



## Black mangrove cichlid (*Tilapia mariae*)

**Synonyms and common names:** *Tilapia meeki* (Pellegrin 1911), *Tilapia dubia* (Lönneberg 1904), tilapia, spotted tilapia, black mangrove cichlid.

**Biology and ecology:** The black mangrove cichlid is a deep-bodied fish native to West Africa<sup>1</sup>. It has a blunt or rounded head with red eyes that are often intersected by a dark band extending downwards toward the mouth. This tilapia species has a long, unbroken upper (dorsal) fin, which extends from above the gills to near the end of the tail fin and is often longer in males than females. In juveniles and sub-adults, this fin is shorter again, finishing half to two-thirds of the way along the length of the tail fin.

Generally, upper body colour in all life stages ranges from a yellowish-green through to dark olive. The underside is a pale milky colour. Between five and nine dark vertical bars or oval spots are present along the sides of the fish. There is also a dark spot present at the base of the fin midway along the back, commonly referred to as the tilapia spot.

“ The tilapia spot and long continuous dorsal fin are useful features to look for when trying to distinguish between tilapia and Australian native fish species ”

Juveniles have a highly pronounced tilapia spot. Adult black mangrove cichlids display a range of colours and patterns associated with reproductive maturity and territoriality<sup>2</sup>. In breeding condition, males and females develop bright red patches behind and below the side (pectoral) fins. Five large dark spots of varying size also appear along the sides of territorial and/or sexually mature fish. This spotted pattern is associated with high levels of aggressive behaviour between mature or reproductively active individuals. Barred patterning, displayed prominently by juveniles, indicates a more submissive fish and is thought to be used to avoid aggressive attacks from adult fish<sup>2</sup>.

Black mangrove cichlids can grow to a length of more than 30cm under favourable conditions<sup>3</sup>. Males are generally longer than females although both sexes can reach this length. In Africa, the largest recorded black mangrove cichlid was 32.3cm long and weighed 550g<sup>3</sup>. This is comparable to black mangrove cichlids in northern Australia, where the largest female was 32.4cm long and weighed 796g, and the largest male was 33.3cm long and weighed 952g<sup>4</sup>. However they are most commonly caught at lengths of 20–25cm and have been found to live for up to nine years<sup>4</sup>.



Different life stages of *Tilapia mariae*. Image: Department of Employment, Economic Development and Innovation (DEEDI), Queensland

**Habitat:** Black mangrove cichlids occur naturally in a wide variety of habitats from shallow, tidally influenced lagoons (brackish water) through to clear, high-flowing rivers and streams<sup>5</sup>. Although their preferred temperature for growth and reproduction is 25–33°C, black mangrove cichlids are flexible in their ecological tolerances and can adapt to and persist in suboptimal conditions<sup>3,4</sup>. In Africa, black mangrove cichlids can live in brackish water with salinity as high as eight parts per thousand – about a quarter of the salinity of normal seawater<sup>3</sup>. In Australia, they have successfully established populations in coastal rivers and associated tributaries, as well as cooler, freshwater impoundments at higher altitudes, power station cooling ponds, and inland water storages. However, they may be unable to successfully establish populations in colder areas of Australia. It is thought that populations away from the coast have mainly been established by people illegally moving fish between watercourses.

**Nutrition:** Black mangrove cichlids are primarily grazers and plankton filter-feeders<sup>1</sup>. They have a



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relatively long large intestine, which helps digest the large amount of algae and plant material eaten. Detailed examination of the stomach contents of captured fish has found their diet to comprise algae (all types but mainly filamentous), diatoms, aquatic plants, detritus, sand and aquatic and terrestrial invertebrates<sup>3</sup>.

**Reproduction and lifecycle:** Black mangrove cichlids are territorial bottom spawners with the capacity to reproduce under a variety of ecological conditions. Males and females both reach sexual maturity at 1–3 years of age<sup>4</sup>. Males mature at a length of 24–27cm and females at 21–23cm<sup>4</sup>. Spawning usually involves just one male and one female. In northern Australian populations, females can produce around 3600–6500 eggs per spawning<sup>4</sup>. This is considered a high number compared to other species of cichlids.

Reproduction is cyclic throughout the year, with peaks in spawning activity correlating with elevated river flows (Africa) and increased water temperatures (Australia)<sup>3,4</sup>. In Africa, spawning events also coincide with the lead up to the full moon<sup>1</sup>. It is thought that this timing may relate to the improved ability of adults to guard eggs and juveniles when the night sky is lighter. In high-density populations, pairs will often spawn in close proximity to each other (leks) and cooperatively guard nearby fry.

Female black mangrove cichlids initiate courtship, which takes place over several days and involves aggressive displays and conflicts with the male<sup>5</sup>. Females then prepare a spawning site (nest), which involves cleaning a selected surface of vegetative material and silt. After the female has released her eggs onto the prepared surface, the male releases his milt (sperm)<sup>5</sup> to fertilise them. Eggs are spherical, interlinked chains about 1.4–3.0mm in diameter and are sticky, allowing spawning to occur on vertical as well as horizontal surfaces. The eggs are tended solely by the female, who guards them from predators, actively fans them to increase water flow, and removes dead or diseased eggs. During this time, the male guards the female and the nest from other black mangrove cichlids.

Eggs hatch within a week of spawning<sup>5</sup>. The male and female then prepare a 5–10cm deep pit, or bower, a short distance from the spawning site by removing silt, debris and vegetation. Embryos or ‘wrigglers’ are transferred by mouth to the pit and are guarded by both parents. Wrigglers become free-swimming juveniles 4–10 days after hatching, depending on the water temperature<sup>5</sup>. At this stage, the male takes on most of the brood-guarding duties. Females stay a short distance away and chase away potential predators.

Parental care lasts for 40–60 days, until juveniles reach a length of 20–25mm. Adults then leave the brood and begin preparing for future breeding.

**Economic impacts:** Black mangrove cichlids are still widely used in Africa for food and traditional fishing<sup>3,5</sup>. The species has been distributed around the globe as part of the ornamental fish trade and, to a limited extent, as an aquaculture species. It is considered an invasive pest in both Australia and the United States. There are currently no legal economic or social uses for black mangrove cichlids in either of these countries.



Tilapia eggs. Image: DEEDI, Queensland

**Environmental impacts:** The ecological impacts of introduced black mangrove cichlids are still being assessed. However, habitat modification, disease vectoring and reductions in biodiversity are likely impacts. A number of strategies have been trialled to control introduced tilapia. For example, in the United States the butterfly peacock bass (*Cichla ocellaris*) has been introduced in some areas as a predator<sup>5</sup>. In Australia, spot poisoning of confined populations has occasionally been done. Unfortunately, none of the control and/or eradication methods currently available will provide a ‘silver bullet’ for the management of this species. Instead, targeted public education campaigns are being used to raise awareness of the harmful effects of tilapia, with the aim of limiting the future spread of this invasive pest.

#### Further information:

1. Fishbase (2010). [Tilapia mariae \(Boulenger 1899\)](#). Fishbase species table online.
2. Australian Centre Tropical Freshwater Research (2007). [Pest Fish Profiles - Tilapia mariae](#). James Cook University.
3. Bradford M, Kroon F and Russell D (2011). The biology and management of *Tilapia mariae* (Pisces: Cichlidae) as a native and invasive species: a review. [Marine and Freshwater Research 62:902-917](#).
4. Russell DJ, Thuesen PA and Thomson FE (2009). *Development of Management Strategies for Control of Feral Tilapia Populations in Australia*. Queensland Department of Employment, Economic Development and Innovation, Brisbane.
5. IUCN-World Conservation Union (2009). [Tilapia mariae \(fish\)](#). Global Invasive Species Database.