

NSW SCIENTIFIC COMMITTEE

Final Determination

The Scientific Committee, established by the *Threatened Species Conservation Act 1995* (the Act), has made a Final Determination under Section 23 of the Act to list the Pilliga Outwash Ephemeral Wetlands in the Brigalow Belt South Bioregion as an ENDANGERED ECOLOGICAL COMMUNITY in Part 3 of Schedule 1 of the Act.

This determination contains the following information:

- Parts 1 & 2:** Section 4 of the Act defines an ecological community as “an assemblage of species occupying a particular area”. These features of Pilliga Outwash Ephemeral Wetlands in the Brigalow Belt South Bioregion are described in Parts 1 and 2 of this Determination, respectively.
- Part 3:** Part 3 of this Determination describes the eligibility for listing of this ecological community in Part 3 of Schedule 1 of the Act according to criteria as prescribed by the *Threatened Species Conservation Regulation 2010*.
- Part 4:** Part 4 of this Determination provides additional information intended to aid recognition of this community in the field.

Part 1. Assemblage of species

- 1.1 Pilliga Outwash Ephemeral Wetlands in the Brigalow Belt South Bioregion, hereafter referred to as Pilliga Outwash Ephemeral Wetlands, is characterised by the assemblage of species listed below.

<i>Alternanthera denticulata</i>	<i>Brachyscome goniocarpa</i>
<i>Calandrinia pumila</i>	<i>Centipeda minima</i> subsp. <i>minima</i>
<i>Cyperus gunnii</i> subsp. <i>gunnii</i>	<i>Eleocharis pusilla</i>
<i>Epaltes australis</i>	<i>Eragrostis elongata</i>
<i>Glossostigma diandrum</i>	<i>Goodenia gracilis</i>
<i>Gratiola pedunculata</i>	<i>Hydrocotyle tripartita</i>
<i>Isoetes muelleri</i>	<i>Juncus subsecundus</i>
<i>Marsilea hirsuta</i>	<i>Mitrasacme paludosa</i>
<i>Murdannia graminea</i>	<i>Myriophyllum implicatum</i>
<i>Myriophyllum simulans</i>	<i>Nymphoides crenata</i>
<i>Nymphoides geminata</i>	<i>Peplidium foecundum</i>
<i>Pseudoraphis spinescens</i>	<i>Ranunculus sessiliflorus</i> var. <i>pilulifer</i>
<i>Wahlenbergia tumidifruca</i>	

- 1.2 The total species list of the community across all occurrences is known to be considerably larger than that given above. Due to variation across the range of the community, not all of the above species are present at every site and many sites may also contain species not listed above.

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Characteristic species may be abundant or rare and comprise only a subset of the complete list of species recorded in known examples of the community. Some characteristic species show a high fidelity (are relatively restricted) to the community, but may also occur in other communities, while others are more typically found in a range of communities.

The number and identity of species recorded at a site is a function of sampling scale and effort. In general, the number of species recorded is likely to increase with the size of the site and there is a greater possibility of recording species that are rare in the landscape.

Species presence and relative abundance (dominance) will vary from site to site as a function of environmental factors such as soil properties (chemical composition, texture, depth, drainage), topography, climate, and through time as a function of disturbance (e.g. fire, logging, grazing) and weather (e.g. flooding, drought, extreme heat or cold).

At any one time, above ground individuals of some species may be absent, but the species may be represented below ground in the soil seed bank or as dormant structures such as bulbs, corms, rhizomes, rootstocks or lignotubers.

The species listed above are vascular plants, however the community also includes micro-organisms, fungi, cryptogamic plants and vertebrate and invertebrate fauna. These components of the community are less well documented.

Part 2. Particular area occupied by the ecological community

- 2.1 The assemblage of species listed in Part 1.1 above which characterises the Pilliga Outwash Ephemeral Wetlands occurs within the Brigalow Belt South Bioregion. This Bioregion is defined by SEWPaC (2012) Interim Biogeographic Regionalisation for Australia, Version 7. Department of Sustainability, Environment, Water, Population and Communities.
<http://www.environment.gov.au/parks/nrs/science/bioregion-framework/ibra/maps.html>
- 2.2 It is the intent of the Scientific Committee that all occurrences of the ecological community (both recorded and as yet unrecorded, and independent of their condition) that occur within this bioregion be covered by this Determination.

Part 3. Eligibility for listing

- 3.1 Reasons for determining eligibility for listing
 - 3.1.1 Pilliga Outwash Ephemeral Wetlands have a highly restricted geographic distribution. The extent of occurrence of Pilliga Outwash Ephemeral Wetlands is estimated to be 2342 km², based on a minimum convex polygon enclosing all known occurrences of the community, the method of assessment recommended by IUCN (2013). The estimated area of occupancy (AOO) is 552 km², which is equivalent to 138 2 x 2 km grid cells, the spatial scale recommended for assessing AOO by IUCN (2013). Approximately one third of the Pilliga Outwash Ephemeral Wetlands occur within conservation reserves, namely the Pilliga National Park and the Pilliga State Conservation Area (Bell *et al.* 2012). Pilliga Outwash

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Ephemeral Wetlands are also likely to occur in the Pilliga West State Conservation Area (J.T. Hunter *in litt.* November 2013).

- 3.1.2 Major threats to Pilliga Outwash Ephemeral Wetlands include altered hydrology, soil disturbance from feral pigs and recreational vehicles, clearing of native vegetation and degradation caused by grazing and weed invasion (M. Brock *in litt.* August 2012; P. Christie *in litt.* June 2012; P. Clarke *in litt.* March 2012; D. Mabberley *in litt.* April 2012).
- 3.1.3 Alteration of water regimes in the Pilliga Outwash Ephemeral Wetlands has occurred intentionally by draining or damming and unintentionally through sedimentation from catchment erosion (Bell *et al.* 2012). Temporary wetland habitats are particularly vulnerable to human activities due to their unique physical and ecological characteristics and their value is frequently overlooked because of their small size and seasonal occurrence (Schwartz and Jenkins 2000). In general, wetlands that depend primarily on precipitation for water input are more vulnerable to changes in climate and weather patterns (Brooks 2005). Under climate change predictions of more episodic precipitation and increased evapotranspiration, temporary wetlands may dry earlier in the year and remain dry for longer periods (Zacharias *et al.* 2007). These changes could adversely affect the successful reproduction of wetland dependent organisms and isolate the remaining productive pools (Brooks 2005). 'Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands' and 'Anthropogenic Climate Change' are listed as Key Threatening Processes under the Act.
- 3.1.4 Pilliga Outwash Ephemeral Wetlands are also threatened by physical disturbance associated with clearing of native vegetation, feral pig invasion and recreational vehicle use (D. Mabberley *in litt.* April 2012; Bell *et al.* 2012). For example, evidence of digging by feral pigs was observed in almost all of the wetlands studied by Bell *et al.* (2012). Soil disturbance from feral pigs and recreational vehicles risks disruption of the seed bank via deeper burial of seeds and encouragement of weeds (Bell *et al.* 2012). During vegetation surveys of Pilliga Outwash Ephemeral Wetlands, Bell *et al.* (2012) found that 11% of the taxa sampled were exotic. In addition, Benson *et al.* (2010) estimate that approximately 60% of the woody cover of native vegetation in the Brigalow Belt South Bioregion has been cleared to support agricultural production. 'Clearing of native vegetation' and 'Predation, habitat degradation, competition and disease transmission by Feral Pigs, *Sus scrofa* Linnaeus 1758' are listed as Key Threatening Processes under the Act.

3.2 Criteria for listing

Pilliga Outwash Ephemeral Wetlands in the Brigalow Belt South Bioregion is eligible to be listed as an Endangered Ecological Community in accordance with Section 12 of the Act as, in the opinion of the Scientific Committee, it is facing a very high risk of extinction in New South Wales in the near future, as determined in accordance with the following criteria as prescribed by the *Threatened Species Conservation Regulation 2010*:

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Clause 18 Restricted geographic distribution of the ecological community

The ecological community's geographic distribution is estimated or inferred to be:

- (b) highly restricted,

and the nature of its distribution makes it likely that the action of a threatening process could cause it to decline or degrade in extent or ecological function over a time span appropriate to the life cycle and habitat characteristics of the ecological community's component species.

Clause 19 Reduction in ecological function of the ecological community

The ecological community has undergone, is observed, estimated, inferred or reasonably suspected to have undergone or is likely to undergo within a time span appropriate to the life cycle and habitat characteristics of its component species:

- (b) a large reduction in ecological function,

as indicated by any of the following:

- (e) change in species composition,
- (f) disruption of ecological processes,
- (g) invasion and establishment of exotic species,
- (h) degradation of habitat.

Dr Mark Eldridge
Chairperson
NSW Scientific Committee

Exhibition period: 04/12/15 – 29/01/16

Proposed Gazettal date: 04/12/15

Part 4. Additional information about the ecological community

The following information is additional to that required to meet the definition of an ecological community under the Act, but is provided to assist in the recognition of Pilliga Outwash Ephemeral Wetlands in the field. Given natural variability, along with disturbance history, Pilliga Outwash Ephemeral Wetlands may sometimes occur outside the typical range of variation in the features described below.

- 4.1 Pilliga Outwash Ephemeral Wetlands generally occur on the Pilliga outwash within a mosaic of woodlands and shrublands, or previously wooded areas, largely dominated by *Allocasuarina luehmanii*, *Eucalyptus chloroclada*, *Eucalyptus pilligaensis*, *Eucalyptus sideroxylon* and *Melaleuca densispicata* (Benson *et al.* 2010; Hunter 2010).
- 4.2 Pilliga Outwash Ephemeral Wetlands includes Communities 1, 2 and 3 of Bell *et al.* (2012). It is equivalent to ID416 of Benson *et al.* (2010) described as “tank gilgai” that form on cracking, clay, alluvial soils that can be over one hectare in size forming a chain of ponds (D. Maberley *in litt.* April 2012). These wetlands are morphologically distinct from the more common lattice gilgai depressions on grey cracking clays to the north and northwest of Pilliga National Park and Pilliga State Conservation Area (Bell *et al.* 2012). Maberley (*in litt.* April 2012) notes that the Pilliga Outwash Ephemeral Wetlands are floristically different from ephemeral wetlands on clayey alluvial plains (for example Shallow freshwater wetland

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sedgeland in depressions on floodplains (ID53 of Benson *et al.* 2010) and other wetlands identified in the Pilliga forests (Sedgeland fen wetland of spring-fed or runoff-fed creeks (ID361), Riparian sedgeland rushland wetland of the Pilliga to Goonoo sandstone forests (ID400) and Swamp Paper-bark very tall shrubland wetland on sodic soils in the Pilliga Scrub (ID410) (Benson *et al.* 2010)). Benson *et al.* (2010) suggest the Pilliga Outwash Ephemeral Wetlands “grades into Buloke woodland (ID411) and Narrow-leaved Ironbark (ID398) in the Pilliga forests and into Brigalow forest (ID35) on "normal" gilgai landscapes.”

- 4.3 The vegetation of Pilliga Outwash Ephemeral Wetlands differs from more southern ephemeral wetlands (e.g. in the Riverina) that are mainly lignum (*Duma florulenta*), Black Box (*Eucalyptus largiflorens*), River Red Gum (*Eucalyptus camaldulensis*) or Cane Grass (*Eragrostis australasica*) dominated (CSU 2011). The Mulga Lands Bioregion ephemeral wetlands to the west have different plant communities and hydrology (M. Casanova *in litt.* June 2012). Pilliga Outwash Ephemeral Wetlands also differ from the *Environment Protection and Biodiversity Conservation Act 1999* listing of Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains because they occur in forested lands or previously wooded areas rather than in grasslands (M. Casanova *in litt.* June 2012).
- 4.4 Pilliga Outwash Ephemeral Wetlands support a number of species at or near the limits of their distribution. Species characteristic of inland wetlands which reach their eastern distributional limit in the Brigalow Belt South Bioregion and are characteristic of Pilliga Outwash Ephemeral Wetlands include: *Nymphoides crenata*, *Glossostigma diandrum*, *Calandrinia pumila*, *Peplidium foecundum*, *Wahlenbergia tumidifruta*, *Brachyscome goniocarpa* and *Ranunculus sessiliflorus* var. *pilulifer*. Species characteristic of the eastern ranges which reach their western distributional limit in the Brigalow Belt South Bioregion and are characteristic of Pilliga Outwash Ephemeral Wetlands include: *Gratiola pedunculata*, *Nymphoides geminata*, *Isoetes muelleri*, *Hydrocotyle tripartita*, *Mitrasacme paludosa* and *Murdannia graminea*.
- 4.5 Pilliga Outwash Ephemeral Wetlands support the following threatened plant species:
Eriocaulon australasicum (Endangered)
Lepidium monoplocoides (Endangered)
Myriophyllum implicatum (Critically Endangered)

References:

- Bell D, Hunter J, Montgomery L (2012) Ephemeral wetlands of the Pilliga Outwash, northwest NSW. *Cunninghamia* **12**, 181–190.
- Benson JS, Richards P, Waller S, Allen C (2010) New South Wales Vegetation Classification and Assessment: Part 3 Plant communities in the Brigalow Belt South, Nandewar and western New England Bioregions: Version 3 of the NSWVCA database. *Cunninghamia* **11**, 457–579.
- Brooks RT (2005) A review of basin morphology and pool hydrology of isolated ponded wetlands: implications for seasonal forest pools of the northeastern United States. *Wetlands Ecology and Management* **13**, 355–348.

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Charles Sturt University (2011) Focus farm wetland study. Report to the Murrumbidgee Catchment Management Authority. Charles Sturt University Institute for Land, Water and Society with the E.H. Graham Centre for Agricultural Innovation, Wagga Wagga.

Hunter JT (2010) Vegetation and floristics of Cubbo, Etoo and Dewson's Lease sections of the Pilliga NP and Pilliga West SCA. Unpublished report to the NSW Department of Environment, Climate Changes and Water.

IUCN Standards and Petitions Subcommittee (2013) Guidelines for Using the IUCN Red List Categories and Criteria. Version 10.1. Prepared by the Standards and Petitions Subcommittee. <http://www.iucnredlist.org/documents/RedListGuidelines.pdf>.

Schwartz SS, Jenkins DG (2000) Temporary aquatic habitats: constraints and opportunities. *Aquatic Ecology* **34**, 3–8.

Zacharias I, Dimitrion E, Dekker A, Dorsman E (2007) Overview of temporary ponds in the Mediterranean region: Threats, management and conservation issues. *Journal of Environmental Biology* **28**, 1–9.