

**Advice to the Minister for Sustainability, Environment, Water, Population and Communities  
from the Threatened Species Scientific Committee (the Committee)  
on Amendment to the list of Threatened Species  
under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)**

**1. Name**

*Thymichthys politus*

This species is commonly known as the red handfish. It is in the Family Brachionichthyidae.

The red handfish was formerly recognised as *Brachionichthys politus*. Recent taxonomic revision now recognises it as *Thymichthys politus* (Richardson, 1844).

**2. Reason for Conservation Assessment by the Committee**

This advice follows assessment of new information provided to the Department.

This is the Committee's second consideration of the species under the EPBC Act. The Committee previously considered this species in 2004, at which time it found that red handfish was eligible for listing as vulnerable.

**3. Summary of Conclusion**

The Committee judges that the species has been demonstrated to have met sufficient elements of Criterion 2 to make it **eligible** for listing as **critically endangered**.

The Committee judges that the species has been demonstrated to have met sufficient elements of Criterion 3 to make it **eligible** for listing as **endangered**.

The Committee judges that the species has been demonstrated to have met sufficient elements of Criterion 4 to make it **eligible** for listing as **vulnerable**.

The highest category for which the species is eligible to be listed is **critically endangered**.

**4. Taxonomy**

The species is conventionally accepted as *Thymichthys politus* (Richardson, 1844) (red handfish).

**5. Description**

Red handfish are small, slow-moving benthic fish (Gledhill and Green, unpublished). There are two primary colour morphs, both dominated by reddish tones. One morph is a uniform vivid red all over the body, while the other is a less strikingly patterned mottled pink with reddish patches (Last and Gledhill, 2009; Gledhill and Green, unpublished). Available data suggests that the colour morphs of red handfish are unlikely to change with time and they are not known to be geographically distinct (Gledhill, pers. comm., 2011).

Red handfish can grow to at least 136 mm in total length (Gledhill and Green, unpublished). The species has a relatively elongate and moderately compressed body that tapers towards the tail (Last and Gledhill, 2009; Gledhill and Green, unpublished). The skin is covered in small, close-set, flattened warts and most of the scales and associated spines of this species are fully embedded in the skin (Gledhill and Green, unpublished).

## 6. National Context

The red handfish has been known to exist in widely disjunct populations in Tasmanian waters. The species was first collected near Port Arthur in the nineteenth century, and during the 1980s was discovered at a small reef near the Actaeon Islands (Last et al., 1983). A few specimens were found at Port Arthur and off the Forestier Peninsula during the 1980s, and an additional specimen was collected off Bridport (Bass Strait) in 1950 (Last and Gledhill, 2009). The largest known population of red handfish was discovered on an inshore reef off Primrose Sands in the 1990s (Gledhill and Green, unpublished).

It appears that the red handfish has undergone a significant decline in both distribution and abundance. No specimens were recorded at Primrose Sands during surveys in 2005, and efforts to locate red handfish at sites where they were previously known to exist are reported to have failed (Gledhill and Green, unpublished). Edgar (pers. comm., 2010) reports that during more than 1000 (200 m x 10 m) underwater transects undertaken at various reef sites around the Tasmanian coast in recent years, only one red handfish has been found, by the Reef Life Survey group in 2010.

Three red handfish were sighted and photographed in the Primrose Sands area during a dive in late 2010 (Brereton, pers. comm., 2010; Green, pers. comm., 2010). Since the initial sighting, red handfish have been recorded at this site during several different dives (Green, pers. comm., 2010).

These areas are encompassed within the 'South' and 'North' Natural Resource Management Regions of Tasmania and a number of Interim Biogeographic Regionalisation of Australia (IBRA) Bioregions, including 'Tasmania South East', 'Ben Lomond', 'Flinders', 'South East Corner' and 'South East Coastal Plain'.

## 7. Relevant Biology/Ecology

Red handfish recorded at Primrose Sands in 1996 ranged from 50–80 mm in length (Bruce et al., 1997). Observed size differences between pairs of red handfish (thought to be male and female pairs) at this site suggest there may be sexual dimorphism in this species, with males being smaller than females and having dark markings between the rays of the first dorsal and pectoral fin (Bruce et al., 1997). While the longevity of red handfish has not been determined, it is assumed to be similar to that of *Brachionichthys hirsutus* (spotted handfish), which may live as long as 8–11 years (Gledhill and Green, unpublished).

Red handfish egg masses have been observed in late October and early November, with 30–60 eggs contained in transparent 'flasks' connected by tubules and bound together with associated threads (Bruce et al., 1997). Egg masses observed during surveys in 1996 were each guarded by an adult red handfish and were attached to stands of the green alga *Caulerpa simpliciuscula*, which appears to be their preferred spawning substrate (Bruce et al., 1997). Red handfish may use other species of green algae as spawning substrata, such as *C. trifaria* and *C. longifolia* (Bruce et al., 1997).

A number of red handfish breeding activities have been observed in aquaria. Spawning has been observed to take over nine hours and females guard the eggs until hatching (Bruce et al., 1997). Eggs hatch after 7–8 weeks into fully formed juveniles (6–7 mm standard length) (Pogonoski et al., 2002) and juveniles have been observed to settle immediately in the vicinity of the egg mass (DEH, 2004). Unlike the spotted handfish, attempts to breed red handfish and raise juveniles to adulthood in captivity have not been successful (Bruce et al., 1997); the reasons for this lack of success are unknown (Gledhill and Green, unpublished).

The red handfish occurs demersally inshore at depths of 1–20 m (Last and Gledhill, 2009), on sand and around rocky reefs (Pogonoski et al., 2002). Bruce et al. (1997) comment that red handfish are found in more exposed localities than that typical of the spotted handfish. Red handfish feed on worms and crustaceans (Kuitert, 1996).

## 8. Description of Threats

A significant current threat to the red handfish is habitat degradation from one or a combination of impacts including introduced species, pollution and siltation, increasing water temperatures and the proliferation of other native species as a result of human activities. The red handfish appears to have a critical reliance on the availability of green algae (particularly *C. simpliciuscula*) as spawning substrata (Gledhill and Green, unpublished).

*Heliocidaris erythrogramma* (a native sea urchin) has increased in abundance throughout eastern Tasmania due to fishing activities that remove the predatory *Jasus edwardsii* (Southern rock lobster) from the ecosystem (Brereton, pers. comm., 2010). Increased numbers of *H. erythrogramma* have resulted in the significant over-grazing of algae and the formation of urchin 'barrens' that are unsuitable for handfish (Brereton, pers. comm., 2010). When *H. erythrogramma* invaded and destroyed the algal habitat at Primrose Sands reef in the 1990s, red handfish disappeared from the site (Last and Gledhill, 2009). No red handfish were located during surveys in 2005, despite abundant *C. simpliciuscula* present on the sediments adjoining the reef (Gledhill and Green, unpublished). It was not until late 2010 that a few red handfish were again recorded at Primrose Sands (Brereton, pers. comm., 2010).

Take by private and commercial aquarium collectors is an additional known threat. Anecdotal reports suggest that the red handfish is subject to small scale collection for illegal trade (DEH, 2004).

Introduced species that destroy critical habitat and affect recruitment are a potential threat to the red handfish. The European green crab (*Carcinus maenas*) is an introduced species that was initially rare in the Derwent Estuary and Storm Bay before it expanded greatly around 2003 (Thresher pers. comm., 2010). While interactions between the European green crab and the red handfish are unknown, the European green crab is a generalist predator that would be likely to consume handfish eggs (Thresher, pers. comm., 2010). The species appears to be expanding throughout the region and is most common in seagrass habitats (Thresher, pers. comm., 2010).

An increase in water temperatures from natural or anthropomorphic sources (e.g. climate change) is also a potential threat (Gledhill and Green, unpublished). Handfish held in aquaria appeared distressed at temperatures above 18°C, and during the summer of 2000–01 water temperatures of approximately 20°C were noted at Primrose Sands where the species is known to exist (Gledhill and Green, unpublished).

## 9. Public Consultation

The information used in this assessment was made available for public exhibition and comment. Any comments received that are relevant to the survival of the species have been considered by the Committee.

## 10. How judged by the Committee in relation to the criteria of the EPBC Act and Regulations

The Committee judges that the species is **eligible** for listing as **critically endangered** under the EPBC Act. The assessment against the criteria is as follows:

**Criterion 1: It has undergone, is suspected to have undergone or is likely to undergo in the immediate future a very severe, severe or substantial reduction in numbers**

There have been no dedicated systematic quantitative or spatial surveys to census population parameters of red handfish (Gledhill and Green, unpublished). However, anecdotal evidence suggests that the species is uncommon within its range and has severely declined over the last three generations. The total population size of the red handfish is thought to be less than that of the spotted handfish (Edgar, pers. comm., 2010), which is estimated to be 1500–2700 adults (Gledhill and Green, unpublished). The only known population of red handfish, at Primrose Sands, may consist of less than 100 individuals (Edgar, pers. comm., 2010).

Historical records suggest that the species once occurred in Bass Strait; however the species has not been recorded from this area since the 1950s. Individuals of the mottled morph were also present at Port Arthur (Tasman Peninsula) in the early 1800s but there have been only two reported observations since the 1980s (Gowlett-Holmes, pers. comm., in Last and Gledhill, 2009), despite a significant amount of commercial and recreational diving in the area (Last and Gledhill, 2009). Last and Gledhill (2009) report a possible major and recent decline off the Forestier Peninsula.

The largest known population consisting of hundreds of red handfish of the bright red morph was found at Primrose Sands (Fredrick Henry Bay) during the 1900s (Last and Gledhill, 2009). Fifteen sightings of at least ten individuals were reported in 1996 (Bruce et al., 1997) and a red handfish density of approximately 7 ha<sup>-1</sup> was recorded in an area off this reef during spotted handfish surveys in 1999 (Gledhill and Green, unpublished). Following an infestation of *H. erythrogramma* urchins at Primrose Sands in the 1990s, red handfish disappeared from the site (Last and Gledhill, 2009).

In late 2010, three red handfish were again sighted at Primrose Sands and a small number of individuals were recorded during subsequent dives at this site (Green, pers. comm., 2010). While it is difficult to determine a long term population trend for this species, the viability of the red handfish is considered to be of great concern (Green, pers. comm., 2010).

A significant threat to the red handfish is the loss of critical habitat. The loss of algal habitat from Primrose Sands reef is likely to have contributed to the severe decline in numbers at this site (Gledhill and Green, unpublished). Red handfish also appear to have a limited capacity for recolonisation of disturbed areas. According to DEH (2004), the threat of collection, combined with the species' low reproductive rate and highly restricted distribution, has the potential to cause rapid and unsustainable population decline.

The Committee judges that the red handfish has undergone a reduction in numbers; however there are insufficient data available to determine whether this reduction has been very severe, severe or substantial. Therefore, the species has not been demonstrated to have met each of the required elements of Criterion 1, and is **not eligible** for listing in any category under this criterion.

**Criterion 2: Its geographic distribution is precarious for the survival of the species and is very restricted, restricted or limited**

The red handfish is historically known from as far north as Bass Strait and as far south as the Actaeon Islands (Gledhill and Green, unpublished). The largest known population of red handfish, of hundreds of individuals, was discovered in Fredrick Henry Bay in the 1900s (Gledhill and Green, unpublished). No specimens were observed at this site during surveys in 2005 (Green, 2005).

During more than 1000 (200 m x 10 m) underwater transects since 1992 (equivalent to more than 2 km<sup>2</sup> of seabed closely searched), numerous reef sites around the Tasmanian coast have been surveyed (Edgar, pers. comm., 2010) to record fish species and their size and abundance (Edgar et al., 2009). These surveys failed to record any red handfish until 2010, when one specimen was sighted at Primrose Sands (Edgar, pers. comm., 2010). Three red handfish were subsequently recorded and photographed in the Primrose Sands area in late 2010 (Brereton, pers. comm., 2010; Green, pers. comm., 2010), with additional sightings made during several different dives (Green, pers. comm., 2010).

No other locations are known where the red handfish can currently be found (Gledhill and Green, unpublished; Edgar, pers. comm., 2010). The species' geographic distribution is therefore limited as its extent of occurrence is unlikely to be more than one hundred square kilometres. The Committee considers this geographic distribution to be very restricted.

As outlined under Criterion 1, there are several known and potential threats to the species, including habitat degradation and illegal collection for the aquaria trade. The species' has a limited capacity for reproduction, dispersal and recolonisation, and is inferred to have undergone a population size reduction over the last three generations.

Given the species' limited breeding and dispersal capabilities and the described threats, the Committee judges the species' geographic distribution to be very restricted and precarious for the survival of the species. Continuing decline in the species' extent of occurrence and number of mature individuals is likely. The species has therefore been demonstrated to have met the relevant elements of Criterion 2 to make it **eligible** for listing as **critically endangered**.

- Criterion 3: The estimated total number of mature individuals is limited to a particular degree; and either**
- (a) evidence suggests that the number will continue to decline at a particular rate; or**
  - (b) the number is likely to continue to decline and its geographic distribution is precarious for its survival**

As described under Criterion 1, the red handfish has not been consistently or systematically surveyed. However, anecdotal information suggests that the species has declined markedly and the total number of mature individuals is judged by the Committee to be low.

The red handfish is currently known only from a limited location at Primrose Sands and is considered to have a very restricted geographic distribution. Given the current known and potential threats to the species and the unknown reason for past declines, it is likely that the species' extent of occurrence and number of mature individuals will continue to decline. The geographic distribution of the red handfish was determined by the Committee to be precarious to the survival of the species under Criterion 2. The species has therefore been demonstrated to have met the relevant elements of Criterion 3 to make it **eligible** for listing as **endangered**.

- Criterion 4: The estimated total number of mature individuals is extremely low, very low or low**

As demonstrated under Criterion 1, it appears that the total number of red handfish has declined. No specimens were recorded at Primrose Sands during surveys in 2005 and efforts to locate red handfish at sites where they were previously known to exist are reported to have failed (Gledhill and Green, unpublished). In late 2010, three red handfish were located in the Primrose Sands area (Brereton, pers. comm., 2010; Green, pers. comm., 2010) and limited sightings have since been made at this site (Green, pers. comm., 2010).

It is thought that the total population size of the red handfish is less than that of the spotted handfish, which is estimated to be 1500–2700 adults (Gledhill and Green, unpublished). Edgar (pers. comm., 2010) estimates that the only known population of red handfish may consist of less than 100 individuals.

These factors, combined with the species' low breeding and dispersal capabilities, restricted geographic distribution and known threats, combine to make it unlikely that the overall number of mature individuals exceeds 1000 in the wild (DEH, 2004), which is considered by the Committee to be low. The species has therefore been demonstrated to have met the relevant element of Criterion 4 to make it **eligible** for listing as **vulnerable**.

**Criterion 5: Probability of extinction in the wild that is at least**

**(a) 50% in the immediate future; or**

**(b) 20% in the near future; or**

**(c) 10% in the medium-term future**

There are insufficient data available to estimate a probability of extinction of the species in the wild over a relevant timeframe. Therefore, as the species has not been demonstrated to have met the required elements of Criterion 5, it is **not eligible** for listing in any category under this criterion.

## 11. CONCLUSION

### Conservation Status

The Committee accepts that the red handfish has a very restricted geographic distribution, which is precarious for the survival of the species due to its limited breeding and dispersal capabilities, high reliance on limited spawning substrata and several known threats, including habitat loss and illegal collection. The total number of mature individuals has undergone a recent decline and is judged by the Committee to be low. Therefore, the species has been demonstrated to have met sufficient elements of Criterion 2 to make it **eligible** for listing as **critically endangered**.

### Recovery Plan

The Committee notes that there is an existing national recovery plan for four species of handfish (DEH, 2005), which includes the red handfish.

## 12. Recommendations

- (i) The Committee recommends that the list referred to in section 178 of the EPBC Act be amended by **transferring** from the **vulnerable** category to the **critically endangered** category:

***Thymichthys politus***

- (ii) The Committee recommends that there should be a recovery plan for this species.

Threatened Species Scientific Committee

18 March 2011

### 13. References cited in the advice

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