

***Caladenia attenuata* (Brinsley) D.L.Jones**

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: *Caladenia attenuata*

**Summary of Conservation Assessment**

*Caladenia attenuata* is found to be eligible for listing as Critically Endangered under Criteria B1ab(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v); C2a(i); D.

The main reason for this *Caladenia attenuata* being eligible for listing in the Critically Endangered category is that the species has an extremely small population: recent surveys (2012) could not confirm the presence of any individuals at either of two historical locations even though conditions were favorable for terrestrial orchids and a number of other orchids were observed. It has a very highly restricted geographic distribution, severely fragmented and is undergoing continuing decline from adverse grazing impacts.

Assessment against IUCN Red List criteria

*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  $\geq 30\%$  over three generations or 10 years (whichever is longer). There is insufficient data to assess *Caladenia attenuata* against this criterion.

*Criterion B Geographic range*

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

Justification: *Caladenia attenuata* has a very highly restricted geographic range.

Extent of Occurrence: The extent of occurrence (EOO) for *Caladenia attenuata* was estimated to be between 0, 4-46 km<sup>2</sup>, based on potential presence at zero, one or two sites. For the calculation of EOO based upon presence at two sites (Bathurst/Duramana and Ilford) a convex hull polygon, as recommended by IUCN (2016), with a width of 1 km (T Auld, pers comm. January 2017), was used. A range of EOO is given because the number of sites where *Caladenia attenuata* is extant is unconfirmed: surveys in 2012 found no plants at the Bathurst/Duramana site and one *Caladenia* sp. specimen (possibly *Caladenia attenuata*) at the Ilford site. To be listed as Critically Endangered under Criterion B1 a species must have an EOO of  $< 100$  km<sup>2</sup>. *Caladenia attenuata* meets the EOO threshold for Critically Endangered under Criterion B1.

Area of Occupancy: The area of occupancy (AOO) for *Caladenia attenuata* was estimated to be 0-4-8 km<sup>2</sup> (based on the presence at zero, one or two sites) using a 2 x 2 km grid, as recommended by IUCN (2016). To be listed as Critically Endangered under Criterion B2 a species must have an AOO of  $< 10$  km<sup>2</sup>. *Caladenia attenuata* meets the AOO threshold for listing as Critically Endangered under Criterion B2.

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 number of locations equals 1,  $\leq 5$ ,  $\leq 10$ .

Assessment Outcome: Subcriterion met at Critically Endangered threshold.

Justification: The number of locations where *Caladenia attenuata* is extant is unconfirmed, but estimates range from 0 to 2: surveys in 2012 found no plants at the Bathurst/Duramana location and one *Caladenia* sp. (which could not be confirmed as *C. attenuata*) at the Ilford location. The locations are separated by 46 km. The definition of location is based on the potential scale of threats such as over-grazing by livestock and rabbits and weed invasion being the most serious plausible threats. These locations also constitute separate subpopulations because genetic and demographic exchange between these locations is unlikely - most orchid seeds are dispersed <10 m (Burndett 2010). Based on this, the population of *Caladenia attenuata* is also severely fragmented. Severe fragmentation occurs where there is increased extinction risk because “most individuals are found in small and relatively isolated subpopulations. These small subpopulations may go extinct with a reduced probability of colonization” (IUCN 2016).

- 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.

Justification: Continuing decline is inferred for extent of occurrence, area of occupancy, habitat, number of locations and subpopulations, and number of mature individuals based on the inability to confirm the presence of the species in surveys undertaken in 2012 at either of two locations where the species had been recorded historically even though surveys were conducted at flowering time and conditions were favourable for above ground presence of the species and a number of other terrestrial orchids were common in the areas searched. Moreover, lack of knowledge about the species distribution creates the potential for ongoing decline resulting from common land management practices, such as grazing by domestic stock. Known sites are impacted by grazing by stock and rabbits and competition from herbaceous weeds.

- c) Extreme fluctuations.

Assessment Outcome: Data Deficient.

Justification: Currently there is no available data to assess the likelihood of extreme fluctuations in *Caladenia attenuata*.

#### *Criterion C Small population size and decline*

Assessment Outcome: Critically Endangered under Criterion C.

Justification: The population size for *Caladenia attenuata* is unknown, but the results from the most recent survey (2012) suggest the population size could be as low as zero or one. At known sites, some plants may remain below ground as dormant tubers or there may be seed in a soil seed bank. To be listed as Critically Endangered under Criterion C a species must have <250 mature individuals. *Caladenia attenuata* meets the total population threshold for listing as Critically Endangered under Criterion C.

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

- C1. An observed, estimated or projected continuing decline of at least (up to a max. of 100 years in future).

Assessment Outcome: Data Deficient.

Justification: There was insufficient data to estimate the rate of continuing decline for *Caladenia attenuata*.

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

Assessment Outcome: Subcriterion met.

Justification: Surveys in 2012 were unable to confirm the presence of *Caladenia attenuata* at any historical location despite favourable growth conditions for terrestrial orchids.

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

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

Assessment Outcome: Subcriterion met at Critically Endangered threshold ( $\leq 50$ ).

Justification: The total estimated population size could be as low as zero or one.

- a (ii). % of mature individuals in one subpopulation = 100%, 95-100% or 90-100%.

Assessment Outcome: Subcriterion data deficient.

Justification: There are two historically known subpopulations of this species. Surveys in 2012 failed to find any *individuals* at one of the locations, while a single individual of a *Caladenia* sp., possibly *Caladenia attenuata*, was found at the second location.

- b. Extreme fluctuations in the number of mature individuals.

Assessment Outcome: Data deficient.

Justification: Currently there is no available data to assess the likelihood of extreme fluctuations in *Caladenia attenuata*.

#### *Criterion D Very small or restricted population*

Assessment Outcome: Critically Endangered under Criterion D.

Justification: The estimated number of *Caladenia attenuata* is as low as zero or one. At known sites, some plants may remain below ground as dormant tubers or there may be seed in a soil seed bank. To be listed as Critically Endangered under Criterion D a species must have  $<50$  mature individuals and *Caladenia attenuata* meets the threshold for listing as Critically Endangered under Criterion D.

#### *Criterion E Quantitative Analysis*

Assessment Outcome: Data Deficient.

Justification: Currently there is not enough data to undertake a quantitative analysis to determine the extinction probability of *Caladenia attenuata*.

### **Description**

The NSW Scientific Committee (2014) state that “*Caladenia attenuata* (Brinsley) D.L.Jones (family Orchidaceae) is a terrestrial herb with “Flowers usually  $<10$  mm across, white, the dorsal sepal lax (hooding the column), labellum midlobe entire wrinkled (flowers Oct.–Nov.); inflorescence unusually tall, to 24 cm high.” (The Royal Botanic Gardens and Domain Trust PlantNET accessed August 2013).”

The NSW Scientific Committee (2014) state that the species “was first described in 1968 (Brinsley 1968) as a variety of *Caladenia carnea*, but has since been elevated to species status (The Royal Botanic Gardens and Domain Trust PlantNET accessed August 2013). It is synonymous with *Petalochilus attenuatus*.”

### **Distribution**

The species is endemic to NSW. The NSW Scientific Committee (2014) state that “Brinsley (1968) reported that the species was known only from the type locality near Bathurst. Since then, there has been only one other confirmed collection of the species from a site near Ilford in 1972 (The Council of Heads of Australasian Herbaria 2013, Australia’s Virtual Herbarium, accessed as *Petalochilus attenuatus*).”

“The geographic distribution of *Caladenia attenuata* is very highly restricted. There are two known sites for the species. The area of occupancy for *C. attenuata* was estimated to be approximately 8 km<sup>2</sup>. This estimate is based on 2 x 2 km grid cells, the scale recommended for assessing area of occupancy by IUCN (2011). The extent of occurrence was estimated to be 52 km<sup>2</sup>.”

“The number of mature individuals of terrestrial orchids will fluctuate depending on seasonal conditions and disturbance history. In 1964, at the type locality, Brinsley (1968) reported ‘considerable numbers of flowering specimens were seen over a fairly restricted area’. Recent searches of both the type locality and the Ilford area site along with other surrounding potentially suitable habitat have failed to confirm the species, even though searches were conducted within the known flowering season, conditions were favourable for detecting terrestrial orchids and other *Caladenia* spp. were readily located (Auld and Fleming in litt. 2013). During this survey, one individual *Caladenia* specimen from near Ilford may be attributable to *C. attenuata*, but more material is needed to resolve this. Hence, the total population size for *C. attenuata* is inferred to be extremely low.”

### **Ecology**

The ecology of *Caladenia attenuata* is unknown.

### **Threats**

NSW Scientific Committee (2014) state that “Both recorded localities for *Caladenia attenuata* are subject to grazing by stock and rabbits and competition from herbaceous weeds such as *Melilotus* sp., *Hypochaeris radicata* and *Sonchus oleraceus* (Auld and Fleming in litt. 2013).” None of the known sites are within a reserve managed for conservation.

### **Conservation and Management Actions**

There is no NSW Saving our Species (SOS) site managed program for *Caladenia attenuata*. The main action within SOS is to conduct targeted survey for the species in suitable habitat surrounding historical occurrences - near Bathurst and Ilford - to assess abundance, distribution and likely threats (OEH 2014).

#### Habitat loss, disturbance and modification

- Protect the two sites where *Caladenia attenuata* has historically been recorded.
  - Remove grazing during the spring flowering season (October-November).
    - Consider fencing sites against domestic stock and rabbits.
  - Prevent soil disturbance and damage to *Caladenia attenuata* tubers.
  - Eradicate weeds/control weeds and maintain at low densities – to minimise competition with *Caladenia attenuata*.

#### Invasive species

- Remove grazing during the spring flowering season (October-November).
  - Consider fencing the sites against domestic stock and rabbits.
- Eradicate weeds/control weeds and maintain at low densities – to minimise competition with *Caladenia attenuata*.

#### Ex situ conservation

- Develop a targeted seed collection program for ex situ seed banking (if possible without negatively impacting the wild population).

#### Stakeholder Management

- Inform land owners and managers of sites where there are known populations and consult with these groups regarding options for conservation management and protection of the species.

### Survey and Monitoring priorities

- Survey to confirm the presence of this species at any location is critically important. Conduct targeted and repeated surveys during October-November at (and in the vicinity of) the historical sites at Bathurst and Ilford.
- Monitor known sites to assess any changes to above ground population abundance.

### Information and Research priorities

- The primary focus is confirming the presence of any *Caladenia attenuata* individuals, securing known populations, and managing the known sites to promote the continue persistence of the species. Key areas for research include:
  - determining pollinators and mycorrhizal associations to aid in conservation in the wild and the potential development of an ex situ population;
  - understanding the impact of grazers on plant survival and growth
  - understanding what factors drive annual fluctuations in above ground abundance.

### References

Brinsley W (1968) A new variety of *Caladenia carnea* R. Br. *The Orchadian* **3**, 16.

Burndrett, M. C. (2007) Scientific approaches to Australian temperate terrestrial orchid conservation. *Australian Journal of Botany* **55**, 293-307.

IUCN International Union for the Conservation of Nature Standards and Petitions Subcommittee (2016) Guidelines for using the IUCN Red List categories and criteria. Version 12. Prepared by the Standards and Petitions Subcommittee. Available online:  
<https://cmsdata.iucn.org/downloads/redlistguidelines.pdf>

NSW Scientific Committee (2014) Final Determination to list *Caladenia attenuata* as Critically Endangered Species. Accessed 30 January 2017.  
<http://www.environment.nsw.gov.au/resources/threatenedspecies/determinations/FDCalaattenCR.pdf>

NSW OEH (2014) Threatened species profile: *Caladenia attenuata*. Accessed 30 January 2017.  
<http://www.environment.nsw.gov.au/threatenedspeciesapp/profile.aspx?id=20276>

# NSW SCIENTIFIC COMMITTEE

## Final Determination

The Scientific Committee, established by the Threatened Species Conservation Act, has made a Final Determination to list the orchid *Caladenia attenuata* (Brinsley) D.L.Jones 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. *Caladenia attenuata* (Brinsley) D.L.Jones (family Orchidaceae) is a terrestrial herb with “Flowers usually <10 mm across, white, the dorsal sepal lax (hooding the column), labellum midlobe entire wrinkled (flowers Oct.–Nov.); inflorescence unusually tall, to 24 cm high.” (The Royal Botanic Gardens and Domain Trust PlantNET accessed August 2013).
2. *Caladenia attenuata* is endemic to NSW and was first described in 1968 (Brinsley 1968) as a variety of *Caladenia carnea*, but has since been elevated to species status (The Royal Botanic Gardens and Domain Trust PlantNET accessed August 2013). It is synonymous with *Petalochilus attenuatus*. Brinsley (1968) reported that the species was known only from the type locality near Bathurst. Since then, there has been only one other confirmed collection of the species from a site near Ilford in 1972 (The Council of Heads of Australasian Herbaria 2013, Australia’s Virtual Herbarium, accessed as *Petalochilus attenuatus*).
3. The geographic distribution of *Caladenia attenuata* is very highly restricted. There are two known sites for the species. The area of occupancy for *C. attenuata* was estimated to be approximately 8 km<sup>2</sup>. This estimate is based on 2 x 2 km grid cells, the scale recommended for assessing area of occupancy by IUCN (2011). The extent of occurrence was estimated to be 52 km<sup>2</sup>.
4. The number of mature individuals of terrestrial orchids will fluctuate depending on seasonal conditions and disturbance history. In 1964, at the type locality, Brinsley (1968) reported ‘considerable numbers of flowering specimens were seen over a fairly restricted area’. Recent searches of both the type locality and the Ilford area site along with other surrounding potentially suitable habitat have failed to confirm the species, even though searches were conducted within the known flowering season, conditions were favourable for detecting terrestrial orchids and other *Caladenia* spp. were readily located (Auld and Fleming *in litt.* 2013). During this survey, one individual *Caladenia* specimen from near Ilford may be attributable to *C. attenuata*, but more material is needed to resolve this. Hence, the total population size for *C. attenuata* is inferred to be extremely low.
5. Both recorded localities for *Caladenia attenuata* are subject to grazing by stock and rabbits and competition from herbaceous weeds such as *Melilotus* sp., *Hypochaeris radicata* and *Sonchus oleraceus* (Auld and Fleming *in litt.* 2013). ‘Competition and grazing by the feral European Rabbit, *Oryctolagus cuniculus* (L.)’ is listed as a Key Threatening Process under the NSW *Threatened Species Conservation Act* 1995.
6. *Caladenia attenuata* (Brinsley) D.L.Jones 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:

# NSW SCIENTIFIC COMMITTEE

## **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 either of the key indicators:
  - (a) an index of abundance appropriate to the taxon, or
  - (b) the geographic distribution, habitat quality or diversity, or genetic diversity.

## **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 either of the key indicators:
  - (a) an index of abundance appropriate to the taxon, or
  - (b) the geographic distribution, habitat quality or diversity, or genetic diversity.

## **Clause 9 Low number of mature individuals of species**

The total number of mature individuals of the species is observed, estimated or inferred to be:

- (a) extremely low.

Professor Michelle Leishman  
Chairperson  
Scientific Committee

Exhibition period: 30/05/04 – 25/07/14

Proposed Gazettal date: 30/05/14

## **References:**

Brinsley W (1968) A new variety of *Caladenia carnea* R. Br. *The Orchadian* **3**, 16.

IUCN Standards and Petitions Subcommittee (2011). Guidelines for Using the IUCN Red List Categories and Criteria. Version 9.0. Prepared by the Standards and Petitions Subcommittee in September 2011.

Royal Botanic Gardens and Domain Trust (2013) PlantNET - The Plant Information Network System of The Royal Botanic Gardens and Domain Trust, Sydney, Australia (version 2.0).  
<http://plantnet.rbgsyd.nsw.gov.au/cgi-bin/NSWfl.pl?page=nswfl&lvl=sp&name=Caladenia~attenuata>  
(accessed on August 2013)

The Council of Heads of Australasian Herbaria (2013) Australia's Virtual Herbarium.  
<http://avh.chah.org.au>. Accessed September 2013 as *Petalochilus attenuatus*.