

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):

Eleanora Babij, Division of Scientific Authority, U.S. Fish and Wildlife Service, Arlington, VA

Dr. Carl H. Ernst, Department of Environmental Science & Policy, George Mason University, Fairfax, VA 22030-4444.

Terry Ireland, U.S. Fish and Wildlife Service, 764 Horizon Dr., Building B, Grand Junction, Colorado 81506

Contact person: Robert R. Gabel

Contact address:

Chief, Division of Scientific Authority
U.S. Fish and Wildlife Service
4401 North Fairfax Drive, Room 750
Arlington, VA 22203

Tel: +01 703 358 1708

Fax: +01 703 358 2276

e-mail: Roddy_Gabel@fws.gov

Taxon reviewed (including common and taxonomic names):

***Bufo boreas* (Boreal Toad, Western Toad)** – The range of the boreal toad extends from western British Columbia and southeastern Alaska south through Washington, Oregon, and Idaho to northern Baja California, Mexico, east to Montana, western and central Wyoming, Nevada, the mountains and higher plateaus of Utah and western Colorado. It inhabits a wide variety of habitats from desert to mountain meadows in and around springs, lake, ponds, reservoirs, streams, and slow moving rivers. Breeding habitat includes lakes, marshes, ponds, and bogs with sunny exposures and quiet, shallow water. Boreal toads feed on a wide range of invertebrates and insects, including flies, mosquitoes, grasshoppers, beetles and moths.

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

<p>Margarita A. Clemente Muñoz Presidenta del Comité de Flora CITES Universidad de Córdoba / Jardín Botánico Avenida de Linneo s/n E-14004 CÓRDOBA Spain / España / Espagne email cr1clmum@uco.es</p>	<p>Thomas Althaus Chair of the CITES Animals Committee Federal Veterinary Office Schwarzenburgstrasse 161 CH-3097 LIEBEFELD Switzerland / Suiza / Suisse email: thomas.althaus@bvet.admin.ch</p>
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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 trade?</p>	<p>Currently, this species is not known to be in trade. It may be traded if federally listed however, which may give it a black market value. Although it is not so critical for the model taxon, it is extremely important for other species. This criterion seems appropriate for listing purposes, but should be modified to say “international” trade.</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>There were 496 males and females observed rangewide in 2002 (the most current count numbers). There have been mark-recapture studies. However, they are not completed. Therefore, we do not have an extrapolated population estimate based on totals observed. It is likely that mark recapture estimates would not be higher than 5,000 and, therefore, the population would qualify as a “small population”, as defined.</p> <p>Although this criterion may be appropriate for knowledge of current population size and inference of decline, it is unclear what the definition of “small” is or even how it could be defined. The definition is very vague and this could lead to differences in application by individuals. Numerical guidelines should not be used. Also, for many populations, specific numbers are not known. When this is the situation, how does this affect the listing? Are reintroduced species that have established themselves and are viable considered wild populations? There needs to be better definitions of this section A.</p> <p>This criterion applies for the species.</p>
<p>A)(i) an observed, inferred or projected decline in the number of</p>	<p>From historical observation records on numbers of individuals, locales, and range there has definitely been a decline in boreal toads from the 1970’s and prior (some Wyoming records</p>

<p>individuals or the area and quality of habitat; or</p>	<p>as early as the late 1950's). Unfortunately, there were no extensive surveys prior to 1993 and only a few breeding sites were monitored from 1990 and on, so extent of decline in any one subpopulation (metapopulation) or rangewide is difficult to quantify. Confounding the issue even more is that there has been increased survey effort in recent years. So are the new breeding sites found in the last 2-5 years new sites or are they sites with a once more plentiful population that are now in decline? In breeding localities that are known to be positive for chytrid fungus and which have been monitored for 7-12 years, substantial declines (224 observed down to 1 as the most extreme case) have occurred. In one breeding locality, the number dropped from 118 to 20 toads in one year. In another locality hit with chytrid fungus, the number dropped from 201 to 68 in one year. The toad is a fairly long-lived species with somewhat low breeding frequency (especially for females) and breeding success, so a criterion looking at around 50% declines over 10 years or more years or 3 generations seems to be a good guideline. I would say that for small populations the decline of 20% in 5 years or 2 generations is also a good guideline or example of a decline.</p> <p>This criterion applies to the species.</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>In 2002, there were 38 active breeding localities, composed of 32 active breeding populations. As the Boreal Toad Conservation Team (BTCT) defines it, a breeding locality may be comprised of one or more specific breeding sites not separated by more than 0.5 mile. A breeding population consists of one or more breeding localities separated by no more than 5 miles. Therefore, the definition of a breeding population could translate to the CITES definition of a sub-population. Consequently, all but perhaps one sub-population would "very small" using 500 individuals as a definition of "very small". The BTCT defines a "large breeding population" as 20+ breeders (male and female) and 4+ egg masses. Using this definition we had 7 large breeding populations (out of 32) in 2002. The 20+ breeders, even if extrapolated with mark-recapture estimators, would certainly not equate to 500 individuals, so for boreal toads this 500 criterion may be too high. The "large" definition was a best guess primarily from a USGS-BRD researcher familiar with the toad's reproductive capabilities and life expectancy.</p> <p>This criterion is appropriate for determination of sub-population numbers, if the purpose of the listing is to single out such population groups. For amphibians such as the boreal toad (and others), the "subpopulation" definition should be expanded to include breeding populations. The comment on criterion A) regarding population size also applies.</p> <p>This criterion applies to part of the species.</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 only a handful of “large” breeding populations of the boreal toad and only 1 population considered viable based on size and lack of the chytrid fungus. Only having one viable population is of concern as is having most individuals in concentrated in one subpopulation.</p> <p>This criterion is appropriate for determination of sub-population numbers, if the purpose of the listing is to single out such population groups. For amphibians such as the boreal toad (and others), the “subpopulation” definition should also be expanded to include breeding populations.</p> <p>This criterion applies to the species.</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>At a particular breeding site, the boreal toad may have one successful year out of several poor years of reproduction, but there have been no rangewide fluctuations noted.</p> <p>This criterion does not seem to apply to the species. However, it is unclear whether this criterion would apply to this species based on the definition. This criterion seems to be highly subjective and needs clarification.</p>
<p>A)(v) a high vulnerability due to the species' biology or behaviour (including migration).</p>	<p>With boreal toads congregating at breeding sites in the spring or early summer, they certainly could be vulnerable to extensive collecting. This species can also be considered vulnerable due to threats from disease, invasive species, and habitat destruction and degradation.</p> <p>Data from this criterion is important.</p> <p>This criterion applies to the species.</p>

<p>B) The wild population has a restricted area of distribution and is characterized by at least one of the following (see definitions below):</p>	<p>What was/is the estimated area of distribution? 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>This species has a wide area of distribution being found throughout the mountainous areas of northwestern North America, ranging from sea level to 10,000 feet. If you use this distribution, we would say it is not restricted. However, subspecies or subpopulations have a more restricted area of distribution. The area of distribution for the subspecies (<i>B. boreas boreas</i>) historically, was southeastern Wyoming (WY) to northcentral New Mexico (NM). Currently there are only known to be a handful of toads in 2 areas in WY and no toads have been found in NM for many years. Colorado has a fairly wide distribution of the toads, but the species is restricted from historical areas. This may cause some confusion for a listing and could impact if a species is/or is not listed. If you are looking at the taxon at the species level, it may seem it has a large area of distribution. However, if the taxon is isolated into subpopulations that are isolated, this could have significant consequences for the species. A good knowledge of the taxon's range is essential for determining listing status.</p> <p>This criterion applies to part of the species.</p>
<p>B)(i) fragmentation or occurrence at very few locations; or</p>	<p>Though boreal toads have been known to travel 5 miles in two years, their mobility is somewhat limited and their habitat is naturally and unnaturally fragmented. This could lead to a breeding population being wiped out from collection with the chance of recolonization being very low or the length of time of recolonization being very long. The fragmented nature of habitat should also be considered in criterion.</p> <p>This criterion applies to the species.</p>
<p>B)(ii) large fluctuations in the area of distribution or the number of sub-populations; or</p>	<p>As indicated in A(iv), this criterion does not seem to apply to the species. However, it is unclear whether this criterion would apply to this species based on the definition of fluctuations. This criterion seems to be highly subjective and needs clarification.</p>
<p>B)(iii) a high vulnerability due to the species' biology or behaviour (including migration); or</p>	<p>As mentioned in B(i), the toad's mobility is limited, so extensive collection from a moderate to large breeding population, most likely to contribute to reduction of the overall population, could certainly limit genetic interchange and colonization or recolonization.</p> <p>It does not seem as though this criterion is really necessary. Wouldn't all species be vulnerable to threats due to it's biology? Some to it's behaviour? This criterion seems to be a given.</p> <p>This criterion applies to the species.</p>
	<p>Despite trying to separate out population size from distribution or extent of habitat, this</p>

<p>B)(iv) an observed, inferred or projected decrease in any one of the following:</p>	<p>criteria appears to be repetitive, especially if you consider observed changes in habitat or population numbers. If you leave it as inferred or projected and clarify that the above criteria in B and A are observed then all of the criteria under B(iv) would still be valuable.</p>
<ul style="list-style-type: none"> • the area of distribution; or 	<p>The area of distribution is confusing, and overlaps with the total distribution presented above under B). Probably could be dropped, unless it refers to the distribution of a critical subspecies or population within in the taxon's total range.</p> <p>This criterion applies to part of the species.</p>
<ul style="list-style-type: none"> • the area of habitat; or 	<p>This criterion applies to the species.</p>
<ul style="list-style-type: none"> • the number of sub-populations; or 	<p>The number of sub-populations is probably not essential, nor is the number of individuals, which should be covered under A) and A)(i).</p> <p>This criterion applies to the species.</p>
<ul style="list-style-type: none"> • the number of individuals; or 	<p>The number of sub-populations (subspecies?) is probably not essential, nor is the number of individuals, which should be covered under A) and A)(i).</p> <p>This criterion applies to the species.</p>
<ul style="list-style-type: none"> • the quality of habitat; or 	<p>Some areas within this species range have declined in quality.</p> <p>This criterion applies to the species.</p>
<ul style="list-style-type: none"> • the recruitment. 	<p>This criterion applies to the species.</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>In the late 1980's boreal toads were found to be absent from 80% of sites in Colorado and 94% of sites in Wyoming where they occurred in the early 1980's to the late 1950's. This is a breeding site or locality measurement and more closely reflects a distributional decline. Is a "marked" decline what separates this criteria from A? This is a bit confusing.</p>
	<p>This criterion appears repetitive with A(i) with the exception of the word ongoing. With the</p>

<p>C)(i) observed as ongoing or as having occurred in the past (but with a potential to resume); or</p>	<p>toad there appears to be ongoing declines in some populations but, perhaps just through survey effort, we are finding new areas with toads leading one to believe that the decline is not as extensive as believed in the late 1980's or early 1990's. This category should be left as "ongoing" since declines occurring in the past should be covered in A(i).</p>
<p>C)(ii) inferred or projected on the basis of any one of the following:</p>	<p>This criterion is somewhat repetitive with A and B, especially the habitat criteria. However, if A is observed, then this criterion could be inferred or projected. However, B seems to cover area and quality of habitat, unless you are emphasizing "marked" population declines as a result of habitat changes.</p>
<ul style="list-style-type: none"> • a decrease in area of habitat; or 	<p>This criterion seems to be covered under A (i). This criterion applies to the species.</p>
<ul style="list-style-type: none"> • a decrease in quality of habitat; or 	<p>This criterion seems to be covered under A (i). This criterion applies to the species.</p>
<ul style="list-style-type: none"> • levels or pattern of exploitation; or 	<p>This is important criterion to consider. For the toad, one collector at one moderate or perhaps even large population one year may not make a huge difference in rangewide population number or distribution. However, collection at a large breeding population in consecutive years and especially collection in consecutive years at all or most of the large or moderate sized breeding populations could really have a detrimental effect to the species. Currently, this is not an issue. This criterion does not apply to the species.</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>The boreal toad has been found to be stressed by adverse environmental factors such as acid rain, pollution, and increased ultraviolet radiation. This criterion applies to this species.</p>
<ul style="list-style-type: none"> • a decreasing recruitment 	<p>This criterion can possibly be covered in A or B unless again you want to make A observed population size or reasons for declines only or clarify that C is only for marked population declines or reasons for declines or clarify that C is only for inferred or projected population declines and reasons for declines. This criterion applies to this species.</p>

D) If not included in Appendix I, is likely to satisfy one or more of criteria A-C within 5 years?

If you are going to put a time limit here, then there should be clear time limits established for criteria that asks for inferred or projected declines in population size or distribution (or habitat quantity and quality). Otherwise, ask to project for 5 years into the future in the above categories so this criterion is not needed.

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 type="checkbox"/> specialized niche requirements (e.g. diet and habitat) | <input type="checkbox"/> threats from disease |
| <input checked="" 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 checked="" type="checkbox"/> fragmentation and habitat loss | <input type="checkbox"/> threats from rapid environmental change (e.g. climate regime shifts) |
| <input checked="" type="checkbox"/> distorted age, size or sex ratio | <input checked="" type="checkbox"/> reduced genetic diversity | <input checked="" type="checkbox"/> selectivity of removals (that may compromise recruitment) |
| <input type="checkbox"/> complex social structure | <input checked="" 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 <u>species</u> be <u>affected by trade</u>?</p>	<p>Currently, this species is not known to be in trade. It may be traded if federally listed however, which may give it a black market value.</p> <p>Should indicate international trade.</p> <p>This criterion applies to this species.</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>It is not known to be necessary. However, with trade in reptiles and amphibians currently appearing to be a big black market, potential listing of the boreal toad may infer that regulation of trade may be necessary. Certainly other toads and frogs are collected, traded, and sold whether listed or not, so potential for this to be collected and traded could increase with a Federal listing (currently being considered for Endangered Species Act listing). Good criterion, but, as with the boreal toad, there's uncertainty as to whether Federal listing would, in fact, spur the international trade of boreal toads.</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>Good criterion.</p>
<p>B)(i) Exceeding, over an extended period, the level that can be continued to perpetuity.</p>	<p>It could easily be inferred that this could happen.</p>
<p>B)(ii) Reducing it to a population level at which its survival would be threatened by other</p>	<p>This also could be inferred to happen. The toads remaining after collection would likely still be susceptible to chytrid fungus, etc., and with fewer of them perhaps more susceptible to extirpation and extinction.</p>

influences.	
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.	Many of the North American toads, and perhaps other toads in the world, could be easily confused with the boreal toad by non-experts, even with reasonable effort to distinguish the species. Similarity of appearance is certainly a good criterion.
D) There are compelling reasons, other than those given in C to ensure that effective control of trade in currently listed species is achieved.	

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

Its unclear whether check marks for vulnerability under criteria A and B in Table 2 is being requested or whether this was copied from Table 1 and is not necessary.

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

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. There will be many cases where this numerical guideline 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.

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

* 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 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 oldest 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.

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.

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
- Dependence (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)