***Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (s266B)**
Approved Conservation Advice (including listing advice) for
Hunter Valley Weeping Myall (*Acacia pendula*) Woodland

1. The Threatened Species Scientific Committee (the Committee) was established under the EPBC Act and has obligations to present advice to the Minister for the Environment in relation to the listing and conservation of threatened ecological communities, including under sections 189, 194N and 266B of the EPBC Act.
2. The Hunter Valley Weeping Myall (*Acacia pendula*) Woodland ecological community was formerly listed as critically endangered under the name: Weeping Myall - Coobah - Scrub Wilga Shrubland of the Hunter Valley. A review of updated information identified new occurrences of the ecological community and indicated that it remains eligible for listing as critically endangered under the EPBC Act.
3. The Committee provided its revised conservation advice on the Hunter Valley Weeping Myall (*Acacia pendula*) Woodland ecological community to the Minister as a draft of this approved conservation advice. In 2014, the Minister accepted the Committee's advice, adopting it as the approved conservation advice.
4. The Minister amended the list of threatened ecological communities under section 184 of the EPBC Act to remove the Weeping Myall - Coobah - Scrub Wilga Shrubland of the Hunter Valley and to include the Hunter Valley Weeping Myall (*Acacia pendula*) Woodland ecological community in the critically endangered category.
5. The NSW *Threatened Species Conservation Act (1995)* lists an ecological community of a similar name as threatened, and recognises the population of the tree *Acacia pendula* (weeping myall) in the Hunter catchment a threatened population.
6. The draft description for this ecological community was made available for expert and public comment for a minimum of 30 business days. The Committee and Minister had regard to all public and expert comment that was relevant to the consideration of the ecological community.
7. This approved Conservation Advice has been developed based on the best available information at the time it was prepared; this includes scientific literature, advice from consultations, existing plans, records or management prescriptions for this ecological community.

Contents

1. DESCRIPTION OF THE ECOLOGICAL COMMUNITY

The ecological community is a low forest to woodland with a canopy dominated by *Acacia pendula* (weeping myall). It occurs on undulating plains that are associated with a range of grassy woodland communities in the Hunter Valley (NSW). The occurrences of *A. pendula* in the Hunter region represent a disjunct and easternmost outlier of the species' distribution.

1.1. Name of the ecological community

The name of the ecological community is the **Hunter Valley Weeping Myall *(Acacia pendula)* Woodland** (hereafter referred to as the "Hunter Valley Weeping Myall Woodland" or the "ecological community").

The ecological community was originally listed as critically endangered under the EPBC Act, under the name "Weeping Myall - Coobah - Scrub Wilga Shrubland of the Hunter Valley", with the assessment based on the single occurrence known at that time of listing. A review of the listing followed updated information, including new occurrences of the ecological community. The previous name was considered to be no longer appropriate as a name for the national ecological community due to variation in the presence and abundance of associated shrub species, and that a 'shrubland' structure does not readily apply to all occurrences of the ecological community. Given the height and density of mature *A. pendula* trees, the term 'woodland' is more applicable. However, the description allows that some disturbance and management regimes may result in regeneration through sucker regrowth that temporarily conforms to a shrubland, or that the density of trees approaches a low forest.

1.2. Location and physical environment

The ecological community occurs within the Hunter Valley region of NSW, which encompasses the northern part of the Sydney Basin IBRA[1] bioregion and the southern part of the NSW North Coast bioregion (Department of the Environment, 2013).The known stands of the ecological community occur between the localities of Warkworth and Wybong (Umwelt, 2006a; Bell, 2007a; Umwelt, 2008), including a well-documented patch at Jerrys Plains cemetery.

The stands of *Acacia pendula* (weeping myall) in the Hunter Valley are disjunct from the main distribution of this species further west, inland of the Great Dividing Range. The nearest major occurrence is on the Liverpool Plains, 100 km to the northwest. It is thought that Hunter Valley stands are a relic from the last glaciation when the Hunter Valley is likely to have been dominated by 'western semi-arid' flora (Tame, 1992a).

The ecological community lies on the floor of the Hunter Valley, at elevations of 60 to 150 metres above sea level (ASL). The region comprises sediments of Permian age dissected by unconsolidated alluviums associated with the Hunter River (Nashar, 1964; Tame, 1992a; NSW Department of Mineral Resources, 1999). The southern rim of the Hunter Valley comprises younger sediments forming the Triassic Narrabeen sequence, while the northern rim is largely older Carboniferous sediments and Tertiary basalt flows. *Acacia pendula*[2] in the Hunter Valley generally, occurs in small stands on heavy, brown clay soils. Peake (2006) suggested that heavy clay soils were the favoured substrate, and that many sites appeared to be located in flood washouts.

[1] Interim Biogeographical Regionalisation of Australia, version 7

[2] Note there are taxonomic uncertainties regarding *A. pendula* and *A. homalophylla-melvillei* in the Hunter Valley. This is discussed in Appendix B and in the recovery plan (NSW OEH, 2013).

1.3. Climate

The Sydney Basin Bioregion generally has a temperate climate characterised by warm summers with no dry season (NSW OEH, 2011). However, there are variations across the bioregion largely due to considerable changes in altitude and distance inland from the coast. Areas of relatively higher temperatures occur at lower altitudes. The Hunter Valley region where the ecological community occurs is low in altitude and experiences warmer temperatures, on average (Table 1), than high elevation sites, e.g. in the Blue Mountains.

The mean annual rainfall in the vicinity of the ecological community is 645 mm/year. Rainfall can occur throughout the year, but tends to be higher during summer (Table 1).

Table 1 Climate data for Jerrys Plains Post Office in the Hunter valley based on mean monthly values (BOM, 2013).

Measure	**Summer (Dec – Feb)**	**Autumn (Mar – May)**	**Winter (June – Aug)**	**Spring (Sept – Nov)**
Mean minimum temperature °C	16 – 17	7 – 15	4 – 5	7 – 13
Mean maximum temperature °C	31 – 32	21 – 29	17 – 19	23 – 29
Mean rainfall (mm/month)	68 – 78	41 – 59	36 – 48	42 – 62

1.4. Vegetation

This ecological community is considered to have been a low forest to woodland that is 5 to 15 metres in height, with a sparse shrub layer 1-3 metres tall ozver a generally grassy ground layer (Peake, 2006). The cover of the canopy layer varies between 5-70 % while the ground layer cover is 30-80 %. The ecological community would have occurred as a mosaic amongst other valley floor communities that are dominated by *Eucalyptus crebra, E. moluccana*, *Acacia salicina* or *Allocasuarina luehmannii* (bulloak).

However, disturbance across the landscape, means that few stands now conform to this structure. The site at Jerrys Plains represents the most intact known patch of the ecological community. Most stands of *A pendula* are not part of the ecological community as they comprise dense regrowth of suckers, over a largely absent shrub layer and a ground layer where the cover of native grasses and forbs is depauperate due to grazing impacts, weed invasion and erosion.

Based on available data, the floristic composition of Hunter Valley Weeping Myall Woodland supports a number of species that characterise the community. These include typically more western species such as *Acacia homalophylla-melvillei, Chenopodium glaucum, Ptilotus semilanatus, Chenopodium carinatum, Enchylaena tomentosa, Acacia salicina, Geijera salicifolia* and *Geijera parviflora*. All of these species, however, have been recorded within other habitats in the Hunter Valley and are not restricted to the ecological community. The Central Hunter Box-Ironbark Woodland and Narrabeen Footslopes Slaty Box Woodland of Peake (2006), in particular, support many of these species at various locations in the Hunter. Umwelt (2006a) suggested that distinguishing the ecological community from other Hunter Valley communities is best done through the presence or otherwise of *Acacia pendula*. All currently known and accepted stands of the ecological community support *Acacia pendula*.

1.4.1. Canopy and mid layers –trees and medium to tall shrubs

The tree canopy of the Hunter Valley Weeping Myall Woodland ecological community is dominated by *Acacia pendula* (weeping myall). This species is widespread west of the Great Dividing Range but is rare in the Hunter Valley. Other small trees and large shrubs that may occur with weeping myall include: *Acacia salicina* (coobah), *Acacia homalophylla-melvillei* (yarran), *Psydrax odorata* (stiff canthium), *Geijera parviflora* (wilga), *Geijera salicifolia* (scrub wilga), *Dodonaea viscosa* (hop bush), *Notolaea microphylla* (native olive), *Sarcostemma viminale* (caustic bush), *Senna artemisioides* (silver cassia) or *Spartothamnella juncea* (red bead bush. Eucalypts are uncommon though *Eucalyptus crebra* (narrow-leaf ironbark) or *Eucalyptus dawsonii* (Dawson's box) may be present as scattered emergent trees. Hybrids of *Acacia* species may also be present in the canopy and shrub layer.

1.4.2. Ground layer – grasses, forbs and low shrubs

The ground stratum is variable, ranging from sparse to dense partly in response to the density of the canopy and shrub layers. The composition is primarily grassy with a range of species present, including: *Themeda triandra* (kangaroo grass*), Rytidosperma* spp. (wallaby grasses) and *Cymbopogon refractus* (barbed wire grass). Some forbs, e.g. *Chrysocephalum apiculatum* (common everlasting) and low shrubs, often chenopods such as *Enchylaena tomentosa* (ruby saltbush), also may be present.

A list of plant species that typically occurs in the Hunter Valley Weeping Myall Woodland ecological community is presented at Table B1 in Appendix B.

1.5. Fauna

The vertebrate fauna inhabiting Weeping Myall woodland/low forest typify those found in grassy woodland environments from throughout the Hunter Valley. While no comprehensive Hunter Valley specific study of grassy woodland fauna has been done, other regions do have considerable comparative data. As with many other *Acacia* species, weeping myall plays host to an array of invertebrate species. These include representatives from the beetle (e.g. Hawkeswood, 1985a, 1992), butterfly (e.g. Hawkeswood, 1985b), and jewel bug (e.g. Cassis & Gross, 2002) families.

Because all known stands of the ecological community are small in extent, form a mosaic with other kinds of grassy woodlands and occur amongst a matrix of modified, agricultural landscapes, few fauna species are likely to be restricted to this ecological community. Few plants within the ecological community provide significant amounts of nectar resources. Habitats likely to be provided by the ecological community mainly include foraging and nesting sites for insectivorous birds, and shelter and foraging areas for reptiles and mammals. These include bird species listed as threatened under the NSW TSC Act, such as the vulnerable *Climacteris picumnus victoriae* (Brown Treecreeper, eastern subspecies), *Melanodryas cucullata* (Hooded Robin) and *Pomatostomus temporalis* (Grey-crowned Babbler). Further details on a range of threatened species recorded in or near the ecological community are covered in the *National context and existing protection* section.

1.6. Key diagnostic characteristics and condition thresholds

National listing focuses legal protection on remaining patches of the ecological community that are most functional, relatively natural, and in relatively good condition. Key diagnostic characteristics and condition thresholds assist in identifying a patch of the threatened ecological community, determine when the EPBC Act is likely to apply to the ecological community and distinguish between patches of different quality.

Much of this naturally restricted ecological community has been cleared and the few known patches that remain all exhibit a degree of disturbance and degradation. No large or high quality

remnants of the ecological community exist, with Jerrys Plains cemetery representing the best reference site. The fragmented and degraded state of the ecological community has been taken into account in developing the key diagnostic characteristics and condition thresholds.

For EPBC Act referral, assessment and compliance purposes, the national ecological community is limited to patches that meet the following key diagnostic characteristics and condition thresholds.

1.6.1. Key diagnostic characteristics

The key diagnostic characteristics presented here summarise the main features of the Hunter Valley Weeping Myall Woodland. These are intended to aid the identification of the ecological community, noting that a broader description is provided above.

A patch must include the following key diagnostic characteristics to be considered the ecological community:

1. The patch is a native vegetation remnant with a canopy that is (or was[3]) dominated[4] by *Acacia pendula* (weeping myall).

AND

2. Other native shrubs or herbs are present in the patch, with an indicative plant species list at Table 1A, Appendix A. If a shrub layer is present, it may include one or more of: other species of *Acacia*, *Geijera* spp. (wilga), *Dodonaea viscosa* (hop bush), *Notolaea microphylla* (native olive), *Psydrax odorata* (stiff canthium), *Sarcostemma viminale* (caustic bush), *Senna artemisioides* (silver cassia) or *Spartothamnella juncea* (red bead bush). The ground layer includes a range of native grasses, forbs and chenopod low shrubs.

General notes on identifying the Hunter Valley Weeping Myall Woodland

Known occurrences are limited to the Hunter Valley geographic region of NSW. The geographic region includes the IBRA subregions of Kerrabee (SYB01), Hunter (SYB02), Ellerston (NNC15) and Upper Hunter (NNC16), though the ecological community is not currently known from all these subregions.

The ecological community occurs on undulating plains, generally at low elevation sites and usually below 200 m ASL. The mean annual rainfall of the region is 600 to 700 mm/year. Associated soils are clays derived from Permian-age geology. The habitat and soils of the Hunter Valley occurrences differ to the Weeping Myall Woodland further inland, that are generally associated with flat areas, shallow depressions or gilgais on raised (relict) alluvial plains.

The structure of the vegetation is a woodland dominated by weeping myall. Eucalypts are uncommon but may occur as scattered emergents in some patches. A sparse shrub layer may be present. The ground layer is of variable density and composition. A list of plant species likely to occur in the ecological community is at Table A1 of Appendix A.

[3] In patches where a Weeping Myall canopy has declined due to disturbance, there should be evidence that either: Weeping Myall was formerly present at the site and likely to have been dominant (e.g. by stumps, past surveys or photographs); or resprouts/suckers, saplings or seedlings indicate that a weeping myall canopy is regenerating; or evidence from a floristic analysis indicates the assemblage of plant species is intermediate between known occurrences of the community.

[4] Dominance in this context means that 50% or more of the crown cover of the canopy stratum was made up of *A. pendula*.

Derived native grasslands are included as part of the ecological community where such sites confirm to the key diagnostic features presented here and the condition thresholds outlined below. Similarly, where a degraded site has been recovered to the point that it meets the key diagnostic features and condition thresholds, it is considered to be a part of the ecological community; this provides suitable recognition and targets for future recovery efforts.

Other woodlands in the landscape are types of grassy eucalypt or bulloak woodlands that are distinctive from the ecological community by the dominance/co-dominance of eucalypts or *Allocasuarina luehmannii* (bulloak). However, much of the surrounding landscape in the region where the ecological community occurs is heavily modified by agriculture and mining activities.

1.6.2. Condition thresholds

Condition thresholds provide guidance for when a patch of a threatened ecological community retains sufficient conservation values to be considered as a Matter of National Environmental Significance, as defined under the EPBC Act. Patches that do not meet the minimum condition thresholds are excluded from full national protection. This means that the referral, assessment and compliance provisions of the EPBC Act are focussed on the most valuable elements of the ecological community.

The Hunter Valley Weeping Myall Woodland is naturally restricted in its extent. All known patches that remain are considered to be in relatively poor condition (Peake, 2006). Most patches consist of regrowth trees and exhibit disturbance to the ground layer vegetation (e.g. grazing). Ongoing management is required to maintain and enhance the biodiversity of the remaining patches, particularly through weed control and suppression (Umwelt, 2006b). This applies both to patches that meet the condition thresholds and those that do not.

Although highly degraded or modified patches are not protected as the ecological community listed under the EPBC Act, it is recognised that patches that do not meet the condition thresholds may still retain important natural values and may be critical to protecting those patches that meet minimum thresholds. They may also be protected through State and local laws or schemes. Therefore, these patches should not be excluded from recovery and other management actions. For a patch that does not meet the condition criteria, suitable recovery and management actions may improve it to the point that it can be regarded as part of the ecological community listed under the EPBC Act. Management actions should, where feasible, aim to restore patches to meet the minimum quality condition thresholds outlined below.

<u>Minimum condition thresholds</u>

These represent the minimum condition of a patch for the purposes of considering any potentially significant detrimental actions involving the ecological community.

1. The patch of the ecological community must be 0.1 ha[5] or more in size.

AND

2. At least 10 native plant species, from the list of native plants at Table A1, Appendix A, are present in a sample plot (see Sampling protocol, below);

AND

3. Non-native perennial plants account for no more than 70 % of the vegetation cover in each vegetation layer of the patch (including annual plus perennial life histories).

[5] Based on area estimates in the recovery plan (NSW OEH, 2013) for 52 natural populations of *A. pendula* (43 confirmed and 9 unconfirmed): the median size of these patches is 0.1 ha. Of the patches documented in the recovery plan, only eleven meet the 0.1 ha size threshold. Not all of these may meet the other diagnostic and condition criteria.

The following information should also be taken into consideration when applying the key diagnostic characteristics and condition thresholds (to assess a site that may include the ecological community and determine the potential impacts on a patch).

Patch: A patch of the listed ecological community is defined as a discrete and continuous or semi-continuous area of the ecological community, as described, and does not include substantial elements of other ecological communities. A patch of the listed ecological community may include small-scale disturbances, such as tracks or breaks, which do not alter its overall functionality, for instance the movement of wildlife or dispersal of plant propagules, and may also include small-scale variations in vegetation such as localised weedy areas within a patch.

Buffer zone: A buffer zone is a contiguous area adjacent to a patch of the ecological community that is important for protecting its integrity. As the buffer zone lies to the outside, around the patch, it is not part of the national ecological community and is not formally protected as a matter of national environmental significance. However, practical application of a buffer zone is strongly recommended.

The purpose of the buffer zone is to help protect and manage the national ecological community. The edges of a patch are considered particularly susceptible to disturbance and the presence of a buffer zone is intended to act as a barrier to further direct disturbance. For instance, a buffer zone may help to protect the ecological community from pollutants spray drift and other threats.

The recommended minimum buffer zone for the ecological community is 15 metres from the edge of a patch, as this accounts for the maximum height of the vegetation and likely influences upon the root zone. A larger buffer zone may be applied, where practical, to protect patches that are of particularly high conservation value.

Timing of surveys: Surveys in grassy woodland environments are best conducted in mid- to late-spring, or after good rainfall in other seasons, and ideally with a repeat survey in a different season (Burrows, 2004) to capture when many species within the ecological community have emerged or are flowering or fruiting to aid identification. Timing of surveys should also consider recovery after recent disturbances (natural or human induced) to the ecological community. Assessments should occur more than two months after any substantial ground or fire disturbance.

Sampling protocol: Given the generally small size of patches for this ecological community, the sampling plot should be based on the size of the patch, up to 0.1 ha. For patches above this size, sample plots should be scaled appropriately for the size of a patch, and positioned appropriately to be representative of the patch. Sampling plots should not overlap with the buffer zone outside the patch.

1.7. Surrounding environment, landscape context and other significant considerations

The condition thresholds represent the minimum level at which patches are to be considered under the EPBC Act. Patches that are relatively large, species rich, contain key faunal groups (e.g. pollinator or seed dispersal groups) and are less disturbed are likely to provide greater biodiversity value. Additionally, patches that are linked with other native vegetation remnants in the landscape, whether ecologically or by proximity are particularly important as wildlife habitat and to the viability of patches of the ecological community into the future.

Some patches occur in isolation and require protection as well as priority actions to link them with other patches of native vegetation. Other patches have additional conservation value through being interconnected to other similar native vegetation associations that may not, in their current state, meet the description. In these instances, the following indicators should be

considered when assessing the impacts of actions or proposed actions under the EPBC Act, or when considering recovery, management and funding priorities for a particular patch:

- Relatively large size and/or large area to boundary ratio – these are less exposed and more resilient to edge effects such as weed invasion and other human impacts;
- Evidence of recruitment of key native species or the presence of a range of age cohorts. For instance, tree canopy is present as saplings through to large mature trees;
- Presence of key pollinator and dispersal animals (e.g. birds that eat acacia seeds);
- Presence of grassy woodland dependent/specialist fauna;
- Good faunal habitat as indicated by patches containing, e.g. mature trees, logs, natural rock outcrops, watercourses, diversity of landscape, and contributing to movement corridors;
- High species richness as shown by the variety of native flora and fauna species that are present;
- Areas where weed/exotic species invasion and feral animal activities are minimal or can be easily managed;
- Presence of national or state listed threatened species or species that are recognised to be near-threatened, in decline or rare in the region;
- Connectivity to other native vegetation remnants or restoration works. In particular, a patch in an important position between (or linking) other patches in the landscape; and/or
- Patches that occur in those areas in which the ecological community has been most heavily cleared and degraded or that are on the natural edge of its range.

1.8. Area critical to the survival of the ecological community

The areas considered critical to the survival of the Hunter Valley Weeping Myall woodland covers all patches that meet the key diagnostic characteristics and condition thresholds for the ecological community.

Note that additional areas that do not meet the minimum condition thresholds may be critical to the survival of the ecological community depending on factors such as their size and shape, landscape linkages to other patches and landscape position, because they could retain some biodiversity or habitat values. For instance, stands of *A. pendula* in the Hunter Valley are recognised as part of an endangered population under NSW legislation. Although some of these may fall outside the description of the national ecological community, they retain important genetic and ecological functions that could contribute to future recovery actions. The *Surrounding environment and landscape context*, above, should also be considered.

1.9. Geographic extent and distribution

The Hunter Valley Weeping Myall Woodland ecological community represents an important edge-of-range outlier for this type of woodland. Its presence in the Hunter Valley is a relict of a formerly more extensive distribution. Establishing the past distribution of this community is difficult, given its natural scarcity in the region, the general degraded condition of known stands, the occurrence of deliberately planted stands, and the lack of historical information about weeping myall in the Hunter Valley.

The ecological community no longer exists at many sites where it was formerly present. In many cases, the loss is irreversible because sites have been permanently cleared or modified to the extent that it is impractical to restore patches. The ecological community now exists as small patches that are degraded to some extent. It is important to distinguish between stands of

the ecological community and the presence of weeping myall as a component species. Weeping myall may occur within other types of woodland where it is not a dominant component, for instance, the Narrabeen Footslopes Slaty Box Woodland and Central Hunter Box – Ironbark Woodland (Peake, 2006).

Peake (2006) documented the Hunter Valley Weeping Myall Woodland as occurring between the locations of Warkworth in the east and Wybong to the west. The occurrences of the ecological community that are relatively better studied and considered good representations of the community are at Jerrys Plains cemetery and at Warkworth in the vicinity of the Wambo coal mine (NSW OEH, 2013). Other stands are, as yet, relatively poorly sampled, especially in terms of their community composition, including the patch at Wybong referred to by Umwelt (2006) and Bell (2012) as potentially representative of the ecological community

The recovery plan (NSW OEH, 2013) identified the confirmed and unconfirmed natural population plus planted sites known at that time, as lying roughly in the area bounded by Merriwa, Cessnock and Scone. Peake (pers. comm., 2014) noted there may be further occurrences in the Scone district and Kerrabee subregion that require investigation about whether *A pendula* is present and dominant. Condition also needs to be considered.

1.10. National context and existing protection

1.10.1. National legislation

The Hunter Valley Weeping Myall Woodland was previously listed as critically endangered under the EPBC Act under the name: "Weeping Myall – Coobah – Scrub Wilga Shrubland of the Hunter Valley". The former listing only included the occurrences at Jerrys Plains Cemetery. This updated listing extends protection to all occurrences that meet the description of the ecological community.

1.10.2. Listed threatened species associated with the ecological community

Acacia pendula is the only threatened plant species known to occur within the Hunter Valley Weeping Myall Woodland ecological community. This species is listed on the New South Wales *Threatened Species Conservation Act 1995* (TSC Act) as an endangered population within the Hunter Valley. There are a number of plant species regarded as regionally significant in the Hunter Catchment that share its habitat (Peake, 2006). These include yarran (*A. homalophylla-melvillei*), mealy saltbush (*Rhagodia parabolica*), *Ptilotis semilanatus,* and caustic vine (*Sarcostemma viminale* subsp. *australe*).

A number of threatened birds occur in the wider woodland landscapes. Roderick and Stuart (2010) documented the status of listed birds within the Hunter Region, which includes some seventy-four species and sub-species. Several of these occur in and around known stands of Weeping Myall woodland/low forest (Table 2). *Melanodryas cucullata* (hooded robin) in particular appears to have a stronghold in the Jerrys Plains – Broke area. Other species known to occur near known stands of Hunter Valley Weeping Myall Woodland in the atlas mapping of Newman et al. (2010) include: *Daphoenositta chrysoptera* (varied sittella), *Lathamus discolour* (swift parrot), *Anthochaera phrygia* (regent honeyeater), *Pomatostomus temporalis* (Grey-crowned Babbler), *Chthonicola sagittata* (speckled warbler) and *Petroica boodang* (scarlet robin).

In general, few threatened reptiles occur within the Hunter Valley. Of the threatened mammals, some are associated with the ecological community e.g. microbats are frequently recorded in woodlands in the vicinity of the ecological community (Table 2).

1.10.3. Conservation reserves

The recovery plan (NSW OEH, 2013) notes that "Hunter Valley Weeping Myall is not adequately represented within conservation reserves, with no individuals (of *Acacia pendula*) or potential habitat occurring within any formal conservation reserves".

1.10.4. State legislation

The New South Wales *Threatened Species Conservation Act 1995* (TSC Act) recognises the importance of weeping myall in the Hunter Valley through two listings:

- Hunter Valley Weeping Myall Woodland of the Sydney Basin is listed as an endangered ecological community. This state listing is broadly equivalent to the national ecological community except that the state listing does not specify condition thresholds.
- *Acacia pendula* population in the Hunter catchment is listed as an endangered population. This listing extends protection to stands of *A. pendula* that may fall outside the description of the ecological community, for instance natural occurrences within eucalypt woodlands or on highly degraded sites such as paddocks that have been heavily grazed or with extensive pasture improvements. This listing, therefore, coincides only partly with the national ecological community, where populations fall within its description. NSW OEH (2013) identified 52 natural populations of *A. pendula* in the Hunter Valley (43 of which are confirmed and nine are yet to be confirmed). Many of these are fragmented, degraded and isolated due to historic extensive vegetation clearing for agriculture and mining across the Hunter Valley.

Table 2. Threatened fauna known from woodlands around the Hunter Valley Weeping Myall Woodland (from Roderick and Stuart, 2010; Newman et al., 2010; NSW Atlas of Wildlife).

Species	**Common name**	**EPBC Act**	**NSW TSC Act**
Birds			
Anthochaera phrygia	regent honeyeater	Endangered	Critically endangered
Certhionyx variegatus	pied honeyeater		Vulnerable
Chthonicola sagittata	speckled warbler		Vulnerable
Circus assimilis	spotted harrier		Vulnerable
Climacteris picumnus	brown treecreeper		Vulnerable
Daphoenositta chrysoptera	varied sittella		Vulnerable
Glossopsitta pusilla	little lorikeet		Vulnerable
Grantiella picta	painted honeyeater		Vulnerable
Hieraaetus morphnoides	little eagle		Vulnerable
Lathamus discolor	swift parrot	Endangered	Endangered
Melanodryas cucullata	hooded robin		Vulnerable
Melithreptus gularis	black-chinned honeyeater		Vulnerable
Pomatostomus temporalis	grey-crowned babbler		Vulnerable
Stagonopleura guttata	diamond firetail		Vulnerable
Mammals			
Chalinolobus dwyeri	large-eared pied bat	Vulnerable	Vulnerable
Miniopterus schreibersii oceanensis	eastern bentwing-bat		Vulnerable
Miniopterus australis	little bentwing bat		Vulnerable
Mormopterus norfolkensis	eastern freetail-bat		Vulnerable
Myotis macropus	large-footed myotis		Vulnerable
Petaurus norfolcensis	squirrel glider		Vulnerable
Pteropus poliocephalus	grey-headed flying-fox	Vulnerable	Vulnerable
Saccolaimus flaviventris	yellow-bellied sheathtail-bat		Vulnerable
Reptiles			
Hoplocephalus bitorquatus	pale-headed snake		Vulnerable
Varanus rosenbergi	Rosenberg's goanna		Vulnerable

2. SUMMARY OF THREATS

The main threats to the Hunter Valley Weeping Myall Woodland ecological community are:

- *Ongoing effects of historic land clearing and resulting fragmentation.* European settlement of the Hunter Valley since the early 1800's transformed the landscape. Agriculture and mining extraction for coal, minerals and gas have been the primary reasons for progressively clearing large areas of woody vegetation. All known stands of the ecological community occur as small, fragmented patches within landscapes that have been heavily cleared and grazed.
- *Current and future land clearing.* This threat is likely in light of mining leases and other human activities in the region. Potential impacts may involve alteration of groundwater and construction of roads through expansions to coal mining, or coal seam gas exploration and extraction.
- *Invasive species.* Weed invasion affects all patches to a varying degree. Weed species from surrounding cleared and grazed landscapes pose edge effects to remnants, and some weeds in the region are known to have significant impacts, e.g. bridal creeper. Pest animals such as rabbits may prevent regeneration of the community through herbivory.
- *Inappropriate grazing regimes.* Grazing no longer occurs in the most intact patches of the ecological community. However, it remains a threat in other stands of *A. pendula* as it is palatable to livestock. Were grazing to cease, it may lead to the regeneration of *A. pendula* by suckering.
- *Inappropriate fire regimes.* Fire is a potential threat, although the highly modified landscape in which the ecological community occurs is unlikely to promote significant high intensity fires.
- *Climate change.* Climate modelling suggests that changes to rainfall and temperature patterns are likely to adversely affect hydrological and fire regimes, potentially impacting upon the ecological community.

Threats to the ecological community are discussed in more detail at Appendix D.

3. SUMMARY OF ELIGIBILITY FOR LISTING AGAINST THE EPBC Act CRITERIA

Further details about how the ecological community was judged against the EPBC Act listing criteria can be found at Appendix E.

Criterion 1 – Decline in geographic distribution

No estimates of original extent or decline based on comprehensive pre-European distribution modelling are available for this ecological community, at this time. Therefore, there is insufficient information to determine whether the ecological community is eligible for listing under this criterion.

Criterion 2- Small distribution coupled with demonstrable threat

The Committee considers that the ecological community has a very restricted geographic distribution, based on the very small area of occupancy and the very small size of patches. The Committee considers that the demonstrable ongoing threats could cause the ecological community to become lost in the immediate future. Therefore, the Committee considers that the ecological community has been demonstrated to have met the relevant elements of Criterion 2 to make it **eligible** for listing as **critically endangered** under this criterion.

Criterion 3 – Loss or decline of functionally important species

There is no information available to the Committee to judge if the ecological community has undergone a loss or decline in functionally important species. Therefore, there is insufficient information to determine whether the ecological community is eligible for listing under this criterion.

Criterion 4- Reduction in community integrity

The population of weeping myall (*A. pendula*) in the Hunter Valley consists of about 50 natural stands scattered throughout the region between Cessnock and Merriwa (NSW OEH, 2013). A majority of natural occurrences appear to be degraded, comprising largely monoculture stands of weeping myall with few to no associated native species. There are few intact patches that support an assemblage of native species sufficient to merit consideration as the nationally-listed ecological community. Fragmentation into isolated, very small patches, weed invasion, and a reduced diversity of ground layer vegetation have all contributed to a loss of integrity across the likely former range of the ecological community.

Therefore, the Committee considers that the ecological community has been demonstrated to have met the relevant elements of Criterion 4 to make it **eligible** for listing as **critically endangered** under this criterion.

Criterion 5 – Rate of continuing detrimental change

There are no data available to the Committee to judge the rate of continuing detrimental change experienced by the ecological community. Therefore, there is insufficient information to determine whether the ecological community is eligible for listing under this criterion.

Criterion 6- Quantitative analysis showing probability of extinction

There are no quantitative data available to assess this ecological community under this criterion. Therefore, there is insufficient information to determine whether the ecological community is eligible for listing under this criterion.

4. PRIORITY RESEARCH AND CONSERVATION ACTIONS

Research Priorities and Conservation actions will contribute to the overall objective of the recovery plan (NSW OEH 2013) to "abate identified threats and maintain and improve the current extent, condition and ecological function of Hunter Valley Weeping Myall to ensure its long-term persistence in the wild".

4.1. Research and monitoring priorities

The following research priorities would inform future priority conservation actions for the Hunter Valley Weeping Myall Woodland ecological community.

- Complete mapping of extent and condition of the ecological community in the Hunter Valley and further westward e.g. in the Merriwa or Goulburn River region, to determine its complete distribution, especially to determine how disjunct it is from the main semi-arid occurrences.
- Investigate the life histories, ecological roles and habitat requirements of key flora and fauna relevant to the ecological community.
- Identify key threats and areas that have the most potential for persistence and / or recovery.
- Determine the most appropriate management and restoration techniques to enhance genetic diversity of weeping myall and improve understory diversity at low quality sites.
- Research into appropriate and integrated methods to manage weeds that affect the ecological community.
- Clarify the taxonomic relationships of *Acacia pendula* and *A. homalophylla-melvillei* in the Hunter region with the western occurrences (See Appendix B).

4.2. Priority recovery and threat abatement actions

The following regional priority recovery and threat abatement actions can be implemented to support the recovery of the Hunter Valley Weeping Myall Woodlands.

Habitat Loss, Disturbance and Modification

- As most known occurrences are on private tenure, investigate formal conservation arrangements, management agreements and covenants to protect and recover these patches.
- Liaise with local councils and state authorities to ensure new developments or activities, avoids or minimises any adverse impact to the ecological community and adjacent land.
    - Implement revegetation/restoration strategies at prioritized sites across the landscape.
    - Include regular monitoring to determine success of revegetation/restoration programs.
    - Management strategies also should consider any threatened and regionally important species within, or near to, patches of the ecological community.
- Where possible, reinstate the diversity and connectivity of native vegetation patches across the landscape through integrated and adaptive management activities. In particular:
    - Ensure that areas of higher quality are maintained to retain their biodiversity and landscape connectivity value; and
    - Recognise that sites of apparently low vegetation quality, e.g. stands of weeping myall over pasture, may retain certain habitat and connectivity values that are important in heavily fragmented landscapes.
- Manage any other known, potential or emerging threats.

Invasive Species

- Develop and implement management plan(s) for the control and prevention of significant weeds invasions in the region e.g. *Asparagus asparagoides* (bridal creeper) and *Olea europaea* subsp. *Cuspidate* (African olive)
- Liaise with councils, developers and contractors to ensure inadvertent damage is not inflicted on patches or surrounding land, including:
  - Intensive management of weeds immediately after disturbances
  - Herbicide use that does not damage non-target species
  - Hygiene practices that avoids the spread of soil and weed seeds.

Trampling, Browsing or Grazing

- Exclude domestic livestock from patches. If some biomass control using livestock is considered desirable, ensure that appropriate timing and levels of grazing are applied to avoid damage to sensitive plants and to allow seed production of native species. Control introduced pest animals, e.g. rabbits, through coordinated landscape-scale control programs in the region.

Conservation Information

- Communicate with landholders/managers, relevant agencies and the public to emphasise the significance and value of the ecological community, and appropriate management.
- Develop education programs, information products and signage to help the public recognise the presence and importance of the ecological community, and their responsibilities under state and local regulations and the EPBC Act. For instance, the Jerrys Plains site has a sign identifying it as a nationally threatened ecological community and other key occurrences should be similarly identified.
- Continue to encourage local participation in recovery efforts through local conservation groups, field days and planting projects, etc.

4.3. Existing management actions /plans

One plan exists:
NSW Office of Environment and Heritage (2013). National Recovery Plan. Weeping Myall – Coobah – Scrub Wilga Shrubland of the Hunter Valley. NSW Office of Environment and Heritage, Sydney.

These prescriptions were current at the time of publishing; please refer to the relevant agency's website for any updated versions.

4.4. Recovery plan recommendation

A recovery plan has been adopted (NSW OEH, 2013) for the listed Weeping Myall- Coobah-Scrub Wilga Shrubland of the Hunter Valley. This recovery plan also covers the NSW-listed Hunter Valley Weeping Myall Woodland ecological community and the endangered population of *A. pendula* in the Hunter Valley, which covers the area of, and threats to, the revised ecological community. It is therefore considered that the existing recovery plan contains actions that are relevant and could be adopted for the Hunter Valley Weeping Myall (*Acacia pendula*) Woodland ecological community, as presented in this advice. It is recommended that this recovery plan be maintained but, at its next review, appropriate modifications be made to take the revised national ecological community into consideration.

APPENDICES

APPENDIX A - SPECIES LISTS

Table A1. Native plant species known to occur in the Hunter Valley Weeping Myall Woodland ecological community.

This is an indicative rather than comprehensive list of plant species present in the ecological community. Patches may not include all species on the list, or may include other species not listed. At any one time, above-ground individuals of some species may be absent, but the species may be represented below ground in soil seed banks or as dormant structures such as bulbs, corms, rhizomes, rootstocks or lignotubers.

Scientific names have been updated to take account of taxonomic changes up to December 2013, and follow the taxonomy accepted by the Australian Biological Resources Study (ABRS).

Sources: Based on a compilation by Bell (2012) of five full floristic sample plots for stands of Weeping Myall: one at Jerrys Plains cemetery; two at Wambo coal mine; and two from Wybong . This list was supplemented by species noted in other relevant reports [Peake (2006); Umwelt, (2006b; 2008); NSW Vegetation Information System for community ID116 (2010); and NSW Scientific Committee (2011)].

Growth Form	Species Name	Common Name
Upper to mid layers		
Tree	*Acacia pendula*	weeping myall
	Allocasuarina luehmannii	bulloak, buloke
	Callitris endlicheri	black cypress pine
	Brachychiton populneus subsp. *populneus*	kurrajong
	Eucalyptus crebra	narrow-leaf ironbark
	Eucalyptus dawsonii	Dawson's Box
Shrub	*Acacia gunnii*	ploughshare wattle
	Acacia implexa	hickory
	Acacia homalophylla-melvillei	yarran
	Acacia salicina	coobah
	Dodonaea viscosa	hop bush
	Geijera parviflora	wilga
	Geijera salicifolia	scrub wilga
	Maireana microphylla	eastern cottonbush
	Myoporum montanum	western boobialla
	Notelaea microcarpa var. *microcarpa*	native olive
	Psydrax odorata subsp. *buxifolia*	stiff canthium
	Rhagodia parabolica	fragrant saltbush
	Sarcostemma viminale subsp. *australe*	caustic bush
	Senna artemisioides subsp. *zygophylla*	silver cassia
	Spartothamnella juncea	red bead bush
Mistletoes and vines	*Amyema congener* subsp. *congener*	
	Lysiana exocarpi subsp. *tenuis*	
	Pandorea pandorana subsp. *pandorana*	wonga vine

Growth Form	Species Name	Common Name
Ground layer		
Forbs and low shrubs	*Arthropodium minus*	small vanilla lily
	Calocephalus citreus	lemon beauty-heads
	Cheilanthes distans	bristly cloak fern
	Chenopodium carinatum	keeled goosefoot
	Chenopodium glaucum	oakleaved goosefoot
	Chrysocephalum apiculatum	common everlasting
	Chrysocephalum semipapposum	clustered everlasting
	Einadia hastata	berry saltbush
	Einadia nutans subsp. *linifolia*	climbing saltbush
	Einadia nutans subsp. *nutans*	nodding saltbush
	Einadia polygonoides	knotted goosefoot
	Enchylaena tomentosa	ruby saltbush
	Eremophila debilis	winter apple
	Maireana enchylaenoides	wingless bluebush
	Minuria leptophylla	minnie daisy
	Ptilotus semilanatus	mulla mulla
	Sclerolaena muricata	back roly poly
Graminoids	*Aristida ramosa*	purple wiregrass
	Austrostipa scabra subsp. *scabra*	speargrass
	Bothriochloa macra	red-leg grass
	Chloris truncata	windmill grass
	Cymbopogon refractus	barb-wire grass
	Cynodon dactylon	couch grass
	Elymus scaber var. *scaber*	common wheatgrass
	Enteropogon acicularis	curly windmill grass
	Eragrostis alveiformis	lovegrass
	Lomandra multiflora subsp. *multiflora*	multi-headed matt-rush
	Monachather paradoxus	bandicoot grass
	Panicum effusum	hairy panic
	Poa sieberiana	poa tussock
	Rytidosperma bipartitum	leafy wallaby grass
	Rytidosperma fulvum	wallaby grass
	Rytidosperma setaceum	smallflower wallaby grass
	Sporobolus caroli	fairy grass
	Themeda triandra	kangaroo grass

APPENDIX B - DETAILED DESCRIPTION OF BIOLOGY

B1. Ecology of Acacia pendula

Acacia pendula is widespread in inland areas of New South Wales, where it occurs on major river floodplains on heavy clay soils. The upper Hunter Valley is the eastern distributional limit for the species (Kodela and Harden, 2002). Along with a number of other more western species, it is thought that this species has become established due to a favourably dry climate and the relatively low elevation of the Great Dividing Range at the head of the valley.

Acacia pendula, which characterises the ecological community, is an erect or spreading small tree 5-13 m high, with pendulous branches and leaves, and rough fissured bark. This attractive small tree has been widely planted as an ornamental both within Australia and overseas (Boxshall and Jenkyn, 2001; Maslin, 2002; Boland et al., 2006). There is some evidence that *Acacia pendula* is relatively slow growing (Applegate and Nicholson, 1987) and moderately salt tolerant (Aswathappa et al., 1987). In Victoria, there is growing interest in the use of this species for its timber (Boxshall and Jenkyn, 2001). Umwelt (2006a) suggested that some of the older *Acacia pendula* trees in the Hunter Valley may be more than 100 years of age. Story (1967) reported on stands of *Acacia pendula* within the Wambo homestead that are of similar dimensions to that present today, suggesting that the plants may be at least 100 years old.

Hunter Valley forms of *Acacia pendula* are rarely known to support the pendulous habit that is typical of the species (Umwelt, 2006a; Bell et al., 2007), and this may be the result of apomixis or neotony acting on the population. This trait, together with the rare flowering and fruiting events observed, has caused some identification problems in this region (Bell et al., 2007: see Appendix 1). Beadle (1981, in Porteners, 1993) stated that fruiting, seed set and germination in *Acacia pendula* was poor. Comparisons can be readily made with the related *Acacia homalophylla* in Victoria, where no sexual reproduction has been observed in living memory (Murphy, pers. comm., 2007). Variation exhibited in another arid-zone Acacia, the *Acacia aneura* complex (Miller et al., 2002), is also synonymous to *Acacia pendula*.

Weeping myall and its close relatives (e.g. *Acacia melvilleii*) are prone to damage from a range of insects, including gall-forming thrips (*Kladothrips rugosus, Oncothrips waterhousei* and *Oncothrips habrus*) and the larvae of *Ochrogaster lunifer,* syn. *O. contraria* (bag-shelter moths) (Floater, 1996; Crespi et al., 1997; Crespi and Abbot, 1999; Kranz et al., 2001; Venn, 2004; Umwelt, 2006a). Cunningham et al., (2011) indicate that in severe defoliations by the larvae of bag-shelter moths, death of adult trees sometimes occurs. In the Hunter Valley, Umwelt (2006a) observed that only non-pendulous forms of *Acacia pendula* succumb to attack by bag-shelter moth larvae. Seed-preventing gall midges (fluted galler, *Dasineura* sp.) are also reported for *Acacia pendula*, and can limit seed production in some areas (Adair et al., 2000).

Watson (2011) notes several species of mistletoe as being hosted by characteristic species within weeping myall woodland. *Amyema quandang* (grey mistletoe) is frequently recorded on *Acacia pendula, A. homalophylla* and *A. aneura* in inland areas, while *Korthalsella rubra* (ruddy mistletoe) and *Amyema lucasii* (leopardwood mistletoe) occur on *Geijera parvifolia* (wilga).

B2. Taxonomic issues

Acacia pendula is typically easy to identify across the bulk of its inland distribution (Boland et al., 2006), due to its pendulous habit and blue-grey foliage. However, in the Hunter Valley identification has been problematic (Bell et al., 2007). because many stands of *A. pendula* do not support the characteristic pendulous habit in foliage. Also, while most stands have foliage that is bluish in appearance (Umwelt, 2006a; Bell et al., 2007), this does not apply to all stands. Lack of fertile fruiting in many of these stands hinders identification from the closely related *Acacia melvillei* and *A. homalophylla*, and is unlikely to be resolved conclusively without

genetic studies. Apomixis (replacement of sexual reproduction by asexual reproduction, such that genetic identities of progeny are identical to the parent) and neotony (retention of juvenile features in the adult phase), as described by Miller et al. (2002) for *Acacia aneura*, may also be impacting on *Acacia pendula* in the Hunter.

Acacia pendula, the principal canopy species of this community, has been widely planted throughout many regions of Australia and overseas due to its horticultural and agricultural benefits (Boxshall & Jenkyn, 2001; Maslin, 2002). This has created some problems in documenting the natural distribution of the species and the associated ecological community, particularly in the Hunter Valley (Bell et al., 2007). In Victoria, the species is thought to have originally been naturally rare (Keith, 2004), but plantings as long as 100 years ago have clouded knowledge of natural stands (Venn, 2004), and genetic studies are required for clarification in that region. In New South Wales, it is thought that plants in the Bathurst district are not natural and are the result of earlier plantings. In the Hunter Valley, plantings of *Acacia pendula* have been recorded from Blackbutt Reserve near Newcastle on the coast, inland to Cassilis and Sandy Hollow.

APPENDIX C - DETAILED DESCRIPTION OF NATIONAL CONTEXT

C1. Distribution

The ecological community occurs in the Hunter Valley of New South Wales, within the Sydney Basin bioregion (Thackway and Cresswell, 1995; Environment Australia, 2000). All known stands of the community lie on the floor of the Hunter Valley, between elevations of 60 and 200 m above sea level (ASL), and extend from Warkworth to Wybong (Umwelt, 2006a; Bell, 2007a; Umwelt, 2008).

At Jerrys Plains, the ecological community occurs in a small stand on heavy, brown clay soil. Other locations throughout the Hunter (of the ecological community and stands of *Acacia pendula*) occur on similar soils. Peake (2006) suggested that heavy clay soils were the favoured substrate, and that some sites appeared to be located in flood washouts.

C2. Landuse history

The Jerrys Plains stand of Hunter Valley Weeping Myall Woodland occurs at the site of the Jerrys Plains General Cemetery, which was established as such in the early 1890s. The cemetery is administered by Singleton Shire Council, and has in total 241 inscriptions. Prior to use as a cemetery, it is uncertain what the condition of native vegetation was. Umwelt (2006b) examined available historical aerial photographs of the site which showed most woody vegetation had been cleared in 1954 and again in 1958, so that current day vegetation represents ~50 years of regeneration. Warkworth stands of the ecological community lie on the former Wambo Estate (now part of the Wambo Coal mine), which was established from 1824, and used as a staging point for the movement of cattle and sheep between Windsor (north-western Sydney) and the Liverpool Plains and New England districts (NSW OEH Heritage Database).

The Wybong valley was first surveyed for European settlement in 1824 by Henry Dangar (McMinn, 1970a). Historical aerial photography from around 1930 shows the location of all stands of Hunter Valley Weeping Myall Woodland to have been already heavily cleared, and lands used for grazing (Umwelt, 2006c).

C3. Relationships to nationally-listed ecological communities

Weeping Myall – Coobah – Scrub Wilga Shrubland of the Hunter Valley

The Hunter Valley Weeping Myall Woodland was previously listed under the EPBC Act as Weeping Myall – Coobah – Scrub Wilga Shrubland of the Hunter Valley. The previous listing only included the occurrence at the Jerrys Plains Cemetery. The updated listing includes all known occurrences of the ecological community.

Weeping Myall Woodlands

This ecological community is listed as endangered under the EPBC Act. It occurs on the inland alluvial plains west of the Great Dividing Range in NSW and Qld. This community is widespread across NSW and Qld is distinct from the Hunter Valley Weeping Myall Woodland as there are differences in species composition and it is found west of the Great Dividing Range.

C4. Relationship to state-listed ecological communities

Hunter Valley Weeping Myall Woodland of the Sydney Basin bioregion

This ecological community is listed as endangered under the New South Wales *Threatened Species Conservation Act 1995*. The NSW and national definitions of the ecological community are similar in their intent of capturing the more intact and diverse patches of native vegetation, rather than largely monospecific stands of trees. The main difference is that the

national listing specifies condition thresholds to help determine when a patch of *A. pendula* can be considered to be part of the ecological community. In particular, a patch size threshold of 0.1 hectare excludes many patches that are very small and highly likely to be degraded.

Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes Bioregions

This ecological community is listed as endangered under the New South Wales *Threatened Species Conservation Act 1995*. It is the equivalent to the NSW distribution of the nationally-listed Weeping Myall Woodlands and is therefore a different ecological community to the Hunter Valley Weeping Myall Woodlands.

C5. Relationships to other vegetation classifications

The ecological community, as it occurs in the Hunter Valley, should be distinguished from other communities characterised by weeping myall in western New South Wales and Queensland. In New South Wales, these include *Weeping Myall Open Woodland of the Riverina and NSW South Western Slopes Bioregions* and *Weeping Myall Open Woodland of the Darling Riverine Plains and Brigalow Belt South Bioregions* (Benson, 2008; Benson et al., 2006, 2010). In Queensland, weeping myall is characteristic in *Eucalyptus populnea* woodland on alluvial plains and *Casuarina cristata* ± *Eucalyptus coolabah* open woodland on alluvial plains (EPBC Act Policy Statement 3.17: Weeping Myall Woodlands). Hunter Valley Weeping Myall Woodland does not include any of these other communities. In Victoria, the few remaining stands of *Acacia pendula* have been deemed insufficient to warrant inclusion in the national Weeping Myall Woodlands (EPBC Listing Advice), and Keith (2004) considered that Victorian stands of Weeping Myall were probably always very minor.

Although united by the common occurrence of the arid zone Acacias (*Acacia pendula, A. melvillei, A. homalophylla*) in the canopy, similar vegetation in western regions of New South Wales and Queensland include a range of other species not present in the Hunter Valley. For example, Sivertsen and Metcalfe (1995) describe Myall Woodlands in the NSW wheat belt as comprising *Acacia pendula, Amyema quandong, Einadia nutans, Ixiolaena tomentosa, Marsilea hirsuta*, and *Austrodanthonia setacea*. For the NSW Hay Plain, *Acacia pendula* Woodland supports *Acacia pendula, Rhagodia spinescens, Atriplex nummularia, Rytidosperma caespitosum, Maireana aphylla, Atriplex* spp. *Enchylaena tomentosa, Atriplex semibaccata, Maireana decalvans, Austrostipa nodosa,* and *Amyema quandang* (Porteners, 1993). RACAC (2004) include species such as *Acacia pendula, Astrebla lappacea, Rhagodia spinescens, Atriplex semibaccata, Sclerolaena muricata, Acacia farnesiana, Maireana decalvans, Maireana aphylla, Thellungia advena, Digitaria divaricatissima* and *Einadia nutans* in their Clay Plain Acacia Woodland from the Brigalow Belt South. Scott (1992) describes her *Acacia melvillei* Woodland from Balranald and Swan Hill as being characterised by *Acacia melvillei, Enchylaena tomentosa, Sida corrugata, Rhagodia spinescens, Nitraria billardieri*, and often with *Tetragonia tetragonioides, Goodenia fascicularis* and *Zygophyllum* spp.

In Queensland, vegetation communities supporting Weeping Myall are included within broader eucalypt-dominated types (Neldner et al., 2005). For example, *Eucalyptus populnea* woodland with *Acacia harpophylla* and/or *Casuarina cristata* on alluvial plains supports associated species such as *Eremophila mitchellii, Geijera parviflora, Acacia melvillei, Alectryon oleifolius* and *Acacia pendula*. The grasses *Bothriochloa decipiens, Aristida ramosa, Enteropogon acicularis, Paspalidium* spp., *Chloris ventricosa, Eragrostis lacunaria, Aristida jerichoensis, Paspalidium constrictum* and *Tripogon loliiformis* also occur. Other communities include *Eucalyptus populnea* woodland on alluvial plains, *Eucalyptus coolabah* +/- *Casuarina cristata* open woodland on alluvial plains, *Eucalyptus coolabah* woodland on alluvial plains, *Eucalyptus populnea* woodland on Cainozoic clay plains, and *Dichanthium* spp., *Astrebla* spp. grassland on fine-grained sedimentary rocks.

Few of these species are present within the Hunter Valley, or are characteristic within Hunter Valley Weeping Myall Woodland.

C6. Differences to similar or intergrading ecological communities

Apart from the characteristic *Acacia pendula*, the ecological community is floristically very similar to several other ecological communities in the Hunter Valley. Peake (2006) has outlined the diversity of vegetation present within the mid to upper Hunter Valley region of New South Wales. In that study, Peake (2006) defined 35 naturally occurring plant communities primarily using numerical classification, including his Hunter Valley Weeping Myall Woodland. This last community was not included in the numerical classification, as sample data was not available at the time; however, descriptions were provided and known stands mapped.

Later, Bell (2007b) showed in a more localised numerical classification that vegetation dominated by Weeping Myall at Warkworth and the nearby Jerrys Plains cemetery was distinct from all other vegetation within the Wambo coal mine site. This suggested that in the absence of more comprehensive data, vegetation dominated by *Acacia pendula* at both stands were analogous, and that by extension the Warkworth *Acacia pendula* vegetation also constituted the ecological community.

More recently, Somerville (2010) has provided a numerical classification for the vegetation within the Hunter-Central Rivers Catchment Management Area, which includes all of the Hunter Valley. In that study, over 200 vegetation communities were defined including a number of grassy woodlands from the Hunter Valley floor. Hunter Valley Weeping Myall Woodland or its equivalent was not defined (sample data is unlikely to have been available), however Narrow-leaved Ironbark/ Grey Box Grassy Woodland was shown to support *Acacia melvillei* in at least one location.

Tables C1 and C2 shows similar and related Permian-based ecological communities to Hunter Valley Weeping Myall Woodlands, and detail how each of these differs from the ecological community. In general, no other defined community for the Hunter supports *Acacia pendula, Acacia melvillei* and/ or *Acacia homalophylla* as a dominant small tree.

C7. Level of protection in reserves

The ecological community is currently not protected in any form of conservation reserve.

Table C1. Similar grassy woodland communities from the Hunter Region based on Peake (2006).

Community (Peake, 2006)	**Key differences**
7: Narrabeen Footslopes Slaty Box Woodland	• canopy dominated by *Eucalyptus dawsonii* and *E. moluccana* • *Acacia salicina, A. melvillei* and *A. pendula* may be present as scattered individuals, but are not characteristic • shrub layer dominated by *Olearia elliptica, Acacia cultriformis, Psydrax odorata, Notelaea microcarpa, Dodonaea viscosa, Acacia decora, Bursaria spinosa, Myoporum montanum, Solanum brownii,* and *Geijera salicifolia* • ground layer dominated by *Dichondra repens, Lomandra multiflora, Aristida ramosa, Brunoniella australis, Cymbopogon refractus, Desmodium brachypodum, Eremophila debilis, Fimbristylis dichotoma* and *Sida corrugata* • occurs at the interface of Triassic Narrabeen and Permian sediments • currently included in Hunter Valley Footslopes Slaty Gum Woodland VEC on NSW TSC Act
10: Central Hunter Box-Ironbark Woodland	• canopy dominated by *Eucalyptus crebra*, *E. moluccana* and *Brachychiton populneus* • *Acacia salicina, A. melvillei* and *A. pendula* may be present as scattered individuals, but are not characteristic • shrub layer dominated by *Notelaea microcarpa, Bursaria spinosa, Breynia oblongifolia, Cassinia quinquefaria, Acacia decora, Myoporum montanum* and *Dodonaea viscosa.* • ground layer dominated by *Cymbopogon refractus, Aristida ramosa, Dichondra repens, Cheilanthes sieberi, Chloris ventricosa, Austrostipa scabra, Desmodium varians, Microlaena stipoides, Eragrostis leptostachya* and *Sporobolus creber*
11: Upper Hunter White Box – Ironbark Grassy Woodland	• canopy dominated by *Eucalyptus crebra*, *E. albens* and *E. albens x moluccana* • shrub layer dominated by *Notelaea microcarpa, Acacia paradoxa, Myoporum montanum* and *Swainsona galegifolia*. • ground layer dominated by *Aristida ramosa, Dichondra repens, Desmodium varians, Austrostipa verticillata, Calotis lappulacea, Einadia hastata, Austrodanthonia fulva, Einadia nutans, Cynodon dactylon,* and *Cheilanthes sieberi*
27: Central Hunter Ironbark – Spotted Gum – Grey Box Forest	• canopy dominated by *Eucalyptus crebra*, *E. albens* and *Corymbia maculata* • shrub layer dominated by *Allocasuarina luehmannii, Acacia parvipinnula, Daviesia ulicifolia, Pultenaea spinosa, Breynia oblongifolia, Hakea sericea, Bursaria spinosa* and *Acacia falcata*. • ground layer dominated by *Cheilanthes sieberi, Cymbopogon refractus, Pratia purpurascens, Lomandra multiflora, Pomax umbellata, Glycine tabacina, Dianella revoluta* and *Laxmannia gracilis*
32: Central Hunter Bulloak Forest Regeneration	• canopy dominated by *Allocasuarina luehmanii*, with eucalypts uncommon • *Acacia salicina* and *Geijera salicifolia* may rarely occur • shrub layer dominated by *Allocasuarina luehmannii,* but may include species such as *Acacia decora, Acacia parvipinnula, Cassinia arcuata Daviesia ulicifolia,* and *Melaleuca thymifolia.* • ground layer dominated by *Aristida vagans, Cynodon dactylon, Eragrostis leptostachya, Austrostipa verticillata, Cymbopogon refractus, Panicum effusum, Paspalidium aversum, Aristida ramosa, Fimbristylis dichotoma* and *Commelina cyanea*

Table C2. Similar grassy woodland communities from the Hunter Region based on Somerville (2010).

Community (Somerville, 2010)	**Key differences**
61: White Box Shrubby Woodland with SEVT Elements near Glenbawn Dam	• canopy dominated by *Eucalyptus albens*, with *Alectryon oleifolius, Geijera parviflora* and *Clerodendrum tomentosum* • shrub layer dominated by *Notelaea microcarpa, Olearia elliptica, Rhagodia parabolica*, and *Spartothamnella juncea* • ground layer dominated by *Austrostipa verticillata, Austrodanthonia fulva, Pellaea falcata* and *Urtica incisa* • a number of shared understorey & ground species, but no key *Acacia* species present
74: Narrow-leaved Ironbark/ Bull Oak Shrub/ Grass Open Forest	• canopy dominated by *Eucalyptus crebra* in association with *E. moluccana* and *Allocasuarina luehmanii* • shrub layer dominated by *Breynia oblongifolia* and *Eremophila debilis* • ground layer dominated by *Themeda australis, Aristida ramosa, Cymbopogon refractus, Eragrostis leptostachya, Cheilanthes sieberi, C. distans, Dichondra* sp. A and *Calotis lappulacea*
75: Narrow-leaved Ironbark/ Grey Box/ Spotted Gum Shrub/ Grass Open Forest	• canopy dominated by *Eucalyptus crebra* in association with *E. moluccana* and *Corymbia maculata* • shrub layer dominated by *Bursaria spinosa, Olearia elliptica, Indigofera australis* and *Acacia parvipinnula* • ground layer dominated by *Themeda australis, Cymbopogon refractus, Paspalidium aversum, Panicum effusum, Microlaena stipoides, Brunoniella australis, Vernonia cinerea, Fimbristylis dichotoma* and *Cheilanthes distans*
76: Narrow-leaved Ironbark/ Native Olive Shrubby Open Forest	• canopy dominated by *Eucalyptus crebra* in association with *E. moluccana* and *Angophora floribunda* • shrub layer dominated by *Notelaea microcarpa, Olearia elliptica, Pittosporum undulatum* and *Acacia paradoxa* • ground layer dominated by *Microlaena stipoides, Dichelachne micrantha, Austrostipa scabra, Aristida ramosa, Dichondra repens, Wahlenbergia stricta, Daucus glochidiatus, Cheilanthes sieberi* and *C. distans*
77: White Box/ Silvertop Stringybark Shrubby Open Forest of the Central Hunter	• canopy dominated by *Eucalyptus albens* in association with *E. laevopinea, E. crebra* and *E. blakelyi* • shrub layer dominated by *Olearia elliptica* and *Notelaea microcarpa* • ground layer dominated by *Microlaena stipoides, Aristida ramosa, Cymbopogon refractus, Pratia purpurascens, Dichondra repens, Cheilanthes sieberi* and *Scuttelaria humilis*
79: Large-fruited Grey Gum/ Spotted Gum/ Grey Box Open Forest on Hills of the Hunter Valley	• canopy dominated by *Eucalyptus punctata, E. moluccana, Angophora floribunda* and *E. blakelyi* • shrub layer dominated by *Notelaea microcarpa, Myoporum montanum, Spartothamnella juncea, Acacia decora, Eremophila debilis* and *Solanum brownii* • ground layer dominated by *Aristida ramosa, Austrostipa verticillata, Cynodon dactylon, Cheilanthes sieberi, Lomandra multiflora, Calotis lappulacea*, and *C. cuneifolia*
80: White Box/ Native Olive Woodland of Upper Hunter & Northern Wollemi	• canopy dominated by *Eucalyptus albens*, with occasional occurrences of *E. moluccana* and *E. crebra* • shrub layer dominated by *Notelaea microcarpa* and *Dodonaea viscosa* • ground layer dominated by *Aristida ramosa, Themeda australis, Cheilanthes sieberi, Vittadinia sulcata, Calotis lappulacea, Einadia hastata,* and *Rostellularia adscendens*
121: Grey Box/ Slaty Box Shrub/Grass Woodland	• canopy dominated by *Eucalyptus moluccana*, with *E. dawsonii, Callitris endlicheri* and *Brachychiton populneus* • shrub layer dominated by *Olearia elliptica, Dodonaea viscosa* and *Notelaea microcarpa* • ground layer dominated by *Aristida ramosa, A. vagans, Cymbopogon*

Community (Somerville, 2010)	Key differences
	refractus, Dichondra repens, Einadia hastata, Calotis lappulacea, Brunoniella australis, Gahnia aspera and *Lomandra multiflora*
152: White Box/ Grass Tree/ Spinifex Woodland at Glenbawn Dam	• canopy dominated by *Eucalyptus albens*, with *Codonocarpus attenuatus* • shrub layer dominated by *Xanthorrhoea glauca, Acacia decora, Olearia elliptica, Beyeria viscosa, Daviesia leptophylla, Notelaea microcarpa,* and *Spyridium buxifolium* • ground layer characterised by *Triodia scariosa, Themeda australis, Austrodanthonia fulva, Gonocarpus elatus* and *Boerhavia dominii*
156: Narrow-leaved Ironbark/ Grey Box Grassy Woodland	• canopy dominated by *Eucalyptus crebra* and *E. molucanna* • *Acacia melvillei* may occur rarely • shrub layer dominated by *Notelaea microcarpa, Cassinia quinquefaria,* and *Maireana microphylla.* • ground layer dominated by *Aristida ramosa, Cymbopogon refractus, Chloris ventricosa, Microlaena stipoides, Austrostipa verticillata, Sporobolus creber, Eragrostis leptostachya, Dichondra repens, Desmodium varians, Calotis lappulacea Cheilanthes sieberi* and *C. distans*
157: Bull Oak Grassy Woodland in the Hunter Valley	• canopy dominated by *Allocasuarina luehmanii*, with *Eucalyptus crebra* and *E. moluccana* occasional • sparse to non-existent shrub layer • ground layer dominated by *Cymbopogon refractus, Eragrostis brownii, Bothriochloa decipiens, Panicum effusum, Aristida ramosa, Aristida vagans, Eragrostis leptostachya, Fimbristylis dichotoma, Chyrsocephalum apiculatum* and *Cheilanthes sieberi*

APPENDIX D - DESCRIPTION OF THREATS

D1. Land clearing and fragmentation

The Hunter Valley was opened up to European settlement in the early 1800s (McMinn, 1970a, b; Wood, 1972), and since that time agricultural enterprises (dairy and beef cattle, sheep) have dramatically transformed the landscape. Although coal was discovered very early on in the settlement period (Branaghan, 1972), it was not until the mid 1900s that a major shift in land use began with the development of mechanical plant and equipment. With this change came an increasing rate of coal extraction from throughout the Hunter, leading to the inevitable conflicts between agriculture and mining that continues to the present day.

Prior to coal mining, the Hunter Valley was a major contributor to cattle and sheep production, and as a result vast areas were cleared of woody vegetation to improve grazing conditions. All currently known stands of the ecological community occur within landscapes that have been heavily cleared and grazed. Jerrys Plains cemetery was established in the early 1890s, and it can be assumed that clearing of native vegetation occurred around this time. Umwelt (2006b) documented how current-day vegetation represents ~50 years of regrowth following clearing in the 1950s at this site. At Warkworth and Wybong, clearing for agriculture began around 1824 (McMinn, 1970a; Wood, 1972), and available historical aerial photographs show extensive clearing by the 1950s.

The threat from current and future clearing on the ecological community still exists although remaining stands of this community occur in already highly fragmented and cleared landscapes. Coal seam gas exploration and extraction and the expansion of coal mining poses the greatest clearing-related threat, as nearly all stands are on private lands. These activities have the potential to affect groundwater and hydrological processes important to the ecological community, as well as introduce roads and other weed threats. The Jerrys Plains cemetery site is currently managed for Hunter Valley Weeping Myall Woodland (Umwelt, 2006b) and only approximately 2 hectares of the ecological community remains at the site. However, in April 2011 a remediation determination worth $100,000 was issued by the Commonwealth to a local Council responsible for damage to 0.11 ha of the ecological community at the Jerrys Plains cemetery. According to departmental records, the remediation determination requires the Council to manage natural regeneration of the impacted area, with weed management and annual survey to be undertaken for a period of five years.

D2. Invasive species

Invasion by weed species has occurred from surrounding landscapes that have been heavily cleared and stocked with cattle. All known stands of Hunter Valley Weeping Myall Woodland are small in size (<2 ha in size), and threats posed by edge effects are very real. All stands support a number of weed species with varying levels of infestation. Ground disturbance resulting from cattle grazing and sheltering has allowed weed species to gain a foothold and flourish.

Peake (2006) considered weed invasion to be particularly problematic at the Jerrys Plains stand of the ecological community, where bridal creeper (*Asparagus asparagoides*) is smothering ground layer vegetation. In a management plan targeting remnant vegetation present at Jerrys Plains cemetery, Umwelt (2006b) identified a further four significant weed species (from a total of 17) that potentially threatened its ecological integrity through reducing native species diversity: bridal creeper, galenia (*Galenia pubescens*), African boxthorn (*Lycium ferocissimum*), mother-of-millions (*Bryophyllum delagoense*) and prickly pear (*Opuntia stricta* var. *stricta*). Monitoring of some other weeds, including onion weed (*Asphodelus fistulosus*), Rhodes grass (*Chloris gayana*), narrow-leaved cotton-bush (*Gomphocarpus fruticosus*), saffron

thistle (*Carthamnus lanatus*), fireweed (*Senecio madagascariensis*), Paddy's lucerne (*Sida rhombifolia*) and veined verbena (*Verbena rigida*), was also recommended by Umwelt (2006b).

Other stands of Hunter Valley Weeping Myall Woodland are also threatened by pasture and roadside weed species, although little details are available (Peake, 2006). Elsewhere in New South Wales, other woodlands dominated by *Acacia pendula* are also characterised by weed species (e.g. Porteners, 1993; Sivertson & Metcalfe, 1995).

Little information is available on the presence of feral animals within known stands of Weeping Myall woodland/low forest. It is likely that European rabbits (*Oryctolagus cuniculus*) are present in most areas and rabbits have been noted at Jerrys Plains Cemetery. On the Hay Plain in western New South Wales, Porteners (1993) noted that rabbit grazing prevented regeneration of woodlands dominated by *Acacia pendula*, and in some areas with lighter clay soils root systems may be undermined.

D3. Grazing

Grazing by domestic stock has been all but removed from the most intact stands at Warkworth, Wybong and Jerrys Plains cemetery (Bell, 2007a; Umwelt, 2006b). It remains a threat to many other stands of *A. pendula* in the Hunter Valley, although such grazing is more likely to be monitored given the protected status of the population and vegetation. In general, grazing practices can lead to the introduction of weed species and the trampling and incidental browse of native seedlings.

In the past, *Acacia pendula* has been used by pastoralists to provide browse during drought conditions by lopping leafy foliage, but this practice is uncommon today (McDonald et al., 2001; Cunningham et al., 2011). Horses are less likely to graze *Acacia pendula* seedlings than are other stock (Anderson, 1968). Removing livestock may lead to the regeneration of *A. pendula* and, in some cases, may lead to a reappearance of *A pendula* in paddocks where the regrowth was suppressed by browsing, thereby 'hiding' the presence of small stands.

D4. Fire

Known stands of the ecological community occur within highly fragmented landscapes on the Hunter Valley floor, and consequently although likely, fire is not currently considered to be a major threat. Peake (2006) found 87 % of 4,352 defined native vegetation remnants were less than 10 ha in size, inferring that the matrix between remnants was cleared, grassland or cropping. Consequently, any fires which may threaten the ecological community will most likely be low intensity grass fires, or those emanating from the surrounding grassy woodlands. However, if a high intensity fire was to go through patches of the ecological community then it is likely that it would be completely destroyed. High intensity fires could result from the accumulation of a weedy understorey, or the re-establishment of weedy pastures should stock be removed for a length of time.

Fire plays an important role in the regulation of floristic composition and structure in grassy woodland environments (e.g. Prober and Thiele, 2005; Prober et al., 2004, 2005), and may be beneficial to stimulate acacia seedbanks, such as *A. pendula*. However, to avoid catastrophic fire, grassy woodland landscapes are best managed through low intensity rather than high intensity fire, to avoid canopy fatalities (Lindenmayer et al., 2005). Tierney and Watson (2009), citing the extensive work done in the western slopes of New South Wales in recent decades, suggest fire frequencies of 5-8 years for box dominated grassy woodlands in the Hunter Valley. However, it is unlikely that fires impacting upon stands of the ecological community will be restricted only to this community, so a landscape approach to fire management should be applied.

D6. Key threatening processes

Key Threatening Processes are listed under the EPBC Act. 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.

Key Threatening Processes that operate in the ecological community include:

- Land clearing and effects of adjacent land use
- Novel biota and their impact on biodiversity
- Competition and land degradation by rabbits

APPENDIX E - ELIGIBILITY FOR LISTING AGAINST THE EPBC ACT CRITERIA

E1. Criterion 1 – Decline in geographical distribution

The ecological community is considered to have been naturally rare, a relic of a previous climate regime (Story, 1963; Tame, 1992a). The present distribution is approximately four hectares. Umwelt (2006a) estimated the pre-European distribution of Hunter Valley Weeping Myall Woodland to have been between 50-200 ha, which implies a reduction in geographic distribution of between 92-98 %. However, the estimate of original extent is not based upon any comprehensive modelling of pre-European vegetation. The original area and decline in extent therefore remain uncertain.

The Committee considers that there is insufficient information to determine whether the ecological community is eligible for listing under Criterion 1.

E2. Criterion 2 – Small geographical distribution coupled with demonstrable threat

This criterion aims to identify ecological communities that are geographically restricted to some extent. Three indicative measures apply: 1) extent of occurrence (i.e. the total geographic range of the ecological community); 2) area of occupancy (i.e. the area actually occupied by the ecological community within its natural range); and 3) patch size distribution (an indicator of the degree of fragmentation). It is recognised that an ecological community with a distribution that is small, either naturally or that has become so through modification, has an inherently higher risk of extinction if it continues to be subject to ongoing threats that may cause it to be lost in the future.

The Hunter Valley has a catchment of over 20 000km^2. However, this considerably overestimates the extent of occurrence for the ecological community because the known occurrences are much more confined, to the region between Wybong and the Wambo coal mine. The linear distance between the localities is about 60 km, so the extent of occurrence is likely to be less than 100 km^2, indicative of a very restricted distribution.

The remaining area of occupancy of the ecological community is approximately four hectares, while the average patch size is less than two hectares. Both of these also are indicative of a very restricted distribution.

The ecological community is subject to a range of demonstrable threats, as outlined in Appendix D. Many of these threats will continue to operate, or even intensify and compound each other, rather than diminish, particularly without further coordinated recovery and management effort. The small size of the ecological community makes it highly vulnerable to human impacts and natural catastrophic events. This ecological community does not occur in any dedicated conservation reserve (Umwelt, 2006a).

The Committee considers that the ecological community has a very restricted geographic distribution, based on its geographic distribution and the very small size of patches. Due to the very small size and restricted nature of the ecological community, it is highly vulnerable to stochastic events. The Committee considers that the demonstrable ongoing threats detailed previously could cause the ecological community to become lost in the immediate future. Therefore, the Committee considers that the ecological community has been demonstrated to have met the relevant elements of Criterion 2 to make it **eligible** for listing as **critically endangered** under this criterion.

E3. Criterion 3 – Loss or decline of functionally important species

Weeping myall is the dominant tree species in the ecological community; however the functional role of this species in the ecological community is not fully understood. If this species was lost then the nature of the remaining vegetation would not represent that of the ecological community. There is no evidence to show that weeping myall has undergone a

substantial decline in its distribution within the Hunter Valley. Most stands of weeping myall in the Hunter Valley do not successfully flower or produce fertile fruit (Bell, 2007a). These stands are likely to be comprised of few true individuals, as root suckering is a common trait in these plants giving the impression of successful sexual reproduction. It is difficult, therefore, to substantiate a decline in the distribution of weeping myall. In contrast, reports of individual specimens and stands of weeping myall have actually increased in recent years, as grazing pressures have been eased and root suckers emerge from formerly well-grazed lands (S. Bell pers. comm.).

Based on the available data, a decline in this functionally important key species cannot be demonstrated. The Committee considers that there is insufficient information to determine whether the ecological community is eligible for listing under Criterion 3.

E4. Criterion 4 – Reduction in community integrity

There are no historical data or detailed information about the original floristic composition or structure of this ecological community, from which evidence of loss in integrity can be clearly demonstrated. However, there are indicative observations from which a reduction in community integrity can be inferred.

- The ecological community now occurs as small fragments in a matrix of highly modified landscapes, largely due to agriculture and mining activities. Even if the original stands of the ecological community are assumed to have been small themselves, the surrounding land use has led to further fragmentation of remnants into even smaller, more isolated stands. The median size of patches, based on 52 natural populations or stands of *A. pendula* (43 confirmed and 9 unconfirmed) identified in the recovery plan, is 0.1 hectare (NSW OEH, 2013).
- The extent of clearing and fragmentation that has already occurred in the Hunter Valley, together with the history of survey and mapping projects completed (e.g. Story, 1963; Tame, 1984; Peake, 2006; Somerville, 2010; plus numerous assessments completed for the mining industry) suggests that all remaining sizable stands of this ecological community have been located. NSW OEH (2013) identified 43 confirmed natural populations of weeping myall in the Hunter valley region. Many of these appear to be very small and degraded with low native plant diversity, such that few patches are in sufficiently good condition to merit consideration as an ecological community (Bell, 2012; NSW OEH, 2013).
- A significant presence of invasive weed species, including pasture plants from surrounding paddocks, has been noted within this ecological community by several studies (Peake, 2006; Umwelt, 2006a; Bell, 2007a, Bell 2013).
- The diversity of native understorey plants in many stands is absent or depauperate. Peake (2006) and NSW Scientific Committee (2006) note that most stands of weeping myall are along roadsides or in pastures and the structure of the ground cover is highly disturbed, and the remaining native species exhibit poor recruitment. In effect, this means an entire vegetation layer has been degraded, if not entirely lost in many stands.
- The weeping myall trees that dominate the community mostly consist of regrowth trees (Peake, 2006). They are potentially threatened with the genetic, demographic and environmental stochasticity associated with small, fragmented populations. NSW OEH (2013) suggests that the weeping myall may have become self-incompatible due to the remaining populations being restricted to one or two genotypes. This may explain the failure, or rare observations of flowering or viable fruit and seed production in the remaining stands.

If it is assumed that all or most stands of weeping myall formerly represented occurrences of the ecological community, then the present situation outlined above represents a very severe reduction in community integrity. Therefore, the Committee considers that the ecological community has been demonstrated to have met the relevant elements of Criterion 4 to make it **eligible** for listing as **critically endangered** under this criterion.

E5. Criterion 5 – Rate of continuing detrimental change

There is little information addressing this criterion. Although the Hunter Valley region has been heavily impacted by clearing for agriculture in the past, there is no evidence it has intensified. Current management actions, such as exclusion of grazing, monitoring of stands, and weed management practices have helped to reduce its impact in the vicinity of the ecological community. The Committee considers that there is insufficient information to determine whether the ecological community is eligible for listing under Criterion 5.

E6. Criterion 6 – Quantitative analysis showing probability of extinction

A quantitative analysis showing the probability of extinction for the ecological community has not been undertaken. The Committee considers that there is insufficient information to determine whether the ecological community is eligible for listing under Criterion 6.

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