

THREATENED SPECIES SCIENTIFIC COMMITTEE

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

The Minister's delegate approved this Conservation Advice on 16/12/2016.

Conservation Advice

Myriophyllum porcatum

ridged water-milfoil

Conservation Status

Myriophyllum porcatum (ridged water-milfoil) is listed as Vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth) (EPBC Act) effective from the 16 July 2000. The species was eligible for listing under the EPBC Act as it was listed as Vulnerable under Schedule 1 of the preceding Act, the *Endangered Species Protection Act 1992* (Cwlth).

Species can also be listed as threatened under state and territory legislation. For information on the current listing status of this species under relevant state or territory legislation, see <http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>.

The main factors causing the species to be eligible for listing in the Vulnerable category are restricted area of occupancy, severely fragmented population and fluctuating population.

Description

The ridged water-milfoil is an annual aquatic herb growing to 40 cm in length. The stem is 1 – 3 mm wide, brittle and sparsely branching. Leaves are in two forms (dimorphic). Submerged leaves are dark green, 11 – 16 mm long, have a comb-like structure (pectinate) with 10 – 18 leaflets (pinnae), and occur in whorls (circular patterns) of 4 – 5 leaves. Emergent leaves are pale, elongate, 5 – 6 mm long, 1.3 – 1.8 mm wide, have 2 – 6 lobes at base, and occur in whorls of 3 – 5 leaves. Flowers are borne directly from the stem (sessile), occur in sparsely branched or simple spikes, and are located in leaf axils. Male flowers are arranged higher on the spike with female flowers below. Male flowers have a perianth (petals and sepals) and have components arranged in groups of four (tetramerous) with four sepals, eight stamens and four sterile styles with a slightly red tinge. Female flowers lack a perianth, while the ovary has four cavities (loculi). Fruit is cylindrical and ribbed, 1.8 – 2.1 mm long and 0.9 – 1.2 mm wide (Murphy 2006; Orchard 1981; Walsh & Entwisle 1996).

Distribution

The ridged water-milfoil is endemic to Victoria, where it is widely but patchily distributed across the north and north-west of the state (Murphy 2006). The range and abundance of the species prior to European settlement is unknown. The current number of individuals is unknown but the population is likely to fluctuate dramatically depending on seasonal rainfall in appropriate habitat (DSE 2008).

The ridged water-milfoil has been recorded from the following locations (AVH 2016; Murphy 2006; Wimmera CMA 2016):

- Kinnairds Wetland, Numurkah, central north Victoria (estimated to contain 500 000 individuals in 2008 and 2009).
- Moodies Swamp, Waggarandall, central north Victoria (estimated to contain 1000 individuals).
- Terrick Terrick National Park, central north Victoria (temporary waterholes in disused granitic sand quarry).
- Mt Hope Station, central north Victoria (seasonal wetland in quarried granite outcrop).

- Pine Grove, central north Victoria (private land – canegrass swamp).
- Lockington, central north Victoria (private land).
- O’Dea Roadside Reserve, central north Victoria (private land).
- Nathalia, central north Victoria (private land).
- Waaia, central north Victoria (private land).
- Tongala, central north Victoria (roadside) (possibly extinct)
- Strathbogie, central Victoria (private land - farm dam).
- Euroa, central Victoria (private land).
- Wathe Flora and Fauna Reserve, north-west Victoria (temporary waterholes).
- Carapugna, north-west Victoria (private land).

Unconfirmed anecdotal information suggests that the species may be present in the seed banks of Lake Lascelles and Lake Albacutya. There is also an old record from the south-west of Victoria (Murphy 2006).

Relevant Biology/Ecology

The ridged water-milfoil occurs in shallow, ephemeral and seasonal wetlands, including lakes, swamps, rock pools in granite outcrops, waterholes in claypans, and highly modified habitats including farm dams and drainage lines (Murphy 2006). It grows and reproduces following autumn and early winter inundation (E. O’Brian pers. comm. cited in Cook et al., 2009). Plants have been observed flowering in September to October and fruiting from October to November (Orchard, 1985). Seed may be able to persist in sediment when the wetland dries out; germinating once the wetland refills (GBCMA 2014; Murphy 2006).

Threats

The ridged water-milfoil is threatened by rural development, agriculture, invasive species, and grazing, and potentially threatened by vehicle movement and climate change. These threats and their effects on the ridged water-milfoil are described in the table below. The threats outlined below have corresponding conservation management priorities.

Table 1 – Threats impacting the ridged water-milfoil in order of severity of risk, based on available evidence.

Threat factor	Threat type and status	Evidence base
Habitat loss, disturbance and modifications		
Habitat loss and modification from rural development and agriculture	known current	Wetlands in Victoria have been significantly impacted since European settlement. It has been estimated that over 90 % of shallow wetlands have been lost in some areas of Victoria, particularly in the northern irrigation regions of the state (Murphy 2006). Due to habitat loss, the ridged water-milfoil population is highly fragmented. Rural development and agriculture continue to threaten wetland habitat for the ridged water-milfoil through hydrological alteration, including wetland drainage, channelisation, irrigation and water diversion, and reduced water quality, including increased nutrients, salinity and sedimentation (DSE 2008; GBCMA 2014; Murphy 2006).
Invasive species		

Competition with introduced weed species	known current	<p>Introduced weed species occur at most sites. Weed invasion of shallow wetlands poses a threat to ridged water-milfoil through competition (DSE 2008).</p> <p>Aquatic weeds pose a direct threat to the ridged water-milfoil. For example, <i>Sagittaria</i> (<i>Sagittaria platyphylla</i>), a Weed of National Significance (Department of the Environment and Energy 2016), poses a substantial threat to the ridged water-milfoil as it forms dense monocultures and alters the flow regime of wetland. <i>Sagittaria</i> is known to occur at Kinnairds Wetland, which may contain the largest subpopulation of ridged water-milfoil (GBCMA 2014).</p> <p>Terrestrial weed species, such as Patterson’s Curse (<i>Echium plantagineum</i>) also pose a threat to ridged water-milfoil as they out-compete the species as wetlands dry out (Murphy 2006).</p> <p>Weed control at known sites may pose a threat to the ridged water-milfoil through herbicide drift and chemical accumulation within wetlands (DSE 2008).</p>
Domestic species		
Habitat degradation and trampling from livestock	known current	The ridged water-milfoil is threatened by grazing of livestock on private land. Livestock degrade the species’ wetland habitat through soil compaction, pugging, erosion, spread of weeds, and increased nutrient input and turbidity. The ridged water-milfoil is also subject to grazing and trampling by livestock (DSE 2008; Murphy 2006).
Climate change		
Altered seasonality	potential	Altered seasonality associated with climate change is likely to threaten the ridged water-milfoil through the loss of shallow ephemeral wetlands (DSE 2008). A change to annual rainfall pattern is likely to affect the species’ reproduction and other ecological processes such as germination and growth (Cook et al., 2009).
Vehicle movement		
Habitat degradation from vehicle movement	potential	The ridged water-milfoil is likely to be threatened by recreational vehicle movement, including 4WD vehicles and motorbikes. Vehicle movement within and adjacent to wetlands is likely to cause habitat degradation through erosion, increased turbidity and direct impacts to wetland vegetation. Vehicle movement has been identified as a potential threat to subpopulations of ridged water-milfoil in Terrick Terrick National Park and Wathe Flora and Fauna Reserve (DSE 2008; Murphy 2006).

Conservation Actions

Conservation and Management priorities

Habitat loss, disturbance and modifications

- Ensure land managers and local council are aware of the species’ occurrence and provide protection measures against identified threats.

- Prevent habitat disturbance. Where appropriate, control access to known sites by fencing subpopulations to exclude vehicle and motorbike access.
- Implement erosion control and repair wetland banks at known sites, where appropriate.

Invasive species

- Manage sites by monitoring weed abundance and, if necessary, use appropriate methods to control and reduce the spread of weed species. Possible threats to the ridged water-milfoil associated with the control method must be considered. Weed control programs should be undertaken in conjunction with research.
- Post fire, implement a weed management plan to prevent weed invasion.

Impacts of domestic species

- Prevent habitat disturbance. Where appropriate, control access to known sites by fencing subpopulations to exclude livestock access.

Seed collection, propagation and other ex situ recovery action

- Assess the need for, and feasibility of, implementing an ex situ conservation strategy or program for the species.
- Establish plants in cultivation in appropriate institutions, such as the Royal Botanic Gardens Victoria, to safeguard against any unforeseen destruction of wild populations.
- To manage the risk of losing genetic diversity, undertake appropriate seed and storage in appropriate institutions, such as the Victorian Conservation Seedbank and Royal Botanic Gardens Victoria, and determine viability of stored seed. Best practice seed storage guidelines and procedures should be adhered to, to maximise seed viability and ability to germinate. Seeds from all natural populations to be collected and stored.

Stakeholder Engagement

- Liaise with the Victorian Government Department of Environment, Land, Water and Planning, Parks Victoria and the Royal Botanic Gardens, as required, to ensure appropriate actions are being undertaken to conserve the species.
- Erect appropriate conservation signs to educate the public about the species.
- Liaise with relevant stakeholders including local councils and private landowners where subpopulations occur to ensure populations are not damaged or destroyed accidentally.
- Encourage formal links with local land care groups and interested individuals.

Survey and Monitoring priorities

- Design and implement a monitoring program to more precisely assess population size, distribution, recruitment and the relative impacts of weed species, livestock grazing and vehicle movement.
- Undertake surveys in suitable habitat to locate any additional occurrences.
- Monitor the progress of conservation actions, including the effectiveness of management actions and adapt them if necessary to contribute to the species' recovery.

Information and research priorities

- Identify the effect of disturbance regimes on the species, in particular the effect of altered wetting and drying regime.
- Investigate appropriate timing of environmental water delivery to wetlands at known sites.
- Reinstate wetting and drying regime through annual water delivery at known sites, as appropriate.
- Undertake research to identify stimuli for recruitment and regeneration.
- Undertake seed germination and/or vegetative propagation trials to determine the requirements for successful establishment.
- Investigate options for linking, enhancing or establishing additional subpopulations.

References cited in the advice

Cook, D., Bayes, E., Jolly, K. & Backstrom, A. (2009). Ecological response of four wetlands to the application of environmental water: Final report on monitoring from May to December 2008. Australian Ecosystems. Report for Goulburn Broken Catchment Management Authority.

Department of Sustainability and Environment (DSE) (2008). Action Statement No. 237: Ridged Water-milfoil *Myriophyllum porcatum*. Victorian Government, East Melbourne.

Goulburn Broken Catchment Management Authority (GBCMA) (2014). Kinnairds Wetland Environmental Management Plan 2014. Report prepared by the Goulburn Broken Catchment Management Authority on behalf of the Moira Shire Council, Shepparton, Victoria.

Murphy, A. H. (2006). National Recovery Plan for the Ridged Water-milfoil *Myriophyllum porcatum*. Department of Sustainability and Environment, Melbourne.

Orchard, A. E. (1981). A Revision of South American *Myriophyllum* (Haloragaceae), and its Repercussions on Some Australian and North American Species. *Brunonia* 4, 27–65.

Walsh, N. J. & Entwisle, T. J. (1996). Flora of Victoria. Inkata Press, Melbourne.

Other sources cited in the advice

Australia's Virtual Herbarium (AVH) (2016). Occurrence records: *Myriophyllum porcatum*.

Council of Heads of Australasian Herbaria. Viewed 24 May 2016. Available on the internet at:

http://avh.ala.org.au/occurrences/search?taxa=Myriophyllum+porcatum&q=&fq=&wkt=&lat=&lon=&radius=&offset=0&max=20#tab_recordsView

Department of the Environment and Energy (2016). Weeds in Australia: *Sagittaria platyphylla*.

Viewed: 27 September 2016. Available on the internet at:

http://www.environment.gov.au/cgi-bin/biodiversity/invasive/weeds/weeddetails.pl?taxon_id=68483

Wimmera CMA (2016). Environmental water creates a hive of activity at wetland dam. Viewed: 24 May 2016. Available on the internet at: <http://www.wcma.vic.gov.au/news/news-detail/2016/04/29/environmental-water-creates-a-hive-of-activity-at-wetland-dam>