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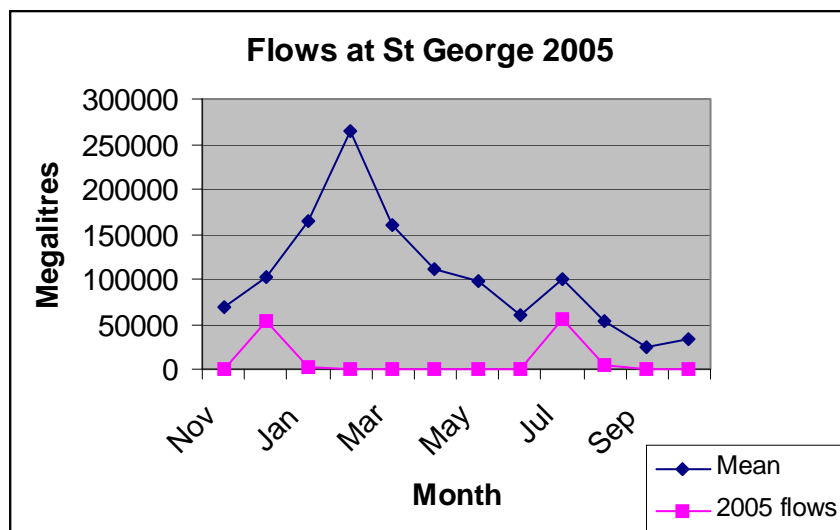
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# 1. Introduction

This report represents the ninth since June 2000 recording the results of monitoring events sponsored by Smartrivers in the Lower Balonne.

Between November 2004 and the time of sampling in November 2005, the area had received poor summer flows and just one low-level but extended winter flow (Figure 1.1), though winter and spring local rains had been reasonable. The winter flow from Jack Taylor Weir (JTW) commenced on 2 July and lasted till 16 September, peaking at 7460ML/d but for much of the time was less than a few hundred. These flows were sufficient to reach all riverine sites in the Lower Balonne and some of the floodplain sites with low commence-to-flow levels (Belah Waterhole, Chinaman Ck and Narran at Clyde).

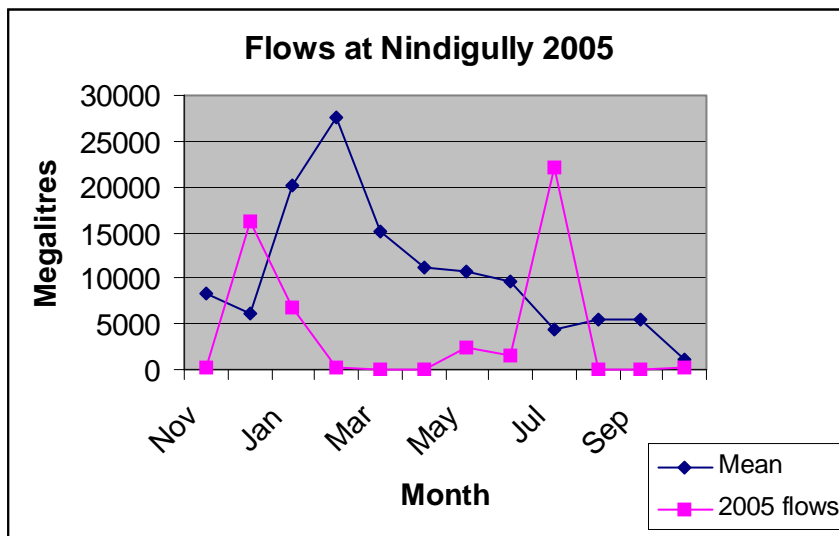
■ **Figure 1.1 Flows at St George 2005 compared to long term mean flows**



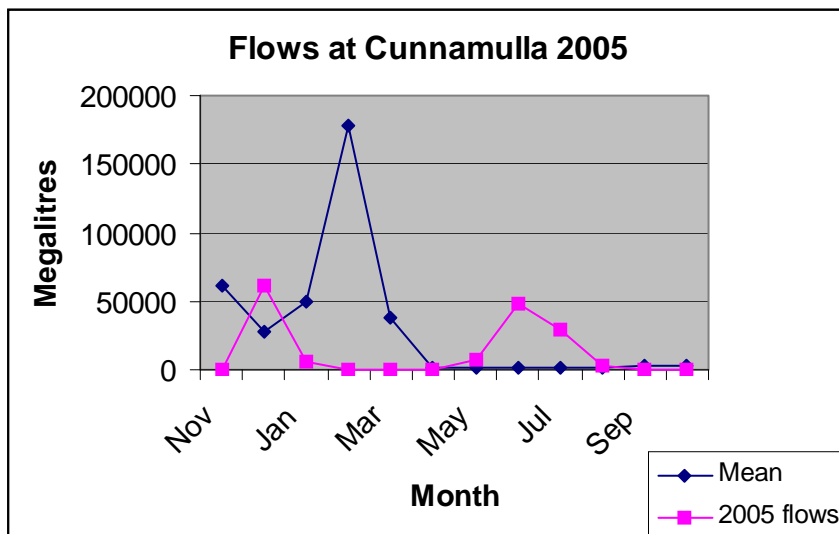
The Warrego and Moonie rivers both flowed briefly but at good levels in December 2004 and at low levels from mid-May till early to mid-September 2005 (Figures 1.2 and 1.3). The Moonie recommenced flow on 17 October and an increase in flow occurred immediately prior to sampling. It would appear from the figures that the winter flow in the Balonne commenced later but early flows were taken into storage in Beardmore Dam so did not reach the gauge at Jack Taylor Weir.

A compensation flow was released from JTW on 3 November and reached the Narran gauge on 18 November. Flow data for other gauges for the sampling period was not available at the time of reporting. Most sites were sampled prior to the flow arriving but the flow did affect some sites: St George, Mooramanna, Whyenbah, Culgoa at Whyenbah and Donegri Ck. The natural flow event in the Moonie River affected results to a lesser extent.

■ Figure 1.2 Flows at Nindigully 2005 compared to long term mean flows



■ Figure 1.3 Flows at Cunnamulla 2005 compared to long term mean flows



## 2. Methods

Eighteen riverine and five floodplain sites were sampled in early November 2005. Sampling methods mirrored earlier events (Benson and Paton 2002) with respect to:

- Fish sampled by multiple gill and fyke nets, bait traps, seine and dip nets, with the actual nets deployed depending on site conditions, particularly the extent of water available.

- Water quality sampled by a multi-parameter data logging water quality meter (a Yeokal 611). This was used for depth stratified sampling and when recording overnight was set within 25cm of the surface.

- Macroinvertebrates sampled by replicated Surber samples in the edge habitat.
- Specialised habitats sampled for macroinvertebrates by qualitative dip netting.

No investigation of riparian zones was undertaken as these have been described previously for most sites (SKM June 2000 report and DNRM unpublished).

Macroinvertebrates were sorted by staff in the EM/Hydrobiology laboratory and were identified and counted by staff of Applied Freshwater Science. The subsampling technique of Wrona *et al* (1982) was employed for larger samples.

### 3. Results

Results are initially presented by site. A regional appraisal is presented in the Discussion.

#### 3.1 Balonne River at St George

This site is adjacent the gauging station below Jack Taylor weir. The banks have a fairly gradual slope and usually a good cover of grass and trees. This was particularly the case on this occasion. The substrate is mainly deep silt with large outcroppings of conglomerate rock. The river is approximately 60m wide and contains a significant number of large snags, particularly near the gauge. Water level was approximately 1-1.5m higher than recent sampling events and the “edge” constituted a significant area of recently inundated grass.

##### 3.1.1 Water quality

Spot water quality profiling was undertaken at the centre of the site (Table 3-1.1). The water column was well mixed, as would be expected during a flow release from Jack Taylor Weir. Temperature showed surprising variation with a clearly warmer surface layer. Conductivity was lower (cf 125-147µS/cm) and pH higher (cf 6.7-6.8) than in May when the river was not flowing.

■ Table 3-1.1 Water quality depth profiling at St George in November 2005.

Sample Time	Depth (m)	Temp (°C)	Dissolved Oxygen (%sat)	Conductivity (µS/cm)	Turbidity (NTU)	pH
1410	Surface	29.3	88	95	>600	7.3
	0.5	26.8	93	95	>600	7.4
	1.0	26.4	92	95	>600	7.3
	1.5	26.0	94	96	>600	7.3
	2.0	25.0	93	94	>600	7.3

##### 3.1.2 Macrophytes

A small patch of *Ludwigia* (3m<sup>2</sup>) grew on the eastern bank. *Persicaria* grew strongly around the snags just downstream of the gauge (this patch has always been present) and had spread towards the rocky area. Filamentous green alga was not evident but some *Azolla* had washed against the banks. Rice sedge (*Cyperus difformis*) was sparsely distributed.

### 3.1.3 Fish

All nets were set at this site. **Table 3-1.2** shows the catch by netting technique. Five native species and two introduced were captured. The catch is in line with historical catches at this site though the lack of fish in the gill nets is unusual. The seine haul was conducted mainly over recently inundated grass and was restricted due to the steeply sloping bed.

■ **Table 3-1.2 Results of fishing at St George in November 2005, by fishing method**

Species	Common name	Gill	Seine	Fyke	Bait	Total Numbers caught
<i>Macquaria ambigua</i>	Yellowbelly		2			2
<i>Bidyanus bidyanus</i>	Silver perch			1		1
<i>Nematolosa erebi</i>	Bony Bream			9		9
<i>Retropinna semoni</i>	Smelt		26	1		27
<i>Hypseleotris klunzingeri</i>	Carp Gudgeon		27			27
<i>Cyprinus carpio</i>	Carp			3		3
<i>Carrasius auratus</i>	Goldfish			1		1
<b>Total Numbers</b>		<b>0</b>	<b>55</b>	<b>15</b>	<b>0</b>	<b>70</b>

### 3.1.4 Macroinvertebrates

Two habitats were sampled at St George. Surber samples were collected from recently inundated grass. A dip net sample was collected from *Persicaria*. A total of 18 discrete (non-overlapping) taxa were identified, 15 from the surbers and 9 from the dip net (**Table 3-1.3**). The fauna was in very low abundance and no taxa dominated the surbers while microcrustacea were particularly common in the dip net. Bait traps also collected 16 *Macrobrachium* (Palaeomonidae, prawns) and they were present in the seine haul.

■ **Table 3-1.3 Numbers of aquatic macroinvertebrates recorded from St George**

	Edge surber		Macrophyte dip
	Mean	Stddev	
Oligochaeta	0.2	0.4	
Ancylidae	0.2	0.4	
Physidae	0.6	0.5	
Planorbidae	0.2	0.4	
Cladocera			90
Copepoda	3.6	2.7	230
Ostracoda	1.8	1.1	1
Atyidae	0.6	0.5	6
Hydrophilidae			1
Ceratopogonidae	3.8	4.5	2
Chironominae	1.4	2.6	2
Orthoclaadiinae	0.4	0.5	
Baetidae	3.8	4.7	2
Caenidae	0.4	0.5	
Corixidae	1.0	1.2	
Coenagrionidae	0.2	0.4	
Gomphidae	0.2	0.4	
Leptoceridae			1
<b>Taxa</b>	<b>7.4</b>	<b>2.9</b>	<b>9</b>
<b>Abundance</b>	<b>18.4</b>	<b>15.2</b>	<b>335</b>
<b>Total taxa</b>	<b>15</b>		<b>18</b>

### **3.2 Balonne River at Mooramanna**

This site is on a straight stretch of river just upstream from the Brookdale pump station. The channel is approximately 50m wide and of trapezoidal shape with parallel benches. The bed substrate is largely sand and the banks are mainly black clay. The compensation flow had reached this site such that water covered the full width of the channel though it was only a few centimetres deep over some of the sand bars. Maximum depth reached 2m on the western edge. Several scattered tea tree seedlings to 2m in height grew in the water on the sand bars. Recent rain had caused erosion of the track into the site such that a significant deposit of soft mud sat at the base of the erosion gully. The water was very turbid.

#### **3.2.1 Water quality**

Overnight logging of water quality parameters was undertaken and only minor variation was evident. The recorded ranges for each parameter were:

Temperature: 26.9 – 29.2°C  
 Dissolved oxygen: 83 - 87% sat, 6.3 – 6.9mg/l  
 pH: 6.6 – 6.9  
 Conductivity: 99 - 103µS/cm  
 Turbidity: >600NTU.

Results from spot water quality profiling are shown in **Table 3-2.1**. The water column was well mixed though temperature decreased with depth.

■ **Table 3-2.1 Water quality depth profiling at Mooramanna in November 2005.**

Sample Time	Depth (m)	Temp (°C)	Dissolved Oxygen (%sat)	Conductivity (µS/cm)	Turbidity (NTU)	pH
1650	Surface	29.6	83	99	>600	7.4
	0.5	29.0	84	100	>600	7.4
	1.0	28.1	85	99	>600	7.4
	1.5	26.5	88	99	>600	7.5
	2.0	26.3	88	99	>600	7.5

### 3.2.2 Macrophytes and algae

Rice sedge and some *Juncus* sp. were present on the edge. The fringe of benthic filamentous green algae was not noted and was probably submerged by the recent flow.

### 3.2.3 Fish

**Table 3-2.2** shows the fish catch by netting technique. All nets were set at this site but gill nets only captured one river turtle (*Emydura macquaria*). Five native fish species and one introduced were recorded with the introduced species being Goldfish whereas Carp and Mosquitofish had been present in May. Yellowbelly were commonly larger than those captured in May (as small as 49mm at that time), though four specimens were less than 160mm in length.

■ **Table 3-2.2 Fish catch by fishing technique at Mooramanna in November 2005.**

Species	Common name	Gill	Seine	Fyke	Bait	Total Numbers caught
<i>Macquaria ambigua</i>	Yellowbelly			7		7
<i>Leiopotherapon unicolor</i>	Spangled perch		1			1
<i>Nematolosa erebi</i>	Bony Bream		7	5		12
<i>Hypseleotris klunzingeri</i>	Carp Gudgeon		28		2	30
<i>Retropinna semoni</i>	Smelt		127			127
<i>Carrasius auratus</i>	Goldfish		2			2
<b>Total Numbers</b>		<b>0</b>	<b>165</b>	<b>12</b>	<b>2</b>	<b>179</b>

### 3.2.4 Macroinvertebrates

Surber samples were collected from soft sediment (recent storm erosion?) from one side of the river. The material may also have been recently inundated by the compensation flow. Thirteen discrete taxa were recorded at the site with all taxa showing very low abundance (**Table 3-2.3**). Bait traps collected 15 *Macrobrachium*. The seine haul captured numerous *Macrobrachium*.

■ **Table 3-2.3 Numbers of aquatic macroinvertebrates recorded from Mooramanna**

	Edge surber	
	Mean	Stddev
Acarina	0.2	0.4
Nematoda	0.2	0.4
Cladocera	0.2	0.4
Copepoda	9.4	5.0
Ostracoda	0.8	1.3
Atyidae	0.2	0.4
Ceratopogonidae	2.0	1.9
Chironominae	0.4	0.9
Tanypodinae	0.2	0.4
Baetidae	1.4	1.9
Caenidae	1.0	1.2
Corixidae	13.0	9.0
Zyoptera	0.2	0.4
Taxa	<b>5.6</b>	<b>2.5</b>
Abundance	<b>29.2</b>	<b>4.5</b>
Total taxa		<b>13</b>

### 3.3 Balonne River at Whyenbah

This site is within the pool formed by the bifurcation weirs and is just upstream of the bridge, within a popular camping and fishing area. The right bank has a relatively gentle slope while the left is very steep for about 4 metres above the water line. The substrate is black soil or fine sand. The river was flowing as a result of the compensation flow. The water level was about 1m higher than previous such that the sand bar near the camping area was fully submerged. A recent storm had caused significant branches and some whole red gums to fall, some into the water. Grass cover on the eastern bank was excellent and there was no evidence of recent grazing by cattle.

#### 3.3.1 Water quality

Overnight logging was undertaken at this site. Little variation was evident. Conductivity and pH were noticeably lower than in May. The recorded ranges for each parameter were:

Temperature: 26.4 – 27.8°C  
 Dissolved oxygen: 84 - 87% sat; 6.6 – 7.0mg/l  
 pH: 6.7 – 6.9  
 Conductivity: 101 - 105µS/cm  
 Turbidity: >600NTU.

Results from spot water quality profiling are shown in **Table 3-3.1**. The water column was well mixed, reflecting the reasonable flow.

■ **Table 3-3.1 Water quality depth profiling at Whyenbah in November 2005.**

Sample Time	Depth (m)	Temp (°C)	Dissolved Oxygen (%sat)	Conductivity (µS/cm)	Turbidity (NTU)	pH
0945	Surface	26.7	87	102	>600	7.4
	0.5	26.4	87	102	>600	7.4
	1.0	26.3	86	102	>600	7.4
	1.5	26.3	86	102	>600	7.5

### 3.3.2 Macrophytes

*Ludwigia* covered approximately 10m along the eastern bank and extended 3m into the water. A small amount of *Azolla* was present with the *Ludwigia* and scattered *Juncus*, Rice sedge and *Persicaria* occurred above the water line.

### 3.3.3 Fish

All fishing nets were deployed at this site and the results are presented in **Table 3-3.1**. Eight native species (with *Hypseleotris* pooled) and two introduced were captured. The Murray Cod measured 25mm in length and only one Yellowbelly was longer than 93mm. The *Tandanus* measured 440mm. Two Rainbowfish had been captured in May. The large number of Smelt captured in the seine net is not unusual at this time of year.

■ **Table 3-3.1 Results of fishing the Balonne River at Whyenbah in November 2005, by fishing method**

Species	Common name	Gill	Seine	Fyke	Bait	Total Numbers caught
<i>Mucullochella peelii peelii</i>	Murray Cod		1			1
<i>Macquaria ambigua</i>	Yellowbelly		1	2	1	4
<i>Leiopotherapon unicolor</i>	Spangled perch			1		1
<i>Nematolosa erebi</i>	Bony Bream	6	48	19		73
<i>Hypseleotris klunzingeri</i>	Carp Gudgeon		19		1	20
<i>Hypseleotris spIV</i>	H. sp4		1			1
<i>Retropinna semoni</i>	Smelt		1295			1295
<i>Neosilurus hyrtlii</i>	Hyrtl's tandan			23		23
<i>Tandanus tandanus</i>	Eeltailed catfish	1				1
<i>Cyprinus carpio</i>	Carp	1				1
<i>Gambusia holbrooki</i>	Mosquitofish		1			1
<b>Total Numbers</b>		<b>8</b>	<b>1366</b>	<b>45</b>	<b>2</b>	<b>1421</b>

### 3.3.4 Macroinvertebrates

Surber samples were collected from firm and soft silt and some samples included leaf litter. A dip net sample was collected from *Ludwigia*. Twenty-one discrete taxa were identified. Ceratopogonids were the most common taxa in surber samples while Physid snails and Pyralid moths were most common in the dip net though no taxa were particularly abundant (**Table 3-3.2**). Twelve prawns and one yabby were captured in bait traps.

■ **Table 3-3.2 Numbers of aquatic macroinvertebrates recorded from the Balonne River at Whyenbah**

	Edge surber		Macrophyte dip
	Mean	Stddev	
Acarina	0.6	0.9	
Nematoda	0.2	0.4	
Physidae	0.2	0.4	34
Cladocera	0.2	0.4	
Copepoda	1.4	1.1	11
Ostracoda	0.2	0.4	9
Atyidae	0.2	0.4	
Ceratopogonidae	23.8	17.8	
Chironominae	7.0	2.2	4
Orthocladiinae			1
Tanypodinae	2.8	2.3	
Muscidae	0.2	0.4	1
Tipulidae	0.2	0.4	
Baetidae	2.6	1.8	8
Caenidae	1.8	1.5	1
Corixidae	2.4	2.7	
Veliidae			4
Pyralidae	0.2	0.4	24
Coenagrionidae			2
Zygoptera	0.4	0.5	
Leptoceridae	0.2	0.4	
<b>Taxa</b>	<b>8.8</b>	<b>3.2</b>	<b>11</b>
<b>Abundance</b>	<b>44.4</b>	<b>18.6</b>	<b>99</b>
<b>Total taxa</b>	<b>19</b>		<b>21</b>

### **3.4 Culgoa River at Whyenbah**

This site is about 1.5 km downstream from the gauging station and weir and just upstream of an old bridge. The compensation flow caused the river to flow strongly and the full width of the baseflow channel was covered, at times to nearly 2m in depth. There was no evidence of grazing or feral animals and grass cover on the banks was excellent. Thunderstorms and strong winds occurred during sampling and nets collected significant twigs and small branches. The site could not be accessed in the usual manner so the boat could not be used.

#### **3.4.1 Water quality**

Water quality was measured on the western side near the large red gum. Results from spot water quality profiling are shown in **Table 3.4.1**. Conductivity was significantly reduced compared to the result from May (320µS/cm).

- **Table 3-4.1 Water quality depth profiling at Culgoa River at Whyenbah in November 2005.**

Sample Time	Depth (m)	Temp. (°C)	Dissolved Oxygen (%sat)	Conductivity (µS/cm)	Turbidity (NTU)	pH
1115	Surface	27.5	88	126	>600	7.2
	0.75	27.5	88	126	>600	7.2

### 3.4.2 Macrophytes

No macrophytes or algae were noted.

### 3.4.3 Fish

Only two gill nets were set as the boat could not be used. Six native fish species and three introduced were recorded (**Table 3-4.2**). The catch was very similar to that from May. The Murray Cod measured 320mm, the Silver Perch 175mm, Yellowbelly between 70mm and 190mm and Carp from 190mm to 390mm.

- **Table 3-4.2 Results of fishing the Culgoa River at Whyenbah in November 2005, by fishing method**

Species	Common name	Gill	Seine	Fyke	Bait	Total Numbers caught
<i>Mucullochella peelii peelii</i>	Murray Cod	1				1
<i>Macquaria ambigua</i>	Yellowbelly			8		8
<i>Bidyanus bidyanus</i>	Silver perch			1		1
<i>Nematolosa erebi</i>	Bony Bream		19	45		64
<i>Hypseleotris klunzingeri</i>	Carp Gudgeon		5			5
<i>Retropinna semoni</i>	Smelt		69			69
<i>Cyprinus carpio</i>	Carp	4		5		9
<i>Carassius auratus</i>	Goldfish		1	1		2
<i>Gambusia holbrooki</i>	Mosquitofish		27			27
<b>Total Numbers</b>		<b>5</b>	<b>121</b>	<b>60</b>	<b>0</b>	<b>186</b>

### 3.4.4 Macroinvertebrates

Three surber samples were collected from coarse sand and two from fine clay. The substrate had been recently inundated. Sixteen discrete taxa were recorded at the site with corixids being most common but no taxa were abundant (**Table 3-4.3**). Bait traps captured 1 prawn but they were common in the seine haul. Very young *Cherax* (Parastacidae, yabbies) were captured in the seine and a larger individual in the fyke nets.

■ **Table 3-4.3 Numbers of aquatic macroinvertebrates recorded from Culgoa River at Whyenbah**

	Edge surber	
	Mean	Stddev
Acarina	0.2	0.4
Oligochaeta	0.8	1.1
Cladocera	4.4	6.6
Copepoda	10.0	11.6
Ostracoda	0.8	1.1
Atyidae	0.2	0.4
Parastacidae	0.2	0.4
Dytiscidae	0.2	0.4
Ceratopogonidae	4.2	4.7
Chironominae	1.0	0.0
Culicidae	0.4	0.9
Tipulidae	0.2	0.4
Baetidae	2.4	4.8
Caenidae	1.0	0.0
Corixidae	40.2	29.5
Leptoceridae	2.2	4.9
<b>Taxa</b>	<b>8.2</b>	<b>0.8</b>
<b>Abundance</b>	<b>68.4</b>	<b>20.5</b>
<b>Total taxa</b>		<b>16</b>

### **3.5 Culgoa River at Cubbie**

This site is about 1km below the Cubbie Weir. The western bank has a very thin riparian zone on the outer side of the meander and it is eroding. The banks are steep with little or no vegetation. The inner side of the meander has a much better riparian zone above the top bank but little or no understorey because of accumulated leaf, bark and branch litter. Snags are plentiful in the water but little other specialised habitat exists. A debris dam exists at the downstream bend in the site. The substrate tends to be very compact clay.

The compensation flow had not reached this site when it was sampled. Water levels were slightly higher than in May but the reach still terminated at the upstream and downstream bends. The deepest part reached about 1.5m but more commonly the depth peaked at between 0.5 and 1.0m. The river was up to 10m wide but more usually less than 5m. Filamentous alga grew strongly on snags at the waterline but was patchy on the edge.

No tracks or disturbances of the edge were observed but goat droppings were very common. Evidence of recent fishing was found on the banks.

### 3.5.1 Water quality

Results from spot water quality profiling are shown in **Table 3-5.1**. Temperature showed a clear distinction between warmer surface and cooler bottom waters but otherwise the water column was well mixed. Dissolved oxygen levels were higher than in May (58% at the surface) while conductivity was lower (213  $\mu\text{S}/\text{cm}$ ).

■ **Table 3-5.1 Water quality depth profiling at Cubbie in November 2005.**

Sample Time	Depth (m)	Temp (°C)	Dissolved Oxygen (%sat)	Conductivity ( $\mu\text{S}/\text{cm}$ )	Turbidity (NTU)	pH
1330	Surface	27.1	87	132	>600	7.4
	0.5	24.0	90	135	>600	7.4
	1.0	22.0	87	132	>600	7.4

### 3.5.2 Macrophytes

No macrophytes or fringing aquatic plants were observed.

### 3.5.3 Fish

One gill net was not set due to site restrictions. Three native fish species and two introduced were identified in a catch of 74 individuals (**Table 3-5.2**). The result is quite different to that from May in that no Bony bream, Rainbowfish or Mosquitofish were recorded but Carp gudgeon and Goldfish were. Large yellowbelly were again common.

■ **Table 3-5.2 Results of fishing the Culgoa River at Cubbie in November 2005, by fishing method**

Species	Common name	Gill	Seine	Fyke	Bait	Total Numbers caught
<i>Macquaria ambigua</i>	Yellowbelly	17		2		19
<i>Hypseleotris klunzingeri</i>	Carp Gudgeon		1			1
<i>Retropinna semoni</i>	Smelt		48			48
<i>Cyprinus carpio</i>	Carp			1		1
<i>Carassius auratus</i>	Goldfish		4	1		5
<b>Total Numbers</b>		<b>17</b>	<b>53</b>	<b>4</b>	<b>0</b>	<b>74</b>

### 3.5.4 Macroinvertebrates

Surber samples were collected from compact clay with some leaf litter. No dip net samples were collected. Eighteen taxa were identified from the edge habitat (**Table 3-5.3**). The most common elements were copepods, corixids and caenids. Bait traps collected 6 *Macrobrachium*.

■ **Table 3-5.3. Numbers of aquatic macroinvertebrates recorded from Culgoa River at Cubbie**

	Edge surber	
	Mean	Stdev
Acarina	1.2	1.6
Nematoda	0.2	0.4
Oligochaeta	2.6	3.2
Ancylidae	4.2	1.6
Cladocera	0.6	1.3
Copepoda	65.4	8.6
Ostracoda	1.0	0.7
Atyidae	0.2	0.4
Ceratopogonidae	7.4	9.2
Chironominae	14.0	24.2
Tanypodinae	4.4	5.9
Baetidae	1.0	1.4
Caenidae	26.4	40.1
Corixidae	33.8	29.4
Notonectidae	0.4	0.9
Gomphidae	3.4	1.5
Zygoptera	0.2	0.4
Leptoceridae	3.8	2.8
<b>Taxa</b>	<b>12.0</b>	<b>1.6</b>
<b>Abundance</b>	<b>170.2</b>	<b>79.9</b>
<b>Total taxa</b>		<b>18</b>

### **3.6 Culgoa River at Woolerbilla**

This site is on a straight stretch of river and has a uniform trapezoidal bed and banks. Little vegetation exists on the sloping banks though the occasional tea tree or coolibah sits adjacent the water. The river was not flowing when sampled and consisted of a pool that was continuous in both directions and reached a depth of about 1m. Two very small patches of Spiny Mud Grass occurred on a shallow bank near the centre of the site and fringing benthic alga was sparse. A strong herb line existed about 1m above the present water line, probably reflecting the flow in July. A number of red gum on the western bank had been shattered by lightning and partly burnt.

#### **3.6.1 Water quality**

Overnight logging was undertaken at this site. Little variation was evident. Conductivity and pH were noticeably lower than in May. The recorded ranges for each parameter were:

Temperature: 23.0 – 25.6°C  
 Dissolved oxygen: 87 - 91% sat; 7.1 – 7.8mg/l  
 pH: 6.0 – 6.7  
 Conductivity: 133 - 138µS/cm  
 Turbidity: >600NTU.

Results from spot water quality profiling are shown in **Table 3-6.1**. The water column was well mixed despite the lack of flow.

■ **Table 3-6.1 Water quality depth profiling at Woolerbilla in November 2005.**

Sample Time	Depth (m)	Temp (°C)	Dissolved Oxygen (%sat)	Conductivity (µS/cm)	Turbidity (NTU)	pH
0800	Surface	23.0	90	137	>600	6.7
	1.0	23.0	91	137	>600	6.7

### 3.6.2 Macrophytes

No macrophytes or fringing aquatic plants were noted.

### 3.6.3 Fish

One gill net could not be set due to site restrictions. Three native fish species plus two introduced were captured (**Table 3-6.2**). A catch of low diversity and abundance is common at this site. The gill net catch tended to be of relatively large fish (eg Yellowbelly at 490mm) that were ready to spawn. Carp gudgeon and Hyrtl's tandan had been captured in low numbers in May. One river turtle was captured in a fyke net.

■ **Table 3-6.2 Results of fishing the Culgoa River at Woolerbilla in November 2005, by fishing method**

Species	Common name	Gill	Seine	Fyke	Bait	Total Numbers caught
<i>Macquaria ambigua</i>	Yellowbelly	2				2
<i>Nematolosa erebi</i>	Bony Bream	5				5
<i>Retropinna semoni</i>	Smelt		5			5
<i>Cyprinus carpio</i>	Carp	4		1		5
<i>Carassius auratus</i>	Goldfish		3			3
<i>Gambusia holbrooki</i>	Mosquitofish		1			1
<b>Total Numbers</b>		<b>11</b>	<b>9</b>	<b>1</b>	<b>0</b>	<b>21</b>

### 3.6.4 Macroinvertebrates

No specialised habitats were available for sampling. Surber samples were collected from compact clay, often with significant eucalypt litter. Twenty-one taxa were identified with caenids the most common (**Table 3-6.3**). Five prawns and 2 yabbies were captured in bait traps.

■ **Table 3-6.3 Numbers of aquatic macroinvertebrates recorded from the Culgoa River at Woolerbilla**

	Edge surber	
	Mean	Stddev
Acarina	0.2	0.4
Oligochaeta	1.0	1.7
Ancylidae	5.0	5.8
Planorbidae	0.2	0.4
Cladocera	1.6	2.6
Copepoda	16.4	8.4
Ostracoda	0.6	0.5
Atyidae	0.2	0.4
Parastacidae	0.2	0.4
Ceratopogonidae	6.6	6.6
Chironominae	6.8	7.8
Orthoclaadiinae	0.2	0.4
Tanypodinae	16.6	16.9
Tabanidae	0.2	0.4
Baetidae	5.6	6.1
Caenidae	79.6	62.5
Corixidae	3.4	2.1
Notonectidae	0.2	0.4
Gomphidae	0.4	0.9
Ecnomidae	0.6	0.5
Leptoceridae	3.6	2.6
<b>Taxa</b>	<b>12.0</b>	<b>2.5</b>
<b>Abundance</b>	<b>149.2</b>	<b>79.5</b>
<b>Total taxa</b>		<b>21</b>

### **3.7 Culgoa River at Balandool**

While there was no water under the bridge or in the uppermost 80m of the site, a continuous pool existed from just upstream of the deep tea tree lined pool to downstream of the next bend. This area included the two remnant pools sampled in May. Maximum depth was about 1.0m and the compensation flow had not reached the site when it was sampled. Very little filamentous alga was observed but *Juncus* was common along the edge and on the downstream end of the main channel island. No major snags were in the water and the tea tree roots were still largely above the water level. There was no evidence of grazing animals and limited evidence of pig activity.

#### **3.7.1 Water quality**

Results from spot water quality profiling are shown in **Table 3-7.1**. The water column was well mixed despite the lack of flow.

- **Table 3-7.1 Water quality depth profiling at Culgoa River at Balandool in November 2005.**

Sample Time	Depth (m)	Temp (°C)	Dissolved Oxygen (%sat)	Conductivity (µS/cm)	Turbidity (NTU)	pH
0945	Surface	22.7	90	148	>600	7.1
	1.0	22.3	90	146	>600	7.1

### 3.7.2 Macrophytes

No algal fringe was noted but *Juncus* was common in patches.

### 3.7.3 Fish

No gill nets were set due to the size and depth of the site. Three native fish species and three introduced were recorded (**Table 3-7.2**). Rainbowfish and Carp gudgeon were recorded in May while Goldfish were not.

- **Table 3-7.2 Results of fishing the Culgoa River at Balandool in November 2005, by fishing method**

Species	Common name	Gill	Seine	Fyke	Bait	Total Numbers caught
<i>Macquaria ambigua</i>	Yellowbelly			2		2
<i>Nematolosa erebi</i>	Bony Bream			1		1
<i>Retropinna semoni</i>	Smelt		15			15
<i>Cyprinus carpio</i>	Carp			3		3
<i>Carrasius auratus</i>	Goldfish		3			3
<i>Gambusia holbrooki</i>	Mosquitofish		1			1
<b>Total Numbers</b>		<b>N/A</b>	<b>19</b>	<b>6</b>	<b>0</b>	<b>25</b>

### 3.7.4 Macroinvertebrates

Surber samples were collected from compact sand substrate with some leaf litter. Twenty-one taxa were recorded (**Table 3-7.3**). Copepods were the most common element. Nine *Macrobrachium* were collected in bait traps and they were common in the seine hauls along with several very small *Cherax*. Larger *Cherax* were captured in the fyke nets.

■ **Table 3-7.3 Numbers of aquatic macroinvertebrates recorded from the Culgoa River at Balandool.**

	<b>Edge surber</b>	
	<b>Mean</b>	<b>Stddev</b>
Acarina	0.4	0.5
Oligochaeta	1.6	0.9
Ancyliidae	2.2	2.8
Cladocera	3.8	1.5
Copepoda	109.6	136.0
Ostracoda	5.2	4.6
Atyidae	0.2	0.4
Parastacidae	1.2	1.6
Dytiscidae	0.2	0.4
Ceratopogonidae	4.0	5.9
Chironominae	2.8	2.9
Tanypodinae	6.4	2.5
Culicidae	0.2	0.4
Muscidae	0.2	0.4
Baetidae	15.0	17.9
Caenidae	2.4	2.8
Corixidae	24.4	16.2
Gerridae	0.2	0.4
Notonectidae	0.2	0.4
Ecnomidae	0.2	0.4
Leptoceridae	1.4	2.1
<b>Taxa</b>	<b>12.6</b>	<b>2.3</b>
<b>Abundance</b>	<b>181.8</b>	<b>135.6</b>
<b>Total taxa</b>		<b>21</b>

### **3.8 Balonne Minor River at Meigunyah**

Not sampled due to lack of access.

### **3.9 Balonne Minor at Trafalgar**

This site is at the upper end of the weir pool and includes areas both upstream and downstream of the recently modified Cubbie intake channel. The water level was similar to that recorded in May, that is, it was very low. Many snags and tree trunks were submerged but all lignum and roots of riparian trees were exposed. Maximum depth was about 2m. There was little disturbance of the edge though goat droppings were common.

#### **3.9.1 Water quality**

No water quality data was collected.

### 3.9.2 Macrophytes

No macrophytes were observed. Fringing benthic algal growth was moderate and growth on snags at the waterline was common.

### 3.9.3 Fish

All nets were used at this site. Four native fish species and three introduced were captured (**Table 3-9.1**). Goldfish was the only addition to the May result. The most noticeable difference with the result from May was the relatively low number and small size of Yellowbelly and Bony bream. The Spangled perch were 70mm and 98mm long while Carp ranged from 166mm to 461mm.

■ **Table 3-9.1 Results of fishing the Balonne Minor at Trafalgar in November 2005.**

Species	Common name	Gill	Seine	Fyke	Bait	Total Numbers
<i>Macquaria ambigua</i>	Yellowbelly	1		1	1	3
<i>Leiopotherapon unicolor</i>	Spangled perch		1	1		2
<i>Nematolosa erebi</i>	Bony Bream		1	2		3
<i>Neosilurus hyrtlilii</i>	Hyrtl's tandan			2		2
<i>Cyprinus carpio</i>	Carp	3	1	9	3	16
<i>Carrasius auratus</i>	Goldfish		2			2
<i>Gambusia holbrooki</i>	Mosquitofish		4			4
<b>Total Numbers</b>		<b>4</b>	<b>9</b>	<b>15</b>	<b>4</b>	<b>32</b>

### 3.9.4 Macroinvertebrates

Five surbers were collected from areas of firm clay with some filamentous algae and occasional leaf litter. Fourteen taxa were recorded with copepods being the most common but none being abundant (**Table 3-9.2**). Eighteen prawns were captured in bait traps but yabbies were not observed by any means.

■ **Table 3-9.2 Numbers of aquatic macroinvertebrates recorded from the Balonne Minor at Trafalgar.**

	Edge surber	
	Mean	Stddev
Acarina	0.2	0.4
Oligochaeta	0.2	0.4
Cladocera	0.4	0.5
Copepoda	17.8	7.9
Ostracoda	1.8	1.3
Atyidae	0.2	0.4
Ceratopogonidae	1.2	1.3
Chironominae	1.8	0.8
Tanypodinae	2.0	2.3
Muscidae	0.2	0.4
Baetidae	1.4	1.5
Caenidae	1.8	2.9
Corixidae	8.0	5.1
Notonectidae	0.2	0.4
<b>Taxa</b>	<b>7.8</b>	<b>2.3</b>
<b>Abundance</b>	<b>36.8</b>	<b>7.4</b>
<b>Total taxa</b>		<b>14</b>

### **3.10 Donegri Ck (Narran River) at Dirranbandi**

The river was flowing as a result of the compensation flow and current speed possibly reached 2m/s at the riffle. The reach sampled was approximately 200m long and consisted of three pools on consecutive meanders. The outer edge of each meander was very steep with little vegetation while the inner edge was well treed. Some saplings had established on the outer edge of the most upstream and downstream meanders and a row of red gum 1-3m high had established several metres above the water on the inside of the downstream meander. Fishers and campers had frequented the deepest pool and significant litter was scattered about.

#### **3.10.1 Water quality**

The water quality meter was suspended from the roots of a large red gum in the deepest pool. Conductivity and pH were much lower than in May while the DO had increased. The ranges recorded overnight for each parameter were:

Temperature: 21.8 – 23.8°C

Dissolved oxygen: 93 - 98% sat; 7.9 – 8.6mg/l

pH: 5.0 – 6.7

Conductivity: 108 - 112µS/cm

Turbidity: >600 NTU.

Results from spot water quality profiling are shown in **Table 3-10.1**. The water column was well mixed as would be expected with the significant flow.

■ **Table 3-10.1 Water quality depth profiling at Donegri Creek in November 2005.**

Sample Time	Depth (m)	Temp (°C)	Dissolved Oxygen (%sat)	Conductivity (µS/cm)	Turbidity (NTU)	pH
0700	Surface	21.8	97	112	>600	5.1
	1.0	21.8	98	112	>600	5.5

### 3.10.2 Macrophytes

*Juncus* was common in patches while some *Ludwigia* and significant amounts of *Azolla* appeared to have washed from the upstream weir.

### 3.10.3 Fish

Two gill nets could not be set because of the small area of the pool with suitable depth. Five native fish species and three introduced were captured (**Table 3-10.2**). Spangled perch and Rainbowfish had been captured in low numbers in May while Smelt had not. The Murray Cod measured 220mm in length while Yellowbelly ranged from 105mm to 350mm and Hyrtl's tandan from 131mm to 215mm (with most in a much smaller range around 160mm). Two long-necked tortoises (*Chelodina longicollis*) were recorded from fyke nets.

■ **Table 3-10.2 Results of fishing at Donegri Creek in November 2005, by fishing method**

Species	Common name	Gill	Seine	Fyke	Bait	Total Numbers caught
<i>Maccullochella peeli peeli</i>	Murray Cod			1		1
<i>Macquaria ambigua</i>	Yellowbelly	2		9		11
<i>Nematolosa erebi</i>	Bony Bream	1	6	12		19
<i>Neosilurus hyrtl</i>	Hyrtl's tandan			48		48
<i>Retropinna semoni</i>	Smelt		73			73
<i>Cyprinus carpio</i>	Carp	3		3	2	8
<i>Carrasius auratus</i>	Goldfish		9	4		13
<i>Gambusia holbrooki</i>	Mosquitofish		4			4
<b>Total Numbers</b>		<b>6</b>	<b>92</b>	<b>77</b>	<b>2</b>	<b>177</b>

### 3.10.4 Macroinvertebrates

Two surbers were collected from the riffle, two from compact gravel/silt and one from soft silt. All samples were from recently inundated habitat. Twenty taxa were recorded with the most common being copepods and baetids but all were in low numbers (**Table 3-10.3**). Low numbers of prawns and yabbies were recorded in the seine haul and fyke nets.

■ **Table 3-10.3 Numbers of aquatic macroinvertebrates recorded from Donegri Creek (Narran River)**

	<b>Edge Surber</b>	
	<b>Mean</b>	<b>Stdev</b>
Oligochaeta	0.8	0.4
Cladocera	5.0	5.3
Copepoda	25.0	20.4
Ostracoda	1.8	1.8
Atyidae	0.2	0.4
Gyrinidae	0.4	0.9
Hydrophilidae	0.2	0.4
Ceratopogonidae	2.6	3.0
Chironominae	4.6	3.6
Orthoclaadiinae	0.2	0.4
Tanypodinae	3.2	4.6
Culicidae	0.2	0.4
Tipulidae	0.2	0.4
Baetidae	12.0	20.3
Caenidae	0.2	0.4
Corixidae	2.2	3.3
Gerridae	0.2	0.4
Mesoveliidae	0.4	0.9
Zygoptera	1.4	1.9
Leptoceridae	0.4	0.5
<b>Taxa</b>	<b>9.4</b>	<b>2.4</b>
<b>Abundance</b>	<b>61.2</b>	<b>30.3</b>
<b>Total taxa</b>		<b>20</b>

### **3.11 Narran River at Clyde**

Water was continuous in both directions at the site and reached 1m deep though most was much less. Width rarely reached 10m. The compensation flow had not reached the site so it was not flowing. There were no macrophytes, a very limited filamentous algal ring and *Juncus* was scattered along the bank. There were no signs of recent use by cattle.

#### **3.11.1 Water quality**

The results of spot measurements are shown in **Table 3-11.1**. Conductivity was less than half what it had been in May.

■ **Table 3-11.1 Spot water quality readings – Narran River at Clyde**

Sample Time	Depth (m)	Temp (°C)	Dissolved Oxygen (%sat)	Conductivity (µS/cm)	Turbidity (NTU)	pH
0845	Surface	23.0	92	155	>600	7.3
	0.5	22.8	92	156	>600	7.9

**3.11.2 Macrophytes**

No macrophytes were recorded. The algal bath-tub ring was very weakly developed.

**3.11.3 Fish**

The catch comprised of three native fish species and three introduced (**Table 3-11.2**). Rainbowfish and Hyrtl's tandan had been captured in low numbers in May while Smelt had not. The Bony bream and Goldfish were small, the former mainly <35mm and the latter from 12mm to 53mm (mainly 20-30mm).

■ **Table 3-11.2 Results of fishing the Narran River at Clyde in November 2005, by fishing method**

Species	Common name	Gill	Seine	Fyke	Bait	Total Numbers caught
<i>Macquaria ambigua</i>	Yellowbelly		1	2		3
<i>Nematolosa erebi</i>	Bony Bream		27			27
<i>Retropinna semoni</i>	Smelt		23			23
<i>Cyprinus carpio</i>	Carp	4		1		5
<i>Carrasius auratus</i>	Goldfish		34	14		48
<i>Gambusia holbrooki</i>	Mosquitofish		26			26
<b>Total Numbers</b>		<b>4</b>	<b>111</b>	<b>17</b>	<b>0</b>	<b>132</b>

**3.11.4 Macroinvertebrates**

No specialised habitats were available to sample at this site. Surbers were collected from firm clay/sand. Fifteen discrete taxa were recorded with chironomids and copepods most common but all taxa were in low numbers (**Table 3-11.3**). Four prawns and 15 *Cherax* were captured in bait traps and they were also captured in fyke nets. Several large *Cherax* attacked fish in the gill nets.

■ **Table 3-11.3 Numbers of aquatic macroinvertebrates recorded from the Narran River at Clyde**

	Edge Surber	
	Mean	Stdev
Nematoda	1.3	0.5
Oligochaeta	1.8	1.1
Ancylidae	2.8	2.6
Cladocera	0.6	0.9
Copepoda	15.0	16.3
Ostracoda	1.0	1.7
Parastacidae	0.2	0.4
Ceratopogonidae	7.2	4.2
Chironominae	18.2	11.8
Tanypodinae	14.8	10.4
Baetidae	1.2	1.8
Caenidae	0.6	0.9
Corixidae	2.0	1.4
Notonectidae	0.6	0.9
Leptoceridae	5.8	2.9
<b>Taxa</b>	<b>10.4</b>	<b>2.4</b>
<b>Abundance</b>	<b>72.8</b>	<b>17.2</b>
<b>Total Taxa</b>		<b>15</b>

### 3.12 Narran River at Booligar

The water level was very low, similar to recent sampling events, and only the main pool and a smaller one about 30m upstream remained. The main pool was approximately 35m x 15m x > 1.5m deep in parts. The upstream pool was just a small remnant. Rare snags were encountered in the water. There had been no recent cattle access and there was no evidence of other animals using the pool. Local rain had caused erosion of the banks and one gully on the western side delivered a significant sediment pile into the main pool.

#### 3.12.1 Water quality

Spot water quality readings were collected from the centre of the main pool and showed strong variation of temperature with depth while other parameters varied little (Table 3-12.1).

■ **Table 3-12.1 Spot water quality readings – Narran River at Booligar**

Sample Time	Depth (m)	Temp (°C)	Dissolved Oxygen (%sat)	Conductivity (µS/cm)	Turbidity (NTU)	pH
1530	Surface	33.0	80	143	>600	7.7
	0.5	25.3	86	140	>600	8.0
	1.0	23.2	89	133	>600	8.1

### 3.12.2 Macrophytes

Small *Juncus* were scattered at the sides and downstream end of the main pool along with one specimen of Rice Sedge and a single *Schoenoplectus*. Filamentous alga was poorly developed.

### 3.12.3 Fish

Two gill nets were not set due to the lack of deep water. Three native fish species and one introduced were captured (**Table 3-12.2**). Spangled perch, Smelt and Mosquitofish had been captured in low numbers in May. Most of the fish captured on this occasion were large, for example while two Bony bream in the seine haul were 19 and 23mm, the other captures were between 211 and 298mm. Carp ranged from 215mm to 397mm and while Yellowbelly in the fyke ranged from 104 to 175mm, those from the seine and gill nets were between 250 and 440mm.

■ **Table 3-12.2 Results of fishing the Narran River at Booligar in November 2005.**

Species	Common name	Gill	Seine	Fyke	Bait	Total Numbers caught
<i>Macquaria ambigua</i>	Yellowbelly	4	4	4		12
<i>Nematolosa erebi</i>	Bony Bream	18	3			21
<i>Neosilurus hyrtl</i>	Hyrtl's tandan			8		8
<i>Cyprinus carpio</i>	Carp			18		18
<b>Total Numbers</b>		<b>22</b>	<b>7</b>	<b>30</b>	<b>0</b>	<b>59</b>

### 3.12.4 Macroinvertebrates

All surbers were collected from the lower end of the pool from firm red sand with some leaf litter. No dip nets were collected due to lack of habitat. Eighteen taxa were recorded. The fauna was dominated by copepods and corixids (**Table 3-12.3**). Bait traps collected 4 prawns and 3 yabbies.

■ **Table 3-12.3 Numbers of aquatic macroinvertebrates recorded from Narran River at Booligar**

	Edge surber	
	Mean	Stddev
Acarina	1.2	1.6
Nematoda	0.2	0.4
Oligochaeta	1.6	0.5
Ancylidae	3.0	2.0
Cladocera	2.4	1.1
Copepoda	83.2	37.9
Ostracoda	2.2	1.9
Ceratopogonidae	11.0	8.5
Chironominae	7.8	2.2
Tanypodinae	16.0	5.4
Muscidae	0.2	0.4
Baetidae	3.2	2.9
Caenidae	6.3	2.6
Corixidae	33.8	21.5
Notonectidae	1.2	1.1
Zygoptera	0.2	0.4
Ecnomidae	0.2	0.4
Leptoceridae	10.8	7.8
<b>Taxa</b>	<b>13.4</b>	<b>1.8</b>
<b>Abundance</b>	<b>183.2</b>	<b>47.7</b>
<b>Total taxa</b>		<b>18</b>

### **3.13 Balandool River at Cubbie**

The site sampled in May was also sampled on this occasion. This represents a permanent relocation of site. The river in this location has a shallow trapezoidal shape with bare banks of black clay. The height from the bed to the top of the bank is about 3.5m. There are no benches but the site is on a meander bend of the main channel near where a small anabranch rejoins. The riparian zone is a thin band of coolibah and occasional tea tree. The understorey is mainly lignum. The surrounding area is floodplain dominated by lignum, black wattle and roly-poly and may have been historically cleared for grazing. A tea tree had fallen over the river at the upstream end of the site and was re-growing from horizontal. All the vegetation near the river was very healthy.

The pool was about 10m wide and at least 100m long, continuing upstream past the fallen tea tree and downstream around the next bend. Depth did not exceed 50cm. There was no evidence of disturbance by stock or feral animals.

### 3.13.1 Water quality

Spot water quality measurements were taken from the centre of the channel and results are shown in **Table 3-13.1**. Conductivity was much lower than in May (416 $\mu$ S/cm).

■ **Table 3-13.1 Spot water quality readings – Balandool River at Cubbie**

Sample Time	Depth (m)	Temp (°C)	Dissolved Oxygen (%sat)	Conductivity ( $\mu$ S/cm)	Turbidity (NTU)	pH
0730	Surface	24.3	92	144	>600	7.1
	0.5	24.3	92	141	>600	7.0

### 3.13.2 Macrophytes and algae

No macrophytes and very little fringing alga was observed.

### 3.13.3 Fish

Two gill nets were not set due to the depth. Three native fish species and three introduced were recorded (**Table 3-13.2**). Bony bream and Rainbowfish were recorded in May but Hyrtl's tandan was not. The Spangled perch captured in the seine haul were between 17 and 27mm while those in the fyke were between 140 and 184mm and several were ripe. Goldfish in the seine measured 20 to 42mm.

■ **Table 3-13.2 Results of fishing the Balandool River at Cubbie in November 2005.**

Species	Common name	Gill	Seine	Fyke	Bait	Total Numbers caught
<i>Macquaria ambigua</i>	Yellowbelly	1				1
<i>Leiopotherapon unicolor</i>	Spangled perch		12	5		17
<i>Neosilurus hyrtlilii</i>	Hyrtl's tandan			8		8
<i>Cyprinus carpio</i>	Carp	1		3		4
<i>Carrasius auratus</i>	Goldfish		12	2		14
<i>Gambusia holbrooki</i>	Mosquitofish		4			4
<b>Total Numbers</b>		<b>2</b>	<b>28</b>	<b>18</b>	<b>0</b>	<b>48</b>

### 3.13.4 Macroinvertebrates

Surber samples were collected from soft mud substrate with little or no algae or leaf litter. Seventeen taxa were recorded with chironomids most common but all taxa in very low numbers (**Table 3-13.3**). Five prawns and 9 yabbies were captured in bait traps and yabbies were also common in the fyke nets.

- **Table 3-13.3 Numbers of aquatic macroinvertebrates recorded from the Balandool River at Cubbie.**

	Edge surber	
	Mean	Stddev
Nematoda	0.4	0.5
Oligochaeta	0.6	0.5
Ancyliidae	7.2	7.4
Cladocera	0.2	0.4
Copepoda	0.6	0.9
Ostracoda	1.0	1.4
Dytiscidae	0.4	0.5
Hydrophilidae	0.2	0.4
Ceratopogonidae	7.4	9.5
Chironominae	23.2	20.4
Orthoclaadiinae	0.4	0.9
Tanypodinae	14.6	11.4
Tabanidae	0.2	0.4
Baetidae	2.6	1.7
Caenidae	3.4	2.9
Corixidae	14.4	7.1
Leptoceridae	1.4	0.9
<b>Taxa</b>	<b>10.2</b>	<b>1.8</b>
<b>Abundance</b>	<b>78.2</b>	<b>38.2</b>
<b>Total taxa</b>		<b>17</b>

### **3.14 Balandool River at Euraba**

The site held water in two very shallow pools. Cattle had been accessing the pools and crossing the site. All of the edge was disturbed by this access. The bottom was very soft and no habitat was present other than small snags.

#### **3.14.1 Water quality**

Spot water quality measurements were taken from the centre of the channel and results are shown in **Table 3-14.1**.

- **Table 3-14.1 Spot water quality readings – Balandool River at Euraba**

Sample Time	Depth (m)	Temp (°C)	Dissolved Oxygen (%sat)	Conductivity (µS/cm)	Turbidity (NTU)	pH
1130	Surface	27.0	90	193	>600	7.4

### 3.14.2 Macrophytes and algae

No macrophytes or fringing alga were observed.

### 3.14.3 Fish

Only seine netting could be undertaken at this site. One native species and one introduced were recorded (**Table 3-14.2**). Goldfish in the seine were between 19 and 49mm in length.

■ **Table 3-14.2 Results of fishing the Balandool River at Euraba in November 2005.**

Species	Common name	Gill	Seine	Fyke	Bait	Total Numbers caught
<i>Retropinna semoni</i>	Smelt		1			1
<i>Carrasius auratus</i>	Goldfish		47			47
<b>Total Numbers</b>		<b>NA</b>	<b>48</b>	<b>NA</b>	<b>NA</b>	<b>48</b>

### 3.14.4 Macroinvertebrates

Surber samples were collected from disturbed soft mud substrate with little or no algae or leaf litter. Fourteen taxa were recorded with copepods dominating the catch (**Table 3-14.3**). No prawns but several yabbies were captured in the seine haul, along with numerous notonectids and dragonflies and several large leeches.

■ **Table 3-14.3 Numbers of aquatic macroinvertebrates recorded from the Balandool River at Euraba.**

	Edge surber	
	Mean	Stddev
Oligochaeta	0.2	0.4
Ancylidae	1.0	1.0
Cladocera	6.8	7.5
Copepoda	54.2	8.5
Ostracoda	0.6	0.9
Parastacidae	0.4	0.5
Hydrophilidae	0.2	0.4
Ceratopogonidae	0.6	0.5
Tanypodinae	1.2	0.8
Baetidae	0.4	0.5
Caenidae	0.8	1.3
Corixidae	5.4	4.4
Notonectidae	0.6	0.5
Leptoceridae	0.8	0.4
<b>Taxa</b>	<b>8.4</b>	<b>1.7</b>
<b>Abundance</b>	<b>73.2</b>	<b>14.7</b>
<b>Total taxa</b>		<b>14</b>

### 3.15 Bokhara River at Koala

The site is basically a long and near-permanent pool that has increased in water level since May. The pool ranged between 10 and 15m wide and up to 1.2m deep. *Ludwigia* and *Azolla* lined 90% of the eastern bank, reaching up to 3m into the pool. There was no *Ludwigia* on the western bank but *Azolla* lined 90% of this bank. Benthic filamentous alga was uncommon. Recent stock access had apparently been limited.

#### 3.15.1 Water quality

Spot water quality measurements were taken from the centre of the channel and results are shown in **Table 3-15.1**. Mild stratification was evident. Conductivity and surface pH (only) were significantly less than recorded in May.

■ **Table 3-15.1 Spot water quality readings – Bokhara River at Koala**

Sample Time	Depth (m)	Temp (°C)	Dissolved Oxygen (%sat)	Conductivity (µS/cm)	Turbidity (NTU)	pH
0730	Surface	23.2	88	119	>600	7.1
	0.5	20.7	84	133	533	8.2
	0.8	20.7	86	139	>600	8.2

Overnight water quality data were recorded at this site. The ranges recorded overnight for each parameter were:

Temperature: 23.3 – 27.4°C

Dissolved oxygen: 81 - 88% sat; 6.4 – 7.5mg/l

pH: 6.0 – 6.7

Conductivity: 118 - 123µS/cm

Turbidity: >600 NTU.

#### 3.15.2 Macrophytes

*Ludwigia* and *Azolla* were significant in the water while *Juncus* occurred sporadically and a small patch (2m<sup>2</sup>) of *Persicaria* had developed just upstream of the boat entry point.

#### 3.15.3 Fish

All nets were used at this site and captured one native species plus two introduced (**Table 3-15.2**). The seine net encountered a lot of alga that rolled in mud so extraction of fish may not have been complete. Bony bream had been caught in reasonable numbers in May along with low numbers of Carp gudgeons and carp. Only one Goldfish was captured in May and on this occasion the fork length ranged from 13 to 42mm. Yellowbelly ranged from 118 to 432mm. Three broad-shelled tortoises (*Chelodina expansa*) were captured in the fyke nets.

■ Table 3-15.2 Results of fishing the Bokhara River at Koala in November 2005.

Species	Common name	Gill	Seine	Fyke	Bait	Total Numbers caught
<i>Macquaria ambigua</i>	Yellowbelly	3		4		7
<i>Carrasius auratus</i>	Goldfish		58	4	3	65
<i>Gambusia holbrooki</i>	Mosquitofish		2			2
<b>Total Numbers</b>		<b>3</b>	<b>60</b>	<b>8</b>	<b>3</b>	<b>74</b>

#### 3.15.4 Macroinvertebrates

Surber samples were collected from relatively firm mud and usually included some *Ludwigia* and *Azolla*. A dip net sample was collected from a mixture of *Ludwigia* and *Azolla*. Twenty-one taxa were recorded, twenty-one from the surbers and fourteen from the dip net. The dominant taxa in surbers were physids (**Table 3-15.3**) while copepods were the most common element in the dip net. Bait traps captured 23 prawns but no *Cherax* and prawns were also abundant in the seine haul along with the odd atyid (shrimp).

■ **Table 3-15.3 Numbers of aquatic macroinvertebrates recorded from Bokhara River at Koala in November 2005**

	Edge surber		Macrophyte dip net
	Mean	Stddev	
Oligochaeta	1.0	1.0	2
Physidae	49.6	95.3	4
Planorbidae	0.2	0.4	
Cladocera	2.2	3.5	2
Copepoda	4.2	1.3	60
Ostracoda	10.6	12.6	4
Atyidae	0.4	0.5	
Parastacidae	0.2	0.4	2
Hydrophilidae	0.4	0.9	
Ceratopogonidae	3.2	2.7	
Chironominae	2.8	2.5	1
Tanypodinae	7.4	2.3	8
Muscidae	3.0	5.0	
Baetidae	3.8	2.6	3
Caenidae	4.4	4.4	8
Corixidae	11.2	7.7	12
Mesoveliidae	0.4	0.9	
Notonectidae	0.6	0.9	1
Anisoptera	0.2	0.4	
Zygoptera	7.2	8.2	2
Leptoceridae	0.4	0.5	2
<b>Taxa</b>	<b>13.6</b>	<b>1.9</b>	<b>14</b>
<b>Abundance</b>	<b>113.4</b>	<b>108.1</b>	<b>111</b>
<b>Total taxa</b>		<b>21</b>	<b>21</b>

### **3.16 Warrego River at Shannonvale**

The site consists of a long pool with a sand / gravel substrate. There was no flow at the time of sampling. The pool was about 20cm deeper than when last sampled such that no sand bars were exposed other than that adjoining the opposite bank. The sand/gravel substrate contained low quantities of silt but a significant amount of leaf litter. Recently germinated Noogoora burr was common on the banks.

#### **3.16.1 Water quality**

Spot water quality measurements were taken from near the centre of the channel adjacent to the logger site. Results are shown in **Table 3-16.1**. Turbidity was higher than commonly recorded at this site while pH was surprisingly low.

■ **Table 3-16.1 Spot water quality readings – Warrego River at Shannonvale**

Sample Time	Depth (m)	Temp (°C)	Dissolved Oxygen (%sat)	Conductivity (µS/cm)	Turbidity (NTU)	pH
0700	Surface	23.5	87	126	514	6.1
	0.5	23.0	85	123	545	6.0

Overnight logging of water quality parameters was undertaken at this site. The recorded ranges for each parameter were:

Temperature: 23.4 – 29.2°C

Dissolved oxygen: 80 - 88% sat; 6.2 – 7.5mg/l

pH: 5.9 – 7.2

Conductivity: 121 - 127µS/cm

Turbidity: 498 - 521.

### 3.16.2 Macrophytes

No macrophytes were recorded and filamentous green alga was very poorly developed.

### 3.16.3 Fish

All nets were deployed at this site. Five species of native fish plus one introduced were captured (**Table 3-16.2**). Single specimens of Silver perch and Spangled perch had been reported in May. The number of Smelt was much higher on this occasion while that of Hyrtl's tandan, Carp Gudgeon and Yellowbelly was much lower.

■ **Table 3-16.2 Results of fishing the Warrego River at Shannonvale in November 2005.**

Species	Common name	Gill	Seine	Fyke	Bait	Total Numbers caught
<i>Macquaria ambigua</i>	Yellowbelly	3		2	1	6
<i>Nematolosa erebi</i>	Bony Bream	1	1	2		4
<i>Hypseleotris klunzingeri</i>	Carp Gudgeon		38		2	40
<i>Retropinna semoni</i>	Smelt		326			326
<i>Neosilurus hyrtlui</i>	Hyrtl's tandan			14		14
<i>Cyprinus carpio</i>	Carp	2				2
<b>Total Numbers</b>		<b>6</b>	<b>365</b>	<b>18</b>	<b>3</b>	<b>392</b>

### 3.16.4 Macroinvertebrates

Two surber samples were collected from coarse sand and three from fine sand with leaf litter. Fourteen taxa were recorded (**Table 3-16.3**), with copepods most common. Eighteen *Macrobrachium* and 3 *Cherax* were captured in bait traps. Both were also captured in fyke and seine nets.

■ **Table 3-16.3 Numbers of aquatic macroinvertebrates recorded from Shannonvale**

	Edge surber	
	Mean	Stddev
Oligochaeta	0.2	0.4
Ancylidae	0.2	0.4
Copepoda	48.6	16.1
Ostracoda	0.2	0.4
Atyidae	0.2	0.4
Ceratopogonidae	0.4	0.5
Chironominae	1.8	1.3
Tanypodinae	0.2	0.4
Baetidae	0.4	0.9
Caenidae	16.6	6.2
Corixidae	15.4	18.1
Notonectidae	0.2	0.4
Gomphidae	0.8	1.3
Leptoceridae	1.2	1.3
<b>Taxa</b>	<b>6.4</b>	<b>2.2</b>
<b>Abundance</b>	<b>86.4</b>	<b>9.0</b>
<b>Total taxa</b>		<b>14</b>

### **3.17 Warrego River at Tinnenburra**

On this occasion the river was continuous at the site though rarely reached 0.5m deep and ranged from 3-15m in width. This water was probably the remains of winter flows coupled with the result of recent local storm runoff. The substrate was firm red clay silt overlaying sand. A few isolated snags occurred in places and there was very little alga. Disturbance to the edge was very limited.

#### **3.17.1 Water quality**

Results of spot water quality samples are shown in **Table 3-17.1**. The sample was collected from mid-stream approximately 20m upstream from the floodgate. Despite significant thermal stratification, even bottom waters showed good oxygen concentrations. Conductivity was 1/3 of what it had been in May and pH was more than a unit lower.

■ **Table 3-17.1 Spot water quality readings – Warrego River at Tinnenburra**

Sample time	Depth (m)	Temp (°C)	Dissolved Oxygen (%sat)	Conductivity (µS/cm)	Turbidity (NTU)	pH
1300	Surface	33.7	75	112	>600	6.7
	0.5	23.7	84	108	>600	7.2

### 3.17.2 Macrophytes

No macrophytes were observed and the algal fringe was not present.

### 3.17.3 Fish

Only seining was undertaken as the site was too shallow for set nets. Five native species (with *Hypseleotris* pooled) and no introduced were captured (**Table 3-17.2**). This is a good result considering the low sampling effort. Spangled perch, Silver perch, Hyrtl's tandan and Carp had been captured in May. The Yellowbelly were 72 and 85mm, Bony bream ranged from 70 to 157mm, Smelt were no larger than 17mm and several of the gudgeons were showing breeding colouration.

■ **Table 3-17.2 Results of fishing the Warrego River at Tinnenburra in November 2005.**

Species	Common name	Gill	Seine	Fyke	Bait	Total Numbers caught
<i>Macquaria ambigua</i>	Yellowbelly		2			2
<i>Nematolosa erebi</i>	Bony Bream		15			15
<i>Hypseleotris klunzingeri</i>	Carp Gudgeon		30			30
<i>Hypseleotris sp 4.</i>	H. sp 4		7			7
<i>Melanotaenia fluviatilis</i>	Rainbowfish		4			4
<i>Retropinna semoni</i>	Smelt		29			29
<b>Total Numbers</b>		<b>NA</b>	<b>87</b>	<b>NA</b>	<b>NA</b>	<b>87</b>

### 3.17.4 Macroinvertebrates

No specialised habitats were present at Tinnenburra so sampling was restricted to surfers collected from compact clay substrate, occasionally with leaf litter. Nineteen taxa were recorded with corixids and caenid mayflies most common (**Table 3-17.3**). *Macrobrachium* and *Cherax* were not recorded from the seine haul.

■ **Table 3-17.3 Numbers of aquatic macroinvertebrates recorded from Tinnenburra**

	Edge surber	
	Mean	Stddev
Acarina	2.2	2.2
Oligochaeta	1.4	1.1
Ancylidae	6.0	4.1
Planorbidae	0.2	0.4
Cladocera	0.2	0.4
Copepoda	1.8	3.5
Ceratopogonidae	2.6	2.6
Chironominae	13.8	10.3
Orthoclaadiinae	0.2	0.4
Tanypodinae	6.8	3.4
Culicidae	1.0	1.7
Baetidae	3.2	4.1
Caenidae	26.2	12.8
Corixidae	96.2	43.5
Gerridae	0.2	0.4
Notonectidae	0.2	0.4
Gomphidae	2.8	3.4
Anisoptera	0.6	0.9
Economidae	0.2	0.4
Leptoceridae	8.2	5.5
<b>Taxa</b>	<b>12.2</b>	<b>2.6</b>
<b>Abundance</b>	<b>174.0</b>	<b>34.4</b>
<b>Total taxa</b>		<b>19</b>

### **3.18 Moonie River at Nindigully**

The water level at this site was much higher than in May such that the downstream riffle section was flowing sluggishly and was often greater than 5m wide. No *Ludwigia* was present and the *Schoenoplectus* near the gauge was just submerged at the base. Locals said that the river commenced flowing some five days earlier. Very little filamentous alga was evident, even on snags at the waterline. The only disturbance to the edge appeared to be caused by birds.

#### **3.18.1 Water quality**

Results of spot water quality samples are shown in **Table 3-18.1**. The water column was well mixed and oxygenated. The low pH may reflect the recent runoff as the calibration was accurate.

■ **Table 3-18.1 Spot water quality readings – Moonie River at Nindigully**

Sample time	Depth (m)	Temp (°C)	Dissolved Oxygen (%sat)	Conductivity (µS/cm)	Turbidity (NTU)	pH
1115	Surface	22.4	92	103	>600	5.7
	0.5	22.0	93	104	>600	5.7

### 3.18.2 Macrophytes

No macrophytes were observed and the fringe of benthic filamentous green alga was very poorly developed.

### 3.18.3 Fish

All nets were set at this site. Four native fish species and three introduced were recorded (**Table 3-18.2**). Only Yellowbelly, Bony bream and Mosquitofish were captured in May. The total catch is within the historical range and while the Carp tended to be moderate to large fish (210 – 390mm) the Yellowbelly ranged from 80 to 410mm and the Bony bream from 72 to 240mm. Most Goldfish were <10mm long. It is unusual to capture smaller specimens of any species at Nindigully.

■ **Table 3-18.2 Results of fishing the Moonie River at Nindigully in November 2005.**

Species	Common name	Gill	Seine	Fyke	Bait	Total Numbers caught
<i>Macquaria ambigua</i>	Yellowbelly	2		1		2
<i>Leiopotherapon unicolor</i>	Spangled perch			1		1
<i>Nematolosa erebi</i>	Bony Bream	2		8		10
<i>Hypseleotris klunzingeri</i>	Carp Gudgeon		1			1
<i>Cyprinus carpio</i>	Carp	12		6		18
<i>Carrasius auratus</i>	Goldfish		14			14
<i>Gambusia holbrooki</i>	Mosquitofish		3			3
<b>Total Numbers</b>		<b>16</b>	<b>18</b>	<b>16</b>	<b>0</b>	<b>50</b>

### 3.18.4 Macroinvertebrates

Surber samples were collected from recently inundated soft mud. Fifteen taxa were identified (**Table 3-18.3**). Corixids and copepods dominated but the catch was of low abundance. Eight *Macrobrachium* were captured in bait traps and moderate numbers were recorded in seine hauls.

■ **Table 3-18.3 Numbers of aquatic macroinvertebrates recorded from Nindigully**

	Edge surber	
	Mean	Stddev
Acarina	0.8	0.4
Oligochaeta	0.4	0.9
Cladocera	0.8	0.4
Copepoda	25.8	19.7
Ostracoda	0.8	0.8
Ceratopogonidae	0.4	0.9
Chironominae	0.2	0.4
Tanypodinae	0.2	0.4
Tipulidae	0.2	0.4
Baetidae	8.6	2.5
Caenidae	1.8	1.5
Corixidae	26.0	8.9
Gomphidae	0.4	0.5
Zygoptera	0.2	0.4
Leptoceridae	0.4	0.5
<b>Taxa</b>	<b>7.8</b>	<b>2.6</b>
<b>Abundance</b>	<b>66.6</b>	<b>24.9</b>
<b>Total taxa</b>		<b>15</b>

### **3.19 Moonie River at Fenton**

On this occasion the water level was slightly higher than in recent times and it rose by a further 7cm overnight. The pool was continuous in both directions, generally about 20m wide and with a maximum depth of about 1.5m. *Juncus* and *Schoenoplectus* occurred in patches. The grass cover on the banks was reasonable and there was no evidence of recent cattle use. The fringe of benthic filamentous green alga was poorly developed and a light surface scum was evident on the second morning.

#### **3.19.1 Water Quality**

Spot water quality data are shown in **Table 3-19.1**. The warm surface water showed low pH and conductivity in contrast with the cooler bottom water that had higher conductivity and pH.

■ **Table 3-19.1 Spot water quality readings – Fenton November 2005**

Sample Time	Depth (m)	Temp (°C)	Dissolved Oxygen (% sat.)	Conductivity (µS/cm)	Turbidity (NTU)	pH
1315	Surface	26.3	87	98	>600	5.8
	0.5	21.8	85	112	>600	5.5
	1.0	20.6	85	141	>600	6.7

Overnight logging of water quality parameters was also undertaken at this site. The recorded ranges for each parameter were:

Temperature: 21.6 – 32.2°C

Dissolved oxygen: 79 - 90% sat; 5.8 – 7.9mg/l

pH: 5.6 – 7.2

Conductivity: 98 - 104µS/cm

Turbidity: >600NTU.

### 3.19.2 Macrophytes

*Juncus* was common on the far bank and in patches on the near bank while *Schoenoplectus* was more common near the boat entry area. The fringe of benthic filamentous green algae was poorly developed though evident on snags at the waterline. A light surface scum was evident on the second morning. Small patches of *Ludwigia* (1-2m<sup>2</sup>) were yellowing and seemed in poor condition.

### 3.19.3 Fish

All nets were deployed at this site. Three native species and three introduced were captured (**Table 3-19.2**). This is very similar to historical catches. The fish captured in all nets tended to be relatively large and healthy and unlike previous occasions, several small Bony bream were recorded from the seine hauls, though two clean hauls covering a large area produced relatively few fish. A small broad-shelled tortoise was captured in a gill net and a long-necked tortoise was captured in a fyke net.

■ **Table 3-19.2 Results of fishing at Fenton in November 2005.**

Species	Common name	Gill	Seine	Fyke	Bait	Total Numbers caught
<i>Macquaria ambigua</i>	Yellowbelly	1		2		3
<i>Nematolosa erebi</i>	Bony Bream	9	5	1		15
<i>Retropinna semoni</i>	Smelt		5			5
<i>Cyprinus carpio</i>	Carp	11		1		12
<i>Carrasius auratus</i>	Goldfish			1		1
<i>Gambusia holbrooki</i>	Mosquitofish		3			3
<b>Total Numbers</b>		<b>21</b>	<b>13</b>	<b>5</b>	<b>0</b>	<b>39</b>

### 3.19.4 Macroinvertebrates

Surber samples were collected from both soft and compact silt and three were from very sloping bank. A dip net sample was collected from *Ludwigia*. Twenty-two taxa were identified with sixteen collected from the surbers and twelve from the dip net.

The most common taxa in the surbers were copepods and corixids while in the dip net they were copepods, cladocera and baetids (**Table 3-19.3**). Bait traps captured 5 *Macrobrachium* but they were not noted in fyke and seine nets. Yabbies were not recorded.

■ **Table 3-19.3 Macroinvertebrates captured at Fenton in November 2005**

	Edge surber		Macrophyte dip
	Mean	Stddev	
Acarina	0.4	0.9	
Oligochaeta	0.4	0.9	
Physidae	0.8	0.8	4
Cladocera	0.2	0.4	50
Copepoda	12.6	6.9	68
Ostracoda	0.8	0.8	1
Atyidae			1
Hydrophilidae	0.6	0.9	
Ceratopogonidae	0.8	0.8	
Chironominae	1.0	1.0	
Tanypodinae	0.4	0.5	1
Muscidae	0.4	0.5	
Baetidae	3.2	2.4	34
Caenidae	1.0	1.0	
Corixidae	13.2	9.3	
Mesoveliidae			1
Notonectidae			3
Pleidae			3
Pyralidae			1
Coenagrionidae			1
Anisoptera	0.4	0.9	
Leptoceridae	1.4	1.7	
<b>Taxa</b>	<b>8.6</b>	<b>2.9</b>	<b>12</b>
<b>Abundance</b>	<b>37.6</b>	<b>8.2</b>	<b>168</b>
<b>Total taxa</b>		<b>16</b>	<b>22</b>

### **3.20 Police Lagoon**

The lagoon still held considerable water, being about 300 metres long, generally between 20 and 30m wide but the depth rarely exceeded 1m. All of the Nardoo was now above the water level though much of it was still green. A solid herb line existed near the water along with some recently germinated Noogoora Burr and *Sesbania*. *Juncus* grew prolifically near the top levee, which is about 15m from the waters edge, but only some 1.5m higher than it. The riparian zone was otherwise generally several metres from the water. Riparian trees are a variety of ages. There was very little

evidence of disturbance to the waters' edge though a number of fishing sticks suggested recent visitation.

### 3.20.1 Water Quality

Results from spot water quality sampling are shown in **Table 3-20.1**. The characteristics of isolated lagoons are clear from this result; turbidity decreasing but pH and conductivity increasing.

■ **Table 3-20.1 Spot water quality readings – Police Lagoon in November 2005**

Sample Time	Depth (m)	Temp (°C)	Dissolved Oxygen (% sat.)	Conductivity (µS/cm)	Turbidity (NTU)	pH
1315	Surface	27.2	90	241	286	8.2
	0.5	24.9	92	237	306	8.2

### 3.20.2 Macrophytes

Nardoo occurred in extensive patches in recently dried backwaters and generally as a thin band adjacent to the water's edge. *Juncus* was also common in the riparian zone but some distance from the present waterline. A small patch of *Ludwigia* had developed near the exposed roots on the western bank.

### 3.21.3 Fish

All nets were deployed at this site. Three native fish species and two introduced were captured (**Table 3-20.2**) with the complement identical to that recorded in May. Bony Bream captured in the gill nets were consistently in the size range 215-255mm while those in the seine net were as small as 17mm. Spangled perch ranged from 55mm to 130mm in length. A broad-shelled tortoise and a long-necked tortoise were captured in fyke and gill nets respectively.

■ **Table 3-20.2 Results of fishing at Police Lagoon in November 2005.**

Species	Common name	Gill	Seine	Fyke	Bait	Total Numbers caught
<i>Nematolosa erebi</i>	Bony Bream	32	26	2		60
<i>Leiopotherapon unicolor</i>	Spangled Perch		2	4		6
<i>Melanotaenia fluviatilis</i>	Rainbowfish		1			1
<i>Cyprinus carpio</i>	Carp	2	1			3
<i>Gambusia holbrooki</i>	Mosquitofish		49			49
<b>Total Numbers</b>		<b>34</b>	<b>79</b>	<b>6</b>	<b>0</b>	<b>119</b>

### 3.20.4 Macroinvertebrates

Surber samples were collected from firm mud with a soft surface layer. Algae and leaf litter were generally present in minor amounts. Sixteen taxa were collected (**Table 3-20.3**). The most common taxa were Caenidae, Corixidae and Chironominae. Forty-eight *Macrobrachium* and 4 *Cherax* were captured in bait traps and small numbers of both were recorded in the seine and/or fyke nets. Yabbies were also feeding on fish captured in the gill nets.

■ **Table 3-20.3 Macroinvertebrates captured at Police Lagoon**

	Edge surber	
	Mean	Stddev
Acarina	4.8	6.4
Oligochaeta	0.2	0.4
Cladocera	0.6	0.9
Copepoda	0.8	0.4
Ostracoda	2.8	3.0
Ceratopogonidae	9.8	3.9
Chironominae	40.6	30.5
Orthocladiinae	4.8	6.4
Tanypodinae	6.8	2.7
Baetidae	0.8	0.8
Caenidae	90.4	51.8
Corixidae	80.4	69.9
Notonectidae	0.2	0.4
Zygoptera	0.2	0.4
Ecnomidae	0.2	0.4
Leptoceridae	4.4	2.9
<b>Taxa</b>	<b>11.0</b>	<b>0.7</b>
<b>Abundance</b>	<b>247.8</b>	<b>78.0</b>
<b>Total taxa</b>		<b>16</b>

### **3.21 Belah Waterhole**

The water level was over 0.5m higher than in May such that several backwater areas contained water, lignum reached the water and much more of the snags was submerged. Green filamentous alga grew strongly near the waterline. Cattle were grazing in the vicinity.

#### **3.21.1 Water Quality**

Overnight logging of water quality parameters produced the following range of results:

Temperature: 20.2 – 25.9°C

Dissolved oxygen: 58 - 93% sat; 5.2 – 7.6mg/l

pH: 8.2 – 8.5

Conductivity: 423 - 432µS/cm

Turbidity: >600 NTU.

#### **3.21.2 Macrophytes**

*Juncus* grew strongly in patches, such as on the small island near the boat entry point and growth of green filamentous alga was strong.

### 3.21.3 Fish

All nets were deployed at this site. Four native fish species and three introduced were recorded (**Table 3-21.1**). Hyrtl's tandan and Goldfish were not captured in May. Bony bream covered the range of sizes from 21 – 256mm while Spangled perch measured from 124 to 194mm and they were all very healthy specimens.

■ **Table 3-21.1 Results of fishing Belah Waterhole in November 2005.**

Species	Common name	Gill	Seine	Fyke	Bait	Total Numbers caught
<i>Macquaria ambigua</i>	Yellowbelly	1				1
<i>Nematolosa erebi</i>	Bony Bream	6	20	22		48
<i>Leiopotherapon unicolor</i>	Spangled Perch			11		11
<i>Hypseleotris klunzingeri</i>	Carp Gudgeon		5		1	6
<i>Hypseleotris sp 4</i>	H.sp 4		1			1
<i>Neosilurus hyrtlilii</i>	Hyrtl's tandan			1		1
<i>Cyprinus carpio</i>	Carp			3		3
<i>Carrasius auratus</i>	Goldfish		1			1
<i>Gambusia holbrooki</i>	Mosquitofish		6			6
<b>Total Numbers</b>		<b>7</b>	<b>33</b>	<b>37</b>	<b>1</b>	<b>78</b>

### 3.21.4 Macroinvertebrates

Five surber samples were collected from a range of firm and soft silt substrates, some with filamentous alga or leaf litter and a dip net sample was collected from trailing lignum (**Table 3-21.2**). Twenty-two taxa were identified. Copepods dominated the surber catch while microcrustaceans and chironomids were most common in the dip net. Bait traps captured 9 *Cherax*, and 22 *Macrobrachium*. Both were also recorded in good numbers from fyke and seine nets and several yabbies were attacking fish caught in the gill nets.

■ **Table 3-21.2 Macroinvertebrates captured at Belah Waterhole**

	Edge surber		Lignum dip
	Mean	Stddev	
Acarina	3.2	3.2	1
Nematoda	0.2	0.4	1
Oligochaeta	1.6	1.3	1
Ancylidae	1.0	1.4	5
Cladocera			16
Copepoda	141.0	64.5	28
Ostracoda	7.0	4.2	23
Atyidae	0.2	0.4	1
Palaemonidae			1
Parastacidae	0.2	0.4	
Hydrophilidae			1
Ceratopogonidae	3.0	0.7	1
Chironominae	7.4	7.2	2
Orthoclaadiinae	0.2	0.4	28
Tanypodinae	13.6	7.0	22
Baetidae	3.6	2.1	14
Caenidae	10.0	3.5	6
Corixidae	39.4	52.2	11
Notonectidae			1
Gomphidae	1.0	0.7	
Ecnomidae	0.8	0.8	
Leptoceridae	3.4	4.5	2
<b>Taxa</b>	<b>13.0</b>	<b>1.2</b>	<b>19</b>
<b>Abundance</b>	<b>236.8</b>	<b>61.8</b>	<b>165</b>
<b>Total taxa</b>		<b>18</b>	<b>22</b>

### **3.22 Clyde Lagoon**

This lagoon received some flow in the July event because the pool extended upstream through a small excavated channel into the natural section. The water in this section was much clearer. The area downstream of the channel was basically a bog with no defined channel and it was covered with Spiny Mud Grass and occasional *Schoenoplectus*. *Ludwigia* regrowth has continued such that approximately 95% of the edge of the main pool was covered and strands extended up to 10m over the water surface. *Azolla* and fringing green filamentous alga was also present, including in the upstream area. The edge of the lagoon was very disturbed by pugging but this was not the case upstream. The edges were steep such that seine and fyke nets were only effective to a short distance from the edge.

### 3.22.1 Water Quality

Spot water quality data are shown in **Table 3-22.1**. The water column was well mixed and the probe may have touched the bottom before recording the last odd results.

■ **Table 3-22.1 Spot water quality readings – Clyde Lagoon in November 2005**

Sample Time	Depth (m)	Temp (°C)	Dissolved Oxygen (% sat.)	Conductivity (µS/cm)	Turbidity (NTU)	pH
1430	Surface	26.2	92	255	185	8.3
	0.5	25.2	90	256	185	8.1
	1.0	24.5	90	258	193	8.0
	1.5	23.3	83	259	183	7.9
	2.0	20.3	86	260	70	9.2

Overnight logging of water quality parameters produced the following range of results:

Temperature: 23.9 – 26.5°C

Dissolved oxygen: 90 - 93% sat; 7.3 – 7.7mg/l

pH: 7.3 – 7.8

Conductivity: 252 - 258µS/cm

Turbidity: 171 - 192 NTU.

The small flow of July apparently broke the drying cycle because the pH and conductivity were lower than in May. The relatively low turbidity possibly reflects the nearly 4 months since the flow occurred, the low impact nature of the flow and the strong macrophyte coverage.

### 3.22.2 Macrophytes

*Ludwigia* occurred over approximately 95% of the edge and *Azolla* was commonly mixed with it. Spiny Mud Grass (*Pseudoraphis spinescens*) was common in the wetted area upstream and occasional *Schoenoplectus* had germinated in this area.

### 3.22.3 Fish

All nets were set at this site (**Table 3-22.2**). The efficiency of seine and fyke nets was hampered by the steeply sloping edge and the propensity of *Azolla* and *Ludwigia*. Three native fish species and three introduced were captured. Hyrtl's tandan had been captured in May but was not on this occasion. The lower numbers of fish on this occasion probably reflects the difficulty in conducting the seine sampling. Most species were represented by fish of various sizes, including Yellowbelly from 119mm to 254mm and Bony bream from 48mm to 255mm. A broad-shelled tortoise was captured in a gill net.

■ Table 3-22.2 Results of fishing Clyde lagoon in November 2005.

Species	Common name	Gill	Seine	Fyke	Bait	Total Numbers caught
<i>Macquaria ambigua</i>	Yellowbelly	2		1		3
<i>Nematolosa erebi</i>	Bony Bream	9	3	6		18
<i>Leiopotherapon unicolor</i>	Spangled Perch			5		5
<i>Cyprinus carpio</i>	Carp	2			1	3
<i>Carrasius auratus</i>	Goldfish			1		1
<i>Gambusia holbrooki</i>	Mosquitofish			1		1
<b>Total Numbers</b>		<b>13</b>	<b>3</b>	<b>14</b>	<b>1</b>	<b>31</b>

#### 3.22.4 Macroinvertebrates

Surber samples were collected from semi-firm clay with *Azolla* or rotted roots of *Ludwigia*. A dip net sample was collected from *Ludwigia*. Twenty-three taxa were identified (**Table 3-22.3**) in total, 13 from the dip net and 17 from the surbers. The surber fauna was of very low abundance and not dominated by any single element. Pyralid (moth) larvae, Chironominae and Ceratopogonidae were the most common elements from the dip net. Eleven *Macrobrachium* and one *Cherax* were captured in bait traps and both were captured in low numbers in fyke nets and the seine haul. Yabbies also attacked fish captured in the gill nets and in one case a tortoise ate a yabby and the tortoise was then captured in the net.

■ **Table 3-22.3 Macroinvertebrates captured at Clyde Lagoon**

	<b>Edge Surber</b>		<b>Macrophyte</b>
	<b>Mean</b>	<b>Stdev</b>	<b>dip</b>
Acarina	0.4	0.5	
Nematoda	0.2	0.4	
Oligochaeta	3.2	2.2	
Ancylidae			2
Cladocera	0.2	0.4	1
Copepoda	1.2	1.1	
Ostracoda	3.6	2.9	
Atyidae			1
Parastacidae	0.2	0.4	
Dytiscidae			1
Hydrophilidae			4
Ceratopogonidae	9.2	5.2	30
Chironominae	4.2	2.9	36
Orthoclaadiinae	0.2	0.4	2
Tanypodinae	6.4	4.0	
Baetidae	1.8	1.5	8
Caenidae	1.2	0.8	
Corixidae	9.0	11.4	
Mesovelliidae	0.6	0.9	2
Notonectidae	0.2	0.4	
Pyralidae			47
Caenagrionidae			4
Anisoptera	0.4	0.5	
Zygoptera			20
<b>Taxa</b>	<b>10.2</b>	<b>3.3</b>	<b>13</b>
<b>Abundance</b>	<b>42.2</b>	<b>21.5</b>	<b>158</b>
<b>Total taxa</b>		<b>17</b>	<b>23</b>

### **3.23 Pilgra Lagoon Downstream**

The lagoon was now about 160m long, 15-18m wide and generally less than 0.5m deep. The substrate was firm sandy silt. No snags were noted but growth of filamentous alga was very strong near the edge. Disturbance of the edge was minimal. Many seedlings that had germinated following the floods of February 2004 continued to survive.

#### **3.23.1 Water Quality**

Spot water quality data are shown in **Table 3-23.1**. The water column was well mixed. Conductivity and pH have increased slightly since May.

■ **Table 3-23.1 Spot water quality readings – Pilgra Lagoon downstream in November 2005**

Sample Time	Depth (m)	Temp (°C)	Dissolved Oxygen (% sat.)	Conductivity (µS/cm)	Turbidity (NTU)	pH
1230	Surface	27.3	94	490	440	9.1
	1.0	27.2	93	491	>600	9.2

### 3.23.2 Macrophytes

No macrophytes were present but the fringe of filamentous alga was very well developed.

### 3.23.3 Fish

Only seine netting was undertaken as heavy rain threatened. One native fish species and one introduced were captured (**Table 3-23.2**) in the two fairly large hauls. The total catch is small given the size of the hauls. Yellowbelly, Spangled perch, Carp and Mosquitofish were captured in May, the natives not being caught in the seine net. It is likely that those species were still present in the lagoon.

■ **Table 3-23.2 Results of fishing Pilgra Lagoon Downstream in November 2005.**

Species	Common name	Gill	Seine	Fyke	Bait	Total Numbers caught
<i>Nematolosa erebi</i>	Bony Bream		1			1
<i>Carrasius auratus</i>	Goldfish		15			15
<b>Total Numbers</b>		<b>NA</b>	<b>16</b>	<b>NA</b>	<b>NA</b>	<b>16</b>

### 3.23.4 Macroinvertebrates

Surber samples were collected from compact mud with some filamentous alga. No dip net sample was collected. Fourteen taxa were recorded (**Table 3-23.3**) with copepods and corixids most common. *Macrobrachium* and *Cherax* were present in seine hauls.

■ **Table 3-23.3 Macroinvertebrates captured at Pilgra Lagoon Downstream**

	Edge surber	
	Mean	Stddev
Acarina	0.8	1.1
Oligochaeta	1.2	1.3
Cladocera	0.4	0.5
Copepoda	108.0	87.6
Ostracoda	0.8	0.4
Dytiscidae	0.2	0.4
Ceratopogonidae	0.2	0.4
Chironominae	2.0	1.9
Tanypodinae	2.0	1.9
Baetidae	1.2	1.8
Caenidae	1.6	1.1
Corixidae	45.4	21.8
Notonectidae	0.8	0.8
Leptoceridae	0.2	0.4
<b>Taxa</b>	<b>8.2</b>	<b>1.5</b>
<b>Abundance</b>	<b>164.8</b>	<b>96.6</b>
<b>Total taxa</b>		<b>14</b>

### 3.24 Chinaman Creek

Water level was slightly higher than that seen in May. The length of the pool was complete in both directions. Fringing green alga was very well developed and there was no macrophyte growth in the water nor a surface scum. A patch of *Juncus* (5m x 2m) grew about 1.0m above the waterline just upstream from the bridge while a patch of *Persicaria* grew 5m downstream. The edge appeared undisturbed. Young riparian trees were in good condition.

#### 3.24.1 Water Quality

Spot water quality data are shown in **Table 3-24.1**. The water column was well mixed though temperature showed a strong gradient.

■ **Table 3-24.1 Spot water quality readings – Chinaman Ck in November 2005**

Sample Time	Depth (m)	Temp (°C)	Dissolved Oxygen (% sat.)	Conductivity (µS/cm)	Turbidity (NTU)	pH
1610	Surface	24.9	91	201	>600	7.8
	0.5	22.5	90	197	>600	7.9
	1.0	18.8	90	192	596	8.1

Overnight logging of water quality parameters produced the following range of results:

Temperature: 23.5 – 25.6°C  
 Dissolved oxygen: 90 - 94% sat; 7.4 – 8.0mg/l  
 pH: 7.1 – 7.4  
 Conductivity: 200 - 205µS/cm  
 Turbidity: >600 NTU.

### 3.24.2 Macrophytes

Fringing green alga was very well developed and there was no macrophyte growth in the water or surface scum. A patch of *Juncus* (5m x 2m) grew about 1.0m above the waterline just upstream from the bridge while a patch of *Persicaria* grew 5m downstream.

### 3.24.3 Fish

All nets were deployed at this site. Five native fish species and two introduced were captured (**Table 3-24.2**). Carp Gudgeon and Mosquitofish were captured in May but Hyrtl's tandan and Goldfish were not. The total catch in May was 216 fish of which 191 were Bony bream. The Yellowbelly on this occasion ranged from 103mm to 255mm in length; the Spangled perch from 135 – 165mm and Bony bream from 21 to 215mm. The Goldfish were 124 and 132mm in length, unlike the small specimens caught at several other sites.

■ **Table 3-24.2 Results of fishing Chinaman Creek in November 2005.**

Species	Common name	Gill	Seine	Fyke	Bait	Total Numbers caught
<i>Macquaria ambigua</i>	Yellowbelly	1		2		3
<i>Nematolosa erebi</i>	Bony Bream	1	18			19
<i>Leiopotherapon unicolor</i>	Spangled Perch			4		4
<i>Retropinna semoni</i>	Smelt		22			22
<i>Neosilurus hyrtlii</i>	Hyrtl's tandan			1		1
<i>Cyprinus carpio</i>	Carp			5	2	7
<i>Carrasius auratus</i>	Goldfish			2		2
<b>Total Numbers</b>		<b>2</b>	<b>40</b>	<b>14</b>	<b>2</b>	<b>58</b>

### 3.24.4 Macroinvertebrates

Surber samples were collected from firm silt with algae and some litter. Eighteen taxa were recorded with copepods and chironomids most common (**Table 3-24.3**). Bait traps captured 2 *Macrobrachium*. *Cherax* was not captured at the site.

■ **Table 3-24.3 Macroinvertebrates captured at Chinaman Creek**

	Edge surber	
	Mean	Stddev
Acarina	0.4	0.9
Nematoda	0.6	0.5
Oligochaeta	1.4	0.5
Ancylidae	4.4	2.8
Cladocera	0.2	0.4
Copepoda	81.8	41.3
Atyidae	0.2	0.4
Hydrophilidae	0.2	0.4
Ceratopogonidae	8.0	3.3
Chironominae	20.0	10.1
Orthoclaadiinae	0.6	0.9
Tanypodinae	2.6	4.2
Culicidae	2.8	2.6
Baetidae	2.8	2.5
Caenidae	12.6	4.6
Corixidae	8.0	5.8
Notonectidae	0.4	0.5
Leptoceridae	2.2	1.5
<b>Taxa</b>	<b>12.4</b>	<b>1.7</b>
<b>Abundance</b>	<b>149.2</b>	<b>37.4</b>
<b>Total taxa</b>		<b>18</b>

## 4. Discussion

### 4.1 Water quality

**Table 4-1.1** summarises the results from all sites sampled in November 2005. Note that the time series data represents overnight recordings rather than 24 hr recordings hence often does not include the middle of the day. Spot recordings on the other hand tend to be taken when logged data is not recorded.

Temperature often showed significant variation both with depth and overnight. Dissolved oxygen was uniformly high and tended to show little variation overnight, even at sites that the compensation flow had not reached. Conductivity tended to be markedly lower than in May at Balonne sites though some sites unaffected by the compensation flow, including floodplain sites, showed increases. The results for the Narran show the reduced conductivity of the compensation water in that the flow had reached Donegri when sampled but it had not reached downstream sites. The small

jump in conductivity between Whyenbah and the Culgoa at Whyenbah is commonly seen and may indicate a local saline input.

Turbidity exceeded the range of the meter at most sites but those with the lowest turbidity may have achieved this result by different means. Police lagoon has been isolated from flow since February 2004, has little macrophyte growth and stock rarely access it. Clyde lagoon and the Bokhara River at Koala were not affected by the compensation flow received winter flow, both have significant stock access and also have significant macrophyte growth. The macrophytes may be reducing turbidity by minimising water movement and trapping suspended particles near the edge.

Results for pH were surprisingly low and do not appear to reflect the compensation flow but may be a combination of that flow and the breaking of the drying cycle by the flow in July. This does not explain all results however because the result at Nindigully was the lowest on record and while it was not affected by the compensation flow, a natural flush was occurring at the time of sampling. Some floodplain sites showed the expected elevated pH because they were unaffected by these flows.

■ **Table 4-1.1 Summary Water Quality Data for November 2005.**

	Temperature °C	Dissolved O <sub>2</sub> % sat	Conductivity µS/cm	Turbidity NTU	pH
Balonne-St George	29.3	88	95	>600	7.3
Balonne-Mooramanna	26.9 – 29.2	83 - 87	99 - 103	>600	6.6 – 6.9
Balonne at Whyenbah	26.4 – 27.8	84 - 87	101 - 105	>600	6.7 – 6.9
Culgoa at Whyenbah	27.5	88	126	>600	7.2
Culgoa at Cubbie	27.1	87	122	>600	7.4
Culgoa at Woolerbilla	23.0 – 25.6	87 - 91	133 - 138	>600	6.0 – 6.7
Culgoa at Balandool	22.7	90	148	>600	7.1
Balonne Minor-Trafalgar					
Narran at Donegri	21.8 – 23.8	93 - 98	108 - 112	>600	5.0 – 6.7
Narran at Clyde	23.0	92	155	>600	7.3
Narran at Booligar	33.0	80	143	>600	7.7
Balandool on Cubbie	24.3	92	144	>600	7.1
Bokhara at Koala	23.3 – 27.4	81 - 88	118 - 123	279 - 592	6.0 – 6.7
Warrego-Shannonvale	23.4 – 29.2	80 - 88	121 - 127	498 - 521	5.9 – 7.2
Warrego-Tinnenburra	33.7	75	112	>600	6.7
Moonie at Nindigully	22.4	92	103	>600	5.7
Moonie at Fenton	21.6 – 32.2	79 - 90	98 - 104	>600	5.6 – 7.2
Police Lagoon	27.2	90	241	286	8.2
Belah Creek	20.2 – 25.9	58 - 93	423 - 432	>600	8.2 – 8.5
Clyde Lagoon	23.9 – 26.5	90 - 93	252 - 258	171 - 192	7.3 – 7.8
Pilgra D/S	27.3	94	490	440	9.1
Chinaman Ck	23.5 – 25.6	90 - 94	200 - 205	>600	7.1 – 7.4

Note: Ranges are from overnight logged data. Single data points are surface recordings from stratification data. River or floodplain systems are either shaded or unshaded. Lagoons are below the bold line.

## 4.2 Macrophytes

Macrophytes were very limited in their distribution and *Ludwigia* remained the most commonly encountered species but it was only significant at one riverine site. *Azolla* was occasionally seen but was also only significant at one riverine site. These species were significant at two lagoon sites. Nardoo was present at one lagoon site. The fringe

of filamentous green alga was a common though not uniform sight and while development was often pronounced at stable sites, those that had been affected by the compensation flow or natural flows showed much less significant development. Spiny mud grass was well developed at one lagoon site where it covered a boggy area. *Juncus* was a common though patchy site and it also grew very well in slight depressions on the floodplain or in roadside drains that had filled from local rainfall.

### 4.3 Fish

In a total catch of 3406 individuals, nine native species of fish (with *Hypseleotris* pooled) were identified from fourteen river sites in the Lower Balonne, seven from the five floodplain sites and seven from the four river reference sites. Three introduced species were captured at both test and reference sites. The number of taxa is in accord with historical sampling and the species list only varies with respect to rare occurrences such as *Tandanus*.

The overall abundance at river test sites was 63% greater than that captured in May 2005 and that at river reference sites was 52% greater. At test sites this related mainly to major increases in the catch of Smelt and small Goldfish and this more than compensated for decreased catches of Bony bream, Mosquitofish, gudgeons and Rainbowfish. Similar changes with respect to native fish were seen in the Warrego River though Hyrtl's tandan also decreased significantly in that system whereas the catch increased in the Lower Balonne. Rainbowfish were captured at 9 test river sites in May but were not recorded in November.

Overall abundance decreased by 66% at lagoon sites, partly because two less sites were sampled and one of these was Whyenbah Lagoon and it is often very productive. Similar temporal changes in species abundance were seen at lagoon sites except for gudgeons, which showed little change. The number of Rainbowfish was also significantly reduced at lagoon and reference river sites. The latter result may be an artefact of the patchy distribution as in each case just one seine haul resulted in the vast majority of the catch in May. One reason for the decrease in the catch of gudgeons in the rivers is that Meigunyah was not sampled and it has historically recorded one of the highest overall gudgeon catches. Gudgeons were still proportionally significant in the Warrego but they are rarely encountered in the Moonie.

**Table 4-3.1** summarises the fish catch across all sites. Shading in the table marks each river and sites are placed from upstream to downstream within each river. The number of native species recorded at river test sites varied between one and eight. Floodplain sites recorded between one and five native species while river reference sites recorded between 3 and 5 native species. The number of individuals captured varied from 21 to 1421 at test river sites and from 16 to 160 at test lagoon sites. At reference sites the number of individuals captured varied from 39 to 342. It should be remembered that the use of the various fishing nets varied among sites.

The most diverse native fauna was found at Whyenbah (8 species), followed by Culgoa at Whyenbah (6 species) St George, Mooramanna, Donegri Ck, Belah Waterhole, Chinaman Ck, Shannonvale and Tinnenburra (5 species). The least diverse fauna was recorded at Balandool at Euraba, Bokhara at Koala and Pilgra Lagoon

downstream (1 native species). In the case of Pilgra and Euraba the result relates partly to the low sampling effort (seine only) and the harshness of the environment while the result at Koala is unusual as the lowest number of native species reported over 8 sampling events to May 2005 was 3. Bony bream was captured at Koala on each previous sampling occasion but it was not captured in November 2005.

■ **Table 4-3.1. Summary of fish catch by site; November 2005**

Site	<i>Maccullochella peelii peelii</i>	<i>Maquaria ambigua</i>	<i>Leiopotherapon unicolor</i>	<i>Bidyanus bidyanus</i>	<i>Nematalosa erebi</i>	<i>Hypseleotris spp</i>	<i>Melanotaenia fluviatilis</i>	<i>Retropinna semoni</i>	<i>Tandanus tandanus</i>	<i>Neosilurus hyrtlil</i>	<i>Cyprinus carpio</i>	<i>Carrasius auratus</i>	<i>Gambusia holbrooki</i>	Total count	Natives	Introduced
St George	0	2	0	1	9	27	0	27	0	0	3	1	0	70	5	2
Mooramanna	0	7	1	0	12	30	0	127	0	0	0	2	0	179	5	1
Whyenbah	1	4	1	0	73	21	0	1295	1	23	1	0	1	1421	8	2
Culgoa at Whyenbah	1	8	0	1	64	5	0	69	0	0	9	2	27	186	6	3
Culgoa at Cubbie	0	19	0	0	0	1	0	48	0	0	1	5	0	74	3	2
Culgoa at Woolerbilla	0	2	0	0	5	0	0	5	0	0	5	3	1	21	3	3
Culgoa at Balandool	0	2	0	0	1	0	0	15	0	0	3	3	1	25	3	3
Trafalgar	0	3	2	0	3	0	0	0	0	2	16	2	4	32	4	3
Balandool on Cubbie	0	1	17	0	0	0	0	0	0	8	4	14	4	48	3	3
Balandool at Euraba	0	0	0	0	0	0	0	1	0	0	0	47	0	48	1	1
Bokhara at Koala	0	7	0	0	0	0	0	0	0	0	0	65	2	74	1	2
Donegri Ck	1	11	0	0	19	0	0	73	0	48	8	13	4	177	5	3
Narran at Clyde	0	3	0	0	27	0	0	23	0	0	5	48	26	132	3	3
Narran at Booligar	0	12	0	0	21	0	0	0	0	8	18	0	0	59	3	1
<b>River summary</b>	<b>3</b>	<b>81</b>	<b>21</b>	<b>2</b>	<b>234</b>	<b>84</b>	<b>0</b>	<b>1683</b>	<b>1</b>	<b>89</b>	<b>73</b>	<b>205</b>	<b>70</b>	<b>2546</b>	<b>9</b>	<b>3</b>
Belah Waterhole	0	1	11	0	48	7	0	0	0	1	3	1	6	78	5	3
Police Lagoon	0	0	10	0	139	0	5	0	0	0	1	0	5	160	3	2
Clyde Lagoon	0	3	5	0	18	0	0	0	0	0	3	1	1	31	3	3
Pilgra D/S	0	0	0	0	1	0	0	0	0	0	0	15	0	16	1	1
Chinaman Ck	0	3	4	0	19	0	0	22	0	1	7	2	0	58	5	2
<b>Lagoon summary</b>	<b>0</b>	<b>7</b>	<b>30</b>	<b>0</b>	<b>225</b>	<b>7</b>	<b>5</b>	<b>22</b>	<b>0</b>	<b>2</b>	<b>14</b>	<b>19</b>	<b>12</b>	<b>343</b>	<b>7</b>	<b>3</b>
<b>Test site summary</b>	<b>3</b>	<b>88</b>	<b>51</b>	<b>2</b>	<b>459</b>	<b>91</b>	<b>5</b>	<b>1705</b>	<b>1</b>	<b>91</b>	<b>87</b>	<b>224</b>	<b>82</b>	<b>2889</b>	<b>10</b>	<b>3</b>
Shannonvale	0	6	0	0	4	40	0	276	0	14	2	0	0	342	5	1
Tinnenburra	0	2	0	0	15	37	4	29	0	0	0	0	0	87	5	0
Nindigully	0	2	1	0	10	1	0	0	0	0	18	14	3	49	4	3
Fenton	0	3	0	0	15	0	0	5	0	0	12	1	3	39	3	3
<b>Reference summ</b>	<b>0</b>	<b>13</b>	<b>1</b>	<b>0</b>	<b>44</b>	<b>78</b>	<b>4</b>	<b>310</b>	<b>0</b>	<b>14</b>	<b>32</b>	<b>15</b>	<b>6</b>	<b>517</b>	<b>7</b>	<b>3</b>

The most commonly encountered species were Yellowbelly (20 of 23 sites in total), Bony bream (19 sites) Carp and Goldfish (18 sites). Smelt was found at 14 sites in total but at only 1 of 5 lagoon sites and this was Chinaman Ck, the lagoon with the closest connection to the river. Spangled Perch was found at 4 of 5 lagoon sites but at only 5 of 18 river sites. The most abundant species at river test sites were Smelt (66%

of the total catch), Bony bream (9%) and Goldfish (8%). At lagoon sites the most abundant species were Bony Bream (66%), Spangled perch (9%) and Smelt (6%). At reference river sites the most abundant species were Smelt (60%), Carp Gudgeon (15%) and Bony bream (9%).

Introduced species contributed 14% of the catch at test river sites, 13% at lagoon sites and 10% at reference river sites. This continues the decreasing trend since May 2004 (which had results of 30.5% for river sites and 60.3% for lagoon sites). The reference rivers were again very different from each other with the Warrego showing a moderate diversity of native species (6), a relatively abundant fauna (429 fish at the two sites) and a very low representation of introduced species (0.5%) while the Moonie showed similar diversity (5) but low abundance (88 fish at two sites) and 58% of the total catch was introduced species.

#### 4.4 Macroinvertebrates

**Table 4-4.1** summarises the macroinvertebrate data for all sites. A trend observed in several earlier data sets wherein the number of taxa and / or the number of individuals per surber sample increased downstream within various rivers, is evident with respect to taxa in the Culgoa, Narran, Warrego and Moonie and with respect to abundance in the Balonne, Narran, Balandool, and Warrego.

■ **Table 4-4.1 Summary of macroinvertebrate data recorded in November 2005**

	Mean taxa (Surbers)	Taxa (dips)	Taxa Total	Individuals (surber)
Balonne at St George	7.4+/-2.9	9	18	18+/-15
Balonne at Mooramanna	5.6+/-2.5		13	29+/-5
Balonne at Whyenbah	8.8+/-3.2	11	21	44+/-19
Culgoa at Whyenbah	8.2+/-0.8		16	68+/-21
Culgoa at Cubbie	12.0+/-1.6		18	170+/-80
Culgoa at Woolerbilla	12.0+/-2.5		21	149+/-80
Culgoa at Balandool	12.6+/-2.3		21	182+/-135
Balonne Minor at Trafalgar	7.8+/-2.3		14	37+/-7
Narran at Donegri	9.4+/-2.4		20	61+/-30
Narran at Clyde	10.4+/-2.4		15	73+/-17
Narran at Booligar	13.4+/-1.8		18	183+/-48
Balandool on Cubbie	10.2+/-1.8		14	37+/-7
Balandool on Euraba	8.4+/-1.7		14	73+/-15
Bokhara at Koala	13.6+/-1.9	14	21	113+/-108
Belah Creek	13.0+/-2.0	19	23	237+/-62
Police Lagoon	11.0+/-0.7		16	248+/-78
Clyde Lagoon	10.2+/-3.3	13	23	42+/-21
Pilgra D/S	8.2+/-1.5		14	165+/-97
Chinaman Ck	12.4+/-1.7		18	149+/-37
Warrego at Shannonvale	6.4+/-2.2		14	86+/-9
Warrego at Tinnenburra	12.2+/-2.6		19	174+/-34
Moonie at Nindigully	7.8+/-2.8		15	67+/-25
Moonie at Fenton	8.6+/-2.9	12	22	38+/-8

The 115 surber samples and 6 dip net samples produced 13,465 individuals and 36 discrete taxa. The total number of taxa recorded from surber samples was 35 while from the dip nets it was 29. This continues a trend over recent sampling events of a

reduction in the number of individuals and the number of taxa per sample. The mean number of individuals per surber in November 2003 was 1052 and it is now 108 and the mean number of taxa per surber was 13.6 and it is now 10.0. While the samples from recently inundated habitat explain part of the difference on this occasion, as the trend has been observed at both test and reference sites it is logical to assume that the cause is regional, such as the ongoing drought.

Abundance and diversity were markedly reduced at sites recently affected by the compensation flow. Floodplain sites often showed slightly higher abundance than riverine sites though the difference was not as marked as it has been on previous occasions.

The most common taxa in surbers were copepods, corixids, caenids, Chironominae and Tanyptodinae. These taxa provided 76.8% of the total catch. The most common taxa in dip nets were copepods, cladocerans, pyralids, baetids and Chironominae. These taxa provided 71.5% of the total catch.

#### **4.5 Current Status**

Drought conditions continued prior to the sampling period with only a minor flow in July and a compensation flow during the latter part of sampling.

Water quality results were surprisingly good, possibly due to the extended low-level flows through July and August.

The fish species complement was in line with historical results but the relative abundance of some species showed greater short-term change than has previously been experienced, except following major flow events. That several native species declined in abundance while Goldfish were apparently breeding well was disappointing. The changes in native species relative abundance were evident at both test and reference sites so probably reflect conditions over the entire region rather than specific conditions in the Lower Balonne. The very good results at Warrego River sites continues to be in stark contrast to that from our two reference sites on the Moonie River. Other organizations should be encouraged to investigate the Moonie in more detail.

Macroinvertebrates show a continuing trend of decreases in abundance at all sites and decreasing taxonomic richness per sample at most sites. As suggested previously, this may in part reflect the relatively greater impact of stock and native animals during dry times as well as the naturally harsh conditions.

### **5. References**

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