

Appendix C
Background information on conservation and
reservation status of *Caladenia caudata* in
Tasmania with commentary on significance of
population in Williams Creek catchment



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BACKGROUND INFORMATION ON CONSERVATION AND RESERVATION STATUS OF *CALADENIA CAUDATA* IN TASMANIA WITH COMMENTARY ON SIGNIFICANCE OF POPULATION IN WILLIAMS CREEK CATCHMENT

Prepared by Mark Wapstra, 13th August 2008

Introduction

The following information is presented to assist Gunns Limited in planning for the management of the population of *Caladenia caudata* identified from the Williams Creek catchment east of the East Tamar Highway.

Targeted surveys for the species were conducted by ECOtas (2007) to meet the conditions of clause 25 of the Commonwealth pulp mill permit. The population details are described in ECOtas (2007) but relevant information from that report is copied below for the convenience of the reader.

The following information is presented on the species for the benefit of all parties such that readers do not have to undertake their own literature review. It draws heavily on information presented in *The Orchids of Tasmania* (Jones *et al.* 1999), information provided by the Threatened Species Section (Department of Primary Industries & Water) in the form of a draft species profile prepared for the Commonwealth government (note that the author is presently engaged to prepare an updated listing statement for the species by the State government), and the author's personal knowledge of the species (which includes a recent examination of all collections of the species held at the Tasmanian Herbarium).

Taxonomy and nomenclature

Scientific name: *Caladenia caudata* Nicholls, *Victorian Naturalist* 64: 231 (1948)

Common name: Tailed spider-orchid

Description

C. caudata is a small-flowered spider-orchid about 40 mm across with red flowers, dark red to blackish osmophores on all perianth segments, and a dark, glandular, long-pointed labellum apex. It is one of Tasmania's most instantly recognisable orchid species when flowering virtually impossible to confuse with other *Caladenia* species.

Distribution

C. caudata is endemic to Tasmania. Its distribution is best described as widespread but localised. It occurs in mainly coastal and subcoastal areas from the far northwest coast (poorly known populations), along the north coast (especially either side of the River Tamar), northeast and east coast, and the southeast around the greater Hobart area.

Habitat

The habitat of *C. caudata* is described as "heathy and grassy open eucalypt forest and woodland, often with she-oaks, and in heathland on sandy and loamy soils" (Jones *et al.* 1999). Habitat is further qualified by "the species is most often found on sunny north-facing sites" (Jones *et al.* 1999). Jones (1998) describes the habitat of this species as "open forest, heathy open forest and coastal scrubs in sands, sandy loams and shallow clay loams".

This is a broad description of potential habitat provided for the benefit of a wide audience. *ECOtas* (2007) noted that it requires some expertise and experience with the species to interpret in relation to the potential of any particular site to support the species. It is difficult to assign accepted descriptions of Tasmanian vegetation types (e.g. TASVEG) to such a broad description of potential habitat because many vegetation types will seem superficially suitable but for various reasons are not (e.g. geographic location, fire frequency, microhabitat characteristics such as soil type, etc.).

Flowering period

The published flowering period of *C. caudata* is "late August to early November but mainly September and October" (Jones 1998; Jones *et al.* 1999; TSS 2006), which is widely interpreted as "August to November" (Jones 2006). Leaves of the species appear a few weeks before flowering but can be confused with other spider-orchids so detection prior to anthesis is not reliable. Flowering can occur throughout the period indicated and at any one site, flowers may appear early in the period through to the end. This is demonstrated by recent flowering (2007) at a known site at Waverly Flora Park, on Hobart's eastern shore, where flowers in bud, fully open flowers, and "finished" (i.e. curled up perianth segments over a fertilised ovary) flowers are present at the same time (M. Wapstra pers. obs.).

Even surveys of habitats highly likely to support the species may provide a negative result. For example the "fire frequency in the habitat of *C. caudata* is moderate to high" (Jones *et al.* 1999). This does not imply that the species requires fire to be present at a site because it can persist, albeit usually in low numbers, in the absence of a high fire frequency, although usually only if there is some other form of disturbance (e.g. slashing). My personal experience with the species in the "Effingham" area (a few kilometres inland of Low Head/George Town) is that the species flowers prolifically 1-3 years after a "hot summer fire" (usually represented by the classic summer wildfire rather than a lower intensity fuel reduction burn) but then virtually disappears once the undergrowth has become dense.

Detection of this species is likely to be most successful when flowers are fully open but the "finished" flowers are also distinctive, allowing the "window of survey opportunity" to be extended for 1-2 weeks, depending on seasonal and local conditions (although flowers are ephemeral in nature and are rarely present for more than a week or so). There is some evidence that flowering may be marginally later in the season in the north of the State, based on specimens cited in Jones (1998), by records held in the *Natural Values Atlas* (DPIW 2007) and by my own observations in the 2007 flowering season (*ECOtas* 2007).

Records from the *Natural Values Atlas* (DPIW 2007), which include records held by the Tasmanian Herbarium, indicate the range of flowering times as follows (ignoring obvious database errors such as records with dates 1st of the 1st of a year):

6th, 8th, 9th, 10th, 14th, 15th, 17th, 18th, 20th, 22nd, 23rd, 27th September

1st, 2nd, 5th, 7th, 9th, 13th, 17th, 24th, 27th, 29th October

4th, 5th, 6th, 10th, 12th, 15th November.

It is noted that ECOtas (2007) detected *C. caudata* in the Williams Creek catchment on 11th and 30th October, with both individuals in flower, suggesting that the population fits within the concept of later flowering for the species in northern Tasmania.

Reservation status

C. caudata is known from several reserves although the status of some populations (with respect to the extant/extinct status and the abundance of plants present) within these reserves is unknown. The species is known from the Arthur-Pieman Conservation Area, Coles Bay Conservation Area, Coningham Nature Recreation Area, Freycinet National Park, Humbug Point Nature Recreation Area, Lime Bay State Reserve, Narawntapu National Park, Rocky Cape National Park, South Arm Nature Recreation Area, Tasman National Park, Waterhouse Conservation Area, Wingaroo Conservation Area and the Henry Somerset Orchid Private Sanctuary.

This listing of reserves provides an impression of a well-reserved species. However, it is noted that while Tasmanian reserves are subject to a code of practice, the *Tasmanian Reserve Management Code of Practice* (PWS, FT & DPIWE 2003), there has been little active management of most reserves, at least in relation to the maintenance of known sites and potential habitat for *C. caudata*. Passive management (i.e. no prescribed burns) may be quite inappropriate for a species such as *C. caudata* that appears to benefit from moderate to high fire frequencies (Jones *et al.* 1999). The population in the Henry Somerset Orchid Conservation Area has been subject to a deliberate ecological burn and the species appears to have benefited from this event (M. Wapstra pers. obs.). Similarly, low-scale fuel reduction burning in the Waverly Flora Park has not appeared to deleteriously impacted on the species (M. Wapstra pers. obs.) and has probably ensured the continued flowering at the known site. Management for the species at other sites has been essentially passive to date. Other sites known to support the species (e.g. Coningham) have been subject to uncontrolled wildfires and this is likely to be of benefit to the species.

Current conservation status

Caladenia caudata is presently listed as Vulnerable (schedule 4) of the Tasmanian *Threatened Species Protection Act 1995*. A recent review of the conservation status of the species recommended that its status be upgraded to vulnerable (schedule 4) from rare (schedule 5), and this recommendation was accepted by the State minister. It is also listed as Vulnerable on the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

The main reason for the listing of *C. caudata* as vulnerable is the continued uncertainty of the status of many of the populations: many listed sites have not had the species recorded for many years (even decades) and many of the known extant sites support an unknown (although probably low) number of individuals. The species meets the technical description of criterion 3b of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* in that "the estimated total number of mature individuals is limited and the number is likely to decline and its geographic distribution is precarious for its survival". The corresponding IUCN 2000 guideline is C2 (a): Population size estimated to number fewer than 10 000 mature individuals and a continuing decline projected in the numbers of mature individuals and no subpopulation estimated to contain more than 1000 mature individuals.

Williams Creek population

ECOtas (2007) described the site and population information for *C. caudata* in the Williams Creek catchment in detail. The information pertinent to the present information statement is re-presented below.

C. caudata was recorded from one site east of the East Tamar Highway in the Williams Creek catchment. Two individuals of *C. caudata* were recorded from close to Williams Creek, east of the East Tamar Highway. The grid references for the plants are 495169mE 5444313mN and 495177mE 5444319mN (GDA94, GPSed, ± 5 m). A nominal area of extent of this "population" is 1 m² per plant so a total of 2 m² (but in reality these sites are represented by single plants occupying less than 10 x 10 cm each). For the purpose of this statement, the two plants is considered as one population (or site).

The site is south of a tributary of Williams Creek in an area of open grassy *Eucalyptus amygdalina*-*Allocasuarina littoralis* woodland on a short section of flatter terrain near the break of slope. The site was burnt in the fires of late November/early December 2006.

The specific location of the individual plants have been marked by the author using plastic flagging tape tied to low shrubs on either side of the plants (i.e. plants are located approximately midway along the line between tapes). In addition, flat rocks have been used to triangulate the location of plants with plants located in the centre of an approximate 30-50 cm triangle of rocks.

Context of Williams Creek population

Based on database information (DPIW's *Natural Values Atlas*), there are about 50 subpopulations of *C. caudata* in Tasmania, but only about 28 of these are presumed to be extant (i.e. with relatively recent and well known collections or observations of flowering plants). Ziegeler (1997a) defined individual subpopulations as a group of colonies or scattered plants not separated by a habitat barrier such as a different habitat type or landform. Ziegeler (1997b) noted that of the 45 recorded subpopulations in Tasmania at that time, 4 were probably extinct, 9 were possibly extinct, and a further 9 were considered to be insufficiently known to enable their status to be determined. Figure 1 shows the distribution of all subpopulations of *C. caudata*, including the recent Williams Creek subpopulation (ECOtas 2007).

Ziegeler (1997b) reported on a subpopulation from the East Tamar Highway but listed it as one of the insufficiently known populations. A recent examination of Tasmanian Herbarium collections of *C. caudata* by the author revealed no supporting specimens for the East Tamar subpopulation cited by Ziegeler (1997b). The only known details of this subpopulation are that it is nominally listed at grid reference 495112mE 5545183mN with a precision of ± 5000 m, apparently recorded by the Launceston-based naturalist and photographer Herbert J. King on 15th September 1961. Given the precision of the record, it is virtually impossible to know exactly where the specimen was collected because the precise location and population details are not known (Ziegeler 1997b). It is more likely that the specimen was collected somewhere along the verges of the East Tamar Highway (the currently shown position of the record simply intersects with notional easting and northing gridlines) rather than several kilometres inland of the main road (an area that was probably always behind a locked gate).

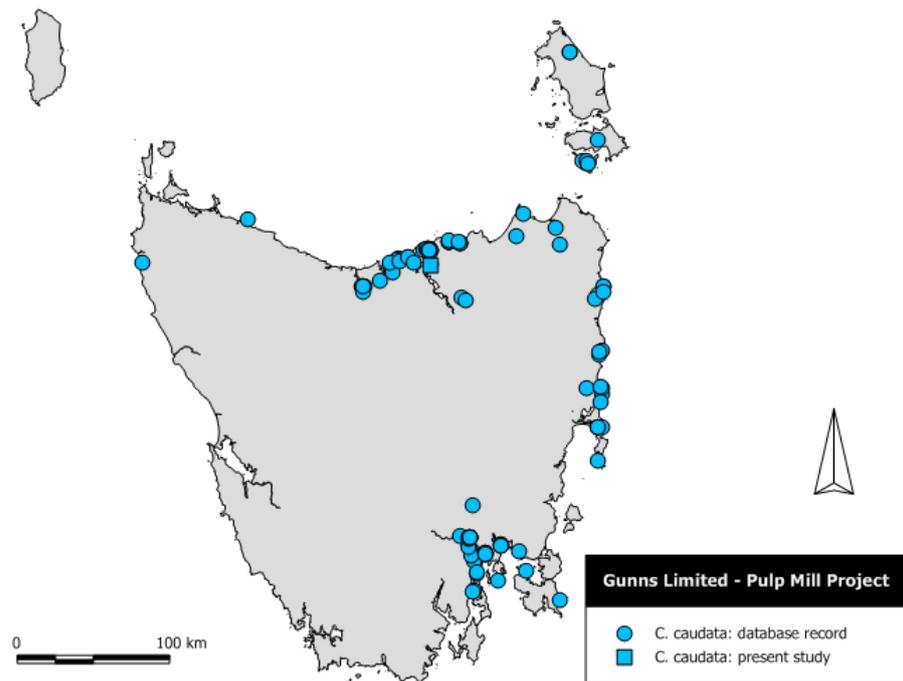


Figure 1. Distribution of *Caladenia caudata* in Tasmania. Note the context of the Williams Creek subpopulation (square point) relative to other subpopulations, especially those along the north coast.

The recent discovery of two individuals in the Williams Creek catchment (ECOTas 2007) technically shifts this subpopulation from insufficiently known to extant. In effect, the discovery of the Williams Creek population simply confirms the presence of the species in this part of the eastern fringe of the River Tamar, and lends credence to the original sighting, which is not supported by herbarium material. The discovery does not then significantly add to the known number of populations for *C. caudata*. In simplest terms, without undertaking a complex analysis of conservation status against legal criteria, it is reasonable to conclude, that the status of vulnerable on both the Tasmanian *Threatened Species Protection Act 1995* and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* remains valid because the number of known populations remains identical, the extent of occurrence is unchanged and the population abundance is only marginally shifted (by two individuals but the number seen in 1961 from the East Tamar is unknown so comparison is impossible).

Analysis of conservation status and relative importance of Williams Creek site

In my opinion, the "new" Williams Creek subpopulation, which supports only two individuals, can hardly be viewed as a critical population for the Statewide persistence and conservation status of the species. The loss of two individuals will not result in the changed legislated status of the species i.e. it would not shift the species into the endangered category under State or Commonwealth threatened species legislation. Such a shift would require an order of magnitude change to the Statewide population (roughly estimated at 1600 plants using contemporary revised data based on initial estimates provided in Ziegeler (1997b)) but note that the number of plants in several populations is simply not known), the extent of occurrence (which would not alter because there are populations on all sides of the Williams Creek area such as at

Latrobe and Beechford) or the area of occupancy (estimated at about 500 km² so a loss of about 2 m² is insignificant at less than 0.5%).

Based on a very approximate population estimate of 1600 mature individuals (and recognising the limitations of these estimates), the loss of 2 mature plants from the Williams Creek site represents approximately 0.1% of the Statewide population. This is a bit of a nonsensical value because of the wide fluctuations in the population numbers in any one population in different years due to seasonal conditions and annual events. For example the year of a summer fire I saw no plants at a particular site, 2 years after fire there were hundreds (perhaps even low thousands if a more detailed survey was undertaken) and a year later less than ten individuals could be found. At other sites, population numbers are remarkably consistent (e.g. Waverly Flora Park) with only occasional peaks after disturbance. Other sites also fluctuate from close to zero to large numbers after fire (e.g. 2007 was a good flowering year at the Henry Somerset Orchid Conservation Area because a prescribed fuel reduction burn took place two years previous).

A better concept of proportional change in conservation status is gained by examining loss of subpopulations. The Williams Creek subpopulation effectively represents one of the known subpopulations. Its loss would represent 2% of the known subpopulations (1 subpopulation from 50). Again, a bit of a nonsensical value in some ways because it might be better to think of extant populations. Working of the estimate of 29 extant subpopulations (the 28 mentioned above plus the Williams Creek one), gives a proportional loss of 3.5%. But again, a nonsensical value because the loss simply shifts the population from extant to extinct. However, given the uncertainty about the original location of the East Tamar collection, it could be argued there are now 51 subpopulations with 1 additional extinct one (if the new Williams Creek site is lost) and 1 still insufficiently known. This latter argument is weak because it goes against my concept that the Williams Creek site now represents the previously insufficiently known East Tamar collection (and the definition of subpopulation used by Ziegeler (1997a) with no significant habitat barriers). As mentioned above, the loss of the Williams Creek population would not lead to a change in the extent of occurrence of the species, and only a very minor loss of area of occupancy (but less than 0.5%). The loss would not alter the reservation status of the species because the Williams Creek site is not in a formal reserve.

Management options

In *ECOtas* (2007), I discussed the potential viability of a small localised population of *C. caudata* in Williams Creek and discussed various possible management options. As indicated above, if practical site management is not possible for the subpopulation represented by two individuals, in my opinion the loss will not result in a change to the conservation status of the species at a Statewide level. However, if practical, managing individual subpopulations (even those with low numbers of plants) is an appropriate conservation objective, because there is the risk of "death by a thousand cuts" i.e. the incremental loss of small populations over many years such that the conservation status is eventually changed for the worse. In the case of *C. caudata*, this would take the loss of many such subpopulations (6 subpopulations from 29 = a 20% loss for example), and it is likely that in the meantime additional subpopulations would be discovered (or previously known ones re-discovered or found to be extant and not extinct). Having said that, finding new populations (or verifying known ones) is unlikely to significantly alter the extent of occurrence, the area of occupancy or the number of mature individuals (although the possibility of finding large populations in the area of the recent Bellingham fires is noted). The number of populations (and more importantly extant ones) may alter slightly but the loss of one small population would still then only marginally alter the overall number of populations (e.g. 1 from 29 = 3.45%; 1 from 35 = 2.86%; etc.).

Managing small localised populations of species such as *C. caudata* is practical in some circumstances and plants have been known to persist for many years very close to disturbance such as frequently used roads. Managing such sites relies on maintaining the integrity of the habitat in terms of overstorey and understorey vegetation, and perhaps critically, the soil conditions (e.g. moisture, acidity, organic content, etc.) because of the close mycorrhizal fungal associations with orchid tubers. Major changes to soil drainage characteristics (e.g. waterlogging, or long term drying out), especially combined with other changes such as vegetation removal, is likely to result in localised extinction. Events such as fire and natural grazing are not a threat *per se* because the species requires a certain disturbance regime that promotes a flowering response but such events do not lead to long term deleterious changes to soil condition (natural succession of vegetation and consequent changes to physical characters of the soil is a natural part of the fluctuations in populations of plants such as *C. caudata*). In summary, managing the local habitat characteristics is more important than more invasive conservation techniques, especially for such a small population as occurs in Williams Creek.

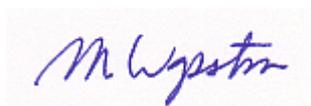
It may be argued that a site with only two plants, one of which was not fertilised in the present season (ECOTAS 2007), does not constitute a viable subpopulation of *C. caudata* and as such, specific site management to "protect" the individual is not warranted. *Caladenia* species have small subterranean tubers enclosed by a fibrous sheath or tunic (Jones *et al.* 1999). Orchid seeds are produced within a capsule, usually containing thousands to millions of seeds, which are dispersed by wind. The seeds only germinate following infection of the embryo by a suitable mycorrhizal fungus (Jones *et al.* 1999). In the case of the present site, one individual was not fertilised this flowering season and so no additional local seed is produced from this plant. However, the second plant was fertilised (as evidenced by the swollen ovary), and so there is a chance that viable seed is produced (ECOTAS 2007). Whether the general area is suitable for establishment of new seed next season is not known but as mentioned above, the site is likely to remain suitable only for the next 1-2 years and then remain unsuitable until a fire once again opens the understorey, hence the argument to manage local habitat features.

Whether the tubers (which are still present at the site) will produce flowers next year is not known. Not all tubers produce vegetative and/or fertile material every year. The lack of additional vegetative material in the area (e.g. leaves) suggests that perhaps only two tubers are present. Translocation of orchid tubers is generally unsuccessful because of the delicate symbiotic relationship between orchid and fungus. Cultivation of species strongly reliant on such a mycorrhizal relationship is very difficult (Jones 2006). It is unknown how long individuals of *Caladenia* persist but if suitable habitat is not maintained (e.g. in this case, a suitably open understorey), tubers are likely to become unviable.

Despite the practical limitations of seed collection (because of the small number of flowers and poor success rate in cultivation) and translocation (due to the delicate symbiotic mycorrhizal relationship), if the site of the two plants is impractical to manage (i.e. the individuals is lost), a simple translocation of the soil from the two plant sites to as close a site as possible (e.g. 50 m upslope) and careful placement of the soil scoop into a prepared hollow may be attempted. Given that targeted surveys in immediately adjacent areas did not detect additional individuals, it is possible that even very nearby areas are unsuitable (alternatively, the Williams Creek subpopulation may simply represent a low abundance population). Ongoing monitoring of translocated soil patches would be needed to determine the success of translocation but it should be noted that lack of flowering may not represent translocation failure because there is no assurance that the individuals would flower in subsequent seasons at their original location.

References

- Department of Primary Industries & Water (DPIW) (2007). *Natural Values Atlas database information as downloaded 12 April 2007*.
- ECOtas (Mark Wapstra) (2007). *Assessment of Proposed Pulp Mill and Associated Infrastructure Footprint for the Presence of Caladenia caudata, Prasophyllum secutum, Glycine latrobeana and Epacris exserta (Permit Condition 25). Part 1: Pulp Mill, Solid Waste Disposal, Reservoir and Workers' Accommodation Facility Areas: ECOtas for Gunns Limited 16 November 2007*.
- Jones, D.L. (2006). *A Complete Guide to Native Orchids of Australia including the Island Territories*. Reed New Holland, Sydney.
- Jones, D.L. (1998). Contributions to Tasmanian orchidology 1-9 2: a taxonomic review of *Caladenia* in Tasmania. *Australian Orchid Research* 3: 16-60.
- Jones, D., Wapstra, H., Tonelli, P. & Harris, S. (1999). *The Orchids of Tasmania*. The Miegunyah Press at Melbourne University Press, Carlton.
- Nicholls, W.H. (1948). Two new species of orchids from Tasmania. *Victorian Naturalist* 64: 231-234.
- Parks and Wildlife Service, Forestry Tasmania & Department of Primary Industries, Water & Environment (PWS, FT & DPIW) (2003). *Tasmanian Reserve Management Code of Practice*. Department of Tourism, Parks, Heritage & the Arts, Hobart.
- Threatened Species Section (TSS) (2006). *Flora Recovery Plan: Tasmanian Threatened Orchids 2006–2010*. Department of Primary Industries, Water & Environment, Hobart.
- Ziegeler, D. (1997a). *A Recovery Plan and Management Guidelines for Threatened Orchids in Tasmanian Forests*. Report to the Tasmanian Regional Forest Agreement Environment and Heritage Technical Committee.
- Ziegeler, D. (1997b). *The Caladenia caudata Recovery Plan 1998–2000*. Parks and Wildlife Service, Hobart. [this document is available as an appendix to Ziegeler (1997a) but is usually cited as a separate item]



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13 August 2008