Publication date: 30/06/2023

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 shrub *Acacia atrox* Kodela as a CRITICALLY ENDANGERED SPECIES in Part 1 of Schedule 1 of the Act and, as a consequence, to omit reference to *Acacia atrox* Kodela in Part 2 Schedule 1 (Endangered Species) of the Act. Listing of Critically Endangered species is provided for by Part 4 of the Act.

Summary of Conservation Assessment

Acacia atrox Kodela was found to be Critically Endangered in accordance with the following provisions in the *Biodiversity Conservation Regulation 2017*: Clause 4.2 (1) (a) (2)(b) Clause 4.3 (a) (d) (e) (i) (iii) because: i) a population reduction has been observed that has not ceased within three generations based on the index of abundance; ii) it has a highly restricted geographic range; ii) the population of the species is severely fragmented; iii) there is an inferred continuing decline of the species habitat area, extent, and quality; iv) there is an observed decline in the number of mature individuals.

The NSW Threatened Species Scientific Committee has found that:

1. *Acacia atrox,* (family Fabaceae) (Kodela 2000; Copeland and Kodela 2012), commonly known as the Myall Creek Wattle, has two subspecies: *Acacia atrox subsp. atrox* and *Acacia atrox subsp. planitiicola*. *Acacia atrox subsp. atrox* was first described from the Inverell region by Kodela (2000) as a "dense, much branched shrub normally 0.5-1.5 (-2) m high, oldest plants to 4 m high; main stem less than 10 cm diam. at breast height, sometimes twisted, spreading by suckering. Bark grey-brown, becoming dark grey and vertically fissured with age". *Acacia atrox subsp. planitiicola* was first described by Copeland and Kodela (2012) as a shrub to small tree to 6 m high, spreading by suckering; bark grey-brown, rough, vertically fissured; branchlets terete, pale light green to yellowish green, becoming darker and brownish in colour with age, glabrous, with inconspicuous low rounded longitudinal ridges. Plants are covered in light green to blue spiney phyllodes, 2-4cm long and 1-1.2mm wide (Copeland and Kodela 2012). Phyllodes are sessile, patent to slightly inclined, very narrowly linear, straight, terete to quadrangular in section with a yellow vein at each angle and a less prominent vein in between these (8-veined altogether, less with *A. atrox subsp. planiticola*), gradually tapered towards a pungent apex (the fine tip orange-brown, 2-3 mm long). Inflorescences normally paired (often one of the peduncles missing), on a short axis (rudimentary raceme) to 1 mm long in phyllode axils (often appearing simple); cream coloured to pale yellow. Ovary densely clothed with minute white hair (NSW Threatened Species Scientific Committee 2001). Differences between the subspecies appear within slight features of the phyllodes and flowers. In *A. atrox subsp. planiticola* the phyllodes appear to be less rigid with the longitudinal veins being less pronounced and fewer in number and the flower-heads appear to be smaller (5–7 mm diam.) with

fewer flowers (17–25-flowered) than in *A. atrox subsp. atrox.* (Copeland and Kodela 2012).

2. *Acacia atrox* is endemic to northern New South Wales (NSW) within the Nandewar and Darling Riverine Plains Bioregions of the Moore Plains and Gwydir Local Government Areas. These are the traditional lands of the Kamilaroi First Nations People (Department of Planning and Environment [Map Data] 2022; Moree Plains Shire Council 2022).

3. *Acacia atrox* occurs naturally in two subpopulations: one within Kirramingly Nature Reserve, south-west of Gurley, and the other on private land near Myall Creek, north-east of Bingara (Copeland and Kodela 2012). Occurring on deep black clay soils derived from basalt and shallow red sandy loams on upper slopes and crests (Office Environment and Heritage 2019b). The subpopulation at Myall Creek grows on slopes and low hills in modified agricultural areas with a mix of native and exotic grasslands (Kodela 2000). The subpopulation in Kirramingly Nature Reserve occurs in open grassy *Eucalyptus* woodland communities with a scattered understory of *Callitris glaucophylla* and *Notelaea microcarpa*, and a dense native grassy groundcover (Clarke *et al* 1998). *Acacia atrox* is thought to have been more widely distributed in the woodland and grasslands communities that were once widespread across the Moore Plains and Gwydir LGAs (Copeland and Kodela 2012; National Parks and Wildlife Service 2003).

4. The geographic distribution of *Acacia atrox* is highly restricted. The Extent of Occurrence (EOO) was estimated to be 22 km^2, calculated as a minimum convex polygon containing all known occurrences, the method of assessment recommended by IUCN (2022). The Area of Occupancy (AOO) is estimated to be 8 km^2 based on 2 x 2 km grid cells, the scale recommended by IUCN (2022). Both EOO and AOO were calculated using GeoCAT software (Bachman *et al*. 2011), enclosing all recent confirmed survey and herbarium records.

5. Current population estimates for the Myall Creek subpopulation is 10,000 ramets of a dense, mostly young demographic across a 4ha area (Department Planning, Industry and Environment 2019). The current subpopulation of 10,000 ramets is predicted to reduce through natural thinning and attrition towards an estimated 500 larger ramets over the next 50 years, based on observations of reduction for this subpopulation over the last two decades (Department Planning, Industry and Environment 2019). The subpopulation within Kirramingly Nature Reserve occurs in six distinct clumps over an area of approximately 5ha. The total population is estimated at 250 clonal ramets (). The Kirramingly subpopulation is made up of mostly mature trees and shrubs with young ramets being sparse (Copeland and Kodela 2012).

6. *Acacia atrox* is a long-lived species (Copeland and Kodela 2012). The species reproduces solely by vegetative suckering with no known production of viable seed (Hawes *et al* 2000; Bell and Hunter 2006; Copeland and Kodela 2012; T. Soderquist pers. comm. May 2022). *Acacia atrox* ramets are stimulated to grow from a disturbed root of a parent stem and reproduce further by production of suckers from its own

establishing root network. All stem counts are considered mature individuals under the IUCN Red List guidelines (International Union for Conservation of Nature 2022). Based on the estimated longevity of 100 years, a generation length of 47 years has been calculated using IUCN (2022) methods.

7. The main threats to *Acacia atrox* include loss of habitat through land clearing for agricultural development, herbivory, and stem damage of young regenerating ramets from grazing animals, and high intensity and high frequency of fire and inadequate recruitment into an ageing population (Office of Environment and Heritage 2019b). 'Clearing of native vegetation' and 'High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition' are listed as Key Threatening Processes in the Act.

8. The current limited geographic extent of *Acacia atrox* is the result of historical clearing for agricultural development (Department of Planning Industry and Environment 2019). Clearing of habitat for agriculture and pasture improvement where protection has ceased, or in other areas where the species has not been recognised, has been identified as a potential future threat for the species (OEH 2019a). Young regenerating ramets have been observed to be damaged and broken by domestic livestock, and new growth is grazed by kangaroos, feral goats, and rabbits (Department Planning, Industry and Environment 2019). There is currently no active management to exclude grazing animals from either of the known *Acacia atrox* subpopulations. The Myall Creek subpopulation is likely to be more susceptible to grazing and damage from livestock as it occurs on private land that is intensively grazed (Department of Planning Industry and Environment 2019). High intensity fire is likely to kill mature trees of *A. atrox* (Office Environment and Heritage 2019b). High frequency fires may affect the species ability to recruit new individuals as subsequent fires will deplete nutrient stores in remaining roots, limiting their ability to resprout (Department of Planning Industry and Environment 2019). Lack of recruitment of younger ramets into both subpopulations could result in rapid population decline if mortality exceeds ongoing recruitment. This is exacerbated by the fact that the two small, severely fragmented subpopulations remain vulnerable to stochastic events (Department of Planning Industry and Environment 2019).

9. *Acacia atrox* is considered severely fragmented as all the individuals are found in two small and isolated subpopulations that are separated by 100 kilometres. As the two locations could be affected by the same extreme drought, *A. atrox* has only one threat-based location. Since vegetative suckering is the only known mechanism for reproduction, gene flow between the subpopulations is unlikely. At both subpopulations, stochastic events such as fire may result in the local extirpation of one or both subpopulations independently. Therefore, these small subpopulations may go extinct, with minimal to no probability of recolonisation from the remaining fragmented subpopulation.

10. Continuing decline has been observed at Myall Creek Hawes *et al* (2000) estimated 50,000 - 100,000 mostly young, shrub-sized ramets, and 70,000 ramets were estimated by Bell and Hunter (2006). The most recent estimate is 10,000 ramets, recorded under the Saving our Species monitoring program (Department of Planning Industry and Environment 2019). There is inferred continuing decline in the area, extent, and quality of habitat of *Acacia atrox,* as a result of ongoing threats from further clearing for cropping, grazing and damage caused by livestock (particularly at Myall Creek), grazing and browsing by feral herbivores such as goats and rabbits, extended drought, and the potential threat of wildfire (National Parks and Wildlife 2003).

11. *Acacia atrox* Kodela 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*:

Assessment against *Biodiversity Conservation Regulation 2017* criteria
The Clauses used for assessment are listed below for reference.

Overall Assessment Outcome:
Acacia atrox was found to be Critically Endangered under Clause 4.2 (1) (a) (2)(b) 4.3 (a) (d) (e) (i) (iii)

Clause 4.2 – Reduction in population size of species
(Equivalent to IUCN criterion A)
Assessment Outcome: Critically Endangered 4.2 (1)(a) (2) (b)

(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) (i) (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 subpopulations 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 subpopulations of the species.	

Clause 4.4 - Low numbers of mature individuals of species and other conditions (Equivalent to IUCN criterion C)
Assessment Outcome: Vulnerable under Clause 4.4 (c) (d) (iii)

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.

Clause 4.7 - Very highly restricted geographic distribution of species–vulnerable species
(Equivalent to IUCN criterion D2)
Assessment Outcome: Data deficient

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.

Senior Professor Kristine French
Chairperson
NSW Threatened Species Scientific Committee

Supporting Documentation:

Taylor CT (2022) Conservation Assessment of *Acacia atrox* (Kodela) (Fabaceae). NSW Threatened Species Scientific Committee

References:

Australian Government Department of Climate Change, Energy, the Environment and Water (2021) Threatened species and ecological communities, Land Clearance as a key threatening process. Available from: Land clearance - DCCEEW (accessed 15th August 2022)

Bachman S, Moat J, Hill AW, De Torre J, Scott B (2011) Supporting Red List threat assessments with GeoCAT: Geospatial Conservation Assessment tool. ZooKeys 150 117.

Clarke PJ, Gardener MR, Nano CE, Whalley RDB (1998) The Vegetation and Plant Species of Kirramingly, NSW National Parks and Wildlife Service and the University of New England

Copeland LM, Kodela PG (2012) *Acacia atrox* subsp. *planiticola* Fabaceae: Mimosoideae), a new threatened subspecies from the Northwestern Plains of New South Wales, Australia. University of New England, Armidale, NSW 2351, *Telopea* 14: 63–68.

Department of Agriculture Water and the Environment (2022) Fire Regimes that Cause Biodiversity Decline: amendments to the list of key threatening processes, Canberra. CCBY 4.0. Available at awe.gov.au/publications (accessed 14th April 2022)

Department of Planning and Environment (2022) NSW PCT Master List [Map Data] C1.1. BioNet Vegetation Classification Application (Exported 7 July 2022)

Department of Planning and Environment (2022) NSW State Vegetation Type Map [Map Data] C1.1M1. ArcGIS (exported on 7th July 2022)

Department of Planning Industry and Environment (2019) Saving our Species (SoS) Site Species Monitoring Plan: *Acacia atrox* Myall Creek Wattle. Unpublished report.

IUCN Standards and Petitions Subcommittee (2022) Guidelines for Using the IUCN Red List Categories and Criteria. Version 15. https://nc.iucnredlist.org/redlist/content/attachment_files/RedListGuidelines.pdf

Kodela PG (2000) *Acacia atrox* (Fabaceae: Mimosoideae), a rare species from the Northwestern Slopes, New South Wales. *Telopea* 9 (2): 415–419.

Moree Plains Shire Council (2022) Tourism Moree Kamilaroi Culture | Moree Plains Tourism | About Moree. Available at: http://www. moreetourism.com.au (accessed 9 June 2022)

NSW Government Biodiversity Conservation Regulation (2017) Biodiversity Conservation Act 2016. Available at: https://legislation.nsw.gov.au/view/whole/html/inforce/current/sl-2017-0432. (accessed 9th May 2022)

National Parks and Wildlife Service (2003) Kirramingly Nature Reserve Plan of Management. (NSW National Parks and Wildlife Service: Narrabri NSW)

NSW Threatened Species Scientific Committee (2001) *Acacia atrox* (a tall shrub) Approved Conservation Advice. Available at: https://www.environment.nsw.gov.au/topics/animals-and-plants/threatened-species/nsw-threatened-species-scientific-committee/determinations/final-determinations/2000-2003/acacia-atrox-a-tall-shrub-endangered-species-listing (accessed 6th April 2022)

Office of Environment and Heritage (2019a) Saving our Species (SoS) Myall Creek Wattle (*Acacia atrox*) Species Profile. Available at: Myall Creek Wattle - profile | NSW Environment, Energy and Science (accessed 14th April 2022)

Office of Environment and Heritage (2019b) Saving our Species, Help Save the Myall Creek Wattle Recovery Strategy. Available at: Myall Creek Wattle (*Acacia atrox*) | Conservation project | NSW Environment, Energy and Science (accessed 12 April 2022)