CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES
OF WILD FAUNA AND FLORA

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COMPILATION OF COMMENTS REGARDING THE APPLICABILITY OF VARIOUS CRITERIA TO ASSESS THE STATUS OF FLORA FOR LISTING UNDER CITES APPENDIX I

1. This document has been prepared by the United States of America.

General comments from reviewer on applicability of criteria for listing on Appendix I	***Pseudophoenix ekmanii*, Dominican cherry palm (palm tree):** It seems that the guidance provided at the beginning of this table specifying that the "species must fulfill the trade criterion and at least one of the criteria A-D," was included just for the purposes of this review. However, it could be modified somewhat (see below) and retained. THE FOLLOWING EDITORIAL CHANGES ARE PROPOSED: "For ~~your information for~~ a species to fulfill the draft criteria for Appendix I it must meet the trade ~~criteria~~ *criterion* and at least one of the *biological* criteria, A-D." GENERAL COMMENTS: For plants, issues such as seed bank viability and primary mode of reproduction should be provided/requested. Where do items such as "possibly extinct" and "threatened with extinction" come into the scenario? These terms are defined in the appendix, but are not referred to in the text of the tables. I am told that "generation length" (a.k.a. generation time) is mentioned in A)(i), yet there is no prompt to the reader. The distinction between the various categories (A, B, and C) is unclear – Is the following characterization correct? Category A comprises a population that is vulnerable due primarily to its small number of individuals (and secondarily to other factors such as limited range and factors causing decline); Category B comprises a population that is vulnerable primarily due to a restricted location (and secondarily to small population size and factors causing decline), and Category C comprises a population that is vulnerable due primarily to decline (and secondarily to small numbers and decline factors)? It seems that these are all circuitous distinctions that add unnecessary complexity and repetition to the criteria. At the same

	time, they are disjunct – for example, some aspects are similar to two Categories but missing in another. E.g., "recruitment" discussed in Categories B)(iv) and C)(ii), but not in, e.g., Categories A)(ii),(iii), or (v)? E.g., "vulnerability" discussed in Categories A)(v) and B)(iii), but not C(ii)? See also changes to the vulnerability checklist at the end of this table.

CRITERION	COMMENTS AND SPECIES ASSESSMENETS
Is or may the species be affected by trade?	***Aloe ferox*, Tap aalwyn (an aloe):** NO COMMENTS. ********** ***Cibotium barometz* (tree fern):** Yes. In trade as wild, and demand for medicine-dried rhizome. Therefore known to be affected by trade. The data from the relevant authentic government shows that the China export, including Hong Kong during 1993 to 1997 of this species, *Cibotium barometz*, is sum of 524,850 tons. This criterion was easy to apply for this taxon. ********** ***Cistanche deserticola*, desert cistanche (parasitic plant):** Yes. The species is a well-known medicinal plant. It was traded national and international wild plants, and over-collecting has happened recently in the demand for medicine (active substance-phenylethanoid glycosides)-dried carnose stem. This was reported commonly by experts as well as media. Significant trade surveys in China indicated it as first grade priority species for conservation action. This criterion was easy to apply for this taxon. ********** ***Dendrobium nobile* (orchid):** Yes. *Dendrobium nobile* is the main raw material of several traditional Chinese medicines, and both the wild and propagated are in great demand in trade. In addition, this species is very attractive, but absolutely cut flowers are from the propagated in Chinese market. ********** ***Dionaea muscipula*, Venus flytrap (carnivorous):** The criterion applies to species. Yes, *Dionaea muscipula* is affected by international trade. There is demand for plants for the international horticultural trade (as plants and mother stock) and for plant extracts for purported medicinal uses (e.g., treatment for certain cancers and HIV-AIDS). Within the United States, the range country, there is a demand for wild-collected plants used to supplement nursery mother stock. This mother stock is extensively used to propagate plants for the U.S. domestic market, but may also be used to produce the large amounts of 'artificially propagated' stock that is in international trade. It is important to understand the relationship of the number of specimens in trade versus number of individuals per population. **Suggested change: Include the word "international" before the word "trade."** ********** ***Galanthus elwesii*, snowdrop (bulb):** The trade criterion is applicable to this species, because it is known to be in trade in significant numbers in relation to the population size(s), and it is known that high level of trade may have a detrimental impact on certain populations. This criteria works, however it is important that in applying the criteria due attention is given to assessing the possible detrimental impact of the trade. The reviewer should make clear the possible detriment. ********** ***Marojejya darianii* (Madagascan palm):** Yes. This criterion was easy to apply for this taxon.

Is or may the species be affected by trade?	********** ***Morchella* spp., morel fungus (mushroom):** There are trade data available. It is possible to obtain trade data for macrofungi. ********** ***Panax quinquefolius*, American ginseng (rhizome):** The criterion applies to this species. Yes, American ginseng is affected by international trade. Whole plants are harvested from the wild in the United States and Canada. There are also various semi-wild production systems used to grow specimens for trade. These alternative methods may have negative affects to wild populations of the species (potential for introduction and spread of diseases, genetic depression or alteration by outcrossing, and habitat modification). In addition, semi-wild production systems are probably masking the quantity of wild sub-populations in the USA. **Suggested change: Include the word *"international"* before the word *"trade"*.** ********** ***Pericopsis elata*, African teak (timber):** This criterion works for this taxon. ********** ***Populus tremuloides*, trembling aspen (clonal tree):** Not applicable to *Populus tremuloides*. Definition of "affected by trade" as listed on pg. 13, is clear and easily interpreted with regard to this species. ********** ***Prunus africana*, African cherry (timber bark):** NO COMMENTS. ********** ***Pseudophoenix ekmanii*, Dominican cherry palm (palm):** Yes, seeds are collected for export to nurseries and growers. Sap is collected for local consumption. Individuals are destructively harvested for the sweet sap, which is fermented into wine. While it may be implicitly understood, this question should specify "international" trade (see below). The definition also requires clarification (as mentioned below) and the reader should be asked to discuss any domestic trade issues within the context of the subsequent criteria (i.e with regard to decline, vulnerability, etc.). **THE FOLLOWING EDITORIAL CHANGES ARE PROPOSED:** **Trade Criterion: Is or may the species be affected by *international* trade?** **Species: In Article I of the Convention the term species is defined as "any species, subspecies or geographically separate population thereof".**

Is or may the species be affected by trade?	**Species and subspecies refer to the biological concept of a species~~, and do not require any further definition~~. *This includes varieties, which may or may not be recognized as distinct species, according to prevailing expert opinion.* ~~The two terms also cover varieties.~~** **"Geographically separate population" refers to *populations or subpopulations* ~~parts~~ of a species or ~~a~~ subspecies *(e.g., stocks, or ecotypes)* within particular geographical boundaries. *Geographical boundaries may include natural or man-made features (e.g., mountain ranges, islands, or dams) or biogeographical restrictions (e.g., due to pollinator or dispersal limitations).* ~~This can also refer to populations or subpopulations, or, for the sake of convenience in certain cases, to 'stocks' as the term is understood in fisheries management.~~ *Where populations are separated due to geopolitical boundaries, the ramifications that this separation has to the survival of the species should be explained.*** **In light of the above clarifications to "geographically separate population", we believe the following paragraph can be deleted as it may be subject to misinterpretation. ~~Until now, the Conference of the Parties has interpreted 'geographically separate populations' as populations delimited by geopolitical boundaries, whereas they have rarely used the other option of geographical boundaries.~~** **Affected by trade: A species "is or may be affected by *international* trade" if: 1. it is known to be in *international* trade, and that trade has or may have a detrimental impact on the status of the species; or 2. it is suspected to be in *international* trade, or there is potential international demand for the species, that may be detrimental to its survival in the wild.** ********** ***Ravenea louvelii* (palm):** Yes*.* This criterion was easy to apply for this taxon*.* ********** ***Satranala decussilvae* (palm):** Yes. This criterion was easy to apply for this taxon. ********** ***Strombocactus disciformis* (cactus):** The criterion applies for the species. Yes, it is not yet affected but it has the potential to become, because the species is already being sold in European nurseries and there are reports of confiscated specimens. **We propose the following changes: This criterion should specifiy *"international"* trade amendments to the definition: Affected by *international* trade. A species "is or may be affected by *international* trade" if: 1. it is known to be in *international* trade, and that trade has or may have a detrimental impact on the status of the species; or 2. it is suspected to be in *international* trade, or there is potential international demand for the species *on the basis of some evidence,* that may be detrimental to its survival in the wild. 3. *It is known that the species was subject to international trade in the past and therefore there is a potential for it to be reinitiated.*** **Add: *If the answer is "yes" explain to the criterion.*** ********** ***Taxus brevifolia*, Pacific yew (temperate timber medicinal):** Not applicable *to Taxus brevifolia*. Definition of affected by trade as listed on pg. 11, is clear and easily interpreted with regard to this species. **********

Is or may the species be affected by trade?	***Tillandsia xerographica*** **(bromeliad):** A. This is a good and applicable criterion, but it should be noted that the species was affected by international trade in wild specimens. Right now, the species in the wild is affected by international trade in artificially propagated plants, resulting from wild collection. Reviewers GT: Yes, there is trade in the species, but all trade specimens originate from nurseries registered with the Management Authority. In these nurseries, plants are produced using different methods, so it can be assumed that trade is not detrimental to the survival of the species. Since 1994, the government has not authorized the commercial harvest of wild plants, this species, or any plants of the genus *Tillandsia*, and although it is known that an illegal markey exists, this has not been confirmed. ********** ***Turbinicarpus pseudomacrochele*****, Hairy-spined turbinicarpus (cactus):** The criterion applies for the species. Yes, it is being illegally extracted from the wild mainly by European and North American collectors. This is the major threat to the species. There have been several confiscated shipments by the Mexican law enforcement authority. **We propose the following changes: This criterion should specifiy *"international"* trade amendments to the definition: Affected by *international* trade. A species "is or may be affected by *international* trade" if: 1. it is known to be in *international* trade, and that trade has or may have a detrimental impact on the status of the species; or 2. it is suspected to be in *international* trade, or there is potential international demand for the species *on the basis of some evidence,* that may be detrimental to its survival in the wild. 3. *It is known that the species was subject to international trade in the past and therefore there is a potential for it to be reinitiated.*** **Add: *If the answer is "yes" explain to the criterion.*** ********** ***Zamia furfuracea*****, carboard palm (cycad): This criterion needs to be more specific.** *Z. furfuracea* was heavily traded in the 1970s but trade is now entirely in cultivated plants. The question needs to make this explicit. In terms of current trade, the answer should be NO, but evaluators may be tempted to say YES because trade WAS so heavy.

A) The wild population is small, and is characterized by at least one of the following (see definitions below):	***Aloe ferox*, Tap aalwyn (an aloe):** In the case of *A. ferox*, the population is large (estimated to be over 100 000 plants). For other Aloes, a small population might be < 3000 plants. ********** ***Cibotium barometz* (tree fern):** No. Wild population is large with comparison with other pteridophyte in China. The estimated size by expert of the population is 76.8 million individuals in 2000. **Is it possible to provide a numerical range to delimitate the size of a wide population which could be considered as small?** ********** ***Cistanche deserticola*, desert cistanche (parasitic plant):** Twenty years ago, the wild population is quite large, distributed in several provinces in northern China, Mongolia and former Russia. But now the population is rather small due to the habitat deconstruction. This criterion was easy to apply for this taxon. ********** ***Dendrobium nobile* (orchid):** No. Wild population of this species can't be considered small. But it is hard to make a rather exact estimate about its population size. Problem: Although *Dendrobium nobile* is widely distributed, and the articles under A) are not suitable for it, some articles under A) affect this species greatly, such as A) (*). ********** ***Dionaea muscipula*, Venus flytrap (carnivorous):** Criterion applies to species. The wild population for this species is 48,000 – 63,000 individuals. ********** ***Galanthus elwesii*, snowdrop (bulb):** This criterion is generally applicable to the species. However, **the definition of "small wild population" is difficult to interpret. "Small" can be interpreted in various ways.** Some taxa (such as *G. koenianus*) exist in populations which are naturally small in contrast to *Galanthus elewesii*. Some species populations are small in relation to their original population before exploitation or habitat loss. Some species populations are small but intrinsically robust. It is not clear that the definition captures the element of vulnerability that typifies some 'small' populations. It may be useful to offer additional guidance as to what is meant by small, for example "a small wild population is one in which any further reduction in abundance may significantly affect the survival of the species". NL SA Comment: This criterion is applicable to the species if you explain the numbers of the population(s) in relation to the level of exploitation if you specify the population(s) in numbers in relation to the harvest level. But a population of 1million plants of this species may also be called small, compared to other populations of a billion plants. Even a population of a billion plants may be called small of the harvest is more than the reproduction potential of this particular species. ********** ***Marojejya darianii* (Madagascan palm):** Yes, less than 100 mature individuals This criterion was easy to apply for this taxon. However there is limited published information on this taxon and the other Palms. **It is important that is the case of many plants where limited published information is available that the views of local national and international experts that have field knowledge of the relevant taxa be given equal weight to published data on better known species.**

A) The wild population is small, and is characterized by at least one of the following (see definitions below):	********** ***Morchella* spp., morel fungus (mushroom):** Applicable to macrofungi. If we consider the fruiting body as "an individual", macrofungi can be easily counted. In the definitions under Population Issues it might be useful to have a new subheading – **Individuals, where the following wording could be inserted: "In the specific case of macrofungi, individuals are counted as the visible reproductive structures, regardless of whether the structure has been produced by sexual or asexual reproduction." Bearing in mind the reproductive strategies of macrofungi, it could also be assumed that individuals (fruiting bodies) may be genetically different from each other, even within a same "colony", since the origin may be sexual (originating in a sexual mycelium) or asexual (originating in a primary mycelium). It may be that these issues are not fundamentally different to that found in other types of organisms. For example, terrestrial perennial orchids that produce annual aboveground parts. It is not practical to measure abundance or decline other than by some measure of the above-ground phase. Resolution of these types of situations in the criteria for seed-bearing plants is very likely to provide a solution for fungi. Population size can be estimated by counting fruiting bodies (individuals – see definitions).** **Population and Population Size** "refers to the number of individuals". If our initial definition of individual is valid, we see no problem here. ********** ***Panax quinquefolius*, American ginseng (rhizome):** The criterion applies to species. **However, the definition of "population size" recommends that the terms "*total*" and "*effective*" be used to describe the population of the taxon. These two terms may not be applicable to most plant taxa, or very difficult to determine.** The sub-populations in the USA, the core range of the species, are estimated to contain a million to a billion individuals, and therefore, the USA wild population is not considered small. Due to the wide distribution of this species and diverse land ownership (Federal, State, private, etc.) in the USA, census information is not available. Census data for the sub-populations in Canada are known (ginseng only occurs in the wild in the provinces of Ontario and Quebec), and the wild population in Canada is considered small. However, the census data of the Canadian sub-populations, at the northern edge of the species' range, cannot be extrapolated to estimate sizes of sub-populations in the USA. ********** ***Pericopsis elata*, African teak (timber):** This criterion works for this taxon. The relevant experts need always to consider what is the appropriate definition of 'small' for the taxon under review. ********** ***Populus tremuloides*, trembling aspen (clonal tree):** No: *P. tremuloides* is continentally distributed, ranging across boreal and temperate North America. Range in Canada covers 5,153,890 sq. km. ********** ***Prunus africana*, African cherry (timber bark):** NO COMMENTS. ********** ***Pseudophoenix ekmanii*, Dominican cherry palm (palm):** Unknown, but probably no more than 5000 adults.

A) The wild population is small, and is characterized by at least one of the following (see definitions below):	**THE FOLLOWING EDITORIAL CHANGE IS PROPOSED: What was/is the estimated size of the population? *Where available,* please include units of measurement *and specify whether this number refers to the total population size or effective population size (see definition for population)*.** **GENERAL COMMENTS: It seems impractical to characterize a population as small or very small – it's either small or it's not. If appropriate biological information is provided, the seriousness of the "bottleneck" will be apparent within the context of the review. The reference to "very small" populations should be deleted.** **In defining "small," numeric values should not be offered to the reviewer as part of the definition. See suggested language, below. Numbers can be misleading. A population of plants consisting of 5000 members can actually be quite small if they reproduce clonally.** **Does "wild" need to be defined here?** **In keeping with the next question (Part B), definitions for "wild population is small" should be broken out into parts – "wild" can be defined, "population" can be defined and "small" can be defined.** **THE FOLLOWING EDITORIAL CHANGES ARE PROPOSED:** **Small wild population: *Provide the numerical, biological, and/or geographical factors to substantiate the characterization of the population in question as being "small."* ~~For some species where data exist to make an estimate, a figure of less than 5,000 individuals has been found to be an appropriate guideline (not a threshold) of what constitutes a small wild population. However, this figure is presented only as an example, since it is impossible to give numerical values that are applicable to all taxa. There will be many cases where this numerical guideline does not apply.~~** **Population size: When providing details on the size of a population or sub-population, *clarify* ~~it should be made clear~~ whether the information ~~presented~~ *provided* relates to an estimate of the *total* number of individuals, or to the *effective* population size (i.e., individuals capable of reproduction, excluding individuals that are environmentally and behaviourally or otherwise reproductively suppressed in the wild), or to another appropriate measure or component of the population. In the case of species biologically dependent on other species for all or part of their life cycles, biologically appropriate values for the host or co-dependent species should *also* be ~~chosen.~~ noted.** ********** ***Ravenea louvelii* (palm):** Yes - less than 25 mature individuals This criterion was easy to apply for this taxon. However there is limited published information on this taxon and the other Palms. **It is important that is the case of many plants where limited published information is available that the views of local national and international experts that have field knowledge of the relevant taxa be given equal weight to published data on better known species.** ********** ***Satranala decussilvae* (palm):** Yes, less than 1000 mature individuals This criterion was easy to apply for this taxon. However there is limited published information on this taxon and the other Palms. **It is important that is the case of many plants where limited published information is available that the views of local national and international experts that have field knowledge of the relevant taxa be given equal weight to published data on better known species.** **********

A) The wild population is small, and is characterized by at least one of the following (see definitions below):	***Strombocactus disciformis* (cactus):** According to the guideline provided for small population, the species has a small population (less than 1000 individuals) and the answer would be yes, so the criterion applies for this species. Nevertheless, **we consider that a definition of small wild population is in fact missing and that absolute numbers should not be included in any case, because they can be misleading. We proposed a more practical and useful (less subjective) definition for small population: a small wild population is one that has low availability of specimens for international trade. This criterion should be based specifically on the wild population instead of just "population". Therefore, a definition of wild population is needed: wild population - wild population refers to the total number of individuals of the species within its natural distribution area (as "species" is defined in Article 1 of the Convention and in this Annex (to be considered in light of any decision arising from consideration of Doc. 12.59).** ********** ***Taxus brevifolia*, Pacific yew (temperate timber medicinal):** Given the extensive range of the species, exact population number is difficult to estimate. The population is not small under the CITES definition. An available reference notes that non-Federal lands in parts of the United States (California, Oregon, and Washington) where inventories were made in the 1980's contained an estimated 700,000 *Taxus brevifolia* trees 28 cm (11 in) diameter at breast height, and larger. ********** ***Tillandsia xerographica* (bromeliad):** A. This is a good and applicable criterion, but this is often difficult to assess for plants in general, and more recent population data (based on fieldwork) are needed. Reviewer Gouda, NL: From the information I have, the population is nearly vanished at least in Guatemala (specialist observations are wanted). Reviewers GT: Currently, the population is small. ********** ***Turbinicarpus pseudomacrochele*, Hairy-spined turbinicarpus (cactus):** According to the guideline provided for small population, the species has a small population (less than 1000 individuals; and it is composed of only around 164 specimens) and the answer would be yes, so the criterion applies for this species. Nevertheless, **we consider that a definition of small wild population is in fact missing and that absolute numbers should not be included in any case, because they can be misleading. We propose a more practical and useful (less subjective) definition for small population: a small wild population is one that has low availability of specimens for international trade. A definition of wild population is needed. This criterion should be based specifically on the wild population instead of just "population". Therefore, a definition of wild population is needed: wild population. Wild population refers to the total number of individuals of the species within its natural distribution area (as "species" is defined in Article 1 of the Convention and in this Annex (to be considered in light of any decision arising from consideration of Doc. 12.59).** **When providing details on the size of a population or sub-population, it should be made clear whether the information presented relates to an estimate of the total number of individuals or to the effective population size (i.e., individuals capable of reproduction, excluding individuals that are environmentally and behaviourally or otherwise reproductively suppressed in the wild) or to another appropriate measure or component of the population.** ********** ***Zamia furfuracea*, carboard palm (cycad):** 10,000 (this would be regarded as relatively large for cycads but it is difficult to evaluate without some threshold levels). This criterion therefore becomes vague. If it is classified as small, *Z. furfuracea* fulfils criterion A(I) and would qualify as Appendix I

A)(i) an observed, inferred or projected decline in the number of individuals or the area and quality of habitat; or	***Aloe ferox*, Tap aalwyn (an aloe):** Leaves are harvested from A. ferox and the impacts on decline can be quite subtle. Nevertheless, it is certainly possible to observe or infer decline. ********** ***Cibotium barometz* (tree fern)*:*** NO COMMENTS. ********** ***Cistanche deserticola*, desert cistanche (parasitic plant):** An observed decline in the number of individuals. ********** ***Dendrobium nobile* (orchid): NO COMMENTS.** ********** ***Dionaea muscipula*, Venus flytrap (carnivorous):** Sub-criterion applies to species. **Definitions and examples of the terms "inferred" and "projected" should be included.** Between 1992 and 2002, comparing the same subpopulations, numbers of individuals declined approximately 17%. The quality of habitat has declined due to lack of natural ecological processes or land management regimes (i.e. prescribed burning, hydrological changes) due to land conversion for agriculture, road building, etc. **To reduce redundancy in Table 1, could category 'A' be restricted to considerations of population size only, rather than also incorporating area and quality of habitat? Certainly they are all related, but since there is a separate Category 'B' for area of distribution, perhaps area and quality of habitat could be restricted to Category 'B'.** ********** ***Galanthus elwesii*, snowdrop (bulb):** This criterion is applicable. NL SA Comment: This criterion is applicable, but you need to define how far you go back in history and also what level of decline is relevant in relation to reproduction capacity. ********** ***Marojejya darianii* (Madagascan palm):** Yes, habitat threatened with destruction for shifting cultivation. This criterion was easy to apply for this taxon ********** ***Morchella* spp., morel fungus (mushroom):** Applicable to macrofungi. **Decline "reduction in abundance, or area of distribution". We would assume it could only be assessed by some abundance measure of the visible reproductive structure (see definition of "individual" above [A]).** **********

A)(i) an observed, inferred or projected decline in the number of individuals or the area and quality of habitat; or	***Panax quinquefolius*, American ginseng (rhizome):** Sub-criterion applies to species. A decline in the number of individuals in the USA has been observed during the past 10-20 years. The quality of habitat has also declined in certain portions of the species' range in the past 10 years. Ontario, Canada: 5959 total plants counted as of 1998 in 31 sub-populations. Half of these have 65 or fewer plants. 13 have 25 or fewer plants. There are 65 records total for Ontario: 31 known to be extant; 11 extirpated; and 23 possibly extant. Quebec, Canada: 74 sub-populations have been reported: 49 known to be extant; 10 extirpated; 15 possibly extant. 40 sub-populations studied in detail. 27 of these have less than 172 plants. Only 2 have more than 500 plants. **Definitions and examples of the terms "inferred and "projected" should be included.** ********** ***Populus tremuloides*, trembling aspen (clonal tree):** **Interpretation of this criterion unclear, with respect to *P. tremuloides* and to other plant species that employ partially or exclusively, non-sexual reproductive strategies. In the case of *P. tremuloides*, clones, or groups of clones occupying 80 hectares are known to have originated from a single seedling. The resulting population consists of many thousands of "trees" (stems) all of which share a common (or commonly originated) root system. As such, a specific definition of "individual" in the case of *vegetatively reproducing species should ideally include a measure of genetic differentiation among or between clonal populations*.** **Interpretation of "decline in area and quality of habitat" is also problematic. Particularly for early succession temperate and boreal tree species, habitat quality is synonymous with "presence" in a given geographical area and at a specific point in time. Decline in habitat of an early succession species such as *P. tremuloides* could equate to a normal, natural cycle in which habitat quality for mid-succession and climax species is improving. The distribution and temporal "mobility" of temperate and boreal tree species suggests *if decline in quality or quantity of forest habitat is to be considered as a threat, it must be considered (a) at a broad landscape-level scale, and (b) with some anticipation that a natural cycle from high quality to low quality and back again, for tree species or for stable species associations, may be occurring*.** ********** ***Prunus africana*, African cherry (timber bark):** No. ********** ***Pseudophoenix ekmanii*, Dominican cherry palm (palm):** Decline due to over-collection; the rate of harvest is unknown and needs quantification. **GENERAL COMMENTS: Re: Decline: Often, there is insufficient baseline data upon which to base a percentage decline in the species. Is it sufficient to estimate the decline in suitable habitat and extrapolate the presumed decline in population? What supporting information is expected to support the extrapolation?** **Long- and short-term decline need to be defined by the reviewer presented in context with the biology of the species.** **What about decline caused by natural phenomena, such as hurricanes?** **Again, a caution against the numerical examples to characterize decline. Decline will be species-dependent and the biological context within which the decline is occurring needs to be provided.**

A)(i) an observed, inferred or projected decline in the number of individuals or the area and quality of habitat; or	**The definition requires extensive revision.** ********** ***Ravenea louvelii*** **(palm):** Yes, habitat already seriously degraded. This criterion was easy to apply for this taxon ********** ***Satranala decussilvae*** **(palm):** Yes, habitat threatened with destruction for shifting cultivation. This criterion was easy to apply for this taxon ********** ***Strombocactus disciformis*** **(cactus):** This sub-criterion applies for the species. Yes. There is not enough information available to recognize a decline in the number of individuals (based on previous data), however there is an evident habitat modification in the area that lead to a projected decline. ********** ***Taxus brevifolia*****, Pacific yew (temperate timber medicinal):** **The general guideline for "marked rate of decline" (see below) is poorly suited to evaluating T. brevifolia (average lifespan of about 350 years) or to many other long-lived, irregularly reproducing forest tree species. The length of time corresponding to three generations could prove unworkable. I would suggest omitting the phrase "whichever is the longer" or including a workable upper time limit. A general guideline for a marked recent rate of decline is a percentage decline of 50% or more in the last 10 years or three generations, whichever is the longer.** ********** ***Tillandsia xerographica*** **(bromeliad):** A. This is a good and applicable criterion, but very much dependant on available knowledge of the population development (for observed) and trade developments (for inferred or projected). Reviewers GT: There is an inferred reduction in the number of individuals, area, and quality of habitat. ********** ***Turbinicarpus pseudomacrochele*****, Hairy-spined turbinicarpus (cactus):** The sub-criterion applies for the species. Yes. There are data that suggest the population has decreased. The size/age structure has been modified, and only 2 out of 5 categories are well represented, while the number of individuals of the first size/age category (i.e., 0- 10mm) is quite low. ********** ***Zamia furfuracea*****, carboard palm (cycad):** 30% over 30 years. As with the IUCN criteria, the timeline for decline can make a big difference to the assessment. **I wonder if we don't need a statement as occurs in the IUCN system for instances where decline has stopped.** In the case of *Z. furfuracea,* decline was severe until ca. 1990 but has now almost stopped.

A)(ii) each sub-population being very small; or	***Aloe ferox*, Tap aalwyn (an aloe):** Not an issue for A. ferox but would be an important criterion for some Aloe species ********** ***Cibotium barometz* (tree fern):** NO COMMENTS. ********** ***Cistanche deserticola*, desert cistanche (parasitic plant):** By sampling method measure the subpopulations (10 × 10 meter) ********** ***Dendrobium nobile* (orchid):** **The definition of sub-population, together with the lack of special study about the species, such as pollination, leads it difficult to make a estimate of size of sub-population of this some wide distributed species, such as *Dendrobium nobile*.** ********** ***Dionaea muscipula*, Venus flytrap (carnivorous):** Sub-criterion applies to species. From < 10 individuals to > 2000 individuals. ********** ***Galanthus elwesii*, snowdrop (bulb):** This is a good and applicable criterion for this species, because there is the clear outcome that each sub- population are not very small. The relevant expert would need to decide what numbers are appropriate for the taxon reviewed. NL SA Comment: However, you could put the case that sub- population of 10 million bulbs over a few square kilometres can be seen as small if all harvesting were to be from this population. ********** ***Marojejya darianii* (Madagascan palm):** 20+, 50, 8, c. 10 mature individuals in 4 widely separated populations. ********** ***Morchella* spp., morel fungus (mushroom):** Applicable to macrofungi. Lack of information for most of the species. If our initial definition of individual is valid,[refers to the number of individuals] we see no problem here. ********** ***Panax quinquefolius*, American ginseng (rhizome):** Sub-criterion applies to species. However, **the definition for a small sub- population may not be applicable to most plant taxa.** In the USA, sub-populations are small and widely scattered. See A(ii) for sub-populations in Canada. ********** ***Pericopsis elata*, African teak (timber):** This criterion works for this taxon.

A)(ii) each sub-population being very small; or	********** ***Populus tremuloides*, trembling aspen (clonal tree):** Not specifically applicable to *P. tremuloides*. **However, with regards to vegetatively reproducing species, a specific definition of sub-population might be required. *Reference to the degree of genetic similarity or variance rather than geographic population, is probably required to accurately delineate subpopulations within a species.*** ********** ***Prunus africana*, African cherry (timber bark):** No. ********** ***Pseudophoenix ekmanii*, Dominican cherry palm (palm):** This palm appears to exist as one single population without subpopulation structure. GENERAL COMMENTS: **The reviewer should provide the numerical, biological, or geographical information to substantiate the use of the terms "sub-population" and "small." Reviewer should be prompted to see definitions. Again, avoid use of "very small" and avoid providing numerical values in the definition.** **THE FOLLOWING EDITORIAL CHANGES ARE PROPOSED: ~~each sub-population being very small~~; CHANGE TO: *being made up of several small sub-populations*** ********** ***Ravenea louvelii* (palm):** Yes - a single population known with less than 25 mature individuals. This is also a dioecious palm, so number of fruit-bearing tress is probably about half the population. This criterion was easy to apply to this taxon. ********** ***Satranala decussilvae* (palm):** 500, 100, 100, c. 30 mature individuals in 4 widely separated populations This criterion was easy to apply to this taxon. Yes. According to the guideline provided for very small subpopulation, the species has very small sub-populations (3) (597, 182 & 163 indiv.) and the answer would be yes, so the subcriterion applies for this species. But again, even in this case when we have the data it is difficult or impossible to determine if it is small or not, and it can vary widely in the cacti family. **For these reasons, we consider that a definition of very small sub-population is in fact missing and that absolute numbers should not be included in any case, because they can be misleading. In fact, we consider there is no way to give a practical and widely applicable definition of "very small sub-population" and consequently this sub-criterion should be deleted. On the other hand, if this criterion is related to the viability of sub-populations, an alternative criterion referred to this might be useful: A)(ii) The size of each sub-population is such that it can be considered to be unviable in the future (justify).** ********** ***Taxus brevifolia*, Pacific yew (temperate timber medicinal):** Easily interpreted, not applicable to *T. brevifolia.* **********

A)(ii) each sub-population being very small; or	***Tillandsia xerographica*** **(bromeliad):** C. **Quantification of number of subpopulations and their size(s) needed. If all subpopulations in country A are small and in country B are large, a listing of the species for country A alone might be considered.** Reviewer Gouda, NL: Most of them probably critical. ********** ***Turbinicarpus pseudomacrochele*****, Hairy-spined turbinicarpus (cactus):** Yes. According to the guideline provided for very small subpopulation, they are considered to be quite small (i.e., 19, 79 and 56 individuals per sub-population). But again, even in this case when we have the data it is difficult or impossible to determine if it is small or not, and it can vary widely in the cacti family. The sub-criterion applies for the species, but **current definition of very small subpopulation is missing. Absolute numbers should not be included in any case, they can be misleading. We consider there is no way to give a practical definition of "very small sub-population" and consequently this sub-criterion should be deleted. On the other hand, if this criterion is related to the viability of subpopulations, an alternative criterion referred to this might be useful: A)(ii) The size of each sub-population is such that it can be considered to be unviable in the future (justify).** ********** ***Zamia furfuracea*****, carboard palm (cycad):** Ca 8 sub populations of 100 to 3500.

A)(iii) a majority of individuals, during one or more life-history phases, being concentrated in one sub-population; or	***Aloe ferox*, Tap aalwyn (an aloe):** Could be measured for mature plants. ********** ***Cibotium barometz* (tree fern):** NO COMMENTS. ********** ***Cistanche deserticola*, desert cistanche (parasitic plant):** NO COMMENTS. ********** ***Dendrobium nobile* (orchid):** NO COMMENTS. ********** ***Dionaea muscipula*, Venus flytrap (carnivorous):** Sub-criterion does not apply to species. **This sub-criterion is not applicable to most plant taxa, including this species.** ********** ***Galanthus elwesii*, snowdrop (bulb):** Not applicable to G. elwesii. ********** ***Marojejya darianii* (Madagascan palm):** NO COMMENTS. ********** ***Morchella* spp., morel fungus (mushroom):** Applicable to macrofungi. ********** ***Panax quinquefolius*, American ginseng (rhizome):** Sub-criterion applies to species in only parts of its range (Canada), and not throughout its range. **The sub-criterion may not be applicable to most plant taxa, and taxa across political boundaries (i.e., over all range countries).** The sub-criterion does not apply to the species in the USA where the largest amount of sub-populations occur. However, it does apply to sub-populations in Canada, where almost 50% of the total number of plants in Quebec are contained in only 3 sub-populations, and 60.5% of the total number of plants in Ontario are in only 1 sub-population. ********** ***Pericopsis elata*, African teak (timber):** This criterion works for this taxon. **********

A)(iii) a majority of individuals, during one or more life-history phases, being concentrated in one sub-population; or	***Populus tremuloides*, trembling aspen (clonal tree):** Not applicable to *P. tremuloides*. **Interpretation of the criterion would be difficult for forest species in which sexual reproduction occurs either periodically or rarely during the life cycle of an individual "tree". (I.e. sexually reproducing members of a largely clonal population might be considered a sub-population. The relative ratio of one form to another within a species population can fluctuate over time, without implying species decline).** ********** ***Prunus africana*, African cherry (timber bark): Not applicable to *Prunus africana,* nor to plants in general.** The exception being that pollen virility has been compromised by atmospheric pollution. ********** ***Pseudophoenix ekmanii*, Dominican cherry palm (palm): Where do issues such as recruitment and generation time (as defined in annex 5) come into the scenario?** ********** ***Ravenea louvelii* (palm):** NO COMMENTS. ********** ***Satranala decussilvae* (palm):** NO COMMENTS. ********** ***Strombocactus disciformis* (cactus): This sub-criterion does not apply to this species, or most of the plants or sessile species. nevertheless, there can be the case that extrinsic factors, such as human exploitation, is affecting a particular vulnerable lifehistory phase of the population.** ********** ***Taxus brevifolia*, Pacific yew (temperate timber medicinal):** Easily interpreted, not applicable to *T. brevifolia* ********** ***Tillandsia xerographica* (bromeliad):** D. Seems not applicable or usable for this species (and most plants in general). ********** ***Turbinicarpus pseudomacrochele*, Hairy-spined turbinicarpus (cactus): This sub-criterion does not apply to this species, or most plants or sessile species. Nevertheless, there can be the case that extrinsic factors, such as human exploitation, is affecting a particular vulnerable lifehistory phase of the population.** ********** ***Zamia furfuracea*, carboard palm (cycad):** Not applicable.

A)(iv) large short-term fluctuations in the number of individuals appropriate to measuring population size for the species concerned;	***Aloe ferox*, Tap aalwyn (an aloe):** Not relevant for *Aloe* species. ********** ***Cibotium barometz* (tree fern):** NO COMMENTS. ********** ***Cistanche deserticola*, desert cistanche (parasitic plant):** NO COMMENTS. ********** ***Dendrobium nobile* (orchid):** NO COMMENTS. ********** ***Dionaea muscipula*, Venus flytrap (carnivorous):** Sub-criterion does not apply to species **This sub-criterion is not applicable to most perennial plant taxa, including this species, and other long-lived plant taxa. This sub-criterion may have limited applicability for annual plant species.** ********** ***Galanthus elwesii*, snowdrop (bulb): Not applicable to G. elwesii or to most plant species.** ********** ***Marojejya darianii* (Madagascan palm):** Insufficient Information -detailed demographic study of populations not completed ********** ***Morchella* spp., morel fungus (mushroom): This criterion is almost impossible to assess since the definition of "fluctuation" is quite inapplicable to fungi (see definitions). This is maybe, in our opinion, the most complicated term to apply to fungi. It is so difficult to distinguish natural fluctuations of fungi (their own strong population dynamics) from fluctuations resulting from some external impact, like harvesting. However, in theory, this could most readily be done if you could compare ecologically similar harvested and non-harvested areas.** **In the case of macrofungi, this aspect seems to be, for most practical purposes, not measurable. However, it is not very different from other cases, such as invertebrates that have a complex life history, or even sexual and asexual reproduction during their life cycles, and both phases are different – e.g. one is visible and another completely invisible (microscopic). The definition refers to taxa that breed only once in their lifetime, which is the case here. We assume that in such difficult cases the term generation length wouldnot be used (see definition). Another option would be to mention how long it takes for a reproductive structure to mature and how frequently reproductive structures are produced. These data should be included under item 3.3 of Annex 6 of the proposal. We think that whether this is considered as "generation length" or not is not really relevant, however, it will provide an indication of important characteristics of the reproductive strategy of the species involved: longlived/ low fecundity versus short-lived/high fecundity, which we believe should be understood when assessing a proposal.**

A)(iv) large short-term fluctuations in the number of individuals appropriate to measuring population size for the species concerned;	********** ***Panax quinquefolius*, American ginseng (rhizome):** The sub-criterion does not apply to species. **This sub-criterion is not applicable to American ginseng and other long-lived perennial plant taxa, and may have limited applicability for annual plant species. Note: fluctuations should be hyperlinked to the definition in the guidelines.** ********** ***Pericopsis elata*, African teak (timber): Not applicable to most plants.** ********** ***Populus tremuloides*, trembling aspen (clonal tree):** Not applicable to *P. tremuloides*, owing to its extended distribution. **However, disturbance (often from wildfire or severe climatic events) regularly results in dynamic, short-term fluctuations (as measured in individual stem counts) for many species that reproduce from a single root system. Disturbance events of this type, whether of natural or anthropomorphic origin, normally result in subsequent rapid, exponential increase in production of stems by the root system.** ********** ***Prunus africana*, African cherry (timber bark):** NO COMMENTS. ********** ***Pseudophoenix ekmanii*, Dominican cherry palm (palm): Caution against the out-of-context use of numbers in defining both the length of time and magnitude of a "fluctuation" – two years is superfluous in absence of a concrete example. E.g., saguaro cacti do not reach sexual maturity until between 35-50 years of age. E.g., Many perennials require three years before reaching sexual maturity.** **The reviewer should be asked to provide numerical, biological or geographic information that characterizes the fluctuation and to substantiate its importance to the survival of the species in the wild.** ********** ***Ravenea louvelii* (palm):** Insufficient information -detailed demographic study of populations not completed ********** ***Satranala decussilvae* (palm):** Detailed demographic study of populations completed at one site, but no indications of fluctuations There is not available information that can be used to determine if a fluctuation in the number of individuals has occurred in this species. Mainly because we only have recent data. Again, **we consider that absolute reference values should not be used in any case (such as 2 years), because they do not apply for many species and can be misleading. This depends on many factors such as the time generation length, which can be used instead or as a reference for these fluctuations.** **********

A)(iv) large short-term fluctuations in the number of individuals appropriate to measuring population size for the species concerned;	***Taxus brevifolia*, Pacific yew (temperate timber medicinal):** **This criterion could pose problems of interpretation.** Forest disturbances can result in short-term fluctuations (often increases) in individual stem counts, particularly for understorey tree species. **Including reference to "fluctuations outside of normal population cycles" would assist in interpretation.** ********** ***Tillandsia xerographica* (bromeliad):** C. **Seems a good criterion, but only in relation to the life-cycle of the species (long life cycle of 15-20 years, slow growing, late maturity, no clustering).** Reviewer Till, AT: Does not apply for this species. **This criterion is much more appropriate for animals, does not work for many plant groups.** Reviewer Gouda, NL: Because of a long life cycle (15-20 years) large fluctuations are not suspected. ********** ***Turbinicarpus pseudomacrochele*, hairy-spined turbinicarpus (cactus):** There is not enough information available for detecting fluctuations. The sub-criterion applies for the species. However, **the definition of "short term" fluctuation should not refer to a 2 year period due to the wide differences in generational time, etc between species. Absolute numbers should not be included in any case, they can be misleading.** ********** ***Zamia furfuracea*, carboard palm (cycad):** Not relevant for cycads.

A)(v) a high vulnerability due to the species' biology or behaviour (including migration)	***Aloe ferox*, Tap aalwyn (an aloe):** Not relevant for Aloe species. ********** ***Cibotium barometz* (tree fern):** NO COMMENTS. ********** ***Cistanche deserticola*, desert cistanche (parasitic plant):** The species is of high vulnerability due to the decreasing of host plant, *Haloxylon ammodendron* (Chenopodiaceae), which is over-collecting for firewood and for timber. This criterion was easy to apply for this taxon. ********** ***Dendrobium nobile* (orchid):** NO COMMENTS. ********** ***Dionaea muscipula*, Venus flytrap (carnivorous):** Sub-criterion applies to species. **Vulnerability factors such as slow growth rate need to be clarified. Does it refer to the population growth rate or actual rate of growth of the plant itself?** This species is vulnerable due to specific habitat requirements and ecological processes (i.e., periodic fires, hydrologic regimes). Without periodic fire, the species will be eliminated from its habitat. ********** ***Galanthus elwesii*, snowdrop (bulb):** Does not display a high level of vulnerability. This is a good criterion for this species. When you apply it the result is a clear negative, the species biology is such that it has not got a high vulnerability. ********** ***Marojejya darianii* (Madagascan palm):** Not applicable/Not possible to say. ********** ***Morchella* spp., morel fungus (mushroom):** Applicable to macrofungi. ********** ***Panax quinquefolius*, American ginseng (rhizome):** Sub-criterion applies to species. **With respect to vulnerability factors, slow growth rate needs clarification.** Does it refer to the population growth rate or actual rate of growth of the plant itself? Reproduction is by seed only, which require an average of 20 months to overcome dormancy before germination can occur. Plants do not begin to produce seed until 4-5 years of age in USA, and 5-8 years in Canada. Seed dispersal is passive (seeds drop next to parent plant), and seed predation is high. No long-term seed bank is established. Seedlings of the species have a high mortality rate. **********

A)(v) a high vulnerability due to the species' biology or behaviour (including migration).	***Pericopsis elata*, African teak (timber):** Not applicable to *Pericopsis elata* ********** ***Populus tremuloides*, trembling aspen (clonal tree):** GENERAL COMMENTS: Easily interpreted, not applicable to P*. tremuloides*. ********** ***Prunus africana*, African cherry (timber bark):** NO COMMENTS. ********** ***Pseudophoenix ekmanii*, Dominican cherry palm (palm):** Vulnerability due to specialized habitat, slow rate of growth, and high age at first maturity. **Why is the definition for vulnerability different in the appendix than the checklist at the end of this table? Note: Several clarifications/additions to vulnerability checklist.** **THE FOLLOWING EDITORIAL CHANGES ARE PROPOSED:** ***Using the checklist provided at the end of this table (and accompanying definitions in the glossary) as a guide, please explain which vulnerability factors affect this species/population/sub-population and why.*** ********** ***Ravenea louvelii* (palm):** Not possible to say. ********** ***Satranala decussilvae* (palm):** Not possible to say, nothing known of biology. Insufficient information to apply this criterion to this taxon. ********** ***Strombocactus disciformis* (cactus):** Yes, the species can be considered vulnerable mainly because of its habitat high specificity. Besides, the species is characterized by a very low growth rate, a long life cycle and a low recruitment rate. This sub-criterion applies to the species, **but we consider that minor modifications must be made to the wording of the sub-criterion and to the definition. Also, a new subcriterion is needed, related specifically to extrinsic factors, so that a more clear and useful evaluation can be made.** **Proposed modifications to vulnerability definition: Vulnerability can be defined** ***as the susceptibility to intrinsic or external effects factors which increase the risk of extinction. There are a number of taxon- or casespecific biological and other factors that may affect the extinction risk associated with a given percentage decline, small population size or restricted area of distribution. These can be, but are not limited to, aspects of any of the following:*** ***INTRINSIC FACTORS:*** • ***Life history (e.g., low fecundity, slow growth rate, high age at first maturity, long generation time)*** • ***Low absolute numbers or biomass or restricted area of distribution*** • ***Population structure (age/size structure, sex ratio)*** • ***Behavioural factors (e.g., social structure, migration, aggregating behaviour)***

A)(v) a high vulnerability due to the species' biology or behaviour (including migration).	• ***Density (for sessile or semi-sessile species)*** • ***Specialized niche requirements (e.g., diet, habitat)*** • ***Species associations such as symbiosis and other forms of co-dependency*** • ***Fragmentation and habitat loss*** • ***Reduced genetic diversity*** • ***Depensation (prone to continuing decline even in the absence of exploitation)*** • ***A relatively high level of endemism*** • ***Threats from disease or invasive species*** • ***Rapid environmental change (e.g., climate regime shifts)*** • ***Selectivity of removals (that may compromise recruitment)*** ***EXTRINSIC FACTORS:*** • ***Selectivity of removals (that may compromise recruitment)*** • ***Threats from exotic species (hybridization, disease transmission, depredation, etc.)*** • ***Habitat degradation (contamination, soil erosion, alteration by invasive species, etc.)*** • ***Habitat loss/destruction*** • ***Habitat fragmentation*** • ***Harsh environmental conditions*** **Alternative Sub-criterion:** ***A) (v) a high vulnerability due to intrinsic factors (i.e. biology and/or behavior; including migration) which increase the risk of extinction of the species.*** **A new sub-criterion:** ***A) (vi) a high vulnerability due to extrinsic factors (e.g. selectivity of removals, habitat loss and fragmentation) which increase the risk of extinction of the species. In the case of cacti, seeds can be a vulnerable phase or stage in their life history that may be particularly affected by extrinsic factors, such as harsh environmental or climatic conditions and is one of the targets of human exploitation.*** ********** ***Taxus brevifolia*, Pacific yew (temperate timber medicinal):** Easily interpreted, not applicable to *T. brevifolia* ********** ***Tillandsia xerographica* (bromeliad):** A. Good criterion in relation to the life-cycle of the species. Reviewer Till, AT: This criterion is much more appropriate for animals, does not work for many plant groups. Reviewer Kiehn, AT: high vulnerability due to the species´ biology is difficult to be assessed, even when potentially assumable for, e.g., specialized epiphytes. Reviewer Gouda, NL: Individuals will take at least 15 years before flowering and will live for a very long time, producing seeds probably once in 2 or more years. The individuals are not growing in clusters, so (normally) producing one shoot after flowering. Reviewers GT: It is highly vulnerable for being an epyphite and and dependant on an arboreal substrate with specific characterists for its survival. ********** ***Turbinicarpus pseudomacrochele*, Hairy-spined turbinicarpus (cactus):** Yes. This species has a slow growth rate, long life-cycles, specialized habitat requirements and low recruitment rates. The sub-criterion applies to the species, **we consider that minor modifications must be made to the wording of the sub-criterion and to the definition. Also, a new subcriterion is needed, related specifically to extrinsic factors, so that a more clear and useful evaluation can be made.**

A)(v) a high vulnerability due to the species' biology or behaviour (including migration).	**Proposed modifications to vulnerability definition: Vulnerability can be defined** ***as the susceptibility to intrinsic or external effects factors which increase the risk of extinction. There are a number of taxon- or casespecific biological and other factors that may affect the extinction risk associated with a given percentage decline, small population size or restricted area of distribution. These can be, but are not limited to, aspects of any of the following:*** ***INTRINSIC FACTORS:*** • ***Life history (e.g., low fecundity, slow growth rate, high age at first maturity, long generation time)*** • ***Low absolute numbers or biomass or restricted area of distribution*** • ***Population structure (age/size structure, sex ratio)*** • ***Behavioural factors (e.g., social structure, migration, aggregating behaviour)*** • ***Density (for sessile or semi-sessile species)*** • ***Specialized niche requirements (e.g., diet, habitat)*** • ***Species associations such as symbiosis and other forms of co-dependency*** • ***Fragmentation and habitat loss*** • ***Reduced genetic diversity*** • ***Depensation (prone to continuing decline even in the absence of exploitation)*** • ***A relatively high level of endemism*** • ***Threats from disease or invasive species*** • ***Rapid environmental change (e.g., climate regime shifts)*** • ***Selectivity of removals (that may compromise recruitment)*** ***EXTRINSIC FACTORS:*** • ***Selectivity of removals (that may compromise recruitment)*** • ***Threats from exotic species (hybridization, disease transmission, depredation, etc.)*** • ***Habitat degradation (contamination, soil erosion, alteration by invasive species, etc.)*** • ***Habitat loss/destruction*** • ***Habitat fragmentation*** • ***Harsh environmental conditions*** **Alternative Sub-criterion:** ***A) (v) a high vulnerability due to intrinsic factors (i.e. biology and/or behavior; including migration) which increase the risk of extinction of the species.*** **A new sub-criterion:** ***B) (vi) a high vulnerability due to extrinsic factors (e.g. selectivity of removals, habitat loss and fragmentation) which increase the risk of extinction of the species. In the case of cacti, seeds can be a vulnerable phase or stage in their life history that may be particularly affected by extrinsic factors, such as harsh environmental or climatic conditions and is one of the targets of human exploitation.*** ********** ***Zamia furfuracea*****, carboard palm (cycad):** As with all cycads, has a relatively slow growth rate and specialist pollinators that may become locally extinct.

B) The wild population has a restricted area of distribution and is characterized by at least one of the following (see definitions below):	***Aloe ferox*, Tap aalwyn (an aloe):** Aloe ferox is distributed over a large area (> 10 000 km2). Nevertheless, restricted range is an issue for other cycad species listed on CITES Appendix 1. This information is generally available for Aloe species. ********** ***Cibotium barometz* (tree fern):** No. The wild population does not have a restrictal area of distribution. It's a widespread distribution throughout southwestern, central and southern China and other Asian countries. This criterion is easy to apply for this taxon. ********** ***Cistanche deserticola*, desert cistanche (parasitic plant):** NO COMMENTS. ********** ***Dendrobium nobile* (orchid):** No. *Dedrobium nobile* is a widely distributed across tropical and south subtropical Asia. **Problem *Dendrobium nobile* is a wide distributed, but our observation showed its habitat has been fragmented severely and quality declined. So when the wild population has a wide area of distribution, then any article under B) is not suitable to estimate it, but some articles, such as B)( ) , might have been resulted in the threat of this species.** ********** ***Dionaea muscipula*, Venus flytrap (carnivorous):** Criterion applies to species. **The definition for area of distribution should not include any unit of measure (i.e., 10,000 km2), as it needs to be applicable for a wide range of taxa.** Species is only found within a 90 mile radius of North Carolina and South Carolina, USA. Estimated area of distribution of the 10 core State counties (9 in NC, 1 in SC) is 60,000 square km. There are at least 4 additional counties where subpopulations may still exist, although no individuals were observed in 2002 and in several cases not in the 1992 survey either. ********** ***Galanthus elwesii*, snowdrop (bulb):** Yes, this is a good and applicable criterion. **When you apply it the outcome is a clear "no restricted area of distribution". Under what circumstances should a population be defined as having a restricted area of distribution in the context of CITES? For most plant species under consideration there will be limited information to base an estimate of area of distribution.** ********** ***Marojejya darianii* (Madagascan palm):** Yes -no population is more than c. 50 sq.m This criterion was easy to apply for this taxon. ********** ***Morchella* spp., morel fungus (mushroom):** Studies need to be done in this respect. **We believe that with some explanations, the definition could ultimately be applied to fungi. There are sites where the presence of the species has been detected, that can be described like spots on a map. Of course, these places keep changing, because it could happen that on the following year the fungi grow somewhere else, close by, because of varying conditions on a very local scale and then the following year be found back at the original site – like many flowering plants. So, a new spot on the map appears. It is possible, however, to draw an imaginary boundary round these spots, so you can apply**

B) The wild population has a restricted area of distribution and is characterized by at least one of the following (see definitions below):	**the first part of the definition and define the total theoretical area of distribution, but more often, it is more convenient to mention the habitat/ecosystem to which these populations are associated, for example, in the case of *Morchella*, the Andean- Patagonian forests of Argentina. By defining this you can then apply the second part of the definition – exclusion (or inclusion) of areas where the species cannot grow. Then what you are really mentioning are the boundaries of the ecosystem. So we suggest the definition could be improved by addition of something like "or the boundaries of the habitat/ecosystem to which the species is associated".** ********** ***Panax quinquefolius*, American ginseng (rhizome):** Criterion does not apply to this species. **The definition for area of distribution should not include any unit of measure (i.e., 10,000 km2), as it needs to be applicable for a wide range of taxa.** The species' area of distribution is considered widespread, occurring in deciduous forest in eastern North America. ********** ***Pericopsis elata*, African teak (timber):** Applicable. ********** ***Populus tremuloides*, trembling aspen (clonal tree):** Not applicable to *P. tremuloides.* ********** ***Prunus africana*, African cherry (timber bark): Because of the broad distribution of this species, the term fragmentation had a connotation more geographic than biological. However, this same taxon includes populations that are quite genetically distinct. For such species, this criterion may be based too much on morphology and not enough on biology. When you get to the point at which you're dealing with potentially distinct species or incompatible subspecies, the question of fragmentation becomes no longer relevant.** **In those plants where the reproductive cycle is measured in centuries, the notion of time becomes extremely important and it becomes difficult to appreciate population declines over periods during which the literature is practically mute on the species and taxonomic issues remain unresolved. Like many other species of forest flora, long lived "ligneux" [les ligneux à cycle long] are sensitive to macroclimatic variations, but they may have a latency period of several decades to a century.** **With respect to the criteria on habitat and area of distribution, it seems to me that a distinction can be drawn. In effect, for P. africana, and in many regions in its area of distribution, two extreme situations exist: --total and definitive destruction of the habitat with no possibility of ecological restoration (e.g., total deforestation for agricultural purposes); --destruction of the Prunus population without significant modification of its habitat or removal of associated taxa, in which case the reintroduction of Prunus is possible from harvested populations in zones that are biogeographically similar.** ********** ***Pseudophoenix ekmanii*, Dominican cherry palm (palm):** The area of distribution is unknown, but thought to occur entirely within the boundaries of Parque Nacional Jaragua and Isla Beata, Barahona Peninsula, Dominican Republic. **In defining "area of distribution," numeric values should not be offered to the reviewer as part of the definition. The reviewer should be asked to provide numerical, biological or geographical factors that characterize the population's area of distribution.**

B) The wild population has a restricted area of distribution and is characterized by at least one of the following (see definitions below):	**Does "wild" need to be defined here?** ********** ***Ravenea louvelii*** **(palm):** Yes - the single population is no more than c. 50 sq.m. This criterion was easy to apply for this taxon ********** ***Satranala decussilvae*** **(palm):** Some populations are very restricted in size. This criterion was easy to apply for this taxon. Yes. We consider that the species has a restricted area of distribution since it occupies only 0.01% of the country's total surface, and it is found in only three separate locations in only three states: guanajuato, hidalgo, and querétaro. The criterion applies to the species. Nevertheless, **we consider that absolute values (such as 10,00 km2, proposed as a guideline) should not be included, because it is by nature a subjective criterion. Instead, it is desirable to make a modification to the criterion by adding *"if your answer is "yes", please define the level of restriction and justify why is it considered as a restricted distribution"* to make it more clear and useful for the person(s) involved in the evaluation process.** **Add to criterion: *If your answer is "yes" please define the level of estriction and justify why is it considered as a estricted distribution.*** ********** ***Taxus brevifolia*****, Pacific yew (temperate timber medicinal):** Easily interpreted, not applicable to *T. brevifolia* ********** ***Tillandsia xerographica*** **(bromeliad):** A. This is a good and applicable criterion. Reviewer Gouda, NL: Probably some remote populations: S.-Mexico: Oaxaca and probably Chiapas? Guatemala: Progresso, Zacapa; Salvador: Sonsonate, Libertad. ********** ***Turbinicarpus pseudomacrochele*****, Hairy-spined turbinicarpus (cactus):** The wild population is "restricted" to the states of Hidalgo and Querétaro. **(what is considered to be "restricted"?)** The criterion applies for the species. **A definition for *"restricted area"* is missing. The figure of 10,000 km2 does not apply for all the different species. Absolute numbers should not be included in any case, they can be misleading.** **Add to criterion: *If your answer is "yes" please define the level of estriction and justify why is it considered as a estricted distribution.*** ********** ***Zamia furfuracea*****, carboard palm (cycad):** Covers a relatively wide area along the Gulf coast of Mexico south of Alvarado. Therefore does not qualify on the basis of restricted distribution.

B)(i) fragmentation or occurrence at very few locations; or	***Aloe ferox*, Tap aalwyn (an aloe):** Although some populations of A. ferox are isolated, they would not qualify as severely fragmented. It remains an important criterion for other Aloes, which tend to be pollinated either by bees or birds. In the case of birds, fragmentation could reduce pollination and seed set in small fragments and reduce gene flow between populations. ********** ***Cibotium barometz* (tree fern):** NO COMMENTS. ********** ***Cistanche deserticola*, desert cistanche (parasitic plant):** NO COMMENTS. ********** ***Dendrobium nobile* (orchid):** NO COMMENTS. ********** ***Dionaea muscipula*, Venus flytrap (carnivorous):** Sub-criterion applies to species. **Fragmentation definition needs to include language applicable to plant taxa with respect to the term 'isolated sub-populations'. We suggest *'isolated subpopulations that prevent or limit the transfer of genetic material between individuals*.' Approximately 40% of the subpopulations are small (<10 – 100 individuals), located in isolated pockets of appropriate habitat, often measuring less than 200 square meters.** ********** ***Galanthus elwesii*, snowdrop (bulb):** Yes, this is a good and applicable criterion. When you apply it the outcome is that the species distribution is not fragmented or limited to a few locations. **Here the definition of fragmentation gives guidance of when a taxon distribution is considered fragmented "*which increases the probability that these small sub- populations will become extinct*". Similar language in the definitions relating to criteria Ai, Aii and B would help guide their application.** ********** ***Marojejya darianii* (Madagascan palm):** Yes -occurring in 4 known populations, two relatively close, the others far spread This criterion was easy to apply for this taxon. ********** ***Morchella* spp., morel fungus (mushroom): Fragmentation is difficult to assess because in the case of fungi, "subpopulations" (how do we identify subpopulations in fungi?) will grow in isolation as a response to their own strategy, not to actual fragmentation. However, Morchella has actually disappeared from some specific sites, which would be dealt with under decline rather than fragmentation but an outcome of this disappearance may be fragmentation. Consequently, the first sentence of the definition, we think, does not apply to fungi, or applies only in some situations. We could simply assume that some definitions will not apply to all animal and plant taxa.**

B)(i) fragmentation or occurrence at very few locations; or	********** ***Panax quinquefolius*, American ginseng (rhizome):** Sub-criterion applies to species. **Fragmentation definition needs to include language applicable to plant taxa with respect to the term 'isolated sub-populations'. We suggest 'isolated subpopulations that prevent or limit the transfer of genetic material between individuals.' In the USA and Canada individuals are widely distributed in small to very small sub-populations throughout the species' range.** Majority of individuals in Canada are found in very small sub-populations. Ontario: 24 of 31 extant sub-populations have <172 plants. 21 have =65 plants. 13 have =25 plants. Quebec: 27 of 49 extant sub-populations have <172 plants. ********** ***Pericopsis elata*, African teak (timber): Does this definition of fragmentation apply to both natural and man-made fragmentation?** ********** ***Populus tremuloides*, trembling aspen (clonal tree):** Not applicable to *P. tremuloides*. ********** ***Prunus africana*, African cherry (timber bark):** NO COMMENTS. ********** ***Pseudophoenix ekmanii*, Dominican cherry palm (palm):** GENERAL COMMENTS: **In defining "fragmentation," numeric values should not be offered to the reviewer as part of the definition. The reviewer should be asked to provide numerical, biological or geographical factors that characterize the population's fragmentation.** ********** ***Ravenea louvelii* (palm):** Occurring in a single population. This criterion was easy to apply for this taxon. ********** ***Satranala decussilvae* (palm):** Occurring in 4 known populations, three relatively close, the other c. 200 km distant. This criterion was easy to apply for this taxon Yes, the species naturally occurs in very few (and separate) locations (three). But, no significant fragmentation appears to occur. The criterion applies to the species. **It could be useful to ask for justification when stating that the population is found in very few locations as this is again a very subjective criterion.** ********** ***Taxus brevifolia*, Pacific yew (temperate timber medicinal):** Easily interpreted, not applicable to *T. brevifolia* **********

B)(i) fragmentation or occurrence at very few locations; or	***Tillandsia xerographica*** **(bromeliad):** A. This is a good and applicable criterion. ********** ***Turbinicarpus pseudomacrochele*****, Hairy-spined turbinicarpus (cactus):** Yes. There is fragmentation; the localities where the plant is found are separated by several km. and they are found at different altitudes, therefore, the distribution is not continuous. However, the fragmentation is not human induced, it is due to the biological characteristics of the species. **Regarding locations, the plant is only found at 3 locations, so we consider it to occur in "few locations" (up until how many are they considered to be few??). The sub-criterion applies for the species. The definition of fragmentation includes a figure of 500km2, which is considered to be an appropriate guideline of what constitutes fragmentation. These might be too much for a species and insignificant for another. Absolute numbers should not be included in any case, they can be misleading. How many are considered to be "few locations"? It is very subjective.** ********** ***Zamia furfuracea*****, carboard palm (cycad):** Occurs in at least 8 subpopulations**.**

B)(ii) large fluctuations in the area of distribution or the number of sub-populations; or	***Aloe ferox*, Tap aalwyn (an aloe):** This is not relevant for *Aloe ferox* or other large *Aloe* species that have relatively long life spans. ********** ***Cibotium barometz* (tree fern):** NO COMMENTS. ********** ***Cistanche deserticola*, desert cistanche (parasitic plant):** Yes. This criterion was easy to apply for this taxon. ********** ***Dendrobium nobile* (orchid):** NO COMMENTS. ********** ***Dionaea muscipula*, Venus flytrap (carnivorous):** Sub-criterion does not apply to this species. **The sub-criterion may not be applicable to most long-lived perennial plant taxa, and may have limited applicability for annual plant species. NOTE: fluctuations should be hyperlinked to the definition in the guidelines.** ********** ***Galanthus elwesii*, snowdrop (bulb):** Not applicable to G. elwesii or plants generally. ********** ***Marojejya darianii* (Madagascan palm):** Populations not known or expected to fluctuate This criterion was easy to apply for this taxon ********** ***Morchella* spp., morel fungus (mushroom): Not applicable to macrofungi. It is virtually impossible to identify sub-populations (see definitions [above]).** ********** ********** ***Panax quinquefolius*, American ginseng (rhizome):** Sub-criterion does not apply to this species. **The sub-criterion may not be applicable to most long-lived perennial plant taxa, and may have limited applicability for annual plant species.** ********** ***Pericopsis elata*, African teak (timber): Not applicable to *P. elata* (or tree species generally).** **********

B)(ii) large fluctuations in the area of distribution or the number of sub-populations; or	***Populus tremuloides*, trembling aspen (clonal tree):** Not applicable to *P. tremuloides.* ********** ***Prunus africana*, African cherry (timber bark):** NO COMMENTS. ********** ***Pseudophoenix ekmanii*, Dominican cherry palm (palm):** NO COMMENTS. ********** ***Ravenea louvelii* (palm):** Populations not known or expected to fluctuate. This criterion was easy to apply for this taxon ********** ***Satranala decussilvae* (palm):** Populations not known or expected to fluctuate. This criterion not applicable to this taxon? ********** ***Strombocactus disciformis* (cactus): It is not clear if the criterion refers to natural or induced fluctuations in the area of distribution. Besides, we consider that this criterion is not applicable to most of the plant or animal species, because variation in the area of distribution is either contracting or expanding, but not fluctuating, so it's not very useful for this purpose and it would be better to eliminate this sub-criterion.** ********** ***Taxus brevifolia*, Pacific yew (temperate timber medicinal):** Easily interpreted, not applicable to *T. brevifolia*. ********** ***Tillandsia xerographica* (bromeliad):** A. This is a good and applicable criterion. **But seems less useful for many plant species in general.** Reviewer Till, AT: **This criterion is much more appropriate for animals, does not work for many plant groups**. Reviewer Gouda, NL: No short-term natural fluctuations. ********** ***Turbinicarpus pseudomacrochele*, Hairy-spined turbinicarpus (cactus):** The sub-criterion does not apply to the species. We consider that this does not occur in most of the species (although many face seasonal fluctuations), there is generally either a decrease or an increase in the area of distribution caused by several factors, but no "large fluctuations". **As these criteria should apply in general to most species, we consider it could be deleted.** ********** ***Zamia furfuracea*, carboard palm (cycad):** Not relevant for cycads.

B)(iii) a high vulnerability due to the species' biology or behaviour (including migration); or	***Aloe ferox*, Tap aalwyn (an aloe):** *Aloe ferox* does not seem to be particularly vulnerable based on available information. However, there is concern that leaf harvesting may affect growth, reduce flowering, and reduce resilience to drought. ********** ***Cibotium barometz* (tree fern):** NO COMMENTS. ********** ***Cistanche deserticola*, desert cistanche (parasitic plant):** The species is of high vulnerability due to the decreasing of host plant, *Haloxylon ammodendron* (Chenopodiaceae), which is over-collecting for firewood and for timber. This criterion was easy to apply for this taxon. ********** ***Dendrobium nobile* (orchid):** NO COMMENTS. ********** ***Dionaea muscipula*, Venus flytrap (carnivorous):** Vulnerability is high due to restricted area of distribution and highly specific habitat requirements. ********** ***Galanthus elwesii*, snowdrop (bulb):** This is a good criterion for this species. When you apply it the outcome is a clear no, the species biology is such that it has not a high vulnerability. ********** ***Marojejya darianii* (Madagascan palm):** Not applicable. ********** ***Morchella* spp., morel fungus (mushroom):** Applicable to macrofungi. In fact, this is the situation for many species. ********** ***Panax quinquefolius*, American ginseng (rhizome):** Sub-criterion applies to species. **See above A(v) <. Definitions and examples of the terms "inferred and "projected" should be included.** A decline in the number of individuals in the USA has been observed during the past 10-20 years. The quality of habitat has also declined in certain portions of the species' range in the past 10 years. Ontario, Canada: 5959 total plants counted as of 1998 in 31 sub-populations. Half of these have 65 or fewer plants. 13 have 25 or fewer plants. There are 65 records total for Ontario: 31 known to be extant; 11 extirpated; and 23 possibly extant. Quebec, Canada: 74 sub-populations have been reported: 49 known to be extant; 10 extirpated; 15 possibly extant. 40 sub-populations studied in detail. 27 of these have less than 172 plants. Only 2 have more than 500 plants.>>> **********

B)(iii) a high vulnerability due to the species' biology or behaviour (including migration); or	***Pericopsis elata*, African teak (timber):** No? **Does low seed viability and high light demand qualify as species biology leading to vulnerability? Does this contribute to area of distribution even if the area cannot be classified as restricted?** ********** ***Populus tremuloides*, trembling aspen (clonal tree):** Not applicable to *P. tremuloides.* ********** ***Prunus africana*, African cherry (timber bark):** NO COMMENTS. ********** ***Pseudophoenix ekmanii*, Dominican cherry palm (palm):** NO COMMENTS. ********** ***Ravenea louvelii* (palm):** Populations not known or expected to fluctuate. This criterion was easy to apply for this taxon ********** ***Satranala decussilvae* (palm):** Populations not known or expected to fluctuate. This criterion not applicable to this taxon? The criterion applies to the species. Yes, the species can be considered vulnerable mainly because of its habitat high specificity. Besides, the species is characterized by a very low growth rate, a long life cycle and a low recruitment rate. ********** ***Strombocactus disciformis* (cactus):** Yes, the species can be considered vulnerable mainly because of its habitat high specificity. Besides, the species is characterized by a very low growth rate, a long life cycle and a low recruitment. The criterion applies to the species. ********** ***Taxus brevifolia*, Pacific yew (temperate timber medicinal):** Easily interpreted, not applicable to *T. brevifolia*. ********** ***Tillandsia xerographica* (bromeliad):** B. Seems **applicable, but for different reasons which need to be identified: - Long life cycle, - Easy to spot and to collect - Easy accessible (not in remote areas)** Reviewer Till, AT: **This criterion is much more appropriate for animals, does not work for many plant groups.** Reviewer Kiehn, AT: high vulnerability due to the species´ biology is difficult to be assessed, even when potentially assumable for, e.g., specialized epiphytes. Reviewer Gouda, NL: Epiphytical growing on trees in wood-land (remote trees), easy to spot and collect and very vulnerable because of the long life cycle.

B)(iii) a high vulnerability due to the species' biology or behaviour (including migration); or	********** ***Turbinicarpus pseudomacrochele*, Hairy-spined turbinicarpus (cactus):** Yes. This species has a slow growth rate, long life-cycles, specialized habitat requirements and low recruitment rates. The sub-criterion applies for the species. **The definition of vulnerability should not include human induced effects (only biological/intrinsic factors as it is stated in the sub-criterion) such as fragmentation and habitat loss, threats from disease or invasive species and selectivity of removals (that may compromise recruitment). (see comments on a(v).** ********** ***Zamia furfuracea*, carboard palm (cycad):** Small populations tend to suffer from loss of pollinators and reproductive failure. Most cycads would qualify.

B)(iv) an observed, inferred or projected decrease in any one of the following:	***Aloe ferox, Tap aalwyn (an aloe):*** **NO COMMENTS.** ********** ***Cibotium barometz*** **(tree fern)***:* NO COMMENTS. ********** ***Cistanche deserticola*****, desert cistanche (parasitic plant): NO COMMENTS.** ********** ***Dendrobium nobile*** **(orchid): NO COMMENTS.** ********** ***Dionaea muscipula*****, Venus flytrap (carnivorous):** NO COMMENTS. ********** ***Galanthus elwesii*****, snowdrop (bulb):** There is not sufficient data for *G. elwesii* to answer any of the below sub- criteria with confidence. ********** ***Marojejya darianii*** **(Madagascan palm):** Yes. This criterion was easy to apply for this taxon ********** ***Morchella*** **spp., morel fungus (mushroom):** NO COMMENTS. ********** ***Panax quinquefolius*****, American ginseng (rhizome):** NO COMMENTS. ********** ***Pericopsis elata*****, African teak (timber):** NO COMMENTS. ********** ***Populus tremuloides*****, trembling aspen (clonal tree): In general, the criteria (Biv), do not employ effective silvicultural and biological proxies for determination of threat of extinction of temperate and boreal forest tree species.**

B)(iv) an observed, inferred or projected decrease in any one of the following:	**Determination of threat of extinction using observed, inferred or projected decline in the per cent number of individuals, or decrease in area of distribution or number of sub-populations, is not likely to capture characteristics critical to the species under review.** **Rate-based measurement, for example, decline over a given unit of time of population, distribution, number of sub-populations, or of other identified factors, would be more likely to yield specific, quantifiable data with which to interpret the degree to which a forest tree species is threatened.** ********** ***Prunus africana*, African cherry (timber bark):** NO COMMENTS. ********** ***Pseudophoenix ekmanii*, Dominican cherry palm (palm):** NO COMMENTS. ********** ***Ravenea louvelii* (palm):** Yes. GENERAL COMMENTS: This criterion was easy to apply. ********** ***Satranala decussilvae* (palm):** NO COMMENTS. ********** ***Strombocactus disciformis* (cactus):** NO COMMENTS. ********** ***Taxus brevifolia*, Pacific yew (temperate timber medicinal): As a general observation, the criteria under B)(iv) seem better suited to evaluation of late successional species such as *T. brevifolia*, than to early-successional species, which can be expected to follow a cycle of decline and re-establishment, in response to natural forest succession.** ********** ***Tillandsia xerographica* (bromeliad):** NO COMMENTS. ********** ***Turbinicarpus pseudomacrochele*, Hairy-spined turbinicarpus (cactus):** NO COMMENTS. ********** ***Zamia furfuracea*, carboard palm (cycad):** NO COMMENTS.

• the area of distribution; or	***Aloe ferox*, Tap aalwyn (an aloe):** **The level of decline needs to be specified.** Aloe ferox is widespread but there has been some decline in area of distribution due to land transformation (i.e. not due to trade). ********** ***Cibotium barometz* (tree fern):** NO COMMENTS. ********** ***Cistanche deserticola*, desert cistanche (parasitic plant):** Yes. A special survey in China show the area of its distribution becomes smaller and smaller. This criterion was easy to apply for this taxon. ********** ***Dendrobium nobile* (orchid):** NO COMMENTS. ********** ***Dionaea muscipula*, Venus flytrap (carnivorous):** Sub-criterion applies to species. **Need to consider the habitat of sub-populations across political boundaries (i.e., range countries).** Evidence from surveys indicates range is shrinking at its north, south and western extremes. Historic area of distribution was approximately 77,000 square km. Currently it is about 60,000 square km, a decline of approximately 22% since ~1950. ********** ***Galanthus elwesii*, snowdrop (bulb):** Yes this is a good and applicable criterion if you have the data or confidence to infer. ********** ***Marojejya darianii* (Madagascan palm):** Likely ********** ***Morchella* spp., morel fungus (mushroom):** **Difficult to determine. Area of distribution - We believe that with some explanations, the definition could ultimately be applied to fungi. There are sites where the presence of the species has been detected, that can be described like spots on a map. Of course, these places keep changing, because it could happen that on the following year the fungi grow somewhere else, close by, because of varying conditions on a very local scale and then the following year be found back at the original site – like many flowering plants. So, a new spot on the map appears. It is possible, however, to draw an imaginary boundary round these spots, so you can apply the first part of the definition and define the total theoretical area of distribution, but more often, it is more convenient to mention the habitat/ecosystem to which these populations are associated, for example, in the case of *Morchella*, the Andean- Patagonian forests of Argentina. By defining this you can then apply the second part of the definition – exclusion (or inclusion) of areas where the species cannot grow. Then what you are really mentioning are the boundaries of the ecosystem. So we suggest the definition could be improved by addition of something like "or the boundaries of the habitat/ecosystem to which the species is associated".** **********

• the area of distribution; or	***Panax quinquefolius*, American ginseng (rhizome):** Sub-criterion applies to species. See B(ii) for USA. Canada: Observed based on lost occurrences: Ontario: 11 extirpated sub-populations Quebec: 10 extirpated sub-populations Projected based on projected loss of occurrences: Ontario: 24 sub-populations not viable Quebec: 27 sub-populations not viable. ********** ***Pericopsis elata*, African teak (timber): Problem here and in B (iii) when you try to answer sub-criteria after saying 'No' to B. This is an artefact of the test process as in normal application of the criteria you would not try to apply the sub- criteria after answering No to B.** Not applicable to *P. tremuloides*. ********** ***Populus tremuloides*, trembling aspen (clonal tree):** Easily interpreted, not applicable to *P. tremuloides*. ********** ***Prunus africana*, African cherry (timber bark):** NO COMMENTS. ********** ***Pseudophoenix ekmanii*, Dominican cherry palm (palm):** NO COMMENTS. ********** ***Ravenea louvelii* (palm):** Likely ********** ***Satranala decussilvae* (palm):** Likely ********** ***Strombocactus disciformis* (cactus):** We don't have enough information to determine this. Nevertheless, it is possible that external factors, such as expansion of livestock and human settlements have reduced the original area of distribution. The criterion applies to the species. **Add to criterion *"specify and justify".*** ********** ***Taxus brevifolia*, Pacific yew (temperate timber medicinal):** Easily interpreted, not applicable to *T. brevifolia.* ********** ***Tillandsia xerographica* (bromeliad):** B. Seems applicable. The factor of accessibility of the area for collectors seems relevant. Reviewer Gouda, NL: Decrease of at least the easy reachable areas in the neighborhood of roads and villages. Many populations totally vanished.

• the area of distribution; or	********** ***Turbinicarpus pseudomacrochele*, Hairy-spined turbinicarpus (cactus):** It applies for the species. There is not enough information available. **Add to criterion *"specify and justify"*.** ********** ***Zamia furfuracea*, carboard palm (cycad):** Has been reduced across its range due to harvesting.

• the area of habitat; or	***Aloe ferox*, Tap aalwyn (an aloe):** **The level of decline needs to be specified.** *Aloe ferox* is widespread but there has been some decline in area of distribution due to land transformation (i.e. not due to trade). ********** ***Cibotium barometz* (tree fern):** NO COMMENTS. ********** ***Cistanche deserticola*, desert cistanche (parasitic plant):** NO COMMENTS. ********** ***Dendrobium nobile* (orchid):** NO COMMENTS. ********** ***Dionaea muscipula*, Venus flytrap (carnivorous):** Sub-criterion applies to species. Habitat of small subpopulations (<10-100 individuals) is being lost to land conversion or development. Between 1992 and 2002 approximately 20% of small subpopulations were likely extirpated. ********** ***Galanthus elwesii*, snowdrop (bulb):** Yes this is a good and applicable criterion. However habitat decline is quite a catch all. ********** ***Marojejya darianii* (Madagascan palm):** Yes due to habitat type – swampy valley bottoms – susceptible to clearance rice cultivation This criterion was easy to apply for this taxon. ********** ***Morchella* spp., morel fungus (mushroom):** Applicable to macrofungi. ********** ***Panax quinquefolius*, American ginseng (rhizome):** Sub-criterion applies to species. **Need to consider the habitat of sub-populations across political boundaries (i.e., range countries)** Observed: In the USA, the species occurs in mid-successional to late-successional deciduous eastern forests. The amount of potential habitat that could be occupied by American ginseng has increased during the last 100 years. In Canada, the actual amount of habitat has decreased. For example, in Quebec, 5 of the 10 sub-populations were extirpated as a result of habitat loss/degradation, and in Ontario, 4 sub-populations declined as a result of habitat loss/degradation. Inferred: In Canada, 16 sub-populations potentially threatened (likely the cause of decline) by logging; 4 potentially threatened by development, and 3 potentially threatened by habitat alteration. **********

the area of habitat; or	***Pericopsis elata*, African teak (timber):** Applies, but probably applies to all taxa reviewed? ********** ***Populus tremuloides*, trembling aspen (clonal tree):** Easily interpreted, not applicable to *P. tremuloides*. ********** ***Prunus africana*, African cherry (timber bark):** NO COMMENTS. ********** ***Pseudophoenix ekmanii*, Dominican cherry palm (palm):** NO COMMENTS. ********** ***Ravenea louvelii* (palm):** Habitat already degraded. ********** ***Satranala decussilvae* (palm):** Not known ********** ***Strombocactus disciformis* (cactus):** Yes, we inferred that there has been a decrease in habitat availability. The criterion applies to the species. ********** ***Taxus brevifolia*, Pacific yew (temperate timber medicinal):** Easily interpreted, not applicable to *T. brevifolia* ********** ***Tillandsia xerographica* (bromeliad):** A. This is a good and applicable criterion. ********** ***Turbinicarpus pseudomacrochele*, Hairy-spined turbinicarpus (cactus):** It is inferred that some habitat has been lost due to modifications in it caused by ranching activities. It applies for the species. ********** ***Zamia furfuracea*, carboard palm (cycad):** Subpopulations have been radically reduced but not completely wiped out.

	Aloe ferox*, Tap aalwyn (an aloe):** A good criterion for Aloes although **there is generally very little information at this level even for well known species** such *as A. ferox*. ******* ***Cibotium barometz* (tree fern)*:*** NO COMMENTS. ********** ***Cistanche deserticola*, desert cistanche (parasitic plant):** NO COMMENTS. ********** ***Dendrobium nobile* (orchid):** NO COMMENTS. **********
• the number of sub-populations; or	***Dionaea muscipula*, Venus flytrap (carnivorous):** Sub-criterion applies to species. Between 1992 and 2002 the number of subpopulations has declined about 23%. See A(i). *Consider restricting to category 'A'. ********** ***Galanthus elwesii*, snowdrop (bulb):** Yes this criterion works but requires careful consideration. **This criterion needs to be considered in relation to the next criterion, the sizes of sub- populations. When the number of sub- populations has increased as a result of fragmentation, and the sizes of the sub-populations have declined, the outcome is an overall decrease and not an increase. However, this is covered by the next sub- criterion (e. g. the 'number of individuals' sub criterion would cover such a scenario).** ********** ***Marojejya darianii* (Madagascan palm):** Could easily happen. This criterion was easy to apply for this taxon. ********** ***Morchella* spp., morel fungus (mushroom):** Not applicable to macrofungi (see definitions above). ********** ***Panax quinquefolius*, American ginseng (rhizome):** Sub-criterion applies to species. The number of sub-populations in the USA are unknown, but are believed to have declined. See B(i) for Canada's data. ********** ***Pericopsis elata*, African teak (timber):** **We find it difficult to apply the definition of sub-populations when dealing with this taxa. Should any discrete**

• the number of sub-populations; or	**population be considered a subpopulation? Little is known about the genetic exchange between 'populations'.** ********** ***Populus tremuloides*, trembling aspen (clonal tree):** Easily interpreted, not applicable to *P. tremuloides*. ********** ***Prunus africana*, African cherry (timber bark):** NO COMMENTS. ********** ***Pseudophoenix ekmanii*, Dominican cherry palm (palm):** NO COMMENTS. ********** ***Ravenea louvelii* (palm):** Not applicable. ********** ***Satranala decussilvae* (palm):** Could easily happen. ********** ***Strombocactus disciformis* (cactus):** The information available (recent) doesn't allow us to determine if there has been a decrease in the number of subpopulations. The criterion applies to the species. ********** ***Taxus brevifolia*, Pacific yew (temperate timber medicinal):** Easily interpreted, not applicable to *T. brevifolia* ********** ***Tillandsia xerographica* (bromeliad):** A. This is a good and applicable criterion. Reviewer Gouda, NL: Large decrease of sub-populations is known, but not personally observed. ********** ***Turbinicarpus pseudomacrochele*, Hairy-spined turbinicarpus (cactus):** There is not enough information available. It applies to the species. ********** ***Zamia furfuracea*, carboard palm (cycad):** NO COMMENTS.

• the number of individuals; or	***Aloe ferox*, Tap aalwyn (an aloe):** Same as above. Currently very abundant, but there may well have been a decline in plant numbers. ********** ***Cibotium barometz* (tree fern):** NO COMMENTS. ********** ***Cistanche deserticola*, desert cistanche (parasitic plant):** Yes. Some resent surveys show that the number of individual is decreased. This criterion was easy to apply for this taxon. ********** ***Dendrobium nobile* (orchid):** NO COMMENTS. ********** ***Dionaea muscipula*, Venus flytrap (carnivorous):** Sub-criterion applies to species. Overall numbers of individuals between 1992 and 2002 have declined approximately 17%. **See A(i). *Consider restricting to category 'A'.** ********** ***Galanthus elwesii*, snowdrop (bulb):** Yes this is a good and applicable criterion. ********** ***Marojejya darianii* (Madagascan palm):** Yes has happened through felling for palm-heart in one population This criterion was easy to apply for this taxon. ********** ***Morchella* spp., morel fungus (mushroom):** Applicable to macrofungi. ********** ***Panax quinquefolius*, American ginseng (rhizome): See A(i) above.** ********** ***Pericopsis elata*, African teak (timber):** Applies, but **reliable data will be a problem for many taxa.** ********** ***Populus tremuloides*, trembling aspen (clonal tree):** Easily interpreted, not applicable to *P. tremuloides*.

• the number of individuals; or	********** ***Prunus africana*, African cherry (timber bark):** NO COMMENTS. ********** ***Pseudophoenix ekmanii*, Dominican cherry palm (palm):** The rate of decline needs quantification, but suspected. ********** ***Ravenea louvelii* (palm):** Don't know. ********** ***Satranala decussilvae* (palm):** Not known. ********** ***Strombocactus disciformis* (cactus):** The information available (recent) doesn't allow us to determine if there has been a decrease in the number of subpopulations. The criterion applies to the species. ********** ***Taxus brevifolia*, Pacific yew (temperate timber medicinal):** Easily interpreted, not applicable to *T. brevifolia* ********** ***Tillandsia xerographica* (bromeliad):** A. This is a good and applicable criterion. ********** ***Turbinicarpus pseudomacrochele*, hairy-spined turbinicarpus (cactus):** There is not enough information available. It Applies For The Species. ********** ***Zamia furfuracea*, carboard palm (cycad):** Number of individuals have declined by ca. 30% over the past 50 years.

• the quality of habitat; or	***Aloe ferox*, Tap aalwyn (an aloe): Difficult to measure.** ********** ***Cibotium barometz* (tree fern)*:*** NO COMMENTS. ********** ***Cistanche deserticola*, desert cistanche (parasitic plant):** NO COMMENTS. ********** ***Dendrobium nobile* (orchid):** NO COMMENTS. ********** ***Dionaea muscipula*, Venus flytrap (carnivorous):** Sub-criterion applies to species. However, **quality of habitat needs to be defined.** Habitats of large subpopulations (>1000 individuals) are generally being maintained to favor the species. These are primarily large areas owned by government (Federal and State lands) or by private conservation organizations. Their main need is more regular habitat burning (prescribed fire) to keep the habitat open. Habitat decline from overgrowth, inopportune mowing time, and herbicides (all pertaining to sites under electrical powerlines and along roadside ditches) is occurring in many sites supporting small subpopulations (<10-500 individuals). ********** ***Galanthus elwesii*, snowdrop (bulb):** Yes, this is a good and applicable criterion. ********** ***Marojejya darianii* (Madagascan palm):** Don't know. ********** ***Morchella* spp., morel fungus (mushroom):** Applicable to macrofungi. ********** ***Panax quinquefolius*, American ginseng (rhizome):** Sub-criterion applies to species. However, **quality of habitat needs to be defined**. We consider that presence or absence of anthropogenic disturbances indicates the quality of habitat (the more disturbances, the poorer the habitat quality). Based on our interpretation of the sub-criterion, the quality of habitat in the USA has declined in the last 25 years due to logging, mining, urban development, invasive species, air pollution, and seasonal drought conditions. In Canada - Observed: 1 sub-population threatened by recreation and 3 by habitat alteration. Inferred: 20 sub-populations potentially threatened by recreation and 2 subpopulations potentially threatened by habitat degradation. **********

• the quality of habitat; or	***Pericopsis elata*, African teak (timber):** Applies. ********** ***Populus tremuloides*, trembling aspen (clonal tree): The criterion does not account for the successional nature of species distribution in temperate and boreal forests.** Often, habitat area and quality are expected to cycle over time. Working under that assumption, this criterion must be interpreted at a broad, landscape-level scale, and considered over a period of time appropriate to the disturbance cycle of the site. ********** ***Prunus africana*, African cherry (timber bark):** NO COMMENTS. ********** ***Pseudophoenix ekmanii*, Dominican cherry palm (palm):** Impact of local land use not known, needs field assessment. ********** ***Ravenea louvelii* (palm):** Habitat already degraded. ********** ***Satranala decussilvae* (palm):** Don't know. ********** ***Strombocactus disciformis* (cactus):** Yes, we inferred that there has been a decrease in the quality of habitat, because of the presence of introduced domestic animals (such as sheep) and human settlements. The criterion applies to the species. ********** ***Taxus brevifolia*, Pacific yew (temperate timber medicinal): *Requires caution in interpretation.*** *T. brevifolia* is adaptable to a range of light regimes and forest types. While some produce better growth rates than others, this does not equate to better survival or recruitment rates. ********** ***Tillandsia xerographica* (bromeliad):** A. This is a good and applicable criterion. ********** ***Turbinicarpus pseudomacrochele*, Hairy-spined turbinicarpus (cactus):** Yes, but not in a high proportion. There have been some modifications to the habitat caused by ranching activities. It applies for the species. ********** ***Zamia furfuracea*, carboard palm (cycad):** Quality of habitat is mostly unaffected as they occur in dune vegetation

• the recruitment.	***Aloe ferox*, Tap aalwyn (an aloe):** Again, relatively easy to measure for Aloes but is not generally available. Recent studies on tree Aloes suggest that recruitment can be measured. ********** ***Cibotium barometz* (tree fern)*:*** NO COMMENTS. ********** ***Cistanche deserticola*, desert cistanche (parasitic plant):** NO COMMENTS. ********** ***Dendrobium nobile* (orchid):** NO COMMENTS. ********** * ***Dionaea muscipula*, Venus flytrap (carnivorous):** Sub-criterion applies to species. **Consider moving to category 'A'** ********** ***Galanthus elwesii*, snowdrop (bulb):** Yes this is a good and applicable criterion NL SA Comment: For this species the pattern and method of harvesting may increase the recruitment. Compare harvest of the species 15 years ago (small bulbs thrown away ex situ), 10 years ago (small bulbs replanted ex situ) and now (small bulbs replanted in situ). ********** ***Marojejya darianii* (Madagascan palm):** Don't know. ********** ***Morchella* spp., morel fungus (mushroom):** Very difficult to measure, almost inapplicable (see discussion of this item under definitions). **Recruitment - This definition could apply conceptually, if our initial definition of an individual is valid, but could be difficult to apply methodologically. With macrofungi, it is not practical to assess and other variables should be selected preferably.** **Generation Length In the case of macrofungi, this aspect seems to be, for most practical purposes, not measurable. However, it is not very different from other cases, such as invertebrates that have a complex life history, or even sexual and asexual reproduction during their life cycles, and both phases are different – e.g. one is visible and another completely invisible (microscopic). The definition refers to taxa that breed only once in their lifetime, which is the case here. We assume that in such difficult cases the term generation length wouldnot be used (see definition). Another option would be to mention how long it takes for a reproductive structure to mature and how frequently reproductive structures are produced. These data should be included under item 3.3 of Annex 6 of the proposal. We think that whether this is considered as "generation length" or not is not really relevant, however, it will provide an**

• the recruitment.	**indication of important characteristics of the reproductive strategy of the species involved: longlived/low fecundity versus short-lived/high fecundity, which we believe should be understood when assessing a proposal.** ********** ***Panax quinquefolius*, American ginseng (rhizome):** Sub-criterion applies to species. The increases in deer have increased herbivory of individuals, which reduces seed production. Harvest of individuals before fruit/seeds are mature and seasonal drought conditions has also reduced recruitment. ********** ***Pericopsis elata*, African teak (timber):** Applies. ********** ***Populus tremuloides*, trembling aspen (clonal tree):** Easily interpreted, not applicable to P. tremuloides. ********** ***Prunus africana*, African cherry (timber bark):** NO COMMENTS. ********** ***Pseudophoenix ekmanii*, Dominican cherry palm (palm):** The term "recruitment" is in glossary; should be underlined. ********** ***Ravenea louvelii* (palm):** Don't know. ********** ***Satranala decussilvae* (palm):** Don't know. ********** ***Strombocactus disciformis* (cactus):** Yes, the available information shows that there is a decreased abundance in the first size (recruitment) category and also that there are other biotic and abiotic factors that are related to a decreased recruitment in the population. The criterion applies to the species. ********** ***Taxus brevifolia*, Pacific yew (temperate timber medicinal):** Easily interpreted, not applicable to *T. brevifolia* ********** ***Tillandsia xerographica* (bromeliad):** A. This is a good and applicable criterion.

• the recruitment.	********** ***Turbinicarpus pseudomacrochele,* Hairy-spined turbinicarpus (cactus):** Yes. The number of individuals of the first size/age category is considerably low. It applies for the species. ********** ***Zamia furfuracea*, carboard palm (cycad):** NO COMMENTS.

C) A marked decline in population size in the wild, which has been either (see definitions below):	***Aloe ferox*, Tap aalwyn (an aloe):** The extent of decline needs to be specified relative to overall population size. There is a possibility that A. ferox may have declined by as much as 30%, which would fit the criterion for Appendix 1. However, the populations are still very large (> 100 000), the decline is mostly due to land transformation, and the trade has an impact only on local populations. A report by TRAFFIC concluded that the trade was sustainable. ********** ***Cibotium barometz* (tree fern):** The application of this criterion is some difficult due to the lack of hard data. Generally speaking, there is a marked decline in the species population size in the past of about 25 year. But recent rate of decline is not available for lacking of exact data. ********** ***Cistanche deserticola*, desert cistanche (parasitic plant):** The population has declined down to about 40% of the historical levels of 50 years ago. Possible but likely that decline does not fulfill the definition of marked. **The application of such a criterion to is always likely to be difficult due to the lack of hard data. The views of national and international experts with field knowledge of the taxa are therefore critical to the assessment. It is therefore vital that such opinion should carry similar weight to published information available for the better known groups. If this is the case then this criterion can be applied to plants.** ********** ***Dendrobium nobile* (orchid):** Yes. Our surveys showed a marked decline in population size of *Dendrobium nobile* in the wild due to over-collection and decline of the quality of habitat. **Problem It is not easy to make an exact estimate of the long-term extent of decline and the recent rate of decline for such a wide distributed species without hard data. Moreover, this species has been used as herbal medicine no less than 400 years in China, which makes it more difficult to estimate its long-term extent of decline and the recent rate of decline.** ********** ***Dionaea muscipula*, Venus flytrap (carnivorous):** Does not apply to species. ********** ***Galanthus elwesii*, snowdrop (bulb):** Yes this is a good and applicable criterion. One generation for G. elwesii is taken to be 6 years. A marked decline (> 50%) is not inferred for this species. ********** ***Marojejya darianii* (Madagascan palm):** NO COMMENTS. ********** ***Morchella* spp., morel fungus (mushroom):** Applicable to macrofungi, but for most cases the information we have is insufficient. **********

C) A marked decline in population size in the wild, which has been either (see definitions below):	***Panax quinquefolius*, American ginseng (rhizome):** Criterion applies to species. The population size of this species has decreased in the last 50 years. Recent rate of decline in population size: Canada For 15 sub-populations for which there are data: 70.8% average decline over 10 years (range is 19% to 100% decline). If total number of plants used: 5552 to 4525 plants = 18% decline in 10 years. ********** ***Pericopsis elata*, African teak (timber):** NO COMMENTS. ********** ***Populus tremuloides*, trembling aspen (clonal tree):** Not applicable to *P. tremuloides*. **Note that the definition of "effective population size" (i.e., individuals capable of reproduction) is ambiguous in the context of clonally reproducing species. Also, as is noted above, the criteria for all subsections of (C) do not closely address the successional nature of species distribution in temperate and boreal forests. As habitat area and quality are normally expected to naturally cycle over time, interpretation of the criteria must be carried out at a very broad landscape scale, and over extended time periods.** ********** ***Prunus africana*, African cherry (timber bark):** NO COMMENTS. ********** ***Pseudophoenix ekmanii*, Dominican cherry palm (palm):** The rate of decline is unknown. **Should "wild" be defined? Caution against use of numeric values out of context. Issues such as generation time factor in. E.g., saguaro cacti take 35-50 years to reach sexual maturity; many perennials take three.** ********** ***Ravenea louvelii* (palm):** Little or no information available to apply this criterion. ********** ***Satranala decussilvae* (palm):** Information not available to answer any of Section C. Lack of data here is critical and likely to be the case when you consider similar plant taxa. ********** ***Strombocactus disciformis* (cactus):** The information available (recent) doesn't allow us to determine if there has been a decrease in the population size in the wild. The criterion applies to the species. **********

C) A marked decline in population size in the wild, which has been either (see definitions below):	***Taxus brevifolia*, Pacific yew (temperate timber medicinal):** Easily interpreted, not applicable to *T. brevifolia* ********** ***Tillandsia xerographica* (bromeliad):** NO COMMENTS ********** ***Turbinicarpus pseudomacrochele*, Hairy-spined turbinicarpus (cactus):** There is not enough information available to fill out the above. The criterion applies for the species. ********** ***Zamia furfuracea*, carboard palm (cycad):** NO COMMENTS.

C)(i) observed as ongoing or as having occurred in the past (but with a potential to resume); or	***Aloe ferox*, Tap aalwyn (an aloe):** This could be used for A. ferox. It is easy to observe changes in long-lived species that are easy to see in the landscape. ********** ***Cibotium barometz* (tree fern)*:*** NO COMMENTS. ********** ***Cistanche deserticola*, desert cistanche (parasitic plant):** Yes. This criterion was easy to apply for this taxon. ********** ***Dendrobium nobile* (orchid):** Yes. ********** ***Dionaea muscipula*, Venus flytrap (carnivorous):** Sub-criterion applies to species. Historical (50+ years): 77,000 square km (~1950) to 60,000 square km (2002), a 22% decline in area of distribution. (Note – historical data is incomplete relating to population size). Recent (1992-2002): Decline in population size is approximately 17%. ********** ***Galanthus elwesii*, snowdrop (bulb):** This seems a good criterion **but for plants this is difficult to assess.** ********** ***Marojejya darianii* (Madagascan palm):** Some evidence from sightings of felled individuals in one population This criterion was easy to apply for this taxon. ********** ***Morchella* spp., morel fungus (mushroom):** Applicable. ********** ***Panax quinquefolius*, American ginseng (rhizome):** Sub-criterion applies to species. Declines in sub-population sizes have been observed in the USA and Canada as having occurred in the past with a potential to resume. ********** ***Pericopsis elata*, African teak (timber):** Applies. **********

C)(i) observed as ongoing or as having occurred in the past (but with a potential to resume); or	***Populus tremuloides*, trembling aspen (clonal tree):** Easily interpreted, not applicable to P. tremuloides. ********** ***Prunus africana*, African cherry (timber bark):** NO COMMENTS. ********** ***Pseudophoenix ekmanii*, Dominican cherry palm (palm):** NO COMMENTS. ********** ***Ravenea louvelii* (palm):** Not observed. ********** ***Satranala decussilvae* (palm):** Not known. ********** ***Strombocactus disciformis* (cactus):** The information available (recent) doesn't allow us to determine if there has been a decrease in the population size in the wild. The criterion applies to the species. ********** ***Taxus brevifolia*, Pacific yew (temperate timber medicinal):** Easily interpreted, not applicable to *T. brevifolia* ********** ***Tillandsia xerographica* (bromeliad):** A. This is a good and applicable criterion. Reviewer Gouda, NL: Many areas of (sub-) populations are cleared of all the individuals over the past 20 years, harvesting all plants with economical value. Reviewers GT: There has been a recent decline in the population, particularly in the past 10 years. ********** ***Turbinicarpus pseudomacrochele*, Hairy-spined turbinicarpus (cactus):** No. There has not been an observed "marked" decline. The sub-criterion applies for the species. ********** ***Zamia furfuracea*, carboard palm (cycad):** Populations were heavily harvested from 1975 to 1985. It has been estimated that 40 tons of stems were exported on a monthly basis. It is estimated that 30% of the entire population was removed at this time.

C)(ii) inferred or projected on the basis of any one of the following:	***Aloe ferox*, Tap aalwyn (an aloe):** NO COMMENTS. ********** ***Cibotium barometz* (tree fern)*:*** NO COMMENTS. ********** ***Cistanche deserticola*, desert cistanche (parasitic plant):** NO COMMENTS. ********** ***Dendrobium nobile* (orchid):** NO COMMENTS. ********** ***Dionaea muscipula*, Venus flytrap (carnivorous):** NO COMMENTS. ********** ***Galanthus elwesii*, snowdrop (bulb):** NO COMMENTS. ********** ***Marojejya darianii* (Madagascan palm):** NO COMMENTS. ********** ***Morchella* spp., morel fungus (mushroom):** NO COMMENTS. ********** ***Panax quinquefolius*, American ginseng (rhizome):** NO COMMENTS. ********** ***Pericopsis elata*, African teak (timber):** NO COMMENTS. ********** ***Populus tremuloides*, trembling aspen (clonal tree):** NO COMMENTS. **********

C)(ii) inferred or projected on the basis of any one of the following:	***Prunus africana*, African cherry (timber bark):** NO COMMENTS. ********** ***Pseudophoenix ekmanii*, Dominican cherry palm (palm):** **Vulnerability could be applied in this Category – see general comment above.** **Ensure definition of vulnerability in appendix coincides with checklist at the end of this table.** **Note: Several clarifications/additions to vulnerability checklist.** **THE FOLLOWING EDITORIAL CHANGES ARE PROPOSED:** ***Using the checklist provided at the end of this table (and accompanying definitions in the glossary) as a guide, please explain which vulnerability factors affect this species/population/sub-population and why.*** ********** ***Ravenea louvelii* (palm):** Not observed. ********** ***Satranala decussilvae* (palm):** NO COMMENTS. ********** ***Strombocactus disciformis* (cactus):** NO COMMENTS. ********** ***Taxus brevifolia*, Pacific yew (temperate timber medicinal):** Easily interpreted, not applicable to *T. brevifolia.* ********** ***Tillandsia xerographica* (bromeliad):** NO COMMENTS. ********** ***Turbinicarpus pseudomacrochele*, Hairy-spined turbinicarpus (cactus):** NO COMMENTS. ********** ***Zamia furfuracea*, carboard palm (cycad):** NO COMMENTS.

	Aloe ferox*, Tap aalwyn (an aloe):** This would be the most likely criterion to use to measure transformation. ******* ***Cibotium barometz* (tree fern)*:* *Cibotium barometz* has a relatively widespread distribution, occurring in the valley, edges and windows of the forest in tropical and subtropical zones in China, Indochina and southeast Asia. Even that its populations are reported to be decline due to habitat destruction accelerated by collection for medicinal use. The plant is easy to natural propagate. However, hard data are still difficult to get to application of the criterion. ********** ***Cistanche deserticola*, desert cistanche (parasitic plant):** The species has a relatively widespread distribution in the past, It occurs as parasitical plant in desert and the habitat is decline. Despite being relatively widespread before, its populations are reported to be decline due to habitat destruction accelerated by collection for trade especially medicinal use. The plant is not easy to propagate and artificially propagated is difficult. However, it is unlikely that the decline can yet be considered as marked in term of the criteria. Exact estimates of decline are difficult due to lack of any hard data. However marked decline will have occurred in local populations. Problem with the application of the decline criteria lies with the quality of information available for different taxa - if an experts best guess is acceptable then the criteria can be applied. If hard data is needed, then not. ********** ***Dendrobium nobile* (orchid):** Yes. ********** ***Dionaea muscipula*, Venus flytrap (carnivorous):** Sub-criterion applies to species. Habitat of small subpopulations (<10-100 individuals) is being lost to land conversion or development. Between 1992 and 2002 approximately 20% of small subpopulations were likely extirpated. ********** ***Galanthus elwesii*, snowdrop (bulb):** Yes, this is a good and applicable criterion. ********** ***Marojejya darianii* (Madagascan palm):** Habitat decreased at the type locality by c. one half due to forest clearance for rice cultivation This criterion was easy to apply for this taxon. ********** ***Morchella* spp., morel fungus (mushroom):** Applicable. ********** ***Panax quinquefolius*, American ginseng (rhizome):** NO COMMENTS.
• a decrease in area of habitat; or	

• a decrease in area of habitat; or	********** ***Pericopsis elata*, African teak (timber):** Applies. ********** ***Populus tremuloides*, trembling aspen (clonal tree):** Easily interpreted, not applicable to P. tremuloides. ********** ***Prunus africana*, African cherry (timber bark):** NO COMMENTS. ********** ***Pseudophoenix ekmanii*, Dominican cherry palm (palm):** NO COMMENTS. ********** ***Ravenea louvelii* (palm):** Not observed. ********** ***Satranala decussilvae* (palm):** Not observed. ********** ***Strombocactus disciformis* (cactus):** Yes, it can be inferred a decrease in area of habitat because of the presence of domestic sheep and human settlements. The criterion applies to the species. ********** ***Taxus brevifolia*, Pacific yew (temperate timber medicinal):** Easily interpreted, not applicable to *T. brevifolia* ********** ***Tillandsia xerographica* (bromeliad):** A. This is a good and applicable criterion. Reviewers GT: There is been a decrease in area of habitat. ********** ***Turbinicarpus pseudomacrochele*, Hairy-spined turbinicarpus (cactus):** Yes. There could be a decrease in area of habitat due to changes on the land-use. The sub-criterion applies for the species. ********** ***Zamia furfuracea*, carboard palm (cycad):** Not relevant.

• a decrease in quality of habitat; or	***Aloe ferox*, Tap aalwyn (an aloe): Quality of habitat is difficult to measure.** ********** ***Cibotium barometz* (a tree fern):** *Cibotium barometz* has a relatively widespread distribution, occurring in the valley, edges and windows of the forest in tropical and subtropical zones in China, Indochina and southeast Asia. Even that its populations are reported to be decline due to habitat destruction accelerated by collection for medicinal use. The plant is easy to natural propagate. However, hard data are still difficult to get to application of the criterion. ********** ***Cistanche deserticola*, desert cistanche (parasitic plant):** The species has a relatively widespread distribution in the past, It occurs as parasitical plant in desert and the habitat is decline. Despite being relatively widespread before, its populations are reported to be decline due to habitat destruction accelerated by collection for trade especially medicinal use. The plant is not easy to propagate and artificially propagated is difficult. However, it is unlikely that the decline can yet be considered as marked in term of the criteria. Exact estimates of decline are difficult due to lack of any hard data. However marked decline will have occurred in local populations. Problem with the application of the decline criteria lies with the quality of information available for different taxa - if an experts best guess is acceptable then the criteria can be applied. If hard data is needed then not. ********** ***Dendrobium nobile* (orchid):** Yes. ********** ***Dionaea muscipula*, Venus flytrap (carnivorous):** Sub-criterion applies to species. However, **quality of habitat needs to be defined.** Habitats of large subpopulations (>1000 individuals) are generally being maintained to favor this species. These are primarily large areas of Federal and State lands, or privately owned by conservation organizations. Species' habitat needs to be burned regularly to keep the habitat open. Habitat decline is from succession, poor mowing practices, and herbicides (all pertaining to sites under electrical powerlines and along roadside ditches) is occurring in many sites supporting small subpopulations (<10-500 individuals). ********** ***Galanthus elwesii*, snowdrop (bulb):** Yes, this is a good and applicable criterion. ********** ***Marojejya darianii* (Madagascan palm):** Not observed. ********** ***Morchella* spp., morel fungus (mushroom):** Applicable. **********

• a decrease in quality of habitat; or	***Panax quinquefolius*, American ginseng (rhizome):** NO COMMENTS. ********** ***Pericopsis elata*, African teak (timber):** Applies. ********** ***Populus tremuloides*, trembling aspen (clonal tree):** **Interpretation unclear for early-succession species such as *P. tremuloides*.** **"Decrease in appropriate habitat across an identifiable geographic zone" (e.g. a watershed or other landscape-scale entity) would better capture the cyclic nature of such species.** ********** ***Prunus africana*, African cherry (timber bark):** NO COMMENTS. ********** ***Pseudophoenix ekmanii*, Dominican cherry palm (palm):** NO COMMENTS. ********** ***Ravenea louvelii* (palm):** Not observed. ********** ***Satranala decussilvae* (palm):** Not observed. ********** ***Strombocactus disciformis* (cactus):** Yes, it can be inferred a decrease in quality of habitat because of the presence of domestic sheep and human settlements. ********** ***Taxus brevifolia*, Pacific yew (temperate timber medicinal):** **This criterion poses difficulties in interpretation.** *T. brevifolia* is a highly adaptive species, able to tolerate habitat change (particularly changes in light regime). **Inference or projection on the basis of habitat quality requires assessment of the ecological amplitude of each species in question.** ********** ***Tillandsia xerographica* (bromeliad):** A. This is a good and applicable criterion. Reviewers GT: There has been a decrese in quality of habitat.

• a decrease in quality of habitat; or	********** ***Turbinicarpus pseudomacrochele*, hairy-spined turbinicarpus (cactus):** Yes. There could be a decrease in the quality of the habitat due to ranching activities, human establishments, etc. The sub-criterion applies for the species. ********** ***Zamia furfuracea*, carboard palm (cycad):** None

• levels or pattern of exploitation; or	***Aloe ferox*, Tap aalwyn (an aloe):** Could be used. Only the leaves are harvested, so the impact on plant populations would be difficult to measure. ********** ***Cibotium barometz* (a tree fern):** *Cibotium barometz* has a relatively widespread distribution, occurring in the valley, edges and windows of the forest in tropical and subtropical zones in China, Indochina and southeast Asia. Even that its populations are reported to be decline due to habitat destruction accelerated by collection for medicinal use. The plant is easy to natural propagate. However, hard data are still difficult to get to application of the criterion. ********** ***Cistanche deserticola*, desert cistanche (parasitic plant):** The species has a relatively widespread distribution in the past, It occurs as parasitical plant in desert and the habitat is decline. Despite being relatively widespread before, its populations are reported to be decline due to habitat destruction accelerated by collection for trade especially medicinal use. The plant is not easy to propagate and artificially propagated is difficult. However, it is unlikely that the decline can yet be considered as marked in term of the criteria. Exact estimates of decline are difficult due to lack of any hard data. However marked decline will have occurred in local populations. **Problem with the application of the decline criteria lies with the quality of information available for different taxa - if an experts best guess is acceptable then the criteria can be applied. If hard data is needed then not.** ********** ***Dendrobium nobile* (orchid):** Yes. ********** ***Dionaea muscipula*, Venus flytrap (carnivorous):** Sub-criterion does not apply to species. **See B(ii).** ********** ***Galanthus elwesii*, snowdrop (bulb):** Yes, this is a good and applicable criterion. **NL SA** Comment: Yes this is a good and applicable criterion. For this species the pattern and method of harvesting may increase the recruitment. Compare harvest of the species 15 years ago (small bulbs thrown away ex situ), 10 years ago (small bulbs replanted ex situ) and now (small bulbs replanted in situ). ********** ***Marojejya darianii* (Madagascan palm):** Not known. ********** ***Morchella* spp., morel fungus (mushroom):** Applicable. ********** ***Panax quinquefolius*, American ginseng (rhizome):** Sub-criterion does not apply to species. **********

• levels or pattern of exploitation; or	***Pericopsis elata*, African teak (timber):** Applies. ********** ***Populus tremuloides*, trembling aspen (clonal tree):** Easily interpreted, not applicable to P. tremuloides. ********** ***Prunus africana*, African cherry (timber bark):** NO COMMENTS. ********** ***Pseudophoenix ekmanii*, Dominican cherry palm (palm):** NO COMMENTS. ********** ***Ravenea louvelii* (palm):** Not observed ********** ***Satranala decussilvae* (palm):** Not observed ********** ***Strombocactus disciformis* (cactus):** The criterion applies to the species. Yes. It is predicted that, because of its restricted distribution area (rarity of the species), there exists a potential market for the species. ********** ***Taxus brevifolia*, Pacific yew (temperate timber medicinal):** Easily interpreted, not applicable to *T. brevifolia* ********** ***Tillandsia xerographica* (bromeliad):** A. This is a good and applicable criterion. Here is seems relevant how easy plants of this species can be found, collected, transported and stored. Reviewer Gouda, NL: Extensive harvesting program. Reviewers GT: Illegat harvest particularly in the last 10 years. ********** ***Turbinicarpus pseudomacrochele*, Hairy-spined turbinicarpus (cactus):** Yes. Actually the major threat to this species is the illegal extraction tho which it is subjected. The sub-criterion applies for the species. ********** ***Zamia furfuracea*, carboard palm (cycad):** Known to have been heavily harvested. Some populations are estimated to have declined from ca. 10000 plants to ca. 100 plants.

	Aloe ferox*, Tap aalwyn (an aloe): Difficult to measure.** ******* ***Cibotium barometz* (a tree fern):** NO COMMENTS. ********** ***Cistanche deserticola*, desert cistanche (parasitic plant):** NO COMMENTS. ********** ***Dendrobium nobile* (orchid):** No. **********
• threats from extrinsic human-induced factors such as competition / predation by introduced species or the effects of hybridization, toxins and pollutants; or	***Dionaea muscipula*, Venus flytrap (carnivorous):** Sub-criterion applies to species. **Suggested change: drop "human-induced" from the text. Add non-anthropogenic factors such as parasitism, disease, etc. can reduce a population to a point where it cannot withstand harvest for commercial international trade.** Small subpopulations: 1) land conversion or development, 2) fire suppression, 3) herbicide use and no or poor mowing practices along roadsides and electrical powerline corridors. Large subpopulations sites need to implement prescribed burning on a regular basis for this fire-dependent species. ********** ***Galanthus elwesii*, snowdrop (bulb):** Unknown / not applicable to *G. elwesii* or to most plant species. ********** ***Marojejya darianii* (Madagascan palm):** Probably not applicable. ********** ***Morchella* spp., morel fungus (mushroom):** Applicable to macrofungi. In fact, in some countries of the distribution area of *Morchella esculenta*, environmental pollution is the main threat on the species ********** ***Panax quinquefolius*, American ginseng (rhizome):** Sub-criterion applies to species. **Suggested change: drop "human-induced" from the text. Non-anthropogenic factors such as parasitism, disease, etc. can reduce a population to a point where it cannot withstand harvest for commercial international trade.** In the USA, known threats are logging, mining, urban development, and illegal poaching of specimens. The inferred or projected threats are invasive species, air pollution and air quality. In Canada, threats have been identified at each of 82 sub-populations. Actual threats (cause of decline) include harvest at 15 sub-populations, logging at 6, and recreation at 1. Potential threats (likely causes of decline) include harvest at 28 sub-populations, recreation at 20, habitat degradation/alteration at 5, and development at 9.

• threats from extrinsic human-induced factors such as competition / predation by introduced species or the effects of hybridization, toxins and pollutants; or	********** ***Pericopsis elata*, African teak (timber):** Applies ********** ***Populus tremuloides*, trembling aspen (clonal tree):** Easily interpreted, not applicable to P. tremuloides. ********** ***Prunus africana*, African cherry (timber bark):** NO COMMENTS. ********** ***Pseudophoenix ekmanii*, Dominican cherry palm (palm):** **Remove reference to "human-induced" and include stochastic events in this question (with example, such as hurricanes).** ********** ***Ravenea louvelii* (palm):** Possibly introduced Strawberry-Guava and Rambling Rose serious introduced pests nearby. ********** ***Satranala decussilvae* (palm):** Probably not applicable. ********** ***Strombocactus disciformis* (cactus):** Yes. There is presence of introduced herbivores (domestic sheep) and of human settlements near the locations where the species is found. The criterion applies to the species. ********** ***Taxus brevifolia*, Pacific yew (temperate timber medicinal):** Easily interpreted, not applicable to *T. brevifolia* ********** ***Tillandsia xerographica* (bromeliad):** A. This is a good and applicable criterion. Reviewers GT: Posibly as a result of abuse of agrochemicals, particularly herbicides. ********** ***Turbinicarpus pseudomacrochele*, Hairy-spined turbinicarpus (cactus):** Not until now, there could exist in the future ?? The sub-criterion applies for the species. ********** ***Zamia furfuracea*, carboard palm (cycad):** None.

• a decreasing recruitment	***Aloe ferox*, Tap aalwyn (an aloe):** Could be measured as seedlings and juveniles are easy to detect in populations. ********** ***Cibotium barometz* (a tree fern):** NO COMMENTS. ********** ***Cistanche deserticola*, desert cistanche (parasitic plant):** NO COMMENTS. ********** ***Dendrobium nobile* (orchid):** DNK: It needs further investigation. ********** ***Dionaea muscipula*, Venus flytrap (carnivorous):** Sub-criterion does not apply to species. ********** ***Galanthus elwesii*, snowdrop (bulb):** Yes this is a good criterion. NL SA Comment: For this species the pattern and method of harvesting may increase the recruitment. Compare harvest of the species 15 years ago (small bulbs thrown away ex situ), 10 years ago (small bulbs replanted ex situ) and now (small bulbs replanted in situ). ********** ***Marojejya darianii* (Madagascan palm):** Not known. ********** ***Morchella* spp., morel fungus (mushroom):** **Very difficult to measure, we would say impossible.** It is anot a very practical concept for these organisms. We could say that recruitment could be empirically assessed based on abundance of fruiting bodies. See comment under B(iv). ********** ***Panax quinquefolius*, American ginseng (rhizome):** Sub-criterion applies to species. Sub-populations have probably experienced a loss of recruitment due to harvest of individuals before seed are mature and herbivory. ********** ***Pericopsis elata*, African teak (timber):** Applies. **********

• a decreasing recruitment	***Populus tremuloides*, trembling aspen (clonal tree):** Easily interpreted, not applicable to *P. tremuloides*. ********** ***Prunus africana*, African cherry (timber bark):** NO COMMENTS. ********** ***Pseudophoenix ekmanii*, Dominican cherry palm (palm):** Demographic viability of population needs assessment. ********** ***Ravenea louvelii* (palm):** Not known. ********** ***Satranala decussilvae* (palm):** Not known. ********** ***Strombocactus disciformis* (cactus):** The criterion applies to the species. Yes, the available information shows that there is a decreased abundance in the first size (recruitment) category and also that there are other biotic and abiotic factors that are related to a decreased recruitment in the population. ********** ***Taxus brevifolia*, Pacific yew (temperate timber medicinal): Interpretation of 'effective population size' (i.e., individuals capable of reproduction) and "decreasing recruitment" is critical and, for certain tree species, would require careful inventory and appropriate interpretation of ongoing ecological processes.** *T. brevifolia* for example, normally reproduces from seed, but is capable of reproducing vegetatively (branch layering or stump sprouts) under specific conditions. **Suggest explicit reference to vegetative reproduction be included under definition "Population Issues, Population Size", similar to the reference under definition of "recruitment".** ********** ***Tillandsia xerographica* (bromeliad):** A. This is a good and applicable criterion. Reviewers GT: DNW ********** ***Turbinicarpus pseudomacrochele*, Hairy-spined turbinicarpus (cactus):** Yes. The number of individuals of the first size/age category is considerably low. The sub-criterion applies for the species. ********** ***Zamia furfuracea*, carboard palm (cycad):** Not measured. Seedling recruitment has been observed in populations that were heavily exploited in the past.

D) If not included in Appendix I, is likely to satisfy one or more of criteria A-C within 5 years?	***Aloe ferox*, Tap aalwyn (an aloe):** NO COMMENTS. ********** ***Cibotium barometz* (a tree fern):** NO COMMENTS. ********** ***Cistanche deserticola*, desert cistanche (parasitic plant):** NO COMMENTS. ********** ***Dendrobium nobile* (an orchid):** NO COMMENTS. ********** ***Dionaea muscipula*, Venus flytrap (carnivorous):** Criterion applies to species. ********** ***Galanthus elwesii*, snowdrop (bulb):** Yes, this is a good and applicable criterion. When you apply it the outcome is a clear "No." However there does seem to be an inconsistency with regard to the time frame when you compare with Criterion A of Appendix II. ********** ***Marojejya darianii* (Madagascan palm):** Already fulfills A and B. ********** ***Morchella* spp., morel fungus (mushroom):** Yes. It is likely to satisfy criteria C) (i) ********** ***Panax quinquefolius*, American ginseng (rhizome):** NO COMMENTS. ********** ***Pericopsis elata*, African teak (timber):** Applies. **Although some conflict with timescale in Appendix II A criterion.** ********** ***Populus tremuloides*, trembling aspen (clonal tree): Speculative**, but can be interpreted relative to P. tremuloides.

D) If not included in Appendix I, is likely to satisfy one or more of criteria A-C within 5 years?	********** ***Prunus africana*, African cherry (timber bark):** NO COMMENTS. ********** ***Pseudophoenix ekmanii*, Dominican cherry palm (palm): The characterization of "near future" as 5 years is spurious in relevance to a preponderance of species. Aside from the "5-year" characterization, what is the difference between this Category, versus Appendix-II, Category A.** ********** ***Ravenea louvelii* (palm):** Already fulfils A & B. ********** ***Satranala decussilvae* (palm):** Yes. ********** ***Strombocactus disciformis* (cactus):** The criterion applies to the species. ********** ***Taxus brevifolia*, Pacific yew (temperate timber medicinal): Speculative,** but likely easily interpreted relative to *T. brevifolia.* ********** ***Tillandsia xerographica* (bromeliad):** A. This is a good and applicable criterion. ********** ***Turbinicarpus pseudomacrochele*, Hairy-spined turbinicarpus (cactus):** Yes, the subcriterion applies to the species. ********** ***Zamia furfuracea*, carboard palm (cycad):** NO COMMENTS.

Notice Regarding the Responses of Reviewers

Note: Not all submissions accurately responded to the purpose of the questionnaire. The purpose of the questionnaire was to assess whether or not a given criteria served as a useful measure of a species' need to be listed on either of the Appendices.

What is a GOOD (or Applicable) Criterion?: A good criterion is one that can be answered – either positively or negatively.

What is a BAD (or Inapplicable) Criterion?: A bad criterion is one that can not be answered due to inherent ambiguity, inapplicability, or vagueness.

EXAMPLES:

> TRADE CRITERION:Species A is heavily traded internationally. Species B is not traded internationally. In these cases, the "trade criterion" is an applicable criterion for both species. This is a criterion that can either be answered positively or negatively for both species.
>
> NUMBER OF INDIVIDUALS CRITERION: Plant species A reproduces both sexually and asexually through root sprouts. Plant species B reproduces only sexually. In this case, the "number of individuals" criterion is applicable for Species B, but not very applicable for Species A. That's because there is ambiguity in the definition of an 'individual' which could refer either to a ramet or genet. Moreover, determining whether a cluster of plants represents genetically distinct individuals may be difficult or impossible to assess accurately in the field. For Plant Species A, this is a criterion that can not be answered positively nor negatively and may therefore be inapplicable.

ADDITIONAL CLARIFICATION:

> TRADE CRITERION: Assume that we have another species, Species C, for which we do not have current data on international trade. Simply because current data isn't available (limiting our ability to respond either positively or negatively) doesn't make the criterion inapplicable. If current data was available, the information would be useful in determining its status for listing. Therefore, the criterion is considered applicable for the species.

Two common errors encountered included:

1) providing an answer regarding the species' status for a criterion (we're not looking for the species' status, but whether or not that criterion or metric makes sense for that species).

2) providing an answer regarding the usefulness of a criterion for the species, but erroneously responding negatively because the species isn't affected by the criterion.