Tilapia mariae 正體中文

System: Marine_freshwater_brackish

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Actinopterygii	Perciformes	Cichlidae

Common name ukuobu (English), pondaworkei (English), ifunu (English), epia ajegi (English), mpupa (English), tha thompo (English), tigrovaya tsikhlida (Russian), a-sannoh (English), marienbuntbarsch (German), tiger cichlid (English), Niger cichlid (English), black mangrove cichlid (English), spotted tilapia (English), fünfflecktilapie (German)

Synonym *Tilapia dubia* , (Riehl and Baensch, 1991)
Tilapia meeki , (Riehl and Baensch, 1991)
Tilapia dubia , (Lönnberg 1904)
Tilapia meeki , (Pellegrin 1911)

Similar species

Summary
Tilapia mariae, or spotted tilapia, is a cichlid native to coastal lagoons in western equatorial Africa that has established populations in Australia and United States. Due to its high fecundity, aggressive behaviour, and ecological plasticity it has the potential for rapid, explosive invasion and has become a significant pest in introduced ranges.

view this species on IUCN Red List

Species Description
Adults have a compressed, ovate body with large red eyes, a round snout, and a small mouth. Coloration is a dark olive to light yellow with dark barring and dark spots. Dorsal and caudal fins bear bright pink and white margins and a faint yellow banding. Sexes are similar in size and appearance with males slightly larger and sometimes having shimmering white spots on their dorsal fin. Adults generally grow to lengths of 30 cm with a record of 40 cm. Juveniles are also olive green with dark vertical bands and a distinct black spot on the rear of the dorsal fin. *T. mariae* may undergo as many as nine different possible rapid colour pattern changes associated with various territorial and courtship behaviours (ACTFR, 2007; GSMFC, 2005; Robins, Undated).

Lifecycle Stages
Females, occasionally aided by their mates, prepare nests by removing plant material and silt, usually on rocky substrates. They prefer smooth rock surfaces than gravel bed, and can spawn on vertical and well as horizontal surfaces. After 5-7 days embryos hatch, becoming free embryos. After hatching the female, with help from the male, moves the free embryos to a pit about 20-30cm from the embryo mass. During this time the female provides most of the care, cleaning the embryos and guarding against predators. After about 2-3 days the young, now known as juveniles, form a school near the substrate. At this stage there is a dramatic shift in parental roles with males spending more time close to the juveniles (Annett *et al*., 1999). They reach sexual maturity at 10-15 cm length which may take 12 to as little as 3 months. *T. mariae* is known for a rapid growth rate and high fecundity (Cribb, 2006; ACTFR, 2007).

Uses
In West Africa *Tilapia mariae* is an important food and source of protein (Robins, Undated).

Habitat Description

Spotted tilapia commonly inhabit still or flowing freshwaters of rock or mud-bottomed streams and lower reaches of medium sized rivers. They inhabit temperatures of 11-37°C with a preferred temperature range of 25-33°C. Although typically a freshwater species, spotted tilapia have a relatively broad salinity tolerance and populate estuarine systems (DPIFM, 2006; ACTFR, 2007; Robins, Undated; Mather & Arthington, 1991).

Reproduction

Spotted tilapia are bi-parental substrate spawners and nest guarders. Fertilization is sexual and external. They exhibit aggressive behaviour while spawning and are believed to breed year-round with seasonal peaks in spring and late summer or fall. *Tilapia mariae* are generally monogamous, but males have been observed breeding with more than one female. Solitary females can be successful with raising young, but few males persist with brood care without the female (Schwanck, 1989). Pairs establish breeding territories. Spawning occurs in nests of gravel or debris often built under rocks. Typically 200-400, but as many as 2000, turquoise-coloured eggs may be deposited in one nest. After 5-7 days, embryos become free embryos and females remove them from the nest to a nearby pit and consume the unfertile eggs (Annett *et al*., 1999). Exhibiting complex parental care, males and females work together to strictly guard, brood, and feed hatchlings until they are free swimming and about 3-4 cm in length, which takes about 9 days (Schwanck, 1987). Clear roles exist between both parents, with females performing nearly all tending of embryos and free embryos. When young become free-swimming and leave the nest males take over tending of young while females patrol the perimeter of the school and chase predators (Annett *et al*., 1999).\r\n\r\n\r\n*T. mariae* may gather in breeding colonies and are known to exhibit lunar synchronisation in spawning, laying more batches before a full moon. Lunar cyclicity may be used as a cue for synchronized breeding, but it is also thought that moonlight improves guarding efficiency in fish with parental care and thus enhances brood survival (Schwanck, 1987).

Nutrition

Tilapia mariae is primarily a planktivore and an opportunistic consumer of filamentous algae, cyanobacteria, detritus, aquatic plants, diatoms, invertebrates, and fish eggs. It has fine teeth with moveable slender shafts adapted for rasping and grinding as well as several gill rakers for sifting food particles (ACTFR, 2007; GSMFC, 2005).

General Impacts

Tilapia mariae dominates introduced habitats, representing a competitive threat to native species and can lower biodiversity. They are extremely aggressive and territorial while breeding. They are capable of rapid invasion and have high fecundity. *T. mariae* can compete with native fish for resources such as prey or breeding sites which can cause the displacement of native fish species. In much of its introduced range, *T. mariae* is the dominant species both by number and biomass (ACTFR, 2007; Cribb, 2006; GSMFC, 2005). Brooks and Jordan (2009) tested whether *T. mariae* and native Lepomis sunfishes compete for territory in South Florida. They found that *T. mariae* are significantly more aggressive and have an advantage in the acquisition and retention of territories; this may impact spawning sites of Lepomis sunfish. As a significant predator Lepomis sunfishes are important in structuring small fish and invertebrate assemblages (Loftus & Kushland, 1987 in Brooks & Jordan, 2009). Thus competitive displacement of sunfishes by *T. mariae* may further disrupt the ecosystems which they invade. Furthermore, the butterfly peacock *Cichla ocellaris* which was introduced as a biocontrol agent for *T. mariae* is physiologically restricted to the canal systems in Florida and cannot survive in the natural wetlands, meaning there is further potential for *T. mariae* densities to increase in these natural systems.

Management Info

Preventative measures: The use of potentially invasive alien species for aquaculture and their accidental release/or escape can have negative impacts on native biodiversity and ecosystems. Hewitt *et al*, (2006) Alien Species in Aquaculture: Considerations for responsible use aims to first provide decision makers and managers with information on the existing international and regional regulations that address the use of alien species in aquaculture, either directly or indirectly; and three examples of national responses to this issue (Australia, New Zealand and Chile). The publication also provides recommendations for a 'simple' set of guidelines and principles for developing countries that can be applied at a regional or domestic level for the responsible management of Alien Species use in aquaculture development. These guidelines focus primarily on marine systems, however may equally be applied to freshwater.
Copp *et al*, (2005) Risk identification and assessment of non-native freshwater fishes presents a conceptual risk assessment approach for freshwater fish species that addresses the first two elements (hazard identification, hazard assessment) of the UK environmental risk strategy. The paper presents a few worked examples of assessments on species to facilitate discussion. The electronic Decision-support tools- Invasive-species identification tool kits that includes a freshwater and marine fish invasives scoring kit are made available on the Cefas (Centre for Environment, Fisheries & Aquaculture Science) page for free download (subject to Crown Copyright (2007-2008)).
Queensland, Australia has outlawed the release of *Tilapia mariae* in waterways and their use as bait with harsh penalties for these offenses of up to $150,000 (DPI&F, 2008). Possession of *T. mariae* has been banned in Florida since 1974 (Nico, 2006).\r\n\r\n
Biological: The piscivorous South American peacock cichlid or butterfly peacock bass (*Cichla ocellaris*) was introduced to Florida as a biological control for *Tilpaia mariae* in 1984 by the Florida Game and Fresh Water Fish Commission (Shafland, 1996). This is the only authorized introduction of an exotic fish into Florida. The butterfly peacock has established and helped reduce numbers of spotted tilapia and has also created a multimillion dollar recreational fishery (Shafland & Stanford, 1999). Importantly, there have been no detrimental impacts from the introduction of the butterfly peacock (Shafland, 1995). Robins (Undated) reports that the two fish appear to have established equilibrium in populations in Florida.

Pathway

Principal source: \r\n
Australian Centre for Tropical Freshwater Research (ACTFR)., 2007a. Pest fish profiles - *Tilapia mariae*.
Gulf States Marine Fisheries Commission (GSMFC)., 2005. *Tilapia mariae* (Boulenger, 1899).
Cribb, H. 2006. Fishnote: Tilapia. All species of the genera *Oreochromis* and *Tilapia*. Department of Primary Industry, Fisheries and Mines (DPIFM), Northern Territory Government.
FishBase., 2008. *Tilapia mariae* Spotted tilapia: Summary
Fuller, P.L., Nico, L.G. & Williams, J.D. 1999. Nonindigenous fishes introduced into inland waters of the United States. *American Fisheries Society, Special Publication 27*. 613p.
Annett, C.A., Pierotti, R. & Baylis, J.R. 1999. Male and female parental roles in the monogamous cichlid, *Tilapia mariae*, introduced in Florida. *Environmental Biology of Fishes 54*: 283–293.

Compiler: National Biological Information Infrastructure (NBII) & IUCN/SSC Invasive Species Specialist Group (ISSG)

Review: Pam Fuller USGS/BRD, Nonindigenous Aquatic Species Program. Florida Integrated Science Center. USA

Pubblication date: 2009-04-07

ALIEN RANGE

[3] AUSTRALIA **[1]** RUSSIAN FEDERATION

[5] UNITED STATES

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Summary: In 1993, Canada, Mexico and the United States signed the North American Agreement on Environmental Cooperation (NAAEC) as a side agreement to the North American Free Trade Agreement (NAFTA). The NAAEC established the Commission for Environmental Cooperation (CEC) to help the Parties ensure that improved economic efficiency occurred simultaneously with trinational environmental cooperation. The NAAEC highlighted biodiversity as a key area for trinational cooperation. In 2001, the CEC adopted a resolution (Council Resolution 01-03), which created the Biodiversity Conservation Working Group (BCWG), a working group of high-level policy makers from Canada, Mexico and the United States. In 2003, the BCWG produced the �Strategic Plan for North American Cooperation in the Conservation of Biodiversity.� This strategy identified responding to threats, such as invasive species, as a priority action area. In 2004, the BCWG, recognizing the importance of prevention in addressing invasive species, agreed to work together to develop the draft CEC Risk Assessment Guidelines for Aquatic Alien Invasive Species (hereafter referred to as the Guidelines). These Guidelines will serve as a tool to North American resource managers who are evaluating whether or not to introduce a non-native species into a new ecosystem. Through this collaborative process, the BCWG has begun to implement its strategy as well as address an important trade and environment issue. With increased trade comes an increase in the potential for economic growth as well as biological invasion, by working to minimize the potential adverse impacts from trade, the CEC Parties are working to maximize the gains from trade while minimizing the environmental costs.
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Summary: Abstract: The number of reproducing populations of non-native fishes in Florida continues to increase, with 25 species and five hybrids verified. Added to those listed by Courtenay, *et al*. (1974) are: *Hoplian malabaricus*, *Tilapia mariae*, *T. zillii*, *Cichlasoma trimaculatum*, and *Betta splendens*. The establishment rate is indicative of south Florida s environmental instability, due primarily to physical alteration of water flow patterns and other forms of aquatic pollution. Introduction of the fish is due to the irresponsibility of a few tropical fish farmers, in some cases; however, *T. zillii* has been purposely introduced as an aquatic weed biocontrol agent. The South American tigerfish (*H. malabaricus*), reportedly a voracious piscivore, is potentially the most harmful of these exotic species; the infested area connects with a swamp and open marsh draining into the Little Manatee River. The location of the *Tilapia mariae* infestation in the Dade County canal system largely precludes renovation. The *T. zillii* population was located in a small borrow pit south of Miami, which, upon renovation, yielded seven exotic species in addition to *T. zillii*: *T. mariae*, *T. mossambica*, *Hypostomus plecostomus*, *Corydoras* sp., *Danio malabaricus*, *Capoeta tetrazona*, and *Carassium auratus*. A remnant population of *Cichlasoma trimaculatum* probably exists in the Tampa area following an attempted renovation; the species was found to be euryhaline, and had access to saltwater. The population of Siamese fighting fish (*Betta splendens*) is confined to a small area of Dade County in ditches where renovation is impractical. (Lynch-Wisconsin)
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Webb, Alan Charles., 2007. Status of non-native freshwater fishes in tropical northern Queensland, including establishment success, rates of spread, range and introduction pathways. Journal & Proceedings of the Royal Society of New South Wales. 140(Part 3-4). 2007. 63-78.
Summary: Abstract: At least 20 non-native fishes have been reported from northern Queensland fresh waters, a 75% increase since 1994. Eleven of these species have established breeding populations and some are locally abundant and highly invasive, such as the tilapiine cichlids (*Oreochromis mossambicus* and *Tilapia mariae*) and the poeciliids (*Gambusia holbrooki* and *Poecilia reticulata*). Besides the continued introduction of non-native species, of great concern is the further spread of the tilapias, especially *Oreochrornis mossambicus* and its hybrid form, and of another invasive, the three-spot gourami, *Trichopterus trichogaster*. Initial introductions are most probably releases of unwanted aquarium fish directly into open waters, or indirectly from ornamental ponds by flood waters. While natural dispersal is occurring, most of the range expansion of the tilapiine cichlids, particularly into impoundments in flood-prone areas, has been as a, result of human translocation, and possibly the use of live bait by anglers.
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