

Geococcus pusillus

earth cress

TASMANIAN THREATENED SPECIES LISTING STATEMENT



Image by Grant Daniels

Scientific name: *Geococcus pusillus* J.Drumm. ex Harv., *Hooker's J. Bot. Kew Gard. Misc.* 7: 52 (1855)

Common name: earth cress

Group: vascular plant, dicotyledon, family **Brassicaceae**

Status: *Threatened Species Protection Act 1995:* **endangered**
Environment Protection and Biodiversity Conservation Act 1999: **Not listed**

Distribution: Biogeographic origin: **not endemic to Tasmania**
Tasmanian Natural Resource Management regions: **North, Cradle Coast (extinct)**
Tasmanian IBRA Bioregions (V6): **Flinders, King (extinct)**

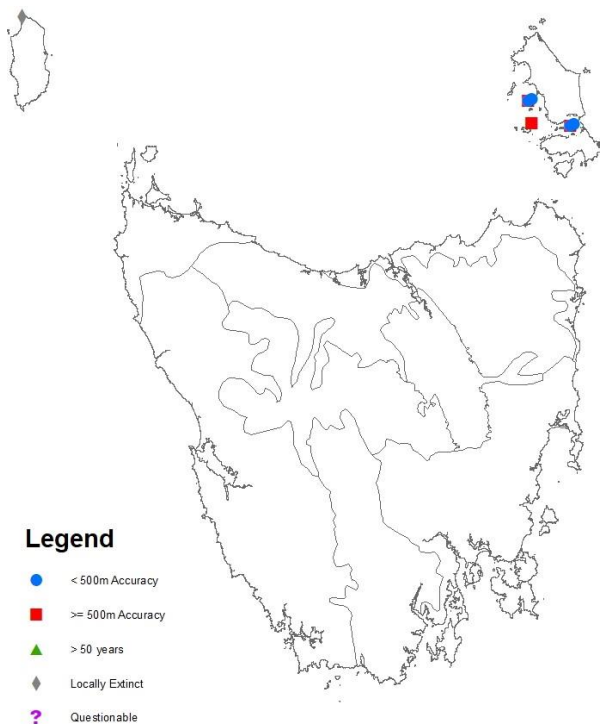


Figure 1. The distribution of *Geococcus pusillus* within Tasmania showing IBRA bioregions (V6)



Plate 1. *Geococcus pusillus* (image by Grant Daniels)

SUMMARY: *Geococcus pusillus* (earth cress) is an annual herb in Tasmania, now restricted to a few small offshore islands in the Furneaux Group and considered to be locally extinct on King Island. While numbers are typically low, they can fluctuate widely, emerging in years of favourable cool-season rainfall. This fluctuation increases the risk of local extinctions. The species is at risk from vegetation clearing, weed invasion, lack of gap-forming disturbance, grazing and changed rainfall patterns associated with climate change.

IDENTIFICATION AND ECOLOGY

Geococcus pusillus is an annual herb that emerges in years of favourable cool-season rainfall (Cunningham et al. 1992). While it is usually found in low numbers, it can cover large areas in favourable conditions. This indicates recruitment from soil-stored seed, with the pendulant seed pods often becoming buried when the pedicels bend back and elongate. Its occurrence in small openings (Whinray 2009) suggests that the species responds favourably to gap-forming disturbance.

Survey techniques

Geococcus pusillus flowers in spring (Walsh & Entwisle 1996). In Tasmania, it has been collected from mid August to early November making this period the recommended timing for surveys, especially after good rainfall and gap-forming disturbance (Whinray 2009).

Description

Geococcus pusillus is a small, often stemless, annual herb (Plate 1). The leaves are 3 to 8 cm long, arising from the base of the plant. They have opposite or alternate triangular lobes that become small and well-spaced near the base and are scattered with star-shaped or forked hairs. The terminal leaves are divided into 3 lobes. The white flowers have 4 petals and are situated on short stalks that tend to arise from the centre of the leaves. The fruit is 5 to 12 mm long and 2 to 3 mm wide and consists of an oblong, 2-celled pod, which is initially covered with star-shaped hairs, becoming hairless.

A unique feature of the pod is that it is situated on a stalk (pedicel) that bends backwards and buries the pod in the soil (Plate 2). The 3 to 5 seeds are oblong-oval shaped and orange-brown in colour. They are 1.5 to 2 mm long.

[description based on Cunningham et al. 1992, Curtis & Morris 1975]

Confusing species

There are no confusing species given the characteristic leaf shape and tendency for fruits to become buried.



Plate 2. Fertile material of *Geococcus pusillus* showing the pedicels starting to bend backwards to bury the fruits (image by Richard White)

DISTRIBUTION AND HABITAT

Except for Queensland and the Northern Territory, this species is widespread on mainland Australia. In Tasmania, *Geococcus pusillus* is known from only three locations on separate islands (Mount Chappell, Mile, Little Chalky and Little Dog islands) to the west and south of Flinders Island in the Furneaux Group, and the species is now considered extinct on King Island (Whinray 2009; Table 1, Figure 1).

The habitat of the species and soil type on the mainland have been described as variable, ranging from sandy creek beds and shallow soils on rocky hillsides to open woodlands and grasslands on heavy soils (Cunningham et al. 1992).

Table 1. Population summary for *Geococcus pusillus* in Tasmania

	Subpopulation	Tenure	NRM Region	1:25000 Mapsheet	Year last seen	Area occupied (ha)	Number of mature plants
1	Mount Chappell Island	unknown	North	Loccota	1973	unknown	unknown
2	Mile Island	Mile Island Conservation Area	North	Whitemark	1973	unknown	>28*
3	Little Chalky Island	private land	North	Whitemark	1990	0.0001	unknown
4	Little Dog Island	Little Dog Island Game Reserve	North	Fisher	2020	0.0001	10-14
5	King Island, possibly Cape Wickham area	unknown	Cradle Coast	Wickham	1876	Presumed extinct	

NRM region = Natural Resource Management region;
*28 plants were collected

Sites in the Furneaux Group are on granite overlain by sand and are associated with gaps amongst *Rhagodia candolleana* (coastal saltbush) on Mount Chappell and Little Chalky Islands. On Little Dog Island it has been recorded within open patches of sand among granite boulders within the sea-spray zone.

POPULATION PARAMETERS

Number of subpopulations: 4 extant, 1 extinct

Number of locations: 3 extant, 1 extinct

Extent of occurrence: 230 km² (extant sites)

Linear extent: 30 km (extant sites)

Area of occupancy: < 1 ha

Area of occupancy (as per IUCN criteria) = 16 km²

Number of mature individuals: < 100

Largest subpopulation: 28

Whinray (2009) has detailed the recorded observations for *Geococcus pusillus* in Tasmania. He concluded that the offshore islands of the Furneaux Group are key sites for this species and that the species is now likely to be extinct on King Island. He considered the paucity of observations likely to be an accurate reflection of the scarcity of the species and estimated the total number of individuals to be fewer than 100, occupying less than 20 m² in total. However, the estimation of the number of subpopulations and their size is limited by the ephemeral nature of the species, and it is likely that more subpopulations will be discovered on Bass Strait islands, particularly in the Furneaux

Group, with spring surveys following good cool-season rainfall and appropriate gap-forming disturbance.

While mainland observations suggest that the number of plants in subpopulations can fluctuate widely, numbers are thought to be typically low (Cunningham et al. 1992, Walsh & Entwisle 1996).

RESERVATION STATUS

Geococcus pusillus occurs in the Mile Island Conservation Area and the Little Dog Island Game Reserve (Table 1). As location details are imprecise, it is possible that the species occurs in the Chappell Islands Nature Reserve that fringes the coast of Mount Chappell Island.

CONSERVATION ASSESSMENT

Geococcus pusillus was listed in 1995 as rare on schedules of the Tasmanian *Threatened Species Protection Act 1995*, having been determined to occur in 20 or less 10 x 10 km Australian Map Grid squares in Tasmania (FAC 2004).

In 2022 this species was uplisted, meeting the following criteria for the endangered category:

B. Extent of occurrence estimated to be less than 500 km² or occupancy less than 10 ha, and,

1. severely fragmented or known to exist at no more than five locations and,
3. extreme fluctuations in the number of mature individuals.

D. Total population extremely small or area of occupancy very restricted and,

1. total population estimated to number fewer than 250 mature individuals;
2. total population with an area of occupancy less than 1 hectare, and typically in five or fewer locations that provide an uncertain future due to the effects of human activities or stochastic events, and thus capable of becoming extinct within a very short time period.

Please note that this assessment was conducted under the previous version of the *Guidelines for Listing under the Threatened Species Protection Act 1995*, which has since been superseded by a newer version endorsed by the Scientific Advisory Committee (Threatened Species) in March 2023.

THREATS LIMITING FACTORS AND MANAGEMENT ISSUES

The Tasmanian sites in Bass Strait represent the southern limit of the distribution of *Geococcus pusillus* and it may never have been widespread and/or common in Tasmania. However, while presumed extinct on King Island, it is possible that there are other subpopulations in similar habitat on Bass Strait islands, particularly those in the Furneaux Group. The species is not well known in Tasmania, though the following threats are inferred from location descriptions in Harris et al. (2001) and Whinray (2009).

Clearing of potential habitat: Clearing of offshore island vegetation in the Furneaux Group may result in the further loss of potential habitat for *Geococcus pusillus*. Historical clearing may have impacted the species e.g. clearing on Mount Chappell Island for sheep grazing in the 1950s.

Weeds: Weeds, particularly those associated with agricultural activities, pose a threat to the species. The Mount Chappell Island site is described as being weedy, risking losses through competition. *Lycium ferocissimum* (boxthorn) and/or *Coprosma repens* (mirror bush)

occur on most of the islands on which *Geococcus pusillus* has been found in the Furneaux Group and, being bird-dispersed, potentially threaten all occurrences of the species. *Euphorbia paralias* (sea spurge) has become a problem weed in the Furneaux Group on sandy coasts in the last few decades. It may also occupy the habitat and out-compete *Geococcus pusillus*.

Inappropriate disturbance regime: The occurrence of *Geococcus pusillus* in small openings suggests that the species responds to gap-forming disturbance such as slashing, track activity and burning. Lack of disturbance may lead to a decline in soil-stored seed. Activities of burrowing seabirds on the island may create recruitment opportunities.

Climate change: The subpopulations on Mile Island and Little Chalky Island are at risk from sea level rise or associated storm surges given the small size and height of the islands (each less than 5 ha and rising only approximately 12 m above sea level). In Walsh & Entwisle (1996), it is noted that the species had seldom been collected in recent years, suggesting that changed rainfall patterns with climate change may prove detrimental to the species.

Browsing and grazing regime: Many members of the Brassicaceae family are palatable to stock, introduced animal pests and native browsers, potentially threatening the species if the browsing and grazing pressure is high. Sheep were introduced to Mount Chappell Island in the 1950s.

Stochastic risk: The species is at risk from losses from chance events due to the small size and area occupied by the species. Small subpopulations could be threatened by the activities of burrowing seabirds if locally intense.

MANAGEMENT STRATEGY

What has been done?

Surveys: A number of botanical surveys, though non-targeted, have been conducted on offshore islands in the Furneaux Group (Whinray 2009) and King Island.

Boxthorn control: A concerted volunteer effort to control boxthorn on the Flinders Island Coast and outer islands was initiated in

2002, treating Little Chalky and Mile islands in 2003 with follow up treatments proposed (Ziegler & Hopkins 2005). The latest follow up treatment occurred in 2009.

Management objectives

The main objective is to reduce the extinction risk to the species in Tasmania by locating and managing subpopulations to ensure their persistence.

What is needed?

Agencies, groups or individuals may assist with some or all of the following recovery actions (coordinated efforts may achieve the best and most efficient results):

- provide information and extension support to relevant Natural Resource Management committees, local councils, government agencies, the local community and development proponents on the locality, significance and management of known subpopulations and potential habitat;
- undertake surveys for the species in potential habitat in the Furneaux Group, King Island and other Bass Strait Islands from mid August to early November, particularly following good cool-season rainfall and gap-forming disturbance;
- determine the precise location of known sites and monitor them;
- protect plants from excessive browsing/grazing or seabird burrowing activity;
- abate the threat from weeds at known sites and control boxthorn on the offshore islands of the Furneaux Group to the west of Flinders Island;
- if overgrown, slash or burn known sites to encourage recruitment;
- if sufficient fertile material is available, collect seed for long-term storage at the Tasmanian Seed Conservation Centre.

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