



Australian Government

Department of Agriculture, Water and the Environment

Threatened Species Scientific Committee (TSSC)

Guidelines for nominating and assessing the eligibility for listing of ecological communities as threatened according to the *Environment Protection and Biodiversity Conservation Act 1999* and the *EPBC Regulations 2000*

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PART B – General concepts and definitions used by the TSSC
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PART A – Introduction and purpose of these guidelines

The purpose of these guidelines is to help with both preparing and assessing a nomination for a potentially nationally threatened ecological community (TEC) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Each TEC nomination is considered by the Threatened Species Scientific Committee (TSSC), so that they can provide advice to the federal environment Minister. A nominated TEC must first be prioritised for assessment. It must then meet legislated eligibility criteria, under the EPBC Act and *Environment Protection and Biodiversity Conservation Regulations 2000* (EPBC Regulations), in order for it to be listed as threatened.

Nominations may be submitted by individuals, or by individuals acting on behalf of bodies and organisations (incorporated and unincorporated). You should submit a nomination for a TEC on the TEC nomination form, which can be downloaded from the Department's website at:

<http://www.environment.gov.au/biodiversity/threatened/nominations/forms-and-guidelines>.

You can either submit your completed nomination electronically, or as hard copy. The TSSC prefer electronic nominations; they are easier to process. Your nomination should be a stand-alone document; but attachments may be provided e.g. maps, or additional data analysis/summaries. If you cannot supply maps/other supporting documentation electronically, please confirm on your completed TEC nomination form that you have sent/provided them separately. An example of a comprehensively completed nomination is also available on the Department's website.

These guidelines represent the Department's and TSSC's current judgement on the nomination and assessment process for ecological communities. **Part B** of these guidelines covers general concepts and definitions; **Part C** gives specific advice on how to complete the nomination form and how to address the listing criteria in particular.

To ensure that your completed nomination meets the requirements of the EPBC Regulations (see [Table 1 on page 3](#)) please follow the instructions below when you complete the nomination form.

1. The EPBC Regulations require you to answer all the questions – if information is not available for a particular question, or is insufficient, you must say this explicitly.
2. You must provide a map or maps of the proposed national geographic distribution of the ecological community. Maps are very useful during the assessment of a nomination.
3. You must give appropriately referenced information and list all your references (including references for expert opinion) at the end of the nomination form.
4. You must present an argument to justify the ecological community's eligibility for listing against the listing criteria in Section 5 of the nomination form.

You should consider the eligibility for listing, of the nominated TEC, across its **entire geographic range** (as opposed to just in a particular locality where it is most threatened). You should adequately explain the ecological community's boundaries and **national extent**.

Please cite references to scientific literature in support of your nomination at appropriate places on the form. Provide a reference list at the end. The opinion of appropriate scientific experts may also be cited (with their approval) in support of a nomination. Please provide the names of any experts you cite, along with their qualifications and contact details, in the reference list.

Your completed nomination should be sent to: The Director, Ecological Communities Section via email: epbc.nominations@environment.gov.au OR mail: Department of the Environment and Energy, GPO Box 787, Canberra ACT 2601

Table 1: Nomination Requirements under the EPBC Regulations

Division 7.2 Nominations for listing
7.03 Notices inviting nominations for an assessment period
<p>(2) A nomination to include an ecological community in a list must:</p> <ul style="list-style-type: none"> (a) be made in writing or electronically; and (b) be of a length, size and form that can be: <ul style="list-style-type: none"> (i) understood by the public; and (ii) published on the Internet.
<p>(3) A nomination must include the following:</p> <ul style="list-style-type: none"> (a) the name of each person making the nomination (each <i>nominee</i>); (b) if applicable, the name of the organisation each nominee represents; (c) each nominee's: <ul style="list-style-type: none"> (i) postal address; (ii) telephone number; and (iii) if applicable, email address (d) if the Minister has determined a conservation theme as a priority theme for the assessment period — a statement indicating how the nomination fits within the conservation theme; (f) the information set out in regulation 7.05 (h) for information under paragraph (f) <ul style="list-style-type: none"> (i) the source of the information; and (ii) when the information became available.
7.05 Nominations of ecological communities
<p>(1) A nomination of an ecological community must include information about the ecological community, including the following:</p> <ul style="list-style-type: none"> (a) the name of the ecological community; (b) any other names by which the ecological community is known; (c) a description of the key components of the ecological community including: <ul style="list-style-type: none"> (i) biological components; (ii) non-biological components; and (iii) the key interactions and functional processes; (d) a description of the characteristic features that distinguish the ecological community from other ecological communities; (e) information about each key species in the ecological community; (f) the ecological community's known or estimated current and past national distribution, including a map.
<p>(2) The nomination must also set out the following:</p> <ul style="list-style-type: none"> (a) a description of past, current and future threats to the survival of the ecological community, including: <ul style="list-style-type: none"> (i) whether the threats are actual or potential; (ii) how and where the ecological community is affected by the threats; and (iii) how the threats are being, or could be, abated; (b) a statement setting out: <ul style="list-style-type: none"> (i) the category under which the nominee considers the ecological community should be listed; and (ii) the reasons why the ecological community should be listed under that category, by reference to the criteria.
<p>(3) However, if information required for subregulation (1) or (2) is not available because of a lack of scientific data or analysis, those subregulations are satisfied if the nomination includes:</p> <ul style="list-style-type: none"> (a) the information that is available; and (b) a statement identifying the data or analysis that is not available.

Developing the proposed priority assessment list of nominations

Submitted ecological community nominations are first considered by the TSSC when it makes its recommendation to the Minister on annual priorities for the assessment of species, ecological communities and threatening processes (the proposed priority assessment list (PPAL)).

Although all nominations are welcome, it may not be possible to include all nominations on the PPAL in any one year.

In preparing the PPAL, the TSSC adopts a strategic approach, taking into account considerations such as:

- the level of threat to the ecological community;
- the effects of listing the ecological community, for example in terms of legislative protection;
- the capacity to effect recovery of the ecological community, or to abate the key threats that impact it;
- the degree to which the nomination considers the national extent of the ecological community;
- the biodiversity and other environmental values of the ecological community; and
- the availability and relevance of information on which an assessment can be based.

To balance its workload, nominations not included on the PPAL in their first year, are re-considered by the TSSC for prioritisation in the subsequent round.

The framework used by the TSSC for the prioritisation of ecological community nominations is included in [Appendix 3 – Framework for the prioritisation of nominations on page 45](#). An overview of the nomination and listing process is provided in the nomination process flowchart, on the Department's website at: <http://www.environment.gov.au/biodiversity/threatened/nominations>.

PART B – General concepts and definitions used by the TSSC

To assist the TSSC to assess your nomination, please consider the following when you complete the nomination form.

The EPBC Act definition of an “ecological community”

The definition of an ecological community, under the EPBC Act, is:

“The extent in nature in the Australian jurisdiction of an assemblage of native species that inhabits a particular area in nature”

An ecological community listing under the EPBC Act is an instrument of environmental protection and conservation; so it should be defined in a way that is legally clear and could be understood by land managers, decision-makers, commercial interests and other stakeholders.

Ecological communities may be defined at a range of scales and there is no nationally agreed classification system in Australia. An ecological community is defined by the co-occurrence and interactions of many species with overlapping distributions.

Ecological communities are complex and dynamic natural systems that can be modified by human activities. This complexity means that one ecological community may not have an exclusive set of obvious, discrete boundaries, without some characteristics that overlap (intergrade) with another ecological community. For example species composition, dominant species, geomorphology or hydrology.

Threatened ecological communities (TECs) are therefore challenging to describe. Some of these challenges are more abstract, because of:

- The intrinsic nature of ecological communities as a scientific construct, based on a particular perspective (e.g. floral assemblages);
- The difficulty of partitioning continuous variation of biological pattern into discrete categories; and,
- The extent to which different levels of natural states and condition (degradation) can take the ecological community away from a defined identity.

Other challenges are more practical and arise from not having enough data; or because different data sets may be difficult to combine¹. Often there is no map, or no single map, that shows the location of all of the ecological community at a particular time.

Because critically endangered and endangered TECs are the subject of EPBC Act referral, assessment, approval and compliance decisions, and all categories of listed TECs are eligible for conservation, recovery and funding programs, the definition of an ecological community should use defining characteristics that can be understood by non-specialists.

Where there is strong evidence of a major ecological process, which is also spatially definable (e.g. hydrological limits), then it is easier to spatially delimit an ecological community. Otherwise, classification is most often based on the (dis-)similarities between described biological units (e.g. vegetation types); principally and preferably on the basis of their biological composition.

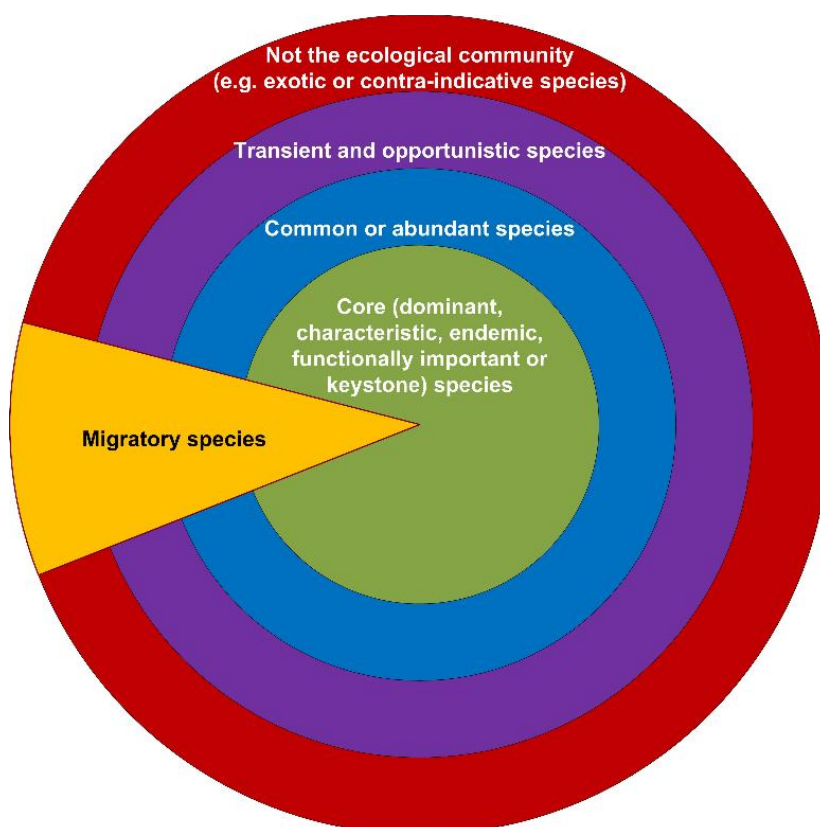
¹ e.g. Differences between studies, in their methods, assumptions, or units of measurement.

It is particularly important that you clearly describe the Key Diagnostic Characteristics² of the ecological community (how to identify it) and define its boundaries; and that you consider its national extent. Also, it is important that you describe (where possible) different levels of condition (e.g. poor, moderate and good) - thresholds at which the characteristics of the ecological community have substantially changed from its natural or benchmark state(s). Some of these concepts are described further in the following sections.

Your description of a TEC nominated for listing should include a list of characteristic or core species. The construction of the list of characteristic species will depend on available information (e.g. qualitative descriptions, quantitative floristic data); and it will vary from case to case (see Preston and Adam, 2004; SPRAT, 2016).

Figure 1 illustrates the mixture of species that make up an ecological community. Your description should usually aim to include: core (dominant, characteristic, endemic, and functionally important, or keystone) species; frequently occurring (or common) species; species that may be locally abundant, though not necessarily present throughout the distribution of the ecological community; and species whose occurrence may help to distinguish the ecological community from other similar communities.

Figure 1: Illustrative mixture of species comprising an ecological community



If you describe transient or opportunistic species as a part of the ecological community, you should ideally also mention the environmental conditions needed for them to occur (e.g. waterbirds following heavy rain). You should also mention ‘contra-indicative species’, if there are any. If contra-indicative species are present in an area then it is not the ecological community.

² Examples of Key Diagnostic Characteristics for TECs can be seen in the more recent Conservation Advices for EPBC Act listed TECs, available at: <http://www.environment.gov.au/cgi-bin/sprat/public/publiclookupcommunities.pl>.

You can also include migratory, rare or threatened species, to draw attention to their occurrence within the ecological community. In some cases, it may be appropriate to subdivide the list of species to make it clear which species are likely to occur frequently throughout the ecological community distribution (common species), as opposed to rarer species.

Types of ecological communities

Ecological communities can be terrestrial or aquatic (including freshwater, brackish/estuarine or marine). They consist of a unique combination of various types and abundances of plant, animal and other species. These species co-occur and interact in various ways in a particular area. In many terrestrial communities the system is defined by the dominant plant species and/or their structure. This is also the case for some freshwater aquatic communities. However, some ecological communities may be defined by the co-occurrence of characteristic fauna. For example marine communities are defined by the animals that provide habitat structure (e.g. coral reefs and sponge communities). Ecological communities may also be defined by their physical characteristics. These include features such as: their structural form (e.g. woodland or grassland); their occurrence on a particular soil/substrate type (e.g. peat bogs, rocky reefs); and, their association with particular environments (e.g. aquatic in the case of wetlands).

In many cases, a combination of these features and (other) biological characteristics (e.g. species composition) are used. Your definition of an ecological community should clearly describe what type of ecological community it is and its key characteristics (biological and physical). It should clearly distinguish the nominated ecological community from other, similar, or nearby ecological communities.

Scale and national extent

Guiding principles

The EPBC Act is a national environment law and TECs listed under the EPBC Act, are one of several ‘Matters of National Environmental Significance’. When you nominate a TEC, it is important to recognise that it will be assessed under the EPBC Act across its national extent. This means you should think beyond its local or regional area; you should consider and document the broader, Australia-wide context of the TEC you are nominating.

In general, the process of defining an ecological community and determining its national extent:

- should be driven by biological characteristics and data, as a first choice, because the EPBC Act is about assemblages of naturally occurring native species;
- should not be based on jurisdictional (e.g. state/political regional) boundaries – although there are instances where biological and ecological distinctness will coincide with jurisdictional boundaries (e.g. Tasmania);
- should consider obvious ecological processes/regimes – particularly those that unite, or have united in the past, populations of component species in parts of the landscape;
- may include soil, geology, and other largely static abiotic factors – more typically as supporting evidence and indicators (other diagnostic characteristics), as opposed to the primary definition of what the ecological community is (its key diagnostic characteristics);
- uses published data to evaluate differences and similarities among occurrences – but allows that expert opinion will sometimes be the only source of information; and

- fulfils the objective of ecological community definition – to produce a reliable and justified grouping of an assemblage of species in Australia (and their recognition under the EPBC Act) that, in turn, supports decision making and management. It need not be useful to all disciplines.

The national process aims for a robustly defined and distinct, threatened entity –whether as a thematic class of elements (characteristics), or an entity united in the landscape by a key ecological process or processes.

Defining an ecological community at a national scale

The definition of an ecological community often determines the scale at which its national extent is considered; and consequently how much of it there is and what condition it is in. This in turn supports the determination of its conservation status, because of the amount remaining of the ecological community and the estimated impact of threats on it. So, the definition of an ecological community is the foundation for developing the Conservation Advice³ (incorporating the TSSC's listing advice) during the assessment process.

There are a range of scales at which a national TEC (and its associated national extent) can be defined. Whilst nationally listed TECs are often defined at a broad landscape/seascape scale, TECs with smaller extents are also important national assets (particularly very distinct, or unique, ecological communities). In some circumstances, narrow scale options may be more appropriate to address particular threats and achieve practical management outcomes.

TECs have been defined using different features or themes (species composition, vegetation structure, ecological processes) that unite them into a coherent nationally-recognised unit (e.g. from a root mat community in a single cave, to broad-scale woodlands and forests ranging over several jurisdictions). An ecological community can also show natural or disturbance-induced variation across its range (geographic distribution). A broad-scale ecological community may be defined with regional variants (sub-types⁴); or these may be defined as separate ecological communities. More naturally, these differences between similar ecological communities or subtypes, are often a result of the latitudinal and longitudinal gradients along the extent of a broader ecological community.

Soils, hydrology, topography and geology can also influence the make-up of the ecological community in particular areas. Biogeography represents geographically distinct areas of land with common characteristics such as geology, landform patterns, climate, ecological features and plant and animal communities. As the Interim Biogeographic Regionalisation of Australia⁵ (IBRA) largely reflects these differences, it is a good example of a regional system that could be used to differentiate between similar ecological communities or sub-types of ecological communities.

³ The Conservation Advice is a document, approved in writing by the Minister, that sets out the grounds on which the community is eligible for the category in which it is listed, the main factors for its eligibility, and information about what could appropriately be done to stop its decline or support its recovery, as set out in section 266B of the EPBC Act.

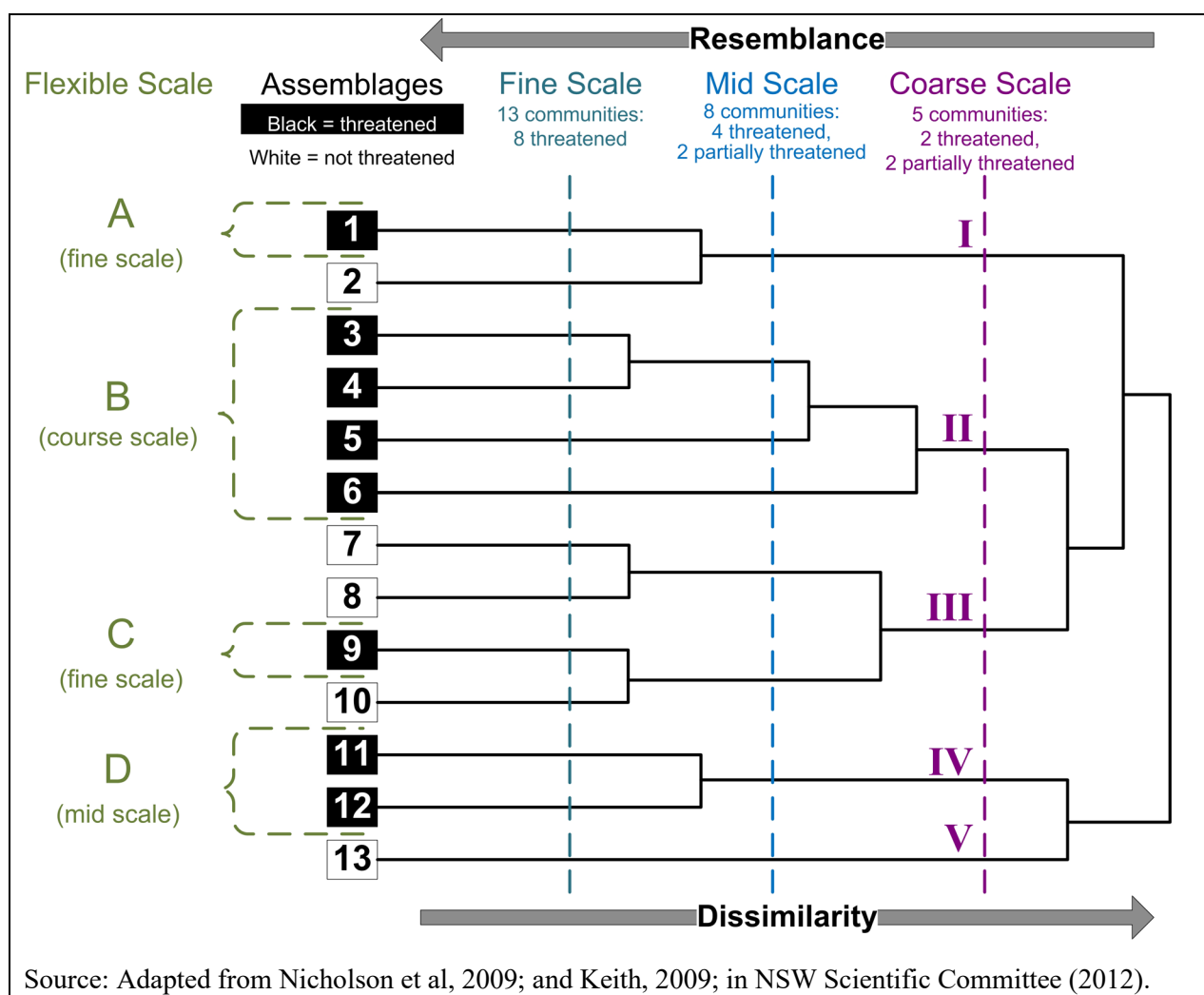
⁴ Ecological communities may have *sub-types* (or sub-components, sub-communities) represented, for example, by a slightly different floral composition.

⁵ IBRA - details available at: www.environment.gov.au/parks/nrs/science/bioregion-framework/ibra/index.html

The NSW Scientific Committee's Guidelines for interpreting listing criteria for species, populations and ecological communities under the NSW *Threatened Species Conservation Act (2012)* illustrates the thematic grouping of ecological assemblages at different scales. In the adapted version at Figure 2:

- At a fine scale of assessment, there are 13 communities, of which eight meet threatened criteria (black squares) due to high rates of decline;
- At a coarse scale, there are five broader communities (I-V) – of these:
 - communities II and IV meet threatened criteria, because their component finer scale assemblages all meet threatened criteria (only black squares);
 - community V does not meet threatened criteria (contains only assemblage 13);
 - the status of communities I and III are uncertain, because only some of their component assemblages meet threatened criteria (a mix of black and white squares).
 These communities may collectively meet threatened criteria if, for example, the assemblages that meet the criteria make up, or previously made up, the majority of the area of occupancy;
- Under a flexible scale of assessment, communities A, B, C and D clearly meet threatened criteria (contain only black squares).

Figure 2: A hypothetical classification of ecological assemblages showing three alternative approaches for dealing with thematic scale in assessment.



If the hypothesized ecological community occupies a discrete cluster of types in a classification dendrogram (e.g. branches 3-6), then there is already some evidence to suggest a sensible thematic grouping, as opposed to when types are drawn from different major branches of a classification (e.g. branches 3,8,12).

Note that different classifications use different methodologies and are created for a variety of reasons. You should examine the content descriptions of the units included in the classification to confirm (or counter) the appropriateness of a grouping and to develop an encompassing definition of the TEC. Usually a mix of compositional and structural data will be necessary for this purpose.

If the hypothesized ecological community contains types 5 and 6 then types 3 and 4 ought also to be considered for inclusion. Again, existing classifications of this kind are only guides. Information on the composition and structure underpinning the “neighbouring” branches in the classification should be examined.

Determining the national extent of an ecological community

Some ecological communities are widespread and occur across several state/territory jurisdictions; while others are more restricted in location (e.g. state or regional endemics). There are also some ecological communities that may be limited to one site, or to a few sites and therefore considered ‘extremely rare’ or ‘unique’. Irrespective of which distribution pattern applies, the main concern is that the extent of the nominated ecological community is clearly defined and that the proposed TEC is distinctive from other, similar, ecological communities.

A national focus can complement and/or enhance protection and conservation through state or territory environmental laws and management actions. For example, a woodland ecological community may be common and widespread in one state, but have a few patches that occur over the border in an adjacent state. Listing and assessment of an ecological community under the EPBC Act, and subsequent management, takes the entire distribution into account; whereas listing under state law only involves the part of the ecological community that occurs in that state.

When you nominate an ecological community under the EPBC Act you should determine its features, such as extent, distribution and range, irrespective of jurisdictional boundaries.

One problem you may face when taking national extent into consideration is that each jurisdiction has its own system for classifying ecological communities, particularly vegetation-based communities. For example, Queensland identifies regional ecosystems, whilst Victoria has ecological vegetation classes. Some other states lack, or have incomplete, state-wide ecological community or vegetation classification system. If the national ecological community that you want to nominate crosses jurisdictional boundaries, you should provide a proper cross-reference to all relevant state classification units that may apply. You are encouraged to talk to experts in all relevant states, to get advice on the national extent and jurisdictional equivalents of your nominated ecological community.

Importantly, some ecological communities, especially those defined at a broad-scale, show regional variation (e.g. in species composition); although their key diagnostic elements, such as the overall structure and function, typically remain similar across their range. In many cases (but not always) there are some characteristic species that occur throughout the range of a particular ecological community. [Table 2](#) provides examples of several national TECs listed under the EPBC Act to demonstrate how national extent has been applied.

Table 2: Examples of consideration of national extent across a variety of listed TECs

<p>Example 1a: Grassy Eucalypt Woodland of the Victorian Volcanic Plain [Listed as Critically Endangered]</p> <p>National Extent Considerations This nomination was limited to woodlands immediately north of Melbourne that are listed as threatened under Victorian legislation. Assessment and expert advice indicated that similar woodlands extend further west and occur throughout the Victorian Volcanic Plain bioregion. The national ecological community is limited to that bioregion because it is associated with soils derived from Quaternary basalt (i.e. a unifying element). Assessment also indicated regional variations where the typical dominant tree species (river red gum, <i>Eucalyptus camaldulensis</i>) may be replaced by other eucalypt species where the climate is either drier or wetter.</p>
<p>Example 1b: Alpine Sphagnum Bogs and Associated Fens [Listed as Endangered]</p> <p>National Extent Considerations: This ecological community was originally nominated as Alpine bogs and fens in one state (VIC), but assessment advice expanded the extent of this ecological community to encompass the same community type in the alpine zones of several states, i.e. VIC, TAS, NSW and ACT. The common features of the listed TEC across this range are: the presence of permanently wet or waterlogged sites, the presence of Sphagnum or peat substrate (indicating the presence of key species), and, elevation to define the alpine zone.</p>
<p>Example 1c: Weeping Myall Woodlands [Listed as Endangered] and Weeping Myall – Coobah – Scrub Wilga Shrubland of the Hunter Valley [Listed as Critically Endangered]</p> <p>National Extent Considerations: Three nominations were received, covering woodlands dominated by weeping myall. Two were broad-scale nominations covering woodlands in northern NSW/southern QLD; plus woodlands in southern NSW. The third nomination related to a single outlying patch of weeping myall in the Hunter Valley. Assessment indicated that the two broad-scale communities should be combined into a single community (Weeping Myall Woodlands), while recognising a degree of regional variation in understorey species composition. The Hunter Valley patch (less than 5 ha in size) was considered to be a relict occurrence (i.e. from a historic climatic regime). It was sufficiently distinct (geographically and ecologically) to merit listing in its own right.</p>
<p>Example 1d: Littoral Rainforest and Coastal Vine Thickets of Eastern Australia [Listed as Critically Endangered]</p> <p>National Extent Considerations: The original nomination was only for rainforest patches around Noosa, Queensland. The listed TEC covers coastal rainforest (within 2 km of the ocean) from north of Cooktown, Queensland, to Lakes Entrance, Victoria (including offshore islands) – some 3000 km. Species composition is highly variable and intergrades along the entire range of the TEC, such that the northernmost patches differ in species composition from the southernmost patches. The unifying elements of the TEC are: shared rainforest vegetation structure (a closed canopy of mainly tall trees, several vegetation layers present, sparse ground layer); maritime influence; and dominance by a range of rainforest species.</p>
<p>Example 1e: The Community of Native Species Dependent on Natural Discharge of Groundwater from the Great Artesian Basin [Listed as Endangered]</p> <p>National Extent Considerations: Originally based on a series of separate nominations for individual spring communities in Queensland, the listed TEC covers hundreds of springs, which vary in size from < 1 m² to over 100 ha. They occur across QLD, SA and NSW, spanning tropical and temperate semi-arid climates. The linking element of the TEC is that they depend on natural discharge of ground waters from a common source – the Great Artesian Basin, into a largely semi-arid environment.</p>

Example 1f: The Natural Temperate Grassland of the Victorian Volcanic Plain [Listed as Critically Endangered], the Natural Temperate Grassland of the South eastern Highlands [Listed as Critically Endangered] and the Lowland Native Grasslands of Tasmania [Listed as Critically Endangered]

National Extent Considerations: Several natural temperate grassland communities across south-eastern Australia were nominated separately for listing. Although these grasslands share some key species in common, the various grasslands also contain some unique characteristic flora and fauna, abundances of some key species vary, and they are widely separated geographically. Each broad grassland community has a distinct regional identity recognised by people in the region supported by different suites of associated species and landscape features and, more importantly, specific conservation actions and objectives to address regional threats. Listing a series of separate regional grasslands was a practical way to preserve these regional identities and help target specific conservation management outcomes.

Geographic distribution used for determining listing eligibility

Extent of occurrence, area of occupancy and patch size

You can consider the geographic distribution of an ecological community in terms of ‘extent of occurrence’ and ‘area of occupancy’, in the sense defined in the International Union for Conservation of Nature and Natural Resources (IUCN) Red List Criteria⁶ for species (see details in [Appendix 1 – Area of occupancy and extent of occurrence on page 43](#)).

Patch size and distribution is another measure of geographic distribution, which when coupled with the nature of threats, can be used for determining listing eligibility. In summary:

- **Extent of occurrence (EOO)**/sometimes called **range**) is the total area inside the shortest continuous boundary that can be drawn to include all the areas where the ecological community occurs.
- **Area of occupancy (AOO)** is the area (within the extent of occurrence) that is actually occupied by the ecological community.
- A **patch** is a discrete and mostly continuous area of an ecological community; it can include small-scale variations, gaps and disturbances. The AOO is typically made up of multiple patches of different sizes and degrees of connectivity.

The accuracy of estimating the AOO (by counting occupied grid squares) is a function of the scale at which it is measured – which should be relevant to the attributes of the particular ecological community you nominate.

For freshwater and marine systems, the notion of geographic distribution is further confounded by dealing with an aquatic environment. In these cases, the EOO (range) may be more meaningful than AOO. For example, the dynamic nature of aquatic environments means that the presence or expression (i.e. AOO) of the ecological community can change temporally and spatially. The driving forces behind the EOO (e.g. groundwater sources or oceanic currents) are generally more predictable and can give greater confidence in the estimated size of the EOO of the ecological community.

⁶ See IUCN Guidelines at: www.iucnredlist.org/technical-documents/red-list-training/red-list-guidance-docs

Measures of patch size include average⁷ patch size and the proportion of patches that are certain sizes (e.g. for many terrestrial vegetation communities patch size classes include: <1 ha, <10 ha, <100 ha, and ≥100 ha). You may well use other concepts to determine the size of each discrete occurrence of an aquatic ecological community. Question 24 (in the nomination form) shows an example of how to summarise patch size data for assessment against Criteria 1 and 2.

Also see [PART C – How to complete the nomination form and justify the criteria for listing on page 20](#) for further guidance on using the geographic distribution of an ecological community to determine listing eligibility.

Mapping scale as it relates to estimating geographic distribution

Estimating geographic distribution (AOO and EOO) is complicated by problems of spatial scale in available mapping. In general, the finer the scale used to map distributions, the smaller the estimated area mapped as occupied by the community will be. The most appropriate scale to use will depend on the ecological community and the origin and comprehensiveness of the data.

For terrestrial communities defined in terms of their vegetation assemblage (i.e. plant communities on land) an appropriate mapping scale is usually of the order of 1:100 000. Coarser scales (e.g. 1:250 000) may be appropriate for very widespread ecological communities – and finer scales (e.g. 1:50 000) may be more appropriate for ecological communities with very restricted distributions. For freshwater aquatic ecological communities (such as rivers and wetlands, and marine ecological communities in particular) the scale used may need to be individually determined.

Geographic and temporal variation within ecological communities

A key feature of Australian ecological communities is their natural variability in space and time. Spatial variability may occur over small scales (e.g. less than 100 metres) – or conversely, at a broader scale of hundreds of kilometres. Similarly, communities may change quickly (e.g. seasonal change in grasslands) – or over longer time-frames (e.g. climatic driven change in alpine communities).

Change in environments can be gradual, subtle and complex. Over larger spatial and temporal scales, gradual changes in species composition, condition and ecological community structure may reflect geographic change and changing trends in climatic factors (such as temperature and rainfall). For example, in aquatic and marine communities, large scale changes in species composition and structure may result from climatic changes (e.g. the seasonality of rainfall and temperature on land) and patterns of ocean circulation which affect sea surface temperature.

The inherent natural variability and complexity of Australia's landscape and ecosystems often results in ecological communities undergoing a transition: from one state to another; from one sub-type to another; or from one ecological community to another – with often unclear demarcation between them. Problems in differentiating these frequently subtle transitions are compounded when terrestrial ecological communities occur in fragmented landscapes – where natural resource management and land use change become significant ecological drivers that may distort the underlying natural variation.

⁷ Median average size is a preferred measure, as opposed to mean average. In either case, identify which average is being quoted (median or mean); otherwise it will be assumed to be a mean average value.

Similar problems can occur in aquatic communities – where water extraction, coastal development and the construction of dams can fragment habitats and affect connectivity between populations. In all cases communities may change over time as ecological development (succession) occurs. This changes the frequency of occurrence of dominant species, as well as altering species composition. These changes must be considered in defining a national threatened ecological community under the EPBC Act.

For example, the definition for the *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* ecological community listed in 2006 encompasses substantial natural, seasonal and geographic variation, as well as variation resulting from past modification. It also allows for likely variation due to climate change over the longer-term future, such that the definition is likely to be relevant for decades to come.

The concept of natural

In Australia, natural areas are generally regarded as those that largely retain the species composition, ecosystem structure and function that existed prior to 1750⁸. However, ecological communities are inherently complex and variable in their natural state. For example, these complexities may reflect: the age of the landscape, the variability of Australia's soils and climate cycles, and the severity and frequency of episodic natural events (such as wildfire, drought and cyclones).

At present, some systems may be far removed from their pre-1750 state. Even so, most ecological communities still retain ecological and biodiversity value worth conserving at a national scale. For example: vegetation-based communities may be infested with weeds; many freshwater aquatic communities now occur in highly regulated river systems; and, bottom trawling in the ocean has significantly altered the structure and composition of some marine communities.

Condition

National listing focuses legal protection on the remaining patches of an ecological community that are most functional, relatively natural and in relatively good condition. The 'condition' (or relative quality) of an ecological community relates to factors such as: species composition, richness and diversity, structural integrity, reproductive success and degree of modification or disturbance by human activities.

For terrestrial plant communities, vegetation condition is frequently used as a surrogate for ecological community condition and can also indicate habitat condition for resident fauna. The 'condition' of a particular ecological community describes how far it has changed from the ecological community that existed prior to a particular agreed benchmark state, or reference condition (e.g. pre-1750).

⁸ The term 'pre-1750', while not corresponding exactly with the year of non-Indigenous, or colonial, settlement in Australia, is commonly used because of its international usage in greenhouse science and vegetation monitoring to describe the time just prior to industrialisation.

Condition classes describe a range of conditions thought to be of similar ecological or conservation value. When you determine ‘condition classes’, ‘condition categories’ and ‘condition thresholds’ for an ecological community (see ‘Condition classes/thresholds’ on page 23), variables you should consider include: connectivity, native species diversity, native vegetation abundance and/or weed cover (e.g. in ground, shrub, and tree layers), age-structure (e.g. mature trees), other composition factors (e.g. dominant or functionally important species) and particular habitat features (e.g. tree hollows). An area that is in relatively good condition resembles the natural or benchmark ecological community more closely than an area in poor condition.

You should also consider the potential for restoration and/or recovery of degraded communities when determining which parts to include, or exclude from the threatened ecological community for protection under the EPBC Act. Patches/occurrences that do not meet minimum condition thresholds can be excluded from national protection through the referral, assessment, approval and compliance provisions of the EPBC Act. Although very degraded/modified patches may not be protected under the EPBC Act, these patches (that do not meet the condition thresholds) may still retain important natural values and may be critical, as a buffer, to protect patches that do meet minimum condition thresholds. Therefore, these patches should not be excluded from recovery and other management actions, including Commonwealth, state and regional NRM⁹ and conservation processes. Suitable recovery and management actions may improve these patches enough for them to be regarded as part of the nationally prescribed TEC, fully protected under the EPBC Act. Management actions should, where feasible, aim to restore patches enough to meet the highest condition class thresholds specified for the TEC.

‘Condition thresholds’ can accommodate different levels of quality or degradation. A judgement needs to be made about thresholds for effective conservation management and protection. They can be set quite low, to take into account (or protect) TECs that now mostly exist in a highly degraded state. For example, the Natural Temperate Grassland of the Victorian Volcanic Plain has declined in extent by an estimated 98% since 1750. Most, if not all, remnants now show some degree of degradation and most are very heavily degraded. In order to ensure the majority of remnants receive protection under the EPBC Act the condition thresholds have been set very low (compared to other listed TECs).

You should also consider whether the ecological community is subject to natural cycles of variability in condition. If an ecological community undergoes natural or anthropogenic changes in condition and is resilient to that change, then condition thresholds and classes may not be relevant. However, it may be that whilst a degree of natural variability exists, other factors (e.g. fishing pressure) reduce the ability of the ecological community to adapt to it. Further discussion of [Condition classes/thresholds can be found on page 23](#).

⁹ National Resource Management programs, see www.nrm.gov.au/index.html

A special case might be made for situations where (whilst there are no/few high quality expressions of an ecological community) restoration may be possible/practicable¹⁰. In such cases, the value of an area is determined by its potential rather than its actual condition. For example, aquatic and marine systems, because of the importance of hydrological connectivity and because they typically have a wider range of natural variability. In such cases, ‘potential condition’ may be more important than ‘current condition’ when defining the ecological community.

Dealing with uncertainty

These guidelines should be applied to an ecological community, based on the available evidence and trends (in both its distribution and integrity); whilst making due allowance for uncertainties.

These uncertainties arise from:

- Natural variability (resulting from changes in community composition and structure in time, and across the range of environments in which it occurs);
- Measurement error (arising from inaccuracies in estimating values); and
- Other factors that are difficult to predict or define (e.g. lack of accuracy in definition of community boundaries).

Uncertainty can also result from lack of information, or from small sample sizes. Vegetation communities may not have been well surveyed and there may not be reliable information on original extent. Lack of data may be a particular challenge in the marine environment, where inaccessibility makes data collection harder (e.g. in the deep sea). In addition, marine species can have very low abundance, even over large areas. This causes sampling challenges, often resulting in data deficiency across a species’ range. This can mean that an ecological community may be known to occur at a particular site because sampling effort shows its presence – but is only suspected to occur in other ‘similar’ less sampled, or un-sampled, areas. In order to define and assess a potential TEC, some certainty is required about its distribution, size, integrity and characteristic features, along with data on trends and threat impacts.

In cases where there is uncertainty, it is important to explain why (e.g. a lack of scientific data). One of the simplest ways to represent uncertainty is to give a best estimate and a range of values around this estimate. The range might be based on scientifically derived confidence intervals, the opinion of a single subject-matter expert, or the consensus opinion of a group of experts. The range you use should be justified.

Determining when an ecological community could become extinct

Section 182 of the EPBC Act, advising on listing criteria, says that an ecological community is eligible for listing if it is facing an extremely high risk of extinction in the wild, as determined in accordance with the prescribed criteria:

- **Critically Endangered (CE)** – Extremely high risk of extinction in the immediate future;
- **Endangered (E)** – Extremely high risk of extinction in the near future;
- **Vulnerable (V)** – Extremely high risk of extinction in the medium-term future.

¹⁰ For definitions and standards of ecological restoration see: Standards Reference Group SERA (2016) *National Standards for the Practice of Ecological Restoration in Australia*. Society for Ecological Restoration Australasia. Available from: www.seraustralasia.com

The following indicative time frames are given (see Applying the indicative time frames to the assessment criteria on page 27) for interpreting the prescribed criteria:

- **Immediate future:** the next 10 years, or 3 generations of any long-lived or key species believed to play a major role in sustaining the community (whichever is the longer), up to a maximum of 60 years.
- **Near future:** the next 20 years, or 5 generations of any long-lived or key species believed to play a major role in sustaining the community (whichever is the longer), up to a maximum of 100 years.
- **Medium-term future:** the next 50 years, or within 10 generations of any long-lived or key species believed to play a major role in sustaining the community (whichever is the longer), up to a maximum of 100 years.

In order to estimate the risk of extinction, or the likelihood of loss of an ecological community (and the timeframe over which the risk or likelihood operates) it is important to consider when an ecological community would be considered extinct; i.e. determining an endpoint to measure against or model the likelihood of reaching, within a specified timeframe.

Whilst it is possible to determine with some certainty when an ecological community has been totally destroyed (e.g. all occurrences removed or converted into permanent artificial structures – by land clearing or ocean bottom trawling), it is more difficult to determine when a modified or degraded ecological community should be presumed to be (or could become) extinct.

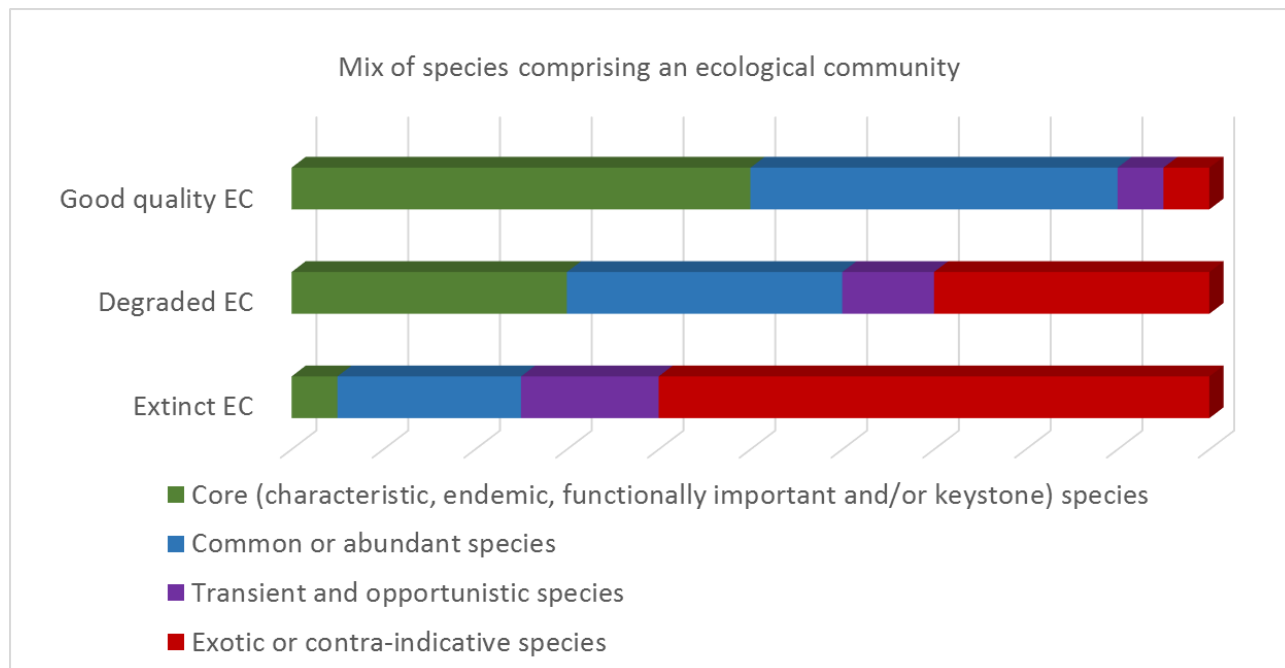
In developing an approach to listing threatened ecosystems, the IUCN defined extinction as a transformation of identity, loss of defining features and/or replacement by a ‘novel’ or substantially altered ecosystem. Unlike species, ecosystems transform rather than disappear – becoming different ecosystems with different characteristic biota (Hobbs et al., 2006; Keith et al., 2013; 2015). Many characteristic features may be lost long before the last characteristic species disappears from the last occurrence (Gaston & Fuller, 2008); and, whilst the novel system could retain some of the characteristic biota of the ecological community it replaces, the abundance and interactions of the retained species, or their ecological functions, are substantially altered.

An ecological community would be considered extinct when its composition has changed (across its national extent) so that it no longer fits its original description (most importantly its Key Diagnostic Characteristics^{2 on page 6}); e.g. when the majority of its original faunal and floral composition has been lost¹¹. In particular, the transformation will involve the loss of core (characteristic, endemic and keystone/ functionally important) species, as per Figure 3.

The transformation could be reversible, at least in part, following threat abatement and recovery actions. However, in many cases the assemblage of species will have been so extensively modified throughout its range that re-establishment of ecological processes, species composition and community structure (within the range of natural variability exhibited by the original ecological community) are unlikely within the foreseeable future.

¹¹ For example where all (or almost all) patches of an ecological community fail to meet minimum condition thresholds and patches are unlikely to recover to the point where thresholds are met.

Figure 3: Illustrative example of the potential change in the mixture of species resulting in the extinction of an ecological community



An ecological community could be threatened with ‘functional’ extinction through on-going modifications of remnants. Whilst these changes might not lead to total destruction of all occurrences, or all core species of the ecological community, they will disrupt ecological processes (such as reproduction and recruitment) that are critical to maintain and recover the community¹² across a large proportion of its former range. Functional degradation can be indicated by the loss of functional biotic components or structure of the ecological community, or by the breakdown of abiotic processes (e.g. nutrient cycling), such that the characteristic native biota will no longer be sustained.

Final determination of when an ecological community is extinct (or could become extinct) is likely to rely on subjective judgement by experts, because complete and conclusive data may not be available. Judgement should be guided by the above principles.

¹² The ability of the ecological community to sustain itself through processes such as reproduction and seedling recruitment (the ability of individuals to mature); and the adequacy of the gene pool to sustain resilient populations over the long term, especially when facing stresses such as climate change.

Glossary

Condition Class

The condition of a particular area of vegetation describes how far the vegetation has changed from the pristine, or ideal, ecological community that existed prior to 1750^{8 on page 14}. An area that is in good condition resembles this ideal more closely than an area in poor condition. A condition class describes a range of conditions that are thought to be of similar value, typically within particular **condition thresholds**.

Integrity (concept of community integrity)

The concept of ‘integrity’ applied to an ecological community refers to its biological integrity. Biological integrity is a system’s wholeness, including the presence of all appropriate elements and occurrences of all processes at appropriate rates. It specifically refers to natural conditions. An ecological community with high integrity is one where natural evolutionary and biogeographic processes still operate. For further information see notes on [Criterion 4 - Reduction in community integrity on page 39](#).

State

The state of an ecological community describes a recognizable form of that ecological community. For example three recognizable states of the Box Gum Grassy Woodlands may be: a state which contains both an overstorey and an understorey; one that contains just an overstorey because the understorey has been removed through processes such as grazing; and, one that contains just an understorey because the overstorey has been removed.

As another example, the Kangaroo Island Narrow-leaved Mallee Woodland can occur in a number of distinct vegetation states ranging from mallee forest to woodland to shrubland, depending on the nature of and timeframe since fire or other disturbances (see detailed discussion of states in the conservation advice at <http://www.environment.gov.au/biodiversity/threatened/communities/pubs/102-conservation-advice-appendices.pdf>).

Sub-type

Ecological communities may have sub-types represented, for example, by a slightly different floral composition. These can be a result of past disturbance history/management regimes in a heavily impacted landscape. More naturally, these differences are a result of the latitudinal and longitudinal gradients along the extent of an ecological community.

Transition

Transition is the movement of specific area of an ecological community from one state to another state. This movement may be due to human activities such as tree clearing, which can change an area from a state containing both an overstorey and an understorey to a state that contains only understorey. Or transition between states may be due to natural cycles (or a combination of natural and human induced change); for example climate or fire.

PART C – How to complete the nomination form and justify the criteria for listing

The threatened ecological community nomination form can be downloaded from the Department's website at: <http://www.environment.gov.au/biodiversity/threatened/nominations/forms-and-guidelines>

In order to make sure that your completed nomination meets the requirements of the EPBC Regulations (see Table 1 on page 3) please follow the instructions below when you complete the nomination form.

- 1) The EPBC Regulations require you to provide particular information about the ecological community, in a way that can be understood by the public and published on the Internet; otherwise your nomination will not be assessed. The best way to do this is to answer all the questions in the nomination form as fully as you can.
- 2) Give your name (the nominator) and contact details; and those of anyone else making the nomination with you (other nominees). Also, if applicable, the name of the organisation each nominee represents.
- 3) If a conservation theme has been announced (for the assessment period) say how the nomination fits the conservation theme (or not).
- 4) The sources of the information you use in your answers should be properly referenced (cited) in the nomination form. All references (including expert opinion) cited in your answers should be listed at the end of your completed nomination form.
- 5) Give the name of the ecological community; and any other names by which the ecological community is known.
- 6) Describe the ecological community in detail. Include: biological components and key species; non-biological components; and key interactions and functional processes.
- 7) Say what characteristic features (key diagnostics) distinguish the ecological community from other ecological communities.
- 8) Give the ecological community's current and past national distribution.
- 9) Include a map (or maps) of the geographic distribution of the ecological community. Maps (and the data used to create them) can be invaluable in the assessment.
- 10) Describe past, current and future threats to the survival of the ecological community, including:
 - i. whether the threats are actual or potential;
 - ii. how and where the ecological community is affected by the threats; and
 - iii. how the threats are being, or could be, abated;
- 11) You must say which category you think the ecological community should be listed under (Critically Endangered, Endangered or Vulnerable). In Section 5 of the nomination form, you must refer to available evidence (that can be assessed against the listing criteria, shown in Table 4 on page 26) to clearly explain why the ecological community is eligible for listing as threatened.
- 12) If information is not available, or is insufficient to answer a particular question, you should say so explicitly, in your answer to that question (i.e. identify the data or analysis that is not available).

Make sure that you consider the potential listing category (status), of the ecological community, across its entire geographic range, regardless of local government, state, territory, or bioregional boundaries. Describe the full national boundaries and national extent of the ecological community (see the discussion of [Scale and national extent on page 7](#)).

Use scientific literature, wherever possible, as the basis for your answers to the questions in the nomination form. You may also cite the opinion of appropriate scientific experts (with their approval) in support of your nomination. If you cite expert opinion, please give the experts' names, their relevant qualifications/area of expertise and contact details at the end of your completed nomination form (in Section 6 - *References*).

Note: What follows does not refer to all sections/questions in the nomination form¹³.

Completing Section 1 – Nominator details and eligibility for listing

Listing Category for which the ecological community is nominated (Summary of eligibility)

This summary of eligibility assists the TSSC to process your nomination. It is a summary of your answers to Section 5 of the nomination form *Justification for this Nomination*. Read [Completing Section 5 – Justification for the nomination on page 25](#) for details of how to assess listing status against the six listing criteria.

Completing Section 2 – Conservation theme, name and description

Conservation theme

Q.1 Meeting the conservation theme

Each year, prior to calling for nominations under the EPBC Act, the Minister decides whether to have an annual conservation theme (or themes) for the nomination/assessment period. This is intended to encourage the submission of nominations that meet the theme. The 2020 conservation theme is '*Listed threatened species which require reassessment to harmonise their listing status across range states and territories*'. Nominations that do not meet the conservation theme are still welcome and will be prioritised for assessment on their relative merits.

Name

Q.2 Proposed name of the ecological community

There are no specific scientific rules for naming ecological communities. In general, a name should take account of the distinctive characteristics, structure, range and national context of the nominated ecological community. Where a community has a published or otherwise generally accepted name, you should use (or note) that in the nomination (and give a reference source of the name). If the community is known by several names, give both the preferred and the alternative names (and the sources of those names). If there is no generally accepted name, give a brief title that describes the distinguishing elements of the community (and is in line with appropriate ecological literature).

¹³ The question numbers here refer to the questions in the nomination form, which is available on the Department's website at: <http://www.environment.gov.au/biodiversity/threatened/nominations/forms-and-guidelines>; along with an example of an ecological community nomination. See also [Appendix 3 – Framework for the prioritisation of nominations on page 45](#).

Names of ecological communities that are already listed under the EPBC Act are at:

www.environment.gov.au/cgi-bin/sprat/public/publiclookupcommunities.pl.

Note: the TSSC often names ecological communities using vegetation structure and key species that are dominant (or characteristic) throughout its range. Geographic locations/regions (e.g. the Hunter Valley) or biogeographical/climatic regions or zones (e.g. IBRA/IMCRA^{14/15} or coastal, subtropical) are also often used in names; as long as they correspond with all, or most of, an ecological community's range.

Description

Q.3 Describe the national distribution in Australia

Describe the national distribution of the ecological community in Australia. Provide a map/s that accurately marks the present and former boundary (where known) of the ecological community's geographic extent and all known locations.

In which bioregion(s) do you think the ecological community occurs? Typically, you should use regional names from the Interim Biogeographic Regionalisation for Australia¹⁴ (IBRA) and the Integrated Marine and Coastal Regionalisation for Australia (Mesoscale)¹⁵ (IMCRA).

Regionalisations are spatial frameworks that apply to many aspects of natural resource management. They are based on collated data and inferred patterns across a variety of spatial scales. They are an accepted tool to help describe ecosystem boundaries for planning and management in the natural environment.

Q.4 Describe the biological components and/or ecological processes that unify the community as an entity

The TSSC understands that many different ecological community descriptions are used throughout Australia and there are issues of ecological judgement associated with these descriptions. Base your description on published ecological literature and/or the considered opinion of appropriate experts (whose details must be provided). Describe the following elements:

- *The scientific names of the core, dominant, commonly occurring and/or otherwise characteristic species; and of the functionally and/or structurally significant species (or groups of species) of the ecological community* (preferably in lists or tables) and an indication of the range of variation in their abundance and distribution. Ideally, this should include information about both the floral and faunal (vertebrate and invertebrate) components of the ecological community. For example, for forest and woodland ecological communities, it is useful to list the key species that occur in each of the vegetation layers present (tree layer/shrub layer/ground layer); or, in the case of some aquatic ecological communities, the dominant taxa, groups or species in faunal layers (see Figure 1 on page 6). Note: "Commonly occurring" does not necessarily mean in high abundance, rather it means that all or most occurrences of the community will contain these species.

¹⁴ IBRA - details available at: www.environment.gov.au/parks/nrs/science/bioregion-framework/ibra/index.html

¹⁵ IMCRA - copy of report available at: www.environment.gov.au/coasts/mbp/imcra/index.html

- *The typical structure of the community* (if known); and an indication of the range of variation. For example, the relative abundance of different kinds of species (e.g. height and cover of different vegetation layers; extent of wetlands or floodplains associated with a riverine system, faunal layers in marine communities), or the types of processes that operate within the community.

Q.5 Describe the associated non-biological landscape or seascape characteristics or components of the ecological community

Describe the physical environment and other characteristics of areas where the ecological community occurs (e.g. in terrestrial communities this includes topography, soils, geology, altitude and climate). For freshwater aquatic environments, this may include information on hydrological cycles, groundwater and surface water components, along with types of wetland or floodplain substrates. It may also include information on temporal/seasonal aspects; e.g. permanent versus seasonally temporary wetlands.

For marine ecological communities, key elements of the physical environment may include: depth, substrate, geomorphology, temperature, water velocity and flow, dominant currents, acidity, salinity, light penetration, nutrient levels and the presence of upwellings, or eddies. In many cases it is physical parameters that drive the biotic components of a marine community.

Q.7a What other ecological communities intergrade with (occur near, and/or may be similar to) the nominated ecological community?

Note: Sometimes the physical, chemical and biological determinants of an ecological community can be difficult to determine at a particular site. For example, boundaries are inherently blurred in marine systems, by: local and large scale currents; temperature and nutrient gradients; and the non-sedentary nature of many organisms. There are rarely absolute physical boundaries to prevent the transmission of processes, organisms and substances. Also, there is often less ‘community’ scale information available for marine ecological communities compared to terrestrial ones. Where you encounter such challenges in defining the ecological community you should note this explicitly in your nomination. Being able to describe which ecological communities intergrade with, or are adjacent to, the proposed ecological community is very helpful in determining which ecological community is present at a particular site.

Completing Section 3 – Condition, existing protection, threats and recovery

Condition classes/thresholds

See earlier discussion of [Geographic and temporal variation within ecological communities on page 13](#).

The condition of a particular area of an ecological community describes how far it has changed from a benchmark state (e.g. pre-1750 condition^{8 on page 14}). An area that is in good or high condition resembles this benchmark state more closely than an area in poor or low condition.

A **condition class** describes a range of conditions that are thought to be of similar ecological value; i.e. a range of conditions that meet or exceed a particular **condition threshold**. A condition class may also contain different condition categories and thresholds, where different variables are used to indicate the same condition class.

You should define condition classes specifically for your nominated ecological community. The characteristics (variables) of different condition classes and categories may relate to: the structure of the ecological community; its species composition or other ecological properties; or the presence or absence of agreed indicator species or invasive species.

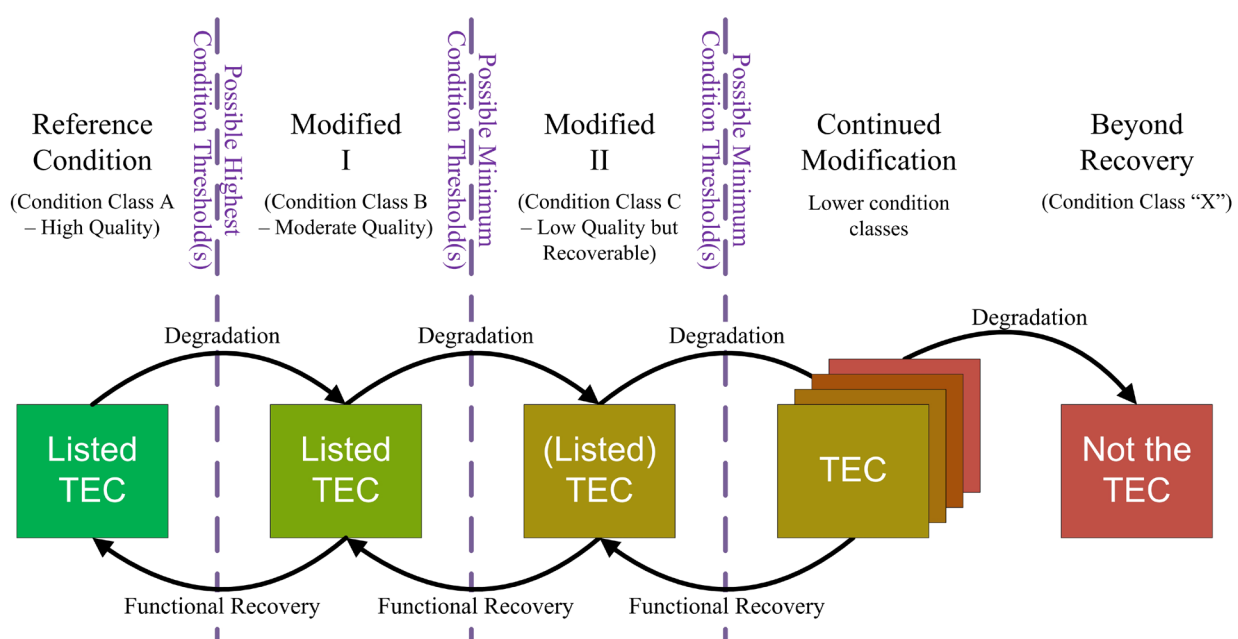
Examples of condition class variables (some of these may also be **key diagnostic characteristics**) include:

- Connectivity (e.g. proximity to other good condition native vegetation);
- presence and abundance of native and non-native species (e.g. estimated as a percentage of total or perennial vegetation cover);
- age-structure;
- native species diversity;
- overstorey projected foliage cover;
- understorey composition and cover (e.g. maximum shrub cover for a grassy woodland); and
- recognised fauna habitat values, or related flora features such as tree hollows.

For a defined ‘ecological community’ some of the condition classes may be identified as minimum ‘**condition thresholds**’ – areas meeting these being considered part of the nationally listed and protected ecological community. Other classes may be considered too degraded to warrant protection as a matter of national environmental significance (MNES) (see Figure 4).

Figure 4 illustrates the ‘Condition class’ approach, incorporating the continuum of an ecological community’s condition – from high quality, through various stages of modified (which still have the capacity for recovery) to a condition considered beyond recovery. This approach differentiates between areas subject to, and areas not subject to, the EPBC Act; and it supports the underlying logic for the TSSC’s listing and conservation advice to the Minister. Condition thresholds and classes should also assist with recovery and management decisions, as reflected in conservation advices, recovery plans and approval conditions for projects assessed under the EPBC Act (e.g. to improve condition from a moderate to a high quality condition class).

Figure 4: Example of the continuum of an ecological community’s condition



Communities usually move to a worse condition under pressure; and potentially can move to a better condition if pressure is relaxed, or management interventions are made. The exception is systems that are beyond recovery because of a loss of characteristic species, or irreversible change in species composition, or a loss of significant geomorphologic elements. In such a case, full recovery is impossible; but recovery of some of the original composition and function may be an NRM objective.

Threats

You must identify past, present and future threats to the ecological community. Are these threats actual or potential; and are their impacts direct or indirect? You must describe the impacts these threats have had, are currently having, or will have in the future on the ecological community and over what timeframe (see Applying the indicative time frames to the assessment criteria on page 27). If possible, draw out the implications and consequences of the impacts for the ecological community. Include as much specific qualitative and particularly quantitative information as possible.

Threat abatement and recovery

Give an overview of how threats (and/or their impacts) have been or are being abated (reduced), or could be abated; also document recovery actions that are underway or proposed. Identify any known management documentation and actions that directly or indirectly address threats to the ecological community – such as recovery plans, regional conservation plans, monitoring reports and management guidelines. If known, comment and provide studies or examples on the effectiveness of different threat abatement and recovery actions.

Completing Section 5 – Justification for the nomination

Category for which the ecological community is nominated under the EPBC Act

The EPBC Act specifies three categories under which threatened ecological communities can be listed (Table 3).

Table 3: EPBC Act categories of threatened ecological communities

Section 182 Critically endangered, endangered and vulnerable communities
(1) An ecological community is eligible to be included in the <i>critically endangered</i> category at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
(2) An ecological community is eligible to be included in the <i>endangered</i> category at a particular time if, at that time: <ul style="list-style-type: none"> (a) it is not critically endangered; and (b) it is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.
(3) An ecological community is eligible to be included in the <i>vulnerable</i> category at a particular time if, at that time: <ul style="list-style-type: none"> (a) it is not critically endangered or endangered; and (b) it is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.

The listing criteria in [Table 4 on page 26](#) are used to determine under which category an ecological community is eligible to be listed.

Before selecting one of the categories below you should read carefully through the following sections. It gives details of the prescribed criteria which eligibility for listing a TEC and the TSSC guidelines for interpreting these criteria.

In Section 5 of the Nomination Form give the reasons for your nomination.

Give evidence to show why the nominated ecological community meets at least one of the six criteria in [Table 4](#) for the nominated category of threat. The TSSC encourages (and may potentially prioritise) nominations that are as comprehensive as possible, assessing the ecological community against as many of the criteria as are relevant (even if some are not met, or are met at a lower category). The ecological community is eligible for listing if any one of the criteria are met. **It will be eligible for listing in the highest category met for any of the six criteria.**

Explain which threatened category the nominated ecological community meets for each relevant criterion and provide evidence to explain how the criteria are met. The criteria for each category under which you can nominate an ecological community for listing are provided in Table 4. The six criteria are aimed at detecting risk factors across the broad range of ecological communities.

Note: When completing Section 5 of the Nomination Form it is not sufficient to just refer back to earlier sections of the form. You must give a full explanation of why the ecological community meets the requirements for listing under a particular category, for at least one criterion.

Under section 182 of the Act, an ecological community is in the Critically Endangered, Endangered, or Vulnerable category, if it meets any of the criteria for that category, in [Table 4](#).

[Table 4: Criteria for Listing Threatened Ecological Communities \(EPBC Regulation 7.02\)](#)

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

Item	Criterion	Category		
		Critically Endangered	Endangered	Vulnerable
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 the indicative time frames to the assessment criteria

A number of the assessment criteria in Table 1 use timeframe thresholds. Defining appropriate time frames is particularly difficult for ecological communities with very long-lived functionally important species. While short time frames are clearly inappropriate for these ecological communities, very long time frames may be unreliable and irrelevant. The IUCN Red List Criteria ^{6 on page 12} for species deal with this issue by specifying time frames in either years or numbers of generations, whichever is longer. A cap is also placed on the maximum time frame to be considered. The focus is also on species that play a major role in sustaining the ecological community.

The following **indicative time frames** should be interpreted in the light of these considerations:

- **Immediate future (or past):** the next (or previous) 10 years, or 3 generations of any long-lived or key species believed to play a major role in sustaining the ecological community, (whichever is the longer), up to a maximum of 60 years.
- **Near future (or recent past):** the next (or previous) 20 years, or 5 generations of any long-lived or key species believed to play a major role in sustaining the ecological community, (whichever is the longer), up to a maximum of 100 years.
- **Medium-term future (or past):** the next (or previous) 50 years, or within 10 generations of any long-lived or key species believed to play a major role in sustaining the ecological community, (whichever is the longer), up to a maximum of 100 years.

Generation is defined to reflect the turnover rate of breeding (or propagating) individuals in a population (i.e. the average age of parents of the current cohort (e.g. newborn or newly established individuals in the population)). Generation length is greater than the age at first breeding or propagation, except in taxa that breed or propagate only once. Where generation length varies under threat, the more natural (i.e. pre-disturbance) generation length should be used. Generation length can be estimated in various ways.

For some ecological communities (e.g. in freshwater aquatic and marine systems) flexibility may be needed when considering indicative timeframes because dominant life forms may have life histories that don't sit within the range of timeframes provided. For example, as a rule, invertebrates feature more as dominant (functional, indicator) species in aquatic ecological communities and generally have shorter life history stages. Therefore, generation times may be in the order of months or a few years, rather than tens of years. Furthermore, given the wide range of life histories for marine species and the variable methods of larval dispersal and recruitment in the marine environment, measuring generation times may not be practical. So the timescales you use may be different to the indicative timeframes specified above.

Applying criteria to assess the level of threat to ecological communities

Interpreting specific criteria

The sections below give guidance on how to interpret the six listing criteria in a practical way, to determine the category under which the ecological community may be eligible for listing. Indicative thresholds, both qualitative and quantitative, are used to determine the appropriate category. In some cases, the indicative thresholds may not be applicable to a particular ecological community (e.g. some marine and freshwater aquatic ecological communities).

This may be for a range reasons, for example:

- the scale of the ecological community may be very large or very small;
- particular life histories of key organisms in the ecological community (e.g. those that are dominant and/or functionally important); and
- baseline data are insufficient or do not exist.

Where the indicative thresholds in these guidelines are not applicable, you should include a strong (evidenced based) argument to explain why you have used alternative thresholds and which alternative thresholds you have been applied.

Criterion 1 - Decline in geographic distribution

Criterion 1 is met if the ecological community's geographic distribution has substantially declined. The EPBC Regulations for listing an ecological community under this criterion are outlined in [Table 5](#).

[Table 5: EPBC Regulations for listing under criterion 1](#)

Item	Criterion	Category		
		Critically Endangered	Endangered	Vulnerable
1	Its decline in geographic distribution is:	very severe	severe	substantial

This criterion refers to a past decline in the geographic distribution of the ecological community. A rate of continuing decline in geographic distribution projected into the future may be covered under [Criterion 5 - Rate of continuing detrimental change on page 40](#).

This criterion is met if:

- the ecological community's range is now less than the threshold proportion of its former range; or
- the total area occupied by the ecological community is now less than the threshold proportion of its former occupied area; or
- less than the threshold proportion of the ecological community is now in big enough patches, or patches well enough connected with other patches, for it to be likely to persist beyond the *near future*.

For ecological communities assessed from 1 July 2013, either of two sets of indicative decline thresholds for terrestrial vegetation communities have been used. One is for a shorter timeframe (i.e. 50 years prior). The other is for a longer timeframe (beyond 50 years) – this typically relates to a benchmark of 1750^{8 on page 14}. The two sets of indicative decline thresholds for terrestrial vegetation communities are in [Table 6](#).

Table 6: Indicative decline thresholds for terrestrial vegetation communities (for Criterion 1)

Criterion	Category		
	Critically Endangered	Endangered	Vulnerable
Its decline in geographic distribution is either:	very severe	severe	substantial
a) Decline relative to the longer-term (beyond 50 years ago e.g. since 1750); or,	≥90%	≥70%	≥50%
b) Decline relative to the shorter-term (past 50 years).	≥80%	≥50%	≥30%

Note: These thresholds are indicative only. Other thresholds might be more appropriate for other types of ecological communities (e.g. invertebrate or aquatic communities); or for ecological communities that originally covered a relatively large, or a particularly small, area.

It is important that you demonstrate that the ecological community has declined to its present state from some convincingly defined former distribution (i.e. a benchmark state).

Where possible, show a measurable contraction in distribution (or patch size) using information at an appropriate scale of mapping. However, it may not be possible to provide precise spatial information on the distribution of an ecological community, particularly given the map scale available (e.g. for a narrow riparian ecosystem). Where this is the case, use other supporting evidence to show a contraction in distribution (or patch size); as long as it is supported by independent scientific assessment.

Criterion 2 - Limited geographic distribution coupled with demonstrable threat

Criterion 2 is met if the ecological community has a limited geographic distribution and the nature of that distribution, when coupled with demonstrable threat/s, makes it likely that the threat/s could cause it to become extinct. The EPBC Regulations for listing an ecological community under this criterion are outlined in [Table 7](#).

Table 7: EPBC Regulations for listing under criterion 2

Item	Criterion	Category		
		Critically Endangered	Endangered	Vulnerable
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

The purpose of this criterion is to recognise that an ecological community with a small or otherwise limited distribution has an intrinsically higher risk of extinction, if it continues to be subjected to a threatening process. Both the limited distribution and the threat of extinction could be either natural, or anthropogenic in origin (or a combination of the two).

Thresholds to identify terrestrial vegetation communities with limited distributions typically use three indicative measures:

- 1) extent of occurrence – an estimate of the total geographic range over which the ecological community occurs;
- 2) area of occupancy – an estimate of the area actually occupied by the ecological community (which generally equates with its present extent); and
- 3) patch size distribution – an indicator of the degree of vulnerability of small patches to particular threats.

These measures are allied to an assessment of timeframes over which demonstrable threats could result in the loss of the ecological community. The highest category met (i.e. indicating the most limited/restricted distribution), against any one of these measures, is applied in the assessment of the criterion to determine the conservation status of the ecological community.

To meet this criterion, both a **limited distribution** and **threat/s that could foreseeably cause the loss of the ecological community** in a certain timeframe must be demonstrated. The thresholds for terrestrial vegetation communities are in [Table 8](#). This criterion is not met for an ecological community with a limited distribution (whether naturally, or that has become so through modification) which is not subject to a threatening process that could cause its loss within the indicative timeframes (or is unlikely to be subject to such processes in the foreseeable future). This criterion only applies to ecological communities with distributions that are considered limited on a national scale (after all bioregional occurrences are taken into account, regardless of state or territory boundaries).

The categories are nested (i.e. *very restricted* is a subset of *restricted* and *limited*; and *restricted* is a subset of *limited*). This means that if an ecological community met one of the thresholds for *very restricted* (e.g. average patch size) but the timeframe in which threats could cause a loss was the *near future* (as opposed to the *immediate future*) the ecological community would be eligible for the listing as Endangered.

For example – Banksia Woodlands of the Swan Coastal Plain met *very restricted* due to a median patch size of less than 10 ha but the timeframe in which threats could cause a loss was estimated as the *near future* (as opposed to the *immediate future*), so the ecological community was determined to be eligible for

listing as Endangered (TSSC, 2016). For further details, see the Criterion 2 discussion in Appendix E of the approved Conservation Advice at: <http://www.environment.gov.au/cgi-bin/sprat/public/publicshowcommunity.pl?id=131&status=Endangered>.

For another example of this categorisation of an endangered ecological community, see the Criterion 2 discussion in Appendix E of the approved Conservation Advice for the Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion (TSSC, 2015) at:

<http://www.environment.gov.au/cgi-bin/sprat/public/publicshowcommunity.pl?id=119&status=Endangered>

Table 8: Conservation status based on limited geographic distributions and threat timeframes (for Criterion 2)

Its geographic distribution is:	Very restricted	Restricted	Limited
Extent of occurrence ¹⁶ (EOO)	< 100 km ² = <10,000 ha	<1,000 km ² = <100,000 ha	<10,000 km ² = <1,000,000 ha
Area of occupancy (AOO)	< 10 km ² = <1,000 ha	<100 km ² = <10,000 ha	<1,000 km ² = <100,000 ha
Patch size ¹⁷	< 0.1 km ² = <10 ha	< 1 km ² = <100 ha	-
AND the nature of its distribution makes it likely that the action of a threatening process could cause it to be lost in (i.e. the timeframe in which threats could cause its loss is):			
The immediate future ¹⁸ Within 10 years, or 3 generations of any long-lived or key species (whichever is the longer), up to a maximum of 60 years.	Critically Endangered	Endangered	Vulnerable
The near future Within 20 years, or 5 generations of any long-lived or key species (whichever is the longer), up to a maximum of 100 years.	Endangered	Endangered	Vulnerable
The medium-term future Within 50 years, or 10 generations of any long-lived or key species (whichever is the longer), up to a maximum of 100 years.	Vulnerable	Vulnerable	Vulnerable

¹⁶ Further details can be found in [Geographic distribution used for determining listing eligibility on page 12](#).

¹⁷ A number of patch size measures may be applied here, depending on what data are available:

- Average patch size – In cases where the ecological community is fragmented and patch size distribution is skewed (away from a ‘normal’ distribution) towards mostly small patches, the median average patch size is the appropriate measure to use. Otherwise, the smaller of the mean average or median average patch size should be referred to.
- Patch size distribution – The proportion of patches that fall within each size class.

All listing criteria should be interpreted in a biologically meaningful way. Alternative threshold values for patch size may be more appropriate, depending on the ecological community; particular ecological communities tend to have a typical range of patch size that reflects the nature of the habitat and is relevant to their assessment.

¹⁸ These timeframes are as per those on [page 27](#).

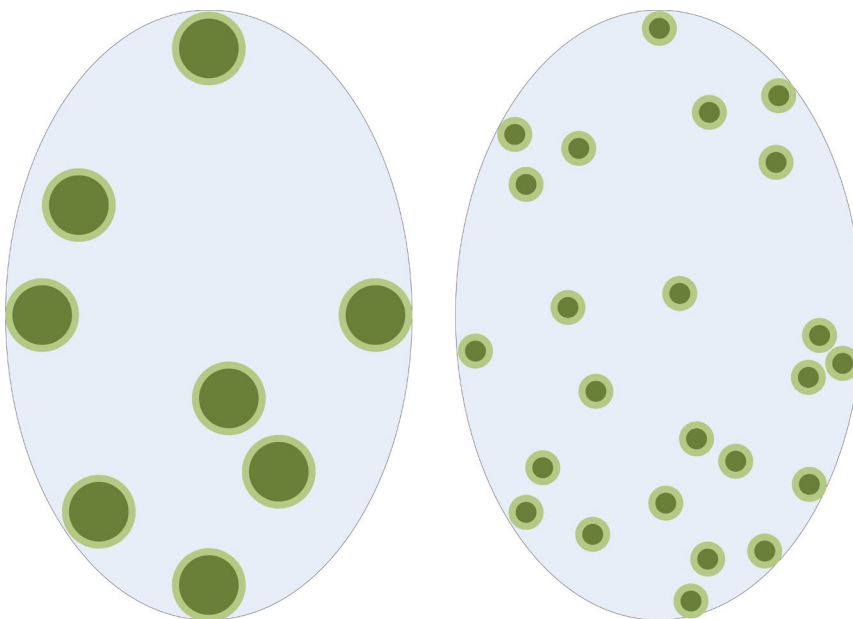
Similarly the timeframe categories are also nested under the EPBC Regulations. To qualify as Critically Endangered under Criterion 2 (as set out in Table 8) an ecological community's geographic distribution must be *very restricted*. Consequently, based on the EPBC Regulations, a *restricted* ecological community, that could be lost in the *immediate future* (e.g. less than 10 years) still only qualifies as Endangered; i.e. less than 10 years is also less than 20 years (the *near future*). Equally, an ecological community with a *limited* geographic distribution can only be found to be Vulnerable under Criterion 2, regardless of whether the timeframe is the *immediate future*, the *near future*, or the *medium-term future*.

An ecological community's geographic distribution may also be limited due to small patch size, which can make it less resilient and more susceptible to certain threats and hence foreseeably hasten its loss. In particular, 'edge effects' such as weed incursion or increased vulnerability to climatic events can disproportionately affect small patches, even if the total measured area of the ecological community is not greatly reduced (see Figure 5).

The position of patches within the EOO is also important. Connectivity may be reduced by the loss of individual patches before the extent of occurrence and area of occupancy are noticeably reduced by cumulative losses.

Figure 5 illustrates the geographical distribution of two potentially threatened ecological communities with similar extent of occurrences (EOOs) and areas of occupancy (AOOs) but quite different patch size distributions. The ecological community in smaller patches is likely to be susceptible to greater edge effects across its range.

Figure 5: Illustrative example of the geographical distribution of two potential TECs



Depending on the nature of a particular ecological community, smaller patches are often important components of the ecological community. However, smaller patches sometimes have limited diversity from which to recolonise/recover losses, and there may be large distances between infrequent (remaining) larger patches. This can increase the threat to the ecological community overall. This could apply equally to ecological communities that are naturally fragmented, depending on the nature of the threats. The impacts of fragmentation are covered under criteria 1, 4 and 5.

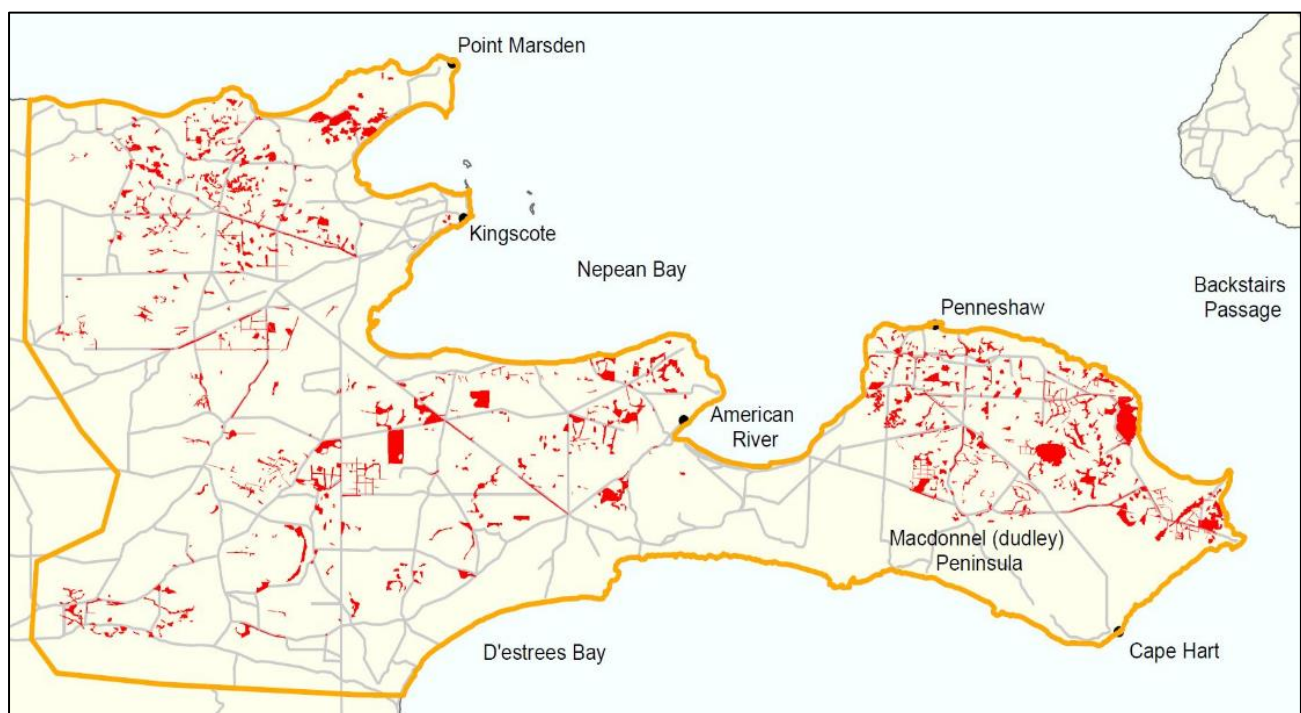
Three examples of ecological communities with a very restricted geographic distribution are outlined below.

Example 1A: Kangaroo Island Narrow-leaved Mallee (*Eucalyptus cneorifolia*) Woodland

As shown in Figure 6, the ecological community is widely scattered across the Eastern Plains and Dudley-Haines Plateau of Kangaroo Island with minor occurrences in adjacent regional ecological areas. Consequently it has an EOO of 105 000 ha. As the estimated extent of occurrence is very close to the indicative threshold that differentiates a restricted and limited distribution (100 000 ha) and given the fragmented nature of this ecological community, the TSSC considered its extent of occurrence to be **restricted**. Its AOO, estimated to cover between 5580 ha and 6900 ha, is also indicative of a **restricted** geographic distribution (<10 000 ha).

Only four of the over 800 patches are greater than 100 ha in size and 81% of patches are less than 10 ha in size (which meets the [<10 ha] average patch size threshold for a **very restricted** geographic distribution). Intensive clearing has resulted in a marked change from continuous, or near continuous, cover to a highly fragmented distribution, which is more susceptible to disturbances and adverse influences from the surrounding environment (TSSC, 2014). Therefore the overall conclusion for criterion 2 was Critically Endangered.

Figure 6: Indicative distribution map (excerpt) of the Kangaroo Island Narrow-leaved Mallee (*Eucalyptus cneorifolia*) Woodland ecological community



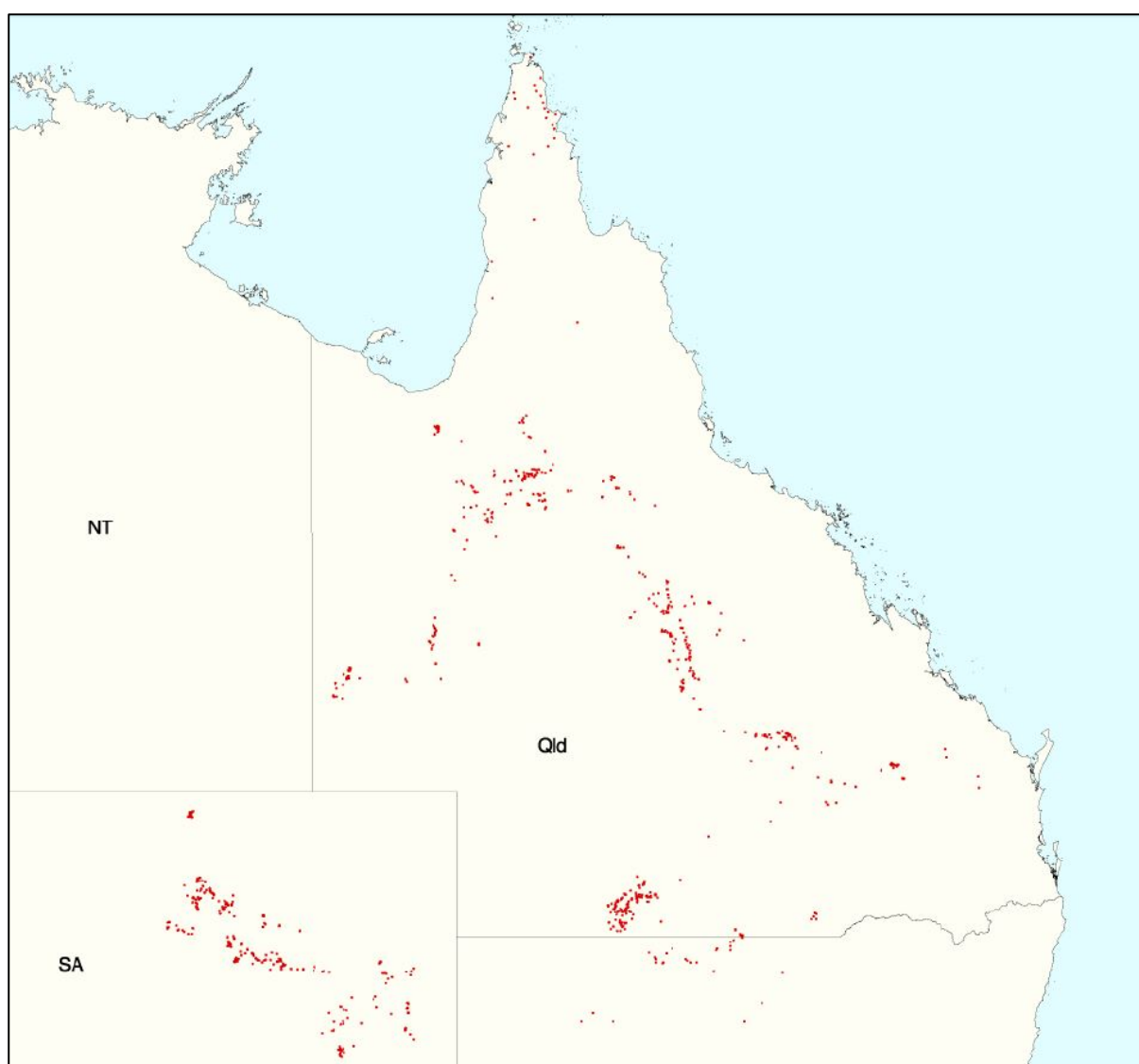
For further details, see the Criterion 2 discussion in Appendix D of the approved Conservation Advice for this ecological community at: <http://www.environment.gov.au/cgi-bin/sprat/public/publicshowcommunity.pl?id=102>. The indicative distribution map of the Kangaroo Island Narrow-leaved Mallee (*Eucalyptus cneorifolia*) Woodland ecological community is available at <http://www.environment.gov.au/biodiversity/threatened/communities/maps/pubs/102-map.pdf>

Example 1B: The Community of Native Species Dependent on Natural Discharge of Groundwater from the Great Artesian Basin (GAB)

As shown in Figure 7, the size of the GAB and the dispersed nature of the discharge spring complexes means that the EOO of the ecological community does not qualify as a **limited** geographic distribution (i.e. less than 10 000 km²). Also at the time the AOO was not readily calculable.

However, discharge springs of the GAB are naturally **very restricted** in their patch sizes, typically less than 100 m in diameter. Individual springs may be isolated by tens of kilometres from the next nearest spring, but all could be lost due to the loss of, or changes in, water discharge across the Basin (TSSC, 2001). Therefore the overall conclusion for criterion 2 was Critically Endangered.

Figure 7: Indicative distribution map (excerpt) of the Community of Native Species Dependent on Natural Discharge of Groundwater from the Great Artesian Basin



The indicative distribution map of the Community of Native Species Dependent on Natural Discharge of Groundwater from the Great Artesian Basin ecological community is available, along with its listing advice, at: <http://www.environment.gov.au/system/files/pages/d057815e-6564-4ad6-b03c-447d5fc189f1/files/artesian-groundwater-dependant-map.pdf> and <http://www.environment.gov.au/cgi-bin/sprat/public/publicshowcommunity.pl?id=26>

Example 1C: Littoral Rainforest and Coastal Vine Thickets of Eastern Australia

As shown in Figure 8 the ecological community has a linear distribution along the eastern coastline, with 82% of patches less than 10 ha in size. The ecological community is naturally fragmented; and patches are getting smaller and even more fragmented because of coastal development, sandmining and agriculture.

The fragmented and linear nature of the patches, their small size and area to perimeter length ratios result in a greater susceptibility to disturbance (such as storms and weed invasion) and hence the ecological community has an inherently higher risk of extinction (TSSC, 2008).

Whilst its patch size distribution qualifies it as having a **very restricted** geographic distribution (<10 ha) – this is not the case for its AOO (34 407 ha), which only qualifies it as having a **limited** geographic distribution.

The indicative distribution map of the Littoral Rainforest and Coastal Vine Thickets of Eastern Australia ecological community is available, along with the Listing Advice, at:

<http://www.environment.gov.au/biodiversity/threatened/communities/pubs/76-map.pdf> and <http://www.environment.gov.au/cgi-bin/sprat/public/publicshowcommunity.pl?id=76>.

Figure 8: Indicative distribution map (excerpt) of the Littoral Rainforest and Coastal Vine Thickets of Eastern Australia ecological



Criterion 3 - Loss or decline of functionally important species

Criterion 3 is met if there has been a substantial decline in a population of a native species that is likely to play a major role in the ecological community, to the extent that restoration of the ecological community is not likely to be possible in the medium-term future. The EPBC Regulations for listing an ecological community under this criterion are outlined in [Table 9](#).

Table 9: EPBC Regulations for listing under criterion 3

Item	Criterion	Category		
		Critically Endangered	Endangered	Vulnerable
3	For a population of a native species that is likely to play a major role in the community, there is a:	very severe decline	severe decline	substantial decline
	to the extent that restoration of the community is not likely to be possible in:	the immediate future	the near future	the medium-term future

This criterion refers to native species that: are critically important in the processes that sustain the ecological community; or, play a major role in the ecological community. Also, the loss of the functionally important species must have the potential to precipitate change in community structure or function sufficient to potentially lead to the ecological community's extinction.

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 in rainforest communities, such as the cassowary.

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

- 1) the decline of a population of native species within the ecological community that is likely to play a major role in the community over a particular timeframe threshold; and
- 2) the specified timeframe threshold within which *restoration* of structure and function for the ecological community as a whole is unlikely.

For the purposes of this criterion '*restoration*' is defined as the re-establishment (or recovery) of ecological processes, species composition and community structure within the range of variability described in the nomination (and/or subsequent Listing / Conservation Advice) for the ecological community. Restoration may occur through active intervention. A benchmark state or reference condition may be used to assess potential outcomes.

The category for which the ecological community may be eligible for listing under this criterion is dependent on the level of decline of the functionally important species over particular timeframes (see **Step 1** below for indicative thresholds).

In addition, the ecological community is only eligible for listing if meeting appropriate timeframes for restoration is unlikely (see **Step 3** below for indicative thresholds). Conversely, if restoration of the community as a whole is likely to be achievable within certain timeframe thresholds, 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 of functionally important species, in which the decline in the ecological community as a whole may be halted, or reversed, such that it is no longer likely to become extinct. For example, reversed by natural processes (such as replacement of one functionally important species by another), or reversed by management intervention (such as ongoing weeding and replanting).

In making an assessment against the criterion, the following steps apply.

Step 1: Determine the level of decline experienced by a population of a functionally important species. Based on the IUCN criteria, the TSSC provides the following thresholds as guidance¹⁹:

- **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.

Note: These timeframes may not necessarily be appropriate for all functionally important species. Alternatives may be applied, but should be fully explained and justified.

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

Level of decline	Category
Very severe	Critically Endangered
Severe	Endangered
Substantial	Vulnerable

Step 3: Predict whether restoration of the ecological community is possible within a certain timeframe. The indicative timeframe threshold (on [page 27](#)) that is used to determine eligibility depends on the level of decline of the functionally important species, so to be eligible for:

- **Critically Endangered**, the decline of the functionally important species is **very severe** and *restoration* of the ecological community as a whole is unlikely in the **immediate future**;
- **Endangered**, the decline of the functionally important species is **severe** and *restoration* of the ecological community as a whole is unlikely in the **near future**; and
- **Vulnerable**, the decline of the functionally important species is **substantial** and *restoration* of the ecological community as a whole is unlikely in the **medium-term future**.

i.e. The criterion is met if the restoration timescale (in which restoration of the ecological community as a whole is possible) is longer than the relevant threshold timeframe.

¹⁹ For guidance on the use of timelines see [page 27](#).

Examples that illustrate eligibility and listing category for Criterion 3

Example 2a: *Eligible to be listed as Critically Endangered*

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 ecological 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 ecological community **may be eligible for listing as Critically Endangered**;

Step 3: Restoration is likely to take 100 years. Based on **very severe** the decline, the restoration timeframe threshold to consider is *immediate future* (i.e. a maximum of 60 years); so restoration is unlikely in the *immediate future*. The ecological community exceeds the threshold.

Therefore, the ecological community meets this criterion and **is eligible** for listing as **Critically Endangered**.

Example 2b: *Not eligible to be listed under any category*

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 ecological community is likely to be possible in 8 years (or only 2 generations of the functionally important species):

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

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

Step 3: based on the **very severe** decline, the restoration timeframe threshold to consider is *immediate future* (i.e. 10 years, or 3 generations). Since restoration is likely to take 8 years (or 2 generations), it is likely to be possible in the *immediate future*, so the ecological community does not exceed the threshold.

Therefore, the ecological community **is not eligible** for listing under any category.

Example 2c: *Not eligible to be listed under any category*

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 ecological community **may be eligible for listing as Endangered**;

Step 3: based on the **severe** decline, the timeframe threshold is *near future*. Since restoration is likely to take 17 years, it is **likely** to be possible within the *near future* (i.e. within 20 years), so the ecological community does not exceed the threshold

Therefore, the ecological community **is not eligible** for listing under any category.

Criterion 4 - Reduction in community integrity

Criterion 4 is met if there has been a substantial reduction in an ecological community's integrity across most of its geographic distribution, as indicated by a substantial degradation of the community or its habitat, or by a substantial disruption of important community processes. The EPBC Regulations for listing an ecological community under this criterion are outlined in [Table 10](#).

Table 10: EPBC Regulations for listing under criterion 4

Item	Criterion	Category		
		Critically Endangered	Endangered	Vulnerable
4	The reduction in its integrity across most of its geographic distribution is:	very severe	severe	substantial
	as indicated by degradation of the community or its habitat, or disruption of important community processes, that is:	very severe	severe	substantial

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

In a similar way as for Criterion 3, in order to assess the risk of extinction under this criterion, the TSSC takes into account the potential for recovery of the ecological community as an indication of the severity of degradation or disruption (i.e. the reduction in integrity must have the potential to precipitate change in community structure or function sufficient to lead to the eventual extinction of the ecological community). The following guidelines are therefore applied to the listing categories:

- **Critically Endangered** = change in integrity such that *restoration* is unlikely within the *immediate future*
- **Endangered** = change in integrity such that *restoration* is unlikely within the *near future*
- **Vulnerable** = change in integrity such that *restoration* is unlikely within the *medium-term future*

For the purposes of this criterion '*restoration*' is defined as the re-establishment (or recovery) of ecological processes, species composition and community structure within the range of natural variability for the ecological community. Restoration may occur through active intervention. A benchmark state or reference condition may be used to assess potential outcomes. Note: Indicative time frames associated with extinction risk are as discussed on [page 27](#).

Step 1 in assessing 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 ecological 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 ecological community.

Step 2 in assessing this criterion recognises that ecological processes are important to maintain an ecological community (e.g. fire regimes or flooding) and that disruption of these processes can lead to the decline in integrity of the ecological community. This criterion could apply where disruption of processes is evident, but prior to a measurable decline in integrity of the ecological community; although clear evidence demonstrating the link must be presented. Examples of this include: altered hydrology leading to rising water tables and/or dryland salinity; or, in the marine environment, an increase in nutrients flowing into the ecological community as a result of human activity. Another example would be where recruitment to the ecological 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). This allows for recognition of a problem at an earlier stage.

Criterion 5 - Rate of continuing detrimental change

Criterion 5 is met if there is a serious rate of continuing decline in an ecological community's geographic distribution, or of a population of a native species that is believed to play a major role in the community - or if there is a serious intensification, across most of its geographic distribution, in degradation, or disruption of important community processes. The EPBC Regulations for listing an ecological community under this criterion are outlined in [Table 11](#).

[Table 11: EPBC Regulations for listing under criterion 5](#)

Item	Criterion	Category		
		Critically Endangered	Endangered	Vulnerable
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

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 (that are unlikely to result in extinction) will not normally count, but an observed change should not be considered to be part of a natural fluctuation unless there is evidence for this.

In assessing this criterion, the TSSC recognises that the rate of continuing detrimental change in an ecological community affects its risk of extinction, regardless of the availability of long-term historical 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 exercises “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 ecological community.

The following rates drawn from the updated IUCN Red List Criteria for species are intended to provide guidance only - An observed, estimated, inferred or suspected detrimental change (over the immediate past or projected for the immediate future²⁰) of at least:

- Critically Endangered (very severe) \cong 80%
- Endangered (severe) \cong 50%
- Vulnerable (substantial/serious) \cong 30%

Where *detrimental change* may refer to any 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 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

Criterion 6 is met if a quantitative analysis shows that the ecological community’s probability of extinction, or extreme degradation over all of its geographic distribution, is at least 10% in the medium-term future. The EPBC Regulations for listing an ecological community under this criterion are outlined in [Table 12](#).

Table 12: EPBC Regulations for listing under criterion 6

Item	Criterion	Category		
		Critically Endangered	Endangered	Vulnerable
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

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 of other components, habitat requirements, ecological processes, threats and any specified management options.

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.

²⁰ For guidance on the use of timelines see [page 26](#)

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.

The indicative timeframe threshold ([on page 27](#)) can be used to determine eligibility.

Completing Section 6 – Referencing

All scientific literature and expert opinion, including online sources should be referenced throughout the nomination and a list of references provided in section 6. Examples of referencing are in the example of a comprehensively completed nomination is available, along with the TEC Nomination Form on the Department's website.

Please provide (electronic/scanned) copies of key documentation/references (or relevant parts of these) that have been cited in your nomination, if they are not easily accessible via the internet. Identify relevant experts and their contact details, in particular experts who were consulted during preparation of your nomination.

Appendix 1 – Area of occupancy and extent of occurrence

Also see IUCN Guidelines at: www.iucnredlist.org/technical-documents/red-list-training/red-list-guidance-docs.

Extent of occurrence (EOO)

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 an ecological community, excluding cases of vagrancy²¹ (see example B in Figure 9). This measure may exclude discontinuities or disjunctions within the overall distributions of the ecological community (e.g. large areas of obviously unsuitable habitat). EOO 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 (AOO)

AOO is defined as the area within its EOO which is actually *occupied* by an ecological community, excluding cases of vagrancy. This takes into account the fact that an ecological community will not usually occur throughout the area of its extent of occurrence, which may contain unsuitable or unoccupied habitats. In some cases the AAO is the smallest area essential to the survival of an ecological community. Typically, patch sizes (where data is available) will be added up, to give a total AOO.

When counting occupied grid squares (as shown in example C in Figure 9) the size of the AOO will be a function of the scale at which it is measured. The scale should be appropriate to relevant biological aspects of the ecological community, the nature of threats and the available data (see

Geographic and temporal variation within ecological communities on page 13).

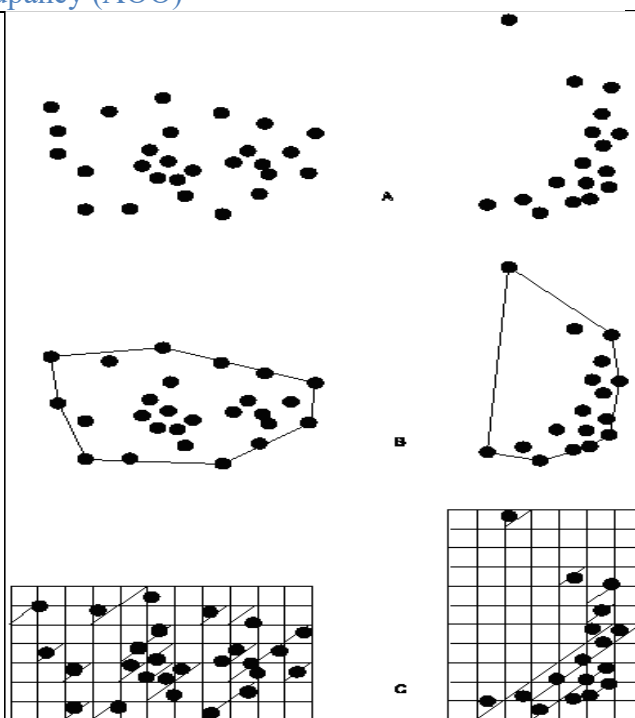
To avoid inconsistencies and bias in assessments caused by estimating area of occupancy at different scales, it may be necessary to standardise estimates by applying a scale-correction factor. It is difficult to give strict guidance on how standardisation should be done because different types of ecological communities have different scale-area relationships.

Figure 9: Two examples of the distinction between extent of occurrence (EOO) and area of occupancy (AOO)

(A) Shows two examples of the spatial distribution of known, inferred or projected sites of present occurrence of an ecological community.

(B) Shows a possible boundary in each case. The EOO is the measured area within each boundary.

(C) Shows one method of estimating AOO, by counting the occupied grid squares.



²¹ Vagrancy: Occurrence well outside an entity's normal distribution

Appendix 2 – Addressing climate change as an important threat

Anthropogenic climate change is happening at an unprecedented rate. It will probably put greater climate stresses on species and ecological communities than there have been for many thousands of years. There are intrinsic limits on how much and how fast ecosystems can adapt to climate change. The current rate of change may be too fast for ecosystems to adapt.

These guidelines are to help you decide if the threat posed by climate change has been, is, or will be, an important threat to the nominated ecological community. Understanding and predicting how climate change will affect ecological communities and ecosystems is very difficult. This is because of the complex ways in which climate change and ecosystems interact, including: non-linearities²², time lags, critical thresholds, feedback loops, rapid transformations and surprises.

Direct impacts of climate change on individual species are rarely the most important ones when it comes to threatening an ecological community (except when it results in the loss or decline of functionally important species, see Criterion 3 - Loss or decline of functionally important species [on page 36](#)). It is the impacts on species' interactions and potential disruptions to ecosystem processes and functions that are often more important.

Currently there is a focus on assessing the potential impacts of climate change as a single stressor on individual species and our understanding of the ecological consequences of climate change is limited. This reflects the current state of climate change science. Recognising these limitations, an assessment of the climate change threat to an ecological community will be limited to estimating the ecological community's exposure to climate change and the vulnerability of its component species.

If climate change is an important threat to the nominated ecological community it is important that you provide referenced information on exactly how climate change might significantly increase the nominated ecological community's vulnerability to extinction.

Please cite the climate change references used to argue for significant climate change impact.

Climate change sensitivity of an ecological community

The sensitivity of an ecological community may be based on the vulnerability of particular component species. The focus should be on the functionally important species that are the most likely to be affected by climate change (e.g. important structural species – such as hard corals or deep rooted trees). Species respond to climate change stresses in a range of ways. For example they may remain in areas where they are able to tolerate or adapt to conditions; or they may move to more suitable habitats where possible; or, they may die out. So, there is likely to be a disassembling of the species composition of the ecological community and new assemblages formed over time. This is a natural adaptive process.

A species' vulnerability to climate change will depend on a combination of biological traits, such as: behaviour, habitat requirements and microhabitat use; as well as its degree of exposure to climate change.

²² Non-linear systems are systems in which effects are not proportional to their causes. Such systems can be chaotic (characterised by random behavior / unpredictability). Non-linearity is a feature of the natural world, of systems which cannot be split up into parts and reassembled into the same thing.

Appendix 3 – Framework for the prioritisation of nominations

To be used in association with the EC nomination guidelines. Points are not in any particular order.

Primary considerations	Issues for prioritisation
Nature, degree and timeframe of threats operating on the EC	This takes into account the number of threats operating, how severe the threat impacts are/were, whether they are actual/ potential or past/current, the timeframe for future threats, and the degree to which threats are manageable.
Conservation status and listing criteria the EC will likely meet	There needs to be sound demonstration that the nominated EC is likely to meet at least one (preferably more) of the six listing criteria. The proposed conservation status is considered on a relative basis to the rest of each year's nomination pool ²³ .
Consideration of quality of data and information available to adequately describe and assess against listing criteria	Nominations that lack information and adequate/high quality data to describe an EC and assess it against listing criteria (or do not provide advice regarding obtaining such data) are more difficult to assess and can waste resources (particularly if listing does not proceed). Therefore they may be considered a lower priority in comparison to better described items in the nomination pool*. However, if it is widely known that threats are operating and the EC is in decline then a nomination should be further investigated by the nominator and/or Department/TSSC.
Consideration of national extent	There are a range of scales at which an ecological community can be defined. Regardless of scale, the proposed extent of the EC needs to be clearly defined and reflect <u>national</u> distribution (e.g. irrespective of jurisdictional boundaries). If national extent is difficult to determine, then assessment may take longer. National listing of ECs often occurs at a broad landscape/seascape scale but it is recognised that smaller threatened ECs are still national assets and can be strong candidates for protection as a matter of national environmental significance.
Consideration of amount and efficacy of protection already provided by areas in conservation reserves	ECs may be already wholly or largely protected by conservation-related tenure. Depending on the effectiveness of this protection, the EC may be a lower priority as listing may not provide additional protection. However, if the current level of protection is insufficient to protect it from threats, then the EC may have a higher priority.
Consideration of existing level and efficacy of protection by state/territory legislation	It is important to consider whether the full national extent is protected by state/territory legislation and how much national listing may add to protection/conservation (e.g. extent across two jurisdictions but only protected by one).
Consideration of existing level and efficacy of protection through Ramsar listing	ECs wholly or largely corresponding to a Ramsar wetland are already afforded protection under the EPBC Act as a matter of national environmental significance. Thus they may be considered a lower priority, depending on the effectiveness of current protection compared to the level of threat operating.
Consideration of existing level and efficacy of protection through Heritage listing	ECs wholly or largely corresponding to protected values within a World or National Heritage area are already afforded protection under the EPBC Act. Thus they may be considered a lower priority, depending on the effectiveness of current protection.

²³ Nomination pool refers to the set of nominations received in any particular year for that year's Priority Assessment List plus previous year nominations that were not prioritised for assessment the year before (i.e. Section 194G(3)(c) of the EPBC Act allows for eligible nominations to be considered for two consecutive annual assessment lists).

Other considerations	Issues for prioritisation
Overall conservation benefit of protecting the EC by contributing to/reinforcing the national context	In general, consider to what degree national listing of the EC would raise awareness/recognition, leading to more opportunities for increased/improved: research, management, threat abatement, recovery or restoration. Also consider benefits of listing that reinforce protection in the national context. For example: does the EC take a landscape/seascape approach, or contribute to a comprehensive, adequate and representative national list of ECs (e.g. range of bioregions or types currently on national lists) or is it of a unique biological nature (including high-value remnants) that is poorly represented by existing protection measures or would listing the EC contribute to other International or National biodiversity policy objectives? These factors may be taken into account when considering prioritisation of the EC against the nomination pool*.
Additional conservation benefit through protection of enhanced ecological functionality at a regional or national scale	For example: Does the EC provide connectivity between other protected areas or threatened systems, and/or create a corridor effect for wildlife movement, and/or protect important regional/national refugia? Such ECs would benefit from protection (and enhance existing biodiversity/habitat/ecosystem-function protection measures in connected areas), which may make them a higher priority when considered against the nomination pool*.
Species Habitat	Protecting an EC can complement threatened species protection in addition to providing broader protection for all wildlife species where landscape-scale threats operate. ECs may be considered a higher priority if they provide critical habitat to a high number of threatened and/or migratory species, or a high number of “rare”, “near-threatened” or “declining” species, or functionally-important species (e.g. ecosystem engineers), or contain a high diversity of species.
Key Threatening Processes	Would listing the EC help to draw attention to and help abate one or more key threatening processes?
Regional Forest Agreements (RFAs)	The EPBC Act does not fully apply to forestry operations in areas covered by RFAs. However, it is noted that threatened ECs in such areas should still be given due consideration in the nomination/prioritisation process, particularly as listing highlights matters of national environmental significance that should be protected and conserved through appropriate management/recovery.

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*The following Technical synthesis of the above document is available online:

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