

# THREATENED SPECIES SCIENTIFIC COMMITTEE

Established under the *Environment Protection and Biodiversity Conservation Act 1999*

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The Minister approved this conservation advice on 5 May 2016; and confirmed this species 12 Dec 2013 inclusion in the Critically Endangered category.

## Conservation Advice

### *Ptilotus pyramidatus*

pyramid mulla-mulla

#### **Taxonomy**

The species is conventionally accepted as *Ptilotus pyramidatus* (Moq.) F. Muell (CHAH 2012). The species was considered extinct until collected in Perth in late 2010 for the first time in 160 years (Davis 2012). Initially described as a new species *Ptilotus christineae*, Davis (2012) confirmed that *P. pyramidatus* is conspecific with *P. christineae* and the latter name must therefore be considered a junior synonym.

#### **Summary of assessment**

##### **Conservation status**

Critically Endangered: Criterion 2 B1, B2 (a), (b)(iii) and Criterion 3 C2 (a)(ii)

The highest category for which *Ptilotus pyramidatus* is eligible to be listed is Critically Endangered.

*Ptilotus pyramidatus* has been found to be eligible for listing under the following listing categories:

Criterion 2: B1, B2 (a), (b)(iii) Critically Endangered

Criterion 3: C2 (a)(ii) Critically Endangered

Criterion 4: Endangered

Species can be listed as threatened under state and territory legislation. For information on the listing status of this species under relevant state or territory legislation, see

<http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>

##### **Reason for conservation assessment by the Threatened Species Scientific Committee**

This advice follows assessment of information provided by the Department of Parks and Wildlife Western Australia (DPaW) as part of the process to confirm the status of a rediscovered species, previously considered extinct, as Critically Endangered.

##### **Public Consultation**

Notice of the proposed amendment and a consultation document was made available for public comment for 35 business days between 2 December 2015 and 22 January 2016. Any comments received that were relevant to the survival of the species were considered by the Committee as part of the assessment process.

## **Species/Sub-species Information**

### **Description**

*Ptilotus pyramidatus* (pyramid mulla-mulla), is a member of the family Amaranthaceae and is a small, perennial herb that grows to a height of about 8 cm. The erect stem is smooth with indistinct pink ribs. The leaves are oblong 8-35 mm long, smooth or with very sparse hairs. The flowers, clustered into a spike, are white with pink margins about 3-5 cm long. Flowers have a short stalk and have five white stamens ageing to pink. Flowering occurs in early October (Davis & Tauss 2011).

The pyramid mulla-mulla is clearly distinguished from other *Ptilotus* species in the Swan Coastal Plain by the combination of its slender rhizome, spatulate leaves, erect flowering shoot, five fertile stamens and wetland habitat (Davis & Tauss 2011).

### **Distribution**

The pyramid mulla-mulla is known from two locations: the original collection site; and the current site of rediscovery in the Kenwick area of south-east Perth in Western Australia (Davis 2012). The species occurs in the Greater Brixton Street Wetlands (GBW), is extremely localised and its total area of occupancy is 0.6 ha (DPaW 2016). The original collection was made by James Drummond from the 'Swan River' colony, which encompassed the south west of Western Australia. The precise locality of the original collection site is unknown (K Atkins pers. comm. 2015).

The Greater Brixton Street Wetlands and about 400 ha of the adjoining rural lands have been searched in several intensive, multi-season surveys (e.g. Tauss & Weston 2010 cited in Davis & Tauss 2011) and no other occurrences of the pyramid mulla-mulla have been found. It is unlikely that other populations will be located in the Swan Coastal Plain as the habitat of this species is scarce and has been thoroughly explored due to its high conservation values (Davis & Tauss 2011).

### **Relevant Biology/Ecology**

The pyramid mulla-mulla is currently known from only one population, or colony, consisting of 110 genets (group of genetically identical individuals) with close to 10 000 ramets (individuals within a genet) growing within a few metres of each other (DPaW 2016). The species may have low genetic diversity which makes the entire population more susceptible to threats such as disease and environmental changes (DPaW 2016).

The pyramid mulla-mulla inhabits a seasonally inundated, flat floodplain at an elevation of about 6.5 m above sea level (Davis & Tauss 2011). The site is underlain by pale grey, muddy-sand to sandy-mud alluvium of the Pinjarra Plain. The regional, unconfined groundwater in most of this area of the GBW is generally at about ground level in late winter. At a local scale, the hydrology and stratigraphy of the wetlands is complex with small, confined aquifers and shallow aquitard layers of ferricrete or calcareous muds or clays that rainwater rests on for varying lengths of time (V & C Semeniuk Research Group 2001 cited in Davis & Tauss 2011). In 2010, despite record-breaking low rainfall in the region, the site inhabited by the species was shallowly inundated for a short period in winter (Davis & Tauss 2011).

The pyramid mulla-mulla is recorded in patchy *Melaleuca acutifolia* open scrub over *Verticordia plumosa* var. *brachyphylla* and *Hypocalymma angustifolium* open heath over *Meeboldina cana*– *Chorizandra enodis* open rushes and sedges and mid-dense, species-rich native annual herbs and geophytes (Davis & Tauss 2011).

### **Threats**

The pyramid mulla-mulla is threatened by off-road vehicles; hydrological change; nutrient enrichment of groundwater; invasive naturalised alien plants particularly harlequin flower (*Sparaxis bulbifera*), cape tulip (*Moraea flaccida*) and Coolatai grass (*Hyparrhenia hirta*), which are prevalent in the area; habitat degradation caused by rabbits (*Oryctolagus cuniculus*) and too frequent fires (Davis & Tauss 2011). DPaW (2016) also lists recreational activities (including waste dumping); change to surrounding land uses; insecure land tenure; dieback disease and poor genetic diversity as threats to the species.

The current municipal drainage scheme does not consider the environmental water requirements of the vegetation in the GBW. Subsequent to the extensive vegetation clearing in the Yule Brook catchment and the resulting increase in the volume of runoff, the brook was excavated to mitigate the flooding of adjacent properties and to convey rainwater (part of which previously infiltrated into the groundwater in the GBW) directly into the Canning River (Davis & Tauss 2011). The GBW are thus no longer subject to natural, regular flooding and alluvial sediment supply from the Yule Brook. A number of other excavated drains, firebreaks and vehicle tracks in the area intersect some of the local, shallow aquifers and also contribute to the dewatering of the wetlands (V & C Semeniuk Research Group 2001 cited in Davis & Tauss 2011). The adverse impact of these changes on the hydrological regime of the GBW will be exacerbated by the trend towards a drier climate that is now evident in the Swan Coastal Plain.

Davis & Tauss (2011) noted there was no overall plan to manage the wetlands, to ameliorate the impacts of the surrounding land uses on the native vegetation and to guide local planning authorities at that time. DPaW have since developed an Interim Recovery Plan (2016) to address these concerns and have identified the coordination of recovery actions as the highest priority in that Plan. However, DPaW also considers that the GBW habitat has declined and notes it is currently in a weedy state with other wetland plant species found dead in the area due to the combined processes of weed invasion, fire and hydrological change (K. Atkins pers.comm. 2015).

Some of the land within the GBW is in State ownership and managed as A class reserves by DPaW. In November 2015, the Western Australian Planning Commission (WAPC) transferred a number of land lots to the State with plans to transfer another two lots early in 2016. The WAPC land lot transfers will all be included in the A class reserve system as the biodiversity values of the GBW are recognised. Further acquisitions of private land reserved for parks and recreation within the GBW, will be acquired when resources are available (R. Parker pers. comm. 2015).

### **How judged by the Committee in relation to the EPBC Act Criteria and Regulations**

<b>Criterion 1. Population size reduction (reduction in total numbers)</b>			
Population reduction (measured over the longer of 10 years or 3 generations) based on any of A1 to A4			
	<b>Critically Endangered Very severe reduction</b>	<b>Endangered Severe reduction</b>	<b>Vulnerable Substantial reduction</b>
<b>A1</b>	<b>≥ 90%</b>	<b>≥ 70%</b>	<b>≥ 50%</b>
<b>A2, A3, A4</b>	<b>≥ 80%</b>	<b>≥ 50%</b>	<b>≥ 30%</b>
A1	<i>based on any of the following:</i> <ul style="list-style-type: none"> <li>(a) direct observation [except A3]</li> <li>(b) an index of abundance appropriate to the taxon</li> <li>(c) a decline in area of occupancy, extent of occurrence and/or quality of habitat</li> <li>(d) actual or potential levels of exploitation</li> <li>(e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites</li> </ul>		
A2			
A3			
A4			

**Evidence:**

**Insufficient data to determine eligibility**

The species was rediscovered in 2010 and has been absent from the herbarium records for a period up to 160 years, and therefore, no abundance data are available that would provide quantitative evidence of a decline over time.

The Committee considers that there is insufficient information to determine the eligibility of the species for listing in any category under this criterion.

<b>Criterion 2. Geographic distribution as indicators for either extent of occurrence AND/OR area of occupancy</b>			
	<b>Critically Endangered Very restricted</b>	<b>Endangered Restricted</b>	<b>Vulnerable Limited</b>
B1. Extent of occurrence (EOO)	< 100 km <sup>2</sup>	< 5,000 km <sup>2</sup>	< 20,000 km <sup>2</sup>
B2. Area of occupancy (AOO)	< 10 km <sup>2</sup>	< 500 km <sup>2</sup>	< 2,000 km <sup>2</sup>
AND at least 2 of the following 3 conditions:			
(a) Severely fragmented OR Number of locations	= 1	≤ 5	≤ 10
(b) Continuing decline observed, estimated, inferred or projected in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) area, extent and/or quality of habitat; (iv) number of locations or subpopulations; (v) number of mature individuals			
(c) Extreme fluctuations in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) number of locations or subpopulations; (iv) number of mature individuals			

**Evidence:**

**Eligible under Criterion 2 B1, B2 (a), (b)(iii) for listing as Critically Endangered**

As the species is only known from a single location, the extent of occurrence is the same as the area of occupancy which is estimated to be within 0.01 km<sup>2</sup>, and thus within a single 2x2 km<sup>2</sup> grid square.

The Committee considers that the species' extent of occurrence and area of occupancy is very restricted, and the geographic distribution is precarious for the survival of the species because it occurs at only one location and a decline in the extent and quality of habitat may be inferred or projected. Therefore, the species has been demonstrated to have met the relevant elements of Criterion 2 to make it eligible for listing as **Critically Endangered**.

<b>Criterion 3. Population size and decline</b>			
	<b>Critically Endangered Very low</b>	<b>Endangered Low</b>	<b>Vulnerable Limited</b>
Estimated number of mature individuals	< 250	< 2,500	< 10,000
AND either (C1) or (C2) is true			
C1 An observed, estimated or projected continuing decline of at least (up to a max. of 100 years in future)	<b>Very high rate 25% in 3 years or 1 generation (whichever is longer)</b>	<b>High rate 20% in 5 years or 2 generation (whichever is longer)</b>	<b>Substantial rate 10% in 10 years or 3 generations (whichever is longer)</b>
C2 An observed, estimated, projected or inferred continuing decline AND its geographic distribution is precarious for its survival based on at least 1 of the following 3 conditions:			

(a)	(i) Number of mature individuals in each subpopulation	≤ 50	≤ 250	≤ 1,000
	(ii) % of mature individuals in one subpopulation =	90 – 100%	95 – 100%	100%
(b)	Extreme fluctuations in the number of mature individuals			

**Evidence:**

**Eligible under Criterion 3 C2, (a)(ii) for listing as Critically Endangered**

The species was rediscovered in 2010 after being considered extinct and is known from 110 plants possibly connected to one rhizome.

The Committee considers that the estimated total number of mature individuals is very low, there is an inferred continuing decline and its geographic distribution is precarious for its survival as all mature individuals are found in 1 population/location. Therefore, the species has been demonstrated to have met the relevant elements of Criterion 3 to make it eligible for listing as **Critically Endangered**.

Criterion 4. Number of mature individuals			
	Critically Endangered Extremely low	Endangered Very Low	Vulnerable Low
Number of mature individuals	< 50	< 250	< 1,000

**Evidence:**

**Eligible under Criterion 4 for listing as Endangered**

The pyramid mulla-mulla is currently known from only one population consisting of 110 (possibly identical) independent individuals growing within a few metres of each other.

The Committee considers that the total number of mature individuals is very low and it is eligible for listing as **Endangered** under this criterion.

Criterion 5. Quantitative Analysis			
	Critically Endangered Immediate future	Endangered Near future	Vulnerable Medium-term future
Indicating the probability of extinction in the wild to be:	≥ 50% in 10 years or 3 generations, whichever is longer (100 years max.)	≥ 20% in 20 years or 5 generations, whichever is longer (100 years max.)	≥ 10% in 100 years

**Evidence:**

**Insufficient data to determine eligibility**

A population viability analysis has not been undertaken.

## **Conservation Actions**

### **Recovery Plan**

Recovery plan decision – A recovery plan is not recommended.

A recovery plan would not have a conservation benefit above existing mechanisms. An approved Conservation Advice (based on the DPaW Interim Recovery Plan 2016) provides sufficient direction to implement priority actions and mitigate against key threats.

### **Primary Conservation Action**

As there are so few pyramid mulla-mulla individuals, removal or death of any of them is likely to have a significant impact on the survival of the species. The GBW habitat and the existing hydrology within that habitat must not be disturbed. Active management of threats in the GBW area, including coordination of recovery actions and securing the total area in a reserve, is vital to ensure the species survival.

### **Conservation and Management Actions**

The species is currently listed as Critically Endangered under the Western Australian state legislation, the *Wildlife Conservation Act 1950*. The GBW habitat is found on land earmarked for protection (A class reserves), but there is no overall habitat management plan associated with the area. Any future conservation management for the wetlands will need to take the priorities and actions listed below into consideration (based on recovery actions identified in the DPaW Interim Recovery Plan (2016) for the species):

#### **Habitat loss disturbance and modifications**

- Prevent habitat disturbance including by securing all the GBW in a conservation reserve and maintaining and repairing the fencing around the species.
- As the numbers of plants are so few, controlling access to the area, especially by off-road vehicles, horse and motorbike riders, is important to preserve the plants from any damage.
- Remove rubbish dumped in the area and improve fencing to prevent further dumping.
- Ensure *Phytophthora* dieback hygiene protocols (CALM 2003) are used when works are undertaken in the GBW to prevent disease impacts on the habitat around the species' location.

#### **Invasive species**

- Develop a weed control strategy and undertake control actions including confirmation of weed species in the area; selection of appropriate control techniques (that have no impacts on pyramid mulla-mulla); and monitoring and reporting on outcomes. Harlequin flower (*Sparaxis bulbifera*), cape tulip (*Moraea flaccida*) and Coolatai grass (*Hyparrhenia hirta*) are known to be present in the area and any weed control strategy should include methods to control their spread in the GBW.
- Rabbits are identified as a threat due to grazing on young plants and the habitat disturbance they cause that also promotes weed invasion. A rabbit control strategy for the wetlands area should be developed including monitoring rabbit numbers and baiting if appropriate.

#### **Fire**

- Though the species is identified as being threatened by too frequent fires, the appropriate fire management regime for protecting and promoting recruitment in the GBW key habitat is not yet identified. Such a regime could include ensuring buffers to prevent wildfire or managed fire from impacting the habitat unless prescribed fire is being used following sound scientific evidence of the critical need for such a fire.

- A GBW fire management strategy was developed in 2002. This strategy should be updated to include clear measures to protect the pyramid mulla-mulla, as well as including a carefully planned weed management strategy, and demonstrated funding to ensure post-fire monitoring and weed control actions occur.
- As part of an updated fire management strategy for the area, maps of the GBW area, including the locations of the pyramid mulla-mulla, should be provided to local and state Rural Fire Services and seek inclusion of mitigation measures in bush fire risk management plan/s, risk register and/or operation maps.

#### Water Quality

- Hydrological change and nutrient enrichment of groundwater are listed as threats to the re-discovered species. The wetlands area that is the species' habitat will require that any relevant management plan consider the hydrological regime and protect the inputs and outflows of the GBW to ensure the wetlands habitat is maintained. Management plans should include addressing water quality issues and the connection of the system to related catchment and riparian systems.

#### Stakeholder Engagement

- As the GBW area is becoming attractive to land developers, it is important to ensure that there is a public engagement component within the various management plans identified above. This can be used to demonstrate the scientific findings underpinning management actions and highlight the importance of protecting the GBW as a whole.
- Friends of the GBW are an active community organisation that could assist in the development and implementation of management plans for the area.

#### **Survey and monitoring priorities**

- Accurately map the species' location to facilitate conservation actions and disseminate to all stakeholders involved in protecting the species.
- As the GBW have been extensively surveyed, it is unlikely that other surveys will find more plants in the area; however, any surveys planned in similar wetland habitat on the Swan Coastal Plain should be an opportunity to locate more pyramid mulla-mulla plants.
- Any management plan for the GBW should include monitoring the existing plants, and their threats, as part of a regime that can keep a watch on their status and health, including the effectiveness of management actions and the need to adapt them if necessary.

#### **Information and research priorities**

- More precisely assess the species ecological requirements including the persistence of the species (recruitment/regeneration/clonality) and the relative impacts of threats on these processes.
- Encourage seed collection by the Threatened Flora Seed Centre (DPaW) and conduct germination and/or vegetative propagation trials to determine the requirements for successful recruitment/establishment.
- Investigate options for enhancing or establishing additional populations including by undertaking germination experiments; encouraging the Botanic Gardens and Parks Authority to undertake cultivation of an ex-situ living collection; and developing a translocation protocol, with reference to the DPaW Policy Statement No.29 *Translocation of Threatened Flora and Fauna* (CALM 1995) as well as the Australian Network for Plant Conservation translocation guidelines (Vallee et. al., 2004).
- Identify optimal fire regimes for regeneration (vegetative regrowth and/or seed germination), and response to other prevailing fire regimes. Fire trials should only be undertaken as a last resort when all other means of regeneration of the species has been investigated and, in addition, all weed management and fire impacts including the timing of fire impacts are fully understood.

- Due to the poor genetic diversity of the pyramid mulla-mulla plants, it is important to determine if the species is susceptible to *Phytophthora cinnamomi* dieback disease. The susceptibility of plants found around the species location should also be determined.

### **Recommendations**

- (i) The Committee recommends that *Ptilotus pyramidatus* be confirmed in its current listing status of Critically Endangered in the list referred to in section 178 of the EPBC Act as there is sufficient evidence to support the category since the species' rediscovery in the wild.
- (ii) The Committee recommends that there not be a recovery plan for this species.

Threatened Species Scientific Committee

2 March 2016

### **References cited in the advice**

- Council of Heads of Australasian Herbaria (CHAH) (2012). Australian Plant Census. Available on the Internet at: <http://www.anbg.gov.au/chah/apc/>
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- Vallee L, Hogbin T, Monks L, Makinson B, Matthes M and Rossetto M (2004). *Guidelines for the translocation of threatened plants in Australia – second edition*. Australian Network for Plant Conservation. Canberra.
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