

# 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):

**Dr Arne Bjørge, Institute of Marine Research, Bergen, Norway**

**Dr Ingolf Røttingen, Institute of Marine Research, Bergen, Norway**

Contact person: **Arne Bjørge**

Contact address:

**Institute of Marine Research,**

**P.O. Box 1870 Nordnes**

**5817 Bergen**

**Norway**

**Tel: + 47 – 55 23 85 00**

**Fax: + 47 – 55 23 86 17**

**e-mail: arne.bjorge@imr.no**

Taxon reviewed (including common and taxonomic names):

**Common name: Norwegian spring spawning herring**

**Taxonomic name: *Clupea harengus***

GENERAL COMMENTS ABOUT THE POPULATION SUBJECT TO THIS REVIEW:

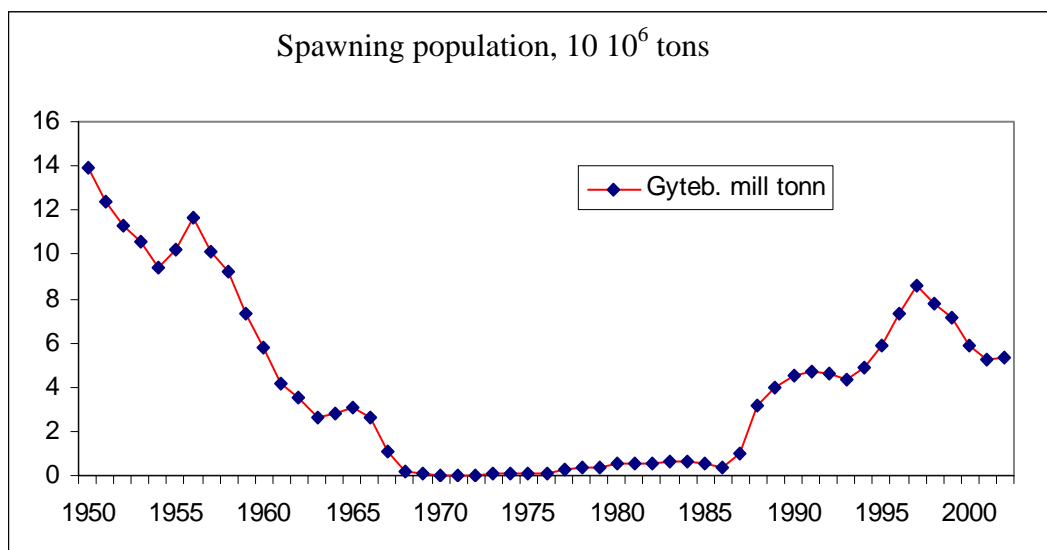
The Norwegian spring spawning herring stock was heavily exploited in the 1950s and 1960s. This exploitation in combination with a cooling at the feeding grounds caused a collapse in the spawning population in the 1960s. The exploitation was brought under strict control, and following a strong year class in 1983, the spawning population recovered in the late 1980s. The current limit reference point for the spawning population is  $2.5 \cdot 10^6$  tons. The current (2002-2003) spawning biomass is estimated at above  $5 \cdot 10^6$  tons, which is the precautionary approach reference point for the spawning stock. The following graphic shows the spawning stock biomass from 1950 to 2002.

Previous to 1950, the quality of abundance data is poorer. However, there seems to be periods of high abundance and periods of low abundance of herring that correlate with periods of higher and lower sea temperatures, respectively. The year 1950 was the end of an about 25-30 years long period of high abundance.

This review is intended to evaluate how the population had performed if the current CITES criteria and guidelines had been applied to the population in the period 1956 to 1985. An evaluation for the most recent years (2002-2003) is also included for comparison.

## CONCLUSIONS:

The Norwegian spring spawning herring population would have qualified for listing due to the recent rate of decline in the period 1956-1968, and due to the historical extent of decline in the period 1956-1985. The current population (2002-2003) does not qualify for listing following any of the CITES biological listing criteria.



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

**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

**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

## 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;"><b>CRITERON</b></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;"><b>NOTES</b></p> <p><b>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).</b></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 kilometers”). 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><b>Trade Criterion</b> Is or may the <u>species</u> be <u>affected by trade</u>?</p>	<p><b>Yes, specimen and products from this population were/are subject to international trade. Events in recent history showed that there was/is sufficient demand for herring products to generate overexploitation and decline of this population.</b></p>
<p>A) The <u>wild population is small</u>, and is characterized by at least one of the following (see definitions below):</p> <p><b>No. After the population crashed in the 1960s, the population was still far above the 5,000 individuals guideline. However, during the 1970s and 1980s the NSS herring changed migration route and showed signs of a depleted population.</b></p> <p><b>No. The current wild population is not small. The spawning component of the population in 2003 was estimated at above 5 10<sup>6</sup> tons (about 25 billion individuals).</b></p>	<p>What was/is the estimated size of the <u>population</u>? Please include units of measurement.</p> <p>[The term “The wild population is small, <u>and</u>” does not always fit as criterion for commercially exploited aquatic species. The population may be subject to historical extent of decline to 5-20% of the baseline, but still large with regard to number of individuals, cf comments to A)(i-v) below.]</p>
<p>A)(i) an observed, inferred or projected <u>decline</u> in the number of individuals or the area and quality of habitat; or</p>	<p><b>This is an additional condition to “The wild population is small”. Because the wild population was/is not small, this criterion was/is not relevant.</b></p>

<p>A)(ii) each <a href="#">sub-population being very small</a>; or</p>	<p>What were/are the estimated sizes of the <a href="#">subpopulation</a>(s)? Please include units of measurement.</p> <p><b>This is an additional condition to “The wild population is small”. Because the wild population was/is not small, this criterion was/is not relevant.</b> (This population does not split in sub-populations.)</p>
<p>A)(iii) a majority of individuals, during one or more life-history phases, being concentrated in one <a href="#">sub-population</a>; or</p>	<p><b>This is an additional condition to “The wild population is small”. Because the wild population was/is not small, this criterion was/is not relevant.</b></p>
<p>A)(iv) large short-term <a href="#">fluctuations</a> 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 <a href="#">fluctuations</a> 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><b>This is an additional condition to “The wild population is small”. Because the wild population was/is not small, this criterion was/is not relevant.</b> [But, varying year-class strength generates stock fluctuations.]</p>
<p>A)(v) a high <a href="#">vulnerability</a> due to the species' biology or behaviour (including migration).</p>	<p><b>This is an additional condition to “The wild population is small”. Because the wild population was/is not small, this criterion was/is not relevant.</b> [But, the migration between different EEZs and international waters, and it’s strong schooling behavior makes this population vulnerable to exploitation if international agreement is not reached regarding TAC and allowances within the TAC.]</p>
<p><b>B) The wild <a href="#">population</a> has a restricted <a href="#">area of distribution</a> and is characterized by at least one of the following</b> (see definitions below):</p>	<p>What was/is the estimated <a href="#">area of distribution</a>? If listing on the basis of one or more <a href="#">sub-populations</a>, what were/are the estimated areas of distribution of the subpopulation(s)? Please include units of measurement?</p> <p><b>No, The population did not have/has not a restricted area of distribution.</b> [The area of distribution varies greatly through the year, but spawning, feeding, wintering and feeding areas &gt;10,000 square nautical miles.]</p>
<p>B)(i) <a href="#">fragmentation</a> or occurrence at very few locations; or</p>	<p><b>This is an additional condition to “The wild population has a restricted area of distribution”. Because the population did not have/has not a restricted area of distribution, this criterion was/is not relevant.</b></p>
<p>B)(ii) large fluctuations in the <a href="#">area of distribution</a> or the number of <a href="#">sub-populations</a>; or</p>	<p><b>This is an additional condition to “The wild population has a restricted area of distribution”. Because the population did not have/has not a restricted area of distribution, this criterion was/is not relevant.</b></p>
<p>B)(iii) a high <a href="#">vulnerability</a> due to the species' biology or behaviour</p>	<p><b>This is an additional condition to “The wild population has a restricted area of distribution”. Because the population did not have/has not a restricted area of</b></p>

(including migration); or	<b>distribution, this criterion was/is not relevant.</b> [But, the migration between different EEZ and international waters, and it's strong schooling behavior makes this population vulnerable to exploitation if international agreement is not reached regarding TAC and allowances within the TAC.]
<b>B)(iv)</b> an observed, inferred or projected decrease in any one of the following:	
<ul style="list-style-type: none"> <li>the <a href="#">area of distribution</a>; or</li> </ul>	<b>This is an additional condition to “The wild population has a restricted area of distribution”. Because the population did not have/has not a restricted area of distribution, this criterion was/is not relevant.</b>
<ul style="list-style-type: none"> <li>the area of habitat; or</li> </ul>	<b>This is an additional condition to “The wild population has a restricted area of distribution”. Because the population did not have/has not a restricted area of distribution, this criterion was/is not relevant.</b>
<ul style="list-style-type: none"> <li>the number of <a href="#">sub-populations</a>; or</li> </ul>	<b>This is an additional condition to “The wild population has a restricted area of distribution”. Because the population did not have/has not a restricted area of distribution, this criterion was/is not relevant.</b> [This population does not split into sub-populations.]
<ul style="list-style-type: none"> <li>the number of individuals; or</li> </ul>	<b>This is an additional condition to “The wild population has a restricted area of distribution”. Because the population did not have/has not a restricted area of distribution, this criterion was/is not relevant.</b>
<ul style="list-style-type: none"> <li>the quality of habitat; or</li> </ul>	<b>This is an additional condition to “The wild population has a restricted area of distribution”. Because the population did not have/has not a restricted area of distribution, this criterion was/is not relevant.</b>
<ul style="list-style-type: none"> <li>the recruitment.</li> </ul>	<b>This is an additional condition to “The wild population has a restricted area of distribution”. Because the population did not have/has not a restricted area of distribution, this criterion was/is not relevant.</b>

<p>C) A marked <b>decline in population size in the wild, which has been either</b> (see definitions below):</p> <p>The Norwegian spring spawning herring population would have qualified for listing due to the recent rate of decline criterion in the period 1956-1968, and due to the historical extent of decline criterion in the period 1956-1987.</p> <p>The current population (2002-2003) does not qualify for listing following any of the decline criteria.</p>	<p>Historical extent of <b>decline</b> - To what extent has the <b>population</b> or the <b>area of distribution</b> (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 <b>decline</b> - Characterize the recent (10-20 year) trends in population size or area of distribution (please specify which).</p> <p><b>For reasons given above (under criteria A and B), this is the only criterion in addition to the Trade Criterion, which has been/is relevant to the Norwegian spring spawning herring population.</b></p>
<p>C)(i) observed as ongoing or as having occurred in the past (but with a potential to resume); or</p>	<p><b>The population declined in the 1960s from a level of about 10,000,000 tons (spawning population) to less than 50,000 tons. Oceanographic changes (cooling) at the foraging grounds were supposed to trigger the decline, but the extent of the decline was driven by overexploitation. The rebuilding period lasted for 25 years, and the population is currently within safe biological limits (as defined by ICES). However, there is a potential for the decline to resume if exploitation is not regulated.</b></p>
<p>C)(ii) inferred or projected on the basis of any one of the following:</p>	<p><b>Not relevant, but:</b></p>
<ul style="list-style-type: none"> <li>• a decrease in area of habitat; or</li> </ul>	<ul style="list-style-type: none"> <li>• <b>there has been no decrease in available habitat.</b></li> </ul>
<ul style="list-style-type: none"> <li>• a decrease in quality of habitat; or</li> </ul>	<ul style="list-style-type: none"> <li>• <b>there has been no significant decrease in quality of habitat.</b></li> </ul>
<ul style="list-style-type: none"> <li>• levels or pattern of exploitation; or</li> </ul>	<ul style="list-style-type: none"> <li>• <b>exploitation level (TAC) is advised by an international scientific advisory organization (ICES). TAC and allowances within the TAC are regulated by an international management agreement (EU, Faroe Islands; Iceland, Norway and Russia). Due to the biology of the species, it's schooling behavior, and the capacity of the fishing fleet, there is a potential for decline if the harvest was not regulated.</b></li> </ul>
<ul style="list-style-type: none"> <li>• threats from extrinsic human-induced factors such as</li> </ul>	<ul style="list-style-type: none"> <li>• <b>there are no known threats from extrinsic human-induced factors.</b></li> </ul>

competition/predation by introduced species or the effects of hybridization, toxins and pollutants; or	
<ul style="list-style-type: none"> <li>• a decreasing recruitment</li> </ul>	<ul style="list-style-type: none"> <li>• <b>there is no systematic decline in recruitment.</b></li> </ul>
<b>D) If not included in Appendix I, is likely to satisfy one or more of criteria A-C within 5 years?</b>	<b>With the current level of monitoring of the population and the harvest, it is unlikely that the stock will satisfy one or more of criteria a-c within 5 years.</b>

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

- |   |   |  |
|---|---|--|
| <input type="checkbox"/> low fecundity  | <input type="checkbox"/> specialized niche requirements (e.g. diet and habitat)                         | <input type="checkbox"/> threats from invasive species   |
| <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 rapid environmental change (e.g. climate regime shifts)  |
| <input checked="" type="checkbox"/> high age at first maturity                        | <input type="checkbox"/> fragmentation and habitat loss   | <input type="checkbox"/> selectivity of removals (that may compromise recruitment)   |
| <input type="checkbox"/> distorted age, size or sex ratio                             | <input type="checkbox"/> reduced genetic diversity  | <input checked="" type="checkbox"/> Other (please specify)   |
| <input type="checkbox"/> complex social structure                                     | <input type="checkbox"/> depensation (prone to continuing decline, even in the absence of exploitation) | <b>For commercially exploited aquatic species subject to trade, populations can be severely depleted but still larger than “small population” according to CITES guidelines.</b> |
| <input checked="" 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"/> threats from disease   |  |
| <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;"><b>Criterion</b></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;"><b>NOTES</b></p> <p><b>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).</b></p>
<p><b>Trade Criterion</b> Is or may the <a href="#">species</a> be <a href="#">affected by trade</a>?</p> <p>Yes.</p>	<p><b>Specimens and products from this population are subject to international trade. Events in recent history showed that there was/is sufficient demand for herring products to generate overexploitation and decline of this population.</b></p>

<p><b>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.</b></p> <p><b>Yes, for the period from about 1956 to about 1970. From about 1970, strict domestic regulations ensured protection of the stock.</b></p> <p><b>No for the current population (2002-2003), because the population has recovered to within safe biological limits, and the harvest is regulated through international agreements..</b></p>	<p><b>For the period before about 1970, the harvest was “unregulated”. The combination of oceanographic factors, increase in fishing efficiency and demand for products, caused a rapid decline in the population between 1956 and 1968 that would have led to qualification for inclusion on Appendix I.</b></p> <p><b>Currently, regulation of trade in this population is not necessary to avoid it becoming eligible for inclusion in Appendix I in the near future because the parties involved in exploitation (EU, Faroe Islands, Iceland, Norway and Russia) regulate the harvest in accordance with scientifically advised TACs.</b></p>
<p><b>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:</b></p>	<p><b>Harvesting of specimens from the wild population for international trade had a detrimental impact on the stock from 1956 to 1968.</b></p> <p><b>Harvest has currently no detrimental effect on the current stock, and is unlikely to have a detrimental effect under the current management regime.</b></p>
<p><b>B)(i) Exceeding, over an extended period, the level that can be continued to perpetuity.</b></p>	
<p><b>B)(ii) Reducing it to a population level at which its survival would be threatened by other influences.</b></p> <p><b>Yes, maybe for the late 1960s and 1970s.</b></p> <p><b>No, not for the current population.</b></p>	

<p>C) <b>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.</b></p>	<p><b>The Norwegian spring spawning herring population is a distinct population, separated from other herring stocks by population characteristics and geographic range. Specimens of the NSS herring population, in the form they are traded, could however, possibly resemble specimens of other herring populations, such that a non-expert, with reasonable effort, is unlikely to be able to distinguish between them.</b></p>
<p>D) <b>There are compelling reasons, other than those given in C to ensure that effective control of trade in currently listed species is achieved.</b></p>	<p><b>No</b></p>

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

- low fecundity
- slow growth rate
- high age at first maturity
- distorted age, size or sex ratio
- complex social structure
- extensive migratory behaviour
- strong aggregating behaviour (e.g., schooling)
- low population density (for sessile or semi-sessile species)
- 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

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

**For commercially exploited aquatic species subject to trade, populations can be severely depleted but still larger than “small population” according to CITES guidelines.**

## General comments:

In the case of the Norwegian spring spawning stock of herring, an independent international scientific advisory body (ICES) is in place, and there is an international agreement to regulate the harvest accordingly. This is an operational mechanism to maintain the population within biological safe limits. In comparison, the CITES criteria will first come into account after the stock is significantly depleted, or the recent rate of decline reaches a certain level.

The most serious threat against a commercially exploited marine living resource with similar characteristics as the NSS herring (large population size, slow growth rate, high age at sexual maturity, strong schooling behavior, and migration between EEZs and international waters) is exploitation which is not regulated by an effective management system that respects national and international laws and regulate the harvest in a sustainable way. However, also for such situations the stock has to be significantly depleted or rapidly declining before the current CITES criteria are relevant.

The Norwegian spring spawning stock of herring has in the past undergone large fluctuations, which probably were not driven by harvest. There seems to be periods of high abundance and periods of low abundance of herring that correlate with periods of higher and lower sea temperatures, respectively. The year 1950 was the end of an about 25-30 years long period of high abundance. Annex 5 should preferably give more guidance on how to define, and estimate, historical baselines for evaluating the historical extent of decline.

Even prior to large-scale commercial exploitation, there were indications of stock fluctuations where the low abundances were in the area of less than 30% of the high abundances. It would therefore be preferable if the Annex 5 could provide further guidance regarding the choice of 5-30% range for historical extent of decline, and how to apply this range.

The CITES criteria are focused on “small populations” and “restricted area of distribution”. This focus was probably developed more for terrestrial species, and they seems less relevant for commercially harvested marine species. The only biological criterion relevant for the stock subject to this review is the decline criterion (cf. the first paragraph under General comments).

Further, Annex 5 should preferably give more guidance on how to apply terms such as productivity and vulnerability.

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 km<sup>2</sup> 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).

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\* 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

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 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 km<sup>2</sup> or less for each subpopulation has been found to be an appropriate guideline (not a threshold) of what constitutes fragmentation. However, this

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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.

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
- 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)