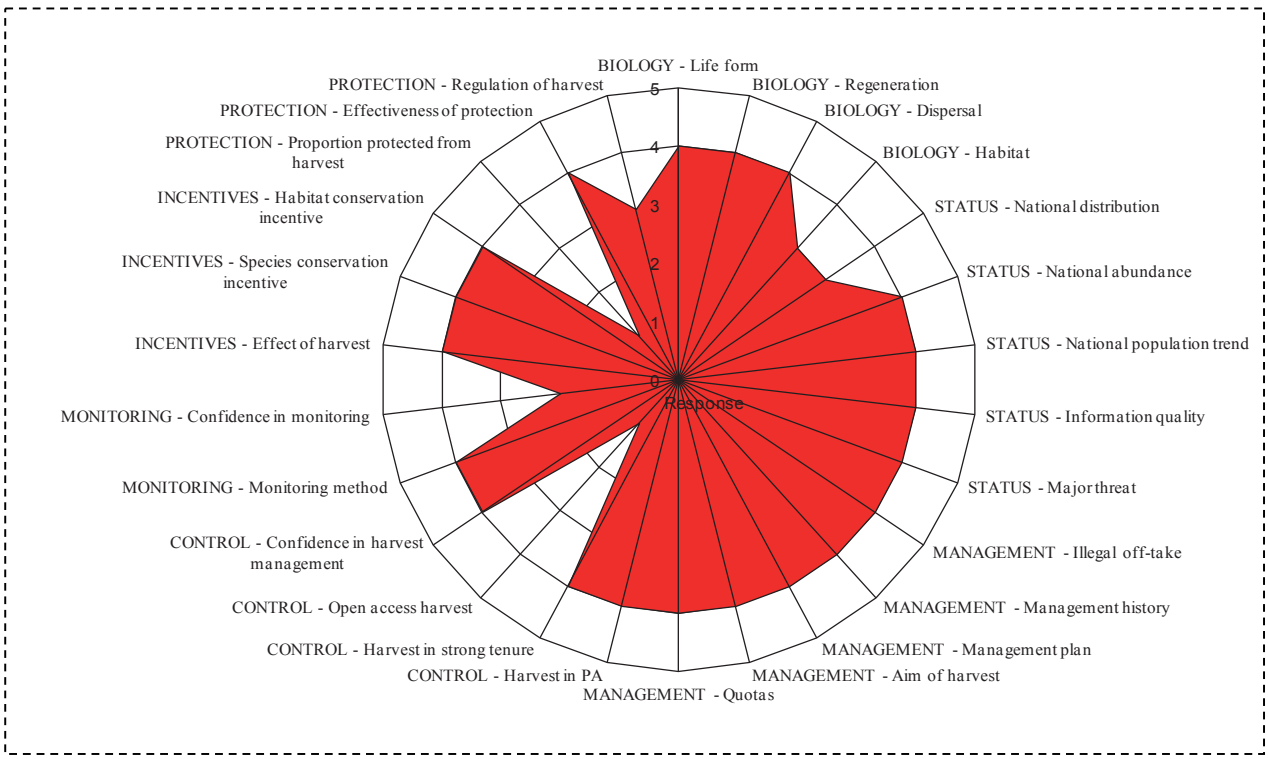

Figure 1. Radar chart summarizing the non-detriment finding assessment undertaken for *Encephalartos hirsutus* in accordance with the CITES NDF checklist. Explanations of scores given are detailed in Table 1. Higher scores are indicative of higher risks to the species. The extensive shaded area in the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

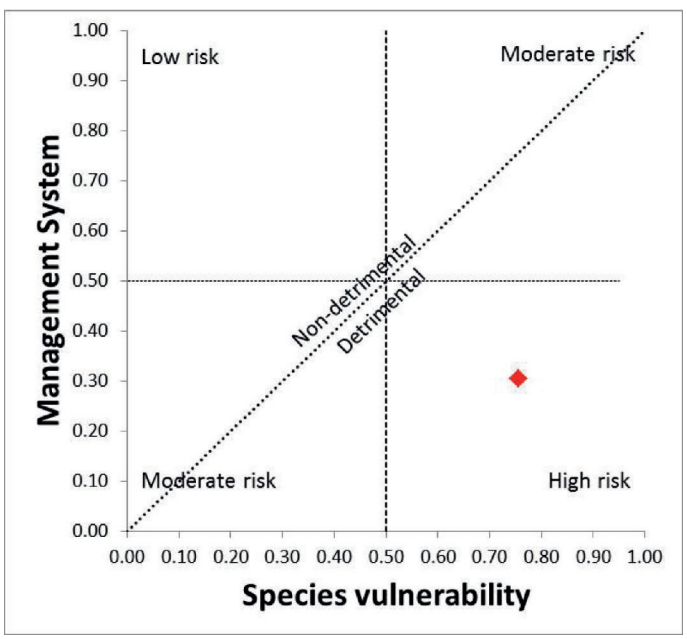

Figure 2. The risk of trading in *Encephalartos hirsutus* as represented by the relationship between species vulnerability (biology and status) (0 = low vulnerability; 1 = high vulnerability) and the management system to which the species is subjected (management, control, monitoring, incentives

and protection) (0 = weak management system; 1 = strong management system). The figure shows that the species is at high risk and trade is detrimental.

Table 1. Non-detriment finding assessment for *Encephalartos hirsutus* 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
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
The cycad life history is characterized by long-lived adults that regenerate predominantly from seed. Plants do produce suckers, but they are relatively unimportant for the regeneration of cycad populations, with 95% of species regenerating from seed only. Suckers remaining behind after the main plant has been harvested do sometimes survive.		
3. Dispersal efficiency: How efficient is the species' dispersal mechanism?	Very good	1
	Good	2
	Medium	3
	Poor	**4**
	Uncertain	5
The dispersal abilities of cycads are not well understood but are generally regarded as poor. Even if seed were dispersed to new sites, the concomitant dispersal of species-specific pollinators would be highly unlikely thus rendering population recovery after local extirpation impossible. Colonization of new sites is improbable due to a number of reproductive limitations, such as limited seed production or non-viable seeds, irregular coning and male biases in populations. There has been no observed change / expansion in the distribution of any cycad species.		
4. Habitat: What is the habitat preference of the species?	Disturbed open	1
	Undisturbed open	2
	Pioneer	**3**
	Disturbed forest	4
	Climax	5
Encephalartos hirsutus *plants grow in exposed positions on south-east facing quartzite cliffs, in moist semi-deciduous mixed scrub.*		
National status		
5. National distribution: How is the	Widespread, contiguous in country	1

species distributed nationally?	Widespread, fragmented in country	2
	Restricted and fragmented	**3**
	Localized	4
	Uncertain	5
Originally there were three known localities for this species in the Soutpansberg region of the Limpopo province.		
6. National abundance: What is the abundance nationally?	Very abundant	1
	Common	2
	Uncommon	3
	Rare	**4**
	Uncertain	5
There is only one verifiable plant with four stems remaining in an inaccessible location on the edge of a cliff in a private nature reserve in Limpopo, although additional plants that were not targeted by monitoring efforts cannot be discounted.		
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
When the species was first described in 1996, the size of the wild population was estimated to number between 400 and 500 plants. By 2004 the monitored wild population had declined to 219 plants and today only one individual apparently remains. Encephalartos hirsutus *is currently listed in the IUCN Red List category of Critically Endangered (A4acd;B2ab(iii,iv,v);C1 (IUCN version 3.1)).*		
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 information on abundance and trend is based on anecdotal reports from field officials. A helicopter survey in 2012 yielded no plants in the wild except the individual previously mentioned.		
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
The impact of poaching on E. hirsutus *has been severe and has resulted in the near extinction of the species. These cycads are highly desirable in the horticultural trade. They are very expensive and can only be observed in elite private collections. Hacking marks on wild plants have been attributed in the literature to medicinal use, but it is more likely that the damage was caused by poachers chopping off suckers for sale into the horticultural trade. In general around 30-50% of cycads removed from the wild die within a few years.*		
Harvest management		
10. Illegal off-take or trade: How	None	1

significant is the national problem of illegal or unmanaged off-take or trade?	Small	2
	Medium	3
	Large	**4**
	Uncertain	5
The first E. hirsutus *to be poached were removed by undermining entire clusters of plants. A large consignment of illegal* E. hirsutus *plants was discovered in the United States of America and 17 plants are currently being held at a secure site in the USA. Illegal off-take and trade has resulted in the near extinction of* E. hirsutus*.*		
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
Illegal harvesting of wild cycads has been occurring in South Africa for the past 40 years, becoming more prevalent from the 1990s onwards in spite of various legislative interventions. Since the 1970s all cycad species have been protected in provincial nature conservation ordinances, with the harvest of any plants or seed requiring a permit (in addition to other activities such as possessing, conveying, selling, etc.). Reportedly no permits were ever issued for the wild harvest of E. hirsutus *plants or seed, and since this species was discovered and described relatively recently, there is a high likelihood that all plants in collections originate from illegally sourced wild plants that were legalized in other provinces. In general there has been an exponential increase in* ex situ *cultivated cycads, which are currently regulated by provincial conservation ordinances/Acts and the National Environmental Management: Biodiversity Act (NEMBA): Threatened or Protected Species Regulations (TOPS). In February 2007 the harvest of cycads from the wild was prohibited nationally in terms of Regulation 25 of the Threatened or Protected Species Regulations (subsequently replaced by Government Notice 371 in May 2012). Poaching is nevertheless ongoing.*		
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 E. hirsutus*. A Biodiversity Management Plan for the Critically Endangered and Endangered cycads will be published in 2015 in terms of section 43 of the NEMBA.*		
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
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 are no quotas for any of South Africa's cycad species – all harvesting is illegal.		
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
Harvesting of wild cycads is illegal throughout South Africa.		
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
Harvesting of wild cycads is illegal throughout South Africa.		
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 *de facto* or actual open access?	**None**	**1**
	Low	2
	Medium	3
	High	4
	Uncertain	5
The harvest of wild cycads is prohibited throughout South Africa.		
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 no management plan for E. hirsutus*. The provincial conservation authorities that are mandated to protect wild cycad populations from illegal harvesting are currently experiencing capacity constraints relating to shortages of human resources and budget. Sixty-five percent of posts within the Biodiversity Management division of the Limpopo Department of Economic Development, Environment and Tourism were vacant in 2011/2012, and there is no botanist in this province to provide strategic direction for the conservation of the species. Frequent arrests and confiscations are indicative that the system intended to protect wild cycad populations is inadequate. Most cycad populations occur outside of state-controlled protected areas, but even those within protected areas are not secure from poaching activities.*		
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
There has been no monitoring of wild cycad populations in Limpopo province between 2004 and 2011.		
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
Sixty-five percent of posts within the Biodiversity Management division of the Limpopo Department of Economic Development, Environment and Tourism were reportedly vacant in 2011/2012. There is no botanist currently employed in Limpopo and this vacant post is unlikely to be filled soon.		
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
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
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
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
Government Notice 371 published in May 2012 in terms of section 57(2) of the National Environmental Management: Biodiversity Act (NEMBA) of 2004 prohibits the harvest of wild cycads throughout South Africa, unless required for conservation or enforcement purposes. Encephalartos hirsutus *is also listed as Specially Protected in the Limpopo Environmental Management Act (No. 7 of 2003).*		
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
The cycad trade is very complex and in order to monitor all the legal and illegal activities related to		

this trade, substantial resources would be required. Although providing for a solid legal framework, the Threatened or Protected Species Regulations have been difficult to implement by resource constrained provinces. The provincial conservation authorities that are mandated to enforce the strict protection measures pertaining to cycads are currently experiencing capacity constraints relating to shortages of human resources and budget. Sixty-eight percent of posts within the Enforcement division of the Limpopo Department of Economic Development, Environment and Tourism were reportedly vacant in the 2011/2012 financial year. In Gauteng, where the demand for illegally harvested wild cycads is ultimately centered, reportedly 4 out of 10 posts within the Biodiversity Enforcement division of the Gauteng Department of Agriculture and Rural Development were vacant in the 2011/2012 financial year, a vacancy rate of 40%. Even cycads within state-controlled protected areas are not secure from poaching activities, with protected areas often understaffed. Enforcement of the legislation is further weakened by inexperienced officials without the necessary skills to identify the different species. Prosecutors and magistrates are infrequently exposed to cycad related cases and are therefore not well informed about South Africa's cycad extinction crisis. Consequently cases relating to cycads seldom result in large fines and/or jail sentences.

*Provincial conservation legislation pertaining to cycads has been ineffectively implemented in the past in both Gauteng and KwaZulu-Natal. Neither province consistently enforced the requirements for possession permits, although all adult ("size-determined") cycads exported from KwaZulu-Natal had to be micro-chipped. In Gauteng, where most cycad enthusiasts live (50% of the Cycad Society's members reside in Gauteng with between 10% and 12% of members residing in each of the Western Cape, KwaZulu-Natal and Mpumalanga provinces), possession permits were not required for cycads between 1994 and 2001, with the regulatory authority only requiring the presentation of documentary proof of legal possession. Similarly, the legal requirement for cycad possession permits was only strictly enforced in the Eastern Cape from 1 April 2004 and property owners in possession of unpermitted cycads after this date were instead issued with cycad site registration letters. Up until 31 March 2004, people in possession of unpermitted cycads were given amnesty based on submission of affidavits and documentary proof of legal origin. (*Encephalartos latifrons *and* E. arenarius *were excluded from this amnesty.) Conservation legislation in three out of the four provinces that were designated out of the former Transvaal province is weak, providing for adequate control over the possession and movement of only those cycad species indigenous to the former Transvaal province (the exception being Limpopo where all South African cycads are Specially Protected). This ineffective implementation of legislation has allowed the entry of illegally harvested plants into the legal trade. In the past, a number of syndicates involved in poaching activities moved illegally harvested cycads into Gauteng where possession permits were not required, laundering them into the trade with the required documentary proof. Such operations apparently continue until today due to the delayed implementation of new national legislation (Threatened or Protected Species Regulations).*

Due to the impossibility of tracing the origin of these cycads and/or proving wild origin to the satisfaction of a court (proof of wild origin over and above a reasonable suspicion is required), these plants have been and continue to be legalized through the issuing of possession permits and are subsequently incorporated into private collections. No permit has ever been issued for the harvest of E. hirsutus *plants or seed and all plants in collections therefore originate from wild sourced plants that were legalized in other provinces. One garden in Pretoria has more than 7* E. hirsutus *plants, all of which were legalized after the owner provided documentary proof of legal possession. Similarly in KwaZulu-Natal, a permit application was received from a member of the public who had purchased five* E. hirsutus *plants. The use of these plants as parental stock for the propagation of seedlings for both the domestic and international cycad trade cannot be ruled out. For example, a female* E. hirsutus *plant was recently legalized for a Gauteng-based exporter and the seedlings are now traded*

on the international market. International trade in E. hirsutus *started in 1999, just three years after the species was described and during the years when the cycad protection measures in Gauteng were particularly weak. The trade has shown an increasing trend since its inception (*$R^2 = 0.39$; $P < 0.05$*) (CITES Trade Database, UNEP World Conservation Monitoring Centre, Cambridge, UK) in parallel with the observed decline of the wild population. Altogether 224* E. hirsutus *specimens (estimated total value of R2 688 000) had been exported from South Africa up until the end of 2011. The average annual value of* E. hirsutus *exports is estimated at around R210 000 ± R207 000 (assuming exports of 3-year old seedlings at 2012-2013 prices). As no permit has ever been issued to allow for the harvest of* E. hirsutus *plants or seed from the wild and the species was only discovered and described recently, it is unlikely that the original parental stock was obtained legally prior to the enactment of the provincial legislation.*

Micro-chips inserted into wild cycads as a measure of proving wild origin are often destroyed or removed and it has been suggested that they are even sometimes replaced with legal micro-chips previously inserted into legally owned ex situ *cycads, effectively laundering plants of wild origin. It has also been suggested that legal micro-chips are inserted into un-chipped wild plants to prove legal ownership. Suckers are seldom micro-chipped and are therefore particularly vulnerable to poaching.*

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

Harvesting of wild cycads is prohibited throughout South Africa, yet this restriction remains ineffective.

Supporting documents

1. The IUCN Species Survival Commission Guidance for CITES Scientific Authorities. Checklist to assist in making non-detriment findings for Appendix II exports. Occasional Paper of the IUCN Species Survival Commission No. 27 (2002). A. Rosser and M. Haywood.
2. Donaldson, J.S. 2010. *Encephalartos hirsutus*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.1. <www.iucnredlist.org>. Downloaded on 30 August 2012.
3. Hugo, C. 2012. Identification of indigenous cycads of South Africa. p. 142. 4 images. Totiusdal. South Africa.

Non-detriment finding for *Encephalartos inopinus*

Reference Number: Enc_ino_May2015

Date: 28 May 2015

Issued by the Scientific Authority of South Africa

Summary of finding

Encephalartos inopinus (Lydenburg cycad) is included in Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). As an Appendix I species, the export of specimens for commercial purposes is prohibited (Article III). However, specimens artificially propagated for commercial purposes are deemed to be specimens of species included in Appendix II (Article VII) of CITES and therefore may be traded. 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 export will not be detrimental to the survival of that species. This document details the undertaking of a non-detriment finding (NDF) for *E. inopinus* and is based on the best available information, current as of May 2015.

Encephalartos inopinus has been listed as Critically Endangered by the IUCN (the International Union for Conservation of Nature), meaning that it is considered to be facing an extremely high risk of extinction in the wild. Formerly localized in Limpopo province, this species may in fact already be extinct in the wild. An aerial survey over the species' locality in 2008 and then again in 2012 failed to locate any plants. Poaching of plants to supply the horticultural trade as well as private collections has had a severe impact on the wild population of *E. inopinus*, causing a dramatic decline of 83% in the time period between 1992 and 2001, and then a further decline of 28% between 2001 and 2004.

The harvest of wild cycads has been prohibited throughout South Africa since February 2007. Prior to this, any harvesting, possession or conveyance of cycads required permits in terms of provincial legislation enacted in the 1970s. No permits were reportedly ever issued for the wild harvest of *E. inopinus* plants or seed, but plants may have been harvested from the wild prior to the enactment of provincial legislation and seedlings were also available from the Hartebeesthoek nursery which operated between 1975 and 1998. In general there has been an exponential increase in *ex situ* cultivated cycads, which are regulated by provincial conservation ordinances/Acts and the National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEMBA): Threatened or Protected Species (TOPS) Regulations. Enforcement of the strict protection measures afforded to cycads has been hampered by the human resource and budgetary constraints facing the provincial conservation authorities that are mandated to enforce provincial and national environmental legislation, and ongoing illegal harvest of wild cycads is a countrywide problem. In Gauteng for example, where the demand for illegally harvested wild cycads is ultimately centered, reportedly 40% of posts within the Biodiversity Enforcement division of the Gauteng Department of Agriculture and Rural Development were vacant in

the 2011/2012 financial year. The Limpopo Department of Economic Development, Environment and Tourism is primarily responsible for the *in situ* protection and management of *E. inopinus*. However this department is experiencing severe capacity constraints, for example vacancy rates for the 2011/2012 financial year were reported to be 65% for the Biodiversity Management division and 68% for the Enforcement division. There is furthermore no botanist in this province to provide strategic direction for the conservation of the species.

Past ineffective implementation of conservation legislation in the provinces of KwaZulu-Natal, the Eastern Cape and particularly Gauteng, where the requirements for cycad possession permits have not been consistently enforced, has facilitated the entry of illegally harvested cycads into the legal trade. Wild-sourced plants have been and continue to be legalized and incorporated into private collections. Their use as parental stock for the propagation of seedlings for both the domestic and international cycad trade cannot be ruled out. International trade in E. inopinus started in 1986, but the bulk of the trade (96%) occurred after 1995 when the cycad protection measures in Gauteng were particularly weak. Peak trade levels between 1995 and 2001 coincided with the massive decline observed in the wild population. By the end of 2011, altogether 2149 specimens (with an estimated total value of R3 868 000 and an average annual value of around R126 000 $\pm$ R63 000) had been exported from South Africa. No conservation benefit for the species or its habitat is derived from the trade in *E. inopinus*.

Micro-chips inserted into wild plants have proven to be largely ineffective for establishing wild origins of cycads and have failed to deter poachers. The failure of the legal protection measures has been further exacerbated by prosecutors and magistrates who are not well informed about South Africa's cycad extinction crisis and the small fines issued and minimal jail sentences passed for cycad related offenses are ineffective deterrents.

There is an outdated conservation plan for *E. inopinus* that is in considerable need of revision. A Biodiversity Management Plan for the Critically Endangered and Endangered cycads will soon be published in terms of section 43 of the NEMBA, however it will be a while before its effectiveness can be evaluated.

The species' biology, which is characterized by a poor dispersal ability and slow growing long-lived adults that regenerate predominantly from seed, renders *E. inopinus* particularly vulnerable to overutilization. This, together with the species' extremely poor conservation status, the severe poaching pressure, the capacity and budgetary constraints that prevent the Limpopo Department of Economic Development, Environment and Tourism from curbing poaching, the lack of conservation incentives and the continuing ineffective implementation of the existing strict protection measures for cycads on a national basis, presents a scenario that is unfavourable for the survival of *E. inopinus* in the wild and the species is at an extremely high risk of unsustainable utilization (Figure 1). In fact illegal off-take to supply the cycad trade may already have caused the extinction of this species. In order to decrease the risk to this species and bring about its recovery, a concerted effort to address all of these factors is essential.

Current trade in artificially propagated specimens of *E. inopinus* is detrimental (Figure 2). The Scientific Authority, in reviewing the factors presented above, is unable to state with any confidence that parental stock is cultivated (as defined in the CITES Resolution Conf. 11.11 (Rev. CoP15)) in all cases of export since (1) evidence of legal acquisition is dubious and (2) the data at hand suggest that some parental stock has been obtained in a manner detrimental to the wild population. It is therefore recommended that *E. inopinus* seedlings may only be exported if the nursery is registered in accordance with the CITES Resolution Conf. 9.19 (Rev. CoP15), and

i. The seedlings are artificially propagated in accordance with the CITES Resolution Conf. 11.11 (Rev. CoP15), or
ii. The seedlings have been grown from wild harvested seed in accordance with the conditions specified in the CITES Resolution Conf. 11.11 (Rev. CoP15) and within the framework of a Biodiversity Management Plan published in terms of section 43 of the NEMBA, or
iii. The seedlings have been grown from legal (TOPS possession permits issued prior to May 2012) wild origin parental plants and a portion of the seed / seedlings are made available for the recovery of the species within the framework of a Biodiversity Management Plan published in terms of section 43 of the NEMBA.

Each nursery applying for CITES registration must be audited in accordance with a decision tree to be developed by the Scientific Authority within 3 months of the publication of this NDF, and regular follow up audits must be conducted in order to monitor seedling propagation. All parental plants must

i. Be accompanied by TOPS possession permits and, with the exception of scenario (iii) above, affidavits from the owner stating that the plants are not of wild origin, and
ii. Not exhibit any characteristics typical of wild origin, with the exception of wild origin parental plants considered in scenario (iii) above. Guidelines for the identification of wild characteristics will be developed by the Scientific Authority within 3 months of the publication of this NDF.

The export of large artificially propagated specimens (with a stem diameter of more than 15 cm) is prohibited (Government Notice 371, May 2012).

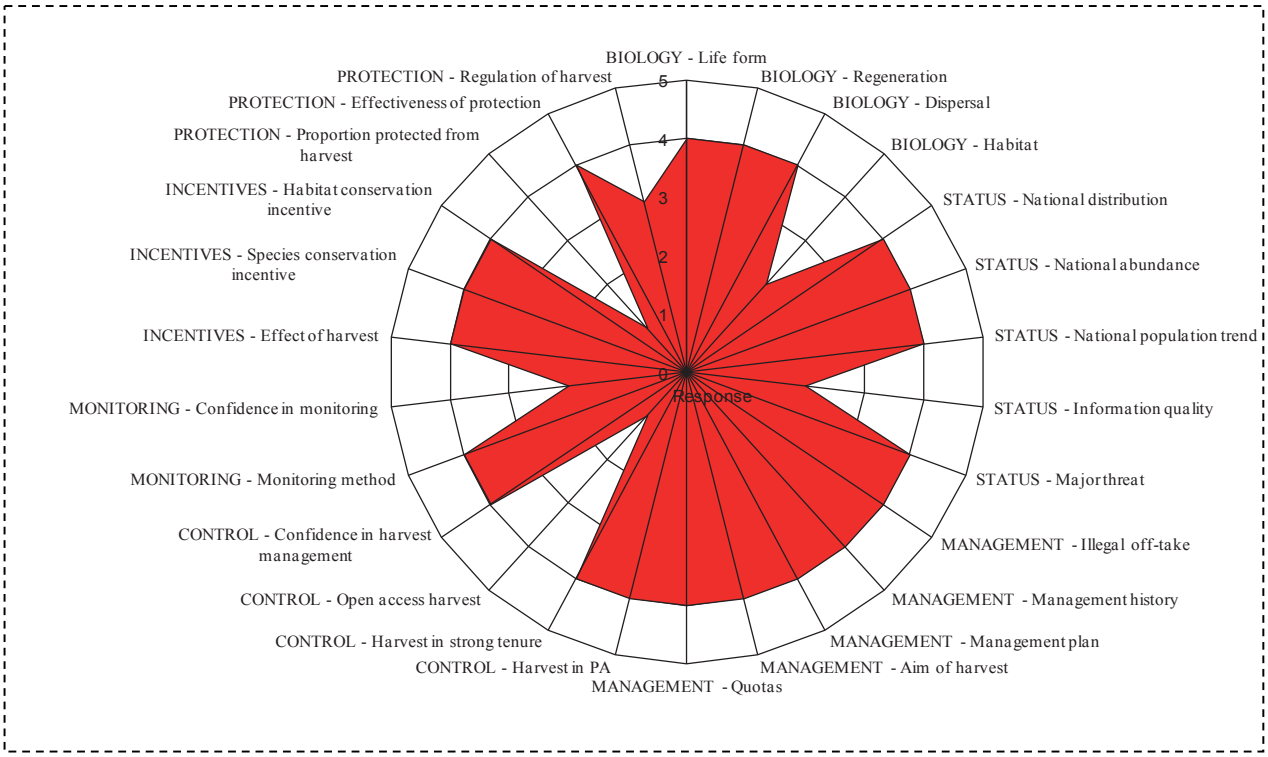

Figure 1. Radar chart summarizing the non-detriment finding assessment undertaken for *Encephalartos inopinus* in accordance with the CITES NDF checklist. Explanations of scores given are detailed in Table 1. Higher scores are indicative of higher risks to the species. The extensive shaded area in the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

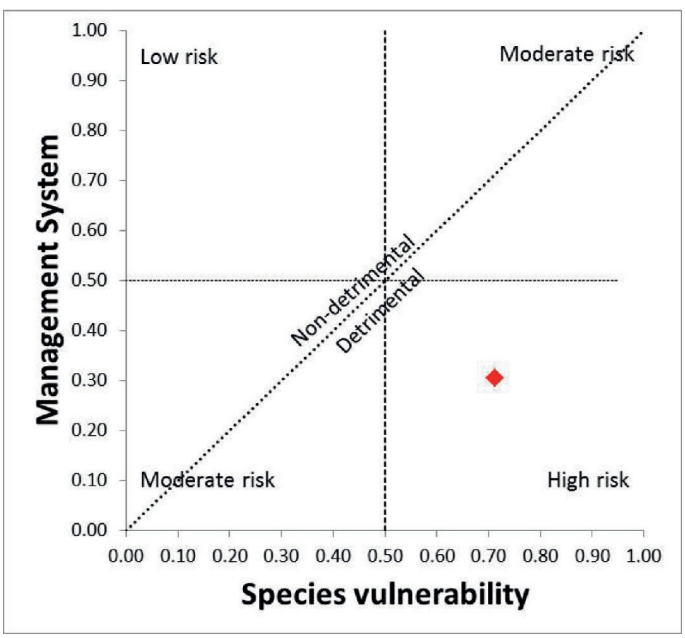

Figure 2. The risk of trading in *Encephalartos inopinus* as represented by the relationship between species vulnerability (biology and status) (0 = low vulnerability; 1 = high vulnerability) and the management system to which the species is subjected (management, control, monitoring, incentives

and protection) (0 = weak management system; 1 = strong management system). The figure shows that the species is at high risk and trade is detrimental.

Table 1. Non-detriment finding assessment for *Encephalartos inopinus* 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
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
The cycad life history is characterized by long-lived adults that regenerate predominantly from seed. Plants do produce suckers, but they are relatively unimportant for the regeneration of cycad populations, with 95% of species regenerating from seed only. Suckers remaining behind after the main plant has been harvested do sometimes survive.		
3. Dispersal efficiency: How efficient is the species' dispersal mechanism?	Very good	1
	Good	2
	Medium	3
	Poor	**4**
	Uncertain	5
The dispersal abilities of cycads are not well understood but are generally regarded as poor. Even if seed were dispersed to new sites, the concomitant dispersal of species-specific pollinators would be highly unlikely thus rendering population recovery after local extirpation impossible. Colonization of new sites is improbable due to a number of reproductive limitations, such as limited seed production or non-viable seeds, irregular coning and male biases in populations. There has been no observed change / expansion in the distribution of any cycad species.		
4. Habitat: What is the habitat preference of the species?	Disturbed open	1
	Undisturbed open	**2**
	Pioneer	3
	Disturbed forest	4
	Climax	5
Encephalartos inopinus *plants grow mainly in thick bush in skeletal soil or no soil on north-facing steep slopes or rocky outcrops in gorges.*		
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
This species was formerly localized in the Limpopo province.		
6. National abundance: What is the abundance nationally?	Very abundant	1
	Common	2
	Uncommon	3
	Rare	**4**
	Uncertain	5
Encephalartos inopinus *may be extinct in the wild.*		
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
Results of helicopter surveys show a dramatic decline in the wild population of this species from 677 plants counted in 1992, to 113 in 2001 and 81 in 2004. An aerial survey over the species' locality in 2008 and then again in 2012 failed to locate any plants and it is suspected that the species may now be extinct in the wild. Encephalartos inopinus *is currently listed in the IUCN Red List category of Critically Endangered (A2acd;B2ab(i,ii,iv,v);C1+2a(i) (IUCN version 3.1)).*		
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
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
Poaching of plants to supply the horticultural trade as well as private collections has had a severe impact on this species and may have resulted in its extinction. In general around 30-50% of cycads removed from the wild die within a few years.		
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
Illegal off-take has caused the possible extinction of E. inopinus.		
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
Illegal harvesting of wild cycads has been occurring in South Africa for the past 40 years, becoming more prevalent from the 1990s onwards in spite of various legislative interventions. Since the 1970s all cycad species have been protected in provincial nature conservation ordinances, with the harvest of any plants or seed requiring a permit (in addition to other activities such as possessing, conveying, selling, etc.). Reportedly no permits were ever issued for the wild harvest of E. inopinus *plants or seed. Plants may however have been harvested from the wild prior to the enactment of provincial legislation or obtained from the Hartebeesthoek nursery which operated in the former Transvaal province between 1975 and 1998. In general there has been an exponential increase in* ex situ *cultivated cycads, which are currently regulated by provincial conservation ordinances/Acts and the National Environmental Management: Biodiversity Act (NEMBA): Threatened or Protected Species Regulations (TOPS). In February 2007 the harvest of cycads from the wild was prohibited nationally in terms of Regulation 25 of the Threatened or Protected Species Regulations (subsequently replaced by Government Notice 371 in May 2012). Poaching is nevertheless ongoing.*		
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 an outdated conservation plan for E. inopinus *that is in considerable need of revision. A Biodiversity Management Plan for the Critically Endangered and Endangered cycads will be published in 2015 in terms of section 43 of the NEMBA.*		
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
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 are no quotas for any of South Africa's cycad species – all harvesting is illegal.		
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

Harvesting of wild cycads is illegal throughout South Africa.		
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
Harvesting of wild cycads is illegal throughout South Africa.		
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 *de facto* or actual open access?	**None**	**1**
	Low	2
	Medium	3
	High	4
	Uncertain	5
The harvest of wild cycads is prohibited throughout South Africa.		
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
The provincial conservation authorities that are mandated to protect wild cycad populations from illegal harvesting are currently experiencing capacity constraints relating to shortages of human resources and budget. Sixty-five percent of posts within the Biodiversity Management division of the Limpopo Department of Economic Development, Environment and Tourism were vacant in 2011/2012, and there is no botanist in this province to provide strategic direction for the conservation of the species. Frequent arrests and confiscations are indicative that the system intended to protect wild cycad populations is inadequate. Most cycad populations occur outside of state-controlled protected areas, but even those within protected areas are not secure from poaching activities.		
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
There has been no monitoring of wild cycad populations in Limpopo province between 2004 and 2011.		
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
Sixty-five percent of posts within the Biodiversity Management division of the Limpopo Department of Economic Development, Environment and Tourism were reportedly vacant in 2011/2012. There is no		

botanist currently employed in Limpopo and this vacant post is unlikely to be filled soon.		
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
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
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
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
Government Notice 371 published in May 2012 in terms of section 57(2) of the National Environmental Management: Biodiversity Act (NEMBA) of 2004 prohibits the harvest of wild cycads throughout South Africa, unless required for conservation or enforcement purposes. Encephalartos inopinus *is also listed as Specially Protected in the Limpopo Environmental Management Act (No. 7 of 2003).*		
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
The cycad trade is very complex and in order to monitor all the legal and illegal activities related to this trade, substantial resources would be required. Although providing for a solid legal framework, the Threatened or Protected Species Regulations have been difficult to implement by resource constrained provinces. The provincial conservation authorities that are mandated to enforce the strict protection measures pertaining to cycads are currently experiencing capacity constraints relating to shortages of human resources and budget. Sixty-eight percent of posts within the Enforcement division of the Limpopo Department of Economic Development, Environment and Tourism were reportedly vacant in the 2011/2012 financial year. In Gauteng, where the demand for illegally harvested wild cycads is ultimately centered, reportedly 4 out of 10 posts within the Biodiversity Enforcement division of the Gauteng Department of Agriculture and Rural Development were vacant in the 2011/2012 financial year, a vacancy rate of 40%. Even cycads within state-controlled protected areas are not secure from poaching activities, with protected areas often understaffed. Enforcement of the legislation is further weakened by inexperienced officials without the necessary skills to identify		

the different species. Prosecutors and magistrates are infrequently exposed to cycad related cases and are therefore not well informed about South Africa's cycad extinction crisis. Consequently cases relating to cycads seldom result in large fines and/or jail sentences.

*Provincial conservation legislation pertaining to cycads has been ineffectively implemented in the past in both Gauteng and KwaZulu-Natal. Neither province consistently enforced the requirements for possession permits, although all adult ("size-determined") cycads exported from KwaZulu-Natal had to be micro-chipped. In Gauteng, where most cycad enthusiasts live (50% of the Cycad Society's members reside in Gauteng with between 10% and 12% of members residing in each of the Western Cape, KwaZulu-Natal and Mpumalanga provinces), possession permits were not required for cycads between 1994 and 2001, with the regulatory authority only requiring the presentation of documentary proof of legal possession. Similarly, the legal requirement for cycad possession permits was only strictly enforced in the Eastern Cape from 1 April 2004 and property owners in possession of unpermitted cycads after this date were instead issued with cycad site registration letters. Up until 31 March 2004, people in possession of unpermitted cycads were given amnesty based on submission of affidavits and documentary proof of legal origin. (*Encephalartos latifrons *and* E. arenarius *were excluded from this amnesty.) Conservation legislation in three out of the four provinces that were designated out of the former Transvaal province is weak, providing for adequate control over the possession and movement of only those cycad species indigenous to the former Transvaal province (the exception being Limpopo where all South African cycads are Specially Protected). This ineffective implementation of legislation has allowed the entry of illegally harvested plants into the legal trade. In the past, a number of syndicates involved in poaching activities moved illegally harvested cycads into Gauteng where possession permits were not required, laundering them into the trade with the required documentary proof. Such operations apparently continue until today due to the delayed implementation of new national legislation (Threatened or Protected Species Regulations).*

Due to the impossibility of tracing the origin of these cycads and/or proving wild origin to the satisfaction of a court (proof of wild origin over and above a reasonable suspicion is required), these plants have been and continue to be legalized through the issuing of possession permits and are subsequently incorporated into private collections. The use of these plants as parental stock for the propagation of seedlings for both the domestic and international cycad trade cannot be ruled out. International trade in E. inopinus *started in 1986, but the bulk of the trade (96%) occurred after 1995 when the cycad protection measures in Gauteng were particularly weak. Trade levels peaked between 1995 and 2001 (71% of the total trade), coinciding with the dramatic 83% decline observed in the wild population, and a record number of 881 specimens was exported in 1997 (CITES Trade Database, UNEP World Conservation Monitoring Centre, Cambridge, UK). By 2011,* altogether *2149* E. inopinus *specimens (estimated total value of R3 868 000) had been exported from South Africa. The average annual value of* E. inopinus *exports is estimated at around R126 000 ± R63 000 (assuming exports of 3-year old seedlings at 2012-2013 prices).*

Micro-chips inserted into wild cycads as a measure of proving wild origin are often destroyed or removed and it has been suggested that they are even sometimes replaced with legal micro-chips previously inserted into legally owned ex situ *cycads, effectively laundering plants of wild origin. It has also been suggested that legal micro-chips are inserted into un-chipped wild plants to prove legal ownership. Suckers are seldom micro-chipped and are therefore particularly vulnerable to poaching.*

26. Regulation of harvest effort: How effective are any restrictions on harvesting (such as age or size,	Very effective	1
	Effective	2
	Ineffective	**3**

season or equipment) for preventing overuse?	None	4
	Uncertain	5
Harvesting of wild cycads is prohibited throughout South Africa, yet this restriction remains ineffective.		

Supporting documents

1. The IUCN Species Survival Commission Guidance for CITES Scientific Authorities. Checklist to assist in making non-detriment findings for Appendix II exports. Occasional Paper of the IUCN Species Survival Commission No. 27 (2002). A. Rosser and M. Haywood.
2. Donaldson, J.S. 2010. *Encephalartos inopinus*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.1. <www.iucnredlist.org>. Downloaded on 30 August 2012.
3. Hugo, C. 2012. Identification of indigenous cycads of South Africa. p. 142. 4 images. Totiusdal. South Africa.

Non-detriment finding for *Encephalartos laevifolius*

Reference Number: Enc_lae_May2015

Date: 28 May 2015

Issued by the Scientific Authority of South Africa

Summary of finding

Encephalartos laevifolius (Kaapsehoop cycad) is included in Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). As an Appendix I species, the export of specimens for commercial purposes is prohibited (Article III). However, specimens artificially propagated for commercial purposes are deemed to be specimens of species included in Appendix II (Article VII) of CITES and therefore may be traded. 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 export will not be detrimental to the survival of that species. This document details the undertaking of a non-detriment finding (NDF) for *E. laevifolius* and is based on the best available information, current as of May 2015.

Encephalartos laevifolius has been listed as Critically Endangered by the IUCN (the International Union for Conservation of Nature), meaning that it is considered to be facing an extremely high risk of extinction in the wild. Its distribution is restricted and fragmented, the species occurring predominantly in Mpumalanga, with the main populations growing in the Kaapsehoop mountain range. Available data to date suggest that the few known and monitored populations in South Africa number approximately 26 plants, 54 plants and 15 plants. The population in the Kaapsehoop area, formerly numbering approximately 1700 plants, has experienced a severe decline of 97% between 1997 and 2010 due to poaching to supply the horticultural trade and private collections. Also due to poaching, *E. laevifolius* no longer occurs in the Blyderivierspoort Nature Reserve in Mpumalanga or in the provinces of KwaZulu-Natal and Eastern Cape.

The harvest of wild cycads has been prohibited throughout South Africa since February 2007. Prior to this, any harvesting, possession or conveyance of cycads required permits in terms of provincial legislation enacted in the 1970s. No permits were reportedly ever issued for the wild harvest of *E. laevifolius* plants or seed but plants may have been harvested from the wild prior to the enactment of provincial legislation. In general there has been an exponential increase in *ex situ* cultivated cycads, which are regulated by provincial conservation ordinances/Acts and the National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEMBA): Threatened or Protected Species (TOPS) Regulations. Enforcement of the strict protection measures afforded to cycads has been hampered by the human resource and budgetary constraints facing the provincial conservation authorities that are mandated to enforce provincial and national environmental legislation, and ongoing illegal harvest of wild cycads is a countrywide problem. In Gauteng for example, where the demand for illegally harvested wild cycads is ultimately centered, reportedly 40% of posts within the Biodiversity

Enforcement division of the Gauteng Department of Agriculture and Rural Development were vacant in the 2011/2012 financial year. The Mpumalanga Tourism and Parks Agency is primarily responsible for the *in situ* protection and management of *E. laevifolius*, however 2011/2012 vacancy rates within this agency were reported to be 51% and 64% within the Wildlife Protection Services and Scientific Services divisions, respectively. From 2011 to 2014 the Mpumalanga Tourism and Parks Agency had no operational budget.

Past ineffective implementation of conservation legislation in the provinces of KwaZulu-Natal, the Eastern Cape and particularly Gauteng, where the requirements for cycad possession permits have not been consistently enforced, has facilitated the entry of illegally harvested cycads into the legal trade. Wild-sourced plants have been and continue to be legalized and incorporated into private collections and their use as parental stock for the propagation of seedlings for both the domestic and international cycad trade cannot be ruled out. The bulk of the international trade (75%) in *E. laevifolius* occurred after 1997, coinciding with the observed dramatic decline in the wild population and taking place in the same time period when the cycad protection measures in Gauteng were particularly weak. Altogether 960 *E. laevifolius* specimens (with an estimated total value of R1 728 000 and an average annual value of around R88 000 $\pm$ R65 000) had been exported from South Africa by the end of 2011, the trade steadily increasing since its inception in 1986. No conservation benefit for the species or its habitat is derived from the trade in *E. laevifolius*.

Micro-chips inserted into wild plants have proven to be largely ineffective for establishing wild origins of cycads and have failed to deter poachers. All but 54 of the 1700 plants micro-chipped in the Kaapsehoop area had been poached by 2010 and numerous *E. laevifolius* plants exhibiting evidence of removed micro-chips have been encountered in Gauteng. The failure of the legal protection measures has been further exacerbated by prosecutors and magistrates who are not well informed about South Africa's cycad extinction crisis and the small fines issued and minimal jail sentences passed for cycad related offenses are ineffective deterrents.

Outdated (20 years old) conservation plans exist for all Mpumalanga's cycad species. Although some of these plans are currently being implemented, parts have collapsed altogether and they are in dire need of major revision. None of these plans address harvest management. A Biodiversity Management Plan for the Critically Endangered and Endangered cycads will soon be published in terms of section 43 of the NEMBA, however it will be a while before its effectiveness can be evaluated. While regular monitoring of *E. laevifolius* does take place, continuation of monitoring programmes is uncertain due to the severe capacity constraints facing the Mpumalanga Tourism and Parks Agency.

The species' biology, which is characterized by a poor dispersal ability and slow growing long-lived adults that regenerate predominantly from seed, renders *E. laevifolius* particularly vulnerable to overutilization. This, together with the species' extremely poor conservation status, the severe ongoing poaching pressure, the outdated conservation plan, the capacity and budgetary constraints that prevent the Mpumalanga Tourism and Parks Agency from effectively managing and monitoring the species, the lack of conservation incentives and the continuing ineffective implementation of the existing strict protection measures for cycads on a national basis, presents a scenario that is unfavourable for the survival of *E. laevifolius* in the wild and the species is at an extremely high risk of unsustainable

utilization (Figure 1). In order to decrease the risk to this species and prevent its imminent extinction, a concerted effort to address all of these factors is essential.

Current trade in artificially propagated specimens of *E. laevifolius* is detrimental (Figure 2). The Scientific Authority, in reviewing the factors presented above, is unable to state with any confidence that parental stock is cultivated (as defined in the CITES Resolution Conf. 11.11 (Rev. CoP15)) in all cases of export since (1) evidence of legal acquisition is dubious and (2) the data at hand suggest that some parental stock has been obtained in a manner detrimental to the wild population. It is therefore recommended that *E. laevifolius* seedlings may only be exported if the nursery is registered in accordance with the CITES Resolution Conf. 9.19 (Rev. CoP15), and

i. The seedlings are artificially propagated in accordance with the CITES Resolution Conf. 11.11 (Rev. CoP15), or
ii. The seedlings have been grown from wild harvested seed in accordance with the conditions specified in the CITES Resolution Conf. 11.11 (Rev. CoP15) and within the framework of a Biodiversity Management Plan published in terms of section 43 of the NEMBA.

Each nursery applying for CITES registration must be audited in accordance with a decision tree to be developed by the Scientific Authority within 3 months of the publication of this NDF, and regular follow up audits must be conducted in order to monitor seedling propagation. All parental plants must

i. Be accompanied by TOPS possession permits and affidavits from the owner stating that the plants are not of wild origin, and
ii. Not exhibit any characteristics typical of wild origin. Guidelines for the identification of wild characteristics will be developed by the Scientific Authority within 3 months of the publication of this NDF.

The export of large artificially propagated specimens (with a stem diameter of more than 15 cm) is prohibited (Government Notice 371, May 2012).

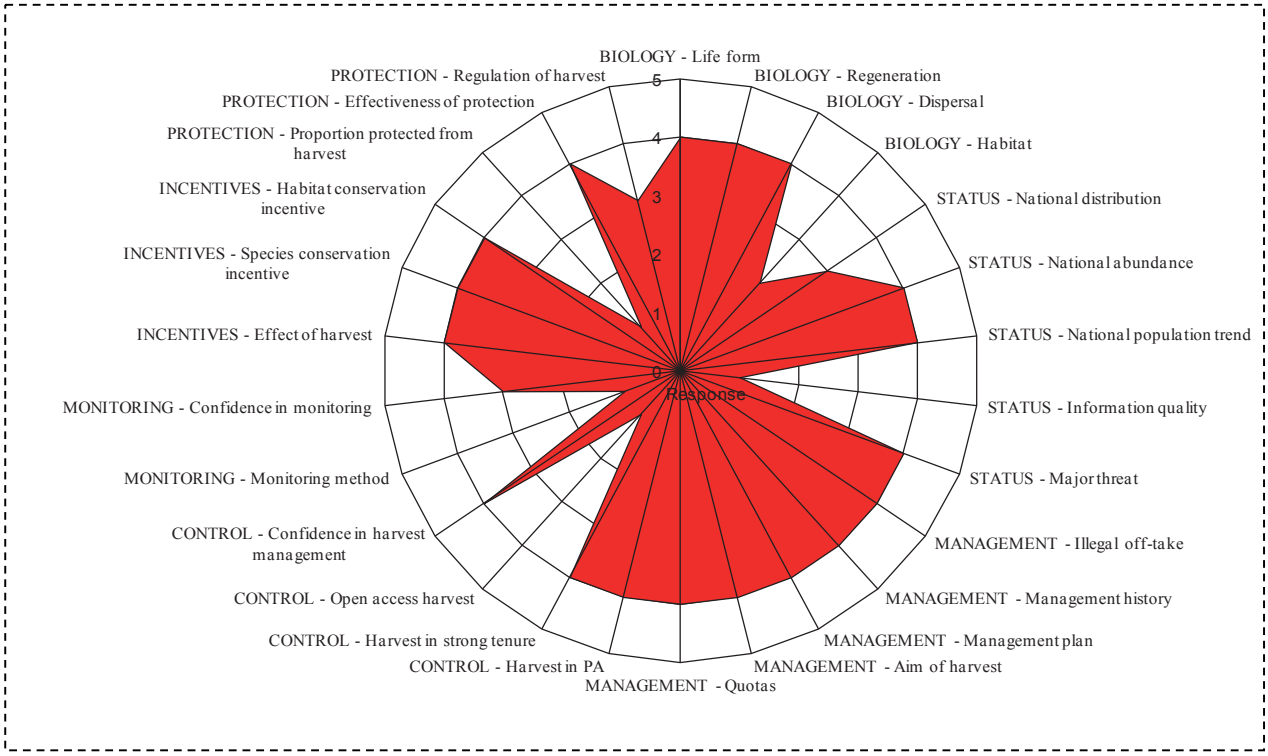

Figure 1. Radar chart summarizing the non-detriment finding assessment undertaken for *Encephalartos laevifolius* in accordance with the CITES NDF checklist. Explanations of scores given are detailed in Table 1. Higher scores are indicative of higher risks to the species. The extensive shaded area in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

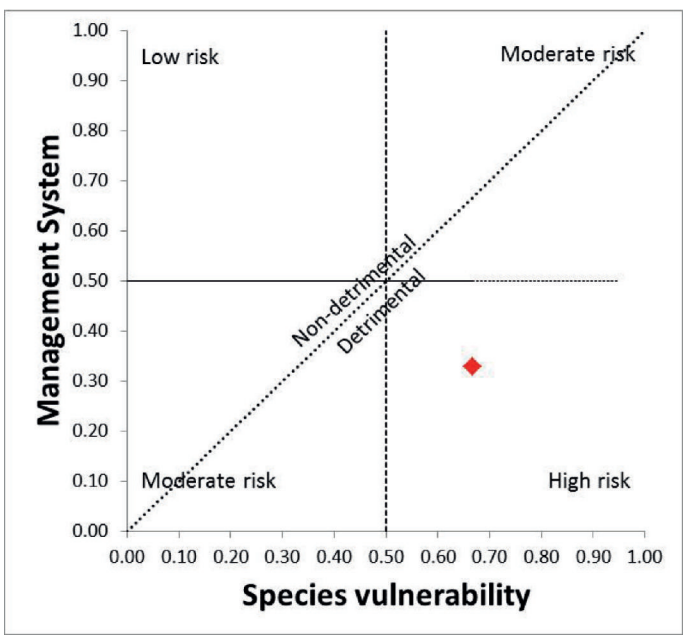

Figure 2. The risk of trading in *Encephalartos laevifolius* as represented by the relationship between species vulnerability (biology and status) (0 = low vulnerability; 1 = high vulnerability) and the management system to which the species is subjected (management, control, monitoring, incentives

and protection) (0 = weak management system; 1 = strong management system). The figure shows that the species is at high risk and trade is detrimental.

Table 1. Non-detriment finding assessment for *Encephalartos laevifolius* 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
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
The cycad life history is characterized by long-lived adults that regenerate predominantly from seed. Plants do produce suckers, but they are relatively unimportant for the regeneration of cycad populations, with 95% of species regenerating from seed only. Suckers remaining behind after the main plant has been harvested do sometimes survive.		
3. Dispersal efficiency: How efficient is the species' dispersal mechanism?	Very good	1
	Good	2
	Medium	3
	Poor	**4**
	Uncertain	5
The dispersal abilities of cycads are not well understood but are generally regarded as poor. Even if seed were dispersed to new sites, the concomitant dispersal of species-specific pollinators would be highly unlikely thus rendering population recovery after local extirpation impossible. Colonization of new sites is improbable due to a number of reproductive limitations, such as limited seed production or non-viable seeds, irregular coning and male biases in populations. There has been no observed change / expansion in the distribution of any cycad species.		
4. Habitat: What is the habitat preference of the species?	Disturbed open	1
	Undisturbed open	**2**
	Pioneer	3
	Disturbed forest	4
	Climax	5
Encephalartos laevifolius *plants grow in full sunlight in grassland or scrub on steep rocky slopes. Most localities are high altitude sites with frequent mists.*		
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
Encephalartos laevifolius *occurs predominantly in Mpumalanga in the Kaapsehoop mountain range and there is an isolated colony further north. It also used to occur in the KwaZulu-Natal and Eastern Cape provinces. The species is not endemic to South Africa, also occurring in Swaziland.*		
6. National abundance: What is the abundance nationally?	Very abundant	1
	Common	2
	Uncommon	3
	Rare	**4**
	Uncertain	5
Available data to date suggests that the few known and monitored populations in South Africa number approximately 26 plants, 54 plants and 15 plants.		
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
An isolated population partially growing within the Blyderivierspoort Nature Reserve declined from 26 plants to 7 plants and after some time the remaining 7 plants were all poached during one incident in 2007/2008. In the Kaapsehoop area 1700 E. laevifolius *plants were micro-chipped in 1997. In the last count undertaken in 2010, only 54 plants were found to be remaining. A small number of* E. laevifolius *plants occurred in KwaZulu-Natal but were illegally harvested at some stage. The species has also been extirpated from the Eastern Cape. There are reports from Swaziland that* E. laevifolius *is being depleted by poachers there too.* Encephalartos laevifolius *is currently listed in the IUCN Red List category of Critically Endangered (A2acde+4acde (IUCN version 3.1)).*		
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
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
Poaching in order to supply the horticultural trade and private collections has had a severe impact on this species. Encephalartos laeviofolius *is a popular species in the cycad trade and large plants are often seen in private garden collections. The growth rates of these cycads are particularly slow and traders may not want to wait until plants grow to a tradable size. Unfortunately these cycads do not transplant well and about 60% of* E. laevifolius *plants removed from the wild die within a few years. Medicinal use of* E. laevifolius *is also recorded in the literature.*		

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
The impact of poaching on E. laevifolius *has been severe. The syndicate responsible for the demise of the Kaapesehoop population was highly organized and knowledgeable and comprised of 57 members. They have since been arrested and are now serving jail sentences, while the head of the syndicate has died. Plants poached by this syndicate were customarily sold to nurseries. Eighteen micro-chipped plants were recovered during an investigation in Gauteng in 2008. Fifty-nine plants were recovered in Nelspruit of which 14 were micro-chipped. Numerous* E. laevifolius *plants have been encountered in Gauteng with their micro-chips removed.*		
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
Illegal harvesting of wild cycads has been occurring in South Africa for the past 40 years, becoming more prevalent from the 1990s onwards in spite of various legislative interventions. Since the 1970s all cycad species have been protected in provincial nature conservation ordinances, with the harvest of any plants or seed requiring a permit (in addition to other activities such as possessing, conveying, selling, etc.). Reportedly no permits were ever issued for the wild harvest of E. laevifolius *plants or seed. Plants may however have been harvested from the wild prior to the enactment of provincial legislation. In general there has been an exponential increase in* ex situ *cultivated cycads, which are currently regulated by provincial conservation ordinances/Acts and the National Environmental Management: Biodiversity Act (NEMBA): Threatened or Protected Species Regulations (TOPS). In February 2007 the harvest of cycads from the wild was prohibited nationally in terms of Regulation 25 of the Threatened or Protected Species Regulations (subsequently replaced by Government Notice 371 in May 2012). Poaching is nevertheless ongoing.*		
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
Outdated (20 years old) conservation plans do exist for all Mpumalanga's cycad species. These plans are all very similar, having being based on the same template, and address propagation and restoration but not harvest. Although components of the plans have collapsed altogether (e.g. ex situ *propagation at the Hartebeesthoek nursery), some of the conservation plans are still being implemented. The plans are however in dire need of major revision, especially as the situation pertaining to cycads has changed significantly since they were drafted. These revisions would however be hampered by a lack of human resources within the Mpumalanga Tourism and Parks Agency. The 2011/2012 vacancy rate within the Scientific Services division for example was reportedly 64% and not a single botanist is currently employed in the province. A Biodiversity Management Plan for the Critically Endangered and Endangered cycads will be published in 2015 in*		

terms of section 43 of the NEMBA.		
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
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 are no quotas for any of South Africa's cycad species – all harvesting is illegal.		
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
Harvesting of wild cycads is illegal throughout South Africa.		
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
Harvesting of wild cycads is illegal throughout South Africa.		
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 *de facto* or actual open access?	**None**	**1**
	Low	2
	Medium	3
	High	4
	Uncertain	5
The harvest of wild cycads is prohibited throughout South Africa.		
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
The provincial conservation authorities that are mandated to protect wild cycad populations from illegal harvesting are currently experiencing capacity constraints relating to shortages of human		

resources and budget. Blyderivierspoort Nature Reserve has 26 field ranger posts and only 7 of these were reportedly filled in 2011/2012, a vacancy rate of 73%. From 2011 to 2014 the Mpumalanga Tourism and Parks Agency had no operational budget. Frequent arrests and confiscations are indicative that the system intended to protect wild cycad populations is inadequate. Most cycad populations occur outside of state-controlled protected areas, but even those within protected areas (e.g. E. laevifolius*) are not secure from poaching activities.*		
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
Formal surveys are undertaken relatively frequently, budget permitting.		
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
The Mpumalanga Tourism and Parks Agency is currently experiencing severe budgetary constraints as well as a lack of human resources. In the 2011/2012 financial year, the Scientific Services division reportedly had a vacancy rate of 64%, and from 2011 to 2014 the Mpumalanga Tourism and Parks Agency had no operational budget.		
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
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
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
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

Government Notice 371 published in May 2012 in terms of section 57(2) of the National Environmental Management: Biodiversity Act (NEMBA) of 2004 prohibits the harvest of wild cycads throughout South Africa, unless required for conservation or enforcement purposes. Encephalartos laevifolius *is also listed as Specially Protected in the Mpumalanga Nature Conservation Act (No. 10 of 1998) and in the Limpopo Environmental Management Act (No. 7 of 2003) and it used to occur within a protected area.*

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

The cycad trade is very complex and in order to monitor all the legal and illegal activities related to this trade, substantial resources would be required. Although providing for a solid legal framework, the Threatened or Protected Species Regulations have been difficult to implement by resource constrained provinces. The provincial conservation authorities that are mandated to enforce the strict protection measures pertaining to cycads are currently experiencing capacity constraints relating to shortages of human resources and budget. The 2011/2012 vacancy rate within the Wildlife Protection Services of the Mpumalanga Tourism and Parks Agency was reported to be 51% and from 2011 to 2014 the Agency had no operational budget. In Gauteng, where the demand for illegally harvested wild cycads is ultimately centered, reportedly 4 out of 10 posts within the Biodiversity Enforcement division of the Gauteng Department of Agriculture and Rural Development were vacant in the 2011/2012 financial year, a vacancy rate of 40%. Even cycads within state-controlled protected areas (e.g. E. laevifolius*) are not secure from poaching activities, with protected areas often understaffed (e.g. Blyderivierspoort Nature Reserve with a vacancy rate of 73%). Enforcement of the legislation is further weakened by inexperienced officials without the necessary skills to identify the different species. Prosecutors and magistrates are infrequently exposed to cycad related cases and are therefore not well informed about South Africa's cycad extinction crisis. Consequently cases relating to cycads seldom result in large fines and/or jail sentences.*

*Provincial conservation legislation pertaining to cycads has been ineffectively implemented in the past in both Gauteng and KwaZulu-Natal. Neither province consistently enforced the requirements for possession permits, although all adult ("size-determined") cycads exported from KwaZulu-Natal had to be micro-chipped. In Gauteng, where most cycad enthusiasts live (50% of the Cycad Society's members reside in Gauteng with between 10% and 12% of members residing in each of the Western Cape, KwaZulu-Natal and Mpumalanga provinces), possession permits were not required for cycads between 1994 and 2001, with the regulatory authority only requiring the presentation of documentary proof of legal possession. Similarly, the legal requirement for cycad possession permits was only strictly enforced in the Eastern Cape from 1 April 2004 and property owners in possession of unpermitted cycads after this date were instead issued with cycad site registration letters. Up until 31 March 2004, people in possession of unpermitted cycads were given amnesty based on submission of affidavits and documentary proof of legal origin. (*Encephalartos latifrons *and* E. arenarius *were excluded from this amnesty.) Conservation legislation in three out of the four provinces that were designated out of the former Transvaal province is weak, providing for adequate control over the possession and movement of only those cycad species indigenous to the former Transvaal province (the exception being Limpopo where all South African cycads are Specially Protected). This ineffective implementation of legislation has allowed the entry of illegally harvested plants into the legal trade. In the past, a number of syndicates involved in poaching activities moved illegally harvested cycads into Gauteng where possession permits were not required, laundering them into the trade with the required documentary proof. Such operations apparently continue until today due to*

the delayed implementation of new national legislation (Threatened or Protected Species Regulations).

Due to the impossibility of tracing the origin of these cycads and/or proving wild origin to the satisfaction of a court (proof of wild origin over and above a reasonable suspicion is required), these plants have been and continue to be legalized through the issuing of possession permits and are subsequently incorporated into private collections. The use of these plants as parental stock for the propagation of seedlings for both the domestic and international cycad trade cannot be ruled out. Trade statistics (derived from the CITES Trade Database, UNEP World Conservation Monitoring Centre, Cambridge, UK) indicate an increasing trend ($R^2 = 0.25$; $P < 0.02$*) in the international trade of* E. laevifolius *since its inception in 1986, the bulk of the trade (75%) coinciding with the observed dramatic decline in the wild population after 1997 and taking place in the same time period when the cycad protection measures in Gauteng were particularly weak. Altogether 960* E. laevifolius *specimens (estimated total value of R1 728 000) had been exported from South Africa up until the end of 2011. The average annual value of* E. laevifolius *exports is estimated at around R88 000 ± R65 000 (assuming exports of 3-year old seedlings at 2012-2013 prices).*

Micro-chips inserted into wild cycads as a measure of proving wild origin are often destroyed or removed and it has been suggested that they are even sometimes replaced with legal micro-chips previously inserted into legally owned ex situ *cycads, effectively laundering plants of wild origin. It has also been suggested that legal micro-chips are inserted into un-chipped wild plants to prove legal ownership. Suckers are seldom micro-chipped and are therefore particularly vulnerable to poaching. All but 54 of the 1700 plants micro-chipped in the Kaapsehoop area had been illegally harvested by 2010 and numerous* E. laevifolius *plants exhibiting evidence of removed micro-chips have been encountered in Gauteng.*

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

Harvesting of wild cycads is prohibited throughout South Africa, yet this restriction remains ineffective.

Supporting documents

1. The IUCN Species Survival Commission Guidance for CITES Scientific Authorities. Checklist to assist in making non-detriment findings for Appendix II exports. Occasional Paper of the IUCN Species Survival Commission No. 27 (2002). A. Rosser and M. Haywood.
2. Donaldson, J.S. 2010. *Encephalartos laevifolius*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.1. <www.iucnredlist.org>. Downloaded on 30 August 2012.
3. Flora Conservation Plan. *Encephalartos laevifolius* (1984). Transvaal Provincial Administration. Nature Conservation Division. Compiled by S. Fourie (Head of Flora and Environmental Conservation Subsection).
4. Hugo, C. 2012. Identification of indigenous cycads of South Africa. p. 142. 4 images. Totiusdal. South Africa.

Non-detriment finding for *Encephalartos latifrons*

Reference Number: Enc_lat_May2015

Date: 28 May 2015

Issued by the Scientific Authority of South Africa

Summary of finding

Encephalartos latifrons (Albany cycad) is included in Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). As an Appendix I species, the export of specimens for commercial purposes is prohibited (Article III). However, specimens artificially propagated for commercial purposes are deemed to be specimens of species included in Appendix II (Article VII) of CITES and therefore may be traded. 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 export will not be detrimental to the survival of that species. This document details the undertaking of a non-detriment finding (NDF) for *E. latifrons* and is based on the best available information, current as of May 2015.

Encephalartos latifrons has been listed as Critically Endangered by the IUCN (the International Union for Conservation of Nature), meaning that it is considered to be facing an extremely high risk of extinction in the wild. Historically scattered through the Albany and Bathurst districts of the Eastern Cape, *E. latifrons* has declined by more than 80% over the past 100 years and today numbers approximately 45 wild plants equally divided between the two major localities where the species is still extant. The species continues to decline in the wild due to poaching for horticultural/ornamental purposes, and illegal harvesting of suckers, pollen, seed and cones from the remaining wild plants, as well as limited bark harvesting, is also occurring. It is anticipated that the proposed wind farms and a lime mine in close proximity to *E. latifrons* plants will increase opportunities for poaching. *Encephalartos latifrons* is a popular cycad amongst collectors and is encountered in private collections as well as in some cycad nurseries primarily in the Eastern Cape, Western Cape and Gauteng.

The harvest of wild cycads has been prohibited throughout South Africa since February 2007. Prior to this, any harvesting, possession or conveyance of cycads required permits in terms of provincial legislation enacted in the 1970s. Apart from one permit issued in 1997 and another in 2000 to allow for the once-off collection of seed, no permits were reportedly ever issued for the wild harvest of *E. latifrons* plants or seed, but plants may have been harvested from the wild prior to the enactment of provincial legislation. In general there has been an exponential increase in *ex situ* cultivated cycads, which are regulated by provincial conservation ordinances/Acts and the National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEMBA): Threatened or Protected Species (TOPS) Regulations. Enforcement of the strict protection measures afforded to cycads has been hampered by the human resource and budgetary constraints facing the provincial conservation authorities that are mandated to enforce provincial and national environmental legislation, and ongoing illegal harvest of wild cycads is a

countrywide problem. In Gauteng for example, where the demand for illegally harvested wild cycads is ultimately centered, reportedly 40% of posts within the Biodiversity Enforcement division of the Gauteng Department of Agriculture and Rural Development were vacant in the 2011/2012 financial year. The Special Investigations unit within the Eastern Cape Department of Economic Development, Environmental Affairs and Tourism is reportedly constrained by a limited operational budget.

Past ineffective implementation of conservation legislation in the provinces of KwaZulu-Natal, the Eastern Cape and particularly Gauteng, where the requirements for cycad possession permits have not been consistently enforced, has facilitated the entry of illegally harvested cycads into the legal trade. Wild-sourced plants have been and continue to be legalized and incorporated into private collections and their use as parental stock for the propagation of seedlings for both the domestic and international cycad trade cannot be ruled out. The number of *E. latifrons* specimens exported from South Africa has increased over the years since the inception of international trade in this species in 1980. In total, 1125 specimens (with an estimated total value of R5 850 000 and an average annual value of around R276 000 ± R188 000) had been exported from South Africa up until the end of 2011, the bulk of the trade (83%) having taken place after 1995 when the cycad protection measures in Gauteng were particularly weak.

Micro-chips have been inserted into all known wild *E. latifrons* plants. Micro-chips have however proven to be largely ineffective for establishing wild origins of cycads and have failed to deter poachers. The failure of the legal protection measures has been further exacerbated by prosecutors and magistrates who are not well informed about South Africa's cycad extinction crisis and the small fines issued and minimal jail sentences passed for cycad related offenses are ineffective deterrents.

A Biodiversity Management Plan (BMP) for *E. latifrons*, the aim of which is to secure the existing wild plants and execute a restoration and monitoring programme, was published in June 2011 in terms of section 43 of the National Environmental Management: Biodiversity Act (NEMBA) of 2004. Harvesting of wild seed for propagation and subsequent trade is allowed in accordance with this BMP provided all permits are in place and on condition a percentage of the seedlings are set aside for restoration purposes. This harvesting model is designed to increase the value of wild *E. latifrons* plants, thereby incentivizing landowners to protect them from poaching. The effectiveness of the BMP has however been questioned as it is reliant on landowner willingness and is therefore unenforceable. At present mismanagement of wild plants and illegal harvesting of seed are occurring, potentially negatively affecting recruitment, while monitoring is difficult due to poor landowner cooperation and hence limited access to properties with *E. latifrons* plants. Further research is required to advise on a quota for the harvest of *E. latifrons* seed. The existence of the BMP and the anticipated potential conservation benefits to the species nevertheless places *E. latifrons* at a lower risk of overutilization than other Critically Endangered cycad species, and it is hoped that the species' conservation status will be improved and ultimately its extinction will be prevented through the implementation of the BMP.

The species' biology, which is characterized by a poor dispersal ability and slow growing long-lived adults that regenerate predominantly from seed, renders *E. latifrons* particularly vulnerable to overutilization. It is therefore imperative that the effectiveness of the existing strict protection measures be improved significantly on a national basis in order to curtail the continuing poaching activities. Until

such time as these improvements are realized, the current trade in artificially propagated specimens is considered to be detrimental (Figures 1 and 2). The Scientific Authority, in reviewing the factors presented above, is unable to state with any confidence that parental stock is cultivated (as defined in the CITES Resolution Conf. 11.11 (Rev. CoP15)) in all cases of export since (1) evidence of legal acquisition is dubious and (2) the data at hand suggest that some parental stock has been obtained in a manner detrimental to the wild population. It is therefore recommended that *E. latifrons* seedlings may only be exported if the nursery is registered in accordance with the CITES Resolution Conf. 9.19 (Rev. CoP15), and

i. The seedlings are artificially propagated in accordance with the CITES Resolution Conf. 11.11 (Rev. CoP15), or
ii. The seedlings have been grown from wild harvested seed in accordance with the conditions specified in the CITES Resolution Conf. 11.11 (Rev. CoP15) and within the framework of a Biodiversity Management Plan published in terms of section 43 of the NEMBA.

Each nursery applying for CITES registration must be audited in accordance with a decision tree to be developed by the Scientific Authority within 3 months of the publication of this NDF, and regular follow up audits must be conducted in order to monitor seedling propagation. All parental plants must

i. Be accompanied by TOPS possession permits and affidavits from the owner stating that the plants are not of wild origin, and
ii. Not exhibit any characteristics typical of wild origin. Guidelines for the identification of wild characteristics will be developed by the Scientific Authority within 3 months of the publication of this NDF.

The export of large artificially propagated specimens (with a stem diameter of more than 15 cm) is prohibited (Government Notice 371, May 2012).

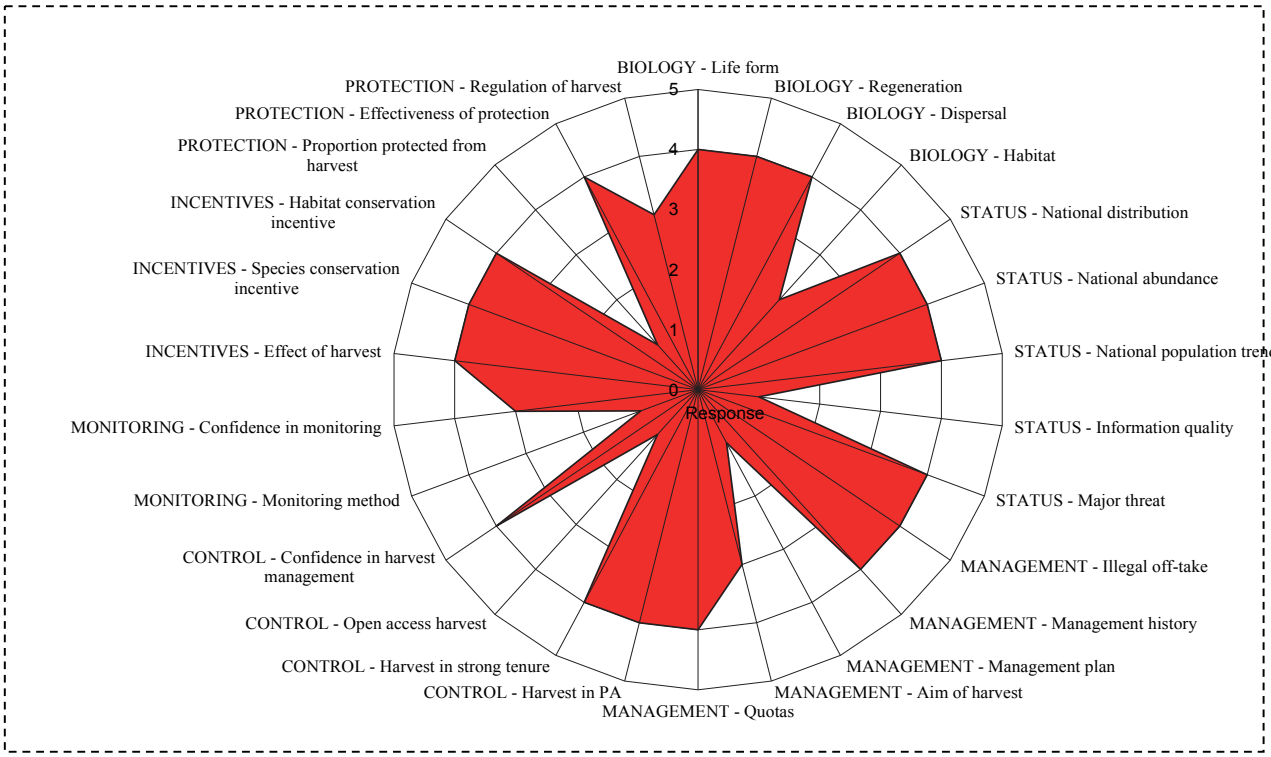

Figure 1. Radar chart summarizing the non-detriment finding assessment undertaken for *Encephalartos latifrons* in accordance with the CITES NDF checklist. Explanations of scores given are detailed in Table 1. Higher scores are indicative of higher risks to the species. The extensive shaded area in the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

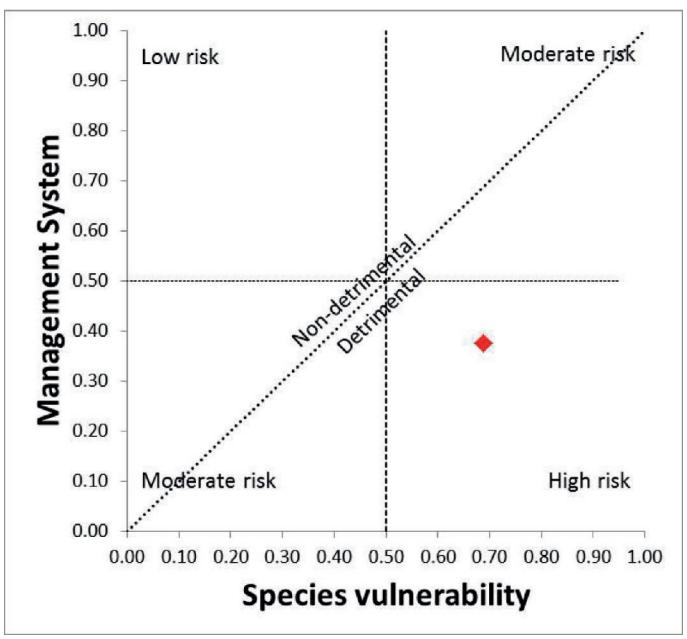

Figure 2. The risk of trading in *Encephalartos latifrons* as represented by the relationship between species vulnerability (biology and status) (0 = low vulnerability; 1 = high vulnerability) and the

management system to which the species is subjected (management, control, monitoring, incentives and protection) (0 = weak management system; 1 = strong management system). The figure shows that the species is at high risk and trade is detrimental.

Table 1. Non-detriment finding assessment for *Encephalartos latifrons* 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
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
The cycad life history is characterized by long-lived adults that regenerate predominantly from seed. Plants do produce suckers, but they are relatively unimportant for the regeneration of cycad populations, with 95% of species regenerating from seed only. Suckers remaining behind after the main plant has been harvested do sometimes survive. Encephalartos latifrons plants cone infrequently and sex ratios in the wild are strongly skewed in favour of males in a ratio of 4:1.		
3. Dispersal efficiency: How efficient is the species' dispersal mechanism?	Very good	1
	Good	2
	Medium	3
	Poor	**4**
	Uncertain	5
The dispersal abilities of cycads are not well understood but are generally regarded as poor. Even if seed were dispersed to new sites, the concomitant dispersal of species-specific pollinators would be highly unlikely thus rendering population recovery after local extirpation impossible. Colonization of new sites is improbable due to a number of reproductive limitations, such as limited seed production or non-viable seeds, irregular coning and male biases in populations. There has been no observed change / expansion in the distribution of any cycad species.		
4. Habitat: What is the habitat preference of the species?	Disturbed open	1
	Undisturbed open	**2**
	Pioneer	3
	Disturbed forest	4
	Climax	5
Encephalartos latifrons *plants grow on rocky outcrops and hill slopes, usually amongst scrub bush vegetation but also in open grassland. The species also occurs along dry river courses.*		

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
Encephalartos latifrons *is restricted to two major localities in the Eastern Cape.*		
6. National abundance: What is the abundance nationally?	Very abundant	1
	Common	2
	Uncommon	3
	Rare	**4**
	Uncertain	5
A total of 45 E. latifrons *plants remain in the wild, approximately equally divided between the two major localities where the species is still extant. In addition to this, 17 confiscated* E. latifrons *plants have been replanted in the wild, 14 of which have survived and of which some have started to produce suckers and cones.*		
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
It is uncertain how widespread or abundant E. latifrons *was historically, but there are records of populations being scattered through the Albany and Bathurst districts of the Eastern Cape. Based on plants in collections and studies of matched photographs, the wild population of* E. latifrons *has declined by more than 80% over the past 100 years. The species continues to decline in the wild due to poaching for horticultural/ornamental purposes, and the illegal harvest of suckers, pollen, seed and cones from the remaining wild plants has been observed. Limited bark harvesting is also occurring. The re-introduced / replanted population is not increasing.* Encephalartos latifrons *is currently listed in the IUCN Red List category of Critically Endangered (A2acd;B2ab(ii,iii,v);C1+2a(i) (IUCN version 3.1)).*		
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
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
Poaching to supply the horticultural trade and private collections is the predominant threat to this species. Encephalartos latifrons *is an attractive and therefore very popular cycad amongst collectors and is commonly encountered in private cycad collections in the Eastern Cape and is also owned by at least one nursery in that province. There is one private collection in the Western Cape numbering 10 plants. Although inspectors rarely encounter this species in collections in Gauteng, quite a*		

number have been imported into the province. At least 10 E. latifrons *plants are present in one garden in Gauteng and another 10 belong to a well-known cycad nursery in the province. It is almost impossible to obtain seedlings of* E. latifrons *and traders generally wait for plants to grow larger before selling them at a high price.*

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

Poaching of wild plants over many years has had a severe impact on this species. A case in 2009 involving the illegal possession and transportation of 25 adult and 151 seedlings of E. latifrons *was reported by the Eastern Cape Department of Economic Development, Environmental Affairs and Tourism. In general around 30-50% of cycads removed from the wild die within a few years.*

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

Illegal harvesting of wild cycads has been occurring in South Africa for the past 40 years, becoming more prevalent from the 1990s onwards in spite of various legislative interventions. Since the 1970s all cycad species have been protected in provincial nature conservation ordinances, with the harvest of any plants or seed requiring a permit (in addition to other activities such as possessing, conveying, selling, etc.). A permit was issued in 1997 and again in 2000 (both valid for one year) to allow for the artificial pollination of E. latifrons *plants and subsequent collection of seed. A condition of the permit was that 50% of the resulting seedlings were to planted back into the wild, however the landowner subsequently refused to honour this permit condition and only 12 plants were reintroduced. Other than this, reportedly no permits were ever issued for the wild harvest of* E. latifrons *plants or seed. Plants may however have been harvested from the wild prior to the enactment of provincial legislation. In general there has been an exponential increase in* ex situ *cultivated cycads, which are currently regulated by provincial conservation ordinances/Acts and the National Environmental Management: Biodiversity Act (NEMBA): Threatened or Protected Species Regulations (TOPS). In February 2007 the harvest of cycads from the wild was prohibited nationally in terms of Regulation 25 of the Threatened or Protected Species Regulations (subsequently replaced by Government Notice 371 in May 2012). Poaching is nevertheless ongoing.*

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

A Biodiversity Management Plan (BMP) for E. latifrons *was published in June 2011 in terms of section 43 of the National Environmental Management: Biodiversity Act (NEMBA) of 2004. A forum comprising of conservation officials and landowners has been established to implement this BMP. The aim of the BMP is to secure the existing wild plants and execute a restoration and monitoring programme. The effectiveness of the BMP has however been questioned as it is reliant on*

landowner willingness and is therefore unenforceable. The recovery of the species is nevertheless anticipated once the management and control of utilization is improved through implementation of the BMP.

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

In terms of the BMP, a percentage of seedlings grown from wild harvested seed must be set aside for restoration purposes while the remainder can be traded. This harvesting model is aimed at increasing the value of the wild plants, thereby incentivizing landowners to protect them from poaching. Intensive harvesting of seed from wild E. latifrons *plants has been taking place since 2006 in anticipation of the BMP's publication, and approximately 3000 seedlings are now available. This harvesting has however been associated with mismanagement of wild plants (e.g. use of poisons and removal of cones), potentially negatively affecting recruitment, and has been conducted in the absence of the required permits. There has also been some disagreement regarding the percentage of seedlings that should be set aside for restoration purposes.*

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

It is difficult to set a quota for the harvest of E. latifrons *seed as it would be dependent upon the number of coning plants. Plants of this species cone infrequently and natural recruitment is absent. Further research is required to advise on a quota.*

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
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

In terms of the published BMP, harvesting of E. latifrons *seed is proposed for privately owned land under the relevant TOPS permits. All seed harvesting currently taking place on private land is however illegal.*

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 *de facto* or actual open access?	**None**	**1**
	Low	2
	Medium	3
	High	4
	Uncertain	5
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
The provincial conservation authorities that are mandated to protect wild cycad populations from illegal harvesting are currently experiencing capacity constraints relating to shortages of human resources and budget. Frequent arrests and confiscations are indicative that the system intended to protect wild cycad populations is inadequate. Most cycad populations occur outside of state-controlled protected areas, but even those within protected areas are not secure from poaching activities. *There has been some delay in implementing the BMP for* E. latifrons*.*		
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
Although current monitoring of wild populations is unstructured and irregular, it should improve in accordance with the recently published BMP. The Eastern Cape Parks & Tourism Agency is currently monitoring the re-introduced / replanted population of E. latifrons*.*		
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
Monitoring is difficult due to poor landowner cooperation and hence limited access to properties with E. latifrons *plants.*		
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 new threat is the possible establishment of a lime mine in the area, which will result in an increase in traffic and opportunities for poaching. Encephalartos latifrons *plants in close proximity to wind farms will also be more susceptible to poachers.*		

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
In terms of the BMP, a percentage of the seedlings grown from wild harvested seed must be set aside for restoration purposes. The harvesting model is aimed at increasing the value of the wild plants, thereby incentivizing landowners to protect them from poaching. However, the BMP has yet to be effectively implemented. Around 20% of the seedlings grown from illegally harvested seed have died or are dying due to lack of care, and to date very few of the seedlings have been used for restoration.		
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
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
Government Notice 371 published in May 2012 in terms of section 57(2) of the National Environmental Management: Biodiversity Act (NEMBA) of 2004 prohibits the harvest of wild cycads throughout South Africa, unless required for conservation or enforcement purposes. Encephalartos latifrons *is also listed on Schedule 3 (Endangered Flora) of the Eastern Cape Nature and Environmental Conservation Ordinance (No. 19 of 1974).*		
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
The cycad trade is very complex and in order to monitor all the legal and illegal activities related to this trade, substantial resources would be required. Although providing for a solid legal framework, the Threatened or Protected Species Regulations have been difficult to implement by resource constrained provinces. The provincial conservation authorities that are mandated to enforce the strict protection measures pertaining to cycads are currently experiencing capacity constraints relating to shortages of human resources and budget. The Special Investigations unit within the Eastern Cape Department of Economic Development, Environmental Affairs and Tourism is reportedly constrained by a limited operational budget. In Gauteng, where the demand for illegally harvested wild cycads is ultimately centered, reportedly 4 out of 10 posts within the Biodiversity Enforcement division of the Gauteng Department of Agriculture and Rural Development were vacant in the 2011/2012 financial year, a vacancy rate of 40%. Even cycads within state-controlled protected areas are not secure from poaching activities, with protected areas often understaffed. Enforcement of the legislation is further weakened by inexperienced officials without the necessary skills to identify the different species. Prosecutors and magistrates are infrequently exposed to cycad related cases and are		

therefore not well informed about South Africa's cycad extinction crisis. Consequently cases relating to cycads seldom result in large fines and/or jail sentences.

*Provincial conservation legislation pertaining to cycads has been ineffectively implemented in the past in both Gauteng and KwaZulu-Natal. Neither province consistently enforced the requirements for possession permits, although all adult ("size-determined") cycads exported from KwaZulu-Natal had to be micro-chipped. In Gauteng, where most cycad enthusiasts live (50% of the Cycad Society's members reside in Gauteng with between 10% and 12% of members residing in each of the Western Cape, KwaZulu-Natal and Mpumalanga provinces), possession permits were not required for cycads between 1994 and 2001, with the regulatory authority only requiring the presentation of documentary proof of legal possession. Similarly, the legal requirement for cycad possession permits was only strictly enforced in the Eastern Cape from 1 April 2004 and property owners in possession of unpermitted cycads after this date were instead issued with cycad site registration letters. Up until 31 March 2004, people in possession of unpermitted cycads were given amnesty based on submission of affidavits and documentary proof of legal origin. (*Encephalartos latifrons *and* E. arenarius *were excluded from this amnesty.) Conservation legislation in three out of the four provinces that were designated out of the former Transvaal province is weak, providing for adequate control over the possession and movement of only those cycad species indigenous to the former Transvaal province (the exception being Limpopo where all South African cycads are Specially Protected). This ineffective implementation of legislation has allowed the entry of illegally harvested plants into the legal trade. In the past, a number of syndicates involved in poaching activities moved illegally harvested cycads into Gauteng where possession permits were not required, laundering them into the trade with the required documentary proof. Such operations apparently continue until today due to the delayed implementation of new national legislation (Threatened or Protected Species Regulations).*

Due to the impossibility of tracing the origin of these cycads and/or proving wild origin to the satisfaction of a court (proof of wild origin over and above a reasonable suspicion is required), these plants have been and continue to be legalized through the issuing of possession permits and are subsequently incorporated into private collections. The use of these plants as parental stock for the propagation of seedlings for both the domestic and international cycad trade cannot be ruled out. Trade statistics (derived from the CITES Trade Database, UNEP World Conservation Monitoring Centre, Cambridge, UK) indicate an increasing trend ($R^2 = 0.21$; $P = 0.01$*) in the international trade of* E. latifrons *since its inception in 1980. In total 1125 specimens (estimated total value of R5 850 000) had been exported from South Africa up until the end of 2011, the bulk of the trade (83%) having taken place after 1995 when the cycad protection measures in Gauteng were particularly weak. The domestic demand for* E. latifrons *seedlings is largely unmet and seedlings seem to be preferentially traded internationally. The average annual value of* E. latifrons *exports is estimated at around R276 000 ± R188 000 (assuming exports of 3-year old seedlings at 2012-2013 prices).*

All known wild E. latifrons *plants have been micro-chipped. However, micro-chips inserted into wild cycads as a measure of proving wild origin are often destroyed or removed and it has been suggested that they are even sometimes replaced with legal micro-chips previously inserted into legally owned* ex situ *cycads, effectively laundering plants of wild origin. It has also been suggested that legal micro-chips are inserted into un-chipped wild plants to prove legal ownership. Suckers are seldom micro-chipped and are therefore particularly vulnerable to poaching.*

26. Regulation of harvest effort: How effective are any restrictions on harvesting (such as age or size,	Very effective	1
	Effective	2
	Ineffective	**3**

season or equipment) for preventing overuse?	None	4
	Uncertain	5
It is premature to ascertain whether the restrictions introduced in terms of the BMP are effective. There has been some delay in implementing the BMP.		

Supporting documents

1. The IUCN Species Survival Commission Guidance for CITES Scientific Authorities. Checklist to assist in making non-detriment findings for Appendix II exports. Occasional Paper of the IUCN Species Survival Commission No. 27 (2002). A. Rosser and M. Haywood.
2. Donaldson, J.S. 2010. *Encephalartos latifrons*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.1. <www.iucnredlist.org>. Downloaded on 30 August 2012.
3. Biodiversity Management Plan for Albany cycad, *Encephalartos latifrons*. Notice 416 of 2011. Department of Environmental Affairs.
4. Population and habitat viability assessment for the Albany cycad (*Encephalartos latifrons*). Workshop report. 17 – 21 July 2006.
5. Hugo, C. 2012. Identification of indigenous cycads of South Africa. p. 142. 4 images. Totiusdal. South Africa.

Non-detriment finding for *Encephalartos middelburgensis*

Reference Number: Enc_mid_May2015

Date: 28 May 2015

Issued by the Scientific Authority of South Africa

Summary of finding

Encephalartos middelburgensis (Middelburg cycad) is included in Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). As an Appendix I species, the export of specimens for commercial purposes is prohibited (Article III). However, specimens artificially propagated for commercial purposes are deemed to be specimens of species included in Appendix II (Article VII) of CITES and therefore may be traded. 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 export will not be detrimental to the survival of that species. This document details the undertaking of a non-detriment finding (NDF) for *E. middelburgensis* and is based on the best available information, current as of May 2015.

Encephalartos middelburgensis has been listed as Critically Endangered by the IUCN (the International Union for Conservation of Nature), meaning that it is considered to be facing an extremely high risk of extinction in the wild. The species has a restricted and fragmented distribution, confined to the Witbank and Middelburg districts of Mpumalanga and marginally in Gauteng. It is estimated that the wild population of this species numbers no more than 350 plants in total, with a large population of between 100 and 200 plants occurring on a provincial nature reserve in Mpumalanga and approximately 150 plants occurring on private land. Resurveys of some of the plants originally recorded in 1983 indicate a loss of approximately 59% of the population, predominantly from poaching activities to supply the horticultural trade and private collections. During 2006 and 2007, illegal harvesting of suckers was particularly rife, while large consignments of illegally possessed *E. middelburgensis* plants were recovered in 2011.

The harvest of wild cycads has been prohibited throughout South Africa since February 2007. Prior to this, any harvesting, possession or conveyance of cycads required permits in terms of provincial legislation enacted in the 1970s. No permits were reportedly ever issued for the wild harvest of *E. middelburgensis* plants or seed, but plants may have been harvested from the wild prior to the enactment of provincial legislation and seedlings were also available from the Hartebeesthoek nursery which operated between 1975 and 1998. In general there has been an exponential increase in *ex situ* cultivated cycads, which are regulated by provincial conservation ordinances/Acts and the National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEMBA): Threatened or Protected Species (TOPS) Regulations. Enforcement of the strict protection measures afforded to cycads has been hampered by the human resource and budgetary constraints facing the provincial conservation authorities that are mandated to enforce provincial and national environmental legislation, and ongoing

illegal harvest of wild cycads is a countrywide problem. In Gauteng for example, where the demand for illegally harvested wild cycads is ultimately centered, reportedly 40% of posts within the Biodiversity Enforcement division of the Gauteng Department of Agriculture and Rural Development were vacant in the 2011/2012 financial year. The Mpumalanga Tourism and Parks Agency is primarily responsible for the *in situ* protection and management of *E. middelburgensis*, however 2011/2012 vacancy rates within this agency were reported to be 51% and 64% within the Wildlife Protection Services and Scientific Services divisions, respectively. Furthermore, 52% of the field ranger posts for the nature reserve on which *E. middelburgensis* occurs were reportedly vacant in 2011/2012. From 2011 to 2014 the Mpumalanga Tourism and Parks Agency had no operational budget.

Past ineffective implementation of conservation legislation in the provinces of KwaZulu-Natal, the Eastern Cape and particularly Gauteng, where the requirements for cycad possession permits have not been consistently enforced, has facilitated the entry of illegally harvested cycads into the legal trade. Wild-sourced plants have been and continue to be legalized and incorporated into private collections and their use as parental stock for the propagation of seedlings for both the domestic and international cycad trade cannot be ruled out. International trade in *E. middelburgensis* started in 1995 very soon after Gauteng relaxed its regulatory requirements for cycads and 1810 specimens (with an estimated total value of R3 620 000 and an average annual value of around R174 000 $\pm$ R87 000) had been exported from South Africa by 2011, 63% of the total trade occurring between 1994 and 2001 when the cycad protection measures in Gauteng were particularly weak. No conservation benefit for the species or its habitat is derived from the trade in *E. middelburgensis*.

Micro-chips inserted into wild plants have proven to be largely ineffective for establishing wild origins of cycads and have failed to deter poachers. Many wild *E. middelburgensis* plants have nevertheless been micro-chipped. The failure of the legal protection measures has been further exacerbated by prosecutors and magistrates who are not well informed about South Africa's cycad extinction crisis and the small fines issued and minimal jail sentences passed for cycad related offenses are ineffective deterrents.

Outdated (20 years old) conservation plans exist for all Mpumalanga's cycad species. Although some of these plans are currently being implemented, parts have collapsed altogether and they are in dire need of major revision. None of these plans address harvest management. A Biodiversity Management Plan for the Critically Endangered and Endangered cycads will soon be published in terms of section 43 of the NEMBA, however it will be a while before its effectiveness can be evaluated. While monitoring of *E. middelburgensis* does take place, continuation of monitoring programmes is uncertain due to the severe capacity constraints facing the Mpumalanga Tourism and Parks Agency.

The species' biology, which is characterized by a poor dispersal ability and slow growing long-lived adults that regenerate predominantly from seed, renders *E. middelburgensis* particularly vulnerable to overutilization. This, together with the species' extremely poor conservation status, the ongoing population decline due to poaching activities, the outdated conservation plan, the capacity and budgetary constraints that prevent the Mpumalanga Tourism and Parks Agency from effectively managing and monitoring the species, the lack of conservation incentives and the continuing ineffective implementation of the existing strict protection measures for cycads on a national basis, presents a

scenario that is unfavourable for the survival of *E. middelburgensis* in the wild and the species is at an extremely high risk of unsustainable utilization (Figure 1). In order to decrease the risk to this species and prevent its imminent extinction, a concerted effort to address all of these factors is essential.

Current trade in artificially propagated specimens of *E. middelburgensis* is detrimental (Figure 2). The Scientific Authority, in reviewing the factors presented above, is unable to state with any confidence that parental stock is cultivated (as defined in the CITES Resolution Conf. 11.11 (Rev. CoP15)) in all cases of export since (1) evidence of legal acquisition is dubious and (2) the data at hand suggest that some parental stock has been obtained in a manner detrimental to the wild population. It is therefore recommended that *E. middelburgensis* seedlings may only be exported if the nursery is registered in accordance with the CITES Resolution Conf. 9.19 (Rev. CoP15), and

i. The seedlings are artificially propagated in accordance with the CITES Resolution Conf. 11.11 (Rev. CoP15), or
ii. The seedlings have been grown from wild harvested seed in accordance with the conditions specified in the CITES Resolution Conf. 11.11 (Rev. CoP15) and within the framework of a Biodiversity Management Plan published in terms of section 43 of the NEMBA.

Each nursery applying for CITES registration must be audited in accordance with a decision tree to be developed by the Scientific Authority within 3 months of the publication of this NDF, and regular follow up audits must be conducted in order to monitor seedling propagation. All parental plants must

i. Be accompanied by TOPS possession permits and affidavits from the owner stating that the plants are not of wild origin, and
ii. Not exhibit any characteristics typical of wild origin. Guidelines for the identification of wild characteristics will be developed by the Scientific Authority within 3 months of the publication of this NDF.

The export of large artificially propagated specimens (with a stem diameter of more than 15 cm) is prohibited (Government Notice 371, May 2012).

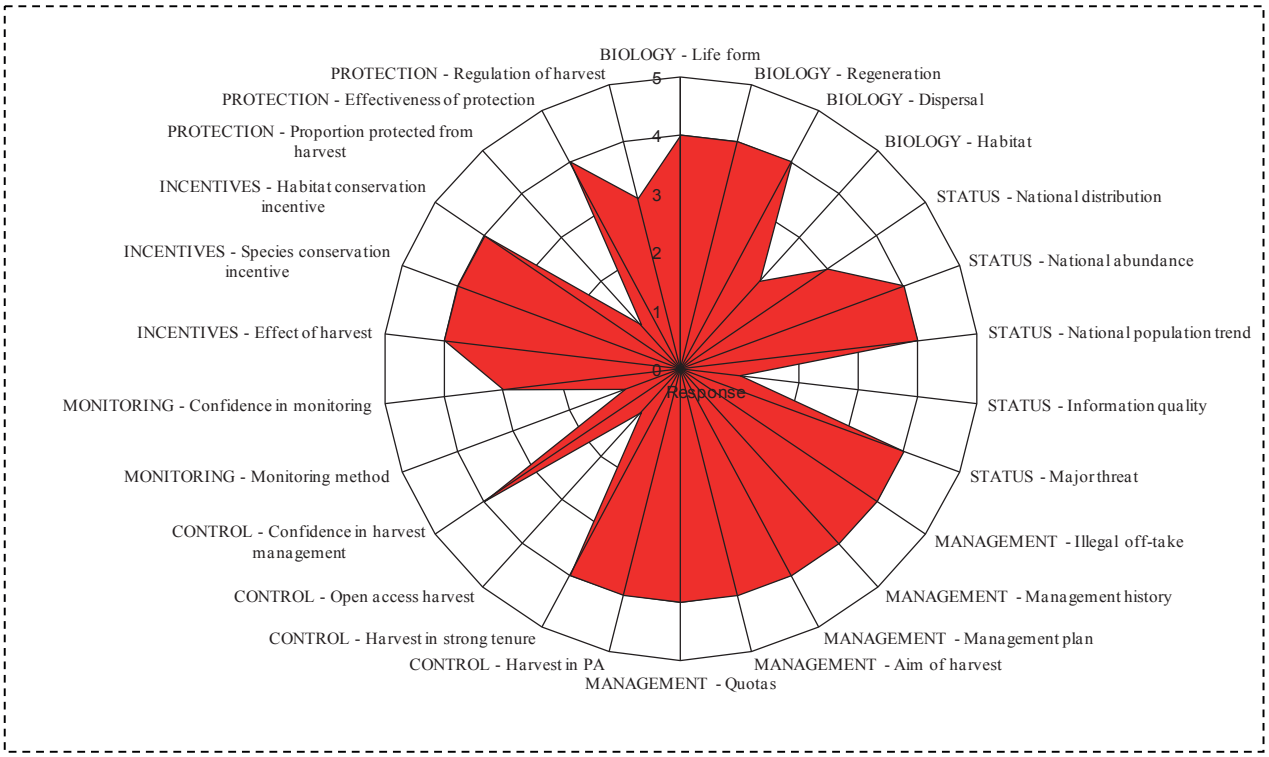

Figure 1. Radar chart summarizing the non-detriment finding assessment undertaken for *Encephalartos middelburgensis* in accordance with the CITES NDF checklist. Explanations of scores given are detailed in Table 1. Higher scores are indicative of higher risks to the species. The extensive shaded area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

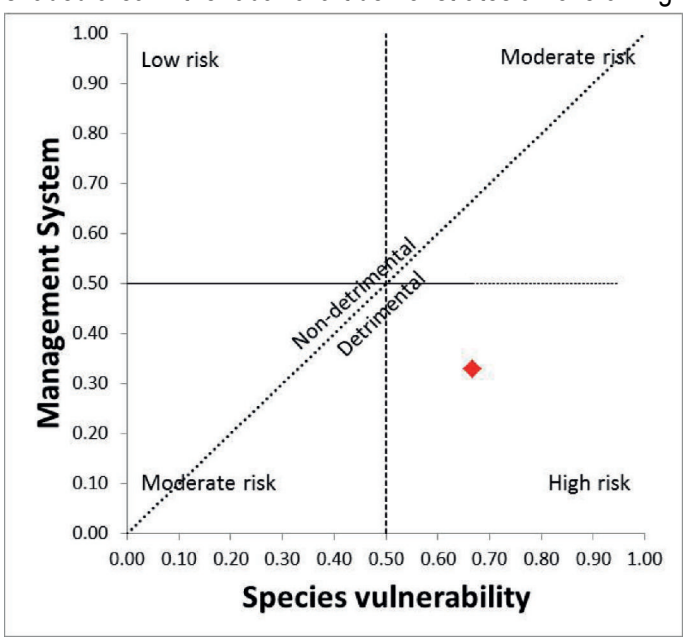

Figure 2. The risk of trading in *Encephalartos middelburgensis* as represented by the relationship between species vulnerability (biology and status) (0 = low vulnerability; 1 = high vulnerability) and the management system to which the species is subjected (management, control, monitoring, incentives

and protection) (0 = weak management system; 1 = strong management system). The figure shows that the species is at high risk and trade is detrimental.

Table 1. Non-detriment finding assessment for *Encephalartos middelburgensis* 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
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
The cycad life history is characterized by long-lived adults that regenerate predominantly from seed. Plants do produce suckers, but they are relatively unimportant for the regeneration of cycad populations, with 95% of species regenerating from seed only. Suckers remaining behind after the main plant has been harvested do sometimes survive.		
3. Dispersal efficiency: How efficient is the species' dispersal mechanism?	Very good	1
	Good	2
	Medium	3
	Poor	**4**
	Uncertain	5
The dispersal abilities of cycads are not well understood but are generally regarded as poor. Even if seed were dispersed to new sites, the concomitant dispersal of species-specific pollinators would be highly unlikely thus rendering population recovery after local extirpation impossible. Colonization of new sites is improbable due to a number of reproductive limitations, such as limited seed production or non-viable seeds, irregular coning and male biases in populations. There has been no observed change / expansion in the distribution of any cycad species.		
4. Habitat: What is the habitat preference of the species?	Disturbed open	1
	Undisturbed open	**2**
	Pioneer	3
	Disturbed forest	4
	Climax	5
Encephalartos middelburgensis *plants grow on sandstone outcrops in open grassland and sheltered valleys.*		
National status		
5. National distribution: How is the	Widespread, contiguous in country	1

species distributed nationally?	Widespread, fragmented in country	2
	Restricted and fragmented	**3**
	Localized	4
	Uncertain	5
This species is confined to the Witbank and Middelburg districts in the upper catchment areas of the Olifants River in Mpumalanga and marginally in Gauteng.		
6. National abundance: What is the abundance nationally?	Very abundant	1
	Common	2
	Uncommon	3
	Rare	**4**
	Uncertain	5
The largest known population of E. middelburgensis*, numbering an estimated 100 to 200 plants, occurs on a provincial nature reserve in Mpumalanga. A ground survey of this species is currently being conducted on private land in Mpumalanga and 102 plants comprising altogether 218 stems have been counted at 13 localities. An additional 5 localities, where a total of 34 plants were recorded in 1983, are still to be surveyed. A total of 7 wild* E. middelburgensis *plants occur in Gauteng. It is estimated that the wild population of this species numbers no more than 350 plants in total.*		
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
Current resurveys of some of the plants originally recorded through aerial and ground surveys in 1983 indicate a loss of approximately 59% of the population. Of the 9 plants recorded in Gauteng in 2004, 2 have since died, possibly from a disease, while the stems of the remaining plants have been damaged (small holes observed, assumed to be damage from porcupines). Encephalartos middelburgensis *is currently listed in the IUCN Red List category of Critically Endangered (A2acd;C1 (IUCN version 3.1)).*		
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
A ground survey is currently underway for this species.		
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
Poaching of wild plants for horticultural/ornamental purposes is the major threat to the survival of this species. Encephalartos middelburgensis *plants are quite expensive and in high demand as a garden plant. During 2006 and 2007, illegal harvesting of suckers from plants on private land was rife, with large plants often dying after being hacked away by poachers in an attempt to access the suckers.*		

Entire large plants were also poached during this period and it is thought that the Avontuur form of this species is now extinct. There are also fewer plants remaining on the cycad hiking trail. In general around 30-50% of cycads removed from the wild die within a few years.

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

Poaching of wild E. middelburgensis *plants has had and continues to have a substantial impact on this species. In 2011, 20 illegally harvested* E. middelburgensis *plants were recovered and in another case 3 plants with stems in excess of 5 m were recovered. Fifteen 80 kg bags containing illegally harvested suckers were transported into Gauteng but never recovered. Twenty-four wild cones pollinated with* ex situ *pollen were also stolen in 2008 (although baboons had removed some cones prior to the poaching incident, as evidenced by a few new seedlings in the area).*

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

Illegal harvesting of wild cycads has been occurring in South Africa for the past 40 years, becoming more prevalent from the 1990s onwards in spite of various legislative interventions. Since the 1970s all cycad species have been protected in provincial nature conservation ordinances, with the harvest of any plants or seed requiring a permit (in addition to other activities such as possessing, conveying, selling, etc.). Reportedly no permits were ever issued for the wild harvest of E. middelburgensis *plants or seed. Plants may however have been harvested from the wild as* E. eugene-maraisii *prior to the enactment of provincial legislation or obtained from the Hartebeesthoek nursery which operated in the former Transvaal province between 1975 and 1998. In general there has been an exponential increase in* ex situ *cultivated cycads, which are currently regulated by provincial conservation ordinances/Acts and the National Environmental Management: Biodiversity Act (NEMBA): Threatened or Protected Species Regulations (TOPS). In February 2007 the harvest of cycads from the wild was prohibited nationally in terms of Regulation 25 of the Threatened or Protected Species Regulations (subsequently replaced by Government Notice 371 in May 2012). Poaching is nevertheless ongoing.*

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

Outdated (20 years old) conservation plans do exist for all Mpumalanga's cycad species. These plans are all very similar, having being based on the same template, and address propagation and restoration but not harvest. Although components of the plans have collapsed altogether (e.g. ex situ *propagation at the Hartebeesthoek nursery), some of the conservation plans are still being implemented. The plans are however in dire need of major revision, especially as the situation*

pertaining to cycads has changed significantly since they were drafted. These revisions would however be hampered by a lack of human resources within Mpumalanga Tourism and Parks Agency. The 2011/2012 vacancy rate within the Scientific Services division for example was reportedly 64% and not a single botanist is currently employed in the province. A Biodiversity Management Plan for the Critically Endangered and Endangered cycads will be published in 2015 in terms of section 43 of the NEMBA.		
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
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 are no quotas for any of South Africa's cycad species – all harvesting is illegal.		
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
Harvesting of wild cycads is illegal throughout South Africa.		
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
Harvesting of wild cycads is illegal throughout South Africa.		
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 *de facto* or actual open access?	**None**	**1**
	Low	2
	Medium	3
	High	4
	Uncertain	5
The harvest of wild cycads is prohibited throughout South Africa.		
18. Confidence in harvest management: Do budgetary and	High confidence	1
	Medium confidence	2

other factors allow effective implementation of management plan(s) and harvest controls?	Low confidence	3
	No confidence	**4**
	Uncertain	5

The provincial conservation authorities that are mandated to protect wild cycad populations from illegal harvesting are currently experiencing capacity constraints relating to shortages of human resources and budget. The provincial nature reserve on which E. middelburgensis *occurs has 31 field ranger posts, and only 15 of these were reportedly filled in 2011/2012, a vacancy rate of 52%. From 2011 to 2014 the Mpumalanga Tourism and Parks Agency had no operational budget. Frequent arrests and confiscations are indicative that the system intended to protect wild cycad populations is inadequate. Most cycad populations occur outside of state-controlled protected areas, but even those within protected areas are not secure from poaching activities.*

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

The species was first surveyed through a combination of ground and aerial surveys between 1979 and 1983 and an aerial survey was undertaken in 2002. A ground survey is currently underway.

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

The Mpumalanga Tourism and Parks Agency is currently experiencing severe budgetary constraints as well as a lack of human resources. In the 2011/2012 financial year, the Scientific Services division reportedly had a vacancy rate of 64%, and from 2011 to 2014 the Mpumalanga Tourism and Parks Agency had no operational budget.

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

Baboons may pose an additional threat to the remaining plants as they frequently break off the cones. Diseased and damaged wild plants in Gauteng are also a concern.

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
23. Incentives for habitat conservation: At the national level, how much habitat conservation	High	1
	Medium	2
	Low	3

benefit is derived from harvesting?	**None**	**4**
	Uncertain	5
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
Government Notice 371 published in May 2012 in terms of section 57(2) of the National Environmental Management: Biodiversity Act (NEMBA) of 2004 prohibits the harvest of wild cycads throughout South Africa, unless required for conservation or enforcement purposes. Encephalartos middelburgensis *is also listed as Specially Protected in the Mpumalanga Nature Conservation Act (No. 10 of 1998) and the Gauteng Nature Conservation Ordinance (No. 12 of 1983). A large population of* E. middelburgensis *occurs in a state-controlled protected area.*		
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
The cycad trade is very complex and in order to monitor all the legal and illegal activities related to this trade, substantial resources would be required. Although providing for a solid legal framework, the Threatened or Protected Species Regulations have been difficult to implement by resource constrained provinces. The provincial conservation authorities that are mandated to enforce the strict protection measures pertaining to cycads are currently experiencing capacity constraints relating to shortages of human resources and budget. The 2011/2012 vacancy rate within the Wildlife Protection Services of the Mpumalanga Tourism and Parks Agency was reported to be 51% and from 2011 to 2014 the Agency had no operational budget. In Gauteng, where the demand for illegally harvested wild cycads is ultimately centered, reportedly 4 out of 10 posts within the Biodiversity Enforcement division of the Gauteng Department of Agriculture and Rural Development were vacant in the 2011/2012 financial year, a vacancy rate of 40%. Even cycads within state-controlled protected areas are not secure from poaching activities, with protected areas often understaffed (e.g. the provincial nature reserve on which E. middelburensis *occurs reportedly had a vacancy rate of 52% in 2011/2012). Enforcement of the legislation is further weakened by inexperienced officials without the necessary skills to identify the different species. Prosecutors and magistrates are infrequently exposed to cycad related cases and are therefore not well informed about South Africa's cycad extinction crisis. Consequently cases relating to cycads seldom result in large fines and/or jail sentences.* *Provincial conservation legislation pertaining to cycads has been ineffectively implemented in the past in both Gauteng and KwaZulu-Natal. Neither province consistently enforced the requirements for possession permits, although all adult ("size-determined") cycads exported from KwaZulu-Natal had to be micro-chipped. In Gauteng, where most cycad enthusiasts live (50% of the Cycad Society's members reside in Gauteng with between 10% and 12% of members residing in each of the Western Cape, KwaZulu-Natal and Mpumalanga provinces), possession permits were not required for cycads between 1994 and 2001, with the regulatory authority only requiring the presentation of documentary proof of legal possession. Similarly, the legal requirement for cycad possession permits was only strictly enforced in the Eastern Cape from 1 April 2004 and property owners in possession of unpermitted cycads after this date were instead issued with cycad site registration letters. Up until 31*		

*March 2004, people in possession of unpermitted cycads were given amnesty based on submission of affidavits and documentary proof of legal origin. (*Encephalartos latifrons *and* E. arenarius *were excluded from this amnesty.) Conservation legislation in three out of the four provinces that were designated out of the former Transvaal province is weak, providing for adequate control over the possession and movement of only those cycad species indigenous to the former Transvaal province (the exception being Limpopo where all South African cycads are Specially Protected). This ineffective implementation of legislation has allowed the entry of illegally harvested plants into the legal trade. In the past, a number of syndicates involved in poaching activities moved illegally harvested cycads into Gauteng where possession permits were not required, laundering them into the trade with the required documentary proof. Such operations apparently continue until today due to the delayed implementation of new national legislation (Threatened or Protected Species Regulations).*

Due to the impossibility of tracing the origin of these cycads and/or proving wild origin to the satisfaction of a court (proof of wild origin over and above a reasonable suspicion is required), these plants have been and continue to be legalized through the issuing of possession permits and are subsequently incorporated into private collections. The use of these plants as parental stock for the propagation of seedlings for both the domestic and international trade cannot be ruled out. International trade in E. middelburgensis *started in 1995 very soon after Gauteng relaxed its regulatory requirements for cycads and 1810 specimens (estimated total value of R3 620 000) had been exported from South Africa by 2011 (CITES Trade Database, UNEP World Conservation Monitoring Centre, Cambridge, UK), 63% of the total trade occurring between 1994 and 2001 when the cycad protection measures in Gauteng were particularly weak. The average annual value of* E. middelburgensis *exports is estimated at around R174 000 ± R87 000 (assuming exports of 3-year old seedlings at 2012-2013 prices).*

Altogether 60 wild E. middelburgensis *plants in Mpumalanga and all of the wild* E. middelburgensis *plants in Gauteng have been micro-chipped. An additional 67 stems were micro-chipped during the current ground surveys. However, micro-chips inserted into wild cycads as a measure of proving wild origin are often destroyed or removed and it has been suggested that they are even sometimes replaced with legal micro-chips previously inserted into legally owned* ex situ *cycads, effectively laundering plants of wild origin. It has also been suggested that legal micro-chips are inserted into un-chipped wild plants to prove legal ownership. Suckers are seldom micro-chipped and are therefore particularly vulnerable to poaching.*

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

Harvesting of wild cycads is prohibited throughout South Africa, yet this restriction remains ineffective.

Supporting documents

1. The IUCN Species Survival Commission Guidance for CITES Scientific Authorities. Checklist to assist in making non-detriment findings for Appendix II exports. Occasional Paper of the IUCN Species Survival Commission No. 27 (2002). A. Rosser and M. Haywood.

2. Donaldson, J.S. 2010. *Encephalartos middelburgensis*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.1. <www.iucnredlist.org>. Downloaded on 30 August 2012.
3. Middelburg cycad resurvey project. Monthly progress report June 2012. Mpumalanga Tourism and Parks Agency / South African National Biodiversity Institute. (Confidential)
4. Flora Conservation Plan. *Encephalartos eugene-maraisii* (1984). Transvaal Provincial Administration. Nature Conservation Division. Compiled by S. P. Fourie (Head of Flora and Environmental Conservation Subsection).
5. Hugo, C. 2012. Identification of indigenous cycads of South Africa. p. 142. 4 images. Totiusdal. South Africa.

Non-detriment finding for *Encephalartos msinganus*

Reference Number: Enc_msi_May2015

Date: 28 May 2015

Issued by the Scientific Authority of South Africa

Summary of finding

Encephalartos msinganus (Msinga cycad) is included in Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). As an Appendix I species, the export of specimens for commercial purposes is prohibited (Article III). However, specimens artificially propagated for commercial purposes are deemed to be specimens of species included in Appendix II (Article VII) of CITES and therefore may be traded. 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 export will not be detrimental to the survival of that species. This document details the undertaking of a non-detriment finding (NDF) for *E. msinganus* and is based on the best available information, current as of May 2015.

Localized to a small area in the Msinga district of KwaZulu-Natal, *E. msinganus* has been listed as Critically Endangered by the IUCN (the International Union for Conservation of Nature), meaning that it is considered to be facing an extremely high risk of extinction in the wild. Poaching of wild plants to supply the horticultural trade and private collections (and possibly also for medicinal purposes) has had a severe impact on the species. It is estimated that there are less than 200 adult *E. msinganus* plants occurring in a few scattered supopulations. Field visits in 2011 confirmed that the plants are still targeted by poachers and all the cycads from one site had been reportedly removed.

The harvest of wild cycads has been prohibited throughout South Africa since February 2007. Prior to this, any harvesting, possession or conveyance of cycads required permits in terms of provincial legislation enacted in the 1970s. No permits were reportedly ever issued for the wild harvest of *E. msinganus* plants or seed since its description in 1996, except for the once-off collection of seed for research purposes in 2005 (although plants may have been harvested from the wild as the Msinga form of *E. natalensis* prior to the enactment of provincial legislation). In general there has been an exponential increase in *ex situ* cultivated cycads, which are regulated by provincial conservation ordinances/Acts and the National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEMBA): Threatened or Protected Species (TOPS) Regulations. Enforcement of the strict protection measures afforded to cycads has been hampered by the human resource and budgetary constraints facing the provincial conservation authorities that are mandated to enforce provincial and national environmental legislation, and ongoing illegal harvest of wild cycads is a countrywide problem. In Gauteng for example, where the demand for illegally harvested wild cycads is ultimately centered, reportedly 40% of posts within the Biodiversity Enforcement division of the Gauteng Department of Agriculture and Rural Development were vacant in the 2011/2012 financial year.

Past ineffective implementation of conservation legislation in the provinces of KwaZulu-Natal, the Eastern Cape and particularly Gauteng, where the requirements for cycad possession permits have not been consistently enforced, has facilitated the entry of illegally harvested cycads into the legal trade. Wild-sourced plants have been and continue to be legalized and incorporated into private collections and their use as parental stock for the propagation of seedlings for both the domestic and international cycad trade cannot be ruled out. The international trade in *E. msinganus* started in 1983 (then the Msinga form of *E. natalensis*) and by 2011 a total of 523 specimens (with an estimated total value of R418 000 and an average annual value of around R14 000 ± R11 000) had been exported from South Africa, the bulk of the trade (80%) having had occurred after 1994 when the cycad protection measures in Gauteng were particularly weak. No conservation benefit for the species or its habitat is derived from the trade *E. msinganus*.

Micro-chips inserted into wild plants have proven to be largely ineffective for establishing wild origins of cycads and have failed to deter poachers. The failure of the legal protection measures has been further exacerbated by prosecutors and magistrates who are not well informed about South Africa's cycad extinction crisis and the small fines issued and minimal jail sentences passed for cycad related offenses are ineffective deterrents.

In 2004 a management plan was developed for all cycads in KwaZulu-Natal, but it is now obsolete. A Biodiversity Management Plan for the Critically Endangered and Endangered cycads will soon be published in terms of section 43 of the NEMBA, however it will be a while before its effectiveness can be evaluated.

The species' biology, which is characterized by a poor dispersal ability and slow growing long-lived adults that regenerate predominantly from seed, renders *E. msinganus* particularly vulnerable to overutilization. This, together with the species' extremely poor conservation status, the continued poaching pressure, the capacity and budgetary constraints that prevent Ezemvelo Kwazulu-Natal Wildlife from curbing poaching, the lack of conservation incentives and the continuing ineffective implementation of the existing strict protection measures for cycads on a national basis, presents a scenario that is unfavourable for the survival of *E. msinganus* in the wild and the species is at an extremely high risk of unsustainable utilization (Figure 1). In order to decrease the risk to this species and prevent its imminent extinction, a concerted effort to address all of these factors is essential.

Current trade in artificially propagated specimens of *E. msinganus* is detrimental (Figure 2). The Scientific Authority, in reviewing the factors presented above, is unable to state with any confidence that parental stock is cultivated (as defined in the CITES Resolution Conf. 11.11 (Rev. CoP15)) in all cases of export since (1) evidence of legal acquisition is dubious and (2) the data at hand suggest that some parental stock has been obtained in a manner detrimental to the wild population. It is therefore recommended that *E. msinganus* seedlings may only be exported if the nursery is registered in accordance with the CITES Resolution Conf. 9.19 (Rev. CoP15), and

i. The seedlings are artificially propagated in accordance with the CITES Resolution Conf. 11.11 (Rev. CoP15), or

ii. The seedlings have been grown from wild harvested seed in accordance with the conditions specified in the CITES Resolution Conf. 11.11 (Rev. CoP15) and within the framework of a Biodiversity Management Plan published in terms of section 43 of the NEMBA.

Each nursery applying for CITES registration must be audited in accordance with a decision tree to be developed by the Scientific Authority within 3 months of the publication of this NDF, and regular follow up audits must be conducted in order to monitor seedling propagation. All parental plants must

i. Be accompanied by TOPS possession permits and affidavits from the owner stating that the plants are not of wild origin, and
ii. Not exhibit any characteristics typical of wild origin. Guidelines for the identification of wild characteristics will be developed by the Scientific Authority within 3 months of the publication of this NDF.

The export of large artificially propagated specimens (with a stem diameter of more than 15 cm) is prohibited (Government Notice 371, May 2012).

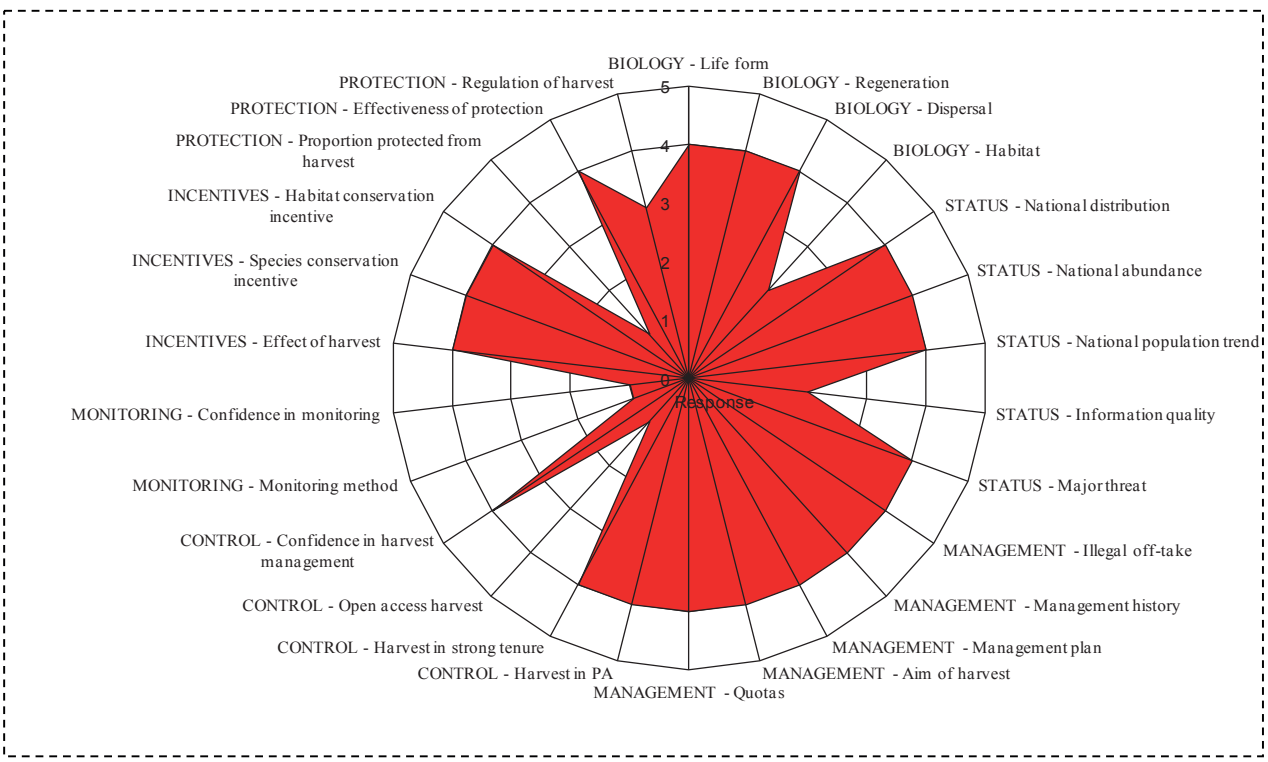

Figure 1. Radar chart summarizing the non-detriment finding assessment undertaken for *Encephalartos msinganus* in accordance with the CITES NDF checklist. Explanations of scores given are detailed in Table 1. Higher scores are indicative of higher risks to the species. The extensive shaded area in the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

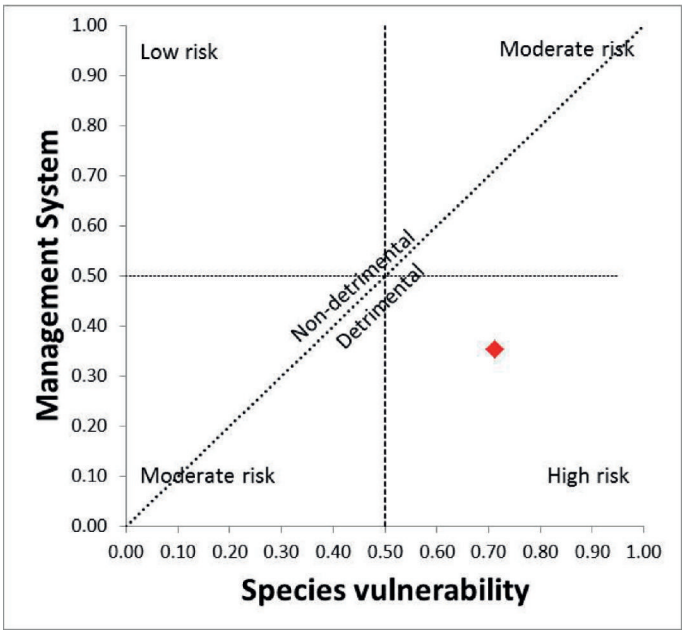

Figure 2. The risk of trading in *Encephalartos msinganus* as represented by the relationship between species vulnerability (biology and status) (0 = low vulnerability; 1 = high vulnerability) and the management system to which the species is subjected (management, control, monitoring, incentives and protection) (0 = weak management system; 1 = strong management system). The figure shows that the species is at high risk and trade is detrimental.

Table 1. Non-detriment finding assessment for *Encephalartos msinganus* 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
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
The cycad life history is characterized by long-lived adults that regenerate predominantly from seed. Plants do produce suckers, but they are relatively unimportant for the regeneration of cycad populations, with 95% of species regenerating from seed only. Suckers remaining behind after the main plant has been harvested do sometimes survive.		

3. Dispersal efficiency: How efficient is the species' dispersal mechanism?	Very good	1
	Good	2
	Medium	3
	Poor	**4**
	Uncertain	5
The dispersal abilities of cycads are not well understood but are generally regarded as poor. Even if seed were dispersed to new sites, the concomitant dispersal of species-specific pollinators would be highly unlikely thus rendering population recovery after local extirpation impossible. Colonization of new sites is improbable due to a number of reproductive limitations, such as limited seed production or non-viable seeds, irregular coning and male biases in populations. There has been no observed change / expansion in the distribution of any cycad species.		
4. Habitat: What is the habitat preference of the species?	Disturbed open	1
	Undisturbed open	**2**
	Pioneer	3
	Disturbed forest	4
	Climax	5
Plants of E. msinganus *grow in short grassland on steep north-facing slopes, usually amongst boulders in scrub clumps.*		
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
Encephalartos msinganus *occurs in a small area in the Msinga district of KwaZulu-Natal.*		
6. National abundance: What is the abundance nationally?	Very abundant	1
	Common	2
	Uncommon	3
	Rare	**4**
	Uncertain	5
Less than 200 adults were successfully located during an aerial survey in 2012, while a number of adults were found at houses and at a school nearby. Encephalartos msinganus *is currently listed in the IUCN Red List category of Critically Endangered (B1ab(iii,v)+2ab(iii,v);C1+2a(ii) (IUCN version 3.1)).*		
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
It is estimated that less than 200 E. msinganus *plants occur in the wild in a small number of scattered subpopulations. Field visits in 2011 confirmed that the plants are targeted by poachers. (A recently removed adult and a few juveniles all with badly damaged roots were found at a house nearby the wild population.)*		

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
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
Despite this species growing in very high mountains that are practically inaccessible, poaching of wild plants for horticultural/ornamental purposes (and possibly also for medicinal purposes) has had a severe impact on E. msinganus*. Since* ex situ *plants cone infrequently and the original wild population was small, this species is uncommon* ex situ*.* Encephalartos msinganus *plants are sometimes encountered in garden collections (particularly large ones) and in nurseries, but selling prices are generally low. Ezemvelo KwaZulu-Natal Wildlife has received one registration application for a nursery that has six adult* E. msinganus *plants. In general around 30-50% of cycads removed from the wild die within a few years.*		
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
Poaching of wild plants to supply the horticultural trade and private collections has had a detrimental impact on E. msinganus*. The chief of the communal area confirmed that all the cycads had been removed from an area in the vicinity.*		
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
Illegal harvesting of wild cycads has been occurring in South Africa for the past 40 years, becoming more prevalent from the 1990s onwards in spite of various legislative interventions. Since the 1970s all cycad species have been protected in provincial nature conservation ordinances, with the harvest of any plants or seed requiring a permit (in addition to other activities such as possessing, conveying, selling, etc.). Apart from a permit issued to collect seed for research purposes in 2005, reportedly no permits have been issued for the wild harvest of E. msinganus *plants or seed. Plants may however have been harvested from the wild as the Msinga form of* E. natalensis *prior to the enactment of provincial legislation. In general there has been an exponential increase in* ex situ *cultivated cycads, which are currently regulated by provincial conservation ordinances/Acts and the National Environmental Management: Biodiversity Act (NEMBA): Threatened or Protected Species Regulations (TOPS). In February 2007 the harvest of cycads from the wild was prohibited nationally in terms of Regulation 25 of the Threatened or Protected Species Regulations (subsequently replaced by Government Notice 371 in May 2012). Poaching is nevertheless ongoing.* *Conservation measures to protect* E. msinganus *included the removal (air lifting) of 31 adult plants*		

from the Msinga area to a nursery in Eshowe as part of an ex situ *conservation programme. At the time it was believed that this was the only way to protect these plants. This 'rescue' was conducted by the KwaZulu-Natal Nature Conservation Department.*		
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
In 2004 a management plan was developed for all cycads in KwaZulu-Natal with a poster that was disseminated to District Conservation Officers and to some police stations and prosecutors. The management plan is however now obsolete. A Biodiversity Management Plan for the Critically Endangered and Endangered cycads will be published in 2015 in terms of section 43 of the NEMBA.		
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
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 are no quotas for any of South Africa's cycad species – all harvesting is illegal.		
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
Harvesting of wild cycads is illegal throughout South Africa.		
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
Harvesting of wild cycads is illegal throughout South Africa.		
17. Harvesting in areas with open	**None**	**1**

access: What percentage of the legal national harvest occurs in areas where there is no strong local control, giving *de facto* or actual open access?	Low	2
	Medium	3
	High	4
	Uncertain	5
The harvest of wild cycads is prohibited throughout South Africa.		
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 no management plan for E. msinganus*. The provincial conservation authorities that are mandated to protect wild cycad populations from illegal harvesting are currently experiencing capacity constraints relating to shortages of human resources and budget. Frequent arrests and confiscations are indicative that the system intended to protect wild cycad populations is inadequate. Most cycad populations occur outside of state-controlled protected areas, but even those within protected areas are not secure from poaching activities.*		
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
Regular aerial surveys are conducted for this 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
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
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
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
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
Government Notice 371 published in May 2012 in terms of section 57(2) of the National Environmental Management: Biodiversity Act (NEMBA) of 2004 prohibits the harvest of wild cycads throughout South Africa, unless required for conservation or enforcement purposes. Encephalartos msinganus *is also listed as Specially Protected in the KwaZulu-Natal Nature Conservation Ordinance (No. 15 of 1974).*		
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
The cycad trade is very complex and in order to monitor all the legal and illegal activities related to this trade, substantial resources would be required. Although providing for a solid legal framework, the Threatened or Protected Species Regulations have been difficult to implement by resource constrained provinces. The provincial conservation authorities that are mandated to enforce the strict protection measures pertaining to cycads are currently experiencing capacity constraints relating to shortages of human resources and budget. In Gauteng, where the demand for illegally harvested wild cycads is ultimately centered, reportedly 4 out of 10 posts within the Biodiversity Enforcement division of the Gauteng Department of Agriculture and Rural Development were vacant in the 2011/2012 financial year, a vacancy rate of 40%. Even cycads within state-controlled protected areas are not secure from poaching activities, with protected areas often understaffed. Enforcement of the legislation is further weakened by inexperienced officials without the necessary skills to identify the different species. (Identification of E. msinganus *is particularly problematic.) Prosecutors and magistrates are infrequently exposed to cycad related cases and are therefore not well informed about South Africa's cycad extinction crisis. Consequently cases relating to cycads seldom result in large fines and/or jail sentences.* *Provincial conservation legislation pertaining to cycads has been ineffectively implemented in the past in both Gauteng and KwaZulu-Natal. Neither province consistently enforced the requirements for possession permits, although all adult ("size-determined") cycads exported from KwaZulu-Natal had to be micro-chipped. In Gauteng, where most cycad enthusiasts live (50% of the Cycad Society's members reside in Gauteng with between 10% and 12% of members residing in each of the Western Cape, KwaZulu-Natal and Mpumalanga provinces), possession permits were not required for cycads between 1994 and 2001, with the regulatory authority only requiring the presentation of documentary proof of legal possession. Similarly, the legal requirement for cycad possession permits was only strictly enforced in the Eastern Cape from 1 April 2004 and property owners in possession of unpermitted cycads after this date were instead issued with cycad site registration letters. Up until 31 March 2004, people in possession of unpermitted cycads were given amnesty based on submission of affidavits and documentary proof of legal origin. (*Encephalartos latifrons *and* E. arenarius *were excluded from this amnesty.) Conservation legislation in three out of the four provinces that were designated out of the former Transvaal province is weak, providing for adequate control over the possession and movement of only those cycad species indigenous to the former Transvaal province*		

(the exception being Limpopo where all South African cycads are Specially Protected). This ineffective implementation of legislation has allowed the entry of illegally harvested plants into the legal trade. In the past, a number of syndicates involved in poaching activities moved illegally harvested cycads into Gauteng where possession permits were not required, laundering them into the trade with the required documentary proof. Such operations apparently continue until today due to the delayed implementation of new national legislation (Threatened or Protected Species Regulations).

Due to the impossibility of tracing the origin of these cycads and/or proving wild origin to the satisfaction of a court (proof of wild origin over and above a reasonable suspicion is required), these plants have been and continue to be legalized through the issuing of possession permits and are subsequently incorporated into private collections. The use of these plants as parental stock for the propagation of seedlings for both the domestic and international cycad trade cannot be ruled out. The international trade in E. msinganus *started in 1983 (then the Msinga form of* E. natalensis*) and by 2011 a total of 523 specimens (estimated total value of R418 000) had been exported from South Africa (CITES Trade Database, UNEP World Conservation Monitoring Centre, Cambridge, UK), the bulk of the trade (80%) having had occurred after 1995 when the cycad protection measures in Gauteng were particularly weak. The trade in this species peaked in 1998 and 1999 (when 60 and 88 specimens were exported, respectively) then decreased steadily (*$R^2 = 0.37$; $P < 0.04$*), perhaps reflecting a decline in the demand for* E. msinganus *commensurate with the very low prices currently observed. The average annual value of* E. msinganus *exports is estimated at around R14 000 ± R11 000 (assuming exports of 3-year old seedlings at 2012-2013 prices).*

Micro-chips inserted into wild cycads as a measure of proving wild origin are often destroyed or removed and it has been suggested that they are even sometimes replaced with legal micro-chips previously inserted into legally owned ex situ *cycads, effectively laundering plants of wild origin. It has also been suggested that legal micro-chips are inserted into un-chipped wild plants to prove legal ownership. Suckers are seldom micro-chipped and are therefore particularly vulnerable to poaching.*

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

Harvesting of wild cycads is prohibited throughout South Africa, yet this restriction remains ineffective.

Supporting documents

1. The IUCN Species Survival Commission Guidance for CITES Scientific Authorities. Checklist to assist in making non-detriment findings for Appendix II exports. Occasional Paper of the IUCN Species Survival Commission No. 27 (2002). A. Rosser and M. Haywood.
2. Donaldson, J.S. 2010. *Encephalartos msinganus*. In: IUCN 2012. IUCN Red List of Threatened Species. Version 2012.1. <www.iucnredlist.org>. Downloaded on 30 August 2012.
3. Hugo, C. 2012. Identification of indigenous cycads of South Africa. p. 142. 4 images. Totiusdal. South Africa.

Non-detriment finding for *Hippopotamus amphibius* (Hippopotamus)

Reference Number: Hip_amp_Jul2015

Date: 23 July 2015

Issued by the Scientific Authority of South Africa

Summary of findings

Hippopotamus amphibius (hippopotamus) 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 export will not be detrimental to the survival of that species. This document details the undertaking of a non-detriment finding (NDF) assessment for the hippopotamus and is based on the best available information, current as of June 2014.

A long-lived species with a low reproductive rate compared to some other larger mammals, hippos are generally tolerant of human activities and are regarded as a pest species outside of protected areas, particularly in communal lands. Although restricted to areas in proximity to water, individuals are able to disperse efficiently between water sources. The species is reasonably adaptable to different environments and hippos are known to forage in agricultural lands.

The national status of *Hippopotamus amphibius* favours sustainable utilization. The species is regionally listed in the IUCN Red List category of Least Concern and there are currently no major threats facing the species. Although the regional population is fragmented, the species is widespread in the country, occurring in all provinces but most numerous in Limpopo, Mpumalanga, North West Province and KwaZulu-Natal. Hippos are regarded as common in South Africa, with recent quantitative data indicating that the regional population is comprised of more than 6300 individuals. The national population is increasing, especially within the Kruger National Park but also within protected areas in North West Province. Animals emigrating out of these protected areas have resulted in a significant increase in hippo numbers in surrounding lands where they are often regarded as pests. The removal of problem hippos is however offset by the introduction of hippos onto private land in Gauteng, North West Province and KwaZulu-Natal.

The weakest area of the non-detriment finding for *Hippopotamus amphibius* relates to the absence of a system of quotas for regulating harvest (Figure 1). However, the legal harvest of hippos, which includes harvesting for hunting trophies and killing of damage causing animals, is minimal, with population management and control being the predominant aim of the harvest. Legal harvest takes place predominantly in protected areas and on commercial farms, the latter characterized by strong local control over resource use. Illegal off-take is of minor concern. The species is furthermore well managed and there are sufficient controls in place to ensure sustainability in the event of an increase in harvesting pressure or a proposal to harvest large numbers of individuals from the population.

Mpumalanga has a policy for handling damage causing animals and there is a framework for regulating damage causing animals in KwaZulu-Natal. Hunting on game farms in all provinces is regulated by permitting systems and culling of hippos on protected areas is undertaken in accordance with the goals and objectives of approved local management plans. Monitoring of the effects of harvest is based on direct population estimates. There are budgetary, manpower and logistical constraints for the implementation of management plans and monitoring programmes. Most culling operations for hippos are nevertheless effectively implemented and regular monitoring of hippo numbers does take place.

Compared to other large animals such as the white rhino, the conservation of this species has not benefited significantly from the hunting and game farming industries, and likewise there is a low benefit with respect to habitat conservation. This lack of conservation incentives, however, does not affect the overall low risk outcome of the non-detriment finding (Figures 1 and 2). The effective protection of the species from harvest also contributes to the low risk that international trade poses to the species (Figure 2). Around 75% of the South African hippo population is legally excluded from harvest, which is regarded as effective since a very small percentage of the hippo population is lost to poaching.

The non-detriment finding undertaken for *Hippopotamus amphibius* (hippopotamus) demonstrates that international trade poses a low risk to this species in South Africa. The species is well managed and the Scientific Authority does not have any current concerns relating to the harvest of the species.

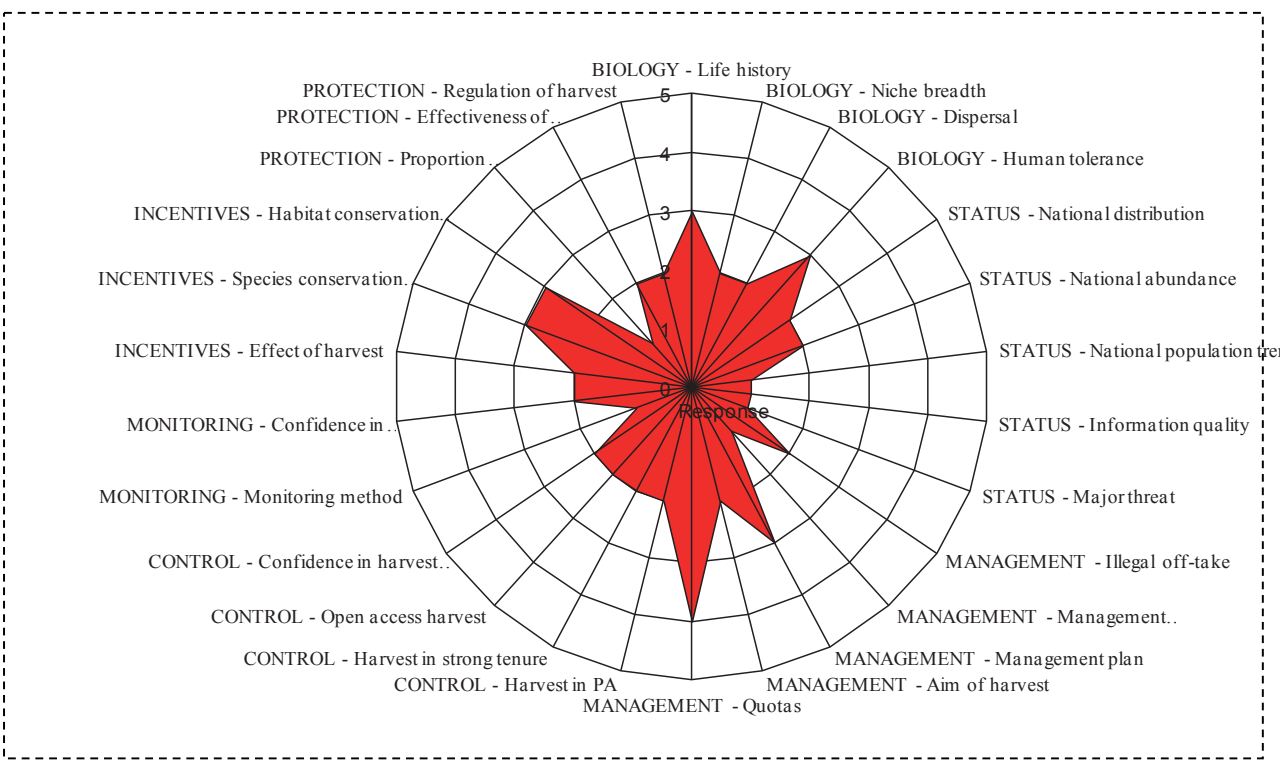

Figure 1. Radar chart summarizing the non-detriment finding assessment undertaken for *Hippopotamus amphibius* (hippopotamus) in accordance with the CITES NDF checklist. Explanations

of scores given are detailed in Table 1. Higher scores are indicative of higher risks to the species. The limited shaded area in the radar chart demonstrates an overall low risk to the species.

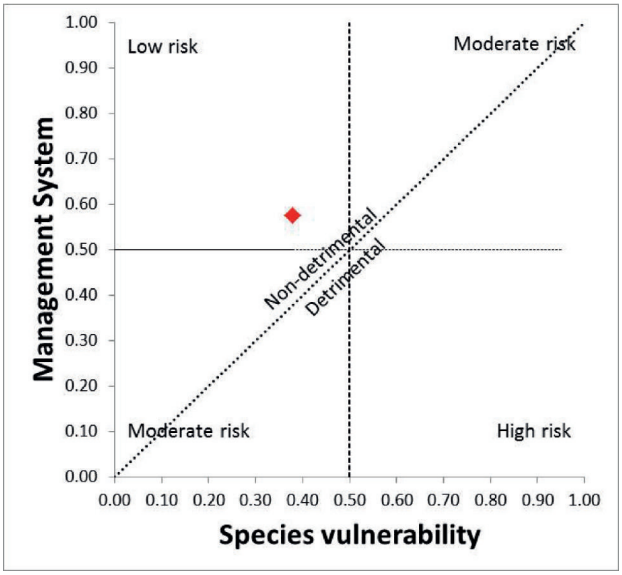

Figure 2: The risk of trading in *Hippopotamus amphibius* (hippopotamus) as represented by the relationship between species vulnerability (biology and status) (0 = low vulnerability; 1 = high vulnerability) and the management system to which the species is subjected (management, control, monitoring, incentives and protection) (0 = weak management system; 1 = strong management system). The figure shows that the species is at low risk and trade is not detrimental.

Table 1. Non-detriment finding assessment for *Hippopotamus amphibius* (hippopotamus) 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 history: What is the species' life history?	High reproductive rate, long-lived	1
	High reproductive rate, short-lived	2
	Low reproductive rate, long-lived	**3**
	Low reproductive rate, short-lived	4
	Uncertain	5
Individuals reproduce on average every 2 years and every 18 months at optimum levels. The intrinsic rate of increase of populations ranges between 8% and 10%. This is a K-selected species that has a low reproductive rate compared to some other larger mammals.		
2. Ecological adaptability: To what extent is the species adaptable (habitat, diet, environmental tolerance etc.)?	Extreme generalist	1
	Generalist	**2**
	Specialist	3
	Extreme specialist	4
	Uncertain	5

The species is reasonably adaptable to different environments, tolerating semi-arid to very mesic conditions. Individuals do not appear to be susceptible to poor water quality, for example in Gauteng they are able to survive in water with a pH of less than 4. Although hippos graze on both long and short grass, they are regarded as specialist grazers and are also habitat engineers in that they create grazing lawns. When individuals escape from protected areas, their feeding behaviour alters and they have been found foraging in lucerne and maize fields. In the Sabie area, hippos are known to occasionally feed on banana trees. As hippos are restricted to areas in proximity of water, they cannot be considered extreme generalists.		
3. Dispersal efficiency: How efficient is the species' dispersal mechanism at key life stages?	Very good	1
	Good	**2**
	Medium	3
	Poor	4
	Uncertain	5
Individuals move up and down rivers in times of drought and are able to move easily between water sources. They may walk up to 35 km during their nocturnal foraging activities. General fences do not hinder the movement of hippos.		
4. Interaction with humans: Is the species tolerant to human activity other than harvest?	No interaction	1
	Pest / Commensal	2
	Tolerant	**3**
	Sensitive	4
	Uncertain	5
Individuals that have escaped from protected areas are regarded as pests, particularly in agricultural lands. Citrus orchards provide good grazing habitat and some citrus farmers in the Lowveld actually regard hippos on their land as an extra security measure and have consequently adapted their farming practices. Crops are protected with electric fencing, but farmers only protect sugar cane until it reaches a height of 1.5 m (hippos do not venture into sugar cane taller than this). In communal areas hippos are considered a pest or problem animal, particularly in the Maputaland area of KwaZulu-Natal where hippos are regularly shot or snared. Hippos are also regarded as problem animals in the communal areas of North West Province in land bordering on dams and rivers. Although regarded as a pest by humans, hippos are generally tolerant of human activities.		
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
Historically the species occurred in all provinces with available water. Today there are numerous populations in Limpopo, Mpumalanga and North West Province. In KwaZulu-Natal hippos occur at eight localities within protected areas and in 18 localities on communal and private land. In the Free State, there is one small population in a protected area and two small populations on private land. There is one small population on private land in the Northern Cape and in the Western Cape hippos occur in about four localities within protected areas, both private and state owned. In Gauteng, hippos occur naturally in the Dinokeng area but have also been introduced into the Cradle of Humankind World Heritage Site.		
6. National abundance: What is the	Very abundant	1

abundance nationally?	**Common**	**2**
	Uncommon	3
	Rare	4
	Uncertain	5

There are between 3000 and 4000 hippos in the Kruger National Park. In Mpumalanga, in open rivers outside the Kruger National Park, approximately 413 hippos were counted during a 2009 survey. According to a 2003 survey in Limpopo, approximately 295 hippos occur in that province. There are approximately 1650 hippos in KwaZulu-Natal, both within protected areas and on private land (2009 figures), while approximately 300 hippos occur both on private land and within protected areas in North West Province. The hippo population in the Eastern Cape is around 100 (about 30 occurring on state land and 70 occurring on private land in the Cacadu Region). There are no more than 20 hippos in each of the provinces of Gauteng, Western Cape and Free State and only 3 individuals in the Northern Cape. Thus altogether the total hippo population of South Africa is estimated at 6300 individuals. Hippos are not expected to be present in the arid areas of the country (approximately two thirds of South Africa), except perhaps in rivers in low numbers. As the figures provided for the Kruger National Park are results of river counts only, there may be many more hippos that weren't counted, while in Mpumalanga and Limpopo many individuals on private land are not counted. The total figure of 6300 is therefore conservative and may be regarded as an underestimate.

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

In Mpumalanga, in the permanently flowing rivers outside of the Kruger National Park, the numbers of hippo are increasing significantly, sometimes at a rate of between 25% and 30% per annum as animals emigrate out of the park. Historically, hippo numbers were managed in the Kruger National Park but are now increasing in the absence of any population control. For example, in 1988 there were approximately 370 hippos in the Crocodile River, which almost doubled to 700 in 2002 and again to 1133 in 2009. In the Sabie River, the hippo population was maintained at between 600 and 900 individuals, but had increased to 1138 by 2009. Numbers of hippo in the Olifants River are reasonably stable at between 800 and 900 individuals. A population of 1119 hippo now occurs in the Letaba River, where between 700 and 800 hippos occurred in the past. Stable populations of approximately 200 animals occur in the seasonal rivers (Limpopo and Levuvhu). In Limpopo province, numbers of hippo in the Limpopo River and Olifants River outside of Kruger have also increased from 50 to 100 and from 150 in 1994 to 186 in 2003, respectively. These figures may be underestimates and concern has been expressed for the growing problem of human wildlife conflict. In the North West Province, hippo numbers are definitely increasing significantly due to a range expansion of the species into areas where rainfall is favourable and habitat suitable. Private landowners are introducing hippos into dams. Populations within protected areas such as Madikwe and Pilanesberg have become too large, resulting in animals emigrating out of these areas. Hippos in the Crocodile River migrate between the North West and Limpopo provinces. In KwaZulu-Natal, populations have remained stable on protected areas since 2004, however the numbers of hippo on private land are increasing as farmers introduce hippos into rivers and dams. There is however a definite decline in communal areas where animals are poached, but overall the population in KwaZulu-Natal has remained stable at around 1600 individuals over the last 6 years. In the Eastern Cape, the small hippo population in the Great Fish River Nature Reserve is counted from a helicopter every third year and in 2006 14 hippos were counted and in 2009 22 hippos were counted. In Gauteng, there is growing public interest in introducing hippo onto private land for aesthetic reasons.

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
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
In KwaZulu-Natal, habitat for this species is being lost as a result of human population growth and expansion, particularly in the Maputaland area, but this is not considered a major threat currently as the species is adequately protected within protected areas. Any losses of hippo in communal areas are offset by the introduction of hippo onto private land and game farms. Another minor threat to the species is the poaching of individuals for their fat (utilized as muthi*) and hides (for making* sjamboks*). In North West Province, hippos now occur in areas where they didn't before. Due to the cessation of culling in protected areas, hippos have emigrated from protected areas into crop lands where food is abundant. Similarly in Mpumalanga, habitat for this species is being lost as a result of human population growth and expansion. Hippos are however moving out of protected areas into areas with a variety of agricultural activities, including citrus orchards where irrigation and mowing of grass has resulted in attractive grazing lawns. Furthermore, seasonal rivers have become permanent, further favouring range expansion of this species. There are thus no major threats facing the species in Mpumalanga or the North West Province.*		
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
Incidences of illegal off-take have not been noted in the North West, Gauteng, Western Cape, Free State or Northern Cape provinces. Low levels of illegal off-take however do occur in Mpumalanga, the Eastern Cape, and KwaZulu-Natal and illegal off-take in KwaZulu-Natal is on the increase.		
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 is a formal framework for regulating the control of damage causing animals in KwaZulu-Natal, where incidences are investigated first to determine if the problem animal can be contained. Mpumalanga manages hippo complaints according to a policy on the handling of damage causing animals. Since management of problem / damage causing hippos is based on complaints received, it is largely reactive. In the Eastern Cape, the culling of damage causing hippos is regulated through a permitting system. In North West Province, KwaZulu-Natal and Limpopo, hippos are hunted on game farms under the control of a permitting system. Generally hippos are culled in protected areas in accordance with the goals contained in ecological management plans.		

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 are approved local management plans for protected areas and also some local management plans for private land outside of protected areas.		
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
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 no hunting quota for this species. Within protected areas, hippos are harvested / culled in order to meet the biological objectives of those protected areas.		
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
The legal harvest of hippos is minimal and includes harvesting for hunting trophies, harvesting for biological control and killing of damage causing animals. In KwaZulu-Natal, legal harvest occurs predominantly in protected areas, with some hunting of hippos on game ranches.		
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
In Mpumalanga, all of the legal harvest occurs outside of protected areas (including killing of damage causing animals), but there is local control over resource use on private land. The killing of damage causing hippos takes place on commercial farms and on communal lands.		
17. Harvesting in areas with open access: What percentage of the	None	1
	Low	**2**

legal 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
The killing of damage causing hippos takes place on commercial farms and on communal lands.		
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 are budgetary, manpower and logistical constraints for the implementation of management plans in all provinces, although most culling operations for hippos are nevertheless effectively implemented. Targets for population control off-takes are often not met because hippos are difficult to remove, particularly as these operations are not well funded.		
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
Monitoring in the provinces with the largest hippo populations (i.e. KwaZulu-Natal, Mpumalanga and Limpopo) involves direct population estimates.		
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
There are budgetary, manpower and logistical constraints in all provinces, but generally regular monitoring of hippo numbers takes place.		
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
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 has not been a large uptake of this species onto game farms. Due to the nature of boundaries, rivers are often fenced out of private land and hippos are consequently introduced into dams instead of rivers, thus providing limited opportunities for conservation of the species. Compared to other large animals such as the white rhino, the conservation of this species has not benefited significantly		

from the hunting and game farming industries.		
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 a low benefit for habitat conservation. Stocking hippo on game farms is often regarded as an "add on" and ideal hippo habitat is limited.		
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
The population of ±3500 hippo in Kruger National Park is strictly protected, representing almost 60% of the South African hippo population. Seventy-five percent of the hippo population in KwaZulu-Natal alone occurs within protected areas. It is therefore fair to say that about 75% of the South African hippo population is legally excluded from harvest.		
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
A very small percentage of the hippo population is lost to poaching.		
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
The off-take target established for the ecological management of protected areas in terms of the goals and objectives of management plans is the main mechanism for restricting harvest. Management of damage causing animals outside of protected areas is effective, particularly in KwaZulu-Natal.		

List of participants

1. Noluthando Bam – Deputy Director Biodiversity Management (Eastern Cape Department of Economic Development and Environmental Affairs)
2. Anuschka Barac – Scientist (North West Department of Agriculture, Environment & Tourism)
3. Willem Boshoff – Deputy Director (North West Department of Agriculture, Environment & Tourism)
4. Thea Carroll – Director: Regulation and Monitoring Services (Department of Environmental Affairs)

5. John Donaldson – Chair of the Scientific Authority (South African National Biodiversity Institute)
6. Johan Eksteen – Manager: Ecological Services (Mpumalanga Tourism and Parks Agency)
7. Theressa Frantz – Director: Applied Biodiversity Research (South African National Biodiversity Institute)
8. Pete Goodman – Coordinator Biodiversity Research (Ezemvelo Kwazulu-Natal Wildlife)
9. Nico Grobler – Assistant Director: Ecological Services (Gauteng Department of Agriculture and Rural Development)
10. Kas Hamman – Executive Director Biodiversity (Cape Nature)
11. Julius Koen – Deputy Director (Northern Cape Department of Environment and Nature Conservation)
12. Den Mabogo – Senior Manager: Biodiversity (Limpopo Department of Economic Development, Environment and Tourism)
13. Sonja Meintjes – Deputy Director (Department of Environmental Affairs)
14. Errol Moeng – Scientist (Limpopo Department of Economic Development, Environment and Tourism)
15. Peter Novellie – General Manager (South African National Parks)
16. Michèle Pfab – Scientific Co-ordinator of the Scientific Authority (South African National Biodiversity Institute)
17. Elsabe Swart – Assistant Director (Northern Cape Department of Environment and Nature Conservation)
18. Adrian Tordiffe – Clinical & Research veterinarian (National Zoological Gardens of South Africa)
19. Savvas Vrahimis – Production Scientist (Free State Department of Tourism, Environment and Economic Affairs)

Non-detriment finding for *Ceratotherium simum simum* (white rhinoceros)

Reference Number: Cer_sim_May2015

Date: 29 May 2015

Issued by the Scientific Authority of South Africa

Summary of findings

The South African population of *Ceratotherium simum simum* (white rhinoceros) is included in Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) for the exclusive purpose of allowing international trade in live animals to appropriate and acceptable destinations and the export of hunting trophies. 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 export will not be detrimental to the survival of that species. This document details the undertaking of a non-detriment finding (NDF) for *C. simum simum* and is based on the best available information, current as of December 2014.

The white rhinoceros is a long-lived species with a low reproductive rate. It is relatively adaptable, being able to survive in a variety of grassland and savannah habitats. Individuals disperse rapidly into new areas and in unfenced areas can move over very large distances. The species is conservation dependent, occurring solely in protected areas and on game farms, but it is tolerant to human activity.

The distribution of the white rhinoceros in South Africa is fragmented. However, it is widespread and common in the country, and in 2012 the national population was estimated to number approximately 18,910 individuals. Analyses undertaken by the IUCN African Rhino Specialist Group (AfRSG) indicate that the national average growth rate of the white rhino population was just over 7% from 1991 to 2012. A number of key events apparently contributed to the exponential increase in the national population of white rhino since the late 1800s when no more than 50 white rhinos survived in the iMfolozi Game Reserve in Natal, such as the advent of chemical capture drugs, translocations and policy changes both locally and internationally that created economic incentives for the private ownership, sustainable use (e.g. trophy hunting) and protection of rhinos. However due to poaching, the national white rhino population is currently growing at about 1-2% per annum. There is some uncertainty about the future national population trend since population models indicate that the white rhino population in the Kruger National Park, which represents just over 50% of the national herd, may be expected to fluctuate non-directionally between 8,000 and 10,000 animals.

The continuing loss of rhinos to poaching for their horn is currently the major threat to South Africa's white rhino population. In 2014, approximately 5.7% of the national population was poached, effectively representing 70% of the potential annual population increment. The rate of poaching has increased exponentially nationwide from 0.03 rhinos per day prior to 2007 to 3.32 in 2014. Nevertheless, the off-take from poaching is still at levels that are sustainable (total births still exceed

total deaths) and are not yet causing a population decline at the national scale. But if the rate of poaching continues to increase at the average of 35% year on year, there will be a detectable negative national population growth rate by 2016 if the underlying biological growth remains below 7% per year. The Kruger National Park has started to show a sign of a decline in the white rhino population size.

Due to rising security costs associated with the threat of poaching, private rhino owners are showing an increasing willingness to disinvest in rhinos, especially in the provinces of Limpopo, Mpumalanga and KwaZulu-Natal. Since approximately 23% of the national herd is kept on 22,274 km^2 of privately owned land, the loss of private sector interest in keeping white rhinos is a significant concern for the conservation of the species. The reduced introduction of rhinos to new areas is expected to result in a decline in the metapopulation growth rate, the total population size and the financial income to the conservation authorities that rely upon funds generated from rhino sales to conserve and protect rhinos. Income of the three largest rhino sellers earned from the sale of white rhino has reduced from a total of ~R100 million in 2009 when 370 rhinos were sold to R20 million in 2014 when only 60 were sold. Furthermore, between 2009 and 2012 there was a reduction in the average price of white rhino, from R365 000 per animal in 2009 to R258 000 in 2012. Total loss of revenue is estimated at R373 million.

A high proportion (73%) of the white rhino population in South Africa is well managed within protected areas, with off-takes (primarily translocations of surplus animals) managed in terms of ecological management plans. The white rhino population in the Kruger National Park (just over 50% of the national population) is managed in accordance with an adaptive management plan. In KwaZulu-Natal, a management strategy and a status reporting framework currently supports constant harvest management for the species. There are no provincial plans in the remaining 8 provinces. A national biodiversity management plan for white rhino that was drafted by the SADC Rhino Management Group (RMG) in accordance with the format for Biodiversity Management Plans (section 43 of the National Environmental Management: Biodiversity Act (NEMBA) of 2004) has been submitted to the Minister.

An estimated 1.4% of the national herd is translocated from protected areas annually. Although the removal of live animals for translocation purposes is not considered to be a form of harvest as these animals are not permanently removed from the national population, there are some international exports of live animals. Between 2002 and 2012 a total of 810 live white rhinos were exported from South Africa, this constituting 29% of the total exports during this time period (CITES Trade Database, UNEP World Conservation Monitoring Centre, Cambridge, UK). The main destination countries were China (30% of exports), Namibia (17% of exports) and Botswana (8% of exports), the latter two countries importing live white rhinos mainly for re-introduction purposes, and China mainly for zoos and breeding facilities. Between 1 January 2010 and October 2014, 424 white rhino were exported from South Africa. The main destinations were Namibia (>200) (range State), China (76), Botswana (>40) (range State) and Vietnam (37).

Legal hunting of white rhinos, mostly on private land, is economically motivated and is regulated through a system of permits. Prior to 2005, the number of white rhinos hunted was generally a function of market forces, with the market supporting the hunting of an average of 36 – 70 animals annually. After 2005 the number of rhinos hunted increased, and by 2011 an average of 116 animals (0.6% of the national population) were hunted, with the vast majority of these hunts being undertaken by non-

traditional hunters ("pseudo-hunters"). Importantly, "pseudo-hunting" only removed surplus male rhinos and was therefore sustainable. Through better regulation, the occurrence of "pseudo-hunts" has reduced considerably and is no longer a major issue, and 73 and 91 rhinos were hunted in 2012 and 2013 respectively (0.4-0.5% of the national population). White rhino hunting trophies exported from South Africa between 2002 and 2012 were primarily imported by the United States of America (33% of trophies), Vietnam (18% of trophies), Spain (10% of trophies) and the Russian Federation (10% of trophies); in total 1629 hunting trophies (although this figure is an overestimate due to the intricacies of data capture) (CITES Trade Database, UNEP World Conservation Monitoring Centre, Cambridge, UK). Setting a hunting quota has been unnecessary to date as the off-take has been well within sustainable levels. Trophy hunting removes surplus adult males, whilst generating important revenue for private and state conservation (while poaching targets animals of all ages and sexes). Legal hunting, combined with the impact of poaching, has not yet reached a level where it has caused a cessation in population growth.

The amended norms and standards for the marking of rhinoceros and rhinoceros horn and for the hunting of rhinoceros for trophy hunting purposes (published in April 2012) require that all rhino hunts are attended by conservation officials. Provinces indicate that this legal requirement is being complied with. High confidence can be placed in the monitoring of illegal and legal harvest in the Kruger National Park and KwaZulu-Natal as a whole, which together make up 70% of the national herd. Monitoring of the remainder of the national herd is variable with many private land owners monitoring their rhinos closely, although provision of the information remains an issue of trust between parties.

The revenue generated by the state and the private sector from owning, selling, translocating, viewing via ecotourism and legal hunting of white rhino has greatly contributed to the conservation of this species in South Africa. The white rhino population is now 10 times larger since sport hunting was introduced in 1968. Due to the significant economic benefits of hunting to game farmers (worth approximately $19 million over the period 2004 – 2008), together with live sales and ecotourism, the private sector has increasingly stocked these animals, effectively maintaining rapid metapopulation growth and contributing to the expansion of the species' range with a further 22,274 km^2 added to the conservation estate in South Africa. Live sales of surplus animals to the private sector have also been highly beneficial to conservation agencies, generating vital conservation revenue and preventing overstocking in established populations. Interestingly, in 2012 suggestions that South Africa would consider submitting a trade in rhino horn proposal to CITES saw a recovery in the average price for a white rhino.

The 77% of the national herd that is kept in state controlled protected areas is strictly protected from excessive hunting, with on average only 10 animals legally hunted annually. However, the increasing poaching rate is indicative of the limited effectiveness of the current protection measures, despite the significant resources that have been deployed towards gaining control over illegal activities. Nevertheless there may be signs that these measures are having a positive impact, as evidenced by a reduction in the rate of increase in poaching from an average of 35% year on year to 21%. Poaching has occurred in most protected areas with some protected areas, notably the Kruger National Park, struggling to combat these illegal activities. This primarily arises from the long permeable border with Mozambique and that country's inadequate legal and wildlife protection systems. Improved protection

measures (enhanced intelligence gathering and effective prosecution with deterrent sentences), as well as active regional cooperation (especially from Mozambique), are required to combat poaching.

In conclusion, the non-detriment finding undertaken for the white rhinoceros as summarized in the analyses of the key considerations above, demonstrates that legal international trade in live animals and the export of hunting trophies poses a low risk to the survival of this species in South Africa (Figures 1 and 2) and should be allowed to continue, provided that the amended norms and standards for the marking of rhinoceros and rhinoceros horn and for the hunting of rhinoceros for trophy hunting purposes (April 2012) are effectively enforced. In fact, continued legal hunting of white rhinoceros is essential for the conservation and protection of the species in South Africa. Currently legal and illegal harvests combined are still within sustainable levels. Between 73 and 91 white rhinos are currently legally hunted annually (0.4-0.5% of the national population), while approximately 5.7% of the national population is currently lost to poachers, remaining below the net 7.1% rate of increase in the white rhino population. The population is thus currently growing at about 1-2% per annum.

It has been argued that a quota system for hunting of white rhino is unnecessary at this stage because legal hunting, even factoring in the animals lost to poaching, is currently of insignificant impact on the population and is sustainable and is market driven. However, due to the increasing poaching rate it is anticipated that this situation will change and a quota system may need to be developed for future implementation.

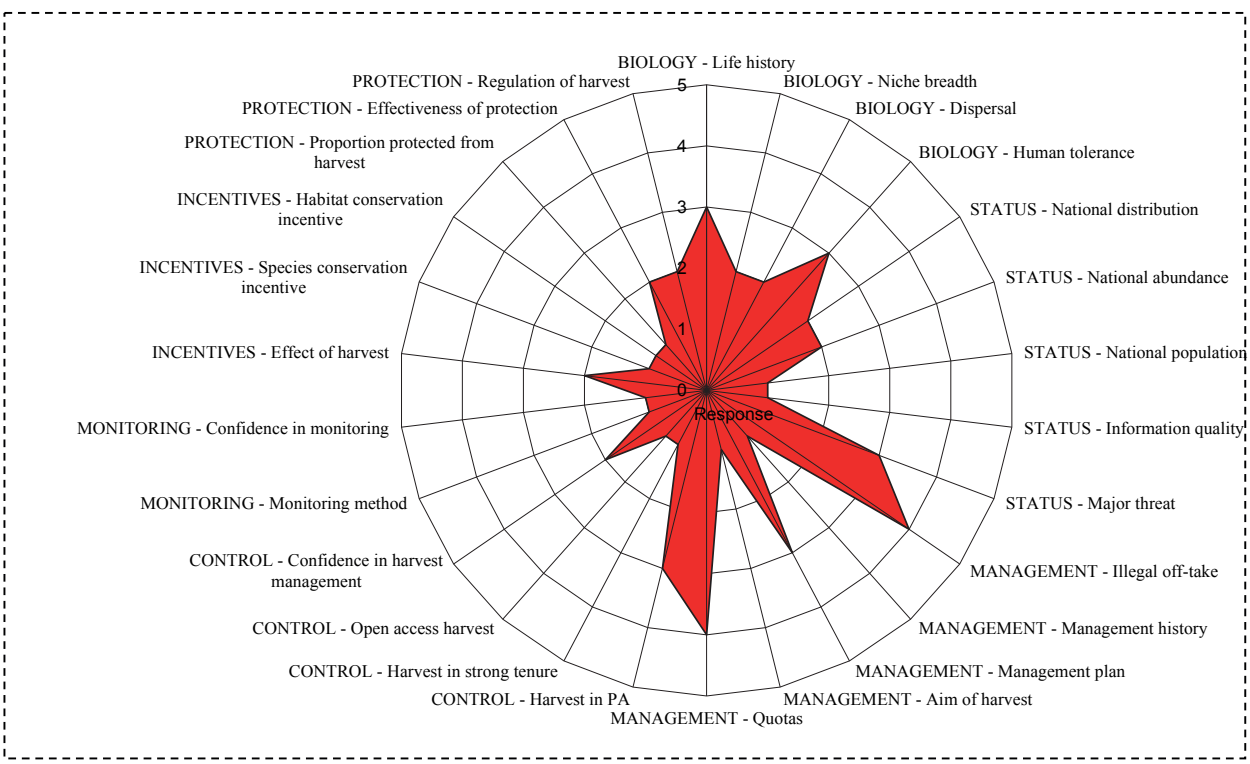

Figure 1. Radar chart summarizing the non-detriment finding assessment undertaken for *Ceratotherium simum simum* (white rhinoceros) in accordance with the CITES NDF checklist.

Explanations of scores given are detailed in Table 1. Higher scores are indicative of higher risks to the species. The limited shaded area in the radar chart demonstrates an overall low risk to the species.

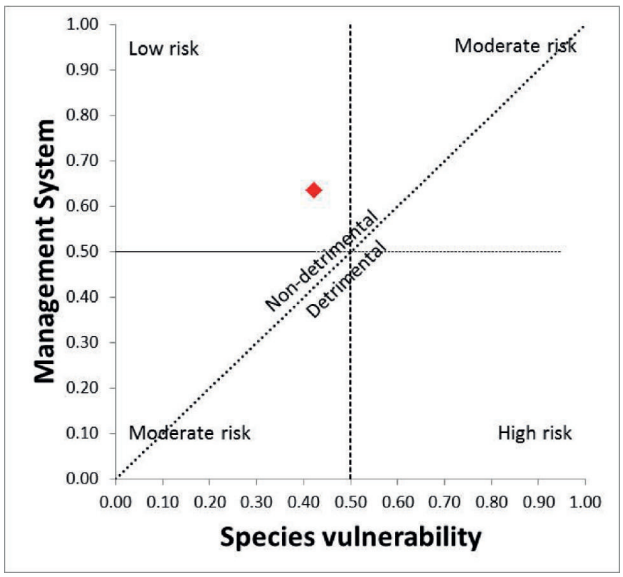

Figure 2: The risk of trading in *Ceratotherium simum simum* (white rhinoceros) as represented by the relationship between species vulnerability (biology and status) (0 = low vulnerability; 1 = high vulnerability) and the management system to which the species is subjected (management, control, monitoring, incentives and protection) (0 = weak management system; 1 = strong management system). The figure shows that the species is at low risk and trade is not detrimental.

Table 1. Non-detriment finding assessment for *Ceratotherium simum simum* (white rhinoceros) 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 history: What is the species' life history?	High reproductive rate, long-lived	1
	High reproductive rate, short-lived	2
	Low reproductive rate, long-lived	**3**
	Low reproductive rate, short-lived	4
	Uncertain	5
2. Ecological adaptability: To what extent is the species adaptable (habitat, diet, environmental tolerance etc.)?	Extreme generalist	1
	Generalist	**2**
	Specialist	3
	Extreme specialist	4
	Uncertain	5
The white rhinoceros is a relatively adaptable species and is able to survive in a variety of habitats from grassland to savannah, and inhabits areas with rainfall averages ranging from 350 mm per year to 1500 mm per year. Due to the low temperatures and poor grazing quality during the winter		

months, juvenile mortality rates on the Highveld are however high. Although animals are able to survive in low nutrient coarse grasslands, grass of a higher nutrient content is the preferred diet.

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

Individuals are generally limited to medium-sized home ranges and dispersal is a process that takes place at the juvenile stage. White rhino calves generally leave their mothers from 2.5 – 3.5 years of age to form groupings with other adult females and/or other sub-adults, subsequently dispersing into new areas. White rhinos in the Kruger National Park are encountered in new landscapes at a rate of 6% per annum. Individuals move over distances of 40 – 50 km during drought conditions. In unfenced areas white rhinos can move over very large distances as they did in the past in the Garamba National Park and as the white rhinos do in Botswana today.

4. Interaction with humans: Is the species tolerant to human activity other than harvest?	No interaction	1
	Pest / Commensal	2
	Tolerant	**3**
	Sensitive	4
	Uncertain	5

White rhinos are conservation dependent, occurring solely in protected areas and on game farms.

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

Although uncommon in Africa, the white rhinoceros is certainly not uncommon in South Africa. According to data gathered from a survey of rhinos on private and state land by the IUCN African Rhino Specialist Group (AfRSG), the total South African white rhino population consists of approximately 18,910 individuals (as at the end of 2012). This estimate takes into account animals lost to poaching. A new national survey is currently underway.

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

According to analyses undertaken by the AfRSG, the national average growth rate of the white rhino population was 7.1% from 1991 to 2012. This figure takes poaching related mortalities into account and is based on an assessment of population data gathered between 1999 and 2010 that assumes

exponential growth. In 1991 there were less than 6,000 white rhinos in South Africa. By 2012 the population had increased threefold to an estimated 18,910 animals. Approximately 5.7% of the national population is currently lost to poachers, remaining below the net 7.1% rate of increase. The population is thus currently growing at about 1-2% per annum.

A number of key events apparently contributed to the exponential increase in the national population of white rhino since the late 1800s, a time when no more than 50 white rhinos survived in the iMfolozi Game Reserve in Natal, such as (1) the first successful translocation of white rhino in 1961, followed by many subsequent translocations; (2) the advent of chemical capture drugs; (3) the commencement of the first sport hunting of white rhino in 1968; (4) the translocation of over 500 white rhino into the Kruger National Park in the early 1980s from the Hluhluwe iMfolozi Park due to a record drought there; (5) a change in policy by the Natal Parks Board that allowed the auctioning of white rhino at their true economic value, effectively increasing the numbers and protection of rhinos on private land from the late 1980s onwards; and (6) a CITES annotated Appendix II listing in 1995 that allowed for live sales and continued exports of hunting trophies.

There is some uncertainty with respect to the future national population trend for white rhinos since SANParks's best population model (which includes estimates of various biases in the data such as observer and detection biases) indicates that the white rhino population in the Kruger National Park may fluctuate non-directionally between 8,000 and 10,000 animals (95% CI: 8,092 – 9,154), although these numbers will be verified in a survey planned for 2015. *The population size in the Kruger National Park is an estimated 25% lower than it would have been in the absence of poaching and management removals. As the white rhino population in the Kruger National Park comprises just over 50% of the national population, trends in the Kruger National Park population will directly affect the national population trend. Current mortality rates for males in the Kruger National Park are estimated to be 2.7% (1% due to poaching and 1.7% due to natural mortality), while mortality rate estimates for females are 1.7% (1% mortality due to poaching).*

Although the off-take from poaching is still at levels that are sustainable and are not yet causing a population decline, if the rate of poaching continues to increase at the average of 35% year on year, there will be a detectable negative national population growth rate by 2016 if the underlying biological growth remains below 7% per year. However, if, through active biological management, underlying population growth was increased to 9%, this tipping point when deaths exceed births would be pushed back to 2017/2018. The intrinsic rate of increase of white rhino populations ranges between 8% and 9% on average, although the rate of increase will vary among individual populations. The population growth rate can be as much as 11 – 13% for recently introduced young populations that are skewed towards females.

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
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
The current major threat to South Africa's white rhino population is the continuing loss of individuals		

to poaching for their horn. During 2014, approximately 1,150 white rhinos (approximately 6% of the national population) were lost to poaching, with approximately 785 poached in the Kruger National Park alone. The rate of poaching has increased exponentially nationwide over the last five years. Prior to 2007 the rate of poaching was 0.03 rhinos per day, increasing to 0.23 per day in 2008, to 0.91 per day in 2010, to 1.83 per day in 2012 and to 3.2 rhinos per day in 2014. In 2014 the year on year increase in poaching had declined to 21% from the average of 35%. Annually there appears to be a variation in poaching rates with peaks in the first and last quarter of each year and a decline in the two mid-year quarters. The primary driver of the increasing poaching rate is the exponential increase in the black market price for rhino horn and new uses and demand from south-east Asia and especially Vietnam. Compounding this is the threat posed by organized crime. Based on recent trends, an exponential model constructed by SANParks predicts that the number of white rhinos poached in the Kruger National Park will soon approximate the surplus number that managers would have wanted to remove in order to prevent overstocking.

Due to rising security costs, private rhino owners are showing an increasing willingness to disinvest in rhinos, a further negative consequence of poaching. Auctioning patterns indicate that there may be a decline in interest in keeping rhinos on private land, particularly in the provinces of Limpopo and Mpumalanga. In 2014 in KwaZulu-Natal a total of 20% (i.e. seven) of the original 37 private land owners had sold their white rhinos. Considering that approximately 23% of the national herd (4,300 animals) is kept on 22,274 km^2 of privately owned land, the loss of private sector interest in keeping white rhinos is a significant concern for the conservation of the species.

Income of the three largest white rhino sellers (SANParks, Ezemvelo KZN Wildlife and Vleisscentraal auctioneers) earned from the sale of white rhino has reduced from a total of approximately R100 million in 2009 when 370 rhinos were sold, to R20 million in 2014 when only 60 were sold. Between 2009 and 2012 there was a 43% year on year reduction in rhino sales, with a reduction in the average price from R365 000 per white rhino in 2009 to R258 000 in 2012. This equated to a direct loss to these institutions during this period of approximately R100 million. With the total number of rhinos being sold declining from the peak of 370 in 2009 to 60 in 2014, a further loss of revenue of about R273 million is estimated, bringing the total revenue loss to R373 million. Turnover from the 1,750 white rhino sold by SANParks, Ezemvelo KZN Wildlife and Vleisscentraal auctioneers over the 2008 – 2014 period totalled R500 million, averaging R63 million per year. Interestingly, in 2012 suggestions that South Africa would consider submitting a trade in horn proposal to CITES saw the average price for a white rhino increase back to R305 000 per animal.

The loss of revenue to both state and private sector owners generated from the sale of surplus rhinos will translate into reduced funds for new conservation land and anti-poaching measures. Active involvement of the private sector in the acquisition of rhinos since 2005 was estimated to generate R290 million for conservation authorities. A further consequence of the decline in the sale and subsequent introduction of rhinos to new areas is the expected decline in the metapopulation growth rate. Increased poaching also means there will be fewer surplus rhino that could be sold to maintain productive densities.

Nevertheless, the off-take from poaching is still at levels that are sustainable (total births still exceed total deaths) and are not yet causing a population decline at the national scale, although Kruger National Park has started to show a sign of a decline in the white rhino population size.

Habitat loss is not a threat to the white rhino and the species' range has in fact expanded.

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

Approximately 5.7% of the white rhino population is currently poached, effectively representing 70% of the potential annual population increment. Although the current poaching levels are considered to be sustainable, they are certainly not insignificant. Six percent less growth over a period of 10 years equates to approximately 17,670 fewer white rhinos; animals that could be sold to generate conservation revenue and/or translocated to increase the metapopulation and expand the species' range (assuming that there is sufficient land to accommodate these additional animals) (figures based on a starting population size of 18,800 and an intrinsic rate of increase of 8%). The sale of surplus white rhinos from the Kruger National Park has been reduced substantially since rhinos are now lost to poachers instead of being removed for management purposes. Management removals of surplus animals preferentially target subadult females, while poachers remove many more adults than are proportionally represented in the population. This effectively represents a R6 billion loss in asset value for the country and will impact significantly on the generation of revenue for conservation and the expansion of the white rhino range.

At the predicted increasing poaching rate, there appears to have already been a detectable negative population growth rate in the Kruger National Park. A similar national trend is anticipated as poaching is occurring nationwide at almost the same rate. However, in 2014 the year on year increase in poaching had declined to 21% from the average of 35%, which may indicate a positive response to the anti-poaching interventions.

The sophistication of the poaching methods employed is a concern, especially as poaching is taking place throughout the country in both protected areas and privately owned land. The occurrence of "pseudo-hunts", the legal hunting of trophies for the purpose of obtaining rhino horn, has reduced considerably and is no longer a major issue. This activity importantly removed surplus male rhinos while illegal poaching removes all sexes and ages, a greater matter of concern since it heavily impacts the breeding potential of the population.

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

A high proportion (73%) of the white rhino population is generally well managed within protected areas, with off-takes managed in terms of ecological management plans. The white rhino population in the Kruger National Park (just over 50% of the national population) is managed in accordance with an adaptive management plan. Management of white rhino on private land is quite variable.

Harvest (hunting) is regulated through a system of permits, mostly on private land, this harvest in general being economically motivated. Legal hunting of white rhinoceros commenced in South Africa when the size of the rhino population was 1,800. Prior to 2005, the number of white rhinos hunted was generally a function of market forces, with the market supporting the hunting of an average of 36 – 70 animals. Since 2005 the number of rhinos hunted increased, and by 2011 an average of 116 animals were hunted, with the vast majority of these hunts being undertaken by non-traditional

hunters ("pseudo-hunters"). Greater regulation of this has resulted in a rapid decline in the number of applications by hunters from non-traditional hunting countries. Despite translocation of significant numbers of white rhino out of the country to stock other African countries and zoos and safari parks worldwide, the white rhino population in South Africa is now 10 times larger since sport hunting was introduced in 1968, clearly demonstrating that this harvest has been sustainable and positive for conservation.

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

A national white rhino strategy was approved in 2000 and in early 2015 a national biodiversity management plan (BMP) for white rhino was submitted to the Minister for consideration. This plan was developed by the SADC Rhino Management Group in accordance with the format for Biodiversity Management Plans (section 43 of the National Environmental Management: Biodiversity Act (NEMBA) of 2004) and will form the basis for greater coordination between existing and future plans. In KwaZulu-Natal, a management strategy and a status reporting framework currently supports harvest management for the species, however, there are no provincial plans in the remaining 8 provinces. Some of the state owned protected areas have approved management plans that take white rhinos into account, while there are also management plans for the larger privately owned areas. SANParks's management strategy for its rhino populations was updated in 2014.

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

The white rhino population in South Africa is generally subjected to two forms of off-take, including management removals of surplus animals and hunting. The majority of management removals are not considered in this NDF to be a form of harvest as animals are not permanently removed from the national population but are sold and then moved to new areas (although there are international exports of live animals). This generates a conservation benefit through ensuring rapid growth in numbers and expansion of the species' range, while at the same time generating conservation revenue. Since 1986 about 3,000 white rhinos have been sold into the private sector. Removals of white rhinos from Kruger National Park are set to continue as a strategy to place animals in safer habitats.

A total of 810 live white rhinos were exported from South Africa between 2002 and 2012, this constituting 29% of the total exports during this time period (CITES Trade Database, UNEP World Conservation Monitoring Centre, Cambridge, UK). Live animals were exported primarily to zoos (48% of exports) and breeding facilities (23% of exports) and for re-introduction purposes (22%). The main destination countries were China (30% of exports), Namibia (17% of exports) and Botswana (8% of exports), the latter two countries importing live white rhinos mainly for re-introduction purposes, and China mainly for zoos and breeding facilities. Between 1 January 2010 and October 2014, 424 white rhino were exported from South Africa. The main destinations were Namibia (>200) (range State), China (76), Botswana (>40) (range State) and Vietnam (37).

Permanent removal of white rhinos from the national population through hunting is economically motivated and justified (about 0.6% of the national population). Sustainable hunting aims to generate a conservation benefit through incentivizing the private sector to keep rhino and to purchase land in order to stock rhino. Trophy hunting removes surplus adult males, whilst generating important revenue for private and state conservation (while poaching removes all ages and sexes, having a greater impact on rhino production). Fifty-nine percent of the total exports of white rhino specimens between 2002 and 2012 were hunting trophies (CITES Trade Database, UNEP World Conservation Monitoring Centre, Cambridge, UK); 1629 trophies in total. (Note that this figure is an overestimate due to the way in which data are captured into the CITES Trade Database.) The main destination countries included the United States of America (33%), Vietnam (18%), Spain (10%) and the Russian Federation (10%).

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

The number of white rhinos hunted annually is market driven. Setting a quota has been unnecessary to date as the off-take has been well within sustainable levels (by 2011 an average of 116 rhinos were hunted annually equating to approximately 0.6% of the national population, while 73 and 91 rhinos were hunted in 2012 and 2013 respectively (0.4-0.5% of the national population)).

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

An estimated 1.4% of the national herd is translocated from protected areas annually. The removal of live animals for translocation purposes is not considered to be a form of harvest in terms of this NDF as these animals are not permanently removed from the national population. On average 116 white rhinos are legally hunted annually (0.6% of the national population) (recently reduced to between 73 and 91 animals (0.4-0.5% of the national population)). Of these less than 10 are hunted from state controlled 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

On average 116 white rhinos are legally hunted annually (0.6% of the national population), but this has been reduced recently to 73 and 91 rhinos hunted in 2012 and 2013 respectively (0.4-0.5% of the national population). Most of these animals are hunted on private land.

17. Harvesting in areas with open access: What percentage of the	**None**	**1**
	Low	2

legal 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
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
Since the introduction of the amended norms and standards for the marking of rhinoceros and rhinoceros horn and for the hunting of rhinoceros for trophy hunting purposes (published in April 2012), all rhino hunts are attended by conservation officials, a legal requirement of the norms and standards. In at least two provinces the numbers of white rhino kept on private land is inadequately known (although estimates exist), and therefore sustainability of hunting, particularly in smaller populations, cannot be adequately assessed, while management plans for ensuring sustainable harvest are lacking. Through better regulation, the occurrence of "pseudo-hunts" has reduced considerably and is no longer a major issue. The issuing of many permits by one province and many hunts on some properties is indicative of possible problems with the implementation and enforcement of the hunting permit system. There are also concerns that in some cases young animals or prime breeding females have been hunted.		
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
Monitoring methods employed in the Kruger National Park involve distance sampling techniques and block counts. Formal distance sampling and aerial survey methods are also employed in the Hluhluwe iMfolozi Park in KwaZulu-Natal. Together these populations make up about 70% of the national herd. Monitoring of the remainder of the national herd is variable with many private land owners monitoring their rhinos closely, although provision of the information remains an issue of trust between parties. The amended norms and standards for the marking of rhinoceros and rhinoceros horn and for the hunting of rhinoceros for trophy hunting purposes (published in April 2012) require that all hunts are monitored by conservation officials. A survey is currently being undertaken of white rhino on private land.		
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
Monitoring of harvest (illegal and legal) in the Kruger National Park and provincial protected areas in KwaZulu-Natal, which together represents 70% of the national herd, can be regarded with high confidence. The amended norms and standards for the marking of rhinoceros and rhinoceros horn and for the hunting of rhinoceros for trophy hunting purposes (published in April 2012) require that all rhino hunts are attended by conservation officials. Provinces indicate that this legal requirement is being complied with.		

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
Legal hunting of white rhino has been beneficial to the conservation of the species. Due to the significant economic benefits of hunting to game farmers (worth approximately $19 million over the period 2004 – 2008), together with live sales and ecotourism, the private sector has increasingly stocked these animals, contributing to the expansion of the species' range and maintaining rapid metapopulation growth. Live sales of surplus animals to the private sector have been highly beneficial to conservation agencies, generating vital conservation revenue (e.g. sales by SANParks, and Ezemvelo KZN Wildlife as well as Vleisscentraal from 2007 to end 2014 totalled R507 million) and preventing overstocking in established populations. However, the increase in poaching is starting to limit this positive impact as private sector interest in buying and keeping rhinos continues to decline due to the rising costs of security. Legal hunting, combined with the impact of poaching, has however not yet reached a level where it has caused a cessation in population growth.		
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
The ability for the state and the private sector to gain financially from owning, selling, translocating, viewing via ecotourism and hunting white rhino has greatly contributed to the conservation of this species in South Africa. Only 1,800 white rhino remained in the 1960s. Today the population is estimated to be three times larger (18,910 animals). Privately owned game farms have contributed significantly to white rhino conservation. Twenty-three percent of the national herd (approximately 4,300 animals) is kept on approximately 22,274 km^2 of privately owned land. The speculation that South Africa may submit a proposal to CITES to trade in horn has seen the average price paid for white rhino increase from a low R255 000 per animal in 2011 to R305 000 in 2013.		
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
Private game reserves contribute significantly to the conservation estate in South Africa. It is estimated that private game farms with white rhinos have added a further 22,274 km^2 to the conservation footprint.		
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

On average 116 white rhinos are legally hunted annually (0.6% of the national population) (recently reduced to between 73 and 91 animals (0.4-0.5% of the national population)). Of these less than 10 are hunted from state controlled protected areas, which altogether accommodate 77% of the national herd.

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

The white rhino is a well-managed species and its legal utilization in fact benefits its conservation. Strict protection measures (enhanced intelligence gathering and effective prosecution with deterrent sentences) are however required to both combat and prevent poaching. Measures are being taken but their long-term effectiveness is unknown at this stage. Poaching has occurred in most protected areas and some protected areas (notably the Kruger National Park) are struggling to combat these illegal activities. This primarily arises from the long permeable border with Mozambique and that country's inadequate legal and wildlife protection systems. A policy decision by SANParks will see the translocation of white rhinos to other protected areas in the former range and the selling of rhinos to the private sector in order to reduce the threat to the Kruger National Park white rhino population. This intervention aims to place rhinos in safer areas, and vital conservation revenue will also be generated. Protection measures in KwaZulu-Natal appear to be more effective than in other provinces.

Despite the significant resources that have been deployed towards gaining control over illegal activities, the increasing poaching rate is indicative of the limited effectiveness of the current protection measures. These measures only address the symptoms and fail to address the cause of the escalating poaching levels (high demand for black market horn at high prices i.e. the low supply to demand ratio). Nevertheless there may be signs that enhanced protection measures are beginning to have a positive impact, as evidenced by a reduction in the year on year increase in the poaching rate that was observed in 2014.

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

Hunting affects only a very small proportion (0.4-0.6%) of the national population. Provinces have indicated that the amended norms and standards for the marking of rhinoceros and rhinoceros horn and for the hunting of rhinoceros for trophy hunting purposes (published in April 2012) are being implemented effectively.

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List of participants

1. Noluthando Bam – Deputy Director Biodiversity Management (Eastern Cape Department of Economic Development and Environmental Affairs)
2. Anuschka Barac – Scientist (North West Department of Agriculture, Environment & Tourism)
3. Willem Boshoff – Deputy Director (North West Department of Agriculture, Environment & Tourism)
4. Thea Carroll – Director: Regulation and Monitoring Services (Department of Environmental Affairs)
5. John Donaldson – Chair of the Scientific Authority (South African National Biodiversity Institute)
6. Johan Eksteen – Manager: Ecological Services (Mpumalanga Tourism and Parks Agency)
7. Richard Emslie – IUCN SSC AfRSG Scientific Officer and Member SADC Rhino Management Group
8. Sam Ferreira – Large Mammal Ecologist: Scientific Services (South African National Parks)
9. Theressa Frantz – Director: Applied Biodiversity Research (South African National Biodiversity Institute)
10. Pete Goodman – Coordinator Biodiversity Research (Ezemvelo Kwazulu-Natal Wildlife)
11. Nico Grobler – Assistant Director: Ecological Services (Gauteng Department of Agriculture and Rural Development)
12. Kas Hamman – Executive Director Biodiversity (Cape Nature)
13. Mike Knight – Chairman: IUCN SSC African Rhino Specialist Group (South African National Parks) & SADC Rhino Management Group (RMG)
14. Julius Koen – Deputy Director (Northern Cape Department of Environment and Nature Conservation)
15. Leon Lötter – Control Biodiversity Officer: Resource Protection (Gauteng Department of Agriculture and Rural Development)
16. Den Mabogo – Senior Manager: Biodiversity (Limpopo Department of Economic Development, Environment and Tourism)
17. Sonja Meintjes – Deputy Director (Department of Environmental Affairs)
18. Errol Moeng – Scientist (Limpopo Department of Economic Development, Environment and Tourism)
19. Lizanne Nel – Senior Manager Biodiversity Management (Limpopo Department of Economic Development, Environment and Tourism)
20. Peter Novellie – General Manager: Park Planning (South African National Parks)
21. Michèle Pfab – Scientific Co-ordinator of the Scientific Authority (South African National Biodiversity Institute)
22. Elsabe Swart – Assistant Director (Northern Cape Department of Environment and Nature Conservation)
23. Adrian Tordiffe – Clinical & Research veterinarian (National Zoological Gardens of South Africa)
24. Savvas Vrahimis – Production Scientist (Free State Department of Economic Development, Tourism & Environmental Affairs)
25. Craig Whittington-Jones – Production Scientist (Gauteng Department of Agriculture and Rural Development)