

NSW Threatened Species Scientific Committee

Exhibition period: 30/11/18 – 25/01/19

Proposed Listing date: 30/11/18

Notice of and reasons for the Final Determination

The Scientific Committee, established under the *Biodiversity Conservation Act 2016* (the Act), has made a Final Determination to list the alga *Nitella parooensis* M.T.Casanova & J.L.Porter as a CRITICALLY ENDANGERED SPECIES in Part 1 of Schedule 1 of the Act. Listing of Critically endangered species is provided for by Part 4 of the Act.

Summary of Conservation Assessment

Nitella parooensis is eligible for listing as Critically endangered, as the highest threat category met by the taxon across all categories, under Clause 4.3(a) (d) (e iiiii) because: i) the distribution of the species is very highly restricted with an area of occupancy of 8 km² and an extent of occurrence of 8 km²; ii) the species is only known to occur at a very small number of locations; and iii) there is a projected continuing decline in the species' habitat area and quality.

The NSW Threatened Species Scientific Committee has found that:

1. *Nitella parooensis* M.T.Casanova & J.L.Porter (family Characeae) is a short lived annual charophyte (an alga) and was described by Casanova and Porter (2013) as “dioecious, scarcely heteroclemous, to 10 cm high, internodes to 3 cm long, c. 0.4 mm wide, sterile branchlets to 3 cm long, unevenly 0–3 × furcate, monopodial or nearly so, in whorls of 5–7 at the axis nodes, with an occasional 0 × furcate accessory branchlet at the base of the whorl. Primary branchlet segments to 40 mm long, ranging from 50 to 100% of total branchlet length. Secondary branchlet segments 2 to 3 mm long. Branchlets have the potential to be 3 or more × furcate, but sometimes the development of segments is suppressed and the terminal segments appear to be pluricellulate (up to 5 cells long including the end cell). Dactyls are essentially bicellulate, to 1.5 mm long. Accessory branchlets where present are 0 × furcate (i.e. dactyls). End cells short, conical and acute, the end of the penultimate cell distinctly narrowed so that the base of the end cell is confluent with it. Fertile parts without mucus, whorls on the female plant somewhat contracted, on the male plant in distinct heads. Fertile branchlets 6 in a whorl, 2 × furcate, oogonia from 0.4 to 0.6 mm long, at first and second branchlet furcations, antheridia terminal, to 400 µm in diameter. Oospores 290–350 µm long × 250–290 µm wide, with 4–5 striae of low flanges, dark to chestnut brown. The shape differs from all other species seen so far, rather than being a flattened sphere, oospores of this species appear twisted. Oospore wall ornamentation is coarsely reticulate, with walls of the reticulum c. 8 µm wide, 3–4 meshes across the fossa. In mature oospores minute, sparse papillae occur on the walls and cavities of the reticulum. Antheridia to 0.4 mm in diameter. Chromosome number not known.”
2. *Nitella parooensis* is endemic to New South Wales (NSW) and occurs in claypan wetlands in the Paroo region in the north west of the state (Casanova and Porter 2013). It is currently known to occur in three small freshwater temporary wetlands within the Paroo River catchment in Nocolleche Nature Reserve. Searches have been undertaken in areas of similar freshwater wetland habitat within Nocolleche Nature Reserve and outside the reserve in the broader area of northwestern NSW and southern Queensland in the Wanaaring – Tibooburra – Hungerford areas, but no further occurrences of *N. parooensis* have been located (Casanova and Porter 2013; J. Porter *in litt.* February 2016).
3. The geographic distribution of *Nitella parooensis* is very highly restricted. The area of occupancy (AOO) is estimated to be 8 km², based on the species occupying two 2 x 2 km grid cells, the spatial scale of assessment recommended by IUCN (2017). The extent of occurrence (EOO) was also estimated to be 8 km². The EOO is reported as equal to AOO, despite the range of the species, measured by a minimum

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convex polygon containing all the known sites of occurrence, being less than AOO. This is to ensure consistency with the definition of AOO as an area within EOO, following IUCN Guidelines (2017).

4. *Nitella parooensis* is very uncommon at the three sites where it is currently known to occur with only scattered individuals seen (J. Porter *in litt.* February 2016). The abundance of *N. parooensis* is difficult to quantify due to its life history and the ephemeral nature of its habitat (J. Porter *in litt.* February 2016).
5. *Nitella parooensis* is a macroscopic green alga superficially similar to a submerged flowering plant, with flexible stems and whorls of branch-like structures that carry the reproductive organs (J. Porter *in litt.* February 2016). The tiny sexual propagules (oospores) can survive prolonged desiccation, remaining dormant in the soil until water is available (J. Porter *in litt.* February 2016). The river system has a highly erratic flooding regime, and rainfall is highly variable averaging 276 mm per year. The temporary wetlands fill infrequently and sporadically, perhaps every 5–7 years. They are shallow (c. 20–30 cm deep) and the water is typically turbid such that at times *N. parooensis* cannot be located visually (Casanova and Porter 2013). Water birds are likely to play an important role in the dispersal of propagules (J. Porter *in litt.* February 2016; Soons *et al.* 2016).
6. The largest site where *Nitella parooensis* is known to occur is a temporary lignum swamp on the edge of the Paroo River floodplain that fills either after minor flooding from the Paroo River (via a distributary creek) or from local runoff. It occurs on heavy grey cracking clay and is fringed by *Eucalyptus ochrophloia* (Yapunyah) and *E. largiflorens* (Black box) with an understorey of *Duma florulenta* (Lignum) and *Acacia stenophylla* (River Coobah). Herbaceous species include *Eleocharis plana*, *Marsilea* spp., *Alternanthera denticulata*, *Cyperus gilesii*, *Aponogeton queenslandicus* and *Eragrostis australasicus*. Submerged species include the charophytes *Chara braunii*, *Nitella sonderi* and *Nitella cristata*. The other two known sites are shallow temporary wetlands adjacent to the floodplain on massive (non-cracking) red clay substrate. These wetlands fill from local runoff after heavy rain and are hydrologically isolated from the Paroo River and its floodplain. One is fringed by a tall open shrubland dominated by *Eremophila sturtii*, *Dodonaea angustifolia*, *Senna* spp., and an understorey of chenopods including *Osteocarpum* sp., *Chenopodium* sp. and *Scleroleana* sp. The other wetland site is more distant from the Paroo River and is associated with sparse vegetation including *Eragrostis australasicus* and *Marsilea* sp. (J. Porter *in litt.* February 2016).
7. Threats to *Nitella parooensis* include feral pigs, weeds, an altered river flow regime, and the impacts of climate change. Feral pigs (*Sus scrofa* Linnaeus 1758) damage the habitat of *N. parooensis* by disturbing the soil leading to damage of the oospores and increasing the likelihood of the spread of weeds through increased nutrients and dispersal of weed seeds. Although weed species are not currently recorded from the wetlands containing *N. parooensis*, the weeds *Rumex crispus* (Curled Dock), *Heliotropium curassavicum* (Smooth Heliotrope), *Polypogon monspeliensis* (Annual Beardgrass), *Carthamus lanatus* (Saffron Thistle) and *Xanthium occidentale* (Noogoora Burr) are present in similar habitats elsewhere in the Nocoleche Nature Reserve. Altered flow regimes of the floodplain caused by water extraction and altered flow regimes upstream may result in changes to flood size, frequency and duration and adversely affect the habitat of *N. parooensis* and its ability to persist in the largest known site. Less frequent flooding will reduce riverine connectivity and may affect recruitment and dispersal of *N. parooensis* (J. Porter *in litt.* February 2016; Hood and Naiman 2000; Stokes *et al.* 2010). Changes to the flooding regime may also reduce floristic diversity (Roberts and Ludwig 1991), encourage invasive weed species such as *Phyla nodiflora* (Lippia) (Stroud 1994), reduce recruitment of floodplain eucalypts (Bacon *et al.* 1993; Walker & Thoms 1993) and eliminate key structural components of the habitat such as River Coobah and Lignum (McCosker and Duggin 1993; J. Porter *in litt.* February 2016). Climate change has the potential to alter rainfall patterns and river flows and reduce habitat availability and persistence (J. Porter *in litt.* February 2016). The predicted change in seasonal rainfall patterns for the region containing the Nocoleche Nature Reserve (OEH 2014) suggests a shift from a relatively aseasonal pattern to one more dominated by rain in summer. This may affect germination and recruitment capacity of *N. parooensis* because evaporation rates are

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substantially higher in summer. 'Predation, habitat degradation, competition and disease transmission by Feral Pigs, *Sus scrofa* Linnaeus 1758', '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.

8. *Nitella parooensis* M.T.Casanova & J.L.Porter is eligible to be listed as a Critically endangered species as, in the opinion of the NSW Threatened Species Scientific Committee, it is facing an extremely high risk of extinction in Australia in the immediate future as determined in accordance with the following criteria as prescribed by the *Biodiversity Conservation Regulation 2017*:

Clause 4.2 – Reduction in population size of species
 (Equivalent to IUCN criterion A)
 Assessment Outcome: Data deficient

(1) - The species has undergone or is likely to undergo within a time frame appropriate to the life cycle and habitat characteristics of the taxon:			
	(a)	for critically endangered species	a very large reduction in population size, or
	(b)	for endangered species	a large reduction in population size, or
	(c)	for vulnerable species	a moderate reduction in population size.
(2) - The determination of that criteria is to be based on any of the following:			
	(a)	direct observation,	
	(b)	an index of abundance appropriate to the taxon,	
	(c)	a decline in the geographic distribution or habitat quality,	
	(d)	the actual or potential levels of exploitation of the species,	
	(e)	the effects of introduced taxa, hybridisation, pathogens, pollutants, competitors or parasites.	

Clause 4.3 - Restricted geographic distribution of species and other conditions
 (Equivalent to IUCN criterion B)
 Assessment Outcome: Critically endangered under Clause 4.3 (a) (d) (e iii)

The geographic distribution of the species is:			
	(a)	for critically endangered species	very highly restricted, or
	(b)	for endangered species	highly restricted, or
	(c)	for vulnerable species	moderately restricted,
and at least 2 of the following 3 conditions apply:			
	(d)	the population or habitat of the species is severely fragmented or nearly all the mature individuals of the species occur within a small number of locations,	
	(e)	there is a projected or continuing decline in any of the following:	
		(i)	an index of abundance appropriate to the taxon,
		(ii)	the geographic distribution of the species,
		(iii)	habitat area, extent or quality,
		(iv)	the number of locations in which the species occurs or of populations of the species,
	(f)	extreme fluctuations occur in any of the following:	
		(i)	an index of abundance appropriate to the taxon,
		(ii)	the geographic distribution of the species,
		(iii)	the number of locations in which the species occur or of populations of the species.

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Clause 4.4 - Low numbers of mature individuals of species and other conditions
 (Equivalent to IUCN criterion Clause C)
 Assessment Outcome: Data deficient

The estimated total number of mature individuals of the species is:			
	(a)	for critically endangered species	very low, or
	(b)	for endangered species	low, or
	(c)	for vulnerable species	moderately low,
and either of the following 2 conditions apply:			
	(d)	a continuing decline in the number of mature individuals that is (according to an index of abundance appropriate to the species):	
		(i)	for critically endangered species very large, or
		(ii)	for endangered species large, or
		(iii)	for vulnerable species moderate,
	(e)	both of the following apply:	
		(i)	a continuing decline in the number of mature individuals (according to an index of abundance appropriate to the species), and
		(ii)	at least one of the following applies:
		(A)	the number of individuals in each population of the species is:
			(I) for critically endangered species extremely low, or
			(II) for endangered species very low, or
			(III) for vulnerable species low,
		(B)	all or nearly all mature individuals of the species occur within one population,
		(C)	extreme fluctuations occur in an index of abundance appropriate to the species.

Clause 4.5 - Low total numbers of mature individuals of species
 (Equivalent to IUCN criterion D)
 Assessment Outcome: Data deficient

The total number of mature individuals of the species is:			
	(a)	for critically endangered species	extremely low, or
	(b)	for endangered species	very low, or
	(c)	for vulnerable species	low.

Clause 4.6 - Quantitative analysis of extinction probability
 (Equivalent to IUCN criterion E)
 Assessment Outcome: Data deficient

The probability of extinction of the species is estimated to be:			
	(a)	for critically endangered species	extremely high, or
	(b)	for endangered species	very high, or
	(c)	for vulnerable species	high.

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Clause 4.7 - Very highly restricted geographic distribution of species–
vulnerable species

(Equivalent to IUCN criterion D2)

Assessment Outcome: Vulnerable via Clause 4.7

For vulnerable species,	the geographic distribution of the species or the number of locations of the species is very highly restricted such that the species is prone to the effects of human activities or stochastic events within a very short time period.
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Dr Marco Duretto
Chairperson
NSW Threatened Species Scientific Committee

References:

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