

***Pimelea axiflora* subsp. *pubescens* Rye (Thymelaeaceae)**

Distribution: Endemic to NSW

Current EPBC Act Status: Not listed

Current NSW TSC Act Status: Endangered

Proposed change for alignment: List on EPBC as Endangered

Conservation Advice: *Pimelea axiflora* subsp. *pubescens*

**Summary of Conservation Assessment**

*Pimelea axiflora* subsp. *pubescens* was found to be eligible for listing as Endangered under IUCN Criterion D.

The main reasons for this species being eligible are i) a low number of mature individuals.

**Description and Taxonomy**

The NSW Scientific Committee (2007) state that "*Pimelea axiflora* subsp. *pubescens* (family Thymelaeaceae) is described by Harden (1990) as a "dioecious shrub to 3 m high, stems glabrous or rarely hairy. Leaves linear to elliptic, rarely wider, 5-60 mm long, 2-10 mm wide, margins usually recurved, mostly glabrous; secondary veins prominent below; petiole to 3 mm long. Flowers in bracteate heads, axillary, + sessile. Bracts usually 2-4, mostly elliptic, 2-7 mm long. Flowers 2-10 in a head, white; male flowers 5-9 mm long; female flowers 3-6 mm long. Fruit c. 3-4 mm long, green."

"The features that distinguish *P. axiflora* subsp. *pubescens* from the other subspecies are: "young stems with hairs to 1 mm long; petioles and lower surface of leaves hairy. Leaves 6-22 mm long, 2-5 mm wide. Female flowers 3-4 mm long." The other two subspecies have stems + glabrous and mature leaves glabrous, and occur to the south of the Bungonia area, *P. axiflora* subsp. *axiflora* mainly south from Braidwood and in Victoria and Tasmania, and *P. axiflora* subsp. *alpina* in Kosciusko National Park and Victoria."

**Distribution and Abundance**

The NSW Scientific Committee (2007) state that "*Pimelea axiflora* subsp. *pubescens* is endemic to NSW and is currently known to occur in the Bungonia State Conservation Area, south east of Goulburn in the South-Eastern Highlands Bioregion (Thackway and Creswell 1995). It occurs on limestone cliff edges and outcrops."

"*Pimelea axiflora* subsp. *pubescens* is currently known from a single population, estimated to contain a total of 50 to 500 plants within an area of less than 4 km<sup>2</sup>. The species therefore has a very highly restricted geographic distribution and a low number of mature individuals. Searches have been made in suitable habitat within Bungonia State Conservation Area without finding further populations. A further area of potential habitat a few kilometres north of the known population has not yet been surveyed."

Since the Final Determination in 2007 was made, the area where the species is found has changed from a State Conservation Area to a National Park.

Apparently, the population has been stable since the 2007 final determination (K. McDougall, pers. comm. May 2017). The number of plants in the population is estimated to currently be between 50 to 500 individuals (mostly adults). The estimate represents the likely upper and lower bounds and has considerable uncertainty as the terrain does not allow an easy assessment of the population size and extent. The estimate is based on what plants can be seen from the edges and below the

Bungonia Lookdown combined with an estimate of the area of suitable habitat (K. McDougall, pers. comm. May 2017).

The species has not been found in other rock outcrop habitat at Adams Lookout and Jerrara Lookout (only 1 km from Bungonia Lookdown). These Lookouts are on a sandstone stratum rather than limestone (between Bungonia Lookout and Mass Cave). Also, the species has not been found on limestone outcrops along the White Track, which leads into Shoalhaven Gorge. Searches in suitable habitat near Bungonia Lookdown have failed to locate more populations (K. McDougall, pers. comm. May 2017).

### Ecology

*Pimelea axiflora* subsp. *pubescens* grows on limestone rock outcrops, ledges and cliff faces with scattered plants of *Eucalyptus amplifolia*, *Brachychiton populneus*, *Bursaria spinosa*, *Dodonaea viscosa*, *Lomatia myricoides*, *Allocasuarina verticillata* and *Grevillea arenaria* (Rye 1990).

The effect of fire on *P. axiflora* subsp. *pubescens* is unknown, although the other subspecies resprout after fire. The last wildfire in the Bungonia National Park area was in 1977-78 but of unknown severity (NSW Flora Fire Response Database 2012). Fire is likely to be rare in the habitat of this species. It is not known if disturbance is required to trigger germination (K. McDougall, pers. comm. May 2017).

Plants seem to flower regularly in spring. There is no data on the lifespan of this species but the plants have been observed at the known site regularly for a decade at least (K. McDougall, pers. comm. May 2017) suggesting that an estimated of longevity in the species is between 10 – 50 years.

It is presumed that the species does not undergo extreme fluctuations. No formal monitoring has been done because of difficulty of access. Some plants can be seen from Bungonia Lookdown when in flower, so there is some confidence that plants persist and are locally common (K. McDougall, pers. comm. May 2017).

### Threats

The NSW Scientific Committee (2007) state that “A number of threats expose the population of *Pimelea axiflora* subsp. *pubescens* to risks of decline. An unknown pathogen is affecting vegetation adjacent to the population and may reduce the survival of established plants of *P. axiflora* subsp. *pubescens* if it infects the population. Some plants in the population may also be exposed to inadvertent or deliberate physical damage by bushwalkers, as walking tracks pass through the population. The species' very highly restricted geographic distribution and low number of mature individuals also place the population at risk of decline due to environmental stochasticity.”

The few plants at Mass Cave grow on rock outcrops immediately besides the walking track to the cave. They may be damaged by visitors clambering over the rocks for better views or even just as a result of people trying to get support on the steep, sometimes slippery track. Damage has been observed but they seem to persisting despite the disturbance (K. McDougall, pers. comm. May 2017).

Previously, plants on the cliff face between Bungonia Lookdown and Mass Cave were damaged by abseilers. Abseiling points were found in the vicinity of plants growing on cliffs just to the east of Bungonia Lookdown. Currently, abseiling is prohibited at the area (K. McDougall, pers. comm. May 2017).

There is considerable grazing by rabbits on many plant species at Bungonia Lookdown, although the more accessible plants of *P. axiflora* subsp. *pubescens* show no signs of browsing. It is likely that most plants are beyond grazing influence (on cliff face) (K. McDougall, pers. comm. May 2017).

The small overall population size and limited spatial extent of the taxon make it at great risk of decline from localised and unusual disturbance events. Threats such as goats and disease could affect the population in the future (K. McDougall, pers. comm. May 2017).

A considerable area of potential habitat for this taxon has already been lost through limestone mining over the past Century on the northern side of Bungonia Creek, opposite Bungonia Lookdown. It is possible that populations of *P. axiflora* subsp. *pubescens* persist in the remaining habitat there. There are currently no plans to expand the mining beyond the existing disturbed area. Searches in suitable habitat near Bungonia Lookdown have failed to locate more populations (K. McDougall, pers. comm. May 2017).

#### Assessment against IUCN Red List criteria

For this assessment, it is considered that the survey of *Pimelea axiflora* subsp. *pubescens* has been adequate and there is sufficient scientific evidence to support the listing outcome.

##### *Criterion A Population Size reduction*

Assessment Outcome: Data Deficient

Justification: To be listed as threatened under Criterion A, the species must have experienced a population reduction of at least 30% over three generations or 10 years (whichever is longer). There is insufficient data to assess this species against this criterion.

##### *Criterion B Geographic range*

Assessment Outcome: Criterion not met

Justification: The extent of occurrence (EOO) for *Pimelea axiflora* subsp. *pubescens* is estimated to be 4 km<sup>2</sup>. A species with an EOO of less than 100 km<sup>2</sup> qualifies under the Critical Endangered threshold. The area of occupancy (AOO) was also estimated to be 4 km<sup>2</sup>, based on one 2 x 2 km grid (as recommended by IUCN 2017). A species with an AOO of less than 10 km<sup>2</sup> qualifies under the Critical Endangered threshold.

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 only one location.

Assessment outcome: sub criterion not met

Justification: The population of this species is not considered to be severely fragmented. Currently there is no plausible threat to the species so there are no 'locations' *sensu* IUCN (2017). Location is a geographically or ecologically distinct area in which a single threatening event can rapidly affect all or partially individuals of the taxon present. The small overall population size and limited spatial extent of this species make it at great risk of decline from localised and unusual disturbance events. There is currently no evidence of any plausible threat to the species.

- 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: sub criterion not met

Justification: The species has a very highly restricted geographic distribution that places the population at risk of decline due to environmental stochasticity. While the species is difficult to access, plants seem to flower regularly in spring and the population appears to

be stable. The population has not been threatened by any pathogen, and human disturbance has been prevented by restricting the area prohibiting abseiling. Currently the population is not thought to be undergoing continuing decline.

c) Extreme fluctuations.

Assessment outcome: sub criterion data deficient

Justification: No formal monitoring has been done because of difficulty of access. Some plants can be seen from the lookout when in flower, but no estimates of fluctuations are available.

*Criterion C Small population size and decline*

Assessment Outcome: Criterion not met

Justification: The estimated population size at the one known site is 50 to 500 mostly mature individuals. The estimate represents the likely upper and lower bounds and has considerable uncertainty as the terrain does not allow an easy assessment of the population size and extent. The estimate is based on what plants can be seen from the edges and below the Bungonia lookout combined with an estimate of the area of suitable habitat (K. McDougall, pers. comm. May 2017). At least one of two additional conditions must be met. These are:

- 1) 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: To meet this sub-criterion, the species must have experienced a population reduction of at least 10% over three generations or 10 years (whichever is longer). There is insufficient data to assess this species against this criterion.

- 2) An observed, estimated, projected or inferred continuing decline

Assessment outcome: sub criterion not met

Justification: The species has a very highly restricted geographic distribution that places the population at risk of decline due to environmental stochasticity. Even though the species is difficult to access, plants seem to flower regularly in spring and the populations appears to be stable. The population is not apparently threatened by any pathogen and human disturbance has been prevented by prohibiting abseiling from the area. Currently the population is not thought to be undergoing continuing decline.

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

- a (i). Number of mature individuals in each population

Assessment outcome: sub criterion met at Endangered threshold

Justification: The estimated population size at the one known site is 50 to 500 mostly mature individuals. The estimation is based on what plants can be seen from the edges and below the Bungonia Lookdown and an estimate of the area of suitable habitat.

- a (ii). % of mature individuals in one population

Assessment outcome: sub criterion met at critically endangered threshold.

Justification: There is only one population containing 100% of all mature individuals.

- b. Extreme fluctuations in the number of mature individuals

Assessment outcome: sub criterion data deficient

Justification: No formal monitoring has been done because of difficulty of access. Some plants can be seen from the lookout when in flower, but no estimates of fluctuations are available.

*Criterion D Very small or restricted population*

Assessment Outcome: Endangered under Criterion D

Justification: *Pimelea axiflora* subsp. *pubescens* is very highly restricted. It is currently known from a single population at the Bungonia National Park, and apparently only occurs on limestone cliff edges and outcrops.

The estimated population size at the one known site is 50 to 500 mostly mature individuals. The estimate represents the likely upper and lower bounds and has considerable uncertainty as the terrain does not allow an easy assessment of the population size and extent. The estimate is based on what plants can be seen from the edges and below the Bungonia lookdown combined with an estimate of the area of suitable habitat (K. McDougall, pers. comm. May 2017). The abundance range covers Endangered to Vulnerable. Due to the uncertainty of the population size for this species, this assessment is taking a precautionary but realistic approach and assigns the species as meeting the Endangered threshold.

#### *Criterion E Quantitative Analysis*

Assessment Outcome: Data Deficient

Justification: Currently, there are not enough data to undertake a quantitative analysis to determine the extinction probability of *Pimelea axiflora* subsp. *pubescens*.

#### **Conservation and Management Actions**

There is no National Recovery Plan and no NSW Saving our Species program for this species. Difficulty of access means that the majority of the population is not being monitored (K. McDougall, pers. comm. May 2017).

#### Habitat loss, disturbance and modification

- Prevent any future grazing by goats.
- Apply guards to limit grazing for individuals that are at risk of damage by rabbits.

#### Ex situ conservation

- Develop a targeted seed collection program for ex situ seed banking.
- Consider translocation to nearby suitable habitat.

#### **Survey and Monitoring priorities**

- Monitoring for increased habitat degradation.
- Regular surveys to determine whether there is a decline in the population.
- Monitoring mortality due to grazing by rabbits.
- Monitoring for recruitment of new individuals.

#### **Information and Research priorities**

- Research priorities include:
  - Understanding recruitment/seedling survival, plant longevity and the species juvenile period
  - Flowering, pollination and seed set
  - Determining the response of the species to disturbance

#### **References**

NSW Scientific Committee (2007) Final Determination to list the shrub *Pimelea axiflora* F. Muell. Ex Meissner subsp. *pubescens* Rye as an Endangered Species. URL <http://www.environment.nsw.gov.au/determinations/PimeleaAxifloraEndSpListing.htm> (accessed 11.5.16).

Harden GJ (ed.) (1990) Flora of NSW Volume 1, pp. 379-380, (University of New South Wales Press: Sydney)

- IUCN Standards and Petitions Subcommittee (2017) Guidelines for Using the IUCN Red List Categories and Criteria. Version 13. Prepared by the Standards and Petitions Subcommittee. <http://www.iucnredlist.org/documents/RedListGuidelines.pdf>.
- Thackway R, Creswell ID (1995) An interim biogeographic regionalisation for Australia: a framework for setting priorities in the National Reserves System Cooperative Program. Version 4.0. (Australian Nature Conservation Agency: Canberra).
- Rye BL (1990) Thymelaeaceae. *In Flora of Australia. Volume 18*. Australia Government Publishing Services, Canberra.

**Expert Communications**

McDougall, Keith. Senior Threatened Species Officer. The Office of Environment and Heritage, NSW.

# ***Pimelea axiflora* subsp. *pubescens* - endangered species listing**

## **NSW Scientific Committee - final determination**

The Scientific Committee, established by the Threatened Species Conservation Act, has made a Final Determination to list the shrub *Pimelea axiflora* F. Muell. ex Meissner subsp. *pubescens* Rye as an ENDANGERED SPECIES in Part 1 of Schedule 1 of the Act. Listing of endangered species is provided for by Part 2 of the Act.

The Scientific Committee has found that:

1. *Pimelea axiflora* subsp. *pubescens* (family Thymelaeaceae) is described by Harden (1990) as a "dioecious shrub to 3 m high, stems glabrous or rarely hairy. Leaves linear to elliptic, rarely wider, 5-60 mm long, 2-10 mm wide, margins usually recurved, mostly glabrous; secondary veins prominent below; petiole to 3 mm long. Flowers in bracteate heads, axillary,  $\pm$  sessile. Bracts usually 2-4, mostly elliptic, 2-7 mm long. Flowers 2-10 in a head, white; male flowers 5-9 mm long; female flowers 3-6 mm long. Fruit c. 3-4 mm long, green."

The features that distinguish *P. axiflora* subsp. *pubescens* from the other subspecies are: "young stems with hairs to 1 mm long; petioles and lower surface of leaves hairy. Leaves 6-22 mm long, 2-5 mm wide. Female flowers 3-4 mm long." The other two subspecies have stems  $\pm$  glabrous and mature leaves glabrous, and occur to the south of the Bungonia area, *P. axiflora* subsp. *axiflora* mainly south from Braidwood and in Victoria and Tasmania, and *P. axiflora* subsp. *alpina* in Kosciusko National Park and Victoria.

2. *Pimelea axiflora* subsp. *pubescens* is endemic to NSW and is currently known to occur in the Bungonia State Conservation Area, south east of Goulburn in the South Eastern Highlands Bioregion (Thackway and Creswell 1995). It occurs on limestone cliff edges and outcrops.

3. *Pimelea axiflora* subsp. *pubescens* is currently known from a single population, estimated to contain a total of 50 to 500 plants within an area of less than 4 km<sup>2</sup>. The species therefore has a very highly restricted geographic distribution and a low number of mature individuals. Searches have been made in suitable habitat within Bungonia State Conservation Area without finding further populations. A further area of potential habitat a few kilometres north of the known population has not yet been surveyed.

4. A number of threats expose the population of *Pimelea axiflora* subsp. *pubescens* to risks of decline. An unknown pathogen is affecting vegetation adjacent to the population and may reduce the survival of established plants of *P. axiflora* subsp. *pubescens* if it infects the population. Some plants in the population may also be exposed to inadvertent or deliberate physical damage by bushwalkers, as walking tracks pass through the population. The species' very highly restricted geographic distribution and low number of mature individuals also place the population at risk of decline due to environmental stochasticity.

5. *Pimelea axiflora* F. Muell. ex Meissner subsp. *pubescens* Rye is not eligible to be listed as a critically endangered species.

6. *Pimelea axiflora* F. Muell. ex Meissner subsp. *pubescens* Rye is eligible to be listed as an endangered species as, in the opinion of the Scientific Committee, it is facing a very high risk of extinction in New South Wales in the near future as determined in accordance with the following criteria as prescribed by the Threatened Species Conservation Regulation 2002:

**Clause 17**

The total number of mature individuals of the species is observed, estimated or inferred to be: (b) very low.

Associate Professor Lesley Hughes

Chairperson

Scientific Committee

Proposed Gazettal date: 20/04/07

Exhibition period: 20/04/07 - 15/06/07

**References:**

Harden GJ (ed.) 1990 *Flora of NSW* Volume 1, pp. 379-380, (University of New South Wales Press: Sydney)

Thackway R, Creswell ID (1995) An interim biogeographic regionalisation for Australia: a framework for setting priorities in the National Reserves System Cooperative Program. Version 4.0. (Australian Nature Conservation Agency: Canberra).