

# Barmah-Millewa Icon Site - Fish monitoring protocol 2007

## 2007 Annual data summary





## **Barmah-Millewa Icon Site - Fish monitoring protocol 2007**

### **Annual data summary for distribution to the Barmah Millewa Technical Advisory Committee and Coordinating Committee**

#### **Introduction**

Condition monitoring of fish, waterbirds and vegetation is necessary to provide ongoing information regarding the 'health' of living Murray icon sites. The working draft of the outcomes evaluation framework calls for the establishment of consistent monitoring frameworks across all icon sites that are consistent with benchmarks set by the monitoring taskforce. Subsequently, a monitoring plan for the Barmah-Millewa Forest is currently being developed by the coordinating committee and the technical advisory committee.

Researchers from the Arthur Rylah Institute and NSW Department of Primary Industries have since commenced condition monitoring of fish at the Asset Site which seeks to benchmark the status of fish communities at three major 'ecotypes' throughout the system; large rivers, small creeks and wetlands. The overall objectives of the monitoring program seek to:

1. Monitor the health and status of the Barmah-Millewa fish community through annual sampling.
2. Assess long term changes in fish populations and correlate any observed changes with factors such as flow, climate and thermal regimes.
3. To provide information that can feedback into management plans and reporting on condition for the Asset.

This annual report presents preliminary data and a brief discussion of significant findings from the first years' sampling.

#### **Methods**

To assess the current condition of fish communities, methods were developed to maintain compatibility with current SRA (Sustainable Rivers Audit) protocols. The program also maintained consistency by balancing the number of sites sampled in each forest (Barmah and Millewa) (Table 1).

### Large River sites

Previous sampling undertaken within the icon site has identified unique fish communities in four broad regions (King et al. 2007). Subsequently, a balanced design was developed with two sites established in each of these four regions. Sampling in the river sites was conducted in June after water levels were reduced to winter base flows. Sampling involved 12 replicates of 90 second electrofishing (or equivalent total time) shots at each site using large electrofishing boats. In addition, 10 unbaited baittraps (minimum of two hour soak) were set to capture any small fish not efficiently sampled during routine electrofishing. Ten baited (liver) hoopnets were also set from the onset of electrofishing and retrieved after a minimum of 2 hours in an attempt to collect Murray crayfish in the river sites. At the completion of each operation, all fish were identified, counted and measured (maximum of 50 individuals per species per site).

**Table 1. Permanent river fish sampling sites in the Barmah-Millewa Forest system.**

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<b>Eco-region</b>
<u>Murray River</u>
<u>Downstream Region</u>
Morning Glory
Barmah/Moria Lake area
<u>Mid Forest Region</u>
Picnic Point
Woodcutters
<u>Upstream region</u>
Ladgroves Beach
Gulf Creek area
<u>Edward River</u>
Downstream offtake regulator
Downstream Gulpa creek confluence

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### Creek and wetland sites

The Barmah and Millewa forests contain a complex matrix of creek systems and wetlands which are also known to contain a wide variety of fish species. An additional 12 sites were subsequently selected for annual sampling, 6 within the creek system and 6 within the wetland/lake system of the Forest. These sites were spatially stratified to include six within the Barmah Forest and six within the Millewa Forest (Table 2). Unlike river sampling, creek and wetland sampling took place during early March when water levels permitted boat access.

Sites within the forest experience a range of flows over any given year which can greatly affect the accessibility. Therefore, sampling effort was slightly reduced from SRA standards, to ensure all sites could be completed in most years. Therefore sampling involved 10 replicates of 90 second boat electrofishing shots at each site (with a 5 shot minimum during low water conditions). If the minimum of five shots could not be completed, the team undertook 8 replicates of 150 seconds with a backpack electrofisher. In addition, 10 unbaited bait traps were also set (minimum of two hours soak time) to capture fish not effectively caught whilst electrofishing. As with river sites, all fish were identified, counted and measured (maximum of 50 individuals per species per site) at the completion of each operation.

**Table 2. Permanent creek and wetland fish sampling sites in the Barmah-Millewa Forest system.**

<b>Eco-region</b>	<b>Forest</b>
<i>Creek sites</i>	
Tongalong Creek	Barmah
Budgee Creek	Barmah
Tullah Creek	Barmah
Toupna Creek	Millewa
Gulpa Creek	Millewa
Aratula Creek	Millewa
<i>Wetland/Lake sites</i>	
Barmah Lake	Barmah
Hut Lake	Barmah
Flat Swamp	Barmah
Moira Lake	Millewa
Pinchgut lagoon	Millewa
Fishermans Bend Billabong	Millewa

## **Results/Discussion**

Flows through the Barmah-Millewa system during the 2006/07 season were one of the lowest on record. Such events occur in an extremely infrequent basis, presenting scientists and managers with a rare opportunity to collect information on the structure of biotic assemblages during extreme drought conditions. Due to the extremely low water levels, Hut Lake, a permanent wetland site identified for annual sampling, was completely dry and so discarded from the first years sampling (See Appendix 1). Additionally, both sites on the Edward River could only be sampled with a small

electrofishing boat with a reduced number of shots. All other sites were sampled successfully.

There was a total of 3,417 fish collected across all eco-types in 2007, consisting of 11 native and 5 introduced species. Total catch was dominated by carp gudgeon (47%) and Australian smelt (16%). A number of species of conservation significance were recorded in forest creeks, wetland and river habitats including southern pygmy perch, trout cod, Murray cod, silver perch, Murray-Darling rainbowfish and dwarf flat-headed gudgeon. This highlights the need to maintain the Forest's diversity of habitat types to conserve the regions fish fauna.

Southern pygmy perch (n=36) were recorded in creeks and wetlands from both the Barmah and Millewa Forests. The highest numbers of this species came from Toupna Creek (Millewa Forest) and is therefore expected to be an important source population for adjoining habitats during high flow periods. Murray-Darling rainbow fish were predominantly collected from the Edward River near the regulator (98%). Two dwarf flat-headed gudgeon were also collected, adding to a recent capture reported in the Barmah-Millewa recruitment project (Tonkin et al. 2007). These recordings are the most upstream confirmed capture of the species in the Murray system (T. Raadik pers. comm.). As expected, larger species such as Murray cod, trout cod, golden perch and silver perch were predominantly found in river and creek sites.

There were 769 introduced species collected (23% of total catch) with 78% recorded in creek/wetland habitats. These habitats had high numbers of gambusia, goldfish, carp and oriental weatherloach. Oriental weatherloach were widespread throughout the whole forest, with numbers recorded in survey being an underestimate of true figures due to sampling difficulties of the species (see observed data). This adds to data documenting this exotic species recent spread throughout the area. Introduced species in river habitats were dominated by carp (88%). Of particular concern is the high numbers of adult carp in the Murray River around Barmah Lake and in the Lake itself which suggests a need for management of the species in the area.

**Table 3.** Raw total abundances of species collected in forest creeks, wetland (including large lakes) and river sites using all methods in 2007. Numbers of fish observed but not collected is represented in brackets.

Common name	Scientific name	Forest creeks	Wetlands (inc. Lakes)	Rivers	TOTAL
<i>Native</i>					
Australian smelt	<i>Retropinna semoni</i>	108 (129)	43 (93)	386 (212)	<b>537 (434)</b>
carp gudgeons	<i>Hypseleotris</i> spp.	852 (228)	735 (344)	28 (20)	<b>1615 (592)</b>
flat-headed gudgeon	<i>Philypnodon grandiceps</i>	29	20	0	<b>49</b>
	<i>Craterocephalus stercusmuscarum</i>				
unspecked hardyhead	<i>fulvus</i>	11 (1)	321 (70)	220 (24)	<b>252 (95)</b>
Murray cod	<i>Maccullochella peelii</i>	1	0	25 (2)	<b>26 (2)</b>
trout cod	<i>Maccullochella macquariensis</i>	0	0	17	<b>17</b>
golden perch	<i>Macquaria ambigua</i>	2	0	18 (5)	<b>20 (5)</b>
silver perch	<i>Bidyanus bidyanus</i>	0	(1)	3	<b>3 (1)</b>
southern pygmy perch	<i>Nannoperca australis</i>	30 (2)	6	0	<b>36 (2)</b>
Murray-Darling rainbowfish	<i>Melanotaenia fluviatilis</i>	2	2	89 (118)	<b>91 (118)</b>
dwarf flat-headed gudgeon	<i>Philypnodon macrostomus</i>	0	2	0	<b>2</b>
Murray crayfish	<i>Euasticus armatus</i>	0	0	9	<b>9</b>
<i>Introduced</i>					
carp	<i>Cyprinus carpio</i>	61 (7)	34 (18)	152 (65)	<b>247 (90)</b>
goldfish	<i>Carassius auratus</i>	68 (33)	34 (12)	20	<b>122 (45)</b>
redfin perch	<i>Perca fluviatilis</i>	0	35 (16)	1	<b>36 (16)</b>
gambusia	<i>Gambusia holbrooki</i>	160 (59)	138 (65)	0	<b>298 (124)</b>
oriental weatherloach	<i>Misgurnus anguillicaudatus</i>	20 (31)	46 (135)	0	<b>66 (166)</b>
	<b>TOTAL (fish)</b>	<b>1344 (490)</b>	<b>1114 (754)</b>	<b>959 (446)</b>	<b>3417 (1690)</b>

## References

King, A.J., Tonkin, Z. and Mahoney, J. (2007). *Assessing the effectiveness of environmental flows on fish recruitment in Barmah-Millewa Forest*. Prepared by Arthur Rylah Institute for Environmental Research, DSE. MDBC Project No. BMF 2004.09.

Tonkin, Z., King, A.J., and Mahoney, J. (2007). *Assessing the effectiveness of environmental flows on fish recruitment in Barmah-Millewa Forest – 2006/07* Progress report. Prepared by Arthur Rylah Institute for Environmental Research, DSE. MDBC Project No. BMF 2004.09.



Appendix 1. Low flows at the permanent sample sites (a) Edward River @ Gulpa Creek; (b) Flat Swamp; (c) Tongalong Creek; (d) Toupna Creek; (e) Tullah Creek and; (f) Hut Lake (not sampled) during surveys in 2007.

(a)



(b)



(c)



(d)



(e)



(f)

