Cichlasoma urophthalmus **System:** Freshwater

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Actinopterygii	Perciformes	Cichlidae

Common name Mexican mojarra (English, Thailand), false red terror (English, Thailand), halepletcichlide (Danish, Denmark), Mayan cichlid (English), schwanzfleckbuntbarsch (German, Germany), rengaskirjoahven (Finnish, Finland), orange tiger (English, United States (USA)), castarrica (Spanish, Mexico), catarrica (Spanish, Thailand), Central American cichlid (English), mojarra del México (Spanish, Spain), mojarra del sureste (Spanish, Mexico, Thailand)

Synonym *Amphilophus urophthalmus*
Parapetenia urophthalma
Nandopsis urophthalmus
Cichlasoma urophthalmus

Similar species

Summary The Mayan cichlid (*Cichlasoma urophthalmus*) is a medium sized cichlid native to Central America. It has invaded regions of Florida including the Everglades National Park and has more recently been reported from Thailand and Singapore. It is a generalist predator, and tolerates a wide range of salinities, temperatures and habitat types; factors which have contributed to its range expansion throughout the Florida peninsula. It can reach high densities and may compete with and predate upon native fish, possibly reducing biodiversity and ecosystem function.

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Species Description
Cichlasoma urophthalmus is a medium sized cichlid fish. Adults range from 8 to 22 cm standard length (SL) and a maximum of 600 g weight. Nico *et al*. (2007) list several important traits useful for distinguishing *C. urophthalmus*: 1) seven (rarely 8) prominent dark bars on body (the first an oblique along nape that crosses near the lateral line origin, and the seventh or posterior-most bar positioned on the caudal peduncle); 2) conspicuous, dark blotch centered above the caudal fin base and often outlined by a light halo (this blotch may be nearly round, oval square, or vertically elongate, and is noticeably blacker than the dark body bands); 3) caudal fin rounded; 4) anal-fin spines 5-7 (usually 6); 5) dorsal-fin spines 14-18 (usually16); and 6) well developed canine, unicuspid teeth in both jaws. Males and females are similar in appearance and are difficult to distinguish even during reproductive season, when both sexes develop intense red on the ventral side of their body. This species is however; highly variable in colour and anatomical features such as body proportion (Martinez-Palacios *et al*. 1993, Martinez-Palacios and Ross 1992 in Nico *et al*., 2007).
A number of other cichlid species resemble *C. urophthalmus* including some ornamental hybrid species known as Flowerhorns (Nico *et al*., 2007).

Notes
The generic allocation of this species is still uncertain. It belongs to the tribe Heroini, but is maintained as an incertae sedis species of *Cichlasoma* pending a revision of heroin cichlids traditionally assigned to the cichlasomatin genus *Cich* (FishBase, 2010).
Due to the taxonomic confusion, many name combinations still appear for this species, including *Amphilophus urophthalmus*, *Parapetenia urophthalma*, *Nandopsis urophthalmus*, and *Cichlasoma urophthalmus* (Nico *et al*., 2007). Miller *et al*. (2005 in Nico *et al*. 2005) recommend referring to this species as *"Cichlasoma" urophthalmus* to indicate the uncertainty of the generic name assignment.

Lifecycle Stages
In Florida, in the late dry season (April) nests are excavated along shorelines. Nests consist of oblong, shallow depressions in the spongy root mass of red mangroves (*Rhizophora mangle*). Nests are less than 10 cm deep and between 10 to 45 cm at their widest. Nests are often found in cloes association with each other. Shortly after nest construction spawning takes place. Parents exhibit advanced parental care which involves guarding behaviour and calling displays to young. Typically the brood surrounds the female, while the male patrols nearby and defends against potential predators. After four to six weeks the level of parental care begins to decline. During this time water levels have risen, enabling young to disperse to warmer habitat that is mainly free of predators. Adults must then replenish energy reserves (Faunce & Lorenz, 2000). Where sufficient food is available some adults may be able to quickly return to breeding condition and reproduce a second time in the same season (Barlow, 1991 in Faunce & Lorenz, 2000). Declining water levels and temperatures during winter gradually force young fish into deeper habitats. In March, changes in the environment facilitate reproduction by mature fish and the cycle begins again.
The reproductive cycle observed in the Mayan cichlid's introduced range is very similar to that in its native range. Most reproductive activity in Florida occurred between April to June (Faunce & Lorenz, 2000), which is in concurrence with studies from Mexico, although the reproductive season in Mexico is longer in duration (Loftus, 1987; Caso Chavez *et al*., 1986 in Faunce & Lorenz, 2000).
The reproduction cycle of Mayan cichlids coincides almost perfectly with the wet-dry cycle of southern Florida. It is unlikely that an exotic species could adapt so well to the hydrologic cycles of a new location in such a short period. However it is possible that the hydrologic conditions in the Florida Everglades are very similar to what this species encounters in its native range (Faunce & Lorenz, 2000). This similarity in environmental conditions explains the high degree of success Mayan cichlids experience in the mangroves of southern Florida (Trexler *et al*., 2000). While reproductive timing is similar between introduced and native populations, Faunce *et al* (2002) found that Mayan cichlids in Florida grow slower and live longer than reported from native Mexican habitats.

Uses
Mayan cichlids have been cultured as a food fish in Mexico since at least the 1980s. It is a suitable aquaculture species due to its wide salinity tolerance, hardiness and high fecundity and can be reared at high stocking densities (Martinez-Palacios & Ross, 1986; Nico *et al*., 2007).
It is also exploited as a game fish, and is commercially exploited in freshwater, brackish and marine environments throughout its native and introduced range. It is edible, attractive and aggressively takes baits and artificial lures. It is often preferred over exotic tilapias in local markets in its native range (Faunce & Lorenz, 2000; Martinez-Palacios & Ross, 1986). However anglers have mixed feelings towards this fish because it fights hard on light tackle and may interfere with pursuit of larger game fishes (Faunce *et al*., 2002).
Mayan cichlids are a popular fish in the aquarium trade in the United States and Europe, although the interest in Europe has declined in recent years (Nico *et al*., 2007).

Habitat Description
The Mayan cichlid is a shallow-water fish usually found in lentic habitats including freshwater marshes and mangrove swamps. It is a highly adaptable species and may also occur in a wide range of natural and artificial inland and coastal environments, including small and large streams, canals, ditches, lakes, ponds, limestone sinkholes and connected caves, marshes, coastal lagoons, and mangrove swamps. It is euryhaline, tolerant of a wide range of salinities (Schofield *et al*., 2009); although it usually found in freshwater and brackish environments it can tolerate marine conditions and is capable of surviving abrupt changes in salinity. In its native range the Mayan cichlid is limited to tropical latitudes. However introduced populations in Florida extend far into the subtropical zone. It is tolerant of a wide temperature range (14-39 °C) and of low oxygen (hypoxic) conditions (Faunce & Lorenz, 2000; Nico *et al*., 2007; FishBase, 2010; Schofield *et al*., 2009). Physiological tolerance to such broad range environmental conditions have likely contributed to the spread of this species throughout Florida (Schofield *et al*., 2009).
Its lower temperature tolerance limit is reportedly around 14°C, and extreme cold events can cause massive declines in its abundance, leading to significant fluctuations in abundance between years (Trexler *et al*., 2000). However it is possible that *C. urophthalmus* in their invasive range are evolving to be more tolerant of colder temperatures, as fish in an outdoor tank experiment tolerated multiple days of water below 15 °C (to 10 °C) (Adams & Wolfe, 2007).

Reproduction
Mayan cichlids exhibit guarding and nesting behaviour. Females produce a maximum of 600 eggs per spawning (FishBase, 2010).

Nutrition
Anatomical features of the Mayan cichlid suggest that it is primarily a carnivore. These include strong dentition; well developed canine unicuspid teeth; short, flat gill rakers; and a short intestine which reduces the efficiency of digesting large amounts of plant material (Martinez-Palacios & Ross, 1988).
Gut analysis of fish from its native range in Mexico found that it is a generalist predator, mainly feeding on invertebrates throughout all seasons. It also consumes some soft algae, although this may be consumed as a consequence of predation on small invertebrates, rather than as a deliberate food item. There was little difference between diet of small and large fish, although larger fish tended to feed on a more limited range of prey items and less plant material. The main identifiable animal consumed were palaemonid and penaeid shrimps (Martinez-Palacios & Ross, 1988).
Diet analysis from a location in its introduced range (Big Cypress National Preserve, Florida) found that this species preferred similar prey items to that in its native range. Both small and large fish fed mainly on fishes and filamentous fungi, although younger fish preferred ostracods, while older fish preferred gastropods, decapods, Hymenoptera and adult Diptera (Bergman & Motta, 2005).

General Impacts
Predation:Nest predation of native centrarchids by Mayan cichlids has been observed in the Everglades National Park (Trexler *et al*., 2000).
Presence of Mayan cichlids may affect prey behaviour. For example, a laboratory study of the native mosquitofish, *Gambusia holbrooki* in Florida found that this species reduced its use of tank microhabitats in the presence of Mayan cichlids (Rehage *et al*., 2009).
Competiton: Mayan cichlids compete with native substrate-spawning species, e.g. native largemouth bass (*Micropterus salmoides*), warmouth (*Chaenobryttus gulosus*) and spotted sunfish (*Lepomis punctatus*) in Everglades National Park. The catch of native species was found to vary inversely with the catch of Mayan cichlids. Although this pattern does not provide proof of a cause-and-effect relationship, further research in this habitat may provide evidence of community-level effects as a result of the Mayan cichlid invasion (Trexler *et al*., 2000).
Ecosystem change: There is concern that the interaction between Mayan cichlids and native fishes could alter the ecology of the Everglades and the Florida Bay region (Faunce *et al*., 2002).
Disease transmission:*Cichlasoma urophthalmus* is a potential vector of diseases and parasites. It was found to be an intermediate host to an unidentified member of the genus *Contracaecum*, a group of anisakid nematodes known to infect birds and mammals, including humans (Bergmann & Motta, 2004). Studies in Mexico have reported *C. urophthalmus* as host to a diverse range of parasites, including 71 helminth species (Salgado-Maldonado, 2006 in Nico *et al*., 2007), and the larvae of the nematode *Serpinema trispinosum*, which affects turtles (Moravec *et al*., 1998 in Nico *et al*., 2007).

Management Info
Management options for controlling exotic fishes once established are nearly non-existent. One possibility for achieving some level of control is to expose fish to cold water temperatures that accompany periodic winter fronts.
Cichlasoma urophthalmus are susceptible to temperatures below 14 or 15 °C (Faunce & Lorenz, 2000; Nico *et al*., 2007) and high salinities were found to slightly decrease the ability of fish to tolerate cold temperatures (by about 1°C) (Schofield *et al*., 2010). Thus, reducing temperatures of their habitat and denying access to thermal refuges may reduce *C. urophthalmus* populations. Refugia in Florida are frequent and often interconnected, and consist of man-made habitats such as canals, ditches, culvert pools, borrow ponds and pools at water control structures. Research suggests that actions such as infilling canals and pools to less than 50 cm water depth and decreasing connectivity of refugia (if done without affecting their water-management roles) would be a positive step in reducing population sizes of Mayan cichlids (Schofield *et al*., 2010).

Pathway
It spread rapidly throughout the southern Florida region was probably aided by fishermen (Simberloff & Gibbons, 2004).Its introduction into Florida may have beeen associated with the ornamental fish trade (Loftus, 1987, Contreras-Balderas, 1999 in Nico *et al*., 2007).

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[1] SINGAPORE
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