

Goldfish control in the Vasse River: summary of the 2008 programme



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Project Brief

This report summarises the results of the 2008 round of the feral Goldfish control in the lower Vasse River and comparisons made with previous control efforts since 2004. Previous reports that detail both the fish fauna of the Vasse River and Goldfish control efforts can be viewed at: wwwscieng.murdoch.edu.au/centres/fish/

These include the following technical publications:

Morgan, D. & Beatty, S. (2004). *Fish fauna of the Vasse River and the colonisation by feral goldfish (Carassius auratus)*. Centre for Fish & Fisheries Research, Murdoch University report to Fishcare WA and Geocatch.

Morgan, D.L. & Beatty, S.J. (2006). *Overview of the feral Goldfish Control Programme in the Vasse River, Western Australia: 2004-2006*. Centre for Fish & Fisheries Research (Murdoch University) report to Geocatch.

Morgan, D.L. & Beatty, S.J. (2007). Feral Goldfish (*Carassius auratus*) in Western Australia: a case study from the Vasse River. *Journal of the Royal Society of Western Australia* 90(3): 151-156.

Methods

Sampling for Goldfish occurred in the Vasse River in February and August 2008. In order to allow direct comparisons with the captures in previous years (i.e. to monitor the relative abundance of Goldfish in the River and gauge the success of the removal programme), the methodology undertaken on each occasion in 2008 replicated the sampling effort of previous years. This involved a double pass boat-electrofishing between the Butter Factory slot-boards up to ~500m upstream of the Bussell Hwy Bypass bridge (Figures 1 and 2). However, in August 2008, intensive boat-electrofishing was carried out in the New River Wetland east of the West St crossing as access was possible at this time of year due to adequate water levels (Figure 1). The site of each Goldfish captured was recorded using a GPS and each placed immediately into an ice slurry prior to transport to the laboratory. Each Goldfish was measured to the nearest 1 mm Total Length (TL) and a sub-sample dissected for reproductive condition and age analysis as per previous years (see Morgan & Beatty 2007).

Results and Discussion

2008 captures

Figure 1a and b illustrate the location and numbers of Goldfish captured in the Vasse River during sampling in February and August 2008. In total, 173 Goldfish were captured, with 93 and 80 captured in February and August, respectively. However, there was a reduction in the number of fish captured in the main channel of the Vasse River between the two periods as 24 of the 80 fish captured in the August sampling were removed from the New River Wetland. The majority of those New River Wetland fish were large and all were mature (Figure 2). Previous years captures in the main channel were: December 2003, 91 Goldfish (initial sampling occasion); 105 Goldfish in March 2005 (~76% of these belonged to the 0+ age class); 55 Goldfish in May 2006 (84% belonging to the 0+ age class); no Goldfish were recorded in September 2006 suggesting the population was severely reduced, however, four Goldfish were captured in the New River Wetland; adjacent to the main channel (Figures 1b and 4).

There was also a considerable difference in the length-frequency distributions (size) of fish captured between the two sampling events in 2008 (Figure 2). For example, during February sampling, the catch was dominated (89%) by the new recruits (0+, ~ 5 months old), with few older fish captured (Figures 2 and 3). In contrast, during August sampling this age class contributed to only 5% of the catch, which was dominated by older ($\geq 3+$) fish. As mentioned, previous years length-frequencies were also dominated by 0+ individuals (Figure 4). Reasons for this change in population demographics is likely to be two fold: (1) Sampling during February 2008 resulted in a major reduction of the 2007 year class (i.e. new recruits) and (2) many (24 individuals) of the larger (i.e. highly fecund) fish were captured in the New River Wetland, which was not sampled during February due to low water levels preventing access with the electrofishing boat.

It is likely that there is migration between the two systems and that the New River Wetland requires additional control effort. During August, all fish captured were mature, and were approaching spawning, which is consistent with the spring spawning period identified previously for the population (Morgan & Beatty 2007). The captures of large fish associated with structures may be related to a spawning aggregation. In order to gain an understanding of the movement patterns and habitat associations of the different age classes of the species, it is recommended that acoustic telemetry and radio-tracking be incorporated into the control programme. This data provides information on small scale and large scale movements, depth utilisation, temperature preference and has the potential to locate spawning aggregations, timing

of movement between habitats (e.g. migrating from the main channel to New River Wetland) and would enhance the effectiveness of control measures in this system (such as incorporating traps, e.g. see carp trap in Stuart *et al.* (2006)), and may be applicable to systems elsewhere.



Figure 1a: Locations and numbers of Goldfish recorded in February 2008.



Figure 1b: Locations and numbers of Goldfish recorded in August 2008.

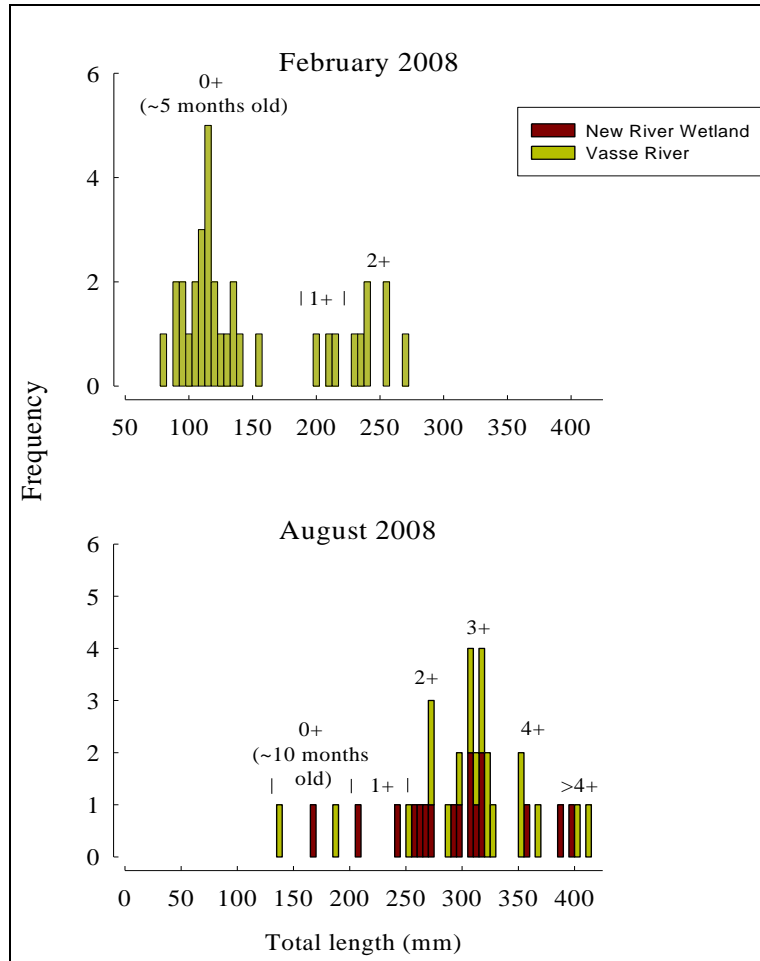


Figure 2: Length-frequency distribution of Goldfish captured during 2008. N.B. The dominance of 0+ individuals in February compared with August.

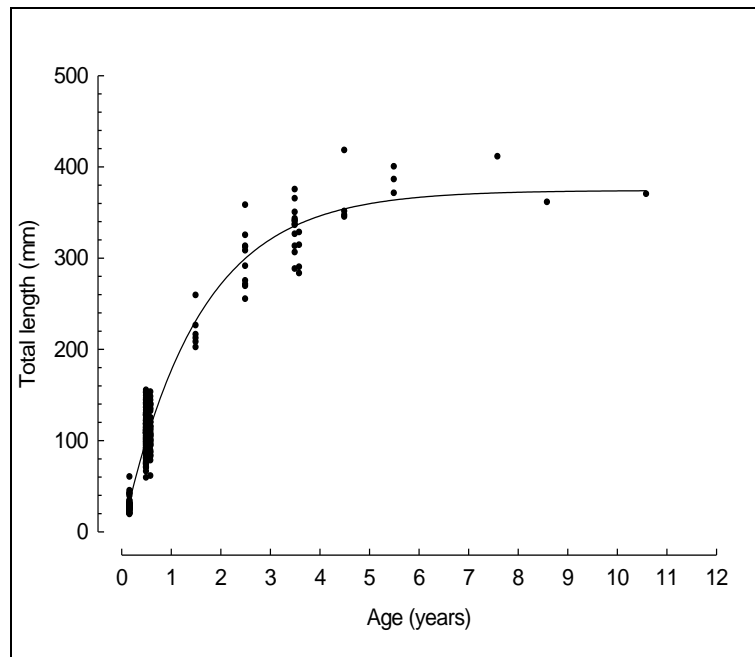


Figure 3: Total length and age of Goldfish in the Vasse River including the von Bertalanffy growth curve. N.B. Approximate age classes were based on the number of translucent zones on the otoliths and October 1 was assigned as the birth date. $K = 0.651$, $t_0 = 0.0163$, $L_\infty = 374.26$. From Morgan & Beatty (2007).

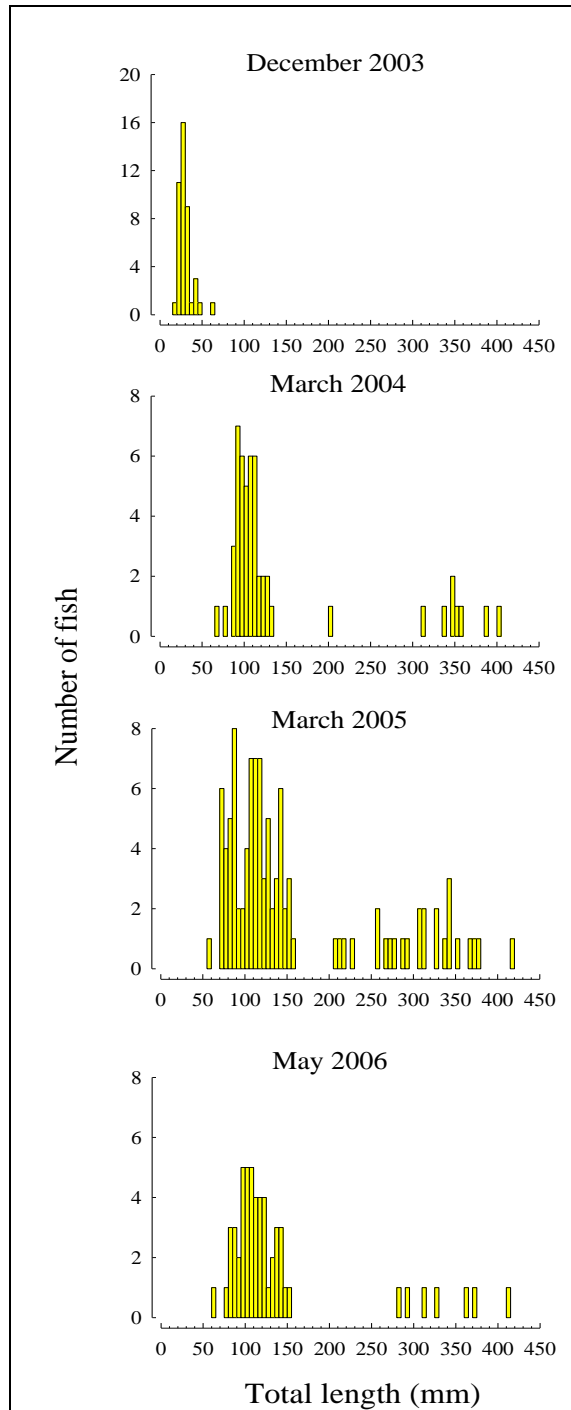


Figure 4: Length-frequency histograms of Goldfish captured in the Vasse River during previous sampling events in December 2003, March 2004, March 2005 and May 2006.

Summary and Recommendations

- The 2008 control programme resulted in 173 Goldfish being captured; 93 and 80 captured in February and August, respectively.
- February Goldfish captures were dominated (89%) by new recruits whereas during the August sampling only 5% of the catch consisted of new recruits.
- It is likely that sampling during February 2008 resulted in a major reduction of the abundance of new recruits in the Vasse River.
- 24 mature fish were captured in the New River Wetland in August suggesting that this may also be a major breeding habitat of the species; contributing to recruitment of the species into the Vasse River.
- It is recommended that a biannual sampling regime be conducted in order to target fish both during low water levels (i.e. early autumn) and also prior to the spring breeding period (late winter).
- Control during low water levels (i.e. in March) should include an intensive fishout (netting and electrofishing) of the New River Wetland.
- Additional techniques (e.g. acoustic tracking, trapping the channel between the New River Wetland and Vasse River) should be investigated to increase understanding of Goldfish movements to further refine future control efforts.

References

- Ivor G. Stuart, I.G., Williams, A., McKenzie, J., and Holt^d. (2006). Managing a migratory pest species: A selective trap for common carp. *North American Journal of Fisheries Management* 26: 888-893.
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