

Conservation Assessment of *Prostanthera gilesii* Althofer ex B.J.Conn & T.C.Wilson (family Lamiaceae)
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***Prostanthera gilesii* Althofer ex B.J.Conn & T.C.Wilson (family Lamiaceae)**

Distribution: Endemic to NSW

Current EPBC Act Status: not listed

Current NSW BC Act Status: Critically Endangered

Proposed listing on EPBC Act: List as Critically Endangered.

Conservation Advice: *Prostanthera gilesii*

Summary of Conservation Assessment

Prostanthera gilesii was found to be eligible for listing as Critically Endangered under Criterion B1ab(iii,v)+2ab(iii,v) and C2a(ii).

The main reasons for this species being eligible are: i) the species has a very highly restricted geographic distribution; ii) there are less than 250 known mature plants; iii) ongoing decline is evident particularly due to weeds and fire, with most plants at one previously known site not recovering from a 2018 wildfire; and iv) the species is only known from one location.

Description and Taxonomy

Prostanthera gilesii is described as a “small, compact, spreading shrub, up to 1 m high, with the populations formed by a tangle of individual plants. Branchlets ± terete, moderately hairy on distal internodes and nodes with antrorse hairs, becoming sparsely hairy, glands indistinct. Leaves dark green, glossy, paler below, aromatic; petiole 1–2 mm long; lamina narrowly ovate to elliptic, 15–26 mm long, 5–10 mm wide, a few hairs on midrib, otherwise glabrous, margin entire; apex obtuse; venation indistinct, midrib slightly raised on abaxial surface. Inflorescence in groups of 3–4, sometimes 6 flowers; calyx green; outer surface glabrous, moderately glandular; inner surface of tube glabrous, lobes densely hairy near margin and apex; corolla 12–15 mm long, white to yellowish white, with purple to dark mauve markings on the inner surface of the tube and base of adaxial median lobe-pair, with pale orange marking on base of abaxial median lobe; hairs crinkled. Fruiting calyx not or only slightly enlarged (only immature fruits seen). Mature mericarps and seeds not seen” (PlantNET 2019).

Prostanthera gilesii Althofer ex B.J.Conn & T.C.Wilson is the currently accepted name for the taxon (APC 2019). It has previously been referred to as *Prostanthera* sp. C (APC 2019).

Distribution and Abundance

“*Prostanthera gilesii* is endemic to New South Wales (NSW) and is currently only known from Mount Canobolas, approximately 13 km west south west of Orange in central western NSW (Conn and Wilson 2015).” (NSW Threatened Species Scientific Committee 2017). Within the Mount Canobolas State Conservation Area, the species is known from two sites (Conn and Wilson 2015). Both sites were burnt in a wildfire in

February 2018 and there has been recovery of most individuals at the larger site post-fire, but very limited recovery at the smaller site.

“The largest population of *Prostanthera gilesii* occurs along a creek-line in wet sclerophyll forest dominated by tall *Eucalyptus dalrympleana* subsp. *dalrympleana*, with scattered *E. canobolensis* and *E. dives*. The understory consists predominantly of *Mirbelia oxylobioides*, *Cassinia longifolia*, *Pteridium esculentum*, *Polyscias sambucifolia* and thickets of exotic Blackberry (*Rubus fruticosus* sp. agg.). The soil is a deep basaltic clay-loam (krasnozem) with alluvial deposits on the lower slopes. The second, smaller population of *Prostanthera gilesii* occurs in a steep rock crevice of a trachyte rocky outcrop. The crevice is fed by seepage and the soil is likely to be formed from rock scree and detritus. The surrounding vegetation is heath with the occasional small tree of *Exocarpos cupressiformis* (native cherry) and *Eucalyptus canobolensis*. The heath is dominated by *Pteridium esculentum*, *Mirbelia oxylobioides*, *Phebalium* sp., *Calytrix tetragona* and *Kunzea parvifolia*.” (NSW Threatened Species Scientific Committee 2017).

The geographic distribution of *Prostanthera gilesii* is very highly restricted. The area of occupancy (AOO) was estimated to be 4 km², based on the species occupying a single 2 x 2 km grid cell, the spatial scale of assessment recommended by IUCN (2019). The extent of occurrence (EOO) was also 4 km². 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, being less than AOO. This is to ensure consistency with the definition of AOO as an area within EOO, following IUCN Guidelines (2019).

There are currently estimated to be 136 individuals based on counting resprouting plants following a fire in February 2018 (H. Zimmer pers. comm. April 2019). Only one plant has been observed resprouting at the rocky outcrop site after the 2018 fire (previously approximately 10 plants were known at the site). It can be difficult to identify separate plants due to their tangled growth habit, however following fire individuals are more easily distinguished as they resprout. There is only 1 location (as per IUCN 2019) for *Prostanthera gilesii*, based on threats of fire, weeds (mainly Blackberry (*Rubus fruticosus* sp. agg.)) and pathogens (*Phytophthora* sp.).

Ecology

Little is known about the ecology of *Prostanthera gilesii*. Mature plants characteristically form a tangled divaricate mass, making it difficult to estimate the numbers of individuals (NSW Threatened Species Scientific Committee 2017). *P. gilesii* readily roots from layered stems and may be clonal, suggesting that genetic diversity within the species may be low. Notes associated with past collections (AVH 2016) indicate *P. gilesii* may not readily set seed, and Conn and Wilson (2015) did not describe the mature mericarps or seed as none were seen on the specimens examined (NSW Threatened Species Scientific Committee 2017). Seedlings have, however, been seen at one site after the recent fire.

Both known sites were burnt in a fire in February 2018. The smaller group of individuals in a steep rock crevice has only recently been relocated despite extensive searching. At this site only one resprouting individual has been found to date (H. Zimmer pers comm. November 2019). At the larger site, some plants were killed in the fire although

most individuals resprouted after the fire (H. Zimmer pers comm. March 2019). There has also been some seedling recruitment, but ongoing mortality of the seedlings makes it uncertain if any will successfully establish or persist to adulthood.

A recent analysis of the genetics of *Prostanthera gilesii*, *P. phyllicifolia*, *P. monticola* and *P. sp. nov.* suggests that *P. gilesii* is a distinct species and that genetic variation exists between the two known sites of the species (H. Zimmer pers comm. Aug 2019).

Threats

There are several threats currently affecting *Prostanthera gilesii*. These include an adverse fire regime, competition from weeds, disturbance from feral pigs (*Sus scrofa*), human visitation and soil pathogens (NSW Threatened Species Scientific Committee 2017).

Recent survey work has indicated that a fire in 2018 has severely reduced the smaller site of *Prostanthera gilesii*, with only one resprouting plant relocated (H. Zimmer pers comm. November 2019). Resprouting of most plants has occurred in the larger site (H. Zimmer pers comm. March 2019). Both sites had not been burnt since the last major fire in the Mt Canobolas SCA in 1982 (DPIE SEED fire history records). The species is threatened by adverse fire as indicated by the significant reduction in plants at one site after a single fire. Further research is needed on the impact of fire on the survival of plants, promotion of seed germination from the soil seed bank and interactions with drought, weeds and grazing.

Blackberry (*Rubus fruticosus* sp. agg.) has increased in abundance since the 2018 fire at the larger site and is a major threat. Other exotic plants also present on Mt Canobolas include English Ivy (*Hedera helix*), Elderberry (*Sambucus nigra*), Radiata Pine (*Pinus radiata*) and English Holly (*Ilex aquifolium*) (NSW Threatened Species Scientific Committee 2017).

“The pathogenic soil fungus *Phytophthora* was detected in the population following observations of dieback in several *Prostanthera gilesii* plants. Whilst it was not the highly pathogenic species *Phytophthora cinnamomi*, most *Phytophthora* species are potentially pathogenic given the right environment and host (Botanic Gardens Trust *in litt.* August 2015). Human visitation to both sites may lead to the spread of *Phytophthora* sp., trampling of the plants and the introduction of weeds. In addition, unauthorised collection of plant material has occurred (name withheld *in litt.* January 2016).” (NSW Threatened Species Scientific Committee 2017).

“Damage caused by feral pigs is evident in the nearby riparian zone of the creek-line site (name withheld *in litt.* January 2016). Feral pigs cause substantial soil disturbance, introduce weeds and spread soil borne diseases.” (NSW Threatened Species Scientific Committee 2017).

Assessment against IUCN Red List criteria

For this assessment it is considered that the survey of *Prostanthera gilesii* has been adequate and there is sufficient scientific evidence to support the listing outcome.

Criterion A Population Size reduction

Assessment Outcome: Data Deficient

Justification: There are insufficient data to estimate if there is a reduction in the population size of *Prostanthera gilesii* over three generations. There is evidence of the loss of most of the individuals at one site after the 2018 fire, but little mortality at the largest known site.

Criterion B Geographic range

Assessment Outcome: Critically Endangered under Criterion B1ab(iii, v)+2ab(iii, v)

Justification: *Prostanthera gilesii* has a very highly restricted geographic distribution. The area of occupancy (AOO) was estimated to be 4 km², based on the species occupying a single 2 x 2 km grid cell, the spatial scale of assessment recommended by IUCN (2019). The extent of occurrence (EOO) was also 4 km². 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, being less than AOO. This is to ensure consistency with the definition of AOO as an area within EOO, following IUCN Guidelines (2019). Both EOO and AOO meet the threshold for Critically Endangered (<100 km² and 10 km² respectively).

In addition to these thresholds, at least two of three other conditions must be met. These conditions are:

- a) The population or habitat is observed or inferred to be severely fragmented or there is 1 (CR), ≤5 (EN) or ≤10 (VU) locations.

Assessment Outcome: Sub criterion met for Critically Endangered.

Justification: *Prostanthera gilesii* is known from a single location based on threats of fire, weeds (mainly Blackberry (*Rubus fruticosus* sp. agg.)) and pathogens (*Phytophthora* sp.).

- b) Continuing decline observed, estimated, inferred or projected in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) area, extent and/or quality of habitat; (iv) number of locations or subpopulations; (v) number of mature individuals

Assessment Outcome: Subcriterion met for iii) and v).

Justification: Continuing decline is inferred in the quality of habitat and number of mature individuals due to weed invasion, disturbance from feral pigs, and the presence of *Phytophthora* sp. One site suffered a major decline in plant numbers after a fire in 2018.

- c) Extreme fluctuations.

Assessment Outcome: Sub criterion not met

Justification: There is no evidence to suggest the species is experiencing extreme fluctuations at present. The species has been observed to resprout after a fire.

Criterion C Small population size and decline

Assessment Outcome: Critically Endangered under Criterion C2a(ii).

Justification: There are currently (2019) estimated to be 136 individuals of *Prostanthera gilesii* and this meets the threshold for Critically Endangered (<250).

At least one of two additional conditions must be met. These are:

- C1. An observed, estimated or projected continuing decline of at least: 25% in 3 years or 1 generation (whichever is longer) (CE); 20% in 5 years or 2 generations (whichever is longer) (EN); or 10% in 10 years or 3 generations (whichever is longer) (VU).

Assessment Outcome: Data Deficient.

Justification: A continuing decline is inferred due to weed invasion, disturbance from feral pigs, the presence of *Phytophthora* sp. and adverse impacts of severe fire on plant survival. All these threats may limit recruitment and impact on mature plants. Whilst most plants at the larger site resprouted following the fire, some plants did not and may now be dead. Only one of approximately 10 plants at the smaller site recovered from the fire. Whilst decline is inferred there are currently insufficient data to quantify a reduction in the population size of *Prostanthera gilesii*.

- C2. An observed, estimated, projected or inferred continuing decline in number of mature individuals.

Assessment Outcome: Sub criterion met.

Justification: A continuing decline is inferred due to weed invasion, disturbance from feral pigs, the presence of *Phytophthora* sp. and adverse impacts of severe fires on plant survival. All these threats may limit recruitment and impact on mature plants. Whilst most plants at the larger site resprouted following the fire, some plants did not and may now be dead. Only one of approximately 10 plants at the smaller site recovered from a fire in 2018.

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

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

Assessment Outcome: Sub criterion met for Endangered.

Justification: The largest subpopulation consists of some 135 mature individuals.

- a (ii). % of mature individuals in one subpopulation is 90-100% (CR); 95-100% (EN) or 100% (VU)

Assessment Outcome: Sub criterion met for Critically Endangered .

Justification: Only one plant has been found at the smaller of the two subpopulations. There are 135 at the larger subpopulation.

b. Extreme fluctuations in the number of mature individuals

Assessment Outcome: Data Deficient

Justification: There is no evidence to suggest the species is experiencing extreme fluctuations at present. The species has been observed to resprout after a fire.

Criterion D Very small or restricted population

Assessment Outcome: Endangered under Criterion D

Justification: Current (2019) estimates are that there are some 136 mature individuals.

Criterion E Quantitative Analysis

Assessment Outcome: Data Deficient

Justification: There are insufficient data to quantify the extinction risk for this species.

Conservation and Management Actions

There is a draft NSW Saving our Species (SoS) program for this species. The following is derived from the NSW SoS program and threat information.

Habitat loss, disturbance and modification

- Prevent habitat disturbance and adverse impacts from visitors to the main site.
- Until research resolves the survival and recruitment response of this species to fire, its populations should be protected from future fires. Out-of-season fires (i.e. during mid autumn - spring) should be avoided.
- Avoid use of any fire suppression actions in known sites (i.e. exclude vehicles, machinery, use of fire retardant).

Invasive species

- Identify and remove weed species while minimising impact on *P. gilesii*.
- Reduce feral pig density in the area immediately surrounding the remaining population of *P. gilesii*.
- Resprouts and seedlings from the 2018 fire should be protected from post-fire grazing (e.g. through feral herbivore control measures) and weed impacts.

Ex situ conservation

- Develop a targeted seed collection program for ex situ seed banking.
- Establish ex situ insurance population by propagating from cuttings or seed if possible.
- Explore options for translocation to create additional wild populations. Ensure best practice guidelines (Commander *et al.* 2018) are followed for any translocations.

Stakeholder Management

- Inform NSW Rural Fire Service of known location. Prevent fire from both sites for at least 10-20 years following the fire of 2018.

Survey and Monitoring priorities

- Monitoring for increased habitat degradation and any decline in mature plants.
- Regular surveys to determine whether there is a decline in the population.
- Monitoring for individual plant survival and growth and for any recruitment.
- Continue to survey and monitor for any further recovery of plants at the smaller site

Information and Research priorities

- Research into the seed ecology of the species to determine germination requirements, dormancy mechanisms and fire response.
- Research into how long it takes juveniles to become fire resistant.
- Research into the time to maturity and how long it may take to re-establish a soil seedbank after a fire has occurred at a site.
- Research on impacts of *Phytophthora cinnamomi* and other *P.* spp. on *Prostanthera gilesii*.

References

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