Nomination for listing ecological communities as

critically endangered, endangered or vulnerable

under the NSW *Biodiversity Conservation Act, 2016*

This nomination form contains the following information:

Section 1 – The assessment and listing process

Section 2 – Nomination form including Nominator information and declaration

Section 3 – Definitions

Section 4 – Listing Criteria, References and links to further information

Section 1 – The assessment and listing process

The NSW Threatened Species Scientific Committee (NSW TSSC) assesses the eligibility of ecological communities that are known to occur in NSW, for listing as threatened ecological communities (ie Critically Endangered, Endangered or Vulnerable ecological communities) in the Schedules of the *NSW Biodiversity Conservation Act, 2016* (BC Act). The NSW TSSC also identifies ecological communities that are collapsed ecological communities.

Under the BC Act, the NSW TSSC must initially assess an ecological community’s risk of extinction in Australia. If an ecological community is not threatened at the national scale then the NSW TSSC can assess the extinction risk of the ecological community in NSW. The [BC Act](https://www.legislation.nsw.gov.au/#/view/act/2016/63) and NSW Biodiversity Conservation Regulation, 2017 sets out the criteria used to make these assessments. These criteria are based on the assessment criteria developed by the International Union for Conservation of Nature (IUCN). The guidelines in NSW TSSC (2017) provide information on how the BC Act and regulations listing criteria should be interpreted.

* 1. Common Assessment Method for national assessments

The NSW Government has signed a Memorandum of Understanding (MOU) with the Commonwealth Government and other State and Territory jurisdictions to implement a Common Assessment Method (CAM) of ecological communities using IUCN criteria.

The CAM will ensure there is a consistent approach based on IUCN criteria to assess threatened ecological communities in Australia. Through information sharing and mutual recognition of assessments, national assessments undertaken by one jurisdiction may be accepted by other jurisdictions. This will ensure an ecological community is listed at the same level of extinction risk at both the Commonwealth and State level and reduce the duplication of assessments.

NSW Endemic ecological communities (communities that are historically and currently only found NSW)

Under the CAM MOU, the NSW TSSC will undertake assessments for ecological communities that are endemic to NSW. The Committee may forward your nomination to other people, researchers and organisations to seek advice on the information provided and/or to obtain more information relevant to the assessment and management of the ecological community.

Ecological communities that are not endemic to NSW

Under the CAM MOU the Commonwealth Threatened Species Scientific Committee (CW TSSC) is predominantly responsible for listing and assessing ecological communities that occur in one or more State or Territory jurisdictions in Australia. The CW TSSC may negotiate with NSW and other jurisdictions to determine the lead jurisdiction for a national assessment. Consequently, any nominations for an ecological community that is not endemic to NSW will be referred to the CW TSSC. You may wish to submit your nomination for an ecological community that is not endemic to NSW directly to the CW TSSC.

With the agreement of the Australian Capital Territory Government, NSW may also undertake assessments for ecological communities found in both NSW and the ACT.

State Listings

Under the NSW BC Act, a national assessment must be undertaken for all ecological communities and a State assessment can only be considered if an ecological community is not likely to be nationally threatened.

* 1. Assessment and listing stages
* Where the NSW TSSC has accepted a nomination for assessment the Committee will review the nomination and determine if there is any further information required to assess the ecological community and where to obtain that information.
* After reviewing all the information received the Committee will assess the ecological community against each of the listing criteria. An ecological community must meet at least one of the criteria to be eligible to be listed. By following the CAM, a NSW endemic ecological community that is eligible to be listed under the BC Act may also be listed as a threatened ecological community under the Commonwealth’s *Environment Protection and Biodiversity Conservation (EPBC) Act, 1999*.
* Where an ecological community is eligible for listing, the Committee may forward its preliminary assessment to the CW TSSC for mutual recognition of the assessment. As part of an information sharing agreement in the MOU the nomination including your name, address and contact details may be provided to the CW TSSC.
* The Committee will place a Preliminary Determination on public exhibition for comment. As the nominator, the Committee will advise you when a Preliminary Determination is publicly released.
* Any submissions received during the public exhibition period will be considered by the Committee which will then make a Final Determination to either list the ecological community or reject the listing. As the nominator, the Committee will advise you when a Final Determination is publicly released.
* The ecological community is added to the Schedules of the BC Act when a Final Determination to list the species is published on the NSW legislation website.
	1. Timeframe for assessments

The NSW TSSC is a part-time Committee and prioritises its nominations on an annual basis and within its resource capacity. The Committee’s nomination priorities are available on the Committee’s webpage.

<http://www.environment.nsw.gov.au/committee/HowToNominateASpeciesAsThreatened.htm>

In addition to considering the Committee’s priorities the following factors can affect the assessment time for a nomination:

* The nomination is incomplete or contains only anecdotal information and further information is required from the nominator,
* The ecological community is not endemic to NSW and must be referred to the CW TSSC for a cross jurisdictional national assessment,
* Advice is required from experts and researchers,
* Difficulty locating and accessing unpublished information relevant to the assessment,
* insufficient data, published information or other evidence with supporting information available to assess the ecological community against the criteria.

Assessment can be delayed for one or more of the above reasons. Where information is readily available the assessment and listing process for a NSW endemic ecological community can take from 8 to 12 months. Any delays will extend that timeframe.

* 1. How to complete the nomination form

The criteria for listing threatened ecological communities under the BC Act and Regulations are included in section 4 of this nomination together with some questions to help you provide the information necessary to address the criteria. The criteria are based on IUCN criteria (see section 4) which includes numerical thresholds that will assist with interpreting the BC Regulation listing criteria (see NSW TSSC (2017)). Ecological communities must be assessed by the Committee as meeting at least one of the BC Regulation listing criteria to be eligible for listing as a threatened species.

Complete as much of the nomination as you can. While the Committee will seek advice from other sources, any information not provided in the nomination will delay the assessment process.

Words with an asterisks(\*) are explained in the definitions section (Section 3) and additional information can be found in the Committee’s guidelines in NSW TSSC (2017).

Include references to published journal articles or other material that support the information you have provided. Unsupported or anecdotal information may not provide sufficient evidence to demonstrate the ecological communities meets the criteria for listing.

Do not quote or provide information you have obtained from other people (usually referenced as personal communications) unless you have obtained the agreement of those people to use those statements in the nomination.

Do not provide information you have obtained on a confidential basis or data under a data licence that prohibits its release to other parties unless you have obtained permission to publicly release the confidential information or data.

Ensure you know and agree to how the Committee will use and share your nomination and the information contained in the nomination and any attachments including your personal details by signing the declaration section.

**DO NOT DELETE ANY SECTION OF THE NOMINATION FORM INCLUDING SECTIONS LEFT BLANK**

* 1. Lodgement of nomination

The original, signed hard copy of the nomination can be posted or scanned and a pdf emailed to:

The Chairperson,

NSW Threatened Species Scientific Committee

PO Box 1967

HURSTVILLE BC NSW 1481

Scientific.committee@environment.nsw.gov.au

In addition to the signed copy, completed nominations can also include supporting documentation in WORD, Excel (may be used for data) or PDF formats.

Section 2. Nomination Form

1. **General information**

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| 1.1 Name of the ecological community (use the generally accepted name, if any). Provide any published references for this name |
|       |
| 1.2 Is the ecological community conventionally accepted? (ie, is the ecological community recognised in any scientific literature or research?) |
|       |
| 1.3 Is the ecological community endemic to NSW (ie. is the community only found in NSW)? |
|       |
| 1.4 Has the ecological community been recorded in the following areas? |
| Lord Howe Island:      | Australian Capital Territory:      |
| 1.5 For ecological communities that are not endemic to NSW please list the State or Territories in Australia where the community occurs?  |
|       |
| 1.6 Is the ecological community currently listed under the NSW *Biodiversity Conservation Act, 2016* (or prior legislation ie NSW *Threatened Species Conservation Act, 1995*)? If so what is the threat category?  |
|       |
| 1.7 What is the category for which the ecological community is nominated under the NSW *Biodiversity Conservation Act, 2016*? |
|       |
| 1.8 Is the ecological community currently listed under the Commonwealth *Environment Protection Biodiversity Conservation Act, 1999* (EPBC)? If so what is the threat category? |
|       |

1. **Ecological Community Information**

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| 2.1 Describe the key biological components (main biological features) of the ecological community. Detail the assemblage of species that characterise the ecological community. What species (or taxonomic groups) of plants and animals are dominant, characteristic or diagnostic? Are there any threatened species known from the ecological community?  |
|       |
| 2.2 Explain how the ecological community is distinguished from any other ecological community.  |
|       |
| 2.3 Provide details on the structure of the ecological community. For example, tree, shrub and ground layers in plant communities. |
|       |
| 2.4 Describe any supplementary information that may assist interpretation of the community in the field. For example, relationships of the community to abiotic factors (e.g. the climate, landforms, altitude, hydrological features and substrates). |
|       |
| 2.5 What other ecological communities intergrade with (occur near, and/or may be similar to) the nominated ecological community? |
|       |
| 2.6 Provide details on the key interactions and functional processes that sustain the ecological community (where known). |
|       |
| 2.7 How is the ecological community impacted by and respond to disturbance regimes such as fire, floods, drought, storms? |
|       |
| 2.8 Is there any other information regarding the ecology or biology of the ecological community or its components relevant to a conservation status assessment? |
|       |

1. **Geographic Distribution**

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| 3.1 If possible, please provide a description of the distribution of the nominated ecological community. Include the particular area in which the ecological community occurs. Indicate the Interim Biogeographic Regionalisation of Australia (IBRA) Bioregion(s) and list the Local Government Area(s) in which the ecological community occurs if known (please refer to the definitions and guidelines for ecological communities at the end of this form for more assistance).  |
|       |
| 3.2 Provide a map indicating the current distribution of the nominated ecological community in NSW (information on distribution elsewhere should be provided if available). Provide a map of prior occurrences, if known, and provide references if available. |
|       |
| 3.3 In the table below please document information about the sites where the nominated ecological community occurs.  |
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| --- | --- | --- | --- | --- |
| Site | Land tenure | Date of most recent survey, or record and its source | Description of habitat | Estimate of area of current extent |
|       |       |       |       |       |
|       |       |       |       |       |
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Any other relevant information for these sites? |
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| 3.4 What is the total estimated extent of occurrence (in km2) of the ecological community (see Definition section) |
|       |
| 3.5 What is the total estimated area of occupancy (in km2) of the ecological community (see Definition section) |
|       |
| 3.6 How many locations\* do you consider the ecological community occurs in and why? Note: The term ‘location’ defines “A geographically or ecologically distinct area in which a single threatening event can rapidly affect all occurrences of an ecosystem type.” (Bland et al. 2017).  |
|       |
| 3.7 Has the ecological community been reasonably well surveyed? A description and justification of methods of survey, analysis and inference upon which information supporting the nomination is based (appropriate references are sufficient if available).  |
|       |
| 3.8 Provide a list of records of the ecological community in National Parks and other conservation reserves. |
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1. **Threats**

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| 4.1 Identify past, current and future threats indicating whether they are actual or potential. For each threat describe:a. how and where the threat impacts on this ecological community1. b. what the effect of each threat has been so far (indicate whether it is known or suspected; does it only affect certain sites). Is the threat associated with continuing declines in:

i. the geographic distribution of the community in NSW,ii. the environmental quality of the community in NSW,iii. the biotic interactions of the community in NSW.c. what is the expected effect of each threat in the future (is the threat only suspected; does it only affect certain sites).d. if the threats interact?  |
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| 4.2 Where possible, provide information on threats for each occurrence/site. (use the larger box below if more space is required to describe the threat(s) and its affects.) |

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| --- | --- | --- | --- | --- |
| Threats | Impact on the ecological community  | Sites affected | Is it a past, current or future threat | Current management activities |
|       |       |       |       |       |
|       |       |       |       |       |
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| 4.3 Identify key management documentation for the ecological community e.g. recovery plans, conservation plans, threat abatement plans etc. |
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| 4.4 Are there any Key Threatening Processes (KTPs) affecting the community? (KTPs are listed in Schedule 4 of the BC Act). |
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1. **Reduction in the geographic distribution of the Ecological Community**

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| 5.1 Is there evidence and estimates of the magnitude of past or projected reductions in the ecological community: 1. Since 1750;
2. In the past 50 years;
3. In the future 50 years;
4. Over a 50 year period encompassing the past, present and the future.
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|       |
| 5.2 Is there evidence of fragmentation of the ecological community or habitat? If so, specify the nature and degree of the isolation between habitat patches or remnants of the ecological community. |
|       |

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| 5.3 Are there any biological, abiotic, geographic, human induced or other barriers or processes operating to reduce the size or increase isolation of habitat patches or reduce species movement between remnants of the ecological community? |
|       |

All estimates of reductions need to specify the time period over which they were observed, estimated, inferred or suspected to have occurred, or are projected to occur in future.

1. **Environmental degradation of the Ecological Community**

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| 6.1 Where possible, for each abiotic threat, provide estimates of the severity (the degree of past or future environmental degradation, expressed as a percentage relative to a change large enough to cause ecosystem collapse\*) and extent (how much of the distribution of the ecological community is affected): 1. Since 1750;
2. In the past 50 years;
3. In the future 50 years;
4. Over a 50 year period encompassing both the past and the future.
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1. **Disruption of Biological processes or interactions in the Ecological Community**

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| 7.1 Where possible, for each biotic threat, provide estimates of the severity (the degree of past or future disruption of biological processes or interactions, expressed as a percentage relative to a change large enough to cause ecosystem collapse) and extent (how much of the distribution of the ecological community is affected): 1. Since 1750;
2. In the past 50 years;
3. In the future 50 years;
4. Over a 50 year period encompassing both the past and the future.
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1. **Quantitative analysis of collapse\***

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| 8.1 Is there a quantitative analysis of the probability of collapse\* of the ecological community? If so, please provide details. |
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1. **Appendices and Information sources**

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| 9.1 If you have attached any information to his nomination please list or describe the information below.  |
| Appendix 1 |
| Appendix 2 |

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| 9.2 Has this document been refereed? If so, indicate by whom. |

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Postal Address | Telephone | Email |
|  |  |  |  |
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| 9.3 Document all written sources, published and unpublished. |
|       |

1. **Nominator information**

**Declaration**

I declare that the information in this nomination and any attachments is true and correct to the best of my knowledge.

I permit the NSW Threatened Species Scientific Committee to provide a copy of the nomination and any attachments to other people or organisations for expert comment or advice.

I permit the NSW Threatened Species Scientific Committee to provide location details or data included in the nomination and any attachments to the Office of Environment and Heritage for inclusion in GIS databases managed by OEH, including publicly accessible databases.

I permit the NSW Threatened Species Scientific Committee to use, reproduce, publish, communicate and distribute information contained in the nomination and any attachments, in Committee publications including determinations, assessment reports, documents for public information and on the Committee’s website.

I permit the NSW Threatened Species Scientific Committee to provide a copy of the nomination and any attachments including my name, address and contact details to Commonwealth, State and Territory government agencies and associated committees or other bodies undertaking threatened species and ecological community assessments for those agencies.

Signed:       Date:

|  |
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| 10.1 Nominator’s details |
| Name |       |
| Organisation |       |
| Postal address(required information) |       |
| Email |       |
| Phone |        |

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| 10.2 Do you wish your personal information (ie name, address and contact details) to be regarded as confidential? (Note: information relating to a Body, Organisation or Company are not personal details and may be publicly released) |
|  |

**Please note**: The Committee is subject to the provisions of the Government Information (Public Access) Act 2009 and access to the nomination and any accompanying information may be sought in accordance with that Act.

Section 3 – Definitions

from Bland *et al*. (2017) *Guidelines for the application of IUCN Red List of Ecosystems Categories and Criteria, Version 1.1.* Gland, Switzerland: IUCN. ix + 99pp, and

IUCN Red List of Ecosystems – Definitions of terms: <https://iucnrle.org/work-with-us/definitions-of-terms/>)

**Continuing decline**

A gradual or episodic decline in distribution or ecological process that is likely to continue into the future, and is non-trivial in magnitude and its effect on the sustainability of characteristic native biota.

**Collapse**

Collapse is a transformation of identity, a loss of defining features, and a replacement by a different ecosystem type. Collapse has occurred when all occurrences of an ecosystem have moved outside the natural range of spatial and temporal variability in composition, structure and function. Some or many of the precollapse elements of the system may remain within a collapsed ecosystem, but their relative abundances may differ and they may be organized and interact in different ways with a new set of operating rules. Ecosystem collapse may be viewed as the analogue of functional extinction in species, which precedes or at least coincides with complete elimination of all characteristic biota.

**Collapsed**

An ecosystem is Collapsed when it is virtually certain that its defining biotic or abiotic features are lost from all occurrences, and the characteristic native biota are no longer sustained. Collapse may occur when most of the diagnostic components of the characteristic native biota are lost from the system, or when functional components (biota that perform key roles in ecosystem organisation) are greatly reduced in abundance and lose the ability to recruit.

**Geographic distribution**

Information for the **extent of occurrence** and **area of occupancy** can be found on pages 53 and 54 of:

Bland, L.M., Keith, D.A., Miller, R.M., Murray, N.J. and Rodríguez, J.P. (eds.) (2017).*Guidelines for the application of IUCN Red List of Ecosystems Categories and Criteria, Version 1.1.* Gland, Switzerland: IUCN. ix + 99pp.

**Location** (Threat-defined location)

A geographically or ecologically distinct area in which a single threatening event can rapidly affect all occurrences of an ecosystem type.

**Relative severity**

The estimated magnitude of past or future environmental degradation or disruption to biotic processes, expressed as a percentage relative to a change large enough to cause ecosystem collapse.

References:

Bland, L.M., Keith, D.A., Miller, R.M., Murray, N.J. and Rodríguez, J.P. (eds.) (2017).Guidelines for the application of IUCN Red List of Ecosystems Categories and Criteria, Version 1.1. Gland, Switzerland: IUCN. ix + 99pp.

NSW TSSC (2017) Guidelines for interpreting listing criteria under the Biodiversity Conservation Act.

Further reading and links:

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| --- | --- |
| Atlas of Living Australia | <https://www.ala.org.au/> |
| Australian Fauna Directory | <https://biodiversity.org.au/afd/search/names> |
| Australian Plant Census (APC) | <https://biodiversity.org.au/nsl/services/apc> |
| Commonwealth threatened species and ecological communities | <http://www.environment.gov.au/biodiversity/threatened> |
| Commonwealth Threatened Species Scientific Committee nomination forms | <http://www.environment.gov.au/biodiversity/threatened/nominations/forms-and-guidelines> |
| Intergovernmental memorandum of understanding - Agreement on a common assessment method for listing of threatened species and threatened ecological communities | <http://www.environment.gov.au/biodiversity/threatened/publications/mou-cam> |
| IUCN- Guidelines for the application of IUCN Red List of Ecosystems Categories and Criteria | <https://www.iucn.org/sites/dev/files/content/documents/rle_guidelines_draft_dec_2015.pdf> |
| NSW Biodiversity Conservation Act, 2016 | <https://www.legislation.nsw.gov.au/#/view/act/2016/63> |
| NSW Biodiversity Conservation Regulation, 2017 | <https://www.legislation.nsw.gov.au/#/browse/inForce/regulations/B> |
| NSW BioNet Atlas – Office of Environment and Heritage | <http://www.bionet.nsw.gov.au/> |
| NSW threatened species profiles | <http://www.environment.nsw.gov.au/threatenedSpeciesApp/> |
| NSW TSSC Guidelines for interpreting the listing criteria under the BC Act | <http://www.environment.nsw.gov.au/committee/scientificcommitteepublications.htm> |
| PlantNET – National Herbarium of NSW, Royal Botanic Gardens and Domain Trust | <http://plantnet.rbgsyd.nsw.gov.au/search/simple.htm> |

Section 4 - Criteria for listing critically endangered, endangered and vulnerable ecological communities

The clause numbering follows the clause numbering in the *Biodiversity Conservation Regulation, 2017*.

An ecological community must be assessed by the Committee as meeting at least one of the BC Regulation criteria to be eligible for listing as a threatened ecological community.

The NSW TSSC will assess the information you provide and any available information from other sources against each of these criteria. While you do not have to assess the species against these criteria you should provide as much information as you can that will assist the Committee with addressing these criteria.

Clause 4.9 – Reduction in geographic distribution of ecological community

(This clause relates to IUCN Red List of Ecosystems Criterion A)

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| **The ecological community has undergone or is likely to undergo within a time span appropriate to the life cycle and habitat characteristics of its component species:** |
|  | (a) | for critically endangered ecological communities | a very large reduction in geographic distribution, or |
|  | (b) | for endangered ecological communities | a large reduction in geographic distribution, or |
|  | (c) | for vulnerable ecological communities | a moderate reduction in geographic distribution. |

Clause 4.10 - Restricted geographic distribution of ecological community

(This clause relates to IUCN Red List of Ecosystems Criterion B)

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| **The ecological community’s geographic distribution is**: |
|  | (a) | for critically endangered ecological communities | very highly restricted, or |
|  | (b) | for endangered ecological communities | highly restricted, or |
|  | (c) | for vulnerable ecological communities | moderately restricted, |
| **and at least 1 of the following conditions apply**: |
|  | (d) | there is a projected or continuing decline in any of the following: |
|  |  | (i) | a measure of spatial extent appropriate to the ecological community, |
|  |  | (ii) | a measure of environmental quality appropriate to the characteristic biota of the ecological community, |
|  |  | (iii) | a measure of disruption to biotic interactions appropriate to the characteristic biota of the ecological community, |
|  | (e) | There are threatening processes that are likely to cause continuing decline in either geographic distribution, environmental quality or biotic interactions within the near future, |
|  | (f) | The ecological community exists at: |
|  |  | (i) | for critically endangered ecological communities | an extremely low number of locations, or |
|  |  | (ii) | for endangered ecological communities | a very low number of locations, or |
|  |  | (iii) | for vulnerable ecological communities | a low number of locations. |

Clause 4.11 – Environmental degradation of ecological community

(This clause relates to IUCN Red List of Ecosystems Criterion C)

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| **The ecological community has undergone or is likely to undergo within a time span appropriate to the life cycle and habitat characteristics of its component species:** |
|  | (a) | for critically endangered ecological communities | a very large degree of environmental degradation, or |
|  | (b) | for endangered ecological communities | a large degree of environmental degradation, or |
|  | (c) | for vulnerable ecological communities | a moderate degree of environmental degradation. |

Clause 4.12 – Disruption of biotic process or interactions in ecological community

(This clause relates to IUCN Red List of Ecosystems Criterion D)

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| **The ecological community has undergone or is likely to undergo within a time span appropriate to the life cycle and habitat characteristics of its component species:** |
|  | (a) | for critically endangered ecological communities | a very large disruption of biotic processes or interactions, or |
|  | (b) | for endangered ecological communities | a large disruption of biotic processes or interactions, or |
|  | (c) | for vulnerable ecological communities | a moderate disruption of biotic processes or interactions. |

Clause 4.13 - Quantitative analysis of probability of collapse of ecological community

(This clause relates to IUCN Red List of Ecosystems Criterion E)

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| **The probability of collapse of the ecological community is estimated to be:** |
|  | (a) | for critically endangered ecological community | extremely high, or |
|  | (b) | for endangered ecological community | very high, or |
|  | (c) | for vulnerable ecological community | high. |

Clause 4.14 - Very small number of locations – vulnerable ecological community

(This clause relates to IUCN Red List of Ecosystems Criterion B3)

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| For vulnerable ecological communities,  | the number of locations of the ecological community such that the ecological community is prone to the effects of human activities or stochastic events within in a very short time period. |

IUCN Red List for Ecosystems criteria (IUCN 2016. *An Introduction to the IUCN Red List of Ecosystems: The Categories and Criteria for Assessing Risks to Ecosystems*. Gland, Switzerland: IUCN. vi + 14pp.)

**Criterion A. Reduction in geographic distribution:** A decline in geographic distribution influences its risk of collapse by (i) reducing the ability of an ecosystem to sustain its characteristic native biota; and (ii) predisposing it to additional threats. On-going declines in distribution lead to the loss of characteristic native biota occurs through a combination of reduced carrying capacity, reduced niche diversity, spatial separation of resources, and increased susceptibility to competition, predation and threats. The rate of decline in an ecosystem indicates its speed towards collapse.

**Criterion B. Restricted geographic distribution:** The extent of geographic distribution of an ecosystem influences its risk of collapse when exposed to spatial threats, for example invasive species, pollution, and climate change. The primary role of criterion B is to identify ecosystems whose distribution is so spatially restricted (confined to a small area) that they are at risk of collapse from the chance occurrence of a single or few threatening events, for example invasive species or fire. Ecosystems that are widely distributed, existing across multiple independent patches are at lower risk from spatial threats.

**Criterion C Environmental degradation:** Abiotic degradation is the deterioration of the physical, non-living attributes that have a defining role in ecosystem-specific characteristics (e.g. specific ecological processes and/or the distribution of an ecosystem). Abiotic degradation reduces the capacity of an ecosystem to sustain its biota and ecological processes, e.g. shifts in fire regimes, environmental flows, and climatic conditions.

**Criterion D. Disruption of biotic processes and interactions:** Biodiversity loss reduces the capacity of ecosystems to capture resources, produce biomass, decompose organic matter and recycle carbon, water and nutrients. The diversity of organisms contributes to ecosystem functions. Disruptions to biotic and abiotic processes and interactions can cause collapse, regime shifts and re-organisation towards novel ecosystems.

**Criterion E. Quantitative risk analysis:** This is an analysis that takes into account potential changes and identifies scenarios to help forecast possible outcomes for ecosystems over time to estimate the probability of ecosystem collapse. This is done through a quantitative model of ecosystem functions to: a) incorporate multiple threats and interactions; b) provide a synthetic view of processes captured in other criteria; and c) forecast ecosystem status under different scenarios.

