

## **CRASSULA NATANS VAR. MINUS (FLOATING STONECROP) IN TASMANIA: NATIVE OR EXOTIC?**

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### **INTRODUCTION**

In recent years I have become interested in weeds in Tasmania. As part of undertaking surveys for various development proposals, reserve management plans and other activities on different land tenures in all parts of the State, I am constantly surprised by the presence of weeds in even the remotest corners of Tasmania. Is it possible to find a place that is entirely free of exotic plant species in the State? While weeds can be found in remote locations, there are some large parts of Tasmania that remain effectively weed free. Conversely, many of our city and suburban streets are now home to native species, happy to take advantage of temporary niches on walls and footpath cracks (some species are even more common in “our” environment than their “own” – think of *Cotula australis*, more often seen in a crack in bitumen than in a grassy woodland). But for some species the question arises: how do we know if the species is native or exotic? Have they been deliberately introduced, escaped from a domestic garden or cultivated crop, entered accidentally in stock feed, or arrived in some other way? One way is to look through the collecting record – if the species was recorded in the earliest of colonial times, it is perhaps fair to assume it was already here when Europeans arrived. But if it took decades, or more than a century even, to first detect a species, it may be easier to assume that it is a late arrival but it does not necessarily follow that the species is exotic. Many of our obviously native species took until the 1980s or even later to be first collected – how we overlooked some species that are actually quite distinct (i.e. it was not a taxonomic quirk that meant we missed it) and often locally common. Take for example a species like *Mirbelia oxylobioides*, a locally common species in the Heathy Hills reserve near Clifton Vale in the southern Midlands that was not recorded in Tasmania until 1998 – nearly 140 years after it was described (and known from mainland Australia).

### **CRASSULA NATANS VAR. MINUS**

#### ***What is it?***

In this paper I use *Crassula natans* var. *minus* (floating stonecrop), a member of the Crassulaceae family (mainly species of succulents such as *Crassula*, *Aeonium* and *Sedum*), as an example species to demonstrate some of the issues in trying to determine whether a species is indigenous or native.

I first came across *Crassula natans* var. *minus* when I visited King Island in 2007. There it occurred as a semi-aquatic annual herb of inundated wet heathland. It was

half-floating in the shallow water and sprawling over the bare muddy edge of the wetland (Plate 1). This was the first time the species had been detected on King Island, and I wondered whether it was more widespread in the State.

I chose this species to explore the notion of indigenous versus alien species, because when I first encountered it in Tasmania I assumed, by virtue of the location and habitat, that it must have been indigenous, only to find out that it is considered introduced/naturalised in Australia. As I began to encounter the species more frequently, I began to question its status.

### Description

*Crassula natans* var. *minus* is an annual herb with filiform stems. It is often much-branched, especially when growing exposed on muddy ground with stems to about 10 cm long, but less branched and with stems up to 35 cm long when floating. The leaves are linear to linear-elliptic, 1–8 mm long and 0.2–2.2 mm wide, usually slightly fleshy and green to reddish-brown giving the plants an overall reddish appearance (Plate 1). The species has tiny white flowers that are usually solitary and occur in the axils of the leaves (Plate 2).



**Plate 1.** The distinctive red stems of *Crassula natans* var. *minus* sprawling over bare muddy ground (Nook Swamps, King Island)

*Crassula natans* var. *minus* could be confused with other annual (and indigenous) species of *Crassula* such as *C. decumbens*, *C. helmsii* and *C. peduncularis*, although there are good keys available to differentiate between them (e.g. Toelken 1981; Toelken et al. 1996; Utas 2011).

### Distribution in Tasmania

The *Census of the Vascular Flora of Tasmania* at the time (Buchanan 2007) listed the species as naturalised, but even then I wondered on what basis this

decision had been arrived at. The latest *Census* (Baker & de Salas 2012) continues to list the species as naturalised. The *Flora of Victoria* (Toelken et al. 1996) listed it as exotic to Victoria, simply noting that it is originally from South Africa. Online State government floras all list the species as naturalised to Australia.



**Plate 2.** Flowering branches of *Crassula natans* var. *minus* growing amongst *Isolepis hystrix* (the green tufts), an herbaceous annual sedge that is also known from a limited number of Tasmanian collections and is considered as naturalised rather than indigenous

Since my first encounter on King Island I have collected it from Lulworth, Petal Point and Curries River Reservoir (all in the State's northeast) and from Dartys Corner on the northwest coast (see Table 1 for details). While many of these sites are disturbed and support a range of annual exotic plant species, several support native species that have conservation significance (e.g. threatened annual herbs such as *Stylidium despectum* and *Phyllangium divergens*). A search of the *Atlas of Living Australia* yielded a few additional collections from Tasmania, and Toelken (1981) cites a record from Badger Island. Thus, bringing the number of documented populations to nine (Table 1, Figure 1).

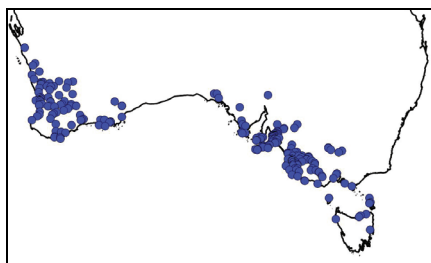
**Table 1.** Populations of *Crassula natans* var. *minus* in Tasmania

| Location  | Collection details <sup>1</sup>  | Comments (including tenure) <sup>2</sup>   |
|---|--|--|
| Badger Island                                     | date not stated<br>Whinray<br>AD no. not stated                          | No collection notes available<br>Cited in Toelken (1981) but not included in <i>Atlas of Living Australia</i> records<br>Private property  |
| Flinders Island,<br>Furneaux Group, Long<br>Point | 17/08/1975<br>J.S. Whinray<br>AD 98110152<br>CANB 533240<br>MEL 0575967A | No collection notes available<br>Tenure unknown  |
| Bluemans Creek                                    | 18/11/2003<br>A. North   | Grassy flat with scattered <i>Eucalyptus viminalis</i> , poorly-drained, with localised pools (A. North, pers. comm.)<br>No collections (DPIPWE <i>Natural Values Atlas</i> data)<br>Private property    |
| Big Waterhouse Lake<br>Road, 1 km from<br>lagoon  | 14/11/2007<br>M. Visoiu<br>HO 546255                                     | Dried-out depressions in old gravel pit; more or less herbaceous wetland; also aquatic in some areas of wetland<br>Waterhouse Conservation Area  |
| Nook Swamps, King<br>Island                       | 18/11/2007<br>M. Wapstra<br>HO 547643                                    | Muddy fringes of inland freshwater ephemeral wetland amongst wet heathland<br>Lavinia State Reserve  |
| Dartys Corner, S of<br>Temma                      | 31/08/2008<br>M. Wapstra<br>HO 551057<br>MEL 2355513A                    | Ephemerally muddy frequently used 4WD track between Temma and Sandy Cape amongst windswept coastal heathland<br>Arthur-Pieman Conservation Area  |
| Lulworth, old tip site                            | 13/10/2008<br>M. Wapstra<br>HO 551824                                    | Ephemeral pond edge (old tip scrape)<br>Crown Land   |
| Curries River<br>Reservoir (near George<br>Town)  | 13/10/2008<br>M. Wapstra<br>HO 551823                                    | Retreating muddy shore of large water impoundment<br>State Forest  |
| Elbow Bay, Inner<br>Sister Island                 | 05/12/2010<br>M. Visoiu  | small (10 x 10 m) granite wetland/waterhole – only freshwater on island (likely stopover spot for birds)<br>No collections (DPIPWE <i>Natural Values Atlas</i> data)<br>Sister Islands Conservation Area |
| Granite Lagoon, King<br>Island                    | 14/12/2011<br>M. Visoiu  | in the flat damp granite gravels around the margins there, was well established and extensive<br>No collections (M. Visoiu, pers. comm.)<br>Crown Land (proposed reserve)                                |

<sup>1</sup> AD, HO, MEL, CANB = formal herbarium collections; <sup>2</sup> comments taken from herbarium sheets, personal observations by the author or as otherwise indicated



**Figure 1.** Distribution of *Crassula natans* var. *minus* in Tasmania (compiled from various sources including the *Atlas of Living Australia* and the *Natural Values Atlas*, both accessed 4.11.2012, and records from the Tasmanian Herbarium)



**Figure 2.** Contemporary Australian distribution of *Crassula natans* var. *minus* (*Atlas of Living Australia*; accessed 4.11.2012)

### **Distribution in Australia**

Toelken (1981) was firm in the view that *Crassula natans* was not indigenous to Australia, stating that “although the typical variety [var. *natans*] is more widespread in South Africa and is usually common it has not been introduced into Australia”. The first Australian specimen of the species was collected in 1883 from the vicinity of

Perth, with several additional collections from the same area between 1898 and 1902 (Toelken 1981). While Toelken (1981) noted that “there were no further records from Australia until the late 1950s), the species had a sporadic collection history in that period with about 10 collections (*Atlas of Living Australia* website at [www.ala.org.au](http://www.ala.org.au), accessed 4.11.2012). In the early 1980s the species appeared to be widely distributed in southwest Western Australia, eastern South Australia, western Victoria and Badger Island in the Furneaux Group (Toelken 1981). The species is now known to have a much wider distribution, or has at least been recorded more often, occurring in a greater part of Western Australia, South Australia, Victoria and Tasmania (Figure 2). Given that the species was collected as early as 1883 and has such a sporadic collection history (suggesting it is overlooked and/or scarce), what is the evidence that the species was introduced into Australia? What was the mechanism for this introduction as early as 1883? It is interesting to note that there are other herbaceous species that display a similar distribution and pattern of spread to that shown by *Crassula natans* var. *minus*. *Disa bracteata* (known in Australia as the ‘South African weed orchid’), native to South Africa, first appeared in Western Australia about 60 years ago (1950), and has slowly spread east across southern Australia, finally appearing in Tasmania in the 2000s.

### **Status**

*Crassula natans* usually grows “...on marshy soil around standing water but occasionally plants are inundated...” (Toelken 1981): this habitat description is consistent with the observed habitat in Tasmania. Could aquatic and wading birds be the mechanism for the dispersal of the species between continents? Recently, the

species was reported from New Zealand (de Lange et al. 2011), from where it had hitherto not been recorded, collected from the botanically significant Lake Waiporohita on the North Island. Lake Waiporohita is an important habitat for a range of aquatic birds, including several that are mostly Australian and regarded as uncommon and/or vagrant species in New Zealand (de Lange et al. 2011). de Lange (1997) had previously treated species such as *Gratiola pedunculata*, a largely Australian species but also present at Lake Waiporohita, as indigenous, suggesting trans-Tasman avian dispersal of sticky seeds. At virtually all of the sites I have observed *Crassula natans* in Tasmania I have also observed wading and/or “dabbling” birds such as ducks, swan, lapwings and gulls. I believe it is a realistic scenario that such birds could carry dislodged stems (and associated adventitious roots) and/or seeds on feet and amongst feathers between wetlands and similar habitats, and that long-distance transport between mainland Australia and Tasmania (perhaps via Bass Strait islands) is feasible. I do not know of particular species of birds that migrate between South Africa and Western Australia that may have facilitated the first trans-Indian dispersal of *Crassula natans* to Australia.

So is *Crassula natans* exotic or indigenous to Tasmania? In relation to its status in New Zealand, de Lange et al. (2011) concluded that, because the species is not indigenous to Australia from whence the New Zealand population is postulated to have originated rather than the apparently native South Africa, it should also be regarded as naturalised in New Zealand. Using a similar argument, the Tasmanian populations could also be considered to be naturalised, but only if it is assumed that these originated from mainland Australian populations and that these in turn were deliberately or accidentally introduced

from South Africa. There is no definitive evidence to support the case for an indigenous or a naturalised status for the species in Tasmania.

Bean (2007) explored means of determining the status of species in Australia, and provided a set of criteria against which to assess species, which included considerations of ecological, phytogeographical and historical factors (the “EPH system”). Using the EPH system, *Crassula natans* var. *minus* would be classified as “alien” based simply on the “historical evidence indicated that the species was not present in the region [Australia] before European settlement (e.g. first herbarium records are well after this time)”.

If *Crassula natans* var. *minus* is a weed, should we treat it as such and try to eradicate or control it? Does it pose any threats to natural wetland habitats? Probably not – I have only ever seen very small patches of the species, it does not appear to be prone to rapid spread and it seems to be a poor competitor with other semi-aquatic herbs (both native and exotic). Interestingly, de Lange et al. (2011) suggested that “as a precautionary measure further study into the impact [of the species] in New Zealand is urgently needed”, although it was “too early to say what effect [it] may have [on wetland turf communities]”. These authors thought that its rapid growth and prolific seed production would facilitate it smothering smaller turf plants.

If *Crassula natans* var. *minus* is indigenous, should we treat it as a conservation-dependent species? Many other annually flowering wetland herbs are listed as threatened on the Tasmanian *Threatened Species Protection Act 1995*, usually on the basis of few and disjunct collections, limited population information and inferred threats to wetland habitats.

I suggest that until a definitive answer is available on the origin of *Crassula natans* var. *minus* in Tasmania, we should treat the species cautiously (e.g. monitor populations and continue to document its distribution) but certainly not as a threatened indigenous species on two grounds. First, making land management decisions on the uncertain indigenous status of a species is likely to be a legal quagmire. Second, despite the limited collections in Tasmania, its current distribution is widespread, it has probably been overlooked and may be substantially more common, it often occurs on semi-disturbed sites and does not appear to be directly threatened by current land uses at known sites, and it occurs in a number of reserves.

### CONCLUDING REMARKS

Bean (2007) noted that the “origin status” of plants has traditionally mainly been of interest to plant geographers and taxonomists but that in recent years such information is of importance to other areas of study including species conservation and vegetation management, biological weed control, floristic evaluation and biogeographical analysis. I would add that working out whether a plant is indigenous or naturalised to a country, state or region is important to understanding dispersal mechanisms of species, and monitoring effects of such factors as climate change and other ecosystem-level changes (e.g. changes in migration patterns of birds).

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### REFERENCES

- Baker, M.L. & de Salas, M.L. (2012). *A Census of the Vascular Plants of Tasmania & Index to The Student's Flora of Tasmania and Flora of Tasmania Online*. Tasmanian Herbarium, Tasmanian Museum & Art Gallery, Hobart ([www.tmag.tas.gov.au](http://www.tmag.tas.gov.au)).
- Bean, A.R. (2007). A new system for determining which plant species are indigenous in Australia. *Australian Systematic Botany* 20(1): 1–43.
- Buchanan, A.M. (2005). *A Census of the Vascular Plants of Tasmania & Index to The Student's Flora of Tasmania*. 4th edn. Tasmanian Herbarium Occasional Publication No. 7, Tasmanian Herbarium, Tasmanian Museum & Art Gallery, Hobart.
- de Lange, P.J. (1997). *Gratiola pedunculata* (Scrophulariaceae): a new addition to the New Zealand flora. *New Zealand Journal of Botany* 35(3): 317–322.
- de Lange, P.J., Rolfe, J.R. & Townsend, A.J. (2011). *Crassula natans* var. *minus* (Crassulaceae) a new trans-Tasman natural weed arrival to northern New Zealand. *New Zealand Journal of Botany* 49(3): 361–366.
- Toelken, H.R., Jeanes, J.A. & Stajsic, V. (1996). *Crassula*. In: *Flora of Victoria. Volume 3*. (Eds. N.G. Walsh & T.J. Entwisle). Inkata Press, Melbourne.
- Toelken, H.R. (1981). The species of *Crassula* L. in Australia. *Journal of the Adelaide Botanic Gardens* 3(1): 57–90.
- Utas (University of Tasmania) (2011). *Key to Tasmanian Vascular Plants*. online resource: <http://www.utas.edu.au/dicotkey/dicotkey/key.htm> (accessed 11/11/2012).

***Information and data sources***

Department of Primary Industries, Parks, Water & Environment *Natural Values Atlas*, accessed 4.11.2012.

*Atlas of Living Australia* website at [www.ala.org.au](http://www.ala.org.au), accessed 4.11.2012, incorporating records provided by the Tasmanian Department of Primary Industries, Parks, Water and Environment (*Natural Values Atlas* as cited above), Tasmanian Seed Conservation Centre, and *Australia's Virtual Herbarium*, a resource of the Council of Heads of Australasian Herbaria and its member Herbaria listed at [www.chah.gov.au](http://www.chah.gov.au).