

***Callistemon purpurascens* S. M. Douglas & S. David (Myrtaceae)**

Distribution: Endemic to NSW

Current EPBC Act Status: not listed

Current NSW TSC Act Status: Critically Endangered

Proposed change for alignment: List on EPBC Act as Critically Endangered

Conservation Advice: *Callistemon purpurascens*

Summary of Conservation Assessment

Callistemon purpurascens is found to be eligible for listing as Critically Endangered under Criteria B1(a),(b)(iii), B2 (a),(b)(iii) and C2 (a)(i). The main reasons that this species is eligible for listing are i) it has a very highly restricted geographic range, with an area of occupancy (AOO) of only 4km²; ii) it is known from only a single location; iii) a continuing decline is estimated in the quality of habitat due to feral pig activity, browsing, invasive weeds and the effects of climate change; iv) there are only 150 known mature individuals; v) all subpopulations consist of less than 20 mature individuals.

Assessment against IUCN Red List criteria

Criterion A Population Size reduction.

Assessment Outcome: Data Deficient.

Justification: There is evidence of clearing for grazing during the 1970s and 1980s around the edges of current *Callistemon purpurascens* habitat. However, it is not known whether *Callistemon purpurascens* occurred in these areas prior to clearing.

Criterion B Geographic range

Assessment Outcome: Critically Endangered B1(a),(b)(iii) and B2 (a),(b)(iii).

Justification:

Callistemon purpurascens has an extent of occurrence of 4km², calculated as a minimal convex polygon containing all known occurrences. The area of occupancy is also estimated to be 4km², based on a single 2 × 2 km grid cell. Both of these estimates are below the thresholds for the Critically Endangered category. At least two of three additional conditions must be met. These conditions are:

- a) The population or habitat is observed or inferred to be severely fragmented or there is only one location.

Assessment Outcome: subcriterion met at critically endangered threshold.

Justification: there is only a single location.

- b) A projected or continuing decline is observed, estimated or inferred in the area, extent and/or quality of habitat, (a) (iii).

Assessment Outcome: subcriterion met.

Justification: A continuing decline is estimated in the quality of habitat due to feral pig activity, livestock grazing, and weed invasion. There is also a risk due to altered hydrology regimes as a result of animal activity. The wetland habitat where *Callistemon purpurascens* occurs is also vulnerable to both drought and flooding events, which are predicted to become more frequent with climate change.

- c) Extreme fluctuations.

Assessment Outcome: subcriterion not met.

Justification: Surveys since 2010 have not shown extreme fluctuations in populations of *Callistemon purpurascens*. However, there is evidence of extreme fluctuations in recruitment, with many juveniles observed in a 2010 survey, and few or no juveniles observed during a subsequent 2013 survey.

Criterion C Small population size and decline

Assessment Outcome: Critically Endangered C2(a)(i).

Justification:

Surveys of *Callistemon purpurascens* habitat and adjacent areas of likely suitable habitat in 2010 and 2013 found approximately 80 mature individuals. This is below the Critically Endangered threshold (<250). In addition to this threshold, one of two additional conditions must be met. These are:

- C1. An observed, estimated or projected continuing decline of at least 10, 20 or 25% in 10, 5 or 3 years or 3, 2 or 1 generations, respectively (up to a max. of 100 years in future).

Assessment Outcome: Data Deficient.

Justification:

Callistemon purpurascens has been known only since 2006, and population surveys were only carried out in 2010 and 2013. Generation time is estimated to be 5-7 years.

- C2. An observed, estimated, projected or inferred continuing decline.

Assessment Outcome: subcriterion met.

Justification: There is a projected decline in the quality of habitat due to feral pigs, livestock grazing, and weed invasion.

In addition, at least 1 of the following 3 conditions:

- a (i). Number of mature individuals in each subpopulation ≤ 50 ; ≤ 250 or ≤ 1000 .

Assessment Outcome: subcriterion met at Critically Endangered threshold.

Justification: the number of mature individuals in subpopulations of *Callistemon purpurascens* is very small, ranging from 1 to 20.

- a (ii). % of mature individuals in one subpopulation = 100%

Assessment Outcome: subcriterion not met.

Justification: mature individuals are relatively evenly divided between subpopulations (~7% to 30% per subpopulation, across approx. 5 subpopulations.)

- b. Extreme fluctuations in the number of mature individuals

Assessment Outcome: subcriterion not met.

Justification: There is also no evidence of extreme fluctuations in the number of individuals.

Criterion D Very small or restricted population.

Assessment Outcome: Endangered D.

Justification:

The mature population size of *Callistemon purpurascens* is estimated to be between 80 and 150 mature individuals. This is below the threshold for Endangered (<250) but above the threshold for Critically Endangered (<50).

Criterion E Quantitative Analysis.

Assessment Outcome: Data Deficient.

Justification: No quantitative analysis has been carried out to assess the probability of extinction in this taxon.

Description

Callistemon purpurascens has been described in the scientific literature as a “shrub to 3– 7 m high (mostly c. 3.5 m), tending to branch above 1.5 m; bark slightly fissured, platy and flaking to peeling (in small sections), subpapery on the largest stems and trunks. Branchlets glabrescent to sericeous. Leaves alternate, 30–70 mm long, 5–8 mm wide, oblanceolate, and thickened at the margin and midrib; both surfaces usually glabrous, but lower surface with occasional silky brown hairs towards the petiole. Leaf base finely tapered, thickened and often twisted. Leaf apex narrowly acute to

narrowly acuminate, with a distinct mucro. Lateral leaf venation clearly pinnate, though generally less apparent than in *C. citrinus* due to the thicker leaves of *C. purpurascens*. Leaf oil glands less dense and less prominent than in *C. citrinus* and *C. megalongensis*, again due to the thickened lamina in *C. purpurascens*. Inflorescence spicate, pseudoterminal, with 20–60 monads, 60–120 mm long, 40–48 mm wide. Hypanthium tuberculate to warty-bullate, downy-hairy, 3.3–4.0 mm deep. Calyx lobes sparsely hairy (not glabrescent as in *C. megalongensis*), scarious with membranous bands; central band 0.1 mm wide. Stamens free, 45–50 per flower. Filaments red-purple (72A RHS Colour Chart, 1966), 17–23 mm long. Anthers dark purple to brown. Style 18–23 mm. Fruit c. 8–10 mm wide, sometimes slightly wrinkled, calyx lobes not retained; globose but may deform to barrel-shaped when crowded. Embryo with obvolute cotyledons.” (Douglas and Wilson, 2015).

Distribution

The species is endemic to NSW. The NSW Scientific Committee (2016) state that “The geographic distribution of *Callistemon purpurascens* is very highly restricted. The extent of occurrence and area of occupancy (AOO) are both estimated to be 4 km². The AOO is based on 2 x 2 km grid cells, the scale recommended for assessing AOO by IUCN (2014).” There is only a single known population, “located in the Megalong Valley in the Sydney Basin Bioregion... on the swampy floodplain and riparian zone of two unnamed tributaries of Megalong Creek below the Blue Mountains Plateau, on privately owned rural land (Douglas and Wilson, 2015). The species is not known to occur in any conservation reserves. There are estimated to be about 150 mature individuals... The number of mature individuals of *C. purpurascens* is very low.” Recruitment is low and highly variable (Douglas and Wilson, 2015).

Ecology

The NSW Scientific Committee (2016) state that “The habitat of *Callistemon purpurascens* consists of swampy, mostly riparian shrubland, swamp woodland and swamp forest with emergent *Melaleuca linariifolia*, *M. styphelioides* and *Eucalyptus camphora*. *Leptospermum* and other *Callistemon* species are often dominant in the midstorey. The ground stratum is variable depending on levels of moisture, light and disturbance (Douglas and Wilson, 2015).” Repeated surveys have found that recruitment is stochastic and limited, and may be highly dependent on weather conditions and other variable conditions such as gap creation and fire (Douglas and Wilson, 2015). According to the scientific committee report, “seeds germinate readily *ex situ* (S. Douglas pers. comm. October 2015)” (NSW Scientific Committee, 2016). Recruitment is low and highly variable (Douglas and Wilson, 2015).

Threats

The NSW Scientific Committee (2016) state that “A number of threats to *Callistemon purpurascens* and its habitat have been identified by Douglas and Wilson (2015). Disturbance of the habitat by feral pigs (*Sus scrofa*) and from livestock grazing has led to pugging and increased erosion of the swampy soils and is facilitating weed invasion. Wallowing by feral pigs is causing habitat degradation and altering the hydrology. The construction of dams on the streams running through the habitat has also affected the hydrology of the swamps, though the effects on *C. purpurascens* are unknown. Changes in hydrology and the resultant potential damage to the swamp ecosystem constitute a significant threat to the long-term viability of *C. purpurascens*. There is a threat of weed invasion by *Rubus anglocandicans* (Blackberry), pasture weeds such as *Axonopus fissifolius* (Carpet Grass) and *Lonicera japonica* (Japanese Honeysuckle), all of which occur in the cleared areas fringing the core habitat of *C. purpurascens*. There is a risk of further clearing of habitat associated with rural-residential land use, livestock grazing and bushfire risk management (S. Douglas *in litt.* January

2013). The effects of extreme rainfall/flood events associated with climate change may lead to the erosion of the swampy floodplain habitat and an increase in prolonged and severe droughts may cause possible loss and degradation of habitat (Douglas and Wilson, 2015)."

Conservation and Management Actions

There is no recovery plan and no SoS program for this species. The following is derived from the threat information. However, see the SoS program for *Callistemon megalongensis* (NSW Environment & Heritage, 2016a, 2016b), a Critically Endangered member of the same genus which co-occurs with *Callistemon purpurascens*.

Habitat loss, disturbance and modification

- Fence core habitat to prevent grazing and pugging by livestock and feral pigs.
- Ensure thorough review of the installation of new dams or removal of existing dams.
- Prevent further clearing of *Callistemon purpurascens* core habitat for grazing or bushfire prevention.
- Monitor water levels in the swamp to understand fluctuations and ensure that there is not a long term trend of increase or decrease.

Invasive species

- *Callistemon purpurascens* core habitat is threatened by *Rubus anglocandicans* (Blackberry), *Axonopus fissifolius* (Carpet Grass) and *Lonicera japonica* (Japanese Honeysuckle). Take steps to remove and control these weeds.
- Install fencing to protect wetland habitat from feral pig activity.
- Control feral pigs where possible.

Ex situ conservation

- Develop a targeted seed collection program for ex situ seed banking.
- Propagate in botanic gardens to ensure the existence of ex situ individuals.

Stakeholder Management

- The majority of *Callistemon purpurascens* habitat occurs on private rural/residential land. A smaller portion of the habitat occurs on a large parcel owned by an Aboriginal Land council. It will be important to liaise with land owners and managers regarding options for conservation management and protection of the species.
- Preventing further clearing of *Callistemon purpurascens* core habitat is of primary importance.
- Arrange for fencing to limit grazing and feral pig activity in the swamp areas where *Callistemon purpurascens* occurs.
- Encourage landholders not to build new dams or demolish existing dams.

Survey and Monitoring priorities

- Monitoring for increased habitat degradation.
- Regular surveys to determine whether there are any changes to population abundance.
- Monitoring to determine whether recruitment is taking place.

Information and Research priorities

- Determine what conditions favour seedling recruitment. Current information suggests wet years may favour recruitment.
- Understand what factors affect seedling survival, which is apparently very low.

- There is mixed evidence as to whether introduced pasture grasses are preventing the germination of *Callistemon purpurascens* seedlings. Understanding whether these grasses are indeed limiting recruitment would aid in conservation planning.

References

- Douglas, S.M., Wilson, P.G., 2015. *Callistemon purpurascens*: a new and threatened species from the Blue Mountains region, New South Wales, Australia. *Telopea* 18, 265–272. doi:10.7751/telopea8562
- NSW Environment & Heritage, 2016a. Megalong Valley Bottlebrush (*Callistemon megalongensis*) Conservation project [WWW Document]. URL <http://www.environment.nsw.gov.au/savingourspeciesapp/Project.aspx?results=c&ProfileID=10517> (accessed 12.19.16).
- NSW Environment & Heritage, 2016b. Help save the Megalong Valley Bottlebrush [WWW Document]. Saving our Species Reports. URL <http://www.environment.nsw.gov.au/savingourspeciesapp/ViewFile.aspx?ReportProjectID=242> (accessed 12.19.16).
- NSW Scientific Committee, 2016. Final Determination to list the shrub *Callistemon purpurascens* S. M. Douglas & S. David as a Critically Endangered Species [WWW Document]. URL <http://www.environment.nsw.gov.au/resources/threatenedspecies/determinations/FDCallispurpCR.pdf> (accessed 12.19.16).

NSW SCIENTIFIC COMMITTEE

Final Determination

The Scientific Committee, established by the *Threatened Species Conservation Act 1995* (the Act), has made a Final Determination to list the shrub *Callistemon purpurascens* S.M.Douglas & S.David as a **CRITICALLY ENDANGERED SPECIES** in Part 1 of Schedule 1A of the Act. Listing of Critically Endangered species is provided for by Part 2 of the Act.

The Scientific Committee has found that:

1. *Callistemon purpurascens* S.M.Douglas & S.David (family Myrtaceae) is described as a “shrub to 3–7 m high (mostly c. 3.5 m), tending to branch above 1.5 m; bark slightly fissured, platy and flaking to peeling (in small sections), subpapery on the largest stems and trunks. Branchlets glabrescent to sericeous. Leaves alternate, 30–70 mm long, 5–8 mm wide, oblanceolate, and thickened at the margin and midrib; both surfaces usually glabrous, but lower surface with occasional silky brown hairs towards the petiole. Leaf base finely tapered, thickened and often twisted. Leaf apex narrowly acute to narrowly acuminate, with a distinct mucro. Lateral leaf venation clearly pinnate, though generally less apparent than in *C. citrinus* due to the thicker leaves of *C. purpurascens*. Leaf oil glands less dense and less prominent than in *C. citrinus* and *C. megalongensis*, again due to the thickened lamina in *C. purpurascens*. Inflorescence spicate, pseudoterminal, with 20–60 monads, 60–120 mm long, 40–48 mm wide. Hypanthium tuberculate to warty-bullate, downy-hairy, 3.3–4.0 mm deep. Calyx lobes sparsely hairy (not glabrescent as in *C. megalongensis*), scarious with membranous bands; central band 0.1 mm wide. Stamens free, 45–50 per flower. Filaments red-purple (72A RHS Colour Chart, 1966), 17–23 mm long. Anthers dark purple to brown. Style 18–23 mm. Fruit c. 8–10 mm wide, sometimes slightly wrinkled, calyx lobes not retained; globose but may deform to barrel-shaped when crowded. Embryo with obvolvate cotyledons” (Douglas and Wilson 2015).
2. *Callistemon purpurascens* was first collected in 2006 and is restricted to the Megalong Valley in the Blue Mountains, central New South Wales (NSW) (Douglas and Wilson 2015). *Callistemon purpurascens* grows near *C. megalongensis* and *C. citrinus* but there is no evidence of intergradation between these species (Douglas and Wilson 2015). Differences among the three species have been tabulated in Douglas and Wilson (2015).
3. The only known population of *Callistemon purpurascens* is located in the Megalong Valley in the Sydney Basin Bioregion. *Callistemon purpurascens* is known to occur on the swampy floodplain and riparian zone of two unnamed tributaries of Megalong Creek below the Blue Mountains Plateau, on privately owned rural land (Douglas and Wilson 2015). The species is not known to occur in any conservation reserves. There are estimated to be about 150 mature individuals. No juveniles have been observed in the wild, though seeds germinate readily *ex situ* (S. Douglas pers. comm. October 2015). The number of mature individuals of *C. purpurascens* is very low.
4. The habitat of *Callistemon purpurascens* consists of swampy, mostly riparian shrubland, swamp woodland and swamp forest with emergent *Melaleuca linariifolia*, *M. styphelioides* and *Eucalyptus camphora*. *Leptospermum* and other *Callistemon* species are often dominant in the midstorey. The ground stratum is variable depending on levels of moisture, light and disturbance (Douglas and Wilson 2015).
5. The geographic distribution of *Callistemon purpurascens* is very highly restricted. The extent of occurrence and area of occupancy (AOO) are both estimated to be 4 km². The AOO is based on 2 x 2 km grid cells, the scale recommended for assessing AOO by IUCN (2014).

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6. A number of threats to *Callistemon purpurascens* and its habitat have been identified by Douglas and Wilson (2015). Disturbance of the habitat by feral pigs (*Sus scrofa*) and from livestock grazing has led to pugging and increased erosion of the swampy soils and is facilitating weed invasion. Wallowing by feral pigs is causing habitat degradation and altering the hydrology. The construction of dams on the streams running through the habitat has also affected the hydrology of the swamps, though the effects on *C. purpurascens* are unknown. Changes in hydrology and the resultant potential damage to the swamp ecosystem constitute a significant threat to the long-term viability of *C. purpurascens*. There is a threat of weed invasion by *Rubus anglocandicans* (Blackberry), pasture weeds such as *Axonopus fissifolius* (Carpet Grass) and *Lonicera japonica* (Japanese Honeysuckle), all of which occur in the cleared areas fringing the core habitat of *C. purpurascens*. There is a risk of further clearing of habitat associated with rural-residential land use, livestock grazing and bushfire risk management (S. Douglas *in litt.* January 2013). The effects of extreme rainfall/flood events associated with climate change may lead to the erosion of the swampy floodplain habitat and an increase in prolonged and severe droughts may cause possible loss and degradation of habitat (Douglas and Wilson 2015). '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', 'Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants' and 'Clearing of Native Vegetation' are listed as Key Threatening Processes under the Act.
7. *Callistemon purpurascens* S.M.Douglas & S.David is eligible to be listed as a Critically Endangered species as, in the opinion of the Scientific Committee, it is facing an extremely high risk of extinction in New South Wales in the immediate future as determined in accordance with the following criteria as prescribed by the *Threatened Species Conservation Regulation 2010*:

Clause 7 Restricted geographic distribution and other conditions

The geographic distribution of the species is estimated or inferred to be:

- (a) very highly restricted,

and:

- (d) a projected or continuing decline is observed, estimated or inferred in the key indicator:
 - (b) the geographic distribution, habitat quality or diversity, or genetic diversity of the species.

Clause 8 Low numbers of mature individuals of species and other conditions

The estimated total number of mature individuals of the species is:

- (a) very low,

and:

- (d) a projected or continuing decline is observed, estimated or inferred in the key indicator:
 - (b) the geographic distribution, habitat quality or diversity, or genetic diversity of the species.

Dr Mark Eldridge
Chairperson
NSW Scientific Committee

Exhibition period: 16/12/16 – 10/02/17

Proposed Gazettal date: 16/12/16

NSW SCIENTIFIC COMMITTEE

References:

Douglas SM, Wilson PG (2015) *Callistemon purpurascens* (Myrtaceae): a new and threatened species from the Blue Mountains region of New South Wales, Australia. *Telopea* **18**, 265–272.

IUCN Standards and Petitions Subcommittee (2014) Guidelines for Using the IUCN Red List Categories and Criteria. Version 11. Prepared by the Standards and Petitions Subcommittee.
<http://www.iucnredlist.org/documents/RedListGuidelines.pdf>.