Nominating a species, population, ecological community or Key Threatening Process under the NSW *Biodiversity Conservation Act 2016:* Background Information

In New South Wales (NSW) species, populations, ecological communities and Key Threatening Processes are listed in the Schedules of the NSW *Biodiversity Conservation Act 2016* or the *Fisheries Management Act 1994*. The committees responsible for listing in the Schedules of the NSW *Biodiversity Conservation Act 2016* is the NSW Threatened Species Scientific Committee, and in the Schedules of the *Fisheries Management Act 1994* is the NSW Fisheries Scientific Committee.

The threatened species provisions of the *Fisheries Management Act 1994* cover all fish (freshwater, estuarine and marine), aquatic invertebrates and marine plants. For the purposes of the *Fisheries Management Act 1994*, the following definitions are used:

- "*Fish*" means any marine, estuarine or freshwater fish or other aquatic animal (e.g., oysters, prawns, sharks, rays, starfish, insects and worms), at any stage of their life history. It does not include whales, mammals, birds, reptiles and amphibians.
- "*Marine vegetation*" means any species of plant that, at any time in its life, must inhabit water, other than freshwater. This includes seagrasses, mangroves and marine algae.

The NSW *Biodiversity Conservation Act 2016* covers the remaining species and ecological communities found in NSW and is the subject of this document.

Section 1: Assessment and listing process

The NSW Threatened Species Scientific Committee (NSW TSSC) assesses the eligibility of species, populations and ecological communities that are known to occur in NSW, for listing as threatened (i.e. Critically endangered, Endangered or Vulnerable) in the Schedules of the NSW *Biodiversity Conservation Act 2016* (BC Act). The NSW TSSC also identifies species that are Extinct or Extinct in the wild and Key Threatening Processes (defined under the BC Act).

Under the BC Act, the NSW TSSC must initially assess a community's/species' risk of extinction in Australia. If a community/species is not threatened at the national scale, then the NSW TSSC can assess the extinction risk of the community/species in NSW. The BC Act and NSW *Biodiversity Conservation Regulation 2017* set 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 of the NSW TSSC (2018) provide information on how the BC Act and Regulations listing criteria should be interpreted.

The NSW TSSC may also consider changes to the listing status of species, populations and ecological communities that are currently on the Schedules of the BC Act (e.g. moving from a category of higher threat to lower threat and vice versa, or delisting) where an assessment against the criteria warrants a change to the current status.

While the NSW TSSC may list threatened populations, a population of a species is only eligible for listing if the species is not separately listed as a threatened species on Schedule 1 of the NSW BC Act. In addition, the population must be, in the opinion of the Scientific Committee, of significant conservation value based on its role in the conservation of the species or a number of other species.

The NSW TSSC may list a key threatening process if it adversely affects threatened species or ecological communities, or it could cause species or ecological communities that are not threatened to become threatened (see Part 4, Division 5 of the BC Act).

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) for the listing of threatened species and ecological communities. It is based on the best practice developed by IUCN, as used in the Red List criteria for Threatened Species and the Red List criteria for Ecosystems.

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

More information on the Common Assessment Method can be found on the Commonwealth Government's website see CAM in Further Reading).

NSW endemic species (species that are historically and currently only found NSW)

Under the CAM MOU, the NSW TSSC will undertake assessments for species that are endemic to NSW. The NSW TSSC 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 species.

Species that are not endemic to NSW

Under the CAM MOU, the Commonwealth Threatened Species Scientific Committee (CTSSC) is predominantly responsible for listing and/or assessing species that occur in more than one State or Territory jurisdiction in Australia. The CTSSC works under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The CTSSC may negotiate with NSW and other jurisdictions to determine the lead jurisdiction for a national assessment. Consequently, any nominations for a species that is not endemic to NSW will be referred to the CTSSC. You may wish to submit your nomination for species that are not endemic to NSW directly to the CTSSC.

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

State Listings for non-endemic species

Under the NSW BC Act, a national assessment must initially be undertaken for all species and a state assessment can only be considered if a species is not likely to be nationally threatened.

Overview of the Nomination Process

The BC Act encourages community involvement in the protection of threatened species, populations and ecological communities, and identification of key threatening processes. Anyone can propose changes to the lists of threatened species and ecological communities in the Schedules of the BC Act. The procedure is as follows:

1. A person or organisation sends a nomination to the NSW TSSC. Nomination forms are available at http://www.environment.nsw.gov.au/committee/HowToNominateASpeciesAsThreatened.htm

Forms are available to:

- nominate a species to be added to the threatened species list.
- nominate an ecological community to be added to the threatened ecological community list.
- nominate a change in threat status of a listed species or ecological community (use the form for listing a species or ecological community).
- nominate a species to be removed from the threatened species list.
- nominate a population to be added to the threatened species list.

- nominate a key threatening process.
- nominate a species to be added to the extinct species list (covers both extinct and extinct in the wild).

2. The NSW TSSC will review the nomination and determine if there is any further information required for the assessment and where to obtain that information.

3. After reviewing all the information received, the NSW TSSC will assess the ecological community/species against each of the listing criteria in the BC Regulations. A community/species must meet at least one of the criteria to be eligible to be listed.

4. The NSW TSSC will then make a preliminary determination to either support or not support the proposal. A preliminary determination will be made if: an ecological community/species currently considered to be non-threatened is eligible for listing; the listed status of the ecological community/species should be changed as a result of the review (e.g., from Endangered to Vulnerable or vice versa); or if a threatened ecological community/species is found to no longer meet the listing criteria.

By following the CAM, NSW endemic species that are eligible to be listed under the BC Act may also be listed as threatened species under the Commonwealth EPBC Act. The NSW TSSC may forward its preliminary assessment to the Commonwealth Threatened Species Scientific Committee (CTSSC) 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 CTSSC.

5. The preliminary determination is then placed on public exhibition for a period of at least 30 days. As the nominator, the NSW TSSC will advise you when a preliminary determination is publicly released. During the public exhibition period, members of the public, government bodies, etc can send submissions about the determination to the NSW TSSC.

6. Any submissions received during the public exhibition period will be considered by the NSW TSSC which will then make a final determination to list the community/species, change the listed status of the community/species, or reject the proposed listing or delisting. As the nominator, the NSW TSSC will advise you when a final determination is publicly released.

7. The Schedules of the BC Act are amended to reflect the outcome when the final determination is published on the NSW legislation website. The final determination is also published on the Office of the Environment and Heritage website.

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 NSW TSSC's nomination priorities are available on it's webpage (see Further Reading).

In addition to considering the priorities for the NSW TSSC 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 species in not endemic to NSW and must be referred to the CTSSC and other jurisdictions for a 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 species against the criteria,
- Conflicting or complex advice is received as a result of consultation.

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 species can take from 8 to 12 months. Any delays will extend that timeframe.

1.1 How to complete the nomination form

Nomination forms consist of a series of questions to help you provide the information necessary to address the criteria in the BC Act. Note, terms used in the nomination form and marked with asterisk (*) are defined in section 5 of the NSW TSSC Nomination Background Information document.

The NSW TSSC recognises that completing a nomination form is demanding due to the volume and detail of information that is required to undertake an assessment. Nominators are encouraged to seek expert advice where appropriate to assist in the completion of the nomination form. Complete as much of the nomination as you can. While the NSW TSSC will seek advice from other sources, any information not provided in the nomination will delay the assessment process.

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 species meets the criteria for listing.

If there is insufficient information to enable details to be provided because of a lack of scientific data or analysis please include any information that is available or provide a statement next to the relevant question identifying that the data or analysis is not available.

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.

Indicate if you are providing information you have obtained on a confidential basis or data under a data licence that prohibits its release to other parties and if you have obtained permission to publicly release the confidential information or data.

Ensure you know and agree to how the NSW TSSC 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 of the nomination form. If you request confidentiality please ensure you have not included your personal information, or any information that can be used to identify you, in the nomination or attachments.

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

Privacy information

The information you provide in this nomination form will be used by the NSW TSSC in the assessment to determine the conservation status and listing or delisting of threatened or extinct species and threatened or collapsed ecological communities.

The NSW TSSC 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 species.

The NSW Government has agreed with the Commonwealth and other state and territory governments to collaborate on national threatened species assessments using a common assessment method. Your nomination, including your details as nominator, may be provided to state and territory government agencies and scientific committees as part of this collaboration unless you have requested that your personal information be treated as confidential and you have not included your personal information in the nomination or attachments.

Individuals can access their personal information or request a correction of personal information held by the NSW TSSC by contacting the NSW TSSC's Executive Officer.

The NSW TSSC has adopted the procedures set out in the DPE Cluster Privacy Management Plan (PMP). The PMP defines personal information and provides details about the privacy principles that the NSW TSSC follows when dealing with personal information.

Section 2: Criteria for listing Critically Endangered, Endangered and Vulnerable species/populations under the NSW Biodiversity Conservation Act (BC Act)

For a species to be found eligible to be listed on Schedule 1 of the BC Act, the NSW Threatened Species Scientific Committee (NSW TSSC) must demonstrate that the species meets Clause 4.3 and 4.4 of Part 4 Division 2 of the BC Act, and at least one of Clauses 4.2-4.7 of Part 4 of the NSW Biodiversity Conservation Regulation 2017.

To delist a species, the species must not meet any of the eligibility clauses. Note (except in cases of erroneous original classifications and taxonomy issues) a species can be moved from a higher level of threat to a lower level when it does not meet the higher category thresholds for a period of five years (see IUCN (2017) section 2.2.1 for more information).

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

A population of a species is also assessed using the clauses of the BC Act Regulation (NSW TSSC 2017). However, a population of a species is not eligible to be listed as a threatened species under any of the criteria specified in Clauses 4.2 to 4.7 unless it meets the additional Clause 4.1(5):

(a) the species to which the population belongs is not separately listed as a threatened species in the Schedules of the BC Act; and

(b) the population is, in the opinion of the NSW TSSC, of significant conservation value based on its role in the conservation of the species or a number of other species.

The BC Regulation criteria in Clauses 4.2-4.7 are based on IUCN (2001) Red List criteria. The Red List criteria have numerical thresholds (see IUCN summary table below). Assistance with the interpretation of the BC Regulation criteria and the IUCN numerical thresholds is provided in the NSW TSSC Guidelines (NSW TSSC 2018).

The clauses for assessing a species or population under the *Biodiversity Conservation Regulation 2017* (BC Regulation) are as follows:

Clause 4.2 – Reduction in population size of species

(Equivalent to IUCN Criterion A)

(1) - The species has undergone or is likely to undergo within a time frame appropriate to the life cycle and habitat characteristics of the taxon:			
	(a)	for critically endangered species	a very large reduction in population size, or
	(b)	for endangered species	a large reduction in population size, or
	(c)	for vulnerable species	a moderate reduction in population size.
(2) - The determination of that criteria is to be based on any of the following:			
	(a)	direct observation,	
	(b)	an index of abundance appropriate to the taxon,	
	(c)	a decline in the geographic distribution or habitat quality,	
	(d)	the actual or potential levels of exploitation of the species,	
	(e)	the effects of introduced taxa, hybridisation, pathogens, pollutants, competitors or parasites.	

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Clause 4.3 - Restricted geographic distribution of species and other conditions

(Equivalent to IUCN Criterion B)

The geographic distribution of the species is:				
	(a)	for critically endangered species		very highly restricted, or
	(b)	for endangered species		highly restricted, or
	(c)	for vulnerable species		moderately restricted,
and at least 2 of the following 3 conditions apply:				
	(d)	the population or habitat of the species is severely fragmented or nearly all the mature individuals of the species occur within a small number of locations,		
	(e)	there is a projected or continuing decline in any of the following:		
		(i)	an index of abundance appropriate to the taxon,	
		(ii)	the geographic distribution of the species,	
		(iii)	habitat area, extent or quality,	
		(iv)	the number of locations in which the species occurs or of populations of the species,	
	(f)	extreme fluctuations occur in any of the following:		
		(i)	an index of abundance appropriate to the taxon,	
		(ii)	the geographic distribution of the species,	
		(iii)	the number of locations in which the species occur or of populations of the species.	

Clause 4.4 - Low numbers of mature individuals of species and other conditions

(Equivalent to IUCN Criterion C)

The estimated total number of mature individuals of the species is:						
	(a)	for critically endangered species			very low, or	
	(b)	for endangered species			low, or	
	(c)	for vulnerable species			moderately low,	
and either of the following 2 conditions apply:						
	(d)	a continuing decline in the number of mature individuals that is (according to an index of abundance appropriate to the species):				
		(i)	for critically endangered species		very large, or	
		(ii)	for endangered species		large, or	
		(iii)	for vulnerable species		moderate,	
	(e)	both of the following apply:				
		(i)	a continuing decline in the number of mature individuals (according to an index of abundance appropriate to the species), and			
		(ii)	at least one of the following applies:			
			(A)	the number of individuals in each population of the species is:		
				(I)	for critically endangered species	extremely low, or
				(II)	for endangered species	very low, or
				(III)	for vulnerable species	low,
			(B)	all or nearly all mature individuals of the species occur within one population,		
			(C)	extreme fluctuations occur in an index of abundance appropriate to the species.		

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Clause 4.5 - Low total numbers of mature individuals of species

(Equivalent to IUCN Criterion D)

The total number of mature individuals of the species is:			
	(a)	for critically endangered species	extremely low, or
	(b)	for endangered species	very low, or
	(c)	for vulnerable species	low.

Clause 4.6 - Quantitative analysis of extinction probability

(Equivalent IUCN Criterion E)

The probability of extinction of the species is estimated to be:			
	(a)	for critically endangered species	extremely high, or
	(b)	for endangered species	very high, or
	(c)	for vulnerable species	high.

Clause 4.7 - Very highly restricted geographic distribution of species–vulnerable species (Equivalent to IUCN Criterion D2)

For vulnerable species,	the geographic distribution of the species or the number of locations of the species is very highly restricted such that the species is prone to the effects of human activities or stochastic events within a very short time period.

IUCN Red List Criteria for Species (Source: IUCN (2017))

A. Population size reduction Population reduction (measured over the longer of 10 years or 3 generations) based on any of A1 to A4			
	Critically Endangered	**Endangered**	**Vulnerable**
A1	**≥ 90%**	**≥ 70%**	**≥ 50%**
A2, A3, A4	**≥ 80%**	**≥ 50%**	**≥ 30%**

A1 Population reduction observed, estimated, inferred or suspected in the past and the causes of the reduction are clearly reversible AND understood AND ceased.

A2 Population reduction observed, estimated, inferred or suspected in the past where the causes of the reduction may not have ceased OR may not be understood OR may not be reversible.

A3 Population reduction, projected or suspected to be met in the future (up to a maximum of 100 years) [(*a) cannot be used for A3*]

A4 An observed, estimated, inferred, projected or suspected population reduction where the time period must include both the past and the future (up to a max. of 100 years in future), and where the causes of reduction may not have ceased OR may not be understood OR may not be reversible.

based on any of the following

(a) direct observation [*except A3*]

(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

B. Geographic range in the form of either B1 (extent of occurrence) AND/OR B2 (area of occupancy)			
	Critically Endangered	**Endangered**	**Vulnerable**
B1. Extent of occurrence (EOO)	**< 100 km²**	**< 5,000 km²**	**< 20,000 km²**
B2. Area of occupancy (AOO)	**< 10 km²**	**< 500 km²**	**< 2,000 km²**
AND at least 2 of the following 3 conditions:			
(a) Severely fragmented OR Number of locations	**= 1**	**≤ 5**	**≤ 10**
(b) Continuing decline observed, estimated, inferred or projected in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) area, extent and/or quality of habitat; (iv) number of locations or subpopulations; (v) number of mature individuals			
(c) Extreme fluctuations in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) number of locations or subpopulations; (iv) number of mature individuals			

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C. Small population size and decline				
		Critically Endangered	**Endangered**	**Vulnerable**
Number of mature individuals		**< 250**	**< 2,500**	**< 10,000**
AND at least one of (C1) or (C2)				
C1	An observed, estimated or projected continuing decline of at least (up to a max. of 100 years in future)	**25% in 3 years or 1 generation (whichever is longer)**	**20% in 5 years or 2 generation (whichever is longer)**	**10% in 10 years or 3 generations (whichever is longer)**
C2	An observed, estimated, projected or inferred continuing decline AND at least 1 of the following 3 conditions:			
(a)	(i) Number of mature individuals in each subpopulation	**≤ 50**	**≤ 250**	**≤ 1,000**
	(ii) % of mature individuals in one subpopulation =	**90 – 100%**	**95 – 100%**	**100%**
(b)	Extreme fluctuations in the number of mature individuals			

D. Very small or restricted population			
	Critically Endangered	**Endangered**	**Vulnerable**
D. Number of mature individuals	**< 50**	**< 250**	**D1. < 1,000**
D2. Only appies to the VU category Restricted area of occupancy or number of locations with a plausible future threat that could drive the taxon to CR or EX in a very short time	–	–	**D2. Typically: AOO < 20 km^2 or number of locations ≤ 5**

E. Quantitative Analysis			
	Critically Endangered	**Endangered**	**Vulnerable**
Indicating the probability of extinction in the wild to be:	**≥ 50% in 10 years or 3 generations, whichever is longer (100 years max.)**	**≥ 20% in 20 years or 5 generations, whichever is longer (100 years max.)**	**≥ 10% in 100 years**

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Section 3: Criteria for listing Critically Endangered, Endangered and Vulnerable ecological communities under NSW Biodiversity Conservation Act (BC Act)

Under the BC Act an ecological community is defined as an assemblage of species occupying a particular area. For an ecological community to be found eligible to be listed on Schedule 2 of the BC Act, the NSW Threatened Species Scientific Committee (NSW TSSC) must demonstrate that the ecological community meets Clause 4.5 of Part 4 Division 2 of the BC Act, and at least one of Clauses 4.9-4.14 of Part 4 of the NSW Biodiversity Conservation Regulation 2017. The criteria are based on IUCN (2016) Red List of Ecosystems criteria. These Red List criteria have numerical thresholds (see IUCN summary table below). Assistance with the interpretation of the BC Regulation criteria and the IUCN numerical thresholds is provided in the NSW TSSC Guidelines (NSW TSSC 2018).

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 ecological community against these criteria you should provide as much information in the nomination form as you can that will assist the NSW TSSC with addressing these criteria.

In order to assess the status of the ecological community, the NSW TSSC will need to know how the name and definition of the ecological community were derived. If the ecological community has previously been defined in the literature, details of the appropriate references should be provided. If the data are unpublished, information on how the data were collected and analysed should be provided.

There is no complete list of names of ecological communities in NSW. If the name applied to the nominated ecological community has been used previously, please provide any references to appropriate literature for this community. Are the published name and the definition of the ecological community identifiably the same as the ecological community in the nomination? If not, what are the differences? If the name has not been used previously, the reason for the choice of name should be provided.

Information of how the ecological community can be differentiated from adjacent or related ecological communities and the range of variation encompassed by the concept of the nominated ecological community, should also be included.

Additional information intended to aid recognition of this community in the field, such as information on environmental attributes of the ecological community (i.e., structure, habitat, position in landscape etc) should be provided.

The clauses for assessing an ecological community under the *Biodiversity Conservation Regulation 2017* (BC Regulation) are as follows:

Clause 4.9 – Reduction in geographic distribution of ecological community

(Equivalent to IUCN Red List of Ecosystems Criterion A)

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.

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Clause 4.10 - Restricted geographic distribution of ecological community

(Equivalent to IUCN Red List of Ecosystems Criterion B)

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

(Equivalent to IUCN Red List of Ecosystems Criterion C)

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

(Equivalent to IUCN Red List of Ecosystems Criterion D)

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.

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

(Equivalent to IUCN Red List of Ecosystems Criterion E)

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

(Equivalent to IUCN Red List of Ecosystems Criterion B3)

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.

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IUCN Red List for Ecosystems criteria (Source: IUCN 2016).

Criterion A. Reduction in geographic distribution over **ANY** of the following time periods:

	A1. the past 50 years	A**2a.** the next 50 years	**A2b** any 50 year period including past, present and future	**A3**. since 1750
CR	≥ 80%	≥ 80%	≥ 80%	≥ 90%
EN	≥ 50%	≥ 50%	≥ 50%	≥ 70%
VU	≥ 30%	≥ 30%	≥ 30%	≥ 50%

Criterion B. Restricted geographic distribution indicated by **ANY** OF B1, B2 or B3:

B1. Extent of a minimum convex polygon enclosing all occurrences (extent of occurrence, EOO) is no larger than:

CR	2,000km^2	**AND** at least one of the following (a-c):	(a) An observed or inferred continuing decline in **ANY OF**: i. a measure of spatial extent appropriate to the ecosystem; **OR** ii. a measure of environmental quality appropriate to characteristic biota of the ecosystem; **OR** iii. a measure of disruption to biotic interactions appropriate to the characteristic biota of the ecosystem. (b) Observed or inferred threatening processes that are likely to cause continuing declines in geographic distribution, environmental quality or biotic interactions within the next 20 years. (c) Ecosystem exists at 1 threat-defined location
EN	20,000km^2	**AND** at least one of the following (a-c):	(a) An observed or inferred continuing decline in **ANY OF**: i. a measure of spatial extent appropriate to the ecosystem; **OR** ii. a measure of environmental quality appropriate to characteristic biota of the ecosystem; **OR** iii. a measure of disruption to biotic interactions appropriate to the characteristic biota of the ecosystem. (b) Observed or inferred threatening processes that are likely to cause continuing declines in geographic distribution, environmental quality or biotic interactions within the next 20 years. (c) Ecosystem exists at ≤ 5 threat-defined locations
VU	50,000km^2	**AND** at least one of the	(a) An observed or inferred continuing decline in **ANY OF**: i. a measure of spatial extent appropriate to the ecosystem; **OR**

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		following (a-c):	ii. a measure of environmental quality appropriate to characteristic biota of the ecosystem; **OR** iii. a measure of disruption to biotic interactions appropriate to the characteristic biota of the ecosystem. (b) Observed or inferred threatening processes that are likely to cause continuing declines in geographic distribution, environmental quality or biotic interactions within the next 20 years. (c) Ecosystem exists at ≤10 threat-defined locations

B2. The number of 10 x 10 km grid cells occupied (area of occupancy, AOO) is no more than:

CR	2	**AND** at least one of the following (a-c):	(a) An observed or inferred continuing decline in **ANY OF**: i. a measure of spatial extent appropriate to the ecosystem; **OR** ii. a measure of environmental quality appropriate to characteristic biota of the ecosystem; **OR** iii. a measure of disruption to biotic interactions appropriate to the characteristic biota of the ecosystem. (b) Observed or inferred threatening processes that are likely to cause continuing declines in geographic distribution, environmental quality or biotic interactions within the next 20 years. (c) Ecosystem exists at 1 threat-defined location
EN	20	**AND** at least one of the following (a-c):	(a) An observed or inferred continuing decline in **ANY OF**: i. a measure of spatial extent appropriate to the ecosystem; **OR** ii. a measure of environmental quality appropriate to characteristic biota of the ecosystem; **OR** iii. a measure of disruption to biotic interactions appropriate to the characteristic biota of the ecosystem. (b) Observed or inferred threatening processes that are likely to cause continuing declines in geographic distribution, environmental quality or biotic interactions within the next 20 years. (c) Ecosystem exists at ≤ 5 threat-defined locations
VU	50	**AND** at least one of	(a) An observed or inferred continuing decline in **ANY OF**:

		the following (a-c):	i. a measure of spatial extent appropriate to the ecosystem; **OR** ii. a measure of environmental quality appropriate to characteristic biota of the ecosystem; **OR** iii. a measure of disruption to biotic interactions appropriate to the characteristic biota of the ecosystem. (b) Observed or inferred threatening processes that are likely to cause continuing declines in geographic distribution, environmental quality or biotic interactions within the next 20 years. (c) Ecosystem exists at ≤10 threat-defined locations

B3. The number threat-defined locations is:

VU	Very small (generally fewer than 5) **AND** prone to the effects of human activities or stochastic events within a very short time period in an uncertain future, and thus capable of Collapse or becoming Critically Endangered within a very short time period (B3 can only lead to a listing as VU).

Criterion C. Environmental degradation over ANY of the following time periods:

C1. The past 50 years, based on change in an abiotic variable affecting a fraction of the extent of the ecosystem and with relative severity, as indicated by the following table:

Extent (%)	Relative severity (%) ≥ 80	≥ 50	≥ 30
≥ 80	**CR**	**EN**	**VU**
≥ 50	**EN**	**VU**	
≥ 30	**VU**		

C2a. The next 50 years, based on change in an abiotic variable affecting a fraction of the extent of the ecosystem and with relative severity, as indicated by the following table; **OR**

C2b. Any 50-year period including the past, present and future, based on change in an abiotic variable affecting a fraction of the extent of the ecosystem and with relative severity, as indicated by the following table:

Extent (%)	Relative severity (%) ≥ 80	≥ 50	≥ 30
≥ 80	**CR**	**EN**	**VU**
≥ 50	**EN**	**VU**	
≥ 30	**VU**		

C3. Since 1750, based on change in an abiotic variable affecting a fraction of the extent of the ecosystem and with relative severity, as indicated by the following table:

Extent (%)	Relative severity (%) ≥ 90	≥ 70	≥ 50
≥ 90%	**CR**	**EN**	**VU**
≥ 70%	**EN**	**VU**	
≥ 50%	**VU**		

Criterion D. Disruption of biotic processes or interactions over ANY of the following time periods

D1. The past 50 years, based on change in a biotic variable affecting a fraction of the extent of the ecosystem and with relative severity, as indicated by the following table:

Extent (%)	Relative severity (%) ≥ 80	≥ 50	≥ 30
≥ 80	CR	EN	VU
≥ 50	EN	VU	
≥ 30	VU		

D2a. The next 50 years, based on change in a biotic variable affecting a fraction of the extent of the ecosystem and with relative severity, as indicated by the following table; **OR**

D2b. Any 50-year period including the past, present and future, based on change in a biotic variable affecting a fraction of the extent of the ecosystem and with relative severity, as indicated by the following table:

Extent (%)	Relative severity (%) ≥ 80	≥ 50	≥ 30
≥ 80	CR	EN	VU
≥ 50	EN	VU	
≥ 30	VU		

D3. Since 1750, based on change in a biotic variable affecting a fraction of the extent of the ecosystem and with relative severity, as indicated by the following table:

Extent (%)	Relative severity (%) ≥ 90	≥ 70	≥ 50
≥ 90%	CR	EN	VU
≥ 70%	EN	VU	
≥ 50%	VU		

Criterion E. Quantitative analysis that estimates the probability of ecosystem collapse to be:

CR	≥ 50% within 50 years
EN	≥ 20% within 50 years
VU	≥ 10% within 50 years

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 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: The persistence of biota within ecosystems depends on biotic processes and interactions. This includes: competitive, predatory, facilitatory, mutualistic, trophic and pathogenic processes; mobile links (e.g. seasonal migration); and species invasions. 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.

Section 4: The criteria for listing key threatening processes are in Part 4, Division 5, 4.32 of the NSW Biodiversity Conservation Act (BC Act)

(1) A key threatening process is eligible to be listed as a ***key threatening process*** if, in the opinion of NSW Threatened Species Scientific Committee (NSW TSSC):

(a) it adversely affects threatened species or ecological communities, or

(b) it could cause species or ecological communities that are not threatened to become threatened.

Section 5: Definitions

See the NSW TSSC Listing Guidelines (NSW TSSC 2018) for more details.

Animal: any animal whether vertebrate or invertebrate and in any stage of biological development but not including humans or fish within the meaning of Part 7A of the *Fisheries Management Act 1994.* Note, to be eligible to be listed as threatened under the NSW BC Act 2016, an animal must be native to New South Wales or known to periodically or occasionally migrate to New South Wales.

Continuing decline (species and populations): For species and populations a continuing decline is "a recent, current or projected future decline (which may be smooth, irregular or sporadic) which is liable to continue unless remedial measures are taken. Fluctuations will not normally count as continuing declines, but an observed decline should not be considered as a fluctuation unless there is evidence for this." (IUCN 2001). Note that continuing declines at any rate can be used to qualify taxa under Clause 4.3 or 4.4 of the BC Regulation 2017.

Continuing decline (ecological communities): For ecological communities, a continuing decline is "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" (Bland et al. 2017).

Collapse (ecological communities) (from Bland et al. 2017): Collapse is a transformation of identity, a loss of defining features, and a replacement by a different ecological community. Collapse has occurred when all occurrences of an ecological community has moved outside the natural range of spatial and temporal variability in composition, structure and function. An ecological community 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. Ecological community collapse may be viewed as the analogue of functional extinction in species (Keith et al. 2013).

Ecological Community: an assemblage of species occupying a particular area. (A threatened ecological community is a critically endangered ecological community, an endangered ecological community or a vulnerable ecological community listed in Schedule 2 of the BC Act).

Extreme fluctuations: "Extreme fluctuations can be said to occur in a number of taxa where population size or distribution area varies widely, rapidly and frequently, typically with a variation greater than one order of magnitude (i.e., a tenfold increase or decrease)" (IUCN 2017).

Habitat: an area occupied, or periodically or occasionally occupied, by a species, population or ecological community and any biotic or abiotic component of that area.

Generation Length: Generation length is the average age of parents of the current cohort (i.e. newborn individuals in the population). For more information refer to Box 1 in NSW TSSC (2018).

Geographic distribution: Geographic distribution is the area or areas in which a species or ecological community occurs, excluding cases of vagrancy in species. This may be assessed by estimating the extent of occurrence and the area of occupancy.

Extent of occurrence

Extent of occurrence (EOO) 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, excluding cases of vagrancy" (IUCN 2017). (see Figure 1). "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)." (IUCN 2017).

Area of occupancy

"Area of occupancy is defined as the area within its 'extent of occurrence' (see above) which is occupied by a taxon, excluding cases of vagrancy. The measure reflects the fact that a taxon 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." (IUCN 2017).

For species, IUCN (2017) recommends using a standard scale based on 2 x 2 km grid cells (a cell area of 4 km^2). The scale is determined by the thresholds in the criteria, i.e. valid use of the criteria requires that AOO is estimated at scales that relate to the thresholds in the criteria. For ecological communities, Bland et al. (2016) recommend using a standard scale based on 10 x 10 km grid cells (a cell area of 100 km^2).

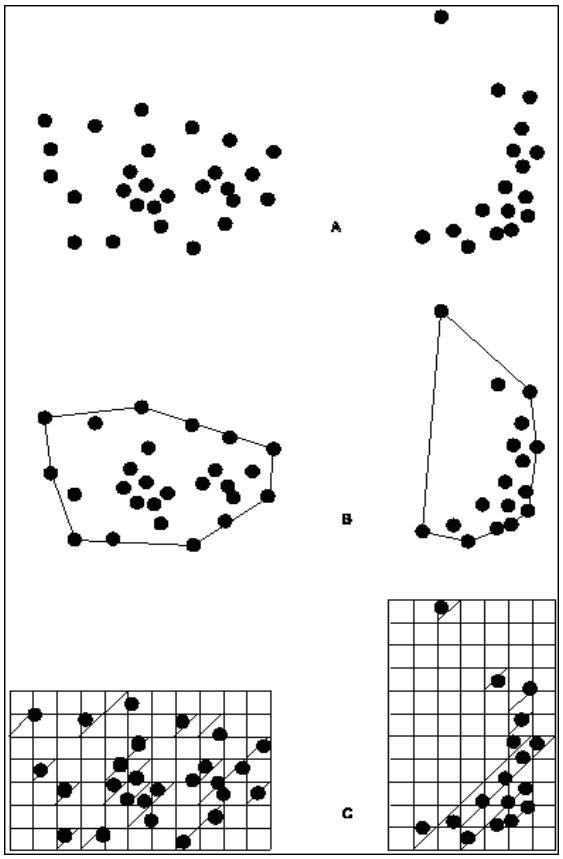

Figure 1. *Two examples of the distinction between extent of occurrence and area of occupancy.*

(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.

From IUCN (2017)

Key Threatening Process: Key threatening process means a threatening process listed in Schedule 4 of the NSW Biodiversity Conservation Act.

Locations: The term 'location' defines a geographically or ecologically distinct area in which a single threatening event can rapidly affect all individuals of the taxon present (IUCN 2017) or all occurrences of an ecological community (Bland et al. 2017).

Mature individuals: (taken directly from NSW TSSC (2017) Regulations)

(1) Mature individuals are individuals in the wild that are capable of producing viable offspring. The total number of mature individuals excludes individuals that are too young (juvenile), too old (senescent), too moribund (for example, diseased) or otherwise unable to produce viable offspring (for example, due to low population density).

(2) In populations with biased sex ratios, it is appropriate to use a lower value for the total number of mature individuals in a way that takes this into account.

(3) In populations that fluctuate, the number of mature individuals will refer to a minimum number of individuals that are present most of the time (in a time span appropriate to the life cycle and habitat characteristics of the species), and will thus usually be much less than the mean number present.

(4) In clonal organisms, reproducing units may be regarded as mature individuals, so long as they survive independently of one another. However, if clonally reproduced individuals are more limited in viability or dispersal ability than sexually reproduced individuals, the total number of mature individuals may be reduced accordingly to take this into account.

(5) For species in which individuals have synchronous dormant life stages, the number of mature individuals should be assessed during, or projected for, a time when mature individuals are available for breeding.

(6) Re-introduced individuals must have produced viable offspring (after the individuals were re-introduced) before they are counted as mature individuals.

(7) Captive, cultivated or artificially maintained individuals cannot be counted as mature individuals.

Plant: means any plant, whether vascular or non-vascular and in any stage of biological development, and includes fungi and lichens, but does not include marine vegetation. Note, to be eligible to be listed as threatened under the NSW BC Act 2016, a plant must be native to New South Wales.

Population: a group of organisms, all of the same species, occupying a particular area.

Relative severity (of threats to ecological communities): 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 (Bland et al 2017).

Severely fragmented: "The phrase 'severely fragmented' refers to the situation in which increased extinction risks to the taxon results from the fact that most of its individuals are found in small and relatively isolated subpopulations (in certain circumstances this may be inferred from habitat information). These small subpopulations may go extinct, with a reduced probability of recolonization" (IUCN 2017). NSW TSSC (2018) provides further details to aid interpretation of severe fragmentation. Please note, insert 'population' instead of 'subpopulation' here, for use in the NSW BC Act.

Species

The BC Act defines a species to include:

(a) a defined subspecies, and

(b) a taxon below a subspecies, and

(c) a recognisable variant of a subspecies or taxon, and

(d) a population of a particular species (being a group of organisms, all of the same species, occupying a particular area).

Threatened species, populations and ecological communities: are species, populations and ecological communities that are listed under the NSW BC Act in Schedules 1 and 2.

The Schedules of the NSW BC Act contain a number of categories that represent the level of threat a species, population or ecological community is facing. Species or populations may be critically endangered, endangered or vulnerable (Schedule 1). Ecological communities may be critically endangered, endangered or vulnerable (Schedule 2).

Threatened Ecological Communities: see Threatened species, population and ecological communities

Threatened Populations: see Threatened species, population and ecological communities. Endangered populations previously listed under the *Threatened Species Conservation Act 1995* were carried over to Schedule 1 of the NSW *Biodiversity Conservation Act 2016*.

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Section 6: References and further reading

References:

Bland LM, Keith DA, Miller RM, Murray NJ, Rodríguez JP (Eds.) (2017) Guidelines for the application of IUCN Red List of Ecosystems Categories and Criteria, Version 1.1. Gland, Switzerland: IUCN.

IUCN (2016) An Introduction to the IUCN Red List of Ecosystems: The Categories and Criteria for Assessing Risks to Ecosystems. Gland, Switzerland: IUCN.
https://portals.iucn.org/library/sites/library/files/documents/2016-035.pdf

IUCN (2017) IUCN Standards and Petitions Subcommittee. Guidelines for Using the IUCN Red List Categories and Criteria. Version 13. Prepared by the Standards and Petitions Subcommittee.
http://cmsdocs.s3.amazonaws.com/RedListGuidelines.pdf

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

NSW TSSC (2018) Guidelines for interpreting listing criteria for species, populations and ecological communities under the NSW Biodiversity Conservation Act 2016. Version 2.0.

Further reading and links:

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
Common Assessment Method (CAM)	http://www.environment.gov.au/biodiversity/threatened/publications/mou-cam
Commonwealth Threatened Species Scientific Committee (CTSSC)	http://www.environment.gov.au/biodiversity/threatened/tssc
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
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	http://www.environment.gov.au/epbc/about
Fisheries Management Act 1994	https://www.legislation.nsw.gov.au/#/view/act/1994/38
Fungorum	http://www.indexfungorum.org/Names/Names.asp
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 Red List Categories and Criteria	http://www.iucnredlist.org/technical-documents/categories-and-criteria
Mycobank Database	http://www.mycobank.org/

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 Fisheries Scientific Committee	https://www.dpi.nsw.gov.au/fishing/species-protection/fsc
NSW threatened species profiles	http://www.environment.nsw.gov.au/threatenedSpeciesApp/
NSW Threatened Species Scientific Committee (NSW TSSC)	http://www.environment.nsw.gov.au/committee/aboutthenswscientificcommittee.htm
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

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