



Safeguarding the critically endangered Spotted Handfish (*Brachionichthys hirsutus*)

The life of a unique and endangered fish: Habitat and Biology of Spotted Handfish

Spotted handfish are endemic to Tasmania and are found in the Derwent estuary and a few sheltered coastal bays in southeast Tasmania. Occupying depths from 1-60 metres, their highest population density occurs between 5-15 m. They prefer particular habitat structure including depressions created by stingrays, expanses of ascidians (a marine organism akin to sea tulips), or the shelter provided by debris such as glass bottles.

Spotted handfish do not have swim bladders to maintain buoyancy and instead rely on their fins to move across the seabed, resembling a form of underwater "walking". Observations of their movement patterns indicates low movement rates with an average daily movement of around 4 m.



Spotted handfish breeding in captivity. Credit: CSIRO

Breeding

In the Derwent estuary, spotted handfish frequently choose the base of stalked ascidians, as their preferred egg-laying sites. During the critical period of egg development, which lasts approximately 6 to 7 weeks, adult spotted handfish protect their precious offspring from potential predators and maintain the cleanliness and optimal water flow around the egg mass. Newborn spotted handfish hatch fully formed at approximately 3 mm in length.

Threats

The decline in spotted handfish populations likely started through by-catch in historical scallop dredge fisheries. Introduced Northern Pacific Sea stars eat their key native spawning habitats, the stalked ascidians. Disturbance from sea-floor infrastructure such as chain swing from boat moorings has also played significantly degraded the intricate microhabitats they favour in shallow coastal bays.

The species is adapted to the temperate cool waters at the southern extremity of the continent making them particularly vulnerable to the adverse impacts of global warming, compounding threats to the species viability.

Research supporting conservation

CSIRO has conducted 80 handfish surveys over the last 25 years. This comprehensive database serves as the foundation for future proactive measures enhancing spotted handfish populations

Monitoring and Habitat Restoration

CSIRO discovered a way to help spotted handfish breed in the wild. We worked with a local ceramicist to design an artificial spawning habitat, now frequently used by spotted handfish where ascidian densities are low. Our monitoring efforts are guided by our research showing an inverse relationship between stalked ascidian densities and the use of artificial spawning habitats by Spotted Handfish.

Captive Breeding Program

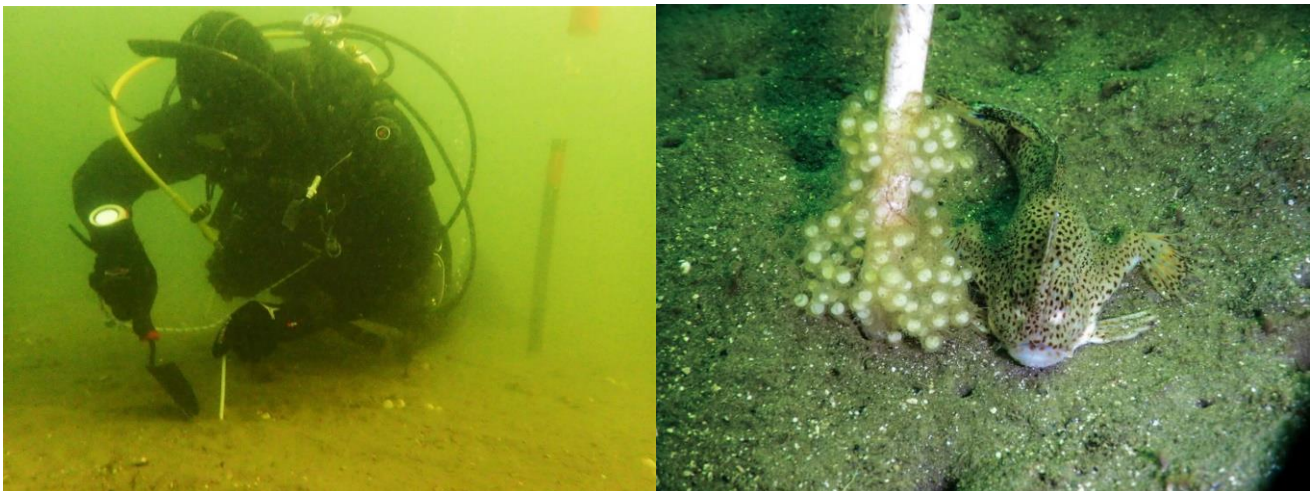
Collaborating with SEALIFE Melbourne Aquarium and Seahorse World Tasmania, CSIRO established a captive breeding program that achieved a significant world-first milestone: successfully breeding Spotted Handfish through all stages of their life cycle. Captive-bred individuals can play a pivotal role in safeguarding the species by replenishing areas where local extinction has occurred and function as an insurance population.

Industry and development

CSIRO welcomes the feedback and engagement of stakeholders in its handfish recovery work. Our conservation initiatives extend to partnering with various industries, especially in regions where human infrastructure interfaces with the natural habitats of the spotted handfish. By collaborating with industry stakeholders, NESP Marine Biodiversity Hub, Derwent Estuary Program, Zoos and Aquariums association (ZAA), Department of Natural Environment and Resources (NRE), UTAS, IMAS, Clarence Council and NRM South, we aim to implement sustainable practices and protective measures that ensure the continued existence of the spotted handfish.

Environmentally Friendly Moorings (EFMs)

To reduce habitat disturbance, we have researched the role of eco-friendly moorings to reduce disturbance from traditional designs. CSIRO is monitoring seafloor before and after installation of eco-moorings in Battery Point, Sandy Bay and North West Bay. The removal of chain moorings between Battery Point and Sandy Bay can contribute to the resilience and genetic diversity of Spotted Handfish populations.



CSIRO plant artificial spawning habitats (left) and spotted handfish using an artificial spawning habitat (right). Credit: CSIRO

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