Survey for the Tasmanian live-bearing seastar *Parvulastra vivipara* at Tinderbox, June 2018

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Operational Summary

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1. Introduction and scope

The Tasmanian live-bearing seastar *Parvulastra vivipara* (formerly known as *Patiriella vivipara*) is an endemic seastar, limited to a small number of sites in south east Tasmania. *P. vivipara* is one of only four seastar species worldwide known to bear live young (i.e. viviparous). The seastar is considered of high conservation value, due to its limited distribution and unique biology. *P. vivipara*'s conservation value was formally recognised in July 1998, when it was listed as an endangered species under the Tasmanian Threatened Species Protection Act 1995. *P. vivipara*'s listing was downgraded to 'vulnerable' in 2008, following the discovery of new subpopulations (DPIPWE 2012). *P. vivipara* is also listed as vulnerable under the Commonwealth's EPBC Act 1999.

The Tasmanian live-bearing seastar is a small species, with a maximum reported radius of up to 15 mm (Dartnall 1970), and an average adult radius of approximately 10 mm (Prestedge 1998). *P. vivipara* usually has five arms, although specimens with two, four or six arms have been identified in small numbers (Prestedge 1998). The seastar is characteristically orange to pale yellow in colour on both the dorsal (upper) and ventral (lower) surfaces (Figure 1).

Figure 1 *Parvulastra vivipara*, showing uniform apricot/yellow colouration that is characteristic of this species.

P. vivipara has only been found in intertidal waters in southeast Tasmania and is known reliably from 13 locations. The northernmost population occurs at Pitt Water, while a population at Southport Lagoon represents the southernmost known population (Prestedge 2001 cited in DPIPWE 2012). The distribution of *P. vivipara* is extremely fragmented as all known populations are relatively small and isolated. The populations are separated by distances that exceed the presumed dispersal capacity of the species (Prestedge 2001). *P. vivipara* is found on rocky areas in the upper intertidal zone, usually under rocks or in crevices (DPIPWE 2012). 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 very habitat specific, with some preferring dolerite and others sandstone (DPIPWE 2012). The different populations vary in size from less than 20 individuals to several thousand. The largest population is located at Pitt Water (population estimate 326,000 individuals; DPIPWE 2012). In the D'Entrecasteaux Channel area small *P. vivipara* populations are known to occur but there have also been instances of populations becoming extinct from some locations (DPIPWE 2012). In the Tinderbox/Howden area, there have been anecdotal reports of a *P. vivipara* population (DPIPWE 2012).

As part of Aquaculture Stewardship Council (ASC) accreditation, Tassal commissioned a survey for *Parvulastra vivipara* in the area adjacent to their Tinderbox marine farm (Marine Farm Lease MF90). The Aquaculture Stewardship Council (ASC) was founded in 2009 to manage the global standards for responsible aquaculture. As part of this certification initiative, the ASC has developed a set of science-based requirements that must be addressed to a required level (ASC 2017). Conservation of natural habitat, local biodiversity and ecosystem function is a specific ASC requirement, with minimising effects on habitat for endangered or threatened species a key consideration (ASC 2017). The *P. vivipara* surveys in the current study were designed to address this ASC requirement.

This report summarises a survey undertaken along the intertidal zone in the Tinderbox area adjacent to the marine farm lease. Surveys focused on habitats likely to support *P. vivipara*. Observations of other taxa were also made with particular consideration given to *Parvulastra exigua*, a closely related seastar which can appear similar *to P. vivipara*.

2. Methods

An approximate 2 km stretch of shoreline was surveyed in the Tinderbox/Howden area (Figure 2). The overall survey area was selected due to the proximity to the Tinderbox marine farm lease and also the availability of suitable *P. vivipara* habitat. The survey area was characterised by the presence of gently sloping, sheltered, rocky habitat known to be the preferred habitat of *Parvulastra vivipara* (Figure 1). The survey area was bordered to the north and south by predominately steeper cliff-like shoreline which is not known to be suitable habitat for *P. vivipara*. The entire shoreline was walked with specific sites selected on the basis of habitat likely to support *P. vivipara*. Eleven sites along this stretch of shoreline were thoroughly searched by four personnel, coinciding with a suitable low tide period (0.61 m).

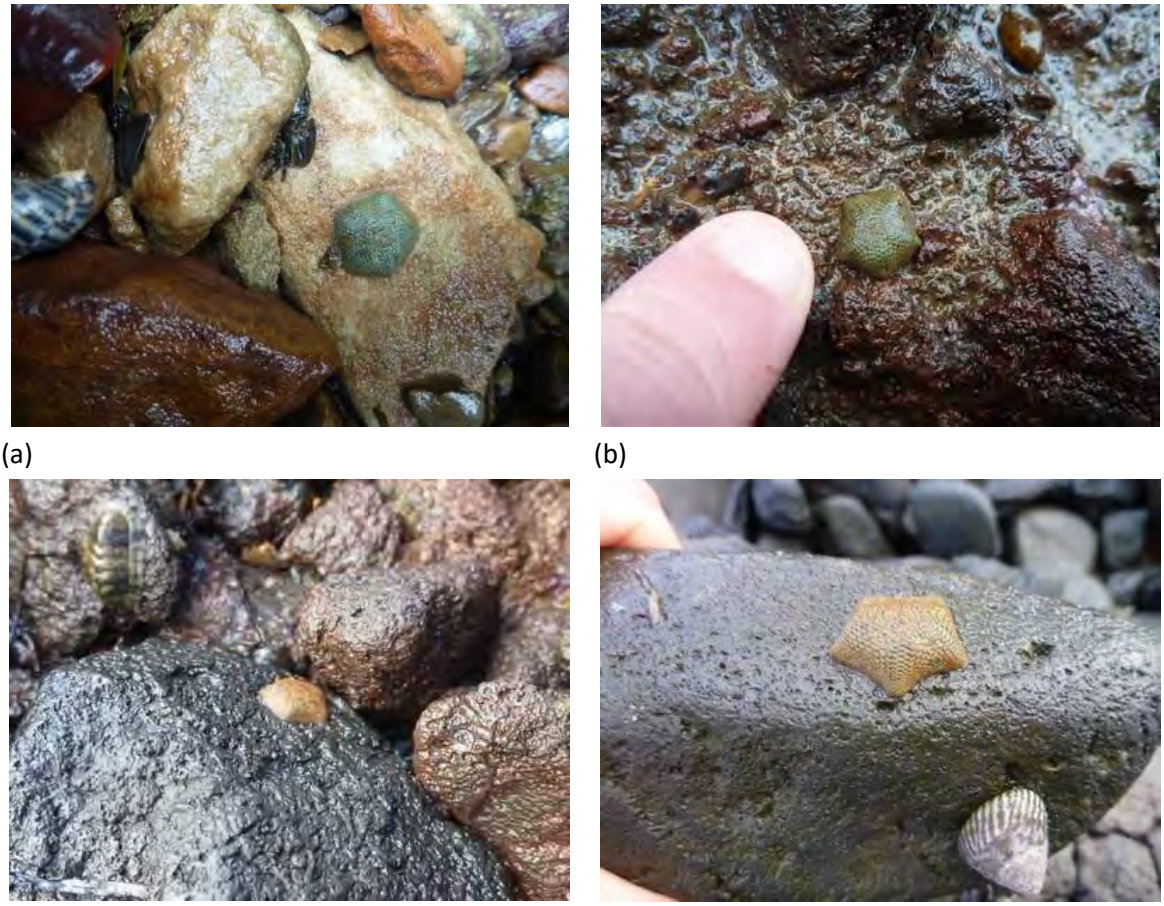
At each site, searchers slowly walked a 30 m transect parallel to the water, carefully lifting and looking under rocks. Rocks were turned over then replaced as it has been observed that *P. vivipara* often resides in the shade within interstices during the daytime, emerging to more exposed locations to feed at night (Polanowski 2002). Surveys focused mainly on the mid-high intertidal zone where *P. vivipara* is known occur at other sites. Between sites, habitat was surveyed by eye whilst walking and turning over occasional rocks. GPS coordinates were recorded (Appendix 1) and field observations were made of the habitat and species present at each site.

Figure 2 Location of survey area and sites surveyed for *Parvulastra vivipara* in June 2018

3. Results

No individuals of the threatened seastar *Parvulastra vivipara* were detected during the survey. A related and morphologically similar species, *P. exigua*, was identified at eight of the eleven sites in low-moderate abundance. *P. exigua* is a common intertidal species with a distribution extending across southern Australia (Edgar 2008). This species showed variable colouration on the dorsal surface ranging from the typical green-blue to a mottled dark orange colour (Figure 3). *P. exigua* can be distinguished from *P. vivipara* on the basis of colouration, with *P. vivipara* uniformly orange to pale yellow on the dorsal and ventral sides (Dartnall 1969, see Figure 1). A range of other taxa were recorded during the survey, with intertidal assemblages observed considered typical of rocky coastal habitats in southern Tasmania. The invasive New Zealand half-crab, *Petrolisthes elongatus*, was present in particularly high abundance at most sites. A summary of observations made during the intertidal survey are included in Table 1.

The shoreline in the survey area included a diverse mix of rock types and structures. Sandstone and dolerite were the main rock types present, with areas of large dolerite boulders and sandstone shelves interspersed with beaches of smaller rocks and cobble (see Appendix 2). The habitat types were considered comparable to areas where *P. vivipara* is currently found at other sites in southern Tasmania. Representative imagery of key habitats and taxa observed during the survey are provided in Appendix 2.



(a) (b)

(c) (d)

Figure 3 Images of *Parvulastra exigua* identified during the survey

Table 1 Summary of survey observations. Transects were carried within the intertidal zone on 8th June 2018, coinciding with suitable low tide (0.61 m at 09:17 am).

Site	Substrate – dominant type(s) and composition	*Parvulastra vivipara* - present/absence	*Parvulastra exigua* - presence/absence (individuals recorded)	Reference photos in Appendix 2 – photo label(s)
1	Sandstone boulders	absent	absent	A, B, C
2	Mixed habitat, sandstone shelf with large rocks and a rocky beach with dolerite 50-300 mm	absent	absent	D, E
3	Rocky beach, dolerite 50-300 mm	absent	present (1)	G
4	Sandstone shelf with sandstone and dolerite rocks 100-500 mm+	absent	present (1)	F
5	Large sandstone boulders 300-500mm+ smaller sandstone rocks 100-200 mm in interstices	absent	present (1)	H, I, J, K
6	Dolerite reef comprised of large 300-600 mm and medium size 150-300 mm rocks	absent	present (6)	L
7	Dolerite reef comprised of large 300-600 mm and medium size 150-300 mm rocks	absent	present (25)	M
8	Dolerite reef comprised of large 300-600 mm and medium size 150-300 mm rocks	absent	present (13)	N
9	Dolerite reef comprised of large 200-600 mm rocks with smaller 20-50 mm rocks in the interstices	absent	present (16)	O
10	Sandstone shelf with dolerite rocks, approx. 100-300 mm diameter	absent	present (2)	P, Q, R, S
11	Sandstone shelf with dolerite rocks approx. 100-300 mm diameter	absent	absent	T

Table 2 Summary of common taxa identified across the 11 sites. Taxa denoted with * were uncommon

Group	Taxa identified
Crustaceans	*Petrolisthes elongatus*, *Cyclograpsis sp.*, *Ligia sp*.
Gastropods	*Bembicium sp.*, *Nodilittorina unifasciata*, *Austrocochlea sp.*, *Austrocochlea constricta*, *Nerita atramentosa*, *Cominella lineolata*, *Lepsiella sp*.
Chitons	*Sypharochiton pelliserpentis*
Anemones	*Actinia tenebrosa, Aulactinia veratra**
Barnacles	*Elminius sp.*, *Siphonaria diemenensis*, *Tetraclitella purpurascens*
Limpets	*Notoacmea sp., Scutus antipodes**, *Cellana sp.*, *Patelloida sp*.
Bivalves	*Crassostrea gigas*, *Mytilus edulis*
Seastars	*Parvulastra exigua, Patiriella regularis**
Flatworms	unidentified
Sea slugs	*Onchidella sp*.
Polychaetes	*Galeolaria caespitosa*
Seaweeds	*Ulva sp*.

4. Conclusions

Despite the presence of suitable habitat, a thorough search of the survey area did not detect any *Parvulastra vivipara* individuals. It appears unlikely that a population currently exists in the Tinderbox/Howden area. It is possible that small *P. vivipara* populations may have been historically present and have since become extinct in the area. However, there remains some question as to whether these populations ever existed (DPIPWE 2012). Historical identification of *P. vivipara* from the Howden area may have confused the species with the closely related *P. exigua* which was common in the current survey.

Intertidal taxa recorded during the survey were typical of species expected to occupy such habitats in southern Tasmania and there was no evidence of environmental degradation along the shoreline surveyed.

References

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Appendices

Appendix 1 site GPS coordinates (Coordinates = UTM, Datum = GDA94, MGA Zone 55)

Site	Easting	Northing
S1	524727	5234145
S2	524771	5234060
S3	524773	5233929
S4	525051	5233549
S5	525199	5233186
S6	525288	5232926
S7	525306	5232901
S8	525336	5232841
S9	525404	5232725
S10	525500	5232639
S11	525566	5232544

Appendix 2 Representative field survey images

	
A - Site 1	B – Site 1, *Patiriella regularis*
	
C – Site 1, *Onchidella sp*.	D - Site 2
	
E – Site 2	F - Site 4

	
G - Site 3	H - Site 5
	
I - Site 5, *Parvulastra exigua*	J – Site 5, *Parvulastra exigua*
	
K - Site 5, *Parvulastra exigua* (middle), *Sypharochiton pelliserpentis* (top left)	L – Site 6, *Cellana sp.*

	
M - Site 7	N - Site 8
	
O - Site 9	P - Site 10
	
Q - Site 10, *Parvulastra exigua* (top), *Austrocochlea sp.* (below)	R - Site 10, *Scutus antipodes*

	
S – Site 10, *Cominella lineolata*	T - Site 11