

Guidelines for assessing key threatening process nominations according to the *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act) and *EPBC Regulations 2000*

Threatened Species Scientific Committee (TSSC)

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## **Part A – Guidelines for key threatening process nominations**

### **Introduction**

The listing of a key threatening process under the EPBC Act is designed to prevent native species or ecological communities from becoming threatened or prevent threatened species and ecological communities from becoming more threatened.

There is a difference between identifying a process as threatening or potentially threatening and listing it as a Key Threatening Process under the EPBC Act. The TSSC is of the view that while many processes that occur in the landscape are or could be threatening processes, there is a lesser number that should be regarded as key threatening processes and receive the appropriate legislative status and hence regulatory recognition.

These guidelines designed to assist in the preparation of nominations of threatening processes consistent with the Regulations and Act.

### **Naming the threatening process**

The name provided should accurately reflect the scope of the process based on the description and evidence provided in this form. The name nominated may not necessarily be the name adopted by the TSSC for a successful nomination.

### **Describing the threatening process**

Nominators need to provide a description of the threatening process that distinguishes it from any other threatening process, by reference to

- (i) its biological and non-biological components.

Nominators need to carefully consider all the components which make up the threatening process. Each biological and non-biological component of the process nominated should be defined as accurately and concisely as possible. If appropriate, in order to distinguish the nominated threatening process from other processes, components which are specifically excluded from the nominated process can be listed.

While not wishing to restrict the generality of nominations, the TSSC would prefer that threatening processes were identified as operating in particular landscape or ecological or seascape contexts.

- (ii) the processes by which those components interact (if known).

In relation to the biological and non-biological components defined above, nominators should attempt to identify the interactions that occur between these components, ie. to describe the actual process. All terms used to name the interactions making up the process should be defined as accurately and as concisely as possible.

It would also be useful if the linkage between components demonstrated how the process threatens native species or ecological communities. For example, it is conceivable that a change in vegetation cover could be threatening to downstream aquatic species, but this linkage would need to be established before it could be understood as a threatening process. Specific examples or data demonstrating impact on named native species or ecological communities should not be included in the description (these are included in the justification section).

**Justification for why the threatening process is eligible to be treated as a key threatening process under the *Environment Protection and Biodiversity Conservation Act 1999***

Nominators need to include reasons for their nomination and provide evidence against the criteria for listing key threatening processes. Although there are three criteria for listing, meeting any **one** of the criteria means a threatening process is eligible for listing as a key threatening process. However, provision of all available evidence against each criterion aids in assessment by the TSSC.

The EPBC Act lists of threatened species and ecological communities are available on the Department of Sustainability, Environment, Water, Population and Communities website at: [www.environment.gov.au/biodiversity/threatened/index.html](http://www.environment.gov.au/biodiversity/threatened/index.html)

**Criterion A - evidence that the threatening process could cause a native species or an ecological community to become eligible for listing in any category, other than conservation dependent.**

This criterion refers to species or ecological communities not currently included in the EPBC Act lists, but which could become eligible for listing due to the impacts of the nominated threatening process. To meet this criterion there must a high likelihood of a significant effect, to the extent that the species or ecological community will meet at least one of the criteria for listing, within an indicated timeframe, should the threat continue.

The conservation status categories of listing relevant to this criterion are:

- for species- Extinct, Extinct in the wild, Critically Endangered, Endangered, Vulnerable.
- for ecological communities- Critically Endangered, Endangered, Vulnerable.

The criteria for listing species and ecological communities in each of these categories can be found in the [Part B](#) and [Part D](#) of these guidelines.

**Criterion B - evidence that the threatening process could cause a listed threatened species or a listed threatened ecological community to become eligible to be listed in another category representing a higher degree of endangerment.**

This criterion refers to species or ecological communities which are currently included in the EPBC Act lists. In order to cause a species or ecological community to become eligible for listing in a category representing a higher degree of endangerment, there must be a high likelihood of a significant effect, to the extent that the species or ecological community will meet at least one criterion for the higher category, within an indicated timeframe, should the threat continue.

The conservation status categories of listing relevant to this criterion are:

- for species- Extinct in the wild, Critically Endangered, Endangered, Vulnerable or Conservation Dependant.
- for ecological communities- Endangered or Vulnerable.

The categories Extinct for species and Critically Endangered for ecological communities are not relevant, since there are no categories representing a higher degree of endangerment. The criteria for listing species and ecological communities in each of these status categories can be found in [Part B](#) and [Part D](#) of these guidelines.

**Criterion C - evidence that the threatening process adversely affects two or more listed threatened species (other than conservation dependent species) or two or more listed threatened ecological communities.**

This criterion refers to species or ecological communities which are currently included in the EPBC Act lists. In order to be adversely affecting a species or ecological community, the threatening process must currently occur where the species or ecological community occurs, and there must be evidence of a current effect.

An adverse effect can include mortality, injury, spread of disease, disturbance to breeding, feeding or roosting habits, habitat alteration or habitat destruction. The extent of impact which can be considered to be an adverse effect depends on the attributes of the population, ecological characteristics, and category in which the species/ecological community is listed. For example, if a species listed as Critically Endangered has less than 50 individuals remaining, then the death of a few individuals would probably constitute an adverse effect. Conversely, the same impact in a species listed as Vulnerable, which has a population of over 9000, would not constitute an adverse impact for the purpose of this criterion.

The conservation status categories relevant to this criterion are:

- for species- Extinct in the wild, Critically Endangered, Endangered, Vulnerable
- for ecological communities- Critically Endangered, Endangered, Vulnerable

The category Extinct for species is not included since there cannot be a current adverse effect on this species. However, if there is evidence of a previous adverse impact before the species became extinct, and this is highly relevant to current impacts of the threatening process, this evidence can also be included.

Some of the information provided in criterion B will also be relevant here. In this case, it should be provided again in the context of this criterion ie. relating to adverse effects rather than population-level impacts.

**Providing information on threat abatement**

If a decision is made to list the threatening process being nominated as a key threatening process, the Minister must then make a decision on whether to have a threat abatement plan.

This section is not required for the nomination to be eligible for listing as a key threatening process under the EPBC Act. However any additional information provided by nominators can be used by the TSSC in preparing its advice to the Minister on the feasibility, effectiveness and efficiency of developing a threat abatement plan, should the threatening process be listed.

## Part B – Criteria for listing species under the *Environment Protection and Biodiversity Conservation Act 1999* and *Environment Protection and Biodiversity Conservation Regulations 2000*

For section 179 of the EPBC Act (which provides general eligibility for inclusion in a category of the list of threatened species), a native species is in the critically endangered, endangered or vulnerable category if it meets any of the criteria for the category mentioned in the following table:

Criterion	Category		
	Critically Endangered	Endangered	Vulnerable
1 It has undergone, is suspected to have undergone or is likely to undergo in the immediate future:	a <a href="#">very severe</a> reduction in numbers	a <a href="#">severe</a> reduction in numbers	a <a href="#">substantial</a> reduction in numbers
2 Its <a href="#">geographic distribution is precarious</a> for the survival of the species and is:	<a href="#">very restricted</a>	<a href="#">restricted</a>	<a href="#">limited</a>
3 The estimated total number of mature individuals is: and either of (a) or (b) is true: (a) evidence suggests that the number will continue to decline at: or (b) the number is likely to continue to decline and its geographic distribution is:	<a href="#">very low</a>  a <a href="#">very high</a> rate  <a href="#">precarious</a> for its survival	<a href="#">low</a>  a <a href="#">high</a> rate  <a href="#">precarious</a> for its survival	<a href="#">limited</a>  a <a href="#">substantial</a> rate  <a href="#">precarious</a> for its survival
4 The estimated total number of mature individuals is:	<a href="#">extremely low</a>	<a href="#">very low</a>	<a href="#">low</a>
5 The probability of its extinction in the wild is at least:	50% in the <a href="#">immediate</a> future	20% in the <a href="#">near</a> future	10% in the <a href="#">medium-term</a> future

These criteria define situations in which a risk of extinction in the wild, some time in the future, is deemed to exist for a species (for the purposes of section 179 of the EPBC Act). It is not necessary to identify a quantitative risk of extinction, but it is important to ensure that judgements about the criteria (for example, whether a reduction in numbers represents a severe decline), are made in the context of risk of extinction. For example, the Committee’s consideration of whether a reduction in numbers of a species is ‘severe’ takes into account the relationship between the reduction in numbers and the biological and other factors that are relevant to the species’ risk of extinction in the wild (or, alternatively, the factors relevant to the species’ prospects of survival in the wild).

The table above includes hyperlinks that, when clicked, will take you to indicative thresholds ([Part C](#)) that may be used by the Committee to judge the subjective terms given above. While these are modified from the “IUCN Red List Categories and Criteria Version 3.1, 2001”, it should be noted that the Committee does not strictly apply these, but has regard to them when making judgments about species in terms of their biological contexts, and on a case-by-case basis.

## Part C – Indicative thresholds that may be used by the Committee to judge the subjective terms provided by the criteria for listing (as presented at Part B)

When assessing a species’ eligibility against the listing criteria (see [Part B](#)), the Committee exercises its judgement to give practical meaning to the subjective terms of the criteria. The Committee does this by considering the information provided to it via the nomination form in the context of the species’ biology and relevant ecological factors, and having regard to the degree of complexity and uncertainty associated with that context and the information provided.

The Committee is also informed by, but not bound by, indicative thresholds, which have been adapted from “IUCN Red List Categories and Criteria Version 3.1, 2001”. When considering whether to use these thresholds, the Committee judges whether they are appropriate to the species in question. For example, a relatively long-lived species with slow reproduction and relative population stability (such as most mammals) might be more impacted by, for example, a 30% decline in numbers than might a relatively short-lived species with fast reproduction and naturally fluctuating populations (such as most insects). This consideration of biological attributes is placed in the context of matters such as the relative population size so as to judge whether, for the species in question, a decline is substantial, severe or very severe, for the purposes of the criteria for listing.

When considering thresholds for assessing commercially harvested marine fish, the Committee refers to the Commonwealth Government Harvest Strategy Policy. This policy allows that declines of up to 60% (from pre-fishing biomass levels) are acceptable for commercially harvested fish species where depletion is a managed outcome. Variations in the extent of acceptable decline depend on the biology of the individual species. The Committee is informed, but not bound, by a series of biological reference trigger points (commonly referred to as BLIM and BTARG) provided in the policy for management intervention for species that decline below 60% of their pre-fishing biomass. These interventions include listing assessments.

EPBC Matters considered		Indicative Thresholds		
Reduction in numbers (based on any of A1 – A4)		Very severe	Severe	Substantial
Criterion One	A1. An observed, estimated, inferred or suspected population size reduction over the last 10 years or three generations, whichever is the longer, where the causes of the reduction are clearly reversible AND understood AND ceased, based on (and specifying) any of the following: (a) direct observation (b) an index of abundance appropriate to the taxon (c) a decline in area of occupancy, extent of occurrence and/or quality of habitat (d) actual or potential levels of exploitation (e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites.	≥90%	≥70%	≥50%
	A2. An observed, estimated, inferred or suspected population size reduction over the last 10 years or three generations, whichever is the longer, where the reduction or its causes may not have ceased OR may not be understood OR may not be reversible, based on (and specifying) any of (a) to (e) under A1.	≥80%	≥50%	≥30%
	A3. A population size reduction, projected or suspected to be met within the next 10 years or three generations, whichever is the longer (up to a maximum of 100 years), based on (and specifying) any of (b) to (e) under A1.	≥80%	≥50%	≥30%
	A4. An observed, estimated, inferred, projected or suspected population size reduction over any 10 year or three generation period, whichever is longer (up to a maximum of 100 years in the future), where the time period must include both the past and the future, and where the reduction or its causes may not have ceased OR may not be understood OR may not be reversible, based on (and specifying) any of (a) to (e) under A1.	≥80%	≥50%	≥30%

*Indicative thresholds*

EPBC Matters considered		Indicative Thresholds		
Criterion Two	<p><b>Geographic distribution is precarious</b> for the survival of the species, based on at least two of a – c:</p> <p>a. Severely fragmented or known to exist at a limited location.</p> <p>b. Continuing decline, observed, inferred or projected, in any of the following:</p> <ul style="list-style-type: none"> <li>(i) extent of occurrence</li> <li>(ii) area of occupancy</li> <li>(iii) area, extent and/or quality of habitat</li> <li>(iv) number of locations or subpopulations</li> <li>(v) number of mature individuals.</li> </ul> <p>c. Extreme fluctuations in any of the following:</p> <ul style="list-style-type: none"> <li>(i) extent of occurrence</li> <li>(ii) area of occupancy</li> <li>(iii) number of locations or subpopulations</li> <li>(iv) number of mature individuals</li> </ul>	<p><b>Precariousness</b> is judged on a case-by-case basis, having regard to the degree of threat operating on the species</p>		
	<p><b>Geographic distribution</b> (based on either of B1 or B2)</p> <p>B1. Extent of occurrence estimated to be less than</p> <p>B2. Area of occupancy estimated to be less than</p>	<p><b>Very restricted</b></p> <p>100 km<sup>2</sup></p> <p>10 km<sup>2</sup></p>	<p><b>Restricted</b></p> <p>5,000 km<sup>2</sup></p> <p>500 km<sup>2</sup></p>	<p><b>Limited</b></p> <p>20,000 km<sup>2</sup></p> <p>2,000 km<sup>2</sup></p>
Criterion Three	<p>Estimated <b>total number</b> of mature individuals</p> <p><i>And either of (A) or (B) is true</i></p> <p>(A) <b>Rate</b> of continued decline</p>	<p><b>Very low</b></p> <p>&lt;250</p>	<p><b>Low</b></p> <p>&lt;2,500</p>	<p><b>Limited</b></p> <p>&lt;10,000</p>
	<p><i>OR</i></p> <p>(B) <b>Continued decline</b> and <b>geographic distribution is precarious</b>, based on at least two of a – c:</p> <p>a. Severely fragmented or known to exist at a limited location.</p> <p>b. Continuing decline, observed, inferred or projected, in any of the following:</p> <ul style="list-style-type: none"> <li>(i) extent of occurrence</li> <li>(ii) area of occupancy</li> <li>(iii) area, extent and/or quality of habitat</li> <li>(iv) number of locations or subpopulations</li> <li>(v) number of mature individuals.</li> </ul> <p>c. Extreme fluctuations in any of the following:</p> <ul style="list-style-type: none"> <li>(i) extent of occurrence</li> <li>(ii) area of occupancy</li> <li>(iii) number of locations or subpopulations</li> <li>(iv) number of mature individuals</li> </ul>	<p><b>Very high</b></p> <p>25% in 3 years or 1 generation (up to 100 years), whichever is longer</p>	<p><b>High</b></p> <p>20% in 5 years or 2 generations (up to 100 years), whichever is longer</p>	<p><b>Substantial</b></p> <p>10% in 10 years or 3 generations (up to 100 years), whichever is longer</p>
		<p><b>Precariousness</b> is judged on a case-by-case basis, having regard to the degree of threat operating on the species</p>		

<b>Criterion Four</b>	<p>Estimated <b>total number of mature individuals</b>, based on the following:</p> <p>a. Number of mature individuals only</p>	<b>Extremely low</b> < 50	<b>Very low</b> < 250	<b>Low</b> < 1,000
<b>Criterion Five</b>	<p><b>Probability of extinction</b> in the wild within a period, based on the following:</p> <p>a. Quantitative analysis</p> <p>(Note: probability must be at least 50% for critically endangered, 20% for endangered, 10% for vulnerable)</p>	<b>Immediate future</b> 10 years or three generations, whichever is the longer (up to a maximum of 100 years)	<b>Near future</b> 20 years or five generations, whichever is the longer (up to a maximum of 100 years)	<b>Medium-term future</b> Within 100 years

**Part D – Criteria for listing ecological communities under the  
*Environment Protection and Biodiversity Conservation Act 1999*  
and *Environment Protection and Biodiversity Conservation  
Regulations 2000***

Item	Criterion	Category		
		Critically Endangered	Endangered	Vulnerable
1	Its decline in geographic distribution is:	very severe	severe	substantial
2	Its geographic distribution is: and the nature of its distribution makes it likely that the action of a threatening process could cause it to be lost in:	very restricted	restricted	limited
		the immediate future	the near future	medium term future
3	For a population of a native species that is likely to play a major role in the community, there is a:  to the extent that restoration of the community is not likely to be possible in:	very severe decline	severe decline	substantial decline
		the immediate future	the near future	the medium-term future
4	The reduction in its integrity across most of its geographic distribution is:  as indicated by degradation of the community or its habitat, or disruption of important community processes, that is:	very severe	severe	substantial
		very severe	severe	substantial
5	Its rate of continuing detrimental change is: as indicated by: a rate of continuing decline in its geographic distribution, or a population of a native species that is believed to play a major role in the community, that is: or (b) intensification, across most of its geographic distribution, in degradation, or disruption of important community processes, that is:	very severe	severe	substantial
		very severe	severe	serious
		very severe	severe	serious
6	A quantitative analysis shows that its probability of extinction, or extreme degradation over all of its geographic distribution, is:	at least 50% in the immediate future	at least 20% in the near future	at least 10% in the medium-term future

## **Applying criteria to assess the level of threat to ecological communities - Interpreting specific criteria**

### **Criterion 1. Decline in geographic distribution**

This criterion can refer to a decrease in the total area of the community without a contraction in range, a decrease in the range over the whole or part of the area in which the community originally existed, or fragmentation of the community through a decrease in the size of patches. A decrease sufficient to meet the criterion is considered to be a measurable change whereby: the ecological community has contracted to less than some threshold proportion of its former range; or the total area occupied by the community is less than the threshold proportion of its former area; or where less than the threshold proportion of the former area of the community is in patches of a size sufficiently large or well connected with other patches for them to be likely to persist beyond the *near future*.

Indicative decline thresholds for terrestrial vegetation communities are:

- Critically Endangered = a very severe decline  $\cong$  95% or more
- Endangered = a severe decline  $\cong$  90% or more
- Vulnerable = a substantial decline  $\cong$  70% or more

These thresholds are indicative only; other thresholds might be more appropriate for other kinds of communities (e.g. invertebrate or aquatic communities) or for terrestrial vegetation communities that originally covered a relatively large or a particularly small area.

The application of a specific time frame (such as since 1750) is not considered critical. However, it is important to demonstrate that the ecological community has declined to its present state from some convincingly defined former state.

Where possible, a measurable contraction in distribution should be demonstrated by an appropriate scale of mapping. Where it is not possible to provide precise spatial information on the distribution of an ecological community, particularly at the map scale available (e.g. a very narrow riparian ecosystem), other supporting evidence demonstrating a contraction in distribution may be considered, provided it is supported by independent scientific assessment.

### **Criterion 2. Small geographic distribution coupled with demonstrable threat**

The categories under this criterion provide for the listing of ecological communities that have a small geographic distribution and for which a threatening process exists within an understood or predicted time-frame. The general thrust is to recognise that an ecological community with a distribution that is currently small has an inherently higher risk of extinction if it is subject to a threatening process. This criterion is not likely to be considered for an ecological community which has a naturally small distribution but is not currently subject to any threatening process or likely to be subject to such processes in the foreseeable future. It applies only to ecological communities with distributions that are small on a national scale, taking into account all bioregional occurrences regardless of State boundaries.

Indicative thresholds for identifying terrestrial vegetation communities with small distributions are:

- Very restricted: Total area of occupancy of  $< 10 \text{ km}^2$  (1,000 ha) or total extent of occurrence  $< 100 \text{ km}^2$  (10,000 ha) or patch sizes of generally  $< 0.1 \text{ km}^2$  (10 ha), depending on the particular community. (Communities tend to have a typical range of

patch size that reflects the nature of the habitat and is relevant to their assessment.)

- Restricted: Total area of occupancy of  $<100 \text{ km}^2$  (10,000 ha) or total extent of occurrence  $<1,000 \text{ km}^2$  (100,000 ha), or patch sizes of generally  $< 1 \text{ km}^2$  (100 ha), depending on the particular community.
- Limited: Total area of occupancy of  $<1,000 \text{ km}^2$  (100,000 ha) or total extent of occurrence  $<10,000 \text{ km}^2$  (1,000,000 ha).

The categories are nested: very restricted is a subset of restricted and limited. The thresholds between categories are indicative only; other thresholds might be more appropriate for particular vegetation communities or communities defined by other attributes.

### **Criterion 3. Loss or decline of functionally important species**

This criterion refers to native species that are critically important in the processes that sustain or play a major role in the ecological community, and whose removal has the potential to precipitate change in community structure or function sufficient to lead to the community's eventual extinction (functionally important species). Examples of species that are functionally important in some ecological communities include the dominant seagrass species in a seagrass community or a keystone disperser of fruits, such as the cassowary, in some rainforest communities.

To determine the eligibility of an ecological community under this criterion, there are two linked, inseparable components:

1. the decline of a population of native species that is likely to play a major role in the community; and
2. based on that decline, the specified threshold within which restoration of the community is **not likely** to be possible.

The category for which the ecological community may be eligible for listing under this criterion (Critically Endangered, Endangered or Vulnerable) is dependent on the level of decline of a functionally important species. The community as a whole is only eligible for listing under the appropriate category if it also meets the appropriate timeframe threshold for restoration. If the timeframe threshold is not met, the ecological community is not eligible for listing under any category using this criterion.

In simple terms, this criterion provides timeframes, linked with the severity of decline, in which the decline of the functionally important species must be halted, or reversed, to ensure the continuation of the ecological community.

Basically, if an ecological community had only one key seed disperser, and that key seed disperser was undergoing a very severe decline, then if the species could not be recovered within ten years (the timeframe for critically endangered), the ecological community would be considered critically endangered. If that same key seed disperser was suffering from a substantial decline, instead of a very severe decline, then the species would need to be able to be recovered within 50 years, otherwise it would meet the timeframe for classification as a vulnerable ecological community.

In making an assessment against the criterion, the following steps are followed:

Step 1: determine the level of decline experienced by a population of a functionally important species of that community.

Based on the IUCN species criteria, the TSSC provides the following thresholds as guidance:

- very severe decline: an estimated decline of at least 80% over the last 10 years or three generations, whichever is longer;
- severe decline: an estimated decline of at least 50% over the last 10 years or three generations, whichever is longer; and
- substantial decline: an estimated decline of at least 20% over the last 10 years or three generations, whichever is longer.

Step 2: determine in which category the community **may** be eligible for listing, according to the level of decline determined in step 1:

<b>Level of decline</b>	<b>Category</b>
very severe	Critically Endangered
severe	Endangered
substantial	Vulnerable

Step 3: predict whether restoration of the community is **not likely** to be possible within a certain timeframe. Restoration is defined as the near complete or complete recovery of species composition, structure and ecological processes, with or without active intervention.

The timeframe threshold used to determine eligibility depends on the level of decline of the functionally important species:

If the decline is **very severe**:

the threshold is **immediate future**- the next 10 years, or three generations of any long-lived species believed to play a major role in sustaining the community, whichever is the longer up to a maximum of 60 years.

If the decline is **severe**:

the threshold is **near future**- the next 20 years, or five generations of any long-lived species believed to play a major role in sustaining the community, whichever is the longer up to a maximum of 100 years.

If the decline is **substantial**:

the threshold is **medium-term future**- the next 50 years, or ten generations of any long-lived species believed to play a major role in sustaining the community, whichever is the longer up to a maximum of 100 years.

The criterion is met if the time within which restoration of the ecological community is **not likely** to be possible is longer than the relevant threshold.

In summary, under this criterion a community is eligible for listing:

- as **Critically Endangered** if, for a population of functionally important species there is a very severe decline, to the extent that restoration of the community is not likely to be possible in the immediate future; or
- as **Endangered** if, for a population of functionally important species there is a severe decline, to the extent that restoration of the community is not likely to be possible in the near future; or
- as **Vulnerable** if, for a population of functionally important species there is a substantial decline, to the extent that restoration of the community is not likely to be possible in the

medium-term future.

Example 1, to assess an ecological community for which it is known that a functionally important species has declined by 85% over the past 10 years; and restoration of the community is likely to be possible in 100 years:

Step 1: the level of decline is over 80%, which is a **very severe decline**;

Step 2: based on this decline the community **may be eligible for listing as Critically Endangered**;

Step 3: based on the decline, the timeframe threshold is **immediate future**. Since restoration may be possible in 100 years, it is not likely to be possible in the immediate future (10 years), so the community meets the threshold.

The community therefore meets this criterion for listing as Critically Endangered.

Example 2, to assess an ecological community for which it is known that a functionally important species has declined by 53% over the past 10 years; and restoration is likely to be possible in 17 years.

Step 1: the level of decline is at least 50% and less than 80%, which is a **severe decline**;

Step 2: based on this decline the community **may be eligible for listing as Endangered**;

Step 3: based on the decline, the timeframe threshold is **near future**. Since restoration is likely to be possible in 17 years, it does not meet the threshold, as restoration is likely to be possible in the near future (20 years).

The ecological community therefore does not meet this criterion under any category.

#### **Criterion 4. Reduction in community integrity**

This criterion recognises that an ecological community can be threatened with extinction through on-going modifications that do not necessarily lead to total destruction of all elements of the community. Changes in integrity can be measured by comparison with a benchmark state that reflects, as closely as possible, the natural condition of the community with respect to the composition and arrangement of its abiotic and biotic elements and the processes that sustain them.

The following guidelines apply to particular risk categories:

- Critically Endangered = change in integrity such that *regeneration* is unlikely within the *immediate future*, even with positive human intervention
- Endangered = change in integrity such that *regeneration* is unlikely within the *near future*, even with positive human intervention
- Vulnerable = change in integrity such that *regeneration* is unlikely within the *medium-term future*, even with positive human intervention

[Where *regeneration* is defined as the re-establishment of ecological processes, species composition and community structure within the range of variability exhibited by the original community; and *indicative time frames* associated with extinction risk are as discussed on page 4.]

The first part of this criterion is intended to capture detrimental changes in the identity and number of component species, the relative and absolute abundances of those species and the

state of the abiotic environment that supports them. It includes irretrievable loss of native species and invasion by non-native species, as well as changes in the physical environment sufficient to lead to ongoing change in biota.

It may be helpful to assess the level of degradation using non-biological factors known to support the community and the species most significant in its description. For example, if the species of invertebrates that characterise a cave community have no mechanism to survive desiccation, the complete drying out of the cave could be considered sufficient to cause the extinction of that community.

The second part of this criterion recognises that ecological processes are important to maintain an ecological community (e.g. fire regimes or flooding) and that disruption to those processes can lead to the decline in integrity of the ecological community. This criterion could apply where disruption of processes is evident or imminent (e.g. altered hydrology leading to rising water tables and/or dryland salinity) prior to a measurable decline in integrity of the ecological community. It could also apply where recruitment to the community is known to be disrupted but where long lived species mask immediate community breakdown (e.g. when seedlings of a dominant tree species are not able to persist in the face of grazing by exotic herbivores). Such a criterion allows for recognition of a problem at an early stage.

### **Criterion 5. Rate of continuing detrimental change**

A continuing change refers to a recent, current or projected future change whose causes are either not known or not adequately controlled, and so is liable to continue unless remedial measures are taken. Natural fluctuations will not normally count as a continuing change, but an observed change should not be considered to be part of a natural fluctuation unless there is evidence for this.

This criterion has been divided into an expression of change with two alternative expressions of the indication of that change. In doing this, the TSSC has recognised that the rate of continuing detrimental change occurring in a community is relevant to its risk of extinction independently of any pre-European data. It is difficult to quantify because detrimental change can be manifest in many different ways and adequate data for monitoring change may not be available. The TSSC will have to exercise “ecological judgement” in applying these criteria, nominations should therefore provide as much evidence as possible of the factors affecting decline and how these factors act on the community.

The following rates drawn from the updated IUCN Red List Criteria for species are intended to provide guidance only:

- Critically Endangered  $\cong$  an observed, estimated, inferred or suspected *detrimental change* of at least 80% over the immediate past or projected for the immediate future
- Endangered  $\cong$  an observed, estimated, inferred or suspected *detrimental change* of at least 50% over the immediate past or projected for the immediate future
- Vulnerable  $\cong$  an observed, estimated, inferred or suspected *detrimental change* of at least 30% over the immediate past or projected for the immediate future

Where *detrimental change* may refer to any one of the components of this criterion, i.e. to (a) geographic distribution or populations of critically important species, or (b) degradation or disruption of important processes.

Data to demonstrate this criterion must be documented. They can be in the form of direct measurements of any of the components, actual or potential levels of exploitation, or the known effects of introduced biotic or abiotic elements on any of the components.

## **Criterion 6. Quantitative analysis showing probability of extinction**

This criterion is intended to include any form of analysis that estimates the extinction probability of an ecological community based on known characteristics of important species or other components, habitat requirements, ecological processes, threats and any specified management options. The TSSC has recognised that this is an emerging area of science and will examine any acceptable modelling that may be provided to it. The Committee will use peer review as part of its process for this criterion.

Population Viability Analysis (PVA) is an example of such a technique appropriate for species, but no formal equivalent has been developed for ecological communities. Regardless of their form, quantitative analyses should make full use of all relevant available data. In a situation in which there is limited information, such data as are available can be used to provide an estimate of extinction risk (for example, estimating the impact of stochastic events on habitat). In presenting the results of quantitative analyses, the assumptions (which must be explicitly stated) and the data used must be documented.

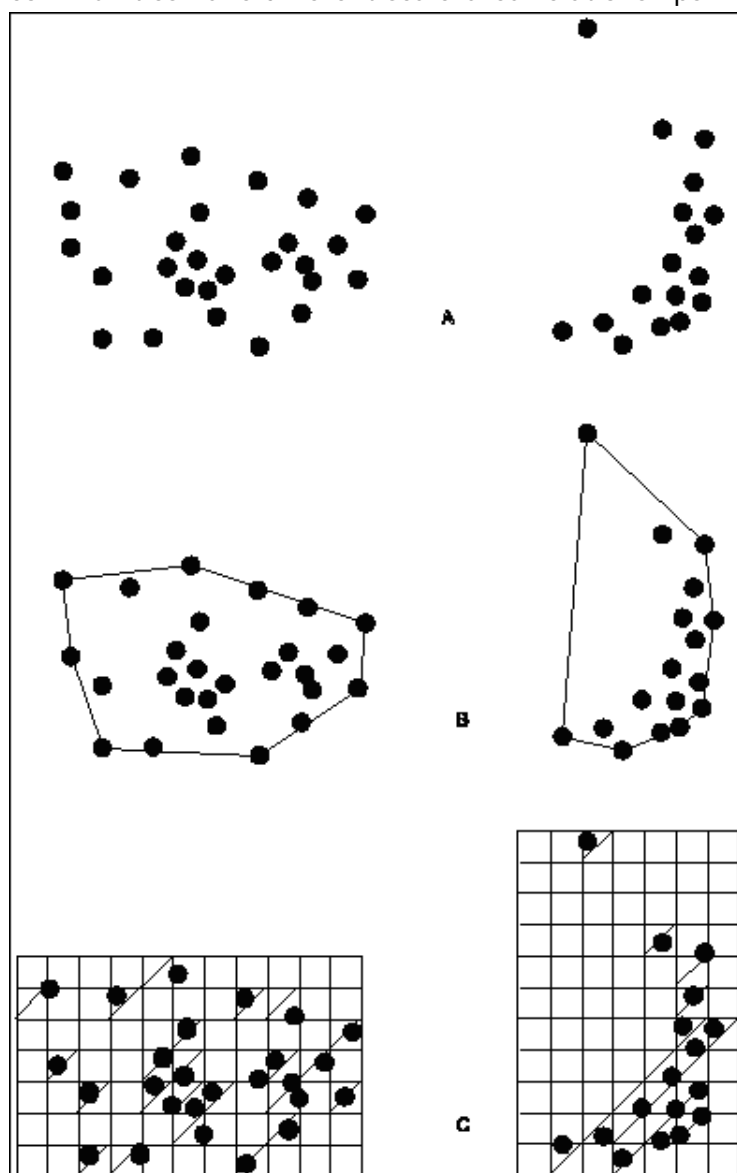
## Part E – Area of occupancy and extent of occurrence

### Extent of occurrence

Extent of occurrence 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 present occurrence of a taxon/ecological community, excluding cases of vagrancy (see [Figure 1](#)). This measure may exclude discontinuities or disjunctions within the overall distributions of taxa/ecological communities (e.g. large areas of obviously unsuitable habitat, see 'area of occupancy' below). Extent of occurrence can often be measured by a minimum convex polygon (the smallest polygon in which no internal angle exceeds 180 degrees and which contains all the sites of occurrence).

### Area of occupancy

Area of occupancy is defined as the area within its 'extent of occurrence' (see above) which is occupied by a taxon/ecological community, excluding cases of vagrancy. The measure reflects the fact that a taxon/ecological community will not usually occur throughout the area of its extent of occurrence, which may contain unsuitable or unoccupied habitats. In some cases (e.g. irreplaceable colonial nesting sites, crucial feeding sites for migratory taxa) the area of occupancy is the smallest area essential at any stage to the survival of existing populations of a taxon/ecological community. The size of the area of occupancy will be a function of the scale at which it is measured, and should be at a scale appropriate to relevant biological aspects of the taxon/ecological community, the nature of threats and the available data. To avoid inconsistencies and bias in assessments caused by estimating area of occupancy at different scales, it may be necessary to standardize estimates by applying a scale-correction factor. It is difficult to give strict guidance on how standardization should be done because different types of taxa/ecological communities have different scale-area relationships.



**Figure 1.** Two examples of the distinction between extent of occurrence and area of occupancy. (A) is the spatial distribution of known, inferred or projected sites of present occurrence. (B) shows one possible boundary to the extent of occurrence, which is the measured area within this boundary. (C) shows one measure of area of occupancy which can be achieved by the sum of the occupied grid squares.