

CITES

Proposed revision of Resolution Conf. 9.24 (CoP12 Com. I. 3)

Criteria for listing on Appendix I and Appendix II

Test of the applicability of the criteria

This document has been prepared to facilitate the assessment of the proposed revision of Resolution Conf. 9.24 (CoP12 Com. I. 3) using an individual plant or animal taxon.

Notice to reviewers: This review should focus on whether the criteria in Table 1, Table 2 and the accompanying definitions, explanations, and guidelines in Annex 5, are biologically sound

and applicable for the taxon under review. The purpose of this review is not to determine whether the current listing status of the taxon under review is appropriate.

Registration Form and Contact Details

Please fill in the details below and send the completed document, as appropriate, to the Chairman of the Animals Committee or the Chairman of the Plants Committee.

Name(s) and affiliation(s) of reviewer(s):

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Taxon reviewed (including common and taxonomic names):

Adelie penguin *Pygoscelis adeliae*

In addition to assessing species that would qualify for CITES listing, it was also considered important to look at some species that should not be listed. The Adelie Penguin was selected for this review partly because it is abundant, and a simple assessment of population size and trends, and of "trade" makes it easy to conclude that the species would not qualify for listing in the Appendices.

These penguins also present an opportunity to examine the applicability of the criteria to colonially breeding, but otherwise wide-ranging marine species.

Please return your completed paper or electronic document to one of the below:

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Instructions on conducting the criteria review

- Tables 1 and 2 outline the proposed draft criteria for listing species on Appendix I and Appendix II of CITES, respectively. These should be read in conjunction with the definitions, explanations, and guidelines included in the proposed amendment of Annex 5.
- Please test the criteria for Appendix I and II using the information you have for the taxon selected i.e. fill out Table 1 and Table 2. This allows a more complete test of the criteria in the short time allowed to us.
- If you fill in this form electronically then these definitions and explanations can be accessed by clicking on the Hyperlink within the table (or 'Ctrl' and click). To get back to the text after clicking a Hyperlink you click on the 'Back' arrow in the Web toolbar (if this is not set up in your version of Word then go to 'View' in the Word menu, then 'Toolbars' and click on 'Web').
- We have provided a copy of the definitions and explanations (Annex 5) at the end of this document for those who wish to fill in the tables as a hard copy.
- Using the data available to you for your chosen taxon please indicate the key data that you used to make your decision, and any problems you had in interpreting or applying the criteria for your chosen taxon.
- Once completed, please send electronic copies and/or hard copies of the review, as appropriate, to the Chair of the Plants Committee or Animals Committee.
- Thank you for taking part in this process.

The Completed forms must be returned by 31 October 2003

Table 1 – Comments from reviewer on applicability of criteria for listing on Appendix I

<p style="text-align: center;">CRITERION</p> <p>For your information for a species to fulfill the draft criteria for Appendix I it must meet the trade criteria and at least one of the criteria A-D.</p>	<p style="text-align: center;">NOTES</p> <p>Whenever appropriate, indicate ways in which this criterion and definitions, explanations and guidelines could be improved and/or quantified to better suit this taxon and its relatives (If you need additional space, please use a separate sheet of paper).</p> <p>For the following specific questions, if a point estimate is not available, please provide a likely range of values (e.g., “about 6,000 – 10,000 individuals”) or some kind of rough estimate or inference (e.g., “likely to be less than 500 square kilometres”). Please try to make a numerical guess or give a verbal description and only use DNW (Do Not Know) if there is truly no information available on the quantity in question.</p>
<p>Trade Criterion Is or may the species be affected by international trade?</p>	<p>No</p> <p>There is minor potential for oil rendering and zoo trade but low likelihood because of their habitat, the Antarctic Treaty, and likely public objections.</p> <p>“International” trade should be specified rather than just trade per se.</p> <p>We agree with the reviewers of <i>Strombocactus</i> concerning suggested change to definition of “affected by international Trade” clauses 1 & 2, and suggest the following change to their clause 3:</p> <p>“3. It was known that the species was subject to and affected by international trade in the past and there is a potential for that trade to be reinitiated.”</p>
<p>A) The wild population is small, and is characterized by at least one of the following (see definitions below):</p>	<p>What was/is the estimated size of the population? Please include units of measurement.</p> <p>Population is not small – estimated to be 2.4 million breeding pairs (i.e. an effective population size of around 5 million birds).</p> <p>We consider the criterion to be appropriate.</p>
<p>A)(i) an observed, inferred or projected decline in the number of individuals or the area and quality of habitat; or</p>	<p>No decline – the sub-criterion does not apply to this species.</p> <p>We consider the sub-criterion to be appropriate.</p>

<p>A)(ii) each sub-population being very small; or</p>	<p>What were/are the estimated sizes of the subpopulation(s)? Please include units of measurement.</p> <p>The sub-populations range from 150 to 250 000 pairs – the sub-criterion does not apply to this species.</p> <p>We consider the sub-criterion to be appropriate.</p>
<p>A)(iii) a majority of individuals, during one or more life-history phases, being concentrated in one sub-population; or</p>	<p>There are many sub-populations – the sub-criterion does not apply to this species.</p> <p>We consider the sub-criterion to be appropriate.</p>
<p>A)(iv) large short-term fluctuations in the number of individuals appropriate to measuring population size for the species concerned;</p>	<p>If the population was/is characterized by large short-term fluctuations in the numbers of individuals, what was/is the average magnitude in orders of magnitude? What was/is the average period of fluctuation in years?</p> <p>There are only minor annual fluctuation in the population size as a whole (about 4%) – the sub-criterion does not apply to this species.</p> <p>We consider the sub-criterion to be appropriate, but suggest the following change in wording: If the population was/is characterized by large short-term fluctuations in the numbers of individuals, what was/is the average magnitude of the fluctuation? What was/is the average period of fluctuation in years?</p>
<p>A)(v) a high vulnerability due to the species' biology or behaviour (including migration).</p>	<p>Yes, the species can be considered vulnerable because of a high dependence on specialized breeding habitat and sea and ice conditions (N.B. because the species does not meet the trade criterion, this should not trigger listing).</p> <p>The criterion is appropriate.</p> <p>It is not necessary to separate intrinsic and extrinsic factors.</p>

<p>B) The wild population has a restricted area of occupancy and is characterized by at least one of the following (see definitions below):</p>	<p>What was/is the estimated area of occupancy? If listing on the basis of one or more sub-populations, what were/are the estimated areas of distribution of the subpopulation(s)? Please include units of measurement?</p> <p>Depending on interpretation of the definition, Adelie penguins could be considered to have a restricted area of distribution when breeding.</p> <p>Definition is extremely loose, particularly for colonial species. Other highly abundant species could meet this criterion as defined. We suggest substituting area of occupancy for area of distribution, and defining a critical number of colonies or subpopulations for colonial species.</p>
<p>B)(i) fragmentation or occurrence at very few locations; or</p>	<p>There are many sub-populations – the sub-criterion does not apply to this species.</p> <p>We consider the sub-criterion to be appropriate, though some further clarification might be helpful in the definition. The guideline of 500km² would not be appropriate for many species at all, particularly if the term “Area of Occupancy” was adopted, so we suggest that it be abandoned in favour of one that refers to significant fragmentation of once-continuous populations.</p>
<p>B)(ii) large fluctuations in the area of distribution or the number of sub-populations; or</p>	<p>The sub-populations are stable – the sub-criterion does not apply to this species.</p> <p>We consider the sub-criterion to be appropriate. It should remain because it will be important for some species.</p>
<p>B)(iii) a high vulnerability due to the species' biology or behaviour (including migration); or</p>	<p>Yes, the species can be considered vulnerable because of a high dependence on specialized breeding habitat and sea and ice conditions (N.B. because the species does not meet the trade criterion, this should not trigger listing).</p> <p>The distinction between this sub-criterion and sub-criterion A(v) requires clarification. Should this criterion be more specifically about reduction in area of distribution, or be deleted?</p>
<p>B)(iv) an observed, inferred or projected significant decrease in any</p>	<p>The significance of the decrease must be justified. For that reason we suggest amending the criterion as indicated.</p>

one of the following:	
<ul style="list-style-type: none"> the area of distribution; or 	<p>No – the distribution as a whole has moved south, but with no overall reduction.</p> <p>The sub-criterion is appropriate.</p>
<ul style="list-style-type: none"> the area of habitat; or 	<p>No.</p> <p>The sub-criterion is appropriate.</p>
<ul style="list-style-type: none"> the number of sub-populations; or 	<p>No – some new colonies have been established.</p> <p>The sub-criterion is appropriate.</p>
<ul style="list-style-type: none"> the number of individuals; or 	<p>No – the sizes of the Ross Sea colonies have displayed significant interannual variability between 1959 and 1997 but this does not constitute a decrease.</p> <p>The sub-criterion is appropriate.</p>
<ul style="list-style-type: none"> the quality of habitat; or 	<p>Yes - the quality of habitat varies from year to year according to the amount of sea ice. As a whole, sea ice extent has changed significantly in recent decades, and this is likely to affect the penguin population long-term.</p> <p>The sub-criterion is appropriate.</p>
<ul style="list-style-type: none"> the recruitment. 	<p>No – recruitment fluctuates from year to year according to sea ice conditions.</p> <p>The sub-criterion is appropriate, though its interpretation must allow for natural fluctuations in recruitment, sometimes over long periods.</p>

<p>C) A marked decline in population size in the wild, which has been either (see definitions below):</p>	<p>Historical extent of decline - To what extent has the population or the area of distribution (please specify which) declined since historical times (i.e., going back 100 years or more if known; else based on whatever information is available)? (Ex. The ___ has declined down to ___% of the historical levels of ___ years ago.)</p> <p>Recent rate of decline - Characterize the recent (10-20 year) trends in population size or area of distribution (please specify which).</p> <p>No – the sizes of the Ross Sea colonies have displayed significant interannual variability between 1959 and 1997, but there has been no overall decline.</p> <p>The criterion is appropriate.</p>
<p>C)(i) observed as ongoing or as having occurred in the past (but with a potential to resume); or</p>	<p>No – the sizes of the Ross Sea colonies have displayed significant interannual variability between 1959 and 1997, but there has been no overall decline.</p> <p>The sub-criterion is appropriate.</p>
<p>C)(ii) inferred or projected on the basis of any one of the following:</p>	
<ul style="list-style-type: none"> • a decrease in area of habitat; or 	<p>No –there has been no overall decline.</p> <p>The sub-criterion is appropriate.</p>
<ul style="list-style-type: none"> • a decrease in quality of habitat; or 	<p>No –there has been no overall decline.</p> <p>The sub-criterion is appropriate.</p>
<ul style="list-style-type: none"> • levels or pattern of exploitation; or 	<p>No – there is no exploitation.</p> <p>The sub-criterion is appropriate.</p>
<ul style="list-style-type: none"> • threats from extrinsic human-induced factors such as competition/predation by introduced species or the effects of hybridization, toxins and pollutants; or 	<p>Yes - minor direct disturbance by human activities, plus potential impacts of accumulation of pesticide residues via the marine food chain, and particularly changes in sea-ice dynamics as a consequence of global warming.</p>

	The sub-criterion is appropriate.
<ul style="list-style-type: none"> a decreasing recruitment 	<p>No – recruitment fluctuates from year to year according to sea ice conditions, but there is no overall decrease.</p> <p>The sub-criterion is appropriate.</p>
<p>D) If not included in Appendix I, is likely to satisfy one or more of criteria A-C within 5 years?</p>	No.

For criteria **A)(v)** and **B)(iii)**, please check which if any of the vulnerability factors listed below apply:

- | | | |
|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|
| <input checked="" type="checkbox"/> low fecundity | <input checked="" type="checkbox"/> specialized niche requirements (e.g. diet and habitat) | <input type="checkbox"/> threats from disease |
| <input type="checkbox"/> slow growth rate | <input type="checkbox"/> species associations such as symbiosis and other forms of co-dependency | <input type="checkbox"/> threats from invasive species |
| <input checked="" type="checkbox"/> high age at first maturity | <input type="checkbox"/> fragmentation and habitat loss | <input checked="" type="checkbox"/> threats from rapid environmental change (e.g. climate regime shifts) |
| <input type="checkbox"/> distorted age, size or sex ratio | <input type="checkbox"/> reduced genetic diversity | <input type="checkbox"/> selectivity of removals (that may compromise recruitment) |
| <input type="checkbox"/> complex social structure | <input type="checkbox"/> depensation (prone to continuing decline, even in the absence of exploitation) | <input type="checkbox"/> Other (please specify) |
| <input type="checkbox"/> extensive migratory behaviour | <input type="checkbox"/> high degree of endemism | |
| <input checked="" type="checkbox"/> strong aggregating behaviour (e.g., schooling) | | |
| <input type="checkbox"/> low population density (for sessile or semi-sessile species) | | |

Table 2 – Comments from reviewer on applicability of criteria for listing on Appendix II

<p style="text-align: center;">Criterion</p> <p>For your information for a species to fulfill the draft criteria for Appendix II it must meet at least one of the criteria A-D.</p>	<p style="text-align: center;">NOTES</p> <p>Whenever appropriate, indicate ways in which this criterion and definitions, explanations and guidelines could be improved and/or quantified to better suit this taxon and its relatives (If you need additional space, please use a separate sheet of paper).</p>
<p>Trade Criterion Is or may the species be affected by international trade?</p>	<p>No - there is minor potential for oil rendering and zoo trade but low likelihood because of hostile environment and public perception. International trade should be specified.</p> <p>The criterion is appropriate.</p>
<p>A) It is known, or can be inferred, that the regulation of trade in the species is necessary to avoid it becoming eligible for inclusion in Appendix I in the near future.</p>	<p>No</p> <p>The criterion is appropriate.</p>
<p>B) It is known, or can be inferred or projected, that harvesting of specimens from the wild for international trade has, or may have, a detrimental impact on the species by either:</p>	<p>No</p> <p>The criterion is appropriate.</p>
<p>B)(i) Exceeding, over an extended period, the level that can be continued to perpetuity.</p>	<p>No</p> <p>The sub-criterion is appropriate.</p>

<p>B)(ii) Reducing it to a population level at which its survival would be threatened by other influences.</p>	<p>No The sub-criterion is appropriate.</p>
<p>C) The specimens of the species in the form in which they are traded resemble specimens of a species included in Appendix II under the provisions of Article II, paragraph 2(a), or in Appendix I, such that a non-expert, with reasonable effort, is unlikely to be able to distinguish between them.</p>	<p>No – the Adelie penguin is easily identified, though it is conceivable that products would not be. The criterion is appropriate.</p>
<p>D) There are compelling reasons, other than those given in C to ensure that effective control of trade in currently listed species is achieved.</p>	<p>No The criterion is probably appropriate, but its wording should be clarified to ensure that its purpose is easily understood – e.g., it may be worth noting that this relates to look-alike species.</p>

For criteria **A)** and **B)**, please check which if any of the vulnerability factors listed below apply:

- Y** low fecundity
- slow growth rate
- Y** high age at first maturity
- distorted age, size or sex ratio
- complex social structure
- extensive migratory behaviour
- Y** strong aggregating behaviour (e.g., schooling)
- low population density (for sessile or semi-sessile species)
- Y** specialized niche requirements (e.g. diet and 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)
- high degree of endemism
- threats from disease
- threats from invasive species

- Y** threats from rapid environmental change (e.g. climate regime shifts)
- selectivity of removals (that may compromise recruitment)
- Other (please specify)

References

Heather, B.D., Robertson, H.A., 1996. The Field Guide to the Birds of New Zealand. Viking. Auckland. 432pp.

Marchant, S. & Higgins, P.J. (Eds). 1990. Handbook of Australian, New Zealand and Antarctic Birds. Volume 1. Ratites to Ducks. Melbourne. Oxford University Press.

Taylor, R.H., Wilson, P.R., 1990. Recent increase and southern expansion of Adélie Penguin populations in the Ross Sea, Antarctica, related to climatic warming. New Zealand Journal of Ecology 14:25-29.

Wilson, P.R., D.G. Ainley, N.Nur, S.S. Jacobs, K.J. Barton, G. Ballard, J.C. Comiso. 2001. Adélie penguin population change in the pacific sector of Antarctica: relation to sea-ice extent and the Antarctic Circumpolar Current. Marine Ecology Progress Series 213:301-309.

Definitions, explanations and guidelines

Species

In Article I of the Convention the term species is defined as “any species, subspecies or geographically separate population thereof”.

Species and subspecies refer to the biological concept of a species, and do not require any further definition.

The two terms also cover varieties.

“Geographically separate population” refers to parts of a species or a subspecies within particular geographical boundaries. 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.

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 trade” if:

1. it is known to be in 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 trade, or there is potential international demand for the species, that may be detrimental to its survival in the wild.

Area of distribution

Area of distribution of a species is defined as the area contained within the shortest continuous imaginary boundary which can be drawn to encompass all the known, inferred or projected sites of occurrence, excluding cases of vagrancy and introductions outside its natural range (though inferring and projecting area of occurrence should be undertaken carefully, and in a precautionary manner). The area within the imaginary boundary should, however, exclude significant areas where the species does not occur, and so in defining an area of distribution, account should be taken of discontinuities or disjunctions in the spatial distribution of species. For migratory species, the area of distribution is the smallest area essential at any stage for the survival of that species (e.g., colonial nesting sites, feeding sites for migratory taxa, etc.). For some species for which data were available to make an estimate, a figure of less than 10,000 km² has been found to be an appropriate guideline (not a threshold) of what constitutes a restricted area of distribution. However, this figure is presented only as an example, since it is impossible to give numerical values that are applicable to all taxa, particularly colonial breeders such as for example. For colonial nesters, the number of colonies should also be considered. There will be many cases where this numerical guideline

Comment: This is de facto “area of occupancy” rather than area of distribution.

We recommend using area of occupancy rather than area of distribution, because this provides a better depiction of habitat occupied than area of distribution. The definition used by IUCN is appropriate

does not apply.

Decline

A decline is a reduction in the abundance, or area of distribution, of a species. Decline can be expressed in two different ways: (i) the overall long-term extent of decline or (ii) the recent rate of decline. The long-term extent of decline is the total estimated or inferred percentage reduction from a baseline level of abundance or area of distribution. The recent rate of decline is the percentage change in abundance or area of distribution over a recent time period. The [data used to estimate or infer](#) a baseline for extent of decline should extend as far back into the past as possible.

A general guideline for a marked historical extent of decline is a percentage decline to 5%-30% of the baseline, depending on the reproductive biology of the species. The extremes of 5% and 30% will be applicable to only a relatively small number of species, but some species may even fall outside of these extremes. However, both these figures are presented only as examples, since it is impossible to give numerical values that are applicable to all taxa because of differences in their biology ([*see footnote with respect to application of decline to commercially exploited aquatic species](#)).

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. If the population is small, a percentage decline of 20% or more in the last 5 years or 2 generations (whichever is the longer) may be more appropriate. However, these figures are presented only as examples, since it is impossible to give numerical values that are applicable to all taxa because of differences in their biology.

* Application of decline for commercially exploited aquatic_species:

In marine and large freshwater bodies, a narrower range of 5-20% is deemed to be more appropriate in most cases, with a range of 5-10% being applicable for species with high productivity, 10-15% for species with medium productivity and 15-20% for species with low productivity. Nevertheless some species may fall outside this range.

In general, historical extent of decline should be the primary criterion for consideration of listing in Appendix I. However, in circumstances where information to estimate extent-of-decline is limited, rate-of-decline over a recent period could itself still provide some information on extent-of-decline.

For listing in Appendix II, the historical extent of decline and the recent rate of decline should be considered in conjunction with one another. The higher the historical extent of decline, and the lower the productivity of the species, the more important a given recent rate of decline is.

A general guideline for a marked recent rate of decline is the rate of decline that would drive a population down within approximately a 10-year period from the current population level to the historical extent of decline guideline (i.e. 5-20% of baseline for exploited fish species). There should rarely be a need for concern for populations that have exhibited an historical extent of decline of less than 50%, unless the recent rate of decline has been extremely high.

Even if a population is not declining appreciably, it could be considered for listing in Appendix II if it is near the extent-of-decline guidelines recommended above for consideration for Appendix I-listing. A range of between 5% and 10% above the relevant extent-of-decline might be considered as a definition of 'near'.

A recent rate-of-decline is important only if it is still occurring, or may resume, and is projected to lead to the species reaching the applicable point for that species in the Appendix I extent-of-decline guidelines within approximately a 10-year period. Otherwise the overall extent-of-decline is what is important. When sufficient data are available, the recent rate-of-decline should be calculated over approximately a 10-year period. If fewer data are available, annual rates over a shorter period could be used. If there is evidence of a change in the trend, greater weight should be given to the more recent consistent trend. In most cases, listing would only be considered if the decline is projected to continue.

The historical extent of decline and the recent rate of decline should be considered in conjunction with one another. In general, the higher the historical extent of decline, and the lower the productivity of the species, the more important a given recent rate of decline is.

In estimating or inferring the historical extent of decline or the recent rate of decline, all relevant data should be taken into account. A decline need not necessarily be ongoing. If data are available only for a short period and the extent or rate of decline based on these data are cause for concern, the guidelines above (extrapolated as necessary or relevant) should still apply. However, natural fluctuations should not normally count as part of a decline, but an observed decline should not necessarily be considered part of a natural fluctuation unless there is evidence for this. A decline that is the result of legal activities carried out pursuant to a harvesting programme that reduces the population to a planned level, not detrimental to the survival of the species, is not covered by the term "decline".

Extended period

The meaning of the term extended period will vary according to the biological characteristics of the species. Selection of the period will depend upon the observed pattern of natural fluctuations in the abundance of the species and on whether the number of specimens removed from the wild is consistent with a sustainable harvesting programme that is based on these natural fluctuations.

Fluctuations

Fluctuations in population size or area of distribution are considered large when the population size or area in question varies widely, rapidly or frequently. Where data exist to make an estimate, one order of magnitude has been found to be an appropriate guideline (not a threshold) for population size. Similarly, fluctuations can be considered 'short term' if the period of fluctuation is about two years. 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.

Fragmentation

Fragmentation refers to the case where most individuals within a taxon are found in small and relatively isolated sub-populations, which increases the probability that these small sub-populations will become extinct and the opportunities for re-establishment are limited. For some species in trade where data exist to make an estimate, an area of distribution of 500 km² or less for each subpopulation has been found to be an appropriate guideline (not a threshold) of what constitutes fragmentation. 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.

Generation length

Generation length is the average age of parents of the current cohort (i.e., newborn individuals in the population). Generation length therefore reflects the turnover rate of breeding individuals in a population. Generation length is greater than the age at first breeding and less than the age of the ¹⁸oldest breeding individual, except in taxa

that breed only once. Where generation length varies under threat, the more natural (i.e., pre-disturbance) generation length should be used.

Near future

Refers to a time period in which it can be projected or inferred that a species would satisfy one (or more) of the criteria in Annex I unless it is included in Appendix II. Clearly this period will be taxon- and case- specific, however, 5-10 years may be considered a useful guideline. 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 issues

Population

Population refers to the total number of individuals of the species (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)

Sub-population

Sub-populations are defined as geographically or otherwise distinct groups in the population between which there is limited genetic exchange.

Population size

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.

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 be chosen.

Small wild population

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.

Deleted: In case estimates of effective population size are provided the following aspects should be taken into account:¶

Very small wild sub-population

For some species where data exist to make an estimate, a figure of less than 500 individuals has been found to be an appropriate guideline (not a threshold) of what constitutes a very small sub-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.

Possibly extinct

A species is possibly extinct when exhaustive surveys in known and/or suspected habitat, and at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Before a species can be declared possibly extinct, surveys should take place over a time-frame appropriate to the species' life cycle and life form.

Recruitment

Recruitment is the total number of individuals added to any particular demographic class of a population by either sexual or asexual reproduction.

Deleted: annually

Threatened with extinction

Threatened with extinction is defined by Annex 1. The vulnerability of a species to threats of extinction depends on its population demographics, biological characteristics (such as body size, trophic level, life cycle, breeding structure or social structure requirements for successful reproduction), and vulnerability due to aggregating habits, natural fluctuations in population size, and/or residency/migratory patterns. This makes it impossible to give numerical threshold values for population size or area of distribution that are applicable to all taxa.

Vulnerability

Vulnerability can be defined as the susceptibility to intrinsic or external effects which increase the risk of extinction. There are a number of taxon- or case-specific 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:

- 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)
- Endemism
- Threats from disease or invasive species
- Rapid environmental change (e.g., climate regime shifts)
- Selectivity of removals (that may compromise recruitment)