

# DPI Primefact

## McCulloch's anemonefish – *Amphiprion mccullochi*

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Threatened Species Unit

### Introduction

The McCulloch's anemonefish (*Amphiprion mccullochi*) is a dark coloured anemonefish (Fig 1) that is found living in the sea anemone species *Entacmaea quadricolor* (bubbletip anemone).



Figure 1. *Amphiprion mccullochi*. (Photo: David Harasti).

McCulloch's anemonefish is endemic to Australia and can be found occurring in Commonwealth Waters around Middleton Reef and Elizabeth Reef, and at Lord Howe Island in New South Wales, where they are found throughout the shallow waters of the protected Lord Howe Island lagoon within the Lord Howe Island Marine Park (Fig 2).

In NSW, the McCulloch's anemonefish is listed as a **critically endangered species**. There are heavy penalties for harming, possessing, buying or selling them, or for

harming their habitat (see 'Legal Implications').



Figure 2. Lord Howe Island lagoon where *Amphiprion mccullochi* inhabits shallow coral reef habitats (Photo Justin Gilligan).

### Description

The McCulloch's anemonefish is a dark brown to black anemonefish with a pale coloured snout. Adults have one white bar on the cheek that usually does not connect over the top of the head. The caudal peduncle and caudal fin are white. The maximum size for the McCulloch's anemonefish is a total length of 120 mm.

In juveniles, the face, trailing edge of the pectoral fins, and caudal peduncle are yellow (Fig 3). As the fish grows, it gradually loses its yellow colouration and the two posterior

white bars. By 50 mm, the fish usually exhibit the adult colouration.



Figure 3. Juvenile *Amphiprion mccullochi*. (Photo: Justin Gilligan).

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## Habitat and ecology

The McCulloch's anemonefish is known to live in its host bubbletip anemone (*Entacmaea quadricolor*).

Bubbletip anemones are found on coral reefs throughout the tropical Indo-Pacific. In Australia, its distribution extends south to at least Coffs Harbour on the east coast, and Perth in Western Australia. At Lord Howe Island, the anemone is distributed from the low water mark to 40 m depth and is most common in the lagoon (1–5 m). Bubbletip anemones require a hard, stable structure to attach their foot to. On coral reefs, including at Lord Howe Island, they typically attach to dead coral reef.

Anemonefish are known to change sex from male to female (protandrous hermaphroditism). Given the social and reproductive patterns of McCulloch's anemonefish match those of other anemonefish, it is most likely that it is also a protandrous hermaphrodite. McCulloch's anemonefish first mature (as males) at 1–2 years of age and can live up to 22 years.

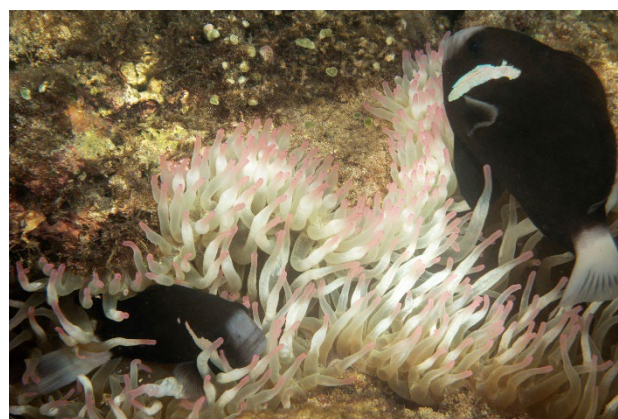


Figure 4. Bubbletip anemone (*Entacmaea quadricolor*) showing bleaching with pair of McCulloch's anemonefish. (Photo: Justin Gilligan).

Anemonefish spawn by laying an egg clutch on the benthic substrate next to their host anemone. A McCulloch's anemonefish breeding pair produces approximately 500–1000 eggs per clutch, and a new clutch is laid around every 8–14 days during the spawning season (November–March). Initially, eggs are approximately 2–3 mm long and orange-red in colouration (Fig 5).



Figure 5. Eggs of *Amphiprion mccullochi* (Photo: Justin Gilligan).

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## Why is the McCulloch's anemonefish threatened?

McCulloch's anemonefish is under threat primarily because of impacts from climate change. The main threat to the McCulloch's anemonefish is rising sea surface temperatures.

McCulloch's anemonefish cannot survive without its host anemone. The distribution and abundance of McCulloch's anemonefish is determined by that of its host anemone. This anemone has declined in recent times from stress (bleaching) and mortality caused by episodes of elevated sea temperatures. As the climate changes, the frequency and severity of these bleaching events is predicted to increase. Continuing loss of this essential habitat is resulting in a declining trend for McCulloch's anemonefish.

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## Conservation and recovery actions

- Continued monitoring of McCulloch's anemonefish and its bubbletip anemones through existing long-term monitoring program.
- Surveys to assess and map the distribution of McCulloch's anemonefish and bubbletip anemones across all habitats, including deeper waters.
- Update habitat mapping of Lord Howe Island to further clarify the distribution of abundance of suitable habitat for the McCulloch's anemonefish and bubbletip anemones to be used in spatial planning.
- Given McCulloch's anemonefish is reliant on host anemones that are subject to bleaching events, recovery

and restoration of this critical habitat should be investigated and implemented.

- Research into constraints on the size of the breeding population of McCulloch's anemonefish and whether translocations or captive breeding can be used to increase the breeding population.
- Research focusing on determining the adaptability and resilience of McCulloch's anemonefish and anemones to increasing water temperatures.
- Development of a detailed translocation plan and undertake translocations to establish additional, viable populations to spread extinction risk (reintroduction or assisted colonisation) or to bolster populations (reinforcement).
- Management actions should be implemented to reduce impacts from anthropogenic threats that result in changes to hydrology/ water/sediment flows in nearshore environments, particularly the Lord Howe Island lagoon, that may result in unfavourable conditions for McCulloch's anemonefish or its anemone.
- Any disturbance that may result in anemone mortality, such as localised water pollution from diffuse source runoff or maritime source pollution, eutrophication resulting from groundwater contamination which can exacerbate the impacts of climate change, should be identified and addressed through local management actions.



- The continued implementation of comprehensive and adequate no-take areas within the remaining distribution of the McCulloch's anemonefish to maintain effective ecosystems and resilience against climate change.
- The export of aquarium fish and anemones from Lord Howe Island should be prohibited to reduce the risk of McCulloch's anemonefish being targeted by the illegal trade.
- Develop emergency response actions to be incorporated into local marine heat wave response plans.
- Report any sightings of the species via the NSW DPI online form: [www.dpi.nsw.gov.au/fisheries/species-protection/report-it](http://www.dpi.nsw.gov.au/fisheries/species-protection/report-it)

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## Legal Implications

It is illegal to catch and keep, buy, sell, possess or harm McCulloch's anemonefish (or any other threatened species in NSW) without a specific permit, licence or other appropriate approval, and significant penalties apply. For critically endangered species, these penalties can include fines of up to \$220,000 and up to two years in prison.

There can also be significant penalties for causing damage to the habitat of a threatened species without approval. The impacts of developments or activities that require consent or approval in accordance with the *Environmental Planning and Assessment Act 1979* must be assessed and considered by consent or determining authorities. Where such actions are likely to result in significant impact on a threatened species or its habitat, a detailed species impact statement must be prepared.

Strategies to be adopted for promoting the recovery of the McCulloch's anemonefish must be set out in the NSW DPI Priorities Action Statement.

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## Bibliography and further reading

Fisheries Scientific Committee (2024) Final Determination *Amphiprion mccullochi* available online at: <https://www.dpi.nsw.gov.au/fishing/species-protection/fsc/final/Amphiprion-mccullochi-McCullochs-Anemonefish-Final-Determination.pdf>

Hobbs JPA (2022). Summary report on the conservation status of McCulloch's anemonefish: towards consideration as a threatened species. Report for the Lord Howe Island Marine Park, Lord Howe Island.

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## For further information

See the NSW DPI website: [www.dpi.nsw.gov.au](http://www.dpi.nsw.gov.au)

Contact the NSW DPI Threatened Species Unit:

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