Conservation Advice for *Pomaderris sericea* (Bent Pomaderris)

In effect under the *Environment Protection and Biodiversity Conservation Act 1999* from 23 November 2021.

This document provides a foundation for conservation action and further planning.

Conservation status

Pomaderris sericea (Bent Pomaderris) is listed in the Vulnerable category of the threatened species list under the *Environment Protection and Biodiversity Conservation Act 1999* (Cwth) (EPBC Act) effective from 16 July 2000. The species is eligible for listing because prior to the EPBC Act, it was listed as Vulnerable under the Endangered Species Protection Act 1992 (Cwlth).

The main factors that make the species eligible for listing in the Vulnerable category are its very restricted distribution, small population size, the small size of every subpopulation, and the decline in quality of habitat.

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 the Species Profile and Threat Database.

Species information

Taxonomy

Conventionally accepted as *Pomaderris sericea* N.A.Wakef. (Wakefield 1951).

Description

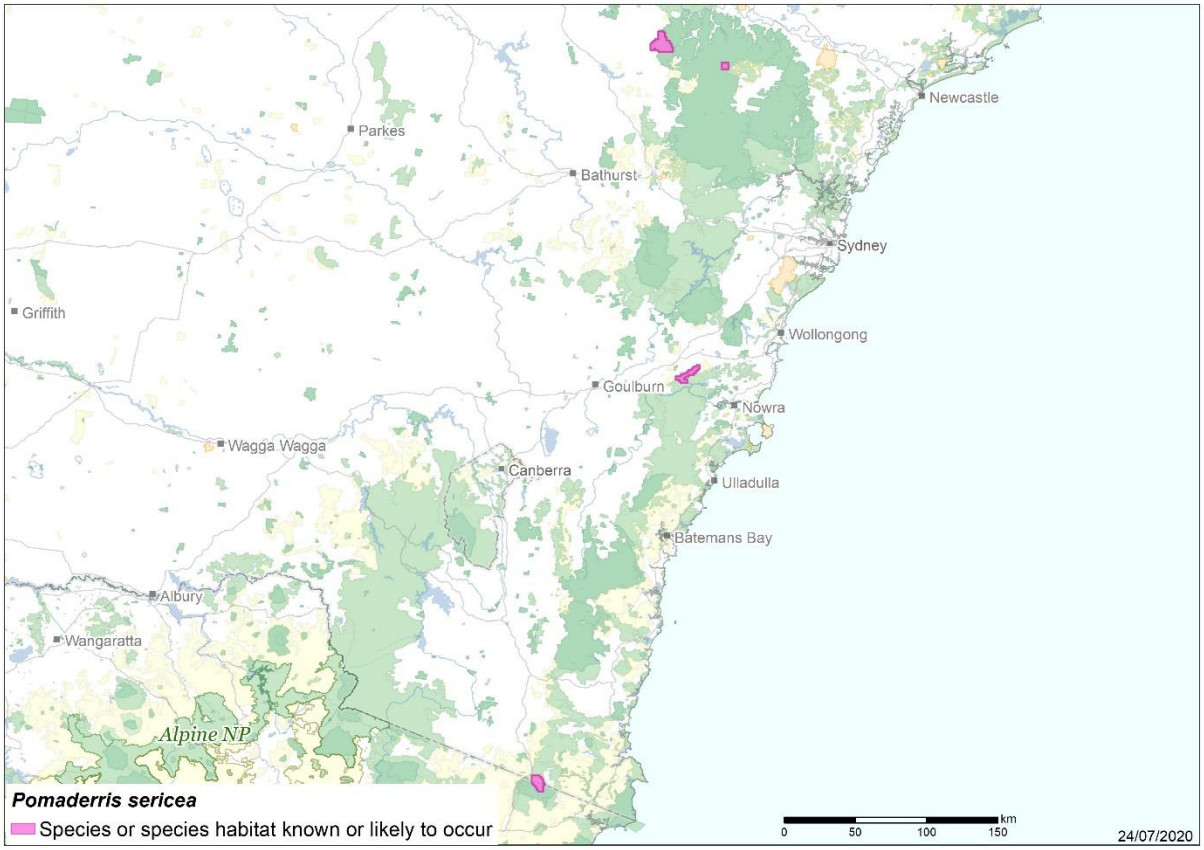
The Bent Pomaderris (*Pomaderris sericea*) is a deciduous shrub growing to about 2 m in height, with branchlets covered by golden hairs that mask the star-shaped hairs on the underside of the leaves. Leaves are alternate, narrow and ovate, 6–30 mm long and 5–10 mm wide, the length not more than 3.5 times the width. Leaves have recurved margins and a hairless upper surface. The small yellow flowers are covered in long, soft, shaggy, grey to golden hairs overlying star-shaped hairs, and form dense pyramid-shaped inflorescences 1–3 cm across. Flowers lack petals but have a floral tube about 1 mm long, and sepals about 2 mm long. The ovary is sparsely hairy (description from Walsh 1999).

Distribution

Only three subpopulations of Bent Pomaderris are known, although the species has not been seen at any of these since 1997 and it is not known if it is still extant at these localities (ALA 2020). Bent Pomaderris was considered by Silcock et al. (2020) as possibly extinct. Records occur in the following localities:

- Coopracambra National Park, Victoria. Fewer than 20 plants. Last observed in 1987 (Carter & Walsh 2010).
- Morton National Park, New South Wales. Population size unknown. Last observed in 1987 (ALA 2020).
- Wollemi National Park, New South Wales. Population size unknown. Last observed in 1997 (ALA 2020).

Map 1 Modelled distribution of Bent Pomaderris



Source: Species distribution data Species of National Environmental Significance database, base map Geoscience Australia.
Caveat: The information presented in this map has been provided by a range of groups and agencies. While every effort has been made to ensure accuracy and completeness, no guarantee is given, nor responsibility taken by the Commonwealth for errors or omissions, and the Commonwealth does not accept responsibility in respect of any information or advice given in relation to, or as a consequence of, anything containing herein.
Species distribution mapping: The species distribution mapping categories are indicative only and aim to capture (a) the specific habitat type or geographic feature that represents to recent observed locations of the species (known to occur) or preferred habitat occurring in close proximity to these locations (likely to occur); and (b) the broad environmental envelope or geographic region that encompasses all areas that could provide habitat for the species (may occur). These presence categories are created using an extensive database of species observations records, national and regional-scale environmental data, environmental modelling techniques and documented scientific research.

Cultural and community significance

The cultural significance of Bent Pomaderris is not well understood, although riparian areas, in which the habitat can occur, have a long and profound history of occupation and management by Indigenous people.

Relevant biology and ecology

The biology and ecology of the Bent Pomaderris are not well understood. Further studies are required to understand its ecological requirements, reproductive strategies, soil seedbank dynamics, longevity, fecundity, recruitment levels, and seed germination requirements. However, the available information on the habitat and reproductive biology of Bent Pomaderris is presented below.

Habitat Ecology

The Victorian population of Bent Pomaderris grows in crevices between sandstone slabs within the flood zone of the upper Genoa River. Vegetation is riparian scrub and associated species include *Calytrix tetragona* (Common Fringe-myrtle), *Grevillea patulifolia* (Swamp Grevillea), *Pomaderris angustifolia* (Narrow-leaved Pomaderris) and *Pomaderris prunifolia* (Plum-leaf Pomaderris). The population at Morton National Park in New South Wales occurs in disturbed tall open forest of *Ceratoptalum apetalum* (Coachwood), *Eleocarpus* species (Oliveberry) and *Eucalyptus dunnii* (Dunn's White-gum). Plants occur near the base of a slope beneath a sandstone cliff at about 200 m above sea level. The population at Wollemi National Park (NSW) occurs in dry sheltered forest with *Eucalyptus punctata* (Grey Gum), *Eucalyptus sparsifolia* (Narrow-leaved Stringybark), *Acacia buxifolia* (Box-leaf Wattle), *Acacia doratoxylon* (Currawang), *Dodonaea boroniifolia* (Fern-leaf Hop-bush), *Entolasia stricta* (Wiry Panic Grass), *Grevillea mucronulata* (Green Grevillea), *Isopogon dawsonii* (Nepean Cone-bush), *Lepidosperma laterale* (Variable Swordsedge), *Phyllanthus hirtellus* (Thyme Spurge), *Poa affinis* (Tussock Grass) *and Styphelia triflora* (Pink Five-corners) (ALA 2020). Soils are derived from Narrabeen Sandstones (Carter & Walsh 2010).

Reproductive Ecology

Bent Pomaderris flowers in October and surveys should be undertaken during its flowering period as accurate identification requires flowering material (VicFlora 2020). Time to reproductive maturity for other Pomaderris is estimated at 4–6 years (Maryott-Brown & Wilks 1993) and generation length of Bent Pomaderris is estimated at 8–20 years (DELWP 2020). Lifespan of some *Pomaderris* species is at least 25 years (LeBreton et al. 2019). The pollinators of Bent Pomaderris are unknown, although insects may be the primary pollinators of Pomaderris generally (Patykowski et al. 2014). Seed dispersal may be undertaken by ants across short distances (Patykowski et al. 2014).

Population Genetics

Chen et al. (2019) studied ploidy levels of several rare Pomaderris species, finding that many were polyploid and capable of apomixis (producing seed without fertilisation). This suggests any surviving Bent Pomaderris subpopulations may have very low genetic diversity, but may still be capable of recruitment from seed and able to persist with low numbers (van Dijk 2003).

Fire Ecology

The sensitivity of Bent Pomaderris to fire is unknown. Most other Pomaderris species do not resprout after fire (Maryott-Brown & Wilks 1993), athough some resprouting was observed in the related *P. adnata* (Sublime Point Pomaderris) (Natale 2016). The moist and physically protected habitat (i.e. escarpments, riverbanks) in which Bent Pomaderris has been recorded

may be sensitive to fire and fires probably naturally occur at infrequent intervals (DPIE 2020). The fragmented distribution across large tracts of otherwise apparently suitable habitat suggest that Bent Pomaderris may have been fragmented by large catastrophic fires in the past (DPIE 2020). Some Pomaderris species take an estimated 4–6 years to reach maturity and produce seed (Maryott-Brown & Wilks 1993) and so the occurrence of fires at a higher frequency than once every 10 years may be detrimental to any extant subpopulations. Many Pomaderris are reliant on fire to promote germination of soil-stored seed (e.g. Patykowski et al. 2016). Pomaderris seed at appromximately 100°C (Ooi et al. 2014; Patykowski et al. 2016; Le Breton et al. 2019), suggesting that very cool burns may not stimulate germination of soil-stored seed.

Habitat critical to the survival

New data suggests that since this species was last assessed, it is likely to be eligible for listing as Critically Endangered when reassessed. Due to the species eligibility for listing (highly restricted range and small population size), all habitat is considered critical to the survival of the species.

No Critical Habitat as defined under section 207A of the EPBC Act has been identified or included in the Register of Critical Habitat.

Important populations

In this section, the word population is used to refer to subpopulation, in keeping with the terminology used in the EPBC Act and state/territory environmental legislation.

New data suggests that since this species was last assessed, it is likely to be eligible for listing as Critically Endangered when reassessed. There is sufficient evidence through the species eligibility for listing, to declare all populations/the national population of this species as important populations under particular pressure of survival and which therefore require protection to support the recovery of the species.

Threats

With so little known about the species, the precise threats to Bent Pomaderris and their impacts on the species are also poorly known. However, threats known to affect other Pomaderris species that are operating in the areas where Bent Pomaderris has been recorded include high frequency fires, fire-drought interactions, browsing by feral herbivores and genetic threats associated with small populations.

Table 1 Likely threats impacting any extant subpopulations of Bent Pomaderris

Threat	Status and severity [a]	Evidence
Climate change		
Increased frequency and severity of bushfires	• Timing: current • Confidence: inferred • Consequence: major • Trend: increasing • Extent: across the entire range	Climate projections for south-eastern Australia include reduced rainfall, increased average temperatures, and more frequent bushfires (CSIRO & Bureau of Meteorology 2015). Analysis by the Wildlife and Threatened Species Bushfire Recovery Expert Panel, based on intersecting the modelled distribution of the Bent Pomaderris and the National Indicative Aggregated Fire Extent

		Dataset, indicates that approximately 77 % of the range of the species was within the extent of the 2019-20 bushfires (Gallagher 2020). The sensitivity of Bent Pomaderris to fire is unknown. Adults are probably killed by fire, with post-fire recruitment from seed the likely fire response in most *Pomaderris* species (LeBreton et al. 2019). Like the related *Pomaderris cotoneaster* (Cotoneaster Pomaderris), the species has a fragmented distribution across large tracts of otherwise apparently suitable habitat suggest that Bent Pomaderris may have been fragmented by frequent fires in the past (LeBreton et al. 2019; DPIE 2020). The moist habitat in which Bent Pomaderris grows suggests fires are infrequent in its habitat (LeBreton et al. 2019; DPIE 2020). Other Pomaderris species need an estimated 2–6 years to reach maturity and produce seed (Maryott-Brown & Wilks 1993; Patykowski et al. 2014). Frequent fires that occur before plants have reached reproductive maturity are likely to be detrimental to Bent Pomaderris by exhausting soil-stored seed reserves (Natale 2016).
Increased frequency and intensity of drought	• Timing: current • Confidence: suspected • Consequence: moderate • Trend: increasing • Extent: across the entire range	Climate projections for south-eastern Australia include reduced rainfall, increased average temperatures, and more frequent droughts (CSIRO & Bureau of Meteorology 2015). Given its apparent preference for damp locations such as river banks, climate change may pose a substantial threat to Bent Pomaderris, through increased drying of sites. Drought has been observed to impact the related Cotoneaster Pomaderris (Carr 1999). Furthermore, fire-drought interactions may affect Bent Pomaderris, as obligate seeders respond to fire for recruitment, yet seedlings have rudimentary root systems vulnerable to desiccation if post- fire drought occurs (Burgman and Lamont 1992)
Invasive species		

Feral herbivores	• Timing: current • Confidence: suspected • Consequence: moderate • Trend: unknown • Extent: unknown	Browsing by deer is a threat to other Pomaderris species occupying a similar range to Bent Pomaderris as it can kill adult plants and germinating seedlings (DELWP 2020; DPIE 2020). It is likely that browsing by deer is also a threat to the Bent Pomaderris.
Genetic threats resulting from small and fragmented populations		
Small population size	• Timing: historical/current • Confidence: suspected • Consequence: moderate • Trend: unknown • Extent: across entire range	There are currently no known individuals of Bent Pomaderris. If the species is still extant, it is likely that surviving populations are small and few in number, causing the species to have avoided detection. Many small, isolated populations are subject to the effects of low genetic diversity (Frankham et al. 2014). If extant, it is likely that this threat is impacting the Bent Pomaderris, although the species may have some resilience to genetic threats if it is able to reproduce apomictically like some other Pomaderris species (Chen 2019).

Status—identify the temporal nature of the threat;
Confidence—identify the extent to which we have confidence about the impact of the threat on the species;
Consequence—identify the severity of the threat;
Trend—identify the extent to which it will continue to operate on the species;
Extent—identify its spatial content in terms of the range of the species.

Each threat has been described in Table 1 in terms of the extent that it is operating on the species. The risk matrix (Table 2) provides a visual depiction of the level of risk being imposed by a threat and supports the prioritisation of subsequent management and conservation actions. In preparing a risk matrix, several factors have been taken into consideration, they are: the life stage they affect; the duration of the impact; and the efficacy of current management regimes, assuming that management will continue to be applied appropriately. The risk matrix and ranking of threats has been developed in consultation with experts and using available literature.

Table 2 Bent Pomaderris risk matrix

Likelihood	**Consequences**				
	Not significant	**Minor**	**Moderate**	**Major**	**Catastrophic**
Almost certain	Low risk	Moderate risk	Very high risk	Very high risk	Very high risk
Likely	Low risk	Moderate risk	High risk **Increased intensity and frequency of drought** **Feral herbivores**	Very high risk **Increased severity and frequency of bushfire**	Very high risk

Likelihood	Consequences				
	Not significant	Minor	Moderate	Major	Catastrophic
			Small population size		
Possible	Low risk	Moderate risk	High risk	Very high risk	Very high risk
Unlikely	Low risk	Low risk	Moderate risk	High risk	Very high risk
Unknown	Low risk	Low risk	Moderate risk	High risk	Very high risk

Priority actions have then been developed to manage the threat particularly where the risk was deemed to be 'very high' or 'high'. For those threats with an unknown or low risk outcome it may be more appropriate to identify further research or continue monitoring.

Conservation and recovery actions

Primary conservation objective

Rediscovery of the species by 2030, followed by an increase in the number of subpopulations and population size, with viable populations sustained in habitats where high threat risks are managed effectively.

Conservation and management priorities

Climate change and fire

- Survey historic populations burnt in the 2019–20 bushfires as post-fire recruitment from soil-stored seed may enable the species to be found.
- Develop and implement a fire management strategy that optimises the survival of the Bent Pomaderris at its historic locations.
  - Avoid planned burns in all recently burnt historic locations.
  - Protect unburnt historic locations (i.e. no planned burns or other disturbance).
  - Take the likelihood of increasingly frequent bushfires into account when developing planned burning programs, to avoid excessively frequent burning of any historic locations.
- Identify current and future habitat likely to remain or become available due to climate change.

Invasive species

- Reduce the impacts of habitat destruction and browsing by feral herbivores by using herbivore control, particularly during the post-fire recovery phase for historic subpopulations burnt in the 2019–20 bushfires.
- If a subpopulation is rediscovered, consider fencing to protect plants from grazing impacts where appropriate. Any fenced subpopulations should be monitored to ensure that the fence itself does not pose a threat to the species by facilitating a build-up of biomass.

Genetic threats resulting from small and fragmented populations

- If extant populations of Bent Pomaderris are found, immediately collect cuttings and seed for ex situ propagation and storage.

- If reproductive material is available, instigate an ex situ propagation program and undertake conservation translocations to create new wild subpopulations, in accordance with the *Guidelines for the Translocation of Threatened Plants in Australia* (Commander et al. 2018).

Stakeholder engagement/community engagement

- Engage and involve Traditional Owners in conservation actions, including survey, monitoring and management actions.
- Encourage ongoing and effective coordination of action to support conservation of Bent Pomaderris, including eradication programs for invasive species, monitoring and appropriate use of fire in the areas impacted by the 2019–20 bushfires.
- If appropriate, engage interested nature conservation groups in participating in surveys for the species in areas of suitable habitat.

Survey and monitoring priorities

- Conduct targeted surveys of all historic records of Bent Pomaderris to determine its persistence at those locations.
- If the species is found, establish and maintain a monitoring program to:
    - document post-fire recovery;
    - determine minimum tolerable fire intervals;
    - determine trends in population size and distribution;
    - determine threats and their impacts; and,
    - monitor the progress of recovery, including the effectiveness of management actions and the need to adapt them if necessary.

Information and research priorities

- Improve understanding of whether Bent Pomaderris is extant by undertaking surveys in areas most likely to support extant subpopulations.
- Improve understanding of the factors behind success or failure of conservation translocations, if undertaken.

Links to relevant implementation documents

National Recovery Plan for the Bent Pomaderris Pomaderris sericea (2010).

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