

Registration Form and Contact Details

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Taxon reviewed (including common and taxonomic names):

Pacific sardine (*Sardinops melanostictus*)

General notes about this species review:

The commercial catch of Japanese sardine showed drastic decrease from 4.5 million metric tons in 1988 to about 50 thousand metric tons in 2002. However this population is known to show such large scale stock size changes periodically. Although, after the former peak of 1.5million metric tons in 1930s, commercial catch of the population decreased to less than only 10 thousand metric tons in 1965, it remarkably rebounded in 1970s and 80s to make recent 1988's 4.5 million mt peak. As many evidences shows that the population have experienced such large scale fluctuations again and again since the period when no powerful fishery existed, such large scale periodical fluctuation of this population is thought to be caused by natural factors.

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

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

<p style="text-align: center;">CRITERON</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 <u>species</u> be <u>affected by trade</u>?</p>	<p>NO The species will not be affected by international trade or catch at high seas.</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>What was/is the estimated size of the <u>population</u>? Please include units of measurement.</p> <p>NO. In 2002, 2.9billion individuals for Pacific sub-population and 47 million individuals for Tsushima sub-population</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>YES for 1988-2002 for Pacific sub-population YES after 1990’s for Tsushima sub-population</p> <p>Maximum for 1986 (554 billion total number of individuals) and minimum for 2002(2.9billion individuals) for Pacific sub-population. 200 billion individuals for 1990 and 47 million individuals for 2002 for Tsushima sub-population</p>
	<p>What were/are the estimated sizes of the <u>sub-population(s)</u>? Please include units of measurement.</p>

<p>A)(ii) each <u>sub-population being very small</u>; or</p>	<p>NO</p> <p>Total Weight : 116,000 mt for 2002 for Pacific sub-population 1400mt for 2002 for Tsushima sub-population (very rough estimate) Total number of individuals: 2.9 billion for 2002 for Pacific sub-population 47million for 2002 for Tsushima sub-population(very rough estimate)</p>
<p>A)(iii) a majority of individuals, during one or more life-history phases, being concentrated in one <u>sub-population</u>; or</p>	<p>NO</p>
<p>A)(iv) large short-term <u>fluctuations</u> 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 <u>fluctuations</u> 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>NO Sub-populations have long-term fluctuation</p>
<p>A)(v) a high <u>vulnerability</u> due to the species' biology or behaviour (including migration).</p>	<p>Maybe YES It has schooling behavior</p>
<p>B) The wild <u>population</u> has a restricted <u>area of distribution</u> and is characterized by at least one of the following (see definitions below):</p>	<p>What was/is the estimated <u>area of distribution</u>? If listing on the basis of one or more <u>sub-populations</u>, what were/are the estimated areas of distribution of the sub-population(s)? Please include units of measurement?</p> <p>Spawning area became much smaller for 2002 compared to 1980s for Pacific sub-population (however still wider than 10,000km²) Spawning area is restricted to near-shore area for 2002 for Tsushima sub-population (however still wider than 10,000km²)</p>
<p>B)(i) <u>fragmentation</u> or occurrence at very few locations; or</p>	<p>One major spawning ground (Tosa bay) and small spawning areas at Izu islands area for Pacific sub-population No large spawning ground for Tsushima sub-population, however fragmentation is not clear</p>

B)(ii) large fluctuations in the <u>area of distribution</u> or the number of <u>sub-populations</u> ; or	YES especially for feeding ground.(very large in 1980s and small for 2002)
B)(iii) a high <u>vulnerability</u> due to the species' biology or behaviour (including migration); or	May be YES It has schooling behavior.
B)(iv) an observed, inferred or projected decrease in any one of the following:	
<ul style="list-style-type: none"> • the <u>area of distribution</u>; or 	YES for 1988-2002 for Pacific subpopulation YES after 1990's for Tsushima subpopulation
<ul style="list-style-type: none"> • the area of habitat; or 	
<ul style="list-style-type: none"> • the number of <u>sub-populations</u>; or 	
<ul style="list-style-type: none"> • the number of individuals; or 	YES for 1988-2002 for Pacific subpopulation YES after 1990's for Tsushima subpopulation Maximum for 1986 (554 billion total number of individuals) and minimum for 2002(2.9billion individuals) for Pacific sub-population. 200 billion individuals for 1990 and 47 million individuals for 2002 for Tsushima sub-population
<ul style="list-style-type: none"> • the quality of habitat; or 	
<ul style="list-style-type: none"> • the recruitment. 	YES for 1988-2002 for Pacific subpopulation YES after 1990's for Tsushima subpopulation Maximum for 1980 (293 billion 0 age individuals) and minimum for 2002(1.7billion individuals) for Pacific sub-population.

	44 billion individuals for 1990 and 32 million 0 age individuals for 2002 for Tsushima sub-population
C) A marked <u>decline</u> in <u>population size</u> in the wild, which has been either (see definitions below):	Historical extent of <u>decline</u> - To what extent has the <u>population</u> or the <u>area of distribution</u> (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.)
	Recent rate of <u>decline</u> - Characterize the recent (10-20 year) trends in population size or area of distribution (please specify which).
C)(i) observed as ongoing or as having occurred in the past (but with a potential to resume); or	YES Maximum for 1986 (554 billion total number of individuals) and minimum for 2002(2.9billion individuals) for Pacific sub-population. 200 billion individuals for 1990 and 47 million individuals for 2002 for Tsushima sub-population
C)(ii) inferred or projected on the basis of any one of the following:	
• a decrease in area of habitat; or	
• a decrease in quality of habitat; or	
• levels or pattern of exploitation; or	YES
• threats from extrinsic human-induced factors such as competition/predation by introduced species or the effects of hybridization, toxins and pollutants; or	

<ul style="list-style-type: none"> • a decreasing recruitment 	<p>YES</p> <p>Maximum for 1980 (293 billion 0 age individuals) and minimum for 2002(1.7billion individuals) for Pacific sub-population. 44 billion individuals for 1990 and 32 million 0 age individuals for 2002 for Tsushima sub-population</p>
<p>D) If not included in Appendix I, is likely to satisfy one or more of criteria A-C within 5 years?</p>	

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 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 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 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) | |
| <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"/> 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;">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 be affected by trade</u>?</p>	<p>NO The species will not be affected by international trade or catch at high seas.</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 The species will not be affected by international trade or catch at high seas.</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>B)(i) Exceeding, over an extended period, the level that can be continued to perpetuity.</p>	<p>YES</p>
<p>B)(ii) Reducing it to a population level at which its survival would be threatened by other influences.</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>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>	

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

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

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.

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)