Sympterichthys unipennis
smooth handfish

TASMANIAN THREATENED SPECIES LISTING STATEMENT

Holotype specimen - image from Last and Gledhill (2009)

Scientific name:	***Sympterichthys unipennis*** (Cuvier 1817)
Common name:	Smooth handfish
Group:	Vertebrate animal, fish, family **Brachionichthyidae**
Status:	*Threatened Species Protection Act 1995*: **endangered (presumed extinct)**
	Environment Protection and Biodiversity Conservation Act 1999: **Not listed**
Distribution:	Endemic status: **Endemic to Tasmania**
	Tasmanian NRM Regions: **South**
	Tasmanian Marine Bioregion (IMCRA V4): **Bruny**

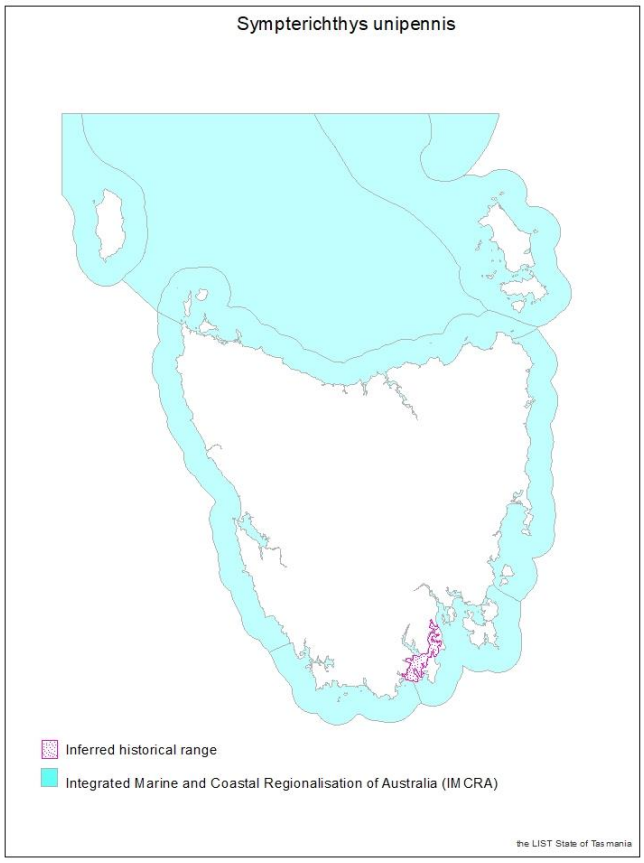

Figure 1. The inferred historic range of the smooth handfish, showing IMCRA regions.

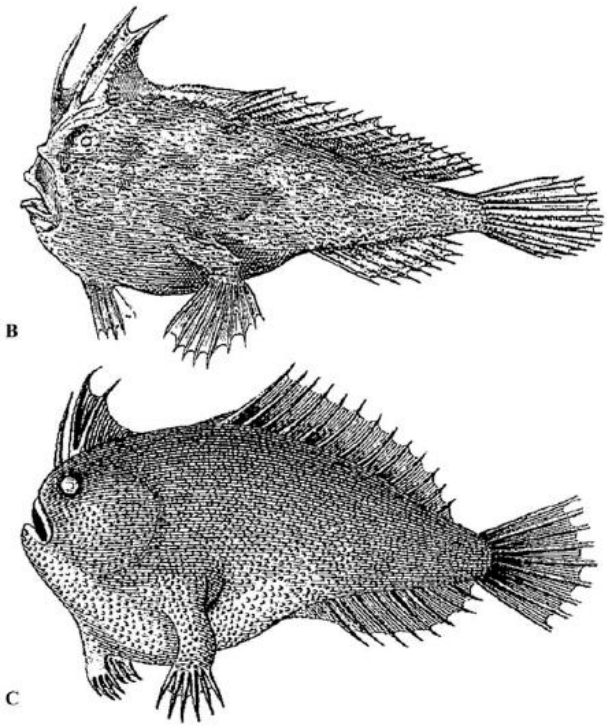

Plate 1. Illustrations of the smooth handfish figured as *Chironectes unipennis* (Cuvier 1817) (B); and *le Lophie lisse* (Lacepède 1804, image reversed) (C).

SUMMARY: the smooth handfish (*Sympterichthys unipennis*) is a benthic fish endemic to south-east Tasmania that is now presumed to be extinct. It belongs to the same family as four extant, threatened handfish species that are also endemic to the south-east of the state, have restricted ranges and have all experienced population declines. The smooth handfish was listed as extinct on the IUCN Red List in 2020.

This benthic species is known only from the holotype specimen collected more than 200 years ago in shallow waters of south-east Tasmania during the first scientific exploration of southern Australia. It was amongst the first Australian fish species collected and was almost certainly a common species at the time of discovery.

There have been no records of this species over the past 200 years and extensive surveys targeting handfish species in the shallow habitats that it occupied have not recorded any individuals. Many factors may have contributed to its demise, but commercial scallop dredging conducted in its habitat during the 20th century is likely to have had a significant impact.

IDENTIFICATION AND ECOLOGY

Sympterichthys unipennis (smooth handfish) is a member of the fish family Brachionichthyidae, comprising 14 species. The smooth handfish is the only family member considered extinct, while 10 of the 13 extant species have also been recorded in the marine environment around Tasmania (Last and Gledhill 2009). 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 one available specimen (holotype) of the smooth handfish is 4.4 cm in length and has been readily distinguished from its closest relative (*Sympterichthys moultoni*) by the absence of dermal spinules on the illicium (the modified fin ray protruding above the mouth), meristic counts, and elongated second spine of dorsal fin. It is distinguishable from all other known handfish species by the combination of the skin surface having a covering of spiny scales, thin illicium of medium length, relatively deep body, 9 pectoral-fin rays, 9 anal-fin rays, and 22 vertebrae (Last and Gledhill 2009).

The ecology of this species is unknown, however other handfish species lack a pelagic larval stage, and dispersal of juveniles is very limited (Edgar et al. 2017). Females lay small clusters of large eggs attached to vertical substrate by filaments and some level of parental care is provided until they hatch (Last and Gledhill 2009, Edgar et al. 2015). Due to their low dispersal capabilities and relatively low reproductive rate, handfish species are susceptible to population fragmentation and local extirpation.

Survey techniques

The holotype specimen obtained by the early French naturalists is likely to have been collected with simple sampling gear such as a dip net, which suggests that the smooth handfish was relatively abundant at that time.

In recent decades, extensive underwater surveys targeting other shallow-water handfish species, such as the Ziebell's, red and spotted handfishes, have been conducted across south and eastern Tasmania using diver-based visual searches along benthic transects (e.g. Edgar et al. 2015, Edgar et al. 2017). GPS parametrised underwater visual census (GUVC) has been recommended as an efficient method to detect and estimate relative densities of handfishes (Lynch et al. 2015 and Wong et al. 2018), while Remote Operated Vehicle (ROV)-based surveys may also be used in deeper water to detect presence. Given the likely similarities in the ecology and distribution of these species and the smooth handfish, it is presumed that this sampling methodology would provide a suitable survey technique (Last et al. 2020).

Confusing species

Although the smooth handfish holotype is somewhat damaged, it has been confirmed as having distinct morphometric and meristic characteristics from the only other con-generic species, and as being distinct from other handfish species as described above (Last and Gledhill 2009, Last et al. 2020).

DISTRIBUTION AND HABITAT

The smooth handfish is known only from the holotype specimen collected in 1802 in shallow waters of south-east Tasmania during the first scientific exploration of southern Australia, and was amongst the first Australian fish species collected. It was almost certainly a common species at the time of discovery (Last et al. 2020).

The historical distribution of the smooth handfish is poorly understood. The sole specimen collected was obtained by the French zoologist François Péron during a voyage to Australia in 1800 to 1804 led by Captain Nicolas Baudin, which was the first scientific exploration of southern Australia. It was amongst the earliest Australian fish species collected. No other data are available except a locality recorded as 'Australian seas'. It is presumed the specimen was taken from somewhere in south-east Tasmania, probably during shallow fish surveys conducted in 1802 in the D'Entrecasteaux Channel (Last and Gledhill 2009). The south-east Tasmanian locality is based, with reasonably high confidence, on inference related to where other fish collections were taken during this French expedition to southern Australia, the primitive type of available collecting gear that would capture this animal, and the distribution of congeneric/confamilial species (Last *et al.* 2020).

Locations visited by this French expedition across southern Australia have been well surveyed ichthyologically in recent decades, including the D'Entrecasteaux Channel, in south-east Tasmania, the most likely site of collection (Last and Gledhill 2009).

The habitat of this presumably shallow, benthic species is unknown, but other handfish species with overlapping south-east Tasmanian distributions occur in rocky and sandy habitats primarily in depths of 1–20 m, but with inferred depth ranges of up to 60 m (Last and Gledhill 2009).

POPULATION PARAMETERS

No population data are available for this species within its former range. Extensive surveys targeting handfish species have been conducted throughout the area of its shallow habitats, but no individuals have been found. All potential habitat and distributional possibilities for this species have been confidently surveyed (Last et al. 2020). For example, a total of 100 hours were spent by 19 experienced divers at 22 sites across southern Tasmania from February to June 2015 to specifically search for Ziebell's handfish and the red handfish, which are presumably similar in ecology and distribution to the smooth handfish (Edgar et al. 2015, Edgar et al. 2017). Survey work was repeated in 2017 and 2018 off the Tasman Peninsula, but no handfish individuals were recorded (Last *et al.* 2020). The D'Entrecasteaux Channel is considered well-sampled, including multiple long-term ecological and environmental monitoring efforts for the Atlantic Salmon farming industry that extend across the entire channel. This region has also been extremely well-covered during more recent scientific dive assessments of scallop densities where divers were also looking for handfishes, with none sighted. When combined with the historical scallop fishery, the survey effort in this area has been greater than anywhere else in which handfishes live (Last et al. 2020). It seems likely that the smooth handfish would have been detected in some part of this surveyed area if the species remained extant (Edgar et al. 2017).

The red handfish (*Thymichthys politus*), Ziebell's handfish (*Brachiopsilus ziebelli*) and spotted handfish (*Brachionichthys hirsutus*) have all experienced documented large-scale population declines since the 1980s (Last and Gledhill 2009, Edgar et al. 2017).

Similarly, there has only been one sighting of the pink handfish (*Brachiopsilus dianthus*) since the 1950s (Last and Gledhill 2009). It seems likely that the population fragmentation experienced by these species also occurred during the demise of the smooth handfish.

CONSERVATION STATUS

The smooth handfish has been listed as endangered (presumed extinct) in 2022, as no occurrence of the taxon in the wild can be confirmed in the past 50 years (Section 15(2) of the *Threatened Species Protection Act 1995*).

Please note that this assessment was conducted under the previous version of *Guidelines for Eligibility for Listing under the Threatened Species Protection Act 1995*, which has been superseded by a newer version endorsed by the Scientific Advisory Committee in March 2023.

THREATS, LIMITING FACTORS & MANAGEMENT ISSUES

No on-going threats are identified for this species on the basis that it is now considered extinct.

The factors contributing to the extinction of the smooth handfish are poorly understood. Other shallow handfish species have experienced severe population declines due to their very limited dispersal capabilities, small subpopulations and impacts from invasive species, habitat loss and pollution (Edgar et al. 2017). The main, general threats that cause declines in handfish species include loss of spawning substrate, habitat loss and degradation, water pollution and siltation, the spread of the invasive Northern Pacific seastar (*Asterias amurensis*) and the cumulative impacts of boating (Commonwealth of Australia 2015). Large scallop and oyster fisheries, which were active in south-east Tasmania from the late 19th century until their collapse in the D'Entrecasteaux Channel by 1967, dredged every part of the channel. This probably contributed to population decline of the smooth handfish due to habitat destruction and direct mortality of individuals as bycatch (Edgar and Samson 2004, Last and Gledhill 2009).

MANAGEMENT STRATEGY

No species-specific management strategy is presented for this species on the basis that it is now presumed extinct. Management strategies for extant, threatened handfish species are described in their respective listing statements and in the national handfish recovery plan (Commonwealth of Australia 2015).

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Prepared: by Karen Parsons, primarily on the basis of Last et al. (2020), in conjunction with the Threatened Species Section under the provisions of the Tasmanian *Threatened Species Protection Act 1995*.

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

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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.