Parvulastra vivipara

Tasmanian live–bearing seastar

TASMANIAN THREATENED SPECIES LISTING STATEMENT

Parvulastra vivipara © Mark Wapstra

Common name: Tasmanian live-bearing seastar

Scientific name: ***Parvulastra vivipara*** (Dartnall, 1969)

Group: Invertebrate animal, seastar, family **Asterinidae**

Previous name: *Patiriella vivipara*

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

Environment Protection and Biodiversity Conservation Act 1999: **Vulnerable**

IUCN Red List: **Not listed**

Distribution: Endemic status: **Endemic**

Tasmanian NRM Regions: **South**

Tasmanian IMCRA coastal & marine bioregions (Version V4): **Bruny, Davey**

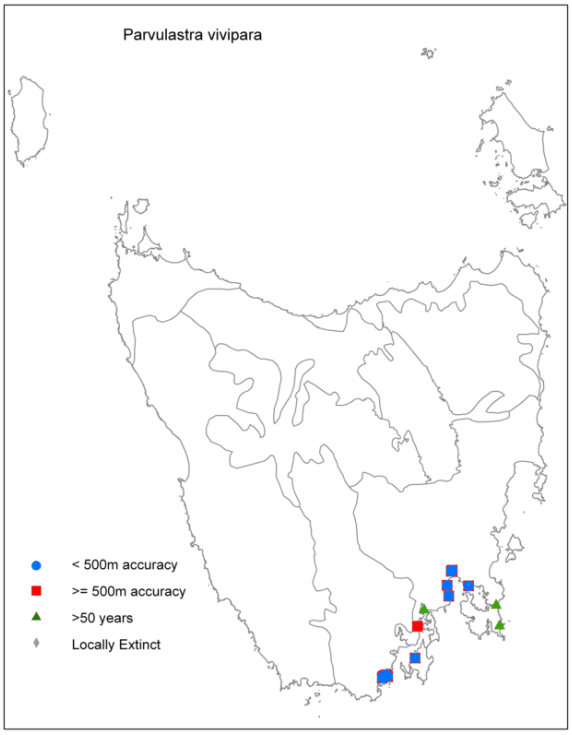

Figure 1. The distribution of *Parvulastra vivipara*, showing IBRA regions (from Natural Values Atlas)

Plate 1. Live specimen of the Tasmanian live-bearing seastar © Mark Wapstra

SUMMARY: The Tasmanian live-bearing seastar is a small, orange-yellow seastar, up to 30 mm across, with five arms and a rounded pentagonal shape. Endemic to Tasmania, the species is known only from waters between the high and low tide mark (littoral waters) in the state's southeast. The seastar is unusual in being one of very few seastars worldwide that brood their eggs then give birth to live young (viviparous). Available data indicate that there has been an 88% reduction in population numbers of the live-bearing seastar between the early 2000s and 2020. The main threats to this species are habitat deterioration and destruction through sedimentation, eutrophication, and coastal development. Sea level rise and competition, displacement and possibly predation from introduced seastars, such as the New Zealand seastar and the northern Pacific seastar, are also identified as threats. Many subpopulations of the species are close to populated areas and have been impacted by catchment runoff, pollutant discharge, coastal encroachment and infrastructure development. The objectives for management of the species include the instigation of a systematic monitoring program, protection of known subpopulations, identification of any locations of unrecorded subpopulations, and increasing understanding of the species' ecology and habitat requirements.

IDENTIFICATION AND ECOLOGY

The Tasmanian live-bearing seastar (*Parvulastra vivipara*) is a bluntly stellate seastar, up to 30 mm across (Plate 1). The species usually has five arms (although morphological variation is common with three, four or six arms occasionally being present) and is a rounded pentagonal shape. Live individuals are a consistent orange-yellow colour, slightly lighter on the actinal surface (Dartnall (1969).

The Tasmanian live-bearing seastar reaches sexual maturity (and a diameter of 5 mm) at around 12 months. It is thought that the species may live 8 to 10 years (Prestedge 1998, 2001). It is capable of breeding throughout the year, with the peak reproductive season occurring from October to January.

However, high numbers of juveniles have also been observed in June suggesting that there may also be a mid-year release period (Polanowski 2002). The Tasmanian live-bearing seastar is hermaphroditic, and undergoes self-fertilisation (Byrne 1996, Byrne and Cerra 1996). Up to 5 young develop in the gonadal sac and when they reach 1–2 mm they rupture from the sac and emerge on the surface of the adult. The newborn seastars are tiny miniatures of the adult. This type of reproduction means that the species cannot disperse widely, unlike species with a free-swimming larval stage (Bryant & Jackson 1999). This apparent inability to disperse into new habitat renders the species vulnerable to several threatening processes.

Embryogenesis is asynchronous, with progeny at different stages of development in the gonads. The end-point of brooding is variable in the Tasmanian live-bearing seastar, with juveniles emerging from the parent at sizes ranging between 1.5 and 5.0 mm diameter. At birth the juveniles are up to 25–30% of the parent's diameter. Birth involves distension of the gonopore, with a marked separation of the ossicles and softening of the connective tissue around the pore. The juveniles are considerably larger than the ova and depend on extraembryonic nutrition to support their growth. Once the mouth opens, the juveniles prey on their intragonadal siblings. Cannibalism accounts for much of the post-metamorphic mortality (Byrne 1996, Byrne and Cerra 1996).

The Tasmanian live-bearing seastar feeds at night and on dull, overcast days (Prestedge 1998). It is an extra-oral (outside of the mouth) feeder on micro-algal films coating the surface of submerged rocks and can evert (push out) its remarkably voluminous cardiac stomach to a diameter larger than that of its body. Individuals often have their stomach fully everted and in contact with the substratum, indicating that digestion is likely to take place outside the body (Polanowski 2002).

Survey techniques

The Tasmanian live-bearing seastar is usually surveyed at low tide, with searches conducted beneath and on the undersides of rocks within the midlittoral zone (DPIW 2006a; Prestedge 1998). Quantitative survey approaches include shore transects and/or quadrats, however surveys to determine presence/absence should also incorporate searches over broader areas (e.g. timed searches) to address areas of potentially low density occurrence. Surveying when sites are under water, particularly during calm conditions at night or on overcast days, may also improve chances of detection as the seastars become more visible at some sites as they emerge out of hiding to feed on upper rock surfaces (Polanowski 2002).

Taxonomic issues

The Tasmanian live-bearing seastar was first described in the genus *Patiriella* (Dartnall 1969) but the southern Australian multi-armed species were recognised as possibly requiring a new genus (Dartnall et al. 2003), which was demonstrated in a taxonomic study by Waters et al. (2004), who suggested that four species previously included in *Patiriella* belong to a monophyletic clade. This group share a consistent morphology characterised by subpentagonal form, longitudinal series of abactinal plates on rays, oblique series of actinal plates, granuliform and digitiform spinelets, a few papulae space, and superambulacral and superactinal plates. The clade warrants generic rank, which was formally recognised by O'Loughlin & Waters (2004) with the erection of *Parvulastra*.

Confusing species

The Tasmanian live-bearing seastar is similar to other species that may co-occur. In the field, colour of live individuals may be used to separate some species. The Tasmanian live-bearing seastar is consistently orange-yellow, *Parvulastra exigua* has a blue-green actinal surface, and *Patiriella regularis* has an off-white actinal surface (Dartnall 1969). Reproductive characteristics may be used to separate several similar species (Dartnall 1969) but this requires microscopical examination.

DISTRIBUTION AND HABITAT

The Tasmanian live-bearing seastar is endemic to Tasmania (Table 1, Figure 1). It is only known from littoral waters (area between the high and low tide mark) in the State's southeast (Prestedge 2001).

The Tasmanian live-bearing seastar is known reliably from 13 locations (Prestedge 2001), however, the subpopulations at possibly up to four of these locations may now be extinct (Prestedge 2001; Rowland 2001, Parsons 2020, Strain *et al.* unpub. data). It is believed that the colony at Woodbridge was introduced there in late 1995. Populations of the Tasmanian Live-bearing Seastar are known to have a highly restricted range and are geographically isolated from each other as all known subpopulations are relatively small and isolated. The sites are separated by distances that exceed the presumed dispersal capacity of the species (Prestedge 2001). The likelihood of the current distribution of the Tasmanian live-bearing seastar being the actual distribution is reasonably high.

The Tasmanian live-bearing seastar lives in rocky areas in the upper intertidal zone, usually under rocks or in crevices (Plates 2 & 3). They appear to have a water depth limit, being found from just below the high water mark to a depth of approximately 1.2 m at high water (Prestedge 2001). The species prefers gently sloping, sheltered shores, characterised by rocks often no more than 20 to 30 cm high. Some small colonies seem to be habitat specific, with some preferring dolerite and others sandstone.

Plate 2. Habitat of the Tasmanian live-bearing seastar at Bambra Reef, Roches Beach, near Lauderdale © Mark Wapstra

Table 1. Population summary for *Parvulastra vivipara*

	Location	Tenure	NRM region*	1:25 000 mapsheet	Year first seen	Extent of subpopulation (m^2)	Abundance
1	Pitt Water	Pitt Water Nature Reserve (Barren and Woody islands only)?	South	Carlton	1966	2020 = 9,450 2022=9,125	2000=326,000 2019-2021 = 14,100 2022=13,422
2	Lewisham (Pitt Water)	Pitt Water - Orielton Lagoon Ramsar Site	South	Carlton	1952	2020=44 2022=31	2020=242 2022=2
3	Bambra Reef, Roches Beach (Frederick Henry Bay)	Marine	South	Carlton	1963	2001=450 2013=943 2022=945	1983=400 1998=100 2001=17,505 2013=8,400 2022=12,283
4	Mays Point (South Arm)	Public Reserve	South	Carlton	2002	15 2022=0	2002=13 2020=possibly extinct 2022=0
5	Primrose Sands (Susan Bay) (Frederick Henry Bay)	Public Reserve	South	Carlton	2001	25 2022=122	2002=1,885 2022=132
6	Pipe Clay Lagoon (South Arm)	Tidal Crown land	South	Cremorne	1998	2000=180 2022=3,174	2000=1,180 2022=8,418
7	Tessellated Pavement (Tasman Peninsula)	Tessellated Pavement State Reserve	South	Taranna	1968	2000=150 2022=205	1998 = 1500 2000=6,858 2022=68
8	Fossil Island, Eaglehawk Neck (Tasman Peninsula)	Tasman National Park	South	Taranna	1953	2022=0	No estimate available (potentially extinct) Last record 2016
9	Fortescue Bay (Tasman Peninsula)	Tasman National Park	South	Hippolyte	1990	2000=20 2022=22	1995=50 2000=20 2002=109 2022=8
10	Grundys Point, Lunawanna, Bruny Island (D'Entrecasteaux Channel)	Public Reserve	South	Partridge	1988	2000=34 2022=0	2000=904 2022=0

11	Southport Lagoon	Southport Lagoon Conservation Area	South	Leprena	2006	Not indicated (DPIW 2006a) 2022=2,563	2006=Several hundred 2022=6,272
12	Peppermint Bay, Woodbridge (D'Entrecasteaux Channel)	Marine	South	Cygnet	1995	2000=150 2022=754	2001=510 Introduced 2022=100
13	Oyster Cove (D'Entrecasteaux Channel)	Marine	South	Barnes Bay	1952	Unknown	Extinct
14	Howden, Powder Jetty (D'Entrecasteaux Channel)	Marine	South	Blackmans Bay		Unknown	Possibly never existed
15	Tinderbox (D'Entrecasteaux Channel)	Tinderbox Marine Nature Reserve	South	Blackmans Bay		Unknown	Possibly never existed

*NRM region = Natural Resource Management region

POPULATION PARAMETERS

The Tasmanian live-bearing seastar is known from 13 isolated subpopulations, which vary in abundance from approximately 100 individuals to more than 10,000 (Table 1). Rowland (2001) estimated the population size of the Tasmanian live-bearing seastar, excluding the Pitt Water subpopulation, to be approximately 27,000 individuals.

Based on data collected in 2000, Aquenal (2005) estimated that the largest subpopulation, located in Pitt Water, contained 326,000 individuals. While this estimate was based on extrapolation of data for representative transects, an accurate count of 21,368 was made on the southern side of the western Sorell Causeway prior to its realignment, with these animals collected for relocation in 2001. This area comprised approximately 15% of the known shoreline distribution of the live-bearing seastar in Pitt Water at the time, but was noted as providing subordinate habitat to the northern side of the same causeway, which was estimated to support 75,000 individuals, and to many neighbouring natural habitats (Aquenal 2005).

With inclusion of data for Pitt Water, the estimated total population size across the entire species range was 353,000.

Plate 3. Habitat of the Tasmanian live-bearing seastar west of Lumeah Point, Pipe Clay Lagoon, near Cremorne © by Mark Wapstra

However, more recent surveys suggest a major decline in population numbers at Pitt Water. Data collected during 2019–2021 suggested a revised population estimate of just 14,100 (Parsons 2020, Parsons pers. comm.), reflecting a 96% decline since 2000. Based on surveys by Strain *et al.* (unpub. data), this number declined to 13,422 by 2022.

The above declines are consistent with monitoring at a series of control sites in Pitt water, which showed numbers of the live-

bearing seastar declining gradually over time, with a loss of 87 to 100% of individuals between 2001 and 2019 (Aquenal 2005, Parsons 2014, Parsons 2020). A separate monitoring program involving 30-minute timed-search surveys at south Midway Point found 68 and 47 individuals during in 2016 and 2018 respectively, down from 287 in 2009 (M. Byrne, personal observation, referenced in Liversage and Byrne 2018). This represents a decline of 83% between 2018 and 2009.

Population declines in Pitt Water appear to be largely associated with environmental deterioration of habitat, specifically sedimentation and eutrophication. In conjunction with this, there has been elevated colonisation by suspension feeding sessile invertebrates, such as tubeworms and ascidians, which has resulted in habitat loss for the live-bearing seastar (O'Hara and Byrne 2017, Parsons 2020). This environmental deterioration, in addition to other physical attributes, led to failure of formerly re-created habitat along the western causeway at Sorell, further contributing to population declines.

Earlier qualitative observations in Pitt Water indicated population declines through the 1970s to 1990s, followed by some recovery (Prestedge 2001), as reflected by the high abundances described by Aquenal (2000, 2005). This led to suggestion that the live-bearing seastar may experience a boom–bust cycle; at the very least it suggested that this species has a high capacity to respond to improved environmental conditions. However, observations of declining health of habitats in Pitt Water between 2000 and 2020, and associated declines in numbers of the live-bearing seastar, suggest that recovery is unlikely unless causes of environmental deterioration can be addressed.

Resurveying of the subpopulation at Roches Beach in 2013 also recorded a reduction in population size, with an estimated 8,400 individuals (Aquenal 2013) compared to an earlier estimate of 17,505 (Rowland 2001). Re-surveying of this site, and additional sites outside Pitt Water, was performed by Strain *et al.* (unpub data) in 2022. Prior to this work, populations at Oyster Cove, Howden, Tinderbox and Fossil Island had been documented as exinct or in doubt. In 2022, sites at Mays Point and Grundys Point recorded no animals (Strain *et al.* unpub. data) and hence are added as likely sites of local extinction. Population sizes at Lewisham, Tessellated Pavement, Fortesque Bay and Primrose Sands were also very small, with numbers suggesting a risk of local extinction. The population size at Woodbridge was also small, although this represents an introduction site where *P. vivipara* has hybdridised with *Parvulastra exigua*, and many hybrids were observed (Strain *et al.*, unpub. data). Estimated population size at Roches Beach increased to 12,283, although was still lower than the above 2001 estimate. Increases were observed at two other sites: Pipe Clay Lagoon, following the discovery of a previously unidentified area of habitat in the south-west part of the lagoon (K. Parsons, pers. obs.); and Southport, where detailed quantitative data had not previously been collected.

Based on updated data, the total population size across the entire species range is estimated at 40,705. This reflects a 88% decline in estimated population size between the early 2000's and 2020.

The absence of earlier quantitative estimates of area of occupancy in Pitt Water complicates temporal assessments of this parameter, but available mapping data also suggest a decline over time. Mapping by Hoggins (1976) indicated that the live-bearing seastar occupied approximately 13 km of shoreline in Pitt Water in the 1970s, while its range at this site was estimated to be only 5 km by the late 1990s (Prestedge 1998), and more recently to be 3.15 km (Parsons 2020, Parsons pers. comm.). Based on updated data provided by Strain *et al.* (unpub data), the extent of occurrence of the Tasmanian live-bearing seastar is estimated at 2,558 km^2, while the area of occupancy is estimated to be 16,941 m^2.

RESERVATION STATUS

The Tasmanian live-bearing seastar occurs in the Pitt Water Nature Reserve (Barren and Woody islands only; and more broadly within the RAMSAR wetland at Pitt Water), Tessellated Pavement State Reserve, Tasman National Park, Southport Lagoon Conservation Area and some coastal Public Reserves. Note that the extent of many of the reserves into the tidal area is not known and some may not extend to the low tide mark, therefore may not fully encompass the extent of the subpopulations (the species will occur to about 1.2 m depth below high-water level).

CONSERVATION STATUS

The Tasmanian live-bearing seastar was listed in 1995 as endangered on the Tasmanian *Threatened Species Protection Act 1995*, but was downlisted to vulnerable in 2008, following the discovery of new subpopulations. However, following records of large declines in population numbers, particularly at Pitt Water, this species was uplisted again to endangered in 2023.

It now meets:
Criterion A for endangered (estimated population reduction), specifically:
A1 (population reduction exceeding 50% within the past three generations),
A1b (reduction determined through an index of abundance) and
A1c (a decline in quality of habitat).

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 been superseded by a newer version endorsed by the Scientific Advisory Committee (Threatened Species) in March 2023.

THREATS, LIMITING FACTORS & MANAGEMENT ISSUES

The main identified threats to the Tasmanian live-bearing seastar are habitat deterioration and destruction through sedimentation, eutrophication, and coastal development. Many of the subpopulations of the Tasmanian live-bearing seastar are in close proximity to areas inhabited by humans and consequently are impacted by habitat degradation and modification through anthropogenic causes, such as runoff of pollutants, removal of suitable habitat, infrastructure development and urban encroachment (Prestedge 2001, TSSC 2009, Parsons 2020). Such threats have not ceased, and may result in further population declines in the future. Sea level rise will also become an increasing threat, causing higher tidal distributions of fouling marine invertebrates and algae, and associated shrinking of the habitat of the live-bearing seastar where no suitable habitat occurs higher on the shore. Other factors may include interspecific competition, displacement and potential predation from introduced seastars such as the New Zealand seastar (*Patiriella regularis*) and the northern Pacific seastar (*Asteria amurensis*).

Habitat modification and destruction: Many of the subpopulations of the Tasmanian live-bearing seastar are in close proximity to populated areas. Human impacts include removal of rocks and suitable substrates from the intertidal zone, infrastructure development, urban encroachment, poor land use practices, and pollution-induced disturbances such as eutrophication, sedimentation, increasing water temperature, declining salinity, and ground water seepage from urban, industrial and agricultural land uses (Bryant & Jackson 1999). Declines in the colonies and population numbers at various sites may potentially be influenced by reduced water quality due to sewerage treatment plant discharge, seepage from areas serviced by septic tanks and from storm water and catchment runoff (Prestedge 1998).

Climate change and sea level rise: Predicted sea level rise over the next 50 to 100 years is expected to result in the up-shore movement of the tidal range of the live-bearing seastar.

In areas where the seastar already occurs at the highest extent of available habitat, this will result in a shrinking or potential loss of habitat. Lost habitat is likely to be dominated by fouling

species moving upshore in response to changing sea levels.

Interspecific competition from introduced seastars: Owing to the small, restricted subpopulations of the Tasmanian live-bearing seastar, it is considered highly vulnerable to interspecific competition and displacement from introduced species such as the New Zealand seastar and the northern Pacific seastar.

Predation by introduced seastars: The introduced northern Pacific seastar preys upon the Tasmanian live-bearing seastar under controlled conditions (Prestedge 1999). To what extent this threat exists in their normal habitat is unknown, as the northern Pacific seastar had not been found in any colony of the Tasmanian live-bearing seastar until 2008, when the species was detected at Bambra Reef.

Recreational activities: An assessment (DPIW 2006b) of the impacts on Southport Lagoon as a result of the proposed change in management of the lagoon waters and the surrounding Conservation Area found that the proposed boat launching site on the western side of the lagoon may lead to a five to ten fold increase in boat traffic on the lagoon and an increase in recreational fishing. An increase in power boat traffic and recreational fishing has the potential to increase the risk of damage to the habitat of the Tasmanian live-bearing seastar.

MANAGEMENT STRATEGY

Management objectives

The main objectives for the recovery of *Parvulastra vivipara* are to prevent the loss or degradation of habitat supporting known subpopulations; identify new subpopulations of the species; increase the information and data available on the location, size and condition of known subpopulations; and improve the understanding of the ecological requirements of the species.

What has been done?

- **Existing management plans**: The Woodbridge Environment Group (Rowland 2001) developed an action plan providing an education and monitoring program for the Tasmanian live-bearing seastar.

  The Southport Lagoon Conservation Area has a management plan (DPIW 2006b) that makes specific mention of the Tasmanian live-bearing seastar. It highlights the possibility of damage to habitat of the species and potential introduction of marine pests. It makes recommendations regarding trailer use, restricted areas and monitoring.

  The Pitt Water Nature Reserve also has a management plan and recommends monitoring, research and management actions, making particular mention of causeway construction projects, to ensure the survival of threatened species such as the live-bearing seastar.

- **Targeted surveys & monitoring:** Dartnall (1969) undertook the original survey, recording the Tasmanian live-bearing seastar from three localities (Pitt Water, Roches Beach and Eaglehawk Neck).

  Hoggins (1976) estimated the size of subpopulations at Midway Point, Tinderbox and Eaglehawk Neck. Prestedge (1998) monitored subpopulations of the Tasmanian live-bearing seastar on the shore at Pitt Water between 1976 and 1982, and Eaglehawk Neck, Roches Beach and Fortescue Bay in February 1998. During the 1990s additional new colonies were recorded mainly as a result of unsystematic private surveys (Prestedge 2001). Rowland (2001) undertook an assessment of the abundance the Tasmanian live-bearing seastar at a number of locations in south-east Tasmania, excluding the Pitt Water subpopulation. Polanowski (2002) undertook surveys and population counts at several of the known sites, and located a new subpopulation at Mays Point, Lauderdale.

  Aquenal (2000, 2005) undertook surveys and population counts along the western causeway in Sorell and adjacent natural habitats of Pitt Water as part of a relocation

program for realignment of the southern side of the causeway. This incorporated monitoring of natural control sites; work which was extended temporally by Parsons (2014, 2020). Parsons (2020) performed surveys and population counts at representative transect sites across both causeways and in natural habitats within Pitt Water. Since 2009, Byrne (personal observation, referenced in Liversage and Byrne 2018) has also conducted temporal surveys at Midway Point in Pitt Water on the basis of 30-minute timed-searches. In 2006, a survey of the species at Southport Lagoon (for the purpose of developing a management plan for the area) was conducted over five days from October to December. Seven colonies, varying from a few individuals to several hundred seastars, were recorded (DPIW 2006a).

In 2022, Strain *et al.* (unpub. data) re-surveyed all known existing populations of *P. vivipara* to produce an updated total population estimate. In conjunction with this project, awareness raising activities were conducted and plans made for preparing an IUCN Red List nomination for the species.

- **Sorell (western) causeway upgrade**: In 1998, the then Department of Roads and Transport undertook structural support and maintenance of a section of sandstone wall of the Sorell Causeway that had degraded through constant wave action over many years. As part of the upgrade, the Department considered the importance of protecting the threatened seastar in its planning. The Department provided a sandstone façade along the entire intertidal zone of the wall to provide specific habitat for the seastar, which otherwise would not have survived or recolonised the structural dolorite boulders. Seastars were relocated by volunteers during the maintenance phase of the works, which were then relocated after works.
- **Sorell bridge construction and causeway realignment:** Prior to causeway realignment works performed as part of the McGees Bridge development, seastars were relocated away from the western causeway (south side) in Pitt Water during 2001, and subsequently returned to re-created habitat post-construction in 2003–2004. Monitoring revealed that 60% of re-created habitat remained viable 10 years later. However, after 15 years, all re-created habitat west of the bridge had become unviable, leaving only a small area of uncertain viability east of the bridge. Declines were also recorded in natural environments, and it was concluded that the failure of the majority of the re-created causeway habitat was due to a combination of physical attributes of the recreated habitat and ongoing environmental deterioration in Pitt Water (Parsons 2020).
- **Future Sorell causeway construction:** As part of the South-East Traffic Solution (SETS) program, a new bridge will be constructed north of the McGees bridge and both of the causeways in Pitt Water will be duplicated, requiring realignment and reinforcement of both structures.

  Work is being performed to assess the feasibility of effective impact avoidance and mitigation for *P. vivipara*. Understanding the reasons for the failure of the former re-created causeway habitat will be critical in achieving appropriate conservation outcomes for the seastar (Parsons 2020).

What is needed?

- To monitor changes in the status of the species – design and implement a systematic monitoring program.
- To increase understanding of the status of the species – more precisely assess population size, distribution, ecological requirements and the relative impacts of threatening processes.
- To better document the distribution of the species – undertake survey work in suitable

habitat and potential habitat to locate any additional subpopulations.

- To improve protection of the species – conduct 'future footprint' mapping of sea level rise scenarios to identify habitats most at risk.
- To improve protection of the species – control and monitor ballast water to reduce the introduction of additional marine pests.
- To improve protection of the species – ensure infrastructure or development activities in areas where the species occurs do not adversely impact on known subpopulations.
- To improve protection of the species – control access to suitably constrain public access to known sites.
- To improve protection of the species – protect subpopulations of the species through the development of conservation agreements and/or covenants.
- To improve protection of the species – develop and implement a management plan for the control of New Zealand seastar (*Patiriella regularis*) and the northern Pacific seastar (*Asterias amurensis*) in the local region.
- To improve protection of the species – raise awareness of the Tasmanian live-bearing seastar within the local community.
- To improve protection of the species – investigate options for linking, enhancing or establishing additional subpopulations.

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Prepared in 2010 by Mark Wapstra and updated in 2021 by Karen Parsons, in conjunction with the Threatened Species Section, under the provisions of the *Threatened Species Protection Act 1995*. Published by the Department of Natural Resources and Environment Tasmania, August 2023.

Cite as: Threatened Species Section (2023). *Listing Statement for* Parvulastra vivipara *(Tasmanian live-bearing seastar)*. Department of Natural Resources and Environment Tasmania.

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