

Lessons from the west: a review of *Gambusia* in Western Australia

Stephen Beatty and David Morgan.

Freshwater Fish Group & Fish Health Unit, Centre for Fish and Fisheries Research, Murdoch University.

Objectives / background

The Eastern mosquitofish (*Gambusia holbrooki*) was introduced into Western Australia in 1934. We discuss the various studies that have assessed the ecology and impacts of this species in the State. This includes the contemporary distribution, behavioural studies relating to its aggressive nature, studies on the biology, ecology, parasites and disease of the species.

Summary of findings

- Distribution in Western Australia (Figures 1 and 2) is largely confined to the South West Coastal Drainage Division between the Hill and Palinup rivers (Morgan et al. 2004). The species is also found in some rivers of the southern Pilbara including the Irwin, Chapman, Greenough and Hutt rivers. Isolated populations were previously known to occur in artificial waterbodies on the North West Cape near Exmouth and Beagle Bay (Kimberley) (see Morgan et al. 2004), but recent control measures resulted in their removal.
- Reproductive period is protracted in the south-west and occurs over a six month period in the Collie River (October – May 1984-1985) (Pen and Potter 1991). Maturity is attained at a young age in individuals born early in the reproductive season.
- Tank experiments revealed a direct correlation between *G. holbrooki* density and fin damage to the endemic western pygmy perch (*Nannoperca vittata*) (Gill et al. 1999). Field examination revealed a higher level of fin damage to native species in wild systems that were degraded and lacked cover (i.e. habitat).
- Morgan and Gill (2000) surveyed 123 sites across different habitat types in the south-west (Margaret River – Broke Inlet), and of the 25% of sites that contained *G. holbrooki*, >50% were either secondarily salinised or regulated (artificially lentic).
- *Gambusia holbrooki* has been replaced by one-spot livebearers (*Phalloceros caudimaculatus*) in at least one system in the south-west (i.e. Bull Creek) (Maddern et al. 2008). The replacement mechanisms may be related to the latter species being omnivorous, having smaller size at maturation and undergoing perennial breeding. Although a replication of the fin-nipping trials of Gill et al. (1999) conducted for *P. caudimaculatus* revealed no evidence of fin-nipping aggression (Maddern et al. 2003).
- Marina et al. (2008) demonstrated that *G. holbrooki* had the lowest prevalence of *Lernaea* sp. infestation of all fishes examined in the south-west (four natives, three introduced). Lybery et al. (2010) demonstrated that overall prevalence of parasites was lower in *G. holbrooki* compared to 10 south-west native fishes.
- Physical removal attempts have been successful in limited cases, including, upper Margaret River and water supply reservoir drainage projects.

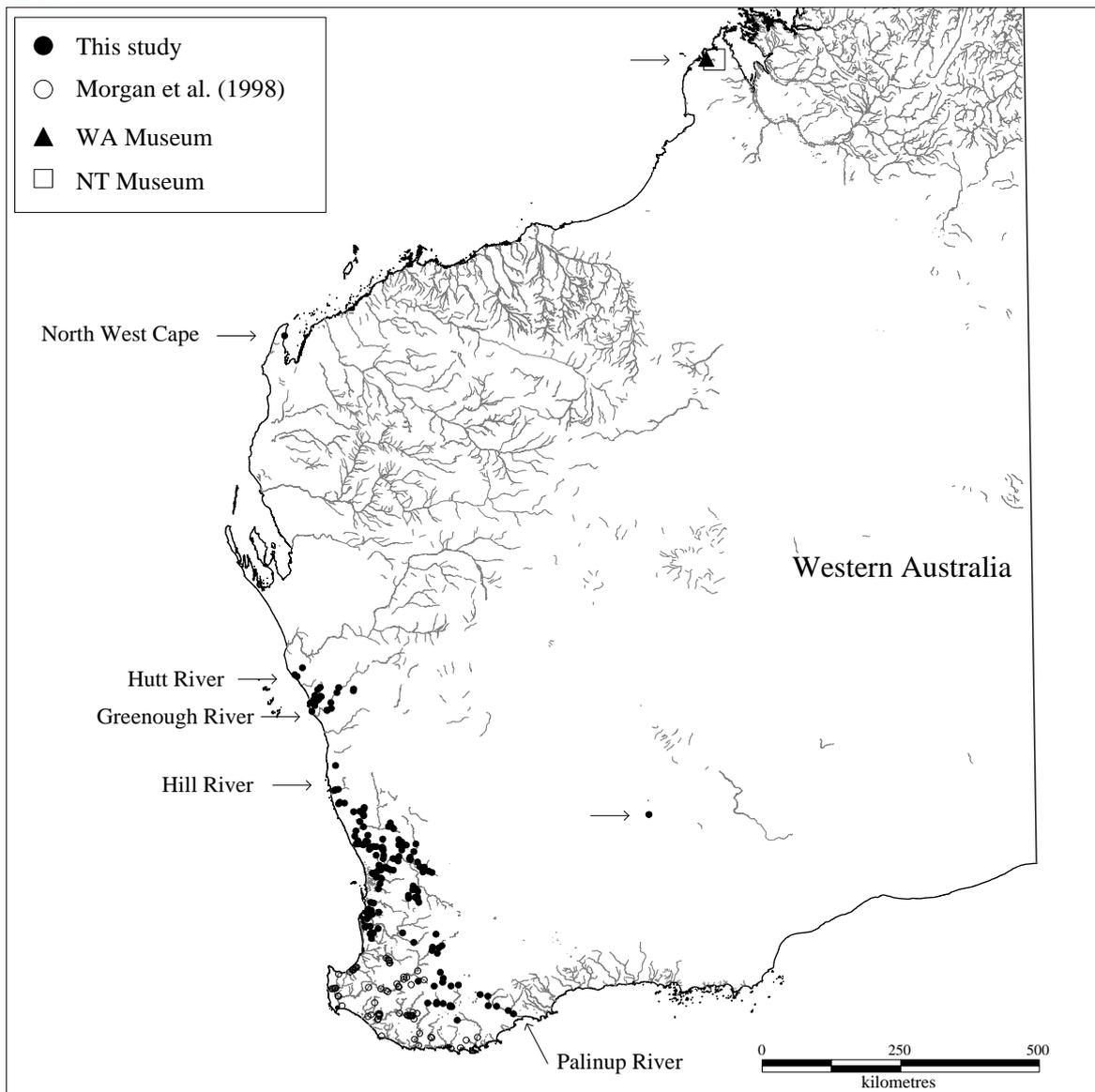


Figure 1: Distribution of *Gambusia holbrooki* in Morgan et al. (2004).

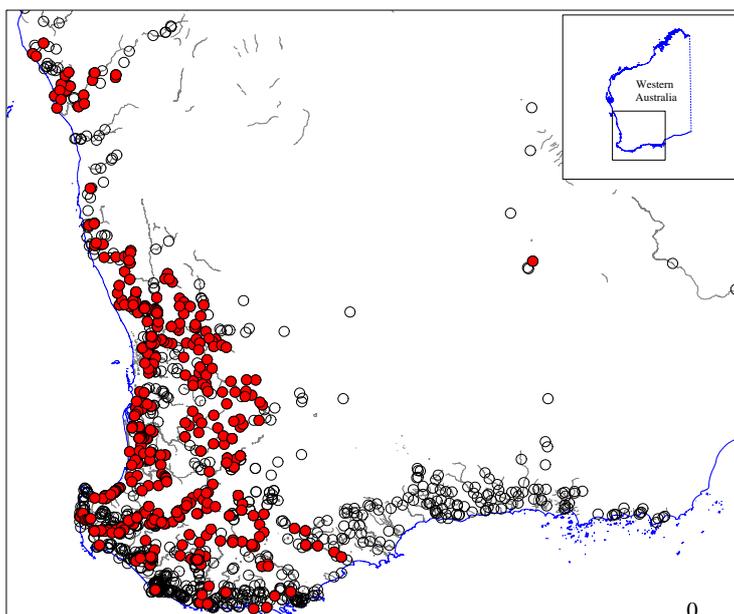


Figure 2: Most recent south-west distribution (Morgan and Beatty, unpublished)

Key messages

- A considerable amount of information on the species exists in Western Australia.
- *Gambusia holbrooki* is widespread, and although there is some historical (particularly Mees 1978) notes on its distributions, the rate of spread is poorly understood. Much of their current spread appears to be within newly constructed ornamental lakes in the metropolitan area.
- Generally favours altered (regulated, salinised, eutrophic) habitats.
- The species has life-history traits enabling rapid colonisation of new environments.
- Aggressive with both tank trials and field evidence of fin-nipping (varies with species, size and habitat complexity).

Management / Research recommendations

- A freshwater fish strategy is required for Western Australia that should include a feral fish strategy.
- A study updating the species (and other feral species) distribution, impact and case studies of control may be useful to guide the above strategy.

Knowledge gaps

- More effective and broadly applicable control measures (as with elsewhere).

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Questions & answers session

Q-You mentioned figure of 5% parasite infection, how does this compare with native fishes?

A- All exotic species have a lower parasite infection rate than native fishes. *Gambusia* had a higher rate of infection than other exotics. It should also be noted that high parasite load is not necessarily completely bad.

Q- Climate change is likely to have serious impacts on natives. Do you think that *Gambusia* will take over and natives die out?

A- I expect the South West tip of Western Australia and the salamander fish will be most vulnerable — but this relates to groundwater and not flow. There will be more impacts felt in the marginal areas — areas where native fish are currently 'holding on' in the presence of *Gambusia*.

Q- Is there evidence that *Gambusia* form part of the diet of fish in WA — natives or ferals like redfin perch?

A- There is no evidence that they form a significant part of the diet of fish, even for ferals like redfin perch.