NSW SCIENTIFIC COMMITTEE

Preliminary Determination

The Scientific Committee, established by the *Threatened Species Conservation Act* 1995 (the Act), has made a Preliminary Determination under Section 22 of the Act to support a proposal for the inclusion of the Artesian Springs Ecological Community in the Great Artesian Basin as a Critically Endangered Ecological Community in Part 2 of Schedule 1A 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 the Artesian Springs Ecological Community in the Great Artesian Basin 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 2 of Schedule 1A 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 The Artesian Springs Ecological Community in the Great Artesian Basin (hereafter referred to as the Artesian Springs Ecological Community) is characterised by the assemblage of species listed below.

Abutilon otocarpum	*Eremophila deserti*
Acacia victoriae	*Eremophila sturtii*
Alternanthera angustifolia	*Eucalyptus camaldulensis*
Atriplex nummularia	*Eucalyptus largiflorens*
Atriplex pumilo	*Eucalyptus populnea*
Boerhavia coccinea	*Geijera parviflora*
Calandrinia ptychosperma	*Glinus lotoides*
Calocephalus platycephalus	*Marsilea* spp.
Centipeda minima	*Morgania floribunda*
Centipeda thespidioides	*Myoporum acuminatum*
Chamaesyce drummondii	*Myoporum desertii*
Chenopodium cristatum	*Myoporum montanum*
Convolvulus sp.	*Nicotiana velutina*
Cynodon dactylon	*Pimelea microcephala* subsp. *microcephala*
Cyperus bulbosus	*Pimelea simplex*
Cyperus difformis	*Portulaca oleracea*
Cyperus gymnocaulos	*Schoenoplectus pungens*

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Cyperus laevigatus	*Schoenoplectus validus*
Cyperus squarrosus	*Sclerolaena birchii*
Dactyloctenium radulans	*Sclerostegia* sp.
Diplachne fusca	*Sporobolus mitchellii*
Dissocarpus paradoxus	*Stemodia florulenta*
Dodonaea viscosa subsp. *angustissima*	*Swainsona* spp.
Einadia nutans subsp. *nutans*	*Trianthema* spp.
Enneapogon avenaceus	*Triglochin hexagona*
Eragrostis australasica	*Triraphis mollis*
Eragrostis dielsii	*Utricularia* spp.
Eragrostis tenella	

1.2 The total species list of the community across all occurrences is likely 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.

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, seasonality of rainfall).

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.

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Part 2. Particular area occupied by the ecological community

2.1 The assemblage of species listed in Part 1.1 above which characterises the Artesian Springs Ecological Community is known from the Mulga Lands, Cobar Peneplain, Darling Riverine Plains, Channel Country and Brigalow Belt South Bioregions, but may occur within other bioregions within the Great Artesian Basin. These Bioregions are 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 these bioregions be covered by this Determination.

2.3 The Artesian Springs Ecological Community is associated with artesian springs within the Great Artesian Basin (Silcock *et al*. 2013).

Part 3. Eligibility for listing

3.1 Reasons for determining eligibility for listing

3.1.1 The Artesian Springs Ecological Community was listed as an Endangered Ecological Community under the Act in 2001 (NSW Scientific Committee 2001). Since this time new data and analyses have become available and the Committee is of the opinion that the determination of this community should be revised.

3.1.2 Major threats to the Artesian Springs Ecological Community are trampling and grazing by stock and feral animals such as pigs, goats and rabbits; and hydrological alteration or unsustainable extraction of water from artesian bores reducing flows (Westbrooke *et al.* 2003; Caddy *et al.* 2010; Fensham *et al.* 2010; Powell *et al.* 2013; Silcock *et al.* 2013).

3.1.3 Trampling and digging, particularly by feral pigs, is a major disturbance around the edges of artesian spring wetlands (Fensham *et al.* 2010). Soil disturbance from feral pigs in and around wetlands can cause disruption of the seed bank via deeper burial of seeds and encouragement of weeds (Bell *et al.* 2012). These effects can be particularly severe in small spring wetlands where animals have unrestricted access and the vegetation of individual small wetlands can be completely destroyed by a single incident. Pigs may also degrade the habitat for specialised fauna through sediment disturbance that causes increases in water turbidity (Fensham *et al.* 2010). 'Predation, habitat degradation, competition and disease transmission by Feral Pigs, *Sus scrofa* Linnaeus 1758' is listed as a Key Threatening Process under the Act.

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3.1.4 Human induced changes to artesian discharge and destruction of spring wetlands through excavation negatively impact the Artesian Springs Ecological Community. Although the Great Artesian Basin Sustainability Initiative bore capping program has made considerable progress (SKM 2008), a number of springs have dried in the past 100 years due to falling water pressure caused by over-extraction (Fensham *et al.* 2010, Silcock *et al*. 2013). Prolonged exposure to disturbance and aquifer drawdown constrains artesian spring vegetation community succession and has caused the extinction of aquatic invertebrate and plant species (Ponder 1986, 1999; Fensham *et al.* 2010). Powell *et al.* (2013) recently visited 45 of the 54 spring groups in New South Wales and found that over three-quarters of the springs had become inactive, with all springs in the Paroo Overflow group, except Peery Lake, recorded as extinct. The extinction of two populations of the Endangered Salt Pipewort, *Eriocaulon carsonii*, is known to have occurred as a consequence of artesian springs becoming inactive (Fensham *et al.* 2010). 'Alteration to the natural flow regimes of rivers, streams, floodplains and wetlands' is listed as a Key Threatening Process under the Act.

3.2 Criteria for listing

The Artesian Springs Ecological Community in the Great Artesian Basin is eligible to be listed as a Critically 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:

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:

(a) a very 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.

Professor Michelle Leishman
Chairperson
NSW Scientific Committee

Exhibition period: 29/08/14 – 24/10/14 Proposed Gazettal date: 29/08/14

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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 the Artesian Springs Ecological Community in the field. Given natural variability, along with disturbance history, the Artesian Springs Ecological Community may sometimes occur outside the typical range of variation in the features described below.

4.1 The 'community of native species dependent on natural discharge of groundwater from the Great Artesian Basin' is listed as Endangered under the Commonwealth *Environmental Protection and Biodiversity Conservation Act* 1999.

The Artesian Springs Ecological Community supports a suite of organisms that are distinct from those in seasonal wetlands, including perennial wetland plants (Fensham *et al.* 2010). The Artesian Springs Ecological Community is variable as each individual spring varies in shape, water flow, topographic and geographic location. The vegetation within the community frequently consists of sedges or similar vegetation (Pickard 1992), with *Cyperus laevigatus* dominating most spring wetlands (Powell *et al*. 2013). Trees and shrubs occur on the edges of, or nearby, the springs. The location of all known springs (dry and active) are provided in Silcock *et al.* (2013).

4.2 Artesian springs are often characterised by mounds of sediment and salts deposited as water evaporates (Ponder 1986, 1999) or they may be depressions.

4.3 Where artesian groundwater pressure has been adequate to maintain the Artesian Springs Ecological Community, it can be distinguished from most other wetland communities of the region because it is not subject to seasonal drying out and is sustained by a relatively constant water supply. However, rapid reductions in spring flow and habitat condition can lead to a loss of water-dependent species. The soil seed bank and extant vegetation of degraded springs often consist only of common flora similar to an overgrazed terrestrial plant community (Pickard 1992; Hamish A.R. Caddy, unpublished data).

4.4 Three artesian spring 'supergroups' are recognised in New South Wales: Bourke, Bogan River and Eulo. The Bourke group extends 500 km from White Cliffs north-east to Culgoa Floodplain National Park just over the Queensland border. The Bogan River group is comprised of widely-spaced springs west of Walgett. Four springs in New South Wales south of Hungerford are regarded as part of the Eulo supergroup (Powell *et al.* 2013; Silcock *et al.* 2013).

4.5 The Artesian Springs Ecological Community corresponds to plant community ID66 Artesian Mound Spring sedgeland wetland mainly of the Mulga Lands Bioregion (Benson *et al*. 2010).

4.6 The Artesian Springs Ecological Community has a highly restricted geographic distribution. The extent of occurrence of the Artesian Springs Ecological Community

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was estimated to be between 25000 km^2 (active springs only) to 89000 km^2 (active and non-active springs). The area of occupancy was estimated to be 44 km^2 (active springs only) to 232 km^2 (active and non-active springs) based on 2 x 2 km grid cells, the scale recommended for assessing area of occupancy by IUCN (2013).

4.7 The Peery Lake artesian springs are within Paroo-Darling National Park (Westbrooke *et al.* 2003). Although this is a reserved area the springs are not likely to be well protected from the threat of alteration of flows. The unsustainable extraction of artesian water occurs outside the reserve, and is likely to influence all springs within the region. The endangered Salt Pipewort, *Eriocaulon carsonii* is known to occur in artesian springs (Fensham *et al*. 2010) and is endemic to the Artesian Springs Ecological Community (Silcock *et al*. 2013).

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