

DRAFT Description and Listing Assessment for the Plains Mallee Box Woodland of the Murray Darling Depression and Riverina Bioregions



Plains Mallee Box Woodlands © Ian Sluiter.

The 'Plains Mallee Box Woodland of the Murray Darling Depression and Riverina Bioregions' ecological community is under assessment by the Threatened Species Scientific Committee for listing as a threatened under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The Committee will provide its advice on the ecological community to the Federal Minister for the Environment as a draft conservation advice in 2020. The Minister will then decide whether to amend the list of threatened ecological communities under Section 184 of the EPBC Act to include the Plains Mallee Box Woodland of the Murray Darling Depression and Riverina Bioregions.

This draft conservation advice is being made available for expert and public comment for a minimum of 30 business days. The Committee and Minister will have regard to all public and expert comment relevant to the consideration of the ecological community for listing.

The preliminary assessment is that the ecological community merits listing as critically endangered and the eligibility against each of the listing criteria is:

Criterion 1: Critically Endangered	Criterion 4: Critically Endangered
Criterion 2: Critically Endangered	Criterion 5: Insufficient data
Criterion 3: Insufficient data	Criterion 6: Insufficient data

ECOLOGICAL COMMUNITY INFORMATION

Description

The ecological community described in this conservation advice includes plants, animals and other organisms associated with a type of mallee woodland that is found in south-west New South Wales, north-west Victoria, and south-east South Australia. It is an open mallee eucalypt woodland with a canopy typically dominated by 'mallee box' *Eucalyptus* species¹ and an understorey in which tussock grasses are prominent in wet years, low chenopod shrubs occur in variable densities, and taller shrubs are typically sparse. The ecological community is associated with relatively medium-heavy textured soils² on near-level sandplains.

This section describes the natural and largely undisturbed state of the ecological community. However, as a result of past disturbance, not all occurrences of the ecological community still exist in a natural or benchmark state (see also [Section 1.1.3](#)).

Name

The name of the ecological community is the **Plains Mallee Box Woodland of the Murray Darling Depression and Riverina Bioregions** (hereafter referred to as the 'Plains Mallee Box Woodland' or the 'ecological community'). The name reflects the dominant mallee types, community structure, landscape context and geographical area over which the ecological community occurs.

The ecological community was originally placed on the 2015 Finalised Priority Assessment List as the 'Ridged plains mallee woodland'. At that time, this reflected the name of the related vegetation type, also known as Ecological Vegetation Class (EVC), used in Victoria.

Location and physical environment

The ecological community occurs within the following bioregions (Interim Biogeographic Regionalisation of Australia, IBRA V7, DoE 2012):

- Murray Darling Depression Bioregion (NSW, SA, Vic)
- Riverina Bioregion (NSW, Vic)

Within these bioregions, the ecological community typically occurs on near-level plains or occasionally on gently sloping terrain surrounding and within run-on landscape depressions where soil textures are typically clay loams, but may occasionally be sandy clay loams or light clays (see below).

The ecological community is associated with areas with an average annual rainfall (MAR) typically in the range of 260mm – 450mm, within semi-arid to arid regions of the Murray-Darling Depression and Riverina Bioregions.

In Victoria, it occurs primarily on Woorinen Formation plains (Lawrence 1966; 1980) and occasionally alluvial plains from the border with South Australia between the two Lowan Formation (Lawrence 1966; 1980) sand sheets known as the Little Desert and the Big Desert and extends in an easterly direction towards Charlton, Boort and Kerang on the southern

¹ Box-barked *Eucalyptus* species with a mallee growth form, within *Eucalyptus* Section *Adnataria*.

² Relatively medium-heavy textured soils – The soils for this ecological community are more heavily textured than for other mallee vegetation communities. The soils are lighter textured than soils that support some other vegetation communities in the region, such as saltbush shrublands and black box woodlands.

boundary, with a northern boundary more or less constrained by the Murray River. Outlier occurrences may also occur within the Little Desert, Big Desert and Natimuk areas (Sluiter and Schultz, 2020).

In NSW, it occurs primarily in the Kyalite-Tooleybuc-Koraleigh-Speewa area with possible extensions east toward Moulamein (Sluiter and Schultz, 2020).

In South Australia, it occurs in the following regions and in the vicinity of associated localities: Western Murray Flats: Monarto to Walker Flat and north to Swan Reach; Southern Murray Mallee: Murray Bridge-Taiem Bend-Wynarka-Karoonda-Wanbi; and Upper South East: Keith-Tintinara-Coonalpyn (Sluiter and Schultz, 2020).

The ecological community is likely or known to occur (as at July 2020) within the Murray, North Central and Wimmera Catchment Management Authority regions in Victoria; the 'Murray' (western edge) and 'Western' (near Balranald) Local Land Services regions in NSW; and the 'South Australian Murray Darling Basin' (Murraylands and Riverland) and 'South East' (Limestone Coast) Natural Resources Management regions in SA.

The ecological community is likely or known to occur (as at July 2020) within or adjacent to the following Local government areas:

Victoria – Buloke Shire, Gannawarra Shire, Hindmarsh Shire, Horsham Rural City, Loddon Shire, Mildura Rural City, Swan Hill Rural City, West Wimmera Shire, Yarriambiack Shire.

NSW – Balranald Shire Council, Edward River Council, Murray River Council.

South Australia – Coorong District Council, Mid Murray Council, Southern Mallee District Council, Tatiara District Council, The District Council of Loxton Waikerie, The District Council of Karoonda East Murray, The Rural City of Murray Bridge.

Soils

Soils are variable but are typically duplex, with clay loam or occasionally sandy clay loam topsoil textures mostly of Woorinen Formation aeolian origin, above deep fine textured clay subsoils. In Victoria and NSW, topsoil colours range in Hue (Munsell (2009) from red (10R), through reddish-brown (2.5YR and 5YR), to brown (7.5YR) and greyish- brown to yellowish-brown (10YR). The latter primarily occurring where Yamba Formation gypsums occur as the sub-soil clay. Soils are typically Chromosols, Calcarosols or occasionally Vertosols.

Vegetation structure

Plains Mallee Box Woodland are mostly 5-10 m tall, occasionally to 15 m, with a very open tree layer. Tree canopy cover³ is typically 10-15%. A small tree and/or tall shrub layer may be present, but is typically sparse with < 5% cover and a height range of 3-5 m. A medium shrub layer 1-3 m tall may also be present, but is normally also present with cover < 10%. A distinctive low to decumbent chenopod sub-shrub layer can be a key feature in many occurrences. The ground layer is dominated by tussock grasses, but may be inconspicuous depending on drought conditions of livestock grazing.

Soil types, landscape settings, fire regimes, grazing regimes and climate variation interact to affect the dynamics of the mallee vegetation present in any area. As a result of past

³ Measured as foliage cover – the percentage of the sample site occupied by the vertical projection of foliage and woody branches (National Committee on Soil and Terrain, 2009: p.81))

disturbances (notably clearing for agriculture and/or heavy grazing), the understorey of the ecological community is highly variable and reflects both local environmental conditions and prior land-use. The latter may enable establishment of introduced plants, notably weedy annual forbs and grasses.

Flora

The following are the most characteristic species of the ecological community.

1.1.1.1 Tree canopy species

The primary diagnostic species particular to this community are the dominance⁴ of the box-barked¹ eucalypt species *Eucalyptus porosa* (black mallee box) or *E. behriana* (bull mallee, broad-leaved mallee box). However, *E. calycogona* (square-fruited mallee, gooseberry mallee, red mallee), or *E. dumosa* (Dumosa mallee) may be dominant in some areas where they share understorey and other characteristics that are consistent with the ecological community.

Eucalyptus odorata (peppermint box, mallee box) may be codominant in some areas.

Allocasuarina leuhmannii (buloke) and *Casuarina pauper* (Belah) can also be locally abundant, but not dominant.

Eucalyptus porosa and *E. behriana* are rarely, if ever, sympatric⁵.

Amyema linophyllum (buloke mistletoe) occurs commonly on mallee canopy branches.

Small tree and large shrub canopy species

Small tree character species include *Myoporum platycarpum* subsp. *perbellum* (sugarwood), *Pittosporum angustifolium* (weeping pittosporum), *Alectryon oleifolius* subsp. *canescens* (rosewood), *Acacia oswaldii* (umbrella wattle) and *A. melvillei* (myall).

Large shrub character species include *Acacia hakeoides* (hakea wattle), *Acacia acinacea* (gold dust wattle), *Eremophila glabra* (common emu-bush), *E. longifolia* (berrigan), *Senna artemisioides* sub-species (senna types) as well as in ecotonal alluvial settings, *Chenopodium nitriaceum* (nitre goosefoot) and occasionally *Duma florulenta* (tangled lignum).

Low shrub and ground layer species

Low shrub or sub-shrub character species include *Atriplex stipitata* subsp. *stipitata* (bitter saltbush), *Chenopodium desertorum* (frosted goosefoot), *Einadia nutans* subsp. *nutans* (nodding saltbush), *Enchylaena tomentosa* (ruby saltbush) and bluebush (*Maireana*) species including *M. enchylaenoides*, *M. excavata*, *M. rohrlachii* (Rorhlach's bluebush), *Rhagodia spinescens* (hedge saltbush), *Sclerolaena diacantha* (grey copperburr) and *S. muricata* (tangled copperburr).

Ground layer character species are typically dominated by graminoids and are often rich in speargrass species (*Austrostipa* spp.). These include rhizomatous perennials such as *Austrostipa platychaeta* (flat-awned speargrass) and *A. elegantissima* (feather speargrass), as well as the tufted perennials (at times annual or ephemeral) including *A. eremophila* (desert speargrass), *A. nitida* (balcarra speargrass) and *A. scabra* (rough speargrass). Other common

⁴ Dominance of canopy species refers to one or more of these species being the most abundant tree in the canopy in terms of cover and/or stem density.

⁵ Sympatric – Species occurring in the same area.

native perennial grasses include *Rytidosperma caespitosa* (common wallaby-grass), *R. duttonianum* (brown-back wallaby-grass), *Enteropogon acicularis* (windmill grass) and *Paspalidium constrictum* (knottybutt grass). Non-grass graminoids include *Dianella revoluta* (black-anther flax-lily) and *Lomandra effusa* (scented mat-rush). In many areas the ground layer is altered or diminished by disturbance.

The abundance of forbs, as well as grasses, is rainfall dependent with large variation attributable to regional climatic gradients, and seasonal and interannual variation in weather. Common forbs include *Arthropodium* spp., *Bulbine semibarbata*, *Brachyscome* spp., *Oxalis perennans*, *Ptilotus* spp., *Sida corrugata*, *Solanum esuriale*, *Teucrium racemosum*, and *Vittadinia* spp..

Grassy weeds including Red Brome (*Bromus rubens*), Common Barley-grass (*Hordeum leporinum*) and Wimmera Rye-grass (*Lolium rigidum*) often dominate the ground flora layer as a consequence of disturbance.

Variation

Most of the ecological community can be broadly categorised into three variants across its range. These are typically dominated by *Eucalyptus behriana* (Variant 1); *E. porosa* (Variant 2); or by *E. dumosa*, but lacking dominance by the canopy species from Variants 1 and 2 (Variant 3).

Variant 1

- *Eucalyptus behriana* as the structural dominant

This includes all Plains Box Mallee Woodland where *Eucalyptus behriana* is the structural dominant tree species (see Plate 1).

This definition excludes mallee communities from the Victorian Goldfields (undescribed as an EVC) and Central Victorian Uplands Bioregions (EVC64 Rocky Chenopod Woodlands) which are a floristically different plant community (or communities) growing within a distinctively different landscape and geological setting. This definition also excludes the listed New South Wales threatened ecological community type known as “Mallee and Mallee-Broombush dominated woodland and shrubland, lacking Triodia, in the NSW South Western Slopes Bioregion” for the same reasons as the Victorian communities are excluded.



Plate 1: Plains Mallee Box Woodland of the Murray-Darling Depression and Riverina Bioregions – Variant 1 at Ultima North (VIC), here with a canopy tree layer dominated by *Eucalyptus behriana*, a shrublayer of *Acacia melvillei* and *Chenopodium nirariaceum* and a grassy ground flora layer. Juveniles of *E. behriana* can be seen in the foreground illustrating recent recruitment of this species. © Ian Sluiter

Variant 2

- *Eucalyptus porosa* as the structural dominant

This includes all Plains Mallee Box Woodland where *Eucalyptus porosa* is the structural dominant tree species (see Plate 2). This definition excludes mallee communities on gypseous substrates from the northern part of the range in Victoria and New South Wales where *Triodia scariosa* (desert spinifex) or occasionally *Roepera aurantiaca* subsp. *aurantiaca* (twiggy twin-leaf) is typically the dominant ground flora species.



Plate 2: Plains Mallee Box Woodlands of the Murray-Darling Depression and Riverina Bioregions – Variant 2 at Cowangie (VIC), here with a canopy tree layer dominated by *Eucalyptus porosa* and a grassy ground flora layer. © Ian Sluiter

Variant 3

– *Eucalyptus dumosa* as the structural dominant

This variant recognises mallee woodland types that are normally dominated by *Eucalyptus dumosa*, where neither *E. behriana* nor *E. porosa* are present or the dominant species, and sharing understorey and other characteristics that are consistent with the ecological community. Therefore this variant excludes *E. dumosa* vegetation communities with a different understorey, for example those that are not on broad plains and where *Triodia scariosa* subsp. *scariosa* is prominent.

This variant occupies the same landscape settings as Variants 1 and 2, but from whatever set of circumstances throughout the Recent (Holocene) past, does not have either *E. behriana* or *E. porosa* as the structural dominant.



Plate 3: Plains Mallee Box Woodland of the Murray-Darling Depression and Riverina Bioregions – Variant 3 at Kyalite North (NSW), here with a canopy tree layer dominated by *Eucalyptus dumosa*. © Ian Sluiter

Fauna

Table 1: Native fauna that are characteristic or commonly part of the ecological community

Species	Common name
Mammal Species	
<i>Cercartetus concinnus</i>	Western Pygmy Possum
<i>Chalinolobus gouldii</i>	Gould's Wattled Bat
<i>Chalinolobus morio</i>	Chocolate Wattled Bat
<i>Lasiorninus latifrons</i>	Southern Hairy-nosed Wombat
<i>Macropus fuliginosus</i>	Western Grey Kangaroo
<i>Macropus robustus</i>	Euro
<i>Macropus rufus</i>	Red Kangaroo
<i>Macropus sp.</i>	
<i>Mormopterus sp.</i>	Free-tailed bats
<i>Nyctophilus geoffroyi</i>	Lesser Long-eared Bat
<i>Sminthopsis murina</i>	Common Dunnart
<i>Tachyglossus aculeatus</i>	Short-beaked Echidna
<i>Tadarida australis</i>	White-striped Freetail-bat
<i>Trichosurus vulpecula</i>	Common Brush-tail Possum
<i>Vespadelus baverstocki</i>	Inland Forest Bat
<i>Vespadelus darlingtoni</i>	Large Forest Bat
<i>Vespadelus regulus</i>	Southern Forest Bat
<i>Wallabia bicolor</i>	Swamp wallaby
Bird Species	
<i>Acanthagenys rufogularis</i>	Spiny-cheeked Honeyeater
<i>Acanthiza apicalis</i>	Inland Thornbill
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill
<i>Acanthiza nana</i>	Yellow Thornbill
<i>Acanthiza reguloides</i>	Buff-rumped Thornbill
<i>Acanthiza sp.</i>	
<i>Acanthiza uropygialis</i>	Chestnut-rumped Thornbill
<i>Accipiter fasciatus</i>	Brown Goshawk
<i>Aegotheles cristatus</i>	Australian Owlet-nightjar
<i>Alauda arvensis</i>	Eurasian Skylark
<i>Anthochaera carunculata</i>	Red Wattlebird
<i>Anthus novaeseelandiae</i>	Richard's Pipit
<i>Aphelocephala leucopsis</i>	Southern Whiteface
<i>Aquila audax</i>	Wedge-tailed Eagle
<i>Ardeotis australi</i>	Australian bustard
<i>Artamus personatus</i>	Masked Woodswallow
<i>Artamus superciliosus</i>	White-browed Woodswallow
<i>Barnardius zonarius</i>	Australian Ringneck, (Ring-necked Parrot)
<i>Burhinus grallarius</i>	Bush stone curlew
<i>Cacatua roseicapilla</i>	Galah
<i>Cacatua sanguinea</i>	Little Corella

<i>Cacomantis flabelliformis</i>	Fan-tailed Cuckoo
<i>Chrysococcyx basalis</i>	Horsfield's Bronze-cuckoo
<i>Cincloramphus mathewsi</i>	Rufous Songlark
<i>Circus approximans</i>	Swamp Harrier
<i>Climacteris picumnus</i>	Brown Tree-creeper
<i>Colluricincla harmonica</i>	Grey Shrike-thrush
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike
<i>Corcorax melanorhamphos</i>	White-winged Chough
<i>Corvus coronoides</i>	Australian Raven
<i>Corvus mellori</i>	Little Raven
<i>Cracticus torquatus</i>	Grey Butcherbird
<i>Cuculus pallidus</i>	Pallid Cuckoo
<i>Dacelo novaeguineae</i>	Laughing Kookaburra
<i>Daphoenositta chrysoptera</i>	Varied Sittella
<i>Dicaeum hirundinaceum</i>	Mistletoebird
<i>Dromaius novaehollandiae</i>	Emu
<i>Epthianura albifrons</i>	White-fronted Chat
<i>Falco berigora</i>	Brown Falcon
<i>Falco cenchroides</i>	Nankeen Kestrel
<i>Grallina cyanoleuca</i>	Magpie-lark
<i>Gymnorhina tibicen</i>	Australian Magpie
<i>Hirundo neoxena</i>	Welcome Swallow
<i>Lalage tricolor</i>	White-winged Triller
<i>Leipoa ocellata</i>	Malleefowl
<i>Lichenostomus leucotis</i>	White-eared Honeyeater
<i>Lichenostomus ornatus</i>	Yellow-plumed Honeyeater
<i>Lichenostomus penicillatus</i>	White-plumed Honeyeater
<i>Lichenostomus virescens</i>	Singing Honeyeater
<i>Malurus lamberti</i>	Variegated Fairy-wren
<i>Malurus leucopterus</i>	White-winged Fairy-wren
<i>Manorina flavigula</i>	Yellow-throated Miner
<i>Melanodryas cucullata</i>	Hooded Robin
<i>Melithreptus brevirostris</i>	Brown-headed Honeyeater
<i>Melopsittacus undulatus</i>	Budgerigar
<i>Merops ornatus</i>	Rainbow Bee-eater
<i>Microeca fascians</i>	Jacky Winter
<i>Mirafrja javanica</i>	Horsfield's Bushlark
<i>Myiagra inquieta</i>	Restless Flycatcher
<i>Neophema elegans</i>	Elegant Parrot
<i>Northiella haematogaster</i>	Blue Bonnet
<i>Nymphicus hollandicus</i>	Cockatiel
<i>Ocyphaps lophotes</i>	Crested Pigeon
<i>Pachycephala inornata</i>	Gilbert's Whistler
<i>Pachycephala pectoralis</i>	Golden Whistler
<i>Pachycephala rufiventris</i>	Rufous Whistler
<i>Pardalotus punctatus</i>	Spotted Pardalote
<i>Pardalotus striatus</i>	Striated Pardalote

<i>Pedionomus torquatus</i>	Plains wanderer
<i>Petrochelidon nigricans</i>	Tree Martin
<i>Petroica goodenovii</i>	Red-capped Robin
<i>Phaps chalcoptera</i>	Common Bronzewing
<i>Phaps elegans</i>	Brush Bronzewing
<i>Phylidonyris albifrons</i>	White-fronted Honeyeater
<i>Platycercus elegans</i>	Crimson Rosella
<i>Podargus strigoides</i>	Tawny Frogmouth
<i>Pomatostomus superciliosus</i>	White-browed Babbler
<i>Pomatostomus temporalis</i>	Grey-crowned babbler
<i>Psephotus haematonotus</i>	Red-rumped Parrot
<i>Psephotus varius</i>	Mulga Parrot
<i>Pyrrholaemus brunneus</i>	Redthroat
<i>Rhipidura albiscapa</i>	Grey Fantail
<i>Rhipidura leucophrys</i>	Willie Wagtail
<i>Sericornis frontalis</i>	White-browed Scrubwren
<i>Smicronis brevirostris</i>	Weebill
<i>Stagonopleura guttata</i>	Diamond Firetail
<i>Strepera versicolor</i>	Grey Currawong
<i>Todiramphus pyrrhopygia</i>	Red-backed Kingfisher
<i>Turnix varia</i>	Painted Button-quail
<i>Turnix velox</i>	Little Button-quail
<i>Tyto alba</i>	Barn Owl
<i>Vanellus tricolor</i>	Banded Lapwing
<i>Zosterops lateralis</i>	Silvereye
Reptile Species	
<i>Christinus marmoratus</i>	Marbled Gecko
<i>Cryptoblepharus carnabyi</i>	Desert Wall skink
<i>Ctenophorus decresii</i>	Tawny Dragon
<i>Ctenophorus fordi</i>	Mallee Military Dragon, Mallee Dragon
<i>Ctenophorus pictus</i>	Painted Dragon
<i>Ctenotus orientalis</i>	Eastern Spotted Ctenotus
<i>Ctenotus robustus</i>	Robust ctenotus, Eastern Striped Skink
<i>Delma malleri</i>	Adelaide Snake-lizard
<i>Diplodactylus tessellatus</i>	Tessellated gecko
<i>Diplodactylus vittatus</i>	Eastern Stone Gecko
<i>Egernia striolata</i>	Eastern Tree Skink
<i>Eremiascincus richardsonii</i>	Broad-banded Sandswimmer
<i>Gehyra lazelli</i>	Southern Rock Dtella
<i>Gehyra variegata</i>	Tree Dtella
<i>Gehyra variegata complex</i>	
<i>Hemiergis decresiensis</i>	Three-toed Earless Skink
<i>Hemiergis peronii</i>	Four-toed Earless Skink
<i>Heteronotia binoei</i>	Bynoe's Gecko
<i>Lerista bougainvillii</i>	Bougainville's Skink
<i>Lerista dorsalis</i>	Southern slider, Southern Four-toed Slider

<i>Lerista edwardsae</i>	Myall Slider
<i>Lerista terdigitata</i>	Robust mulch slider, Southern Three-toed Slider
<i>Menetia greyii</i>	Dwarf Skink
<i>Morethia adelaidensis</i>	Adelaide Snake-eye
<i>Morethia boulengeri</i>	South-Eastern Morethia Skink, Common Snake-eye, Boulenger's Skink
<i>Morethia obscura</i>	Mallee Snake-eye
<i>Nephrurus milii</i>	Barking Gecko
<i>Pseudonaja</i> sp.	
<i>Ramphotyphlops australis</i>	Southern Blind Snake
<i>Suta nigriceps</i>	Mitchell's Short-tailed Snake
<i>Suta suta</i>	Curl snake
<i>Tiliqua rugosa</i>	Sleepy Lizard
<i>Underwoodisaurus milii</i>	Thick-tailed gecko
Frog Species	
<i>Neobatrachus pictus</i>	Painted Frog
Invertebrates	
<i>Melobasis abnormis</i>	

1.2 Cultural and community significance

A wide variety of plant and animal resources from within the Plains Mallee Box Woodland were used for food and materials by the Indigenous peoples of the area. In turn, the traditional custodians managed the ecological community and the biodiversity and landscapes of the surrounding mallee regions where it occurs. The term 'mallee' itself is Koori (south-east Australian) in origin (Yates et al., 2017). It is used generically to refer to a particular group of eucalypt species, to the vegetation formation in which they occur, and to the region in Victoria that was predominantly covered by this vegetation. The term 'mallee' is also used to describe the bioregions in which mallee eucalypts dominate (Mallee CMA 2008)

THREATS

Threat table

Table 2 outlines the key threats facing the ecological community. The key threats faced by the ecological community are described to help explain why this ecological community merits listing as threatened and supports the assessment against the criteria at [section 3.1](#). Although presented as a list, in reality, these threats often interact, rather than act independently.

Table 2: Summary of threats facing the ecological community

Threat factor	Threat Status*	Evidence base
Clearing for agriculture	<i>Timing:</i> past / ongoing <i>Severity:</i> extreme <i>Scope:</i> whole	<ul style="list-style-type: none"> The physical environment where the ecological community occurs has made it highly suitable for dryland cropping. These regions have experienced extensive loss and fragmentation of native vegetation, notably of the ecological community (NRE 1997; Mallee CMA 2012; Wimmera CMA 2013).

Threat factor	Threat Status*	Evidence base
		Furthermore, the ecological community is poorly represented in conservation reserves with remnants mostly occurring in roadside reserves and along edges of agricultural land.
Clearing for mining and quarrying	<i>Timing:</i> ongoing <i>Severity:</i> extreme <i>Scope:</i> majority	<ul style="list-style-type: none"> • Mining for mineral-sands and rare earths in the semi-arid and arid zone of southern and south-eastern Australia may result in direct clearance of this ecological community. Because of the orientation (mostly southeast to northwest) of mineral sands deposits in the Murray-Darling Basin, particularly in Victoria and New South Wales, mining for mineral sands has the potential to dissect roads and disturb large areas of remnant vegetation. Mineral sands mines and associated infrastructural alignments are seldom <1km wide, and depending on the depth of the mineralized zone, up to 2km wide. • Gypsum mining or quarrying also has the potential to clear this ecological community due to the propensity for some areas of the ecological community to occur on gypsum deposits. This is a very serious ongoing and future threat to remnants of the ecological community.
Clearing for linear infrastructure	<i>Timing:</i> ongoing <i>Severity:</i> extreme <i>Scope:</i> majority	<ul style="list-style-type: none"> • Clearing for road maintenance and incremental widening in agricultural areas with ever-increasing sizes of farm machinery is a potential threat, particularly given the prevalence of patches along existing roadsides and fencelines. Powerlines and other linear infrastructure such as pipelines also has the potential to clear patches of remnant vegetation.
Fragmentation legacies	<i>Timing:</i> ongoing <i>Severity:</i> extreme / major <i>Scope:</i> whole	<ul style="list-style-type: none"> • Historic clearance of the ecological community as well as other surrounding vegetation has resulted in severe fragmentation and invasion by exotic species, which leads to ongoing loss of species diversity through extinction debt; loss of ecological function in remaining patches; and greater vulnerability and reduced resilience of smaller patches to stochastic events. Much of the community occurs in linear fragments with large edge-to-area ratios. This increases potential harm done through threatening processes such as weed invasion and incremental clearing, and overall are more difficult to manage for biodiversity. The majority of remnants (~74%) are now less than 1 ha in size. • Edge effects relevant to the ecological community that make it highly susceptible to small-scale, cumulative threats include: encroachment of disturbance from adjoining land use (vehicle disturbance, road works, slashed or mineral earth firebreaks); grazing and livestock management (stock camps/holding in remnants); soil nutrient enrichment by aeolian deposition; herbicide drift; landscape-scale gypsum use (increasing infiltration/reducing runoff in the landscape); firewood collection; invasion by exotic plants and animals; and rubbish dumping.
Livestock grazing	<i>Timing:</i> ongoing <i>Severity:</i> major <i>Scope:</i> minority	<ul style="list-style-type: none"> • Grazing by livestock is an ongoing threat to remnants where it is a common land use, particularly for remnants on private land but also for roadside remnants and other areas on public land such as Travelling Stock Routes. Structure, function, and composition of ecosystems are all negatively affected by

Threat factor	Threat Status*	Evidence base
		<p>livestock grazing across semi-arid and arid regions of Australia, even at very low levels of grazing (Eldridge et al. 2016).</p> <ul style="list-style-type: none"> Heavy grazing, preferential grazing and trampling has disrupted understorey structure and native species diversity. In some cases this has eliminated shrubs from the field layer and left a lower layer dominated by grasses or bare ground. Re-sprouting canopy species can also be restricted by grazing. Many of the common species in the lower shrub layer are easily eliminated by heavy grazing which affects the regeneration ability of remnants (Mallee CMA 2008). Some remnants may still be directly affected by grazing where they are used as stock camps or for holding (Mallee CMA 2012). Overgrazing from livestock, particularly in times of drought, can result in an increase in bare ground (and subsequent erosion), soil compaction, altered nutrient cycling (including water) and levels, increased weed abundance, and reduced recruitment and survival of native plants. Wind erosion as a consequence of overgrazing continues as a legacy after grazing ceases. Mallee landscapes are one of the contributors to the dust storms that have been occurring since ca. 1860s and prominent in recent years. For example, in the 1930s parts of the Victorian Mallee become one of the worst wind eroded areas in Australia (NRE 1997). Soil surface scalding and aeolian deposition from wind-eroded soil into remnants affects growth and may cause death of native species, affects regeneration, and may introduce weeds (Mallee CMA 2008). Grazing can fragment and remove the biological soil crust (lichens, mosses, cyanobacteria, algae, fungi and bacteria). The consequence of this can be the loss of key ecological functions such as soil stabilisation, the regulation of water infiltration and positive influences on vascular plant survival and germination (Duncan et al. 2007). This can have further consequences for the litter layer and result in a degraded soil invertebrate habitat.
Altered fire regimes	<p><i>Timing:</i> ongoing <i>Severity:</i> major/minor <i>Scope:</i> whole</p>	<ul style="list-style-type: none"> Ridged Plains Mallee (as this community is known in Victoria) typically has 'discontinuous and somewhat fire-retardant fuels and burn infrequently' (White 2006), due to the chenopod component. However some areas can become highly flammable in summers after very wet seasons in autumn-winter-spring promoting grass growth. Natural fire regimes may be altered such that some areas (e.g. roadsides) burn too frequently. Patches are small so are more likely to burn uniformly rather than in a mosaic, or narrow so edge effects following burns are prevalent. Introduction of fire without effective pest control may allow rabbits and hares to negatively impact the lower strata by leaving regenerating seedlings exposed (Macaulay 2006).
Invasive species – Plants	<p><i>Timing:</i> ongoing <i>Severity:</i> major <i>Scope:</i> whole</p>	<ul style="list-style-type: none"> Due to the linear nature and roadside location of many patches of the ecological community, the understorey of the ecological community can be severely impacted by invasive flora species. Weeds of National Significance present in the

Threat factor	Threat Status*	Evidence base
		<p>region include African boxthorn (<i>Lycium ferocissimum</i>); bridal creeper (<i>Asparagus asparagoides</i>); cactus species (<i>Opuntia</i> spp.); and athel pine (<i>Tamarix aphylla</i>) (Mallee CMA 2008).</p> <ul style="list-style-type: none"> Constituent plant species of the community are threatened by competition from invasive species particularly in the ground flora layer with the outcome being significant changes to flora composition in remnants and changes in ecological function. Examples of these species include annual grasses such as Wimmera ryegrass (<i>Lolium rigidum</i>); Brome grasses (<i>Bromus</i> spp.); Common Barley-grass (<i>Hordeum leporinum</i>), Wild Oats (<i>Avena</i> spp.), Fescues (<i>Vulpia</i> spp.); whilst mustards (<i>Brassica</i> spp.), Rocket (<i>Sisymbrium</i> spp.); and Horehound (<i>Marrubium vulgare</i>) are also common invasive ground flora species. Annual exotic grasses become established due to disturbance of the ground layer and increased nutrient levels, notably nitrogen and phosphorous. The exotic grasses then further disrupt nutrient cycling in the soil in a positive feedback loop where the soil conditions favour exotics species over native perennials. Weeds may provide habitat for other invasive species and reduce habitat suitability for some native species (Mallee CMA 2008). For example, African boxthorn infests roadside vegetation and provides habitat for rabbits and foxes, compounding its impact. Production species, such as olives and almonds, are established in some remnants (Mallee CMA 2008). Dense stands of Olives can crowd out native understoreys and their flammable branches can promote fire. The fruits are spread by birds and foxes.
Invasive species – Animals	<p>Timing: ongoing</p> <p>Severity: minor</p> <p>Scope: whole</p>	<p>Feral animals:</p> <ul style="list-style-type: none"> Rabbits alter the structure and composition of native vegetation communities by exerting selective grazing pressure on native species and removing large amounts of biomass. They compete with native fauna for grasses, herbs and seeds and affect woody tree and shrub species regeneration (Sandell 2009). Compared to domestic stock, goats and kangaroos, rabbits are more effective at preventing woody perennial regeneration (Parks Victoria 2002). Rabbits cause death of or significant declines in growth of <i>Allocasuarina luehmannii</i> in this region (Bennett et al. 2020). Rabbits also have the ability to severely disturb soil and the biological soil crust and have caused widescale erosion and destruction of vegetation in the landscape (White et al. 2003). Their presence can prevent native vegetation patches from functioning as habitat for many fauna species (Mallee CMA 2012).
Overharvesting	<p>Timing: ongoing</p> <p>Severity: minor</p> <p>Scope: majority</p>	<ul style="list-style-type: none"> Firewood removal impacts on fauna habitat, creates pathways for weed invasion and affects soil nutrient cycling.

Threat factor	Threat Status*	Evidence base
Changes in water availability and associated effects	<i>Timing:</i> ongoing <i>Severity:</i> minor <i>Scope:</i> majority	<ul style="list-style-type: none"> The development of water storages and river regulation systems have substantially altered natural hydrological processes in the Mallee region, with flow on effects to biodiversity and ecological processes (Mallee CMA 2012). Changes in ground water are due to increasing salinity and nitrification and regionally higher water tables. Altered flooding regimes are another factor that impacts on biodiversity (e.g. less recruitment) (Cheal et al. 2011). Human-induced dryland salinisation is known to impact some components of the ecological community.
Climate change and severe weather	<i>Timing:</i> ongoing <i>Severity:</i> major <i>Scope:</i> whole	<ul style="list-style-type: none"> Climate change projections are available for the Murray Basin that covers the entire MDD and Riverina bioregions plus some adjoining areas. The forecast over the next century is for higher temperatures (including more frequent extreme maxima on consecutive days), declining rainfall (including more extended dry spells), especially in the cooler seasons, and harsher drought and fire weather. It is likely that changing climatic conditions will compound the negative effects of existing threats including habitat loss and fragmentation, invasive species and broad-scale bushfires (DSE 2008). Ecological conditions for plant communities in the Mallee are predicted to experience substantial change, by as much as 70%.⁶ There is a high probability that climate change will constrain the regenerative capacity of remnant ecological communities.⁷ The capacity of species to adapt by genetic selection or migration are less likely where ecological communities are fragmented. Species most at risk include those with restricted/specialised habitat requirements, poor dispersal abilities and small populations (Mallee CMA 2012). Research in to the anticipated effects of climate change on the ecological community is necessary to assist potential adaptation (SERA 2016).
<p>*Timing – the threat occurs in the past (and unlikely to return), is ongoing (present/continuing), is likely to occur/return in the future, or timing is unknown</p> <p>Severity – the threat causes or has the potential to cause impacts that are extreme (leading to loss or transformation of affected patches/occurrences), major (leading to degradation of affected patches/occurrences), minor (impacting some components of affected patches/occurrences), negligible or unknown</p> <p>Scope – the threat is affecting the whole (>90%), a majority (>50%), a minority (<50%), a negligible amount, or unknown amount of the ecological community</p>		

⁶ <http://nrmclimate.vic.gov.au/regional-cma-information/385/>

⁷ <http://nrmclimate.vic.gov.au/regional-cma-information/386/>

Key threatening processes

The EPBC Act provides for the identification and listing of key threatening processes. A threatening process is defined as a key threatening process if it threatens or may threaten the survival, abundance or evolutionary development of a native species or ecological community.

The following are EPBC-listed key threatening processes, current at the date of writing, that may be relevant to the ecological community or the plants and animals that comprise it:

- Land clearance;
- Loss of climatic habitat caused by anthropogenic emissions of greenhouse gases;
- Novel biota and their impact on biodiversity;
- Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants;
- Competition and land degradation by rabbits;
- Predation by feral cats;
- Predation by European red fox.

Any approved threat abatement plans or advice associated with these items provides information to help landowners manage these threats and reduce their impacts to biodiversity.

These can be found at <http://www.environment.gov.au/cgi-bin/sprat/public/publicgetkeythreats.pl>.

CONSERVATION OF THE ECOLOGICAL COMMUNITY

Identification of the ecological community

The Plains Mallee Box Woodland intergrade with other vegetation types and ecological communities. Key diagnostic characteristics are used to identify an area of native vegetation as being the ecological community, and define the features that distinguish it from other communities.

Key diagnostics

The key diagnostic characteristics are designed to allow identification of the ecological community irrespective of the season.

Areas of vegetation that do not meet the key diagnostics are not the nationally listed ecological community.

The ecological community is defined as patches of native vegetation meeting the description in Section 1.1 that meet all of the following key diagnostic characteristics:

- Occurs in New South Wales, Victoria and South Australia, within Murray Darling Depression and Riverina Bioregions (Interim Biogeographic Regionalisation of Australia, IBRA V7, DoE 2012).
- Within these bioregions, the ecological community typically occurs on near-level plains or occasionally on gently sloping terrain surrounding and within run-on landscape depressions. Soils are variable but are typically duplex, with clay loam or occasionally sandy clay loam topsoil textures mostly of aeolian origin, above deep fine textured clay subsoils.
- The primary diagnostic species particular to this community are the dominance⁴ of the box-barked¹ eucalypt species *Eucalyptus porosa* (black mallee box) or *E. behriana* (bull mallee, broad-leaved mallee box). However, *E. calycogona* (square-fruited mallee, gooseberry mallee, red mallee), or *E. dumosa* (Dumosa mallee) may be dominant in some areas where they share understorey and other characteristics that are consistent with the ecological community.
- The tree canopy is usually 5-10 m tall, occasionally to 15 m, with a very open tree layer. Tree canopy cover is typically 10-15%.
- A small tree and/or tall shrub layer may be present, but is typically sparse with < 5% cover and a height range of 3-5 m. A medium shrub layer 1-3 m tall may also be present, but is normally also present with cover >10%.
- A distinctive low to decumbent chenopod sub-shrub layer can be a key feature in many occurrences.
- The ground layer is dominated by tussock grasses, but may be inconspicuous depending on drought conditions of livestock grazing.
- *Triodia* spp. (spinifex) are typically absent from the ground layer and never dominant.

LISTING ASSESSMENT

Eligibility for listing against the EPBC Act criteria

On the basis of available information, it is likely the ecological community will be eligible for listing as **critically endangered**, under Criteria 1, 2 and 4 (see below).

This assessment uses the criteria set out in the [EPBC Regulations](#).

Criterion 1 – decline in geographic distribution

Likely to be eligible under Criterion 1 for listing as **Critically endangered**.

	Category		
	Critically Endangered	Endangered	Vulnerable
Its decline in geographic distribution is:	very severe	severe	substantial
• <i>decline relative to the longer-term/1750 timeframe</i>	≥90%	≥70%	≥50%
• <i>decline relative to the past 50 years</i>	≥80%	≥50%	≥30%

Evidence:

This ecological community was once extensive on heavier sandy loam to loam soils with typically higher annual rainfall, compared to other mallee vegetation communities in these bioregions that occur on lighter soils with deeper sands. This made areas where the ecological community occurred highly favourable for clearing, for activities such as dryland cropping. Across its range most patches now occur as small, isolated remnants, many of which are in narrow roadside reserves.

The ecological community is likely to be assessed as **critically endangered** based on indicative estimates of decline shown in Table 3. There are reliable estimates of extent and decline for this ecological community in Victoria through the related EVC area statements. Some estimates of past and current extent for vegetation units related to the ecological community are provided in regional biological surveys published in SA. Data is not available for the NSW part of the range but estimates of decline in Victoria and SA are likely to be indicative for the NSW part of the distribution due to similar landuse patterns across these areas.

Available estimates from most of the ecological community's potential range indicate a **very severe** decline in geographic distribution, of at least 90–95% since 1750. It is therefore considered that the ecological community has met the relevant elements of Criterion 1 to make it eligible for listing as Critically Endangered.

Table 3. Estimates of past and current extent and decline for the ecological community.

State (Source)	Vegetation unit	Pre-European extent (ha)	Current extent (ha)	Decline (%)
Victoria (2007 EVC area statement)	EVC 96	613 706	39 436	93.6
SA (Murray Mallee biol. survey, 2000)	FG 34 & 37	n/a	13 690	n/a
SA (South East biol. survey, 2003)	FG 2, 89	n/a	458	95.1*

* Estimate of decline is based on the South East biological survey (2003), showing a grouping of Floristic Groups (FGs) 1, 2 and 89. Of 6947 ha remaining in this grouping, most (6489 ha) of the remaining current extent is for FG1 (a mallee community dominated by *Eucalyptus incrassata*, which falls outside the definition of this ecological community); and 458 ha remains for FGs 2 and 89. It is assumed the decline in extent for FGs 2 and 89 is at least that which is reflected by the collective decline based on all three FGs (95.1%).

Criterion 2 – limited geographic distribution coupled with demonstrable threat

Likely to be eligible under Criterion 2 for listing as **Critically endangered**.

	Category		
	Critically Endangered	Endangered	Vulnerable
Its geographic distribution is:	very restricted	restricted	limited
• <i>Extent of Occurrence (EoO)</i>	<100 km ²	< 1,000 km ²	< 10,000 km ²
• <i>Area of Occupancy (AoO)</i>	<10 km ²	< 100 km ²	< 1,000 km ²
• <i>Average patch size</i>	<0.1 km ²	< 1 km ²	
AND the nature of its distribution makes it likely that the action of a threatening process could cause it to be lost in:	the immediate future	the near future	medium term future
• <i>timeframe</i>	10 years or 3 generations	20 years or 5 generations	50 years or 10 generations

Evidence:

The median patch size is 0.37 ha, which is indicative of a **very restricted** distribution.

The ecological community has a severely fragmented distribution, as indicated by an analysis of the Victorian distribution, which is indicative of the distribution across its range (Table 4). 97.2% of remnants are less than 10 ha and only 0.13% are over 50 ha (totalling 2793 ha). This differs greatly from the pre-European distribution where 64.3% of patches were less than 10 ha and 11% were over 50 ha (totalling 560 444 ha). The proportion of patches greater than 100 ha has declined from 6.1% (totalling 536 246 ha) to 0.03% (totalling 920 ha) and patches of 0.1 – 1 ha have increased from 8.3% to 73.6%. Prior to clearance, patches of the ecological community adjoined other, now also highly cleared, native vegetation communities across the region.

The nature of the current distribution makes it very susceptible to edge effects and to the actions of various threats, particularly understorey disturbance (e.g. grazing, aeolian

deposition), invasive species, altered fire regimes, further fragmentation and cumulative loss of patches. The collective action of these threatening processes have the potential to cause the loss of the ecological community in the **immediate future** (within three generations of the mallee eucalypt tree species).

This represents a **very restricted** geographic distribution, and the nature of this distribution makes it likely that the action of a threatening process could cause it to be lost in the immediate future. It is therefore considered that the ecological community has met the relevant elements of Criterion 2 to make it eligible for listing as Critically Endangered.

Table 4: Patch sizes, contemporary and pre-European

	Extant (based on 2005 data)		Pre-European	
	Area	Number of patches	Area	Number of patches
Median patch size	0.37 ha		5.00 ha	
Patches 0.1* to 1 ha	6182 ha or 15.5%	19 255 or 73.6%	445 ha or 0.1%	595 or 8.3%
Patches 1 ha to <10 ha	18388 ha or 46%	6166 or 23.6%	13 774 ha or 2.2%	4028 or 56%
Patches 10 ha to <20 ha	6720 ha or 16.8%	486 or 1.9%	13 638 ha or 2.2%	961 or 13.4%
Patches 20 ha to <50 ha	5878 ha or 14.7%	204 or 0.8%	25 505 ha or 4.2%	818 or 11.4%
Patches 50 ha to 100 ha	1873 ha or 4.7%	29 or 0.1%	24 198 ha or 3.9%	352 or 4.9%
Patches over 100 ha	920 ha or 2.3%	7 or 0.03%	536 246 ha or 87.4%	440 or 6.1%

Source: Victorian EVC data (2005).

* Analysis of patch size distribution excludes spatial data <0.1 ha

Criterion 3 – decline of functionally important species

Insufficient data to determine eligibility under Criterion 3.

	Category		
	Critically Endangered	Endangered	Vulnerable
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
<ul style="list-style-type: none"> <i>Estimated decline over the last 10 years or three generations, whichever is longer</i> 	80%	50%	20%
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
<ul style="list-style-type: none"> <i>timeframe</i> 	10 years or 3 generations	20 years or 5 generations	50 years or 10 generations

Evidence:

Overall, there has been significant loss of area and loss of various flora and fauna components of the ecological community. However, data to support analysis against this criterion, and its indicative thresholds, for loss of particular functionally important species of flora or fauna within remaining patches of this ecological community is not available.

Furthermore, no one species acts alone to influence community structure and processes in the ecological community. Rather it is groups of species, such as several key eucalypt canopy species, or groups of fauna (such as pollinating birds or digging/scratching ground mammals and birds), that play key functional roles. These roles include habitat provision, nutrient cycling, seed dispersal and/or burial, water infiltration, and pollination. The effect of these declines of these species groups on the ecological community are best addressed under Criterion 4.

It is therefore considered that there is **insufficient information** to determine the eligibility of the ecological community for listing in any category under Criterion 3 at this time.

Criterion 4 – reduction in community integrity

Likely to be eligible under Criterion 4 for listing as **critically endangered**.

	Category		
	Critically Endangered	Endangered	Vulnerable
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
<ul style="list-style-type: none"><i>such that restoration is unlikely (even with positive human intervention) within</i>	<i>the <u>immediate</u> future (10 years or 3 generations)</i>	<i>the <u>near</u> future (20 years or 5 generations)</i>	<i>the <u>medium-term</u> future (50 years or 10 generations)</i>

Evidence:

Changes to the structural, compositional and functional integrity of the ecological community has followed extensive clearance of the ecological community, and surrounding vegetation, for dryland agriculture following European settlement. There have been very severe losses in the extent of the ecological community (see Criterion 1) and the patch size distribution is now heavily skewed towards smaller patches, mainly occurring as linear strips along roadsides, compared with the widespread distribution of the ecological community prior to clearing (see Criterion 2). Therefore a great majority of patches are subject to edge effects. Most remnants have been heavily grazed by stock or feral herbivores and shrubs are absent in many stands due to the lack of regeneration of native plants. These threats and the others outlined in Section 2 continue to operate on sites across the range of the ecological community, regardless of condition.

One of the key indications of edge effects is that weeds now occur in the majority of patches, as a consequence of past disturbance and land use surrounding patches. Grassy weeds include Red Brome (*Bromus rubens*), Common Barley-grass (*Hordeum leporinum*) and Wimmera Rye-grass (*Lolium rigidum*) and often dominate the ground layer. These annual exotic grass become established due to disturbance of the ground layer and increased nutrient levels, notably nitrogen and phosphorous. The exotic grasses then further disrupt nutrient cycling in the soil in a positive feedback loop where the soil conditions favour exotics species over native perennials. Shrubby weeds also affect community integrity. African Boxthorn (*Lycium ferocissimum*), which is dispersed by birds, can become large and form dense infestations that out-compete native plants, and provide habitat for rabbits and foxes that contribute to reductions in the native faunal components of the ecological community.

As a consequence of the extensive land-use change in the matrix surrounding remnants, many of the natural ecological processes once interacting with remnants are likely to have been altered or eliminated. There has been fragmentation and isolation, species loss, and deleterious genetic effects for component species. The mammalian fauna of the mallee region has undergone significant change since European settlement due to extensive clearing, predators and grazing (NRE 1997). This further contributes to an overall lack of community integrity in the majority of patches across the range of the ecological community. These ongoing impacts mean that restoration is unlikely (even with positive human intervention) within any timeframe.

Conclusion:

The combination of all these impacts represents a very severe reduction in integrity across most of its geographic distribution, as indicated by a **very severe** degradation of the community or its habitat. It is therefore considered that the ecological community has met the relevant elements of Criterion 4 to make it eligible for listing as **Critically Endangered**.

Criterion 5 – rate of continuing detrimental change

Insufficient data to determine eligibility under Criterion 5.

	Category		
	Critically Endangered	Endangered	Vulnerable
Its rate of continuing detrimental change is: as indicated by:	very severe	severe	substantial
(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	very severe	severe	serious
(b) intensification, across most of its geographic distribution, in degradation, or disruption of important community processes, that is:	very severe	severe	serious
<ul style="list-style-type: none"> an observed, estimated, inferred or suspected detrimental change over the immediate past, or projected for the immediate future (10 years or 3 generations), of at least: 	80%	50%	30%

Evidence:

There have been no consistent measurements to provide quantitative estimates of rates of continuing detrimental change (of extent or degradation) over a time series, to be able to address this criterion. However, change in extent from pre-European estimates is addressed under Criterion 1, and reduction in community integrity is addressed under Criterion 4.

It is considered that there is **insufficient information** to determine the eligibility of the ecological community for listing in any category under this criterion.

Criterion 6 – quantitative analysis showing probability of extinction

Insufficient data to determine eligibility under Criterion 6.

	Category		
	Critically Endangered	Endangered	Vulnerable
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
<ul style="list-style-type: none"><i>timeframes</i>	<i>10 years or 3 generations</i>	<i>20 years or 5 generations</i>	<i>50 years or 10 generations</i>

Evidence:

Quantitative analysis of the probability of extinction or extreme degradation over all its geographic distribution has not been undertaken. It is therefore considered that there is **insufficient information** to determine the eligibility of the ecological community for listing in any category under this criterion.

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