

Smilasterias tasmaniae

Bruny Island seastar

Image by
Rod Hartvigsen



Image by Jonathan Esling

TASMANIAN THREATENED SPECIES LISTING STATEMENT

Common name: Bruny Island seastar

Scientific name: *Smilasterias tasmaniae* O'Loughlin and O'Hara, 1990

Group: Invertebrate, Echinodermata, Asteroidea, Stichasteridae

Status: *Threatened Species Protection Act 1995:* **endangered**

Environment Protection and Biodiversity Conservation Act 1999: **Not Listed**

Distribution: Endemic status: **Endemic to Tasmania**

Tasmanian NRM Regions: **South**

IBRA Regions: **South East, Southern Ranges**

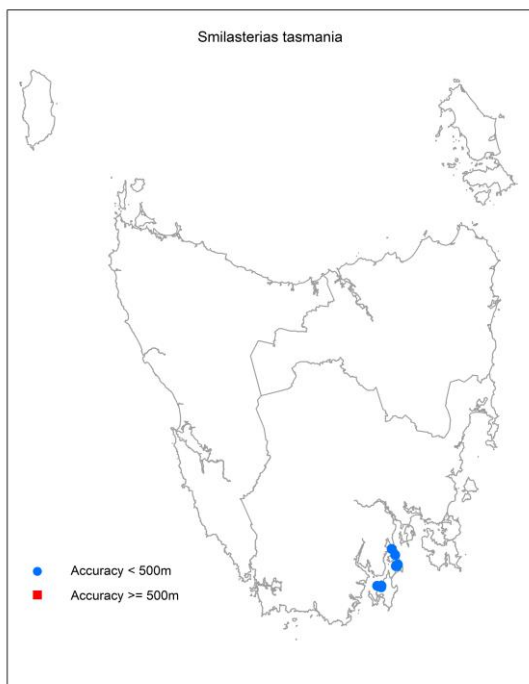


Figure 1. The distribution of the Bruny Island seastar in Tasmania, showing NRM regions



Plate 1. Bruny Island seastar
TOP: upper view of three specimens
BOTTOM: underside view
(images by Jonathan Esling)

SUMMARY: The Bruny Island seastar (*Smilasterias tasmaniae*) is a five-armed seastar of dark grey-brown/tan colour, growing to 40 mm width. It occurs on rocky benthic marine habitats in the low intertidal-subtidal environments to depths of 8 m. The Bruny Island seastar is endemic to Tasmania where it has a highly restricted distribution in south-eastern waters. Little is known about its biology and ecology.

Most of the known populations occur along the western shores of Bruny Island. The principal threats to the Bruny Island seastar are unknown but are likely to include: habitat modification and loss through coastal development and other activities; modification of water quality resulting in siltation or eutrophication of benthic habitats; collection for aquaria; and interspecific competition, displacement and potential predation from introduced seastar species.

The main objectives for management of the Bruny Island seastar include increased knowledge of its distribution, ecology, biology and habitat requirements, and protection of its populations and habitats.

IDENTIFICATION AND ECOLOGY

The Bruny Island seastar, *Smilasterias tasmaniae*, belongs to a group of seven *Smilasterias* species found in Antarctic, Subantarctic, New Zealand and southeast Australian marine environments (O'Loughlin and O'Hara 1990, McKnight 2006). Of these species, *S. tasmaniae* is unique in having a highly restricted distribution, with populations confined to southeast Tasmania, and it is one of a cluster of geographically restricted seastar species (e.g. the Derwent seastar *Patiriella littoralis* – suspected to be extinct, and the live-bearing seastar *Parrulastra vivipara*) found only in this region.

The Bruny Island seastar has five arms and a width of up to 40 mm (O'Loughlin and O'Hara 1990). Its upper (abactinal) surface is dark grey to brown in colour with lighter brown-tan arm tips, while the under (actinal) surface is pale orange-tan (K. Parsons, pers. comm.).

The Bruny Island seastar occurs on benthic rocky habitats in the marine environment and has been recorded primarily in the low intertidal zone but also up to 8 m depth in the subtidal zone (O'Loughlin and O'Hara 1990).

There have been no targeted investigations of the ecology or biology of this species. The only close relative to occur in southeast Tasmania, *Smilasterias multipara*, has separate sexes and broods its young in its cardiac stomach (i.e. it is classified as a 'gastric brooder'). The young develop inside the stomach and are released as miniature replicas of adults when they have achieved a diameter of approximately 2mm (O'Loughlin and O'Hara 1990). This method of reproduction limits the capacity for dispersal, therefore providing a greater potential for local genetic variation to occur. It is currently unclear whether *S. tasmaniae* is also a gastric brooder, since reproductive habits can vary, even within the same genus of seastars (I. O'Hara pers. comm.).

Survey techniques

There is one record of the Bruny Island seastar in the subtidal zone at 8 m depth, while all other observations have been in the low intertidal zone. Due to ease of access for conducting searches, surveys for this species should focus initially on the intertidal zone. Intertidal surveys should be conducted of the low intertidal zone during low tidal conditions, with searching conducted beneath and on the undersides of rocks. Uprturned rocks should be returned to their original position once searched to reduce disturbance to intertidal habitat. Quantitative intertidal survey approaches using transect lines and quadrats may be applied, however as the Bruny Island seastar can occur at very low densities in the intertidal zone (K. Parsons, pers. comm.), generic searches across as much suitable low tidal habitat as possible will be most effective for detection.

Subtidal reef surveys are best performed during calm and high tidal conditions. Generic searches are likely to be most effective for detection, and will require searching rock surfaces and crevices, beneath small rocks and include searching beneath raised algal canopies, where feasible.

Confusing species

One additional *Smilasterias* species is found within close vicinity to the geographic range of the Bruny Island seastar: *Smilasterias multipara*. This species grows to a larger size than *S. tasmaniae*, with a diameter of up to 76 mm. *Smilasterias multipara* has up to six thin actinal plates in a series, while *S. tasmaniae* is unique within its genus in not having a series of actinal plates. In general terms, *S. tasmaniae* also has shorter, stumpier arms that are widened at the base and lack white colour patches (T. O'Hara, pers. comm.), compared with the longer, more slender arms and white colour patches observed in *S. multipara*. Other small, five-rayed (armed) seastars within the geographical and bathymetric range of *S. tasmaniae* are pentagon shaped and either lack the distinct, separated arms of this species or have strong webbing joining them. *Smilasterias tasmaniae* can be distinguished from the juveniles of other five-rayed species within its range by colour or other morphological features (e.g. granular seastar *Uniophora granulifera* - large rounded tubercles on the dorsal surface).

DISTRIBUTION AND HABITAT

The Bruny Island seastar is endemic to southeast Tasmania (Table 1, Figure 1). The original specimen for which this species was described was collected from Lighthouse Bay on the southwest coast of Bruny Island in 1977, where it was found on rocks with brown kelp at a depth of 8 m (O'Loughlin and O'Hara 1990). However, an earlier specimen, collected in 1929 at Catamaran (Recherche Bay) on the southeast tip of mainland Tasmania, was later identified as this species. This specimen was collected from 'under stones' in the intertidal zone (O'Loughlin and O'Hara 1990). There have been no recent surveys at either Lighthouse Bay or Catamaran to confirm the contemporary distribution of the Bruny Island seastar at these locations.

A subsequent project to survey seastars in rocky intertidal habitats of southeast Tasmania (Materia 1994) did not list any survey sites at Lighthouse Bay or Catamaran, although elsewhere it was reported that this study found the Bruny Island seastar to be absent from these southerly localities (Bryant and Jackson 1999, Cochran 2003).

The survey project did locate five populations of the Bruny Island seastar along the west coast of south Bruny Island, including Grundys Point, Point Winifred, Chevertons Point, Sadgrove Point and Smoothys Point (Materia 1994). This species was recorded at an additional site on the west coast of south Bruny Island, to the west of Ventenat Point, in 2019 (K. Parsons, pers. comm.). Two additional sites are mapped in the DPIPWE Natural Values Atlas (NVA) on the west coast of north Bruny Island, at Simmonds Bay and Bligh Point, however no details are known on the observer or year of observation. A further Bruny Island seastar sighting in this region has been reported to the east of Black Rock Point (Elizabeth Turner, pers. comm., cited in Cochran 2003).

Habitats of this species have been described as 'on rocks with brown kelp' at 8 m depth, and in the intertidal zone 'under stones' (O'Loughlin and O'Hara 1990). Recent, limited searches on the west coast of south Bruny Island recorded this species beneath rocks in the low intertidal zone, with an apparent preference for rocks with the coral worm *Galeolaria caespitosa* growing on their underside (K. Parsons, pers. comm.) (Plate 1).

There have been no extensive surveys of the distribution of this species, and some of the distributional data are now dated. Habitat preference is also not well understood, particularly in the subtidal zone.

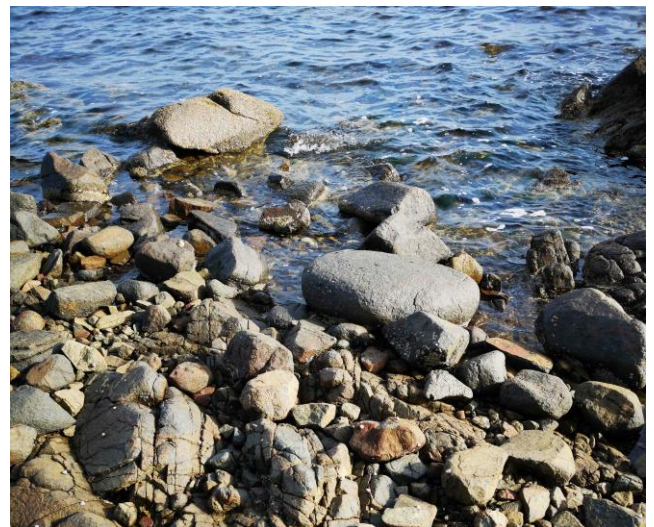


Plate 2. Example of Bruny Island seastar intertidal habitat (image by Rod Hartvigsen).

POPULATION PARAMETERS

There is currently no population data for this species. Early records from Catamaran and Lighthouse Bay were each based on one or two individuals, while abundances were not recorded in the rocky intertidal surveys on the west coast of Bruny Island. Recent searches at Winifred Point and a location to the west of Ventenat Point, both on the west coast of south Bruny Island, identified 3-4 individuals per site after lengthy searches of low intertidal rocky habitat (K. Parsons, pers. comm.). This suggests that either the species exists in these areas at very low population densities, and/or reflects the fact that areas searched were at the very upper tidal limit of the habitat range for the Bruny Island seastar.

RESERVATION STATUS

Geographical accuracy of the sighting (± 100 m) impedes confirming if any of the Bruny Island seastar records occur in reservations, due to data inaccuracies. However, three locations are in close proximity to Conservation Areas (Table 1). The other sites recorded for this species are not reserved, either in the intertidal or subtidal environment.

CONSERVATION STATUS

The Bruny Island seastar is currently listed as endangered under the Tasmanian *Threatened Species Protection Act 1995*.

It was originally listed in 1999 as rare due to stochastic risks to its small population. It was uplisted to endangered in 2020 meeting criterion B (extent of occurrence estimated to be less than 500 km² and area of occupancy less than 0.1 km²), specifically B1 (severely fragmented and known to exist at no more than five locations) and B2c (continuing decline in extent and/or quality of habitat).

THREATS, LIMITING FACTORS & MANAGEMENT ISSUES

The principal threats to the Bruny Island seastar are likely to include:

Habitat loss and modification: Many of the populations of the Bruny Island seastar are in close proximity to low-density populated areas and to aquaculture facilities.

Human impacts may result from coastal reclamation and development of coastal structures such as jetties and aquaculture structures, removal of rocks and suitable substrates from the intertidal zone, and modification of patterns of sedimentation (Bryant and Jackson 1999, Cochran 2003). The D'Entrecasteaux Channel is a very popular waterway for recreational boating, and hence recurrent power boat traffic in shallow environments may cause localised damage to the habitat of the Bruny Island seastar.

Modification of water quality: Declining water quality through increased turbidity and nutrient concentrations may impact on this species through smothering of habitat caused by siltation or algal growth (Bryant and Jackson 1999, Cochran 2003). Seepage from septic systems, fertiliser runoff from agricultural lands, stormwater runoff and nutrient inputs from fish farms have the potential to modify local water quality conditions.

Illegal collection: Seastars are highly sought after by collectors for aquaria and this threat relates to this species as well as other threatened seastars found in the intertidal zone (Bryant and Jackson 1999, Cochran 2003). Raised awareness may assist in reducing the likelihood of illegal collection.

Interspecific competition from introduced seastars: Given overlapping habitat distributions with several introduced seastar species, the Bruny Island seastar may be vulnerable to interspecific competition and displacement from introduced species such as the New Zealand seastar and the Northern Pacific seastar (Bryant and Jackson 1999).

Climate change: There have been no studies to determine the environmental tolerances of the Bruny Island seastar. However, given this species has a narrow distribution range in southeast Tasmania, and the Tasmanian east coast has been identified as a global hotspot for sea warming (Hobday and Pecl 2014), there is a risk that increasing sea temperatures will gradually diminish suitable habitat.

Table 1. Population summary for the Bruny Island Seastar

	Subpopulation	Tenure	NRM region*	1:25 000 mapsheet	Year last (first) recorded	Extent of subpopulation (ha)	Abundance
1	Catamaran	(Possibly) Recherche Bay Nature Recreation Area	South	Recherche	1929	Unknown	Unknown if population still exists
2	Lighthouse Bay	Public Land	South	Cloudy	1977	Unknown	Unknown if population still exists
3	Grundys Point	Public Land	South	Partridge	1994	Unknown	Abundance unknown
3	Point Winifred	Public Land	South	Partridge	2019	Unknown	Abundance unknown
3	West of Ventenat Point	Public Land	South	Partridge	2019	Unknown	Abundance unknown
4	Chevertons Point	Public Land/ (Possibly) Chuckle Head Conservation Area	South	Great Bay	1994	Unknown	Abundance unknown
4	Sadgrove Point	Public Land	South	Great Bay	1994	Unknown	Abundance unknown
4	Smoothys Point	Public Land	South	Great Bay	1994	Unknown	Abundance unknown
4	Simmonds Bay	Public Land	South	Barnes Bay	?	Unknown	Abundance unknown
4	Bligh Point	Public Land/ (Possibly) Bligh Point Conservation Area	South	Barnes Bay	?	Unknown	Abundance unknown
4	East of Black Rock Point	Public Land	South	Barnes Bay	2003?	Unknown	Abundance unknown

*NRM region = Natural Resource Management region. Given the highly restricted distribution of this species within the context of marine organisms, and the potential areal extent of individual threatening events in the marine environment (e.g. oil spills, algal blooms), the southern and northern sections of the Bruny Island west coast have each been interpreted as representing one location.

MANAGEMENT STRATEGY

Management objectives

The main objectives for the management of the Bruny Island seastar include: protection of known populations; identification and protection of any currently unknown populations; and increasing understanding of the species' ecology, biology (in particular, mode of reproduction) and habitat requirements.

What has been done?

Existing management plans: A report titled 'Managing Threatened Species & Communities on Bruny Island' (Cochran 2003) contains information on threatened flora and fauna species of Bruny Island and ways to assist their survival. It lists key threats and management actions for the Bruny Island seastar.

The report identified threats to this species as: removal of rocks and suitable substrates; decreasing water quality and increasing nutrients; sedimentation and increased siltation; increased coastal development, including the construction of jetties in sensitive locations; collection for aquaria; and marine pests such as the Northern Pacific seastar, which may compete with and displace this species.

Management actions recommended for the Bruny Island seastar included: a detailed environmental impact assessment for any coastal development within its range, such as jetties, boat sheds and fish farms or any other development which may cause increased turbidity of the water, or input of sewage or other pollutants (e.g. from boat motors, generators or buildings); education programs to minimise release of pollutants via stormwater; raising awareness of its threatened species status to reduce the likelihood of collection for aquaria; and control measures for introduced pests such as the Northern Pacific seastar.

Targeted surveys & monitoring: Materia (1994) undertook surveys of seastars, including the Bruny Island seastar, across a range of rocky intertidal sites in southeast Tasmania. More recent observations (April 2019) have confirmed the species' presence on the west coast of Bruny Island (K. Parsons pers comm.). Other surveys of marine invertebrate biodiversity in intertidal and subtidal environments of southeast Tasmania have not detected this species (e.g. Barrett *et al.* 2010, Stuart-Smith *et al.* 2010).

What is needed?

- To better document the distribution of the species – undertake survey work in suitable habitat and potential habitat to locate any additional populations and better document its geographical range;
- To increase understanding of the status of the species – more precisely assess population size, habitat preferences and range, environmental tolerances, ecological requirements and the relative impacts of threatening processes;
- To monitor changes in the status of the species – design and implement a monitoring program;

- To improve protection of the species – conduct detailed impact assessments relating to this species for any coastal or marine developments within its range and ensure infrastructure or other development activities do not adversely impact on its populations or habitats;
- To improve protection of the species – identify existing sources of pollutants or habitat disturbance that may be impacting on populations of this species and seek to address identified or potential impacts through preventative and restorative measures; and
- To improve protection of the species – raise awareness of the Bruny Island seastar within the local community.

BIBLIOGRAPHY

- Barrett, N., Edgar, G., Zagal, C.J., Oh, E. and Jones, D. (2010) *Surveys of intertidal and subtidal biota of the Derwent Estuary*. Institute for Marine and Antarctic Studies, University of Tasmania, Hobart.
- Bryant, S. and Jackson, J. (1999) *Tasmania's threatened fauna handbook*. Threatened Species Unit, Parks and Wildlife Service, Tasmania.
- Cochran, T. (2003) *Managing Threatened Species & Communities on Bruny Island*. Threatened Species Unit, Department of Primary Industries, Water and Environment, Tasmania.
- Hobday, A.J. and Pecl, G.T. (2014) Identification of global marine hotspots: sentinels for change and vanguards for adaptation action. *Reviews in Fish Biology and Fisheries* 24(2): 415–425.
- O'Loughlin, P.M. and O'Hara, T.D. (1990) A review of the genus *Smilasterias* (Echinodermata, Asteroidea), with descriptions of two new species from south-eastern Australia, one a gastric brooder, and a new species from Macquarie Island. *Memoirs of the Museum of Victoria* 50(2): 307-323.

McKnight, D.G. (2006) *The marine fauna of New Zealand: Echinodermata: Asteroidea (sea-stars). 3. Orders Velatida, Spinulosida, Forcipulatida, Brisingida, with addenda to Paxillosida, Valvatida.* NIWA (National Institute of Water and Atmospheric Research), Wellington.

Materia, C.J. (1994) *A study of native Asteroids in south eastern Tasmania.* Wildlife Report 94/9. Hobart, Tasmania: Tasmania Parks and Wildlife Service, and the Tasmanian Museum and Art Gallery.

Stuart-Smith, R. D., Barrett, N. S., Stevenson, D. G. and Edgar, G. J. (2010) Stability in temperate reef communities over a decadal time scale despite concurrent ocean warming. *Global Change Biology* 16: 122-134.

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Contact details: Threatened Species and Private Land Conservation Section, Department of Primary Industries, Parks, Water and Environment, GPO Box 44, Hobart, Tasmania, Australia, 7001. Phone 1300 368 550. ThreatenedSpecies.Enquiries@dPIPWE.tas.gov.au

Permit: A permit is required under the Tasmanian *Threatened Species Protection Act 1995* to knowingly “take” (which includes kill, injure, catch, damage, destroy and collect), keep, trade in or process any specimen of a listed species.