

# *Brachiopsilus dianthus*

pink handfish

TASMANIAN THREATENED SPECIES LISTING STATEMENT



Pink handfish © Karen Gowlett-Holmes

**Scientific name:** *Brachiopsilus dianthus* (Last and Gledhill 2009)

**Common name:** Pink handfish

**Group:** Vertebrate animal, fish, family: **Brachionichthyidae**

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

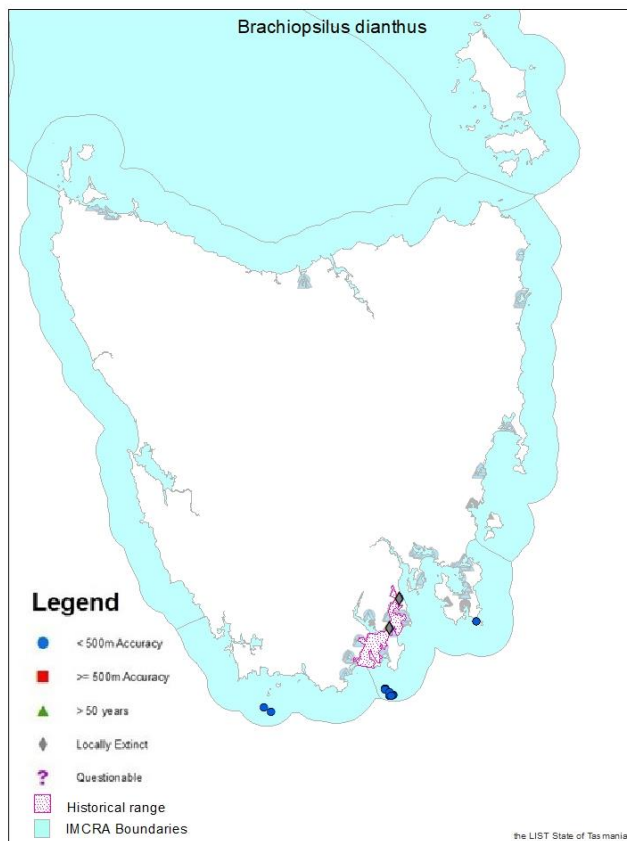
*Environment Protection and Biodiversity Conservation Act 1999:* **Not listed**

*IUCN Red List:* **Endangered**

**Distribution:** Biogeographic origin: **Endemic to Tasmania**

Tasmanian NRM Region: **South**

Tasmanian IMCRA bioregions (Version V4.0): **Bruny, Davey**



**Figure 1.** The distribution of *Brachiopsilus dianthus*, (from Natural Values Atlas), showing IMCRA bioregions



**Plate 1.** Preserved specimen of the pink handfish. Image from Last & Gledhill (2009).

**SUMMARY:** The pink handfish (*Brachiopsilus dianthus*) is a benthic fish endemic to Tasmania and is one of four restricted-range extant handfish species in the south-east of the state. All four are listed as threatened at state and international levels, while *B. dianthus* is the only one of these species not currently listed as nationally threatened.

Surveys of Commonwealth waters off Tasmania's southern coast in 2021 recorded the first observations of pink handfish in over 20 years and the first records of its occurrence at depths greater than 50 m. Prior to this, there had only been four confirmed records of this species within Tasmania, all between 1947 and 1999, to depths between 15 and 38 m. Evidence suggests that the pink handfish has been completely lost from former shallow parts of its range, with the species believed to now be limited to remnant deep water reef habitat.

Current threats to this species are unknown but, based on knowledge of other handfish species, possible threats include lack of information on population characteristics, likely small population size, warming seas, and potential habitat degradation due to encroaching development and range-expanding urchins.

A Recovery Team oversees a collaborative research and management effort aimed at improving the status of threatened handfish species in Tasmania, focussing at this stage on the spotted, red and Ziebell's handfishes.

## IDENTIFICATION AND ECOLOGY

*Brachiopsilus dianthus* (known as the pink handfish) is a member of the fish family Brachionichthyidae, comprising 13 extant species, of which 10 occur in the marine environment around Tasmania. All handfish use their hand-like fins to "walk" along the seafloor, rather than swim, although most possess a limited capacity to swim over short distances.

The pink handfish is a cryptic and very rarely observed species. The four historical specimens collected and preserved have ranged in total length from 94 to 136 mm (Last and Gledhill 2009), although there is insufficient information available to estimate maximum length attained.

The species is described as having a relatively even mottled colour all over the body, including the fins.

It was described specifically as: reddish and pink blotches dorsally and on the head; pink on the chin and belly; dorsal fins similar to upper body coloration, fin margins reddish brown; rayed portion of pectoral fin, and caudal and anal fins paler with reddish brown marks on fin membranes; pelvic fin and illicium pinkish; and eyes bluish black (Last and Gledhill 2009).

The diet of pink handfish is not confirmed but may be similar to other handfish species, consisting of small invertebrates (Pogonoski et al. 2002) such as crustaceans and worms (Edgar et al. 1982).

The breeding strategy of this species is not known but is likely to be similar to that in other threatened handfish species. In these species, females lay egg masses and guard around small, vertical, semi-rigid structures on the seafloor, such as stalked ascidians (*Syczoza* sp.), seagrasses, algae, sponges, and polychaete worm tubes (Commonwealth of Australia 2015). Juveniles pass through planktonic stages while still in the egg and directly recruit at the spawning site. While juvenile survival rate is higher than in marine species with an oceanic planktonic life stage, the above strategy reflects a low breeding capacity and dispersal rate. This limits the potential for colonisation of new areas and recovery from impact.

## Survey techniques

No standard method of surveying has been identified for the pink handfish. Dive surveys are a successful and accepted method to survey for other handfish species, however, at least some of its habitat range occurs in waters deeper than suited to diver surveys.

Baited Remote Underwater Video (BRUV) and Autonomous Underwater Vehicle (AUV) remote imaging technology have been used to successfully detect handfish species during transect surveys of deep-water habitat. BRUV and AUV surveys have been identified as useful tools in conducting targeted surveys for the species at depth, however, image quality is noted as a limitation to these survey methods

accurately identifying to species level (Perkins et al. 2022).

More accurate identification, particularly at depths beyond that accessible by divers, may involve the use of more sophisticated remotely operated vehicle (ROV) technology, use of environmental DNA (eDNA) sampling or a combination of methods. Availability and improvements in these types of survey techniques has greatly increased the potential detectability of this species.

### Confusing species

The pink handfish is distinct from most handfish species, although there is some potential for confusion with certain colour morphs of Ziebell's handfish (*Brachiopsilus ziebelli*), a species in the same genus which has also historically been recorded in the D'Entrecasteaux Channel and the Tasman Peninsula (amongst other locations; Last and Gledhill 2009). The typical form of the latter species includes yellow fins and could not be confused with the pink handfish. However other colour forms (e.g. Loney's form) include a mottled colour pattern similar to that of the pink handfish. The mottled colour forms of Ziebell's handfish include greyish-pink flecks or shades of fawn (Last and Gledhill 2009, K. Gowlett Holmes, pers. comm.) as opposed to the pink and reddish blotches on the pink handfish. Both the pink and Ziebell's handfishes lack the warty skin (i.e. body covered with wart-like protuberances) of the red handfish (*Thymichthys politus*) (Last and Gledhill 2009).

### DISTRIBUTION AND HABITAT

The pink handfish is endemic to the east and south coast of Tasmania. Knowledge of its distribution and preferred habitats is limited (Last and Gledhill 2009). Prior to 2021, the distribution and depth range of pink handfish had been based on just four historical specimens collected from three locations between 1947 and 1999. Those specimens, found in the D'Entrecasteaux Channel, Huon Estuary and Tasman Peninsula (Last and Gledhill 2009, K. Gowlett-Holmes, pers. comm.) (Table 1), were assumed to be associated with relatively shallow waters, typically no greater than 15 m and up to a depth of 38 m (Edgar et al. 2017) (Table 1).

However, contemporary research suggests that the habitat and range of the pink handfish may need to be reconsidered.

Extensive underwater dive surveys targeting shallow handfish species at depths of less than 40 m have been carried out across south and eastern Tasmania, including the D'Entrecasteaux Channel and Tasman Peninsula, but no individuals of the pink handfish have been found in its historical range in decades (Edgar et al. 2017, 2020), suggesting this species has been completely lost from the former shallow part of its range and it may now be limited to remnant deeper areas of reef habitat.

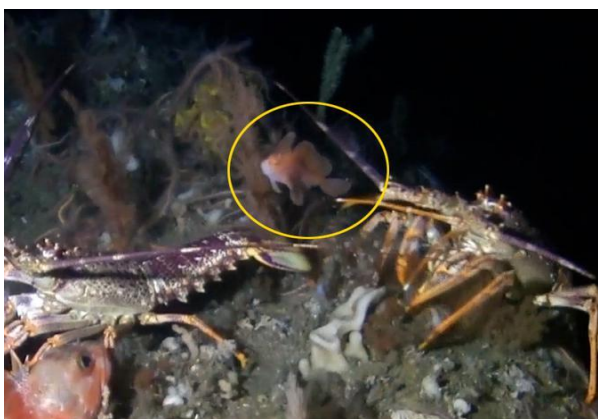
In 2021 and 2022, research undertaken within Commonwealth Marine Parks off Tasmania's southern coast detected the species for the first time in over two decades in locations and at depths never previously recorded. A study by the Institute for Marine and Antarctic Studies (IMAS) in 2021 of deep-water reef habitat in the Tasman Fracture Marine Park (TFMP) using BRUV and AUV surveys confirmed two pink handfish observations on reef habitat at depths of approximately 120–130 m (Perkins et al 2022). A further 26 probable records of pink handfish in the TFMP were also noted but not confirmed due to poor image resolution, with more definitive species identification requiring a mix of higher resolution imagery and eDNA sampling (Perkins et al. 2022).

University of Tasmania researchers also conducted AUV surveys of the Commonwealth Huon Marine Park (HMP) in 2022 and experts identified 14 pink handfish along transects at depths of approximately 56–87 m on rocky reef habitat (N. Barrett, pers. comm.).

Contemporary records from the TFMP and Huon Marine Park markedly extend the known depth range of this species, as well as extending their known spatial extent from localised inshore SE Tasmania to the offshore SW coast (Perkins et al. 2022). It should be noted that these observations are from Commonwealth waters outside of Tasmania's jurisdictional area and the pink handfish remains unrecorded in Tasmanian waters since 1999.

It is possible that further targeted surveys in deeper waters around southern Tasmania will detect further subpopulations of the species and add to knowledge of its abundance and distribution.

The habitat of the pink handfish is not well understood, however, current data suggests that it is likely to be a cool water, reef associated species (N. Barrett pers. comm). Observations of live specimens have been made on both low profile to high profile reef systems, with no clear habitat preference other than reef (N. Barrett pers. comm, Perkins et al. 2022). It has also been described as likely occurring near or on hard substrates (rocky/rubble) amongst a thick coverage of sessile macroinvertebrates such as sponges, ascidians and octocorals (Edgar et al. 2020). It is notable that handfishes may exhibit strong preferences for particular micro-habitats (e.g. spotted handfish, Wong et al. 2018), enabling direct recruitment of juveniles into the preferred habitat.



**Plate 2.** A still image captured from the video of the recent sighting in the Tasman Fracture Marine Park with *Brachiossilus dianthus* circled. Image © IMAS/Parks Australia

#### POPULATION PARAMETERS

*Number of subpopulations:* 3 (2 possibly extinct)

*Extent of occurrence:* 2,787 km<sup>2</sup>

*Area of occupancy for Tasmania only (as per IUCN criteria) =* 20 km<sup>2</sup>

*Number of mature individuals:* unknown

*Largest subpopulation:* unknown

These figures are based on data available from the Natural Values Atlas (NVA) for subpopulations found within Tasmanian waters only and do not include observations from Commonwealth Marine Parks.

The discovery of new subpopulations of the species in Commonwealth waters has resulted in two new sites for the species. However, these sites fall outside of Tasmania's jurisdiction. If the EOO and AOO are calculated to include the Commonwealth Marine Park records this would result in an EOO of 4,446 km<sup>2</sup> and an AOO of 48 km<sup>2</sup>. Including the Commonwealth observations increases the values for these parameters, however, the overall assessment outcome of endangered remains unchanged.

Little is known about population size or other population parameters for this rarely recorded species. Based on the rarity of sightings, findings for other threatened handfish species, and a history of anthropogenic impacts within its historical range, it seems likely that this species is characterised by a small population size

The five subpopulations from which it is known (Table 1) are considered severely fragmented due to an inferred low dispersal capability, with two of these populations likely to have been lost, presumed extinct, with no observations at the locations in over 50 years and two of these occurring outside of Tasmanian jurisdiction

#### RESERVATION STATUS

This species occurs within The Tasman Fracture Marine Reserve and Huon Marine Reserve, both Commonwealth Marine Parks outside Tasmanian coastal waters.

#### CONSERVATION STATUS

The pink handfish has been listed as endangered under the *Threatened Species Protection Act 1995* since December 2022.

Eligibility for this listing is based on IUCN criterion:

- Criterion B (extent of occurrence and/or area of occupancy),
- B2c (continuing decline in: area, extent and/or quality of habitat).
- A continuing decline in area and quality of habitat for the pink handfish is inferred on the basis of sea warming and other potential threats such as encroaching development and range-expanding urchins.

The pink handfish is currently not listed under the *Environment Protection and Biodiversity Conservation Act 1999*. The species has been listed as endangered on the IUCN Red List since 2020.

**Table 1.** Population summary for the pink handfish

Sub-pop.	Location	Tenure	NRM region*	1:25 000 mapsheet	Year last (first) recorded	Depth	Extent of subpopulation (ha)	Abundance
1	Dennes Pt	Public Land	South	Blackman's Bay	1947 (1947)	Unknown	Unknown, estimated at 4 km <sup>2</sup>	Population unlikely to still exist
2	Huon Estuary	Public Land	South	Dover	1958 (1958)	15 m	Unknown, estimated at 4 km <sup>2</sup>	Population unlikely to still exist
3	Black Head, Tasman Peninsula	Public Land	South	Tasman	1999 (1999)	38 m	Unknown, estimated at 4 km <sup>2</sup>	Unknown, 1 observation recorded
4	Tasman Fracture Marine Park **	Commonwealth Marine Park	South	Tasman	2021 (2021)	120 m	Unknown	Unknown, 2 observations recorded
5	Huon Marine Park **	Commonwealth Marine Park	South	Huon	2022 (2022)	70 m	Unknown	Unknown, 14 observations recorded

\*NRM region = Natural Resource Management region

\*\* These subpopulations are in Commonwealth waters and have not been included in EOO and AOO calculations

#### THREATS, LIMITING FACTORS AND MANAGEMENT ISSUES

Threats, limiting factors and management issues for the pink handfish are not well known, but are likely to be similar to those for other threatened handfish species. Potential issues identified include:

**Lack of information:** Without more information about the species and its requirements, it is difficult to determine effective conservation management actions. Current information gaps include population locations and size, basic biology, habitat requirements and specific threats.

**Climate change:** Given the species' limited distribution in southern and eastern Tasmania, within an area identified as a global hotspot for ocean warming (Hobday and Pecl 2014), climate change is likely to pose a threat to this species. Warmer water temperatures may impact upon handfish survival (directly and on habitat) and/or reproductive capacity, directly and/or indirectly.

**Degradation of habitat:** Habitat of this species in the D'Entrecasteaux Channel has historically been severely impacted by scallop dredging, and continues to be affected by a range of

recreational and commercial anthropogenic activities. The D'Entrecasteaux Channel historically supported a commercial scallop dredging fishery. Dated sediment core analysis has linked this fishery to catastrophic declines in native marine mollusc species (Edgar and Samson 2004). It is likely that this historical fishery also caused a decline in the pink handfish as a result of habitat disturbance and destruction, and direct take of individuals as bycatch (Edgar et al. 2020).

Habitat loss, pollution and introduction of invasive species are all likely to be contributing to degradation of its habitat (Edgar et al. 2020), particularly in its shallow water range. As industries such as finfish aquaculture move into deeper waters, there is potential for impacts to extend to the deeper parts of its range.

The range-expanding long-spined sea urchin (*Centrostephanus rodgersii*) poses an additional potential threat, since it has been found to over-graze sessile invertebrates on both shallow and deep reefs on the Tasmanian east coast (Ling 2008, Ling et al. 2016).

Grazing by this species may therefore lead to degradation and loss of foraging and breeding habitat upon which the pink handfish relies.

**Illegal collection:** Due to its charismatic appearance, the pink handfish may be sought after by collectors. The inferred small population size of this species suggests that any illegal collection for the purposes of personal aquaria or the aquarium trade would pose a significant threat.

## MANAGEMENT STRATEGY

### Management objectives

In the first instance, the primary management objectives for this species are to raise its awareness amongst fishers, divers and other stakeholders to increase the likelihood of sightings being reported, and improve knowledge of its distribution, habitat preferences and biology. Improved knowledge can then be utilised to better identify threats and conservation actions for management of the species and its habitat.

### What has been done?

Due to the rarity of the pink handfish, and lack of information on its current distribution, population size and abundance, little action has been undertaken to date in relation to the management and conservation of this species.

### 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;
- Improve knowledge of distribution, habitat and depth preferences, abundance, biology and habitat condition; perform remote camera surveys and other suitable survey methods for this species in deep waters off southern Tasmania within suitable habitat;
- Improve community awareness of the pink handfish, particularly amongst cray fishers, other fishers using bottom-sampling gear in the marine environment, and the diving community;
- Encourage inclusion of the pink handfish in handfish conservation projects and future handfish recovery documents, with a focus on raising awareness, encouraging reporting and improving knowledge;
- Review, identify and mitigate threats on the basis of any improved knowledge;
- Consider options for the active conservation and management of the species and its habitat;
- Implement, monitor, review and adapt conservation and management actions based on the best information available;
- Ensure regulators of developments that may impact on areas of known or potential habitat consider the needs of the species during risk assessment processes.

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**Permit:** It is an offence under Tasmanian legislation to collect, catch, damage, injure, destroy, or kill a threatened species listed under the *Threatened Species Protection Act 1995*, without a permit.