Publication date: 24/09/2021

Notice and reasons for the Final Determination

The NSW Threatened Species Scientific Committee, established under the *Biodiversity Conservation Act 2016* (the Act), has made a Final Determination to list the herb *Lobelia claviflora* Albr. & R.W.Jobson 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

Lobelia claviflora was found to be eligible for listing as Critically Endangered under Clause 4.3 (a) (d) (e iii). The main reasons for this species being eligible are: i) it has a very highly restricted geographic range; ii) it is only found at a single location; and (iii) there is inferred continuing decline due to habitat disturbance from feral pigs, domestic stock grazing and further loss of potential habitat.

The NSW Threatened Species Scientific Committee has found that:

1. *Lobelia claviflora* was discovered in 2012 and recently described by Albrecht *et al.* (2018). PlantNET (2020) describe it as an "annual (or possibly rarely a short-lived perennial) herb to c. 25 cm high, single-stemmed or occasionally with several stems arising from base. Stems erect or ascending, glabrous, sometimes producing adventitious roots from lower nodes. Leaves linear-subulate or lowermost linear-lanceolate, 5–21 mm long, 0.4–3 mm wide, glabrous, entire or lower leaves with irregularly placed small marginal swellings, apex narrowly acute to subacute, often with a tiny translucent apiculum, base attenuate. Flowers bisexual, each initially developing in the axil of one leaf of a sub-opposite pair of distal leaves, the axis between the sub-opposite leaves subsequently elongating so that the leaves are displaced and appear alternate, this pattern repeating with subsequent terminal growth so that a flower appears to be borne at every second node, lateral flower-bearing shoots sometimes produced from the 'non-flowering' nodes if conditions favourable for flowering persist; pedicels 16–55 mm long, glabrous. Calyx lobes 1.5–2.5 mm long. Corolla weakly 2-lipped, 10–14 mm long; upper lip two-lobed, violet-blue; lower lip three-lobed, the lobes basally fused for c. 2–3.5 mm above the sinus between the two lips, the fused part with a prominent central yellow zone and 3 deep purple, ±basally fused broad bands, deep purple bands extending into the tube on the ventral side and covered with dense club-shaped hairs; central lobe violet-blue distally, white proximally; lateral lobes mostly violet-blue but white proximally on the half adjacent to the central lobe; tube 5–7 mm long, split to within 3.5–4.8 mm of base on dorsal side, glabrous externally, internally with dense club-shaped hairs on the ventral side covering the deep purple vertical bands and yellow zone adjacent and immediately below, longer hairs to c. 0.3 mm present further below in the proximal region of the tube. Anther tube dark greyish-blue, 1.5–1.9 mm long, two lower anthers each with an apical seta c. 0.3–0.5 mm long. Fruit obconical to obovoid, slightly compressed laterally, 3.3–5 mm long. Seeds subcylindrical to ellipsoid or ovoid, subterete to slightly compressed, 0.38–0.5 mm long, mid to dark brown, with a network of almost straight to heterogeneously undulating close fine surface ridges."

2. *Lobelia claviflora* is a short-lived, ephemeral semi-arid species that occurs near Cuttabri, south west of Wee Waa in north western NSW. It is currently known from three sites that are no more than 5.5 km apart and located on private land in sedge-dominated wetlands occupying shallow basins on the Namoi River floodplain (Albrecht *et al.* 2018). The vegetation community where *L. claviflora* currently occurs is dominated by *Eleocharis blakeana, E. pusilla, Damasonium minus, Goodenia gracilis, Utricularia fenshamii, Nymphoides geminata, Juncus radula, Eriocaulon australasicum* and *Eragrostis microcarpa* (Albrecht *et al.* 2018). *Eucalyptus pilligaensis* and *Casuarina cristata* occur scattered within and on the margins of the sedgelands (Albrecht *et al.* 2018). The general area in which the swamps are located is heavily thinned woodland that is used for grazing domestic livestock (R. Jobson *in litt.* February 2019).

3. *Lobelia claviflora* has a very highly restricted geographic distribution. The area of occupancy (AOO) was estimated to be 8 km^2, based on the species occupying two 2 km x 2 km grid cells, the spatial scale of assessment recommended by IUCN (2019). The extent of occurrence (EOO) was also 8 km^2. The EOO is reported as equal to AOO, despite the range of the species, measured by a minimum convex polygon containing all the known sites of occurrence (2.9 km^2), being less than the AOO. This is to ensure consistency with the definition of AOO as an area within EOO, following IUCN Guidelines (2019).

4. *Lobelia claviflora* is an ephemeral herb that appears shortly after significant rain that floods the local creeks and leads to the inundation of wetland habitat (R. Jobson *in litt*. February 2019). Emergent flowering plants of *L. claviflora* are found in water up to c. 20 cm in depth and also in moist areas on the margins of swamps from which water has receded (Albrecht *et al*. 2018). *Lobelia claviflora* appeared following habitat inundation in October 2012 to January 2013 and again between October 2016 and December 2016 (R. Jobson *in litt*. February 2019). There were no above ground plants observed in the intervening dry period (R. Jobson *in litt*. February 2019). Flowering was observed in October 2016 indicating it may have commenced in September (Albrecht *et al.* 2018). In cultivation, with unlimited water supply, *L. claviflora* was observed to flower through to April the following year (Albrecht *et al*. 2018). It is likely that in the wild, plant longevity and the length of the flowering season are determined by rainfall events and temperature patterns (Albrecht *et al*. 2018).

5. The three known sites were surveyed in 2016 and a total of 380-500 individuals were observed, with approximately 400 (±50 plants), 40 (±10 plants) and one mature individual of *Lobelia claviflora* recorded at each site respectively (R. Jobson *in litt.* February 2019). Plant numbers were estimated by circumnavigating the swamps and counting all individuals. The species can only be detected above ground following significant rainfall events, as *L. claviflora* is present only in the soil seed bank in dry times.

6. The main threats to *Lobelia claviflora* are from degradation to the habitat from domestic and feral animals, and other agricultural activities including alteration of the water regime by dam construction. The current sites where *L. claviflora* occurs

are open to domestic livestock grazing and the wetland habitat can be a focal point for domestic stock and feral animals (D. Albrecht *in litt*. July 2019). Feral pigs (*Sus scrofa* Linnaeus 1758) occur throughout the area and damage has been observed at the two smaller sites. Pigs trample and dig up the soil leading to disturbance to the ground surface, vegetation, roots, soil seed bank, and fauna habitats. Disruption of the soil seed bank may affect future plant recruitment. 'Predation, habitat degradation, competition and disease transmission by Feral Pigs, *Sus scrofa* Linnaeus 1758' is a Key Threatening Process under the Act.

7. There is a history of conversion of wetlands to stock watering points throughout the landscape where *Lobelia claviflora* occurs. Dam construction may lead to the clearing of habitat, disturbance to soil seed banks and disruption to the natural hydrology of the area. It may also destroy areas of wetland habitat that could otherwise have been recolonised by *L. claviflora* even if not occupied by the species at the time of construction. Road maintenance activities may also lead to the disruption of the natural hydrology of the very flat terrain. Wetland species are sensitive to hydrological change as it is the pattern of access to periodic inundation that often drives their life cycles. 'Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands' is a Key Threatening Process under the Act.

8. *Lobelia claviflora* Albr. & R.W.Jobson 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*:

Appendix 1
Assessment against Biodiversity Conservation Act criteria
The Clauses used for assessment are listed below for reference.

Assessment Outcome: Critically Endangered under Clause 4.3 (a) (d) (e iii)

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.

Clause 4.4 – Low numbers of mature individuals of species and other conditions (Equivalent to IUCN criterion 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: Vulnerable under Clause 4.5 (c).

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.

Clause 4.7 – Very highly restricted geographic distribution of species– vulnerable species (Equivalent to IUCN criterion D2)
Assessment Outcome: Vulnerable under 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.

Dr Anne Kerle
Chairperson
NSW Threatened Species Scientific Committee

Supporting Documentation:

Scott J (2020) Conservation Assessment of *Lobelia claviflora* Albr. & R.W.Jobson (Campanulaceae). NSW Threatened Species Scientific Committee.

References:

Albrecht DE, Jobson RW, Walsh NG, Knox EB (2018) *Lobelia claviflora* (Campanulaceae: Lobelioideae), a new species from northern New South Wales, Australia. *Telopea* **21**: 121–127.

IUCN Standards and Petitions Committee (2019) Guidelines for Using the IUCN Red List Categories and Criteria. Version 14. Prepared by the Standards and Petitions Committee. Accessed from http://www.iucnredlist.org/documents/RedListGuidelines.pdf.

PlantNET (The NSW Plant Information Network System) Royal Botanic Gardens and Domain Trust, Sydney. (accessed 09 September 2020). Available at: https://plantnet.rbgsyd.nsw.gov.au/cgi-bin/NSWfl.pl?page=nswfl&lvl=sp&name=Lobelia~claviflora