

Brachionichthys hirsutus

spotted handfish

TASMANIAN THREATENED SPECIES LISTING STATEMENT



Image by Tim Lynch

Common name: spotted handfish

Scientific name: *Brachionichthys hirsutus* (Lacépède, 1804)

Group: Actinopterygii, Lophiiformes, Brachionichthyidae

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

Environment Protection and Biodiversity Conservation Act 1999: **Critically Endangered**

Distribution: Endemic status: **Endemic to Tasmania's eastern coast**

Tasmanian NRM Regions: **South**

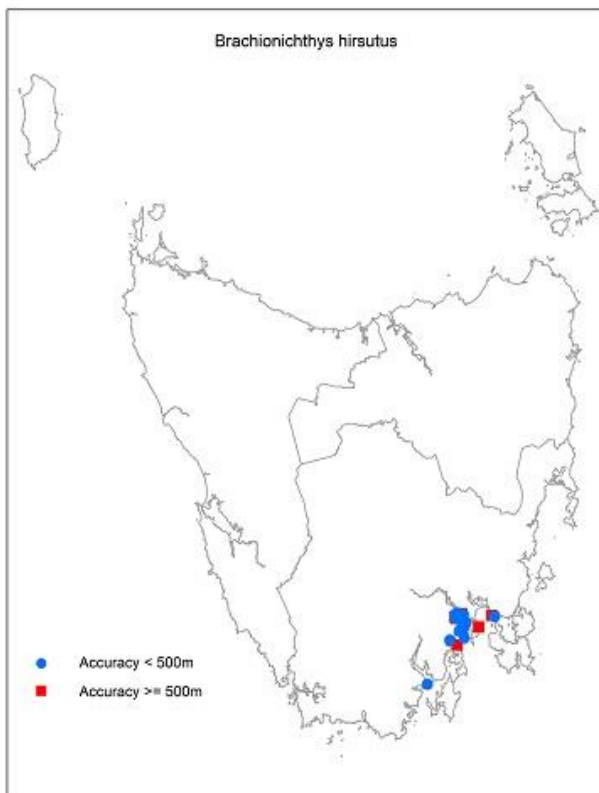


Figure 1. The known distribution of the spotted handfish over the past 50 years, showing NRM regions. Note: map does not include the recent Storm Bay or Huon Estuary locations.



Plate 1. Spotted handfish. Images by Mark Green (top) and Tim Lynch (bottom).

SUMMARY:

The spotted handfish (*Brachionichthys hirsutus*) is a small, benthic fish endemic to Tasmania and is one of three listed threatened handfish species.

Currently only known from the Derwent Estuary, the D'Entrecasteaux Channel, Huon Estuary and Storm Bay in south-eastern Tasmania. The total current population is estimated to comprise no more than 3,000 mature individuals (Handfish Conservation Project 2019), although this estimate is not robust.

Threats to the species include small population size, fragmentation of this small population into even smaller local populations which show little connectivity, degradation and loss of habitat by human impacts, such as moorings as well as by introduced pests, stochastic events, and possibly warming seas.

A Recovery Team oversees a collaborative research and management effort aimed at improving the status of the species.

IDENTIFICATION AND ECOLOGY

Brachionichthys hirsutus (known as the spotted handfish) is a member of the fish family Brachionichthyidae, which comprises 14 extant species that are globally restricted to south-eastern Australia, of which 11 occur in the seas around Tasmania.

The spotted handfish is a small and cryptic species. Adult handfish are typically 10 to 12 cm in length but can grow up to a maximum of 14 to 15 cm (Handfish Conservation Project 2019).

They possess a relatively short and rounded body that tapers towards the tail and is covered with small spines. The dorsal area and sides are white to pale pink and covered with orange, brown or black (or a gradient thereof) spots that have orange borders (Last et al. 1983).

Spotted handfish are a benthic fish that use their hand-like fins to “walk” along the seafloor, rather than swim (although they possess a limited capacity to quickly swim over short distances to avoid danger).

They are thought to occupy the middle of the food chain with species such as flathead fish their major predator.

The spotted handfish feeds upon small crustaceans and polychaete worms, although other reported dietary items include amphipods (Bruce et al. 1997).

They depend on small, semi-rigid vertical structures for use as spawning habitat. One preferred spawning habitat is stalked ascidians, with eggs laid around the base, although other structures such as seagrasses, sponges and algae may also be used. The spawning period for spotted handfish is between September to October (Pogonoski et al. 2002), with egg masses comprising between 80 to 200 eggs (Last and Bruce 1996-7). An adult spotted handfish (generally thought to be the mother although it may be the father in some cases) guards the egg mass for a period of 6 to 7 weeks until the fully-formed young hatch.

Spotted handfish mature at around 2 years and can live for up to 10 years, although the number of animals that reach this age is very small (Bessell 2018). Consequently, the species has a relatively short period to reproduce.

A reduction has occurred in naturally occurring spawning habitat due to the consumption of such habitat by the introduced northern Pacific seastar (*Asterias amurensis*) and mechanical destruction by vessel moorings. A trial of artificial structures (including plastic and ceramic structures), has been conducted in important breeding sites which have been denuded of suitable spawning habitat. These artificial structures are utilised by spotted handfish, although further research is required to confirm local population-scale positive effects (Lynch et al. 2019).

Survey techniques

Diver-based surveys by suitably experienced personnel using GPS parametrised underwater visual census (GUVIC), is recommended as an efficient method to detect and estimate relative densities of handfish (Lynch et al. 2015 and Wong et al. 2018). Remote Operated Vehicle (ROV)-based surveys may also be used in deeper water and have successfully detected fish but have not been used to estimate densities or abundances.

Confusing species

The spotted handfish is superficially similar to the more common Australian handfish (*Brachionichthys australis* sp. nov.), though the latter has a larger eye, longer illicium with a smaller esca, longer first dorsal-fin ray, fewer second dorsal-fin rays, shorter second dorsal-fin base, and a more subtle colour pattern (Last et al. 2007).

DISTRIBUTION AND HABITAT

The spotted handfish is endemic to Tasmania's coastline. Once recorded from southern coastal waters to the north-east Tasmanian coastal waters (Handfish Conservation Project 2019), in more recent years the species has only been found in a small number of local populations within the lower Derwent Estuary, adjoining bays and channels and the Huon Estuary.

Recent genetic work suggests that there is little gene flow between local populations (Lynch *et al.* 2020).

The species is found in coastal waters in soft sediment benthic environments from coarse to fine sand and shell grit to silt, with a depth distribution between 0 to 60 metres (Commonwealth of Australia 2015). Within this habitat it displays a strong preference for complex micro-habitats (Wong et al. 2018), such as shell hash filled holes left by foraging skates and rays.

Due to its small overall population size and the small and disjunct distributions of these local populations, all areas within which spotted handfish have been found (and around these areas) are considered critical habitat for the species' survival.

POPULATION PARAMETERS

Prior to the mid 1980s the species was considered common throughout the lower Derwent Estuary and adjoining bays (Pogonoski et al. 2002). At the time of preparation of this listing statement, only nine small sub-populations in the River Derwent and one sub-population in the D'Entrecasteaux Channel are known to be extant (Lynch et al. 2019). In 2019, individual animals were also observed on either side of Storm Bay via ROV surveys (Lynch et al. 2020), suggesting the likely presence of sub-populations in these areas.

The most recent estimates suggest that there are likely to be fewer than 3,000 adult spotted handfish in existence (Handfish Conservation Project 2019). This is consistent with analysis of data in 2009 which indicated a total abundance of between 1,500 to 2,700 adults (Green 2009). However, research in 2014 indicated that total abundance may have decreased since that time (Commonwealth of Australia 2015).

RESERVATION STATUS

One local population occurs within the Opossum Bay Marine Conservation Area. The primary objective of this Conservation Area (proclaimed under the *Nature Conservation Act 2002* in December 2009) is the protection of habitat for the spotted handfish (Parks and Wildlife Service 2019).

There are also records from within the Central Channel Marine Conservation Area, although the current status of this local population is unknown.

CONSERVATION STATUS

In 1999, the species was added to Schedule 3 (extant endangered species) of the Tasmanian *Threatened Species Protection Act 1995*. Eligibility for this listing was based on Criteria B (extent of occurrence and/or area of occupancy), B1 (severely fragmented or known to exist at no more than five locations) and B2 (continuing decline inferred, observed or projected) and it was determined that it was probably also eligible under Criterion A1(c) (observed, estimated, or inferred total population reduction of at least 50 % over the last 10 years or within the past three generations of the species, whichever is the longer, based on a decline in area of occupancy, extent of occurrence and/or quality of habitat).

The spotted handfish is also listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBCA). In 2012, the species was uplisted from Endangered to Critically Endangered on the EPBCA, based on Criterion 2 (its geographic distribution is precarious for the survival of the species and is very restricted, restricted or limited) (Threatened Species Scientific Committee 2010).

THREATS, LIMITING FACTORS & MANAGEMENT ISSUES

Threats, limiting factors and management issues for spotted handfish include:

Direct disturbance and degradation and loss of habitat: Inappropriate developments can result in direct disturbance of spotted handfish and/or adversely affect its habitat. Developments that have the potential to impact on spotted handfish and/or its habitat include infrastructure such as break walls, walls and jetties, and mechanical disturbance from moorings.

Physical damage can also occur through actions such as boat propeller wash and anchoring, which can disturb handfish eggs.

Pollution and siltation: Changes to catchment process or coastal use can lead to algal blooms and eutrophication, which can smother habitat.

Illegal collection: Due to their charismatic appearance and threatened status, spotted handfish are likely to be highly sought after by collectors. Due to the small population size, any illegal collection for the purposes of personal aquaria or the aquarium trade is a significant threat to this species.

Climate change: An increase in water temperatures is a potential threat to the species (Gledhill and Green, unpublished report). Warmer water temperatures may impact upon spotted handfish survival and/or reproductive capacity, both directly and indirectly. Climate change may also lead to increased severe weather events, which may dislodge spawning substrate and degrade habitat (K. Gowlett-Holmes, pers. comm.). As they are a coastal species in south-eastern Tasmania there are no further poleward habitats for the species to move into, should their current locations become inhospitable due to climate change.

Predation and competition: The introduced northern Pacific seastar (*Asterias amurensis*) is known to consume the natural spawning substrates of the spotted handfish within the Derwent Estuary and may possibly also feed directly upon the handfish egg masses, although the latter has not been firmly established (Wong and Lynch 2017). Handfish have also been observed defending egg masses against seastars (Lynch *et al* 2019).

Population size and fragmentation: Small and discrete populations are more at risk from the impacts of threatening processes and stochastic events. With little exchange between local populations there is little chance of recovery following localised extinction.

MANAGEMENT STRATEGY

Management objectives

The main objective for the management of the spotted handfish is to ensure an ecologically functional wild population that with limited management has a high likelihood of persistence, and to increase understanding of the biology and ecology of the species in order to conserve and contribute to the future recovery of the species (Commonwealth of Australia 2015).

What has been done?

Population surveys: Surveys of the nine known local populations in the Derwent Estuary occurred each year from 2015 to 2019 and have been combined with less intense surveying back to 1998 to produce time-series data. Exploratory surveys of some areas of potential habitat in the D'Entrecasteaux Channel were also undertaken, during which a small, new, local population was discovered. Prior to these yearly surveys, survey effort had been more opportunistic and ad hoc, although several sites have been surveyed numerous times over the years.

Trial of Artificial Spawning Habitats: Artificial spawning habitats such as plastic and ceramic structures have been trialled and appear to be suitable, although further work is required to confirm positive effects at the population level.

Assessment of environmentally sustainable moorings: During surveys, handfish have not been observed in the scars left on the seabed by traditional swing moorings used to secure vessels in shallow water. Environmentally sustainable (ES) moorings, which do not impact on the seabed, have been designed, modelled for survivability in extreme conditions and deployed at four sites within the handfish's range. Soon after deployment, spotted handfish were observed to re-occupy the recovering mooring scars under the ES moorings.

Captive breeding program: *Ex-situ* breeding and restocking of wild populations has been identified as a priority for bolstering current populations and possibly re-establishing populations at sites previously occupied. A preliminary captive husbandry and head-starting trial was undertaken in 2018, but more experimental aquaculture research is needed to progress this priority.

Community awareness: In 2018, the Handfish Conservation Project was established to raise awareness and funds to further handfish research and conservation management efforts (<https://handfish.org.au>).

A spotted handfish Fact Sheet is also available from the NESP Marine Biodiversity Hub website (<https://www.nespmarine.edu.au/fact-sheets>).

The captive trial has also provided an opportunity to raise awareness of the plight of the species through public display and awareness information sessions at Seahorse World at Beauty Point and at Melbourne SEALIFE Aquarium.

What is needed?

- Consider further options for the active conservation and management of the species and its habitat;
- Further develop ROV methods so they are comparable to the well established GUVIC methods for surveys;
- A better understanding of how developments impact on spotted handfish;
- The use of ES moorings to reduce potential impacts on handfish habitat where practicable;
- Further genetic and population studies;
- A Population Viability Analysis;

- Improved knowledge of the distribution, abundance, population trends and habitat condition by continuing to undertake regular, standardised, surveys of known local populations and undertaking regular, standardised surveys of potential habitat;
- Identify threats and factors limiting expansion of local populations and colonisation of potential habitat;
- Implement, monitor, review and adapt conservation and management actions based on the best information available;
- Continue investigations into optimal captive husbandry requirements and subsequent establishment of a managed captive breeding program (if suitable) to act as an insurance population and source of fish for endorsed release to the wild projects;
- Ensure proponents and regulators of developments that may impact on areas of known or potential habitat consider the needs of the species during assessment processes.

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View: <https://dpiwwe.tas.gov.au/conservation/threatened-species-and-communities/lists-of-threatened-species>

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