### Pest fish profiles

**Gambusia holbrooki** - Gambusia

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### Glossary

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### Common names:
Gambusia, eastern gambusia, mosquitofish, plague minnow, top minnow.

### Synonyms:
*Gambusia affinis holbrooki*

### Classification:
- Family: Poeciliidae
- Subfamily: Poeciliinae
- Supertribe: Poeciliini
- Tribe: Gambusiini
- Genus: Gambusia
- Species: holbrooki

### Taxonomic description:
Dorsal fin with 12-14 spines and 19-21 soft rays; anal fin with 3 spines and 15-17 soft rays.

### Appearance & Size:
Narrow, rounded fusiform body, greenish olive to brown on the back to grey on the sides and shading to silvery white belly, sometimes with a bluish sheen. This pattern can change to a pale sandy colour when in shallow water over sandy substrate or dark olive over muddy substrate.

Females are larger in size than males (max. size 8 and 3.5 cm respectively). Females are similar in appearance to the female guppy, *Poecilia reticulata*, although the latter has clear fins while gambusia has fins marked with small dark spots. Females appear typically to predominate in populations due to shorter lifespan of males (1 year compared to 2 years in females) and differences in habitat preferences of males (Vargas and de Sostoa 1996, Specziar 2004), although size-selective predation, for example, by piscivorous birds, can bias the ratio toward smaller males (Britton & Moser 1982).

Males have a highly modified anal fin extended to form a tubular gonopodium for sperm transfer to the female. Male guppies are similar in size and morphology except gambusia males lack extensions to the dorsal or caudal fins and the bright colour patterns typical of male guppies.

### Diet:
The species is omnivorous and a gape-limited forager. It feeds on small aquatic invertebrates including insects, their eggs and larvae, aquatic crustaceans (cladocerans, ostracods, copepods) as well as eggs and fry of small fish, small gastropods and amphibian tadpoles. Its diet may also opportunistically include terrestrial insects which fall into the water, as well as filamentous and unicellular algae and detritus (Arthington 1988, Webb and Joss 1997; Arthington and Marshall 1999; Ivantsoff 1999; Specziar 2004; Weihrauch 2006).

### Reproduction:
Gambusia is viviparous (i.e. gives birth to live young). Fertilisation is internal, with the male inseminating females using its gonopodium. Gambusia form shoals and there is no pair formation. In tropical regions or thermally elevated habitats, breeding can be year round, while in temperate regions, photoperiod plays an important role as a cue for maturation. Females typically mature around 2cm total length (TL) but may mature earlier in stressed conditions at 1-2cm TL. Fecundity is a function of female size. Females produce, on average, between 20-50 young per brood, but up to 100 young per brood is common (Milton and Arthington 1983, Specziar 2004), with several broods throughout the breeding season.
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Gambusia holbrooki – Gambusia

World distribution:

![World distribution map of Gambusia holbrooki](image)

Figure 1: World wide distribution of Gambusia.

Native and introduced distribution:
Naturally distributed in Atlantic and Gulf Slope drainages of the USA as far west as southern Alabama and east into Florida and north to New Jersey (Wooten et al. 1988, Fuller et al. 1999).
Introduced distribution: see map below (GISD 2004, Froese & Pauly 2007).

Habitat:
Prefers warm, slow flowing or still waters among aquatic vegetation in shallow margins of water bodies.

Ecological tolerances:
The species has wide ecological tolerances that result in an ability to survive short-term dispersal under harsh conditions and maintain populations in suboptimal habitats. It can survive in temperatures between 0.5 and 38°C for cold and warm adapted populations (Otto 1973), and is reproductively active at temperatures between 18 and 34°C. It can tolerate salinities between 0 and 25ppt (Nordlie and Mirandi 1996) and dissolved oxygen concentrations as low as 0.2 mg/l (McKinsey and Chapman 1998), the latter well below the lethal limits for most native Australian fish species (Pearson et al. 2003).

Ecological impacts:
The species was introduced into many countries as a biocontrol for mosquito larvae. However, its usefulness in this role is questionable - Australian studies have demonstrated that native fishes, such as rainbowfish and blue eyes, are more effective in consuming mosquito larvae and do not have the species’ negative impacts (Lloyd 1990; Hurst et al. 2004; Willems et al. 2005).

Gambusia has been implicated in the decline of a number of fish species overseas and in Australia (Wager and Jackson 1993) as a predator on eggs and fry and by its aggressive behaviour affecting feeding and reproductive behaviour (Rincon et al. 2002). The ‘fin-nipping’ habit of gambusia not only stresses fish, but can lead to their infection by bacteria and fungi causing eventual death (Lloyd 1990). Gambusia may also adversely affect water quality by reducing zooplankton populations and triggering phytoplankton blooms resulting in fish kills (Hurlbert et al. 1972, Hurlbert and Mulla 1981). It has also been implicated in the decline of native amphibians (frogs) by making habitat unsuitable for occupation by adults or by predation on eggs and tadpoles (Webb and Joss 1997, Hamer et al. 2002).

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Glossary

Anal  (Fin) beneath the body, behind anal opening.
Caudal  Towards the tail.
Dorsal  Situated near to or on the back.
Fecundity  Fertility.
Filamentous  Long, cylindrical and thread-like.
Fry  Newly hatched or born fish.
Pulsiform  Cigar-shaped: larger in the middle and tapering at both ends.
Gonopodium  Modified anal fin in male livebearers, used to deliver sperm into females.
Omnivorous  Eating both plant and animal matter.
Photoperiod  The relationship between the length of light and dark in a 24-hour period.
Piscivory  Fish-eating or fish-eating.
Tubular  In the form of a tube: slender and cylindrical or pipe-like.
Viviparous  Gives birth to live young. Nutrients provided from mother via placenta.

References


Hamer A.J., Lane S.J. & Mahoney M.J., 2002. The role of introduced mosquito fish (Gambusia holbrooki) in excluding the native green and golden bell frog (Litoria aurea) from original habitats in south-western Australia. Oecologia (Berlin) 121(3): 444-452.


Other information sheets available:

Spotted tilapia - Tilapia mariae
Oscar - Astronotus ocellatus
Burton's haplochromis - Haplochromis burtoni
Mosquitofish - Gambusia holbrooki

Guppy - Poecilia reticulata
Swordtail - Xiphophorus helleri
Platy - Xiphophorus maculatus
Three-spotted gourami - Trichogaster trichopterus

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For further information please contact TropWATER@jcu.edu.au, tel: 07 4781 4262

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