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## 1. Introduction

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

At the time of sampling in May 2005, the area had endured another basically failed wet season such that the flows in January/February of 2004 definitely represented only a temporary reprieve from the drought. Summer flows this year commenced at Jack Taylor Weir on 7 December 2004, peaked at 8660ML/d on 14 December, and continued till 19 January. Further small inflows to the dam occurred but they were not released. Flows only remained above compensation level for 12 days. Culgoa at Whyenbah flowed for 30 days more than the Balonne Minor, possibly indicating a minor difference in height of the weirs effective at low flows. Briarie Ck, the Chinaman Ck floodplain and the Doctors Ck floodplain did not flow but flow did reach Belah Waterhole.

The Warrego and Moonie rivers flowed at approximately the same time. The Warrego flowed from 16 December to 6 February and peaked at 14131ML/d. The results from the Moonie are as yet unconfirmed and appear odd because the peak at Nindigully was 1134ML/d while that at Fenton was 19226ML/d yet Nindigully flowed for at least one month longer than Fenton.

## 2. Methods

Nineteen riverine and seven floodplain sites were sampled between mid-April and mid-May 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 610). 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of riparian zones was undertaken, as these have been described previously for most sites (SKM June 2000 report and DNRM unpublished).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 a good cover of grass and trees. The substrate is mainly deep silt with large outcroppings of conglomerate rock. The river is approximately 60m wide and contained a significant number of large snags, particularly near the gauge. Water level was similar to previous low-water sampling events.

#### 3.1.1 Water quality

Spot water quality profiling was undertaken at the centre of the site (**Table 3-1.1**). Only the deepest water showed stratification with respect to dissolved oxygen.

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

Sample Time	Depth (m)	Temp. (°C)	Dissolved Oxygen (%sat)	Conductivity (µS/cm)	Turbidity (NTU)	pH
1450	Surface	27.9	90	125	>600	6.8
	0.5	27.4	82	126	>600	6.7
	1.0	27.2	78	126	>600	6.7
	1.5	27.1	79	127	>600	6.8
	2.0	26.8	60	147	>600	6.7

#### 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). Filamentous green algae formed a continuous film at the waters' edge.

#### 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 very much in line with historical catches at this site.

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

Species	Common name	Gill nets	Seine nets	Fyke nets	Bait traps	Dip net	Total Numbers caught
<i>Macquaria ambigua</i>	Yellowbelly	1		1			2
<i>Nematolosa erebi</i>	Bony Bream	2	26	5			33
<i>Retropinna semoni</i>	Smelt		37				37
<i>Hypseleotris klunzingeri</i>	Western Carp Gudgeon		22		1		23
<i>Melanotaenia fluviatilis</i>	Rainbowfish		4				4
<i>Cyprinus carpio</i>	Carp	1					1
<i>Gambusia holbrooki</i>	Mosquitofish		3				3
<b>Total Numbers</b>		<b>4</b>	<b>92</b>	<b>6</b>	<b>1</b>		<b>103</b>

The fishing techniques also captured two long-neck turtles (*Chelodina longicollis*).

### 3.1.4 Macroinvertebrates

Two habitats were sampled at St George. Surber samples were collected from rock (2) and mud/silt substrates (3). A dip net sample was collected from *Persicaria*. A total of 26 discrete (non-overlapping) taxa were identified, 14 from the surbers and 23 from the dip net (**Table 3-1.3**). The surber fauna was dominated by Chironominae and ceratopogonids while copepods, Chironominae, Baetidae and Atyidae (shrimps) dominated the dip net. Several taxa were captured by the dip net but not surbers. Bait traps also collected 17 *Macrobrachium* (Palaeomonidae, prawns) and they were present in the seine haul. One *Cherax* (Parastacidae, yabbies) was recorded in a fyke net.

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

	Edge surber		Macrophyte dip
	Mean	Stddev	
Acarina			2
Nematoda			1
Oligochaeta	2.0	2.3	2
Ancylidae			2
Planorbidae			1
Cladocera	0.4	0.5	6
Copepoda	1.0	1.4	528
Ostracoda	0.8	0.8	5
Isopoda	0.3	0.5	3
Atyidae	0.8	0.8	54
Elmidae			1
Hydrophilidae			2
Ceratopogonidae	15.0	6.4	28
Chironominae	32.2	35.1	135
Orthoclaadiinae			3
Tanypodinae	1.2	1.3	3
Culicidae	0.2	0.4	
Baetidae	1.6	1.1	83
Caenidae	0.6	1.3	1
Corixidae	1.2	1.3	
Veliidae			2
Aeschnidae			1
Coenagrionidae			2
Gomphidae	0.6	0.5	
Isostictidae			1
Leptoceridae			1
<b>Taxa</b>	<b>8.0</b>	<b>1.0</b>	<b>23</b>
<b>Abundance</b>	<b>58</b>	<b>35</b>	<b>867</b>
<b>Total taxa</b>	<b>14</b>		<b>26</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 was approximately 50m wide and of trapezoidal shape with parallel benches. The bed substrate is largely sand and the banks are mainly black clay. Site structure was almost identical to previous events but the water was very shallow, being less than 0.5m in other than a few spots on the western edge. There were no macrophytes but benthic filamentous green algae formed a solid fringe. A light scum covered the water surface.

Cattle had been accessing the water and pugging was very common along the western edge.

#### 3.2.1 Water quality

Overnight logging of water quality parameters was undertaken and minor variation was evident. Maxima tended to occur in the late afternoon or early evening and minima occurred in the early morning. The recorded ranges for each parameter were:

Temperature: 24.8 – 26.9°C

Dissolved oxygen: 74 - 82% sat, 5.9 – 6.6mg/l

pH: 7.5 – 7.8

Conductivity: 186 - 195µS/cm

Turbidity: >600NTU.

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

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

Sample Time	Depth (m)	Temp. (°C)	Dissolved Oxygen (%sat)	Conductivity (µS/cm)	Turbidity (NTU)	pH
0755	Surface	24.8	75	193	>600	7.8
	1.2	24.6	76	193	>600	7.8

#### 3.2.2 Macrophytes and algae

*Juncus* sp. was present on the edge. The fringe of benthic filamentous green algae was well developed.

#### 3.2.3 Fish

**Table 3-2.2** shows the fish catch by netting technique. All nets were set at this site. The seine net catch was very large so not all specimens were extracted. All species were extracted and what appeared to be a representative size range. Six native species and two introduced were recorded with the introduced species in relatively low numbers. Many of the fish were very small. Yellowbelly ranged from 49mm to 257mm and the Silver perch was 135mm long.

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

Species	Common name	Gill nets	Seine net (1)	Fyke nets	Bait traps	Dip net	Total Numbers caught
<i>Macquaria ambigua</i>	Yellowbelly	1	1		2		4
<i>Bidyanus bidyanus</i>	Silver perch		1				1
<i>Nematolosa erebi</i>	Bony Bream		55	15			70
<i>Hypseleotris klunzingeri</i>	Western Carp Gudgeon		16		1		17
<i>Melanotaenia fluviatilis</i>	Rainbowfish		2				2
<i>Retropinna semoni</i>	Smelt		48				48
<i>Cyprinus carpio</i>	Carp			1			1
<i>Gambusia holbrooki</i>	Mosquitofish		4				4
<b>Total Numbers</b>		<b>1</b>	<b>127</b>	<b>16</b>	<b>3</b>		<b>147</b>

### 3.2.4 Macroinvertebrates

Surber samples were collected from sand/gravel and silt substrates on different sides of the river. Sixteen discrete taxa were recorded at the site with Chironominae, ceratopogonids and corixids the most common (**Table 3-2.3**). Bait traps collected 41 *Macrobrachium* and five *Cherax*. The seine haul captured numerous *Macrobrachium*.

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

	Edge surber	
	Mean	Stddev
<b>Oligochaeta</b>	<b>1.8</b>	<b>1.6</b>
<b>Spaeriidae</b>	1.2	1.3
<b>Copepoda</b>	1.2	1.6
<b>Ostracoda</b>	1.3	1.9
<b>Atyidae</b>	3.0	1.2
<b>Dytiscidae</b>	0.4	0.5
<b>Elmidae</b>	0.2	0.4
<b>Ceratopogonidae</b>	24.8	12.9
<b>Chironominae</b>	35.8	24.1
<b>Tanypodinae</b>	7.6	2.7
<b>Muscidae</b>	0.2	0.4
<b>Caenidae</b>	5.2	6.3
<b>Baetidae</b>	1.0	1.7
<b>Corixidae</b>	24.8	15.4
<b>Gomphidae</b>	0.6	0.5
<b>Leptoceridae</b>	0.2	0.4
<b>Taxa</b>	<b>10.2</b>	<b>1.1</b>
<b>Abundance</b>	<b>109</b>	<b>23</b>
<b>Total taxa</b>		<b>16</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 water level was very low, so much so that a rock bar that is rarely exposed beyond the “beach” area was 15cm out of the water. There was no flow and surface scum was blown about by the wind.

#### 3.3.1 Water quality

Overnight logging was undertaken at this site. Little variation was evident. The recorded ranges for each parameter were:

Temperature: 25.0 – 27.8°C

Dissolved oxygen: 73 - 86% sat; 5.9 – 6.8mg/l

pH: 7.4 – 7.7

Conductivity: 148 - 155µS/cm

Turbidity: >600NTU.

#### 3.3.2 Macrophytes

*Juncus* occurred above the water line in small patches. The surface scum accumulated at the edge and on twigs when winds consistently pushed it in one direction. A few strands of *Ludwigia* occurred downstream of the boat entry point on the eastern side.

#### 3.3.3 Fish

All fishing nets were deployed at this site and the results are presented in **Table 3-3.1**. Six native species and two introduced were captured. The Murray Cod measured 65mm in length. Only one Yellowbelly was longer than 72mm.

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

Species	Common name	Gill nets	Seine net	Fyke nets	Bait traps	Dip net (0)	Total Numbers caught
<i>Mucullochella peelii peelii</i>	Murray Cod				1		1
<i>Macquaria ambigua</i>	Yellowbelly		3	6			9
<i>Nematolosa erebi</i>	Bony Bream	1	10	1	1		13
<i>Hypseleotris klunzingeri</i>	Western Carp Gudgeon		22				22
<i>Melanotaenia fluviatilis</i>	Rainbowfish		2				2
<i>Retropinna semoni</i>	Smelt		29				29
<i>Cyprinus carpio</i>	Carp	1					1
<i>Gambusia holbrooki</i>	Mosquitofish		4				4
<b>Total Numbers</b>		<b>2</b>	<b>70</b>	<b>7</b>	<b>2</b>		<b>81</b>

#### 3.3.4 Macroinvertebrates

Surber samples were collected from sandy silt and some samples included leaf litter and algae. Thirteen discrete taxa were identified. Corixids, ostracods, oligochaetes and tanypodids were the most common taxa in surber samples (**Table 3-3.2**). Fifty-three 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	
	Mean	Stddev
Oligochaeta	3.0	3.4
Sphaeriidae	1.0	0.0
Hyriidae	0.2	0.4
Copepoda	1.0	0.7
Ostracoda	1.2	1.1
Ceratopogonidae	51.2	25.1
Chironominae	10.4	5.2
Orthoclaadiinae	0.4	0.5
Tanypodinae	1.2	0.4
Tipulidae	0.2	0.4
Caenidae	1.2	0.4
Corixidae	3.8	2.5
Gomphidae	0.8	1.3
<b>Taxa</b>	<b>9.4</b>	<b>0.9</b>
<b>Abundance</b>	<b>76</b>	<b>25</b>
<b>Total taxa</b>		<b>13</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 site was very like it had been in November 2004, that is, it consisted of a series of very shallow isolated pools. All root habitat was exposed out of the water and there was very limited algal growth. There was no evidence of grazing or feral animals. Several recently germinated Noogoora Burr were present on the bed and banks.

#### 3.4.1 Water quality

Water quality was measured in the pool at the base of a large red gum. Depth was less than 30 cm so only a surface reading was taken. Results from spot water quality profiling are shown in **Table 3.4.1**.

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

Sample Time	Depth (m)	Temp. (°C)	Dissolved Oxygen (%sat)	Conductivity (µS/cm)	Turbidity (NTU)	pH
1330	Surface	31.9	92	320	>600	7.7

#### 3.4.2 Macrophytes

No macrophytes were present and algal development was very limited.

### 3.4.3 Fish

No gill or fyke nets were set as the water was too shallow. Five native fish and two introduced were recorded (**Table 3-4.2**). The seine haul was very large so not all specimens, particularly of Bony bream, were removed. The carp in this catch ranged from 132mm to 470mm in length. The Silver perch were 136 and 137mm long. Yellowbelly ranged between 87mm and 294mm in length.

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

Species	Common name	Gill nets	Seine net (1)	Fyke nets	Bait traps	Dip net	Total Numbers caught
<i>Macquaria ambigua</i>	Yellowbelly		8				8
<i>Bidyanus bidyanus</i>	Silver perch		2				2
<i>Nematolosa erebi</i>	Bony Bream		95				95
<i>Hypseleotris klunzingeri</i>	Western Carp Gudgeon		6				6
<i>Retropinna semoni</i>	Smelt		61				61
<i>Cyprinus carpio</i>	Carp		20		1		21
<i>Carassius auratus</i>	Goldfish		1				1
<b>Total Numbers</b>		<b>N/A</b>	<b>193</b>	<b>N/A</b>	<b>1</b>		<b>194</b>

### 3.4.4 Macroinvertebrates

Four surber samples were collected from coarse sand and one from silty sand. Leaf litter was present in some samples. Nineteen discrete taxa were recorded at the site with Cladocera, ceratopogonids and Chironominae being most common (**Table 3-4.3**). Bait traps captured 47 prawns and 6 yabbies and both were common in the seine haul.

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

	Edge surber	
	Mean	Stddev
Nematoda	0.6	0.5
Oligochaeta	3.8	3.2
Hyriidae	0.2	0.4
Cladocera	76.4	77.8
Copepoda	14.4	13.4
Ostracoda	0.2	0.4
Isopoda	0.2	0.4
Atyidae	2.0	1.2
Parastacidae	0.2	0.4
Ceratopogonidae	53.6	30.1
Chironominae	11.0	17.6
Tanypodinae	3.0	3.7
Culicidae	0.6	0.9
Baetidae	0.2	0.4
Caenidae	3.0	6.2

Corixidae	2.8	4.7
Gerridae	0.2	0.4
Zygoptera	0.4	0.9
Ecnomidae	0.2	0.4
<b>Taxa</b>	<b>10.2</b>	<b>2.9</b>
<b>Abundance</b>	<b>173</b>	<b>100</b>
<b>Total taxa</b>		<b>19</b>

### 3.5 Culgoa River at Cubbie

This site is about 1km below the Cubbie Weir. The western bank has only 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.

Water levels were very low and while the reach was continuous it terminated at the upstream and downstream bends. The deepest part reached over 1m but more commonly the depth peaked at about 0.5m. The river was up to 10m wide but more usually less than 5m. A minor benthic algal fringe was present and a surface scum covered about 15m at both ends of the reach.

No tracks or disturbance of the edge was observed but goat droppings were very common. Perhaps tracks should not be expected in such firm substrate.

#### 3.5.1 Water quality

Results from spot water quality profiling are shown in **Table 3-5.1**. The water column was well mixed, turbid and with low dissolved oxygen levels.

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

Sample Time	Depth (m)	Temp. (°C)	Dissolved Oxygen (%sat)	Conductivity (µS/cm)	Turbidity (NTU)	pH
1135	Surface	23.1	58	213	>600	7.3
	1.0	22.8	54	214	>600	7.3

#### 3.5.2 Macrophytes

No macrophytes or fringing aquatic plants were observed.

#### 3.5.3 Fish

All nets were set at the site. Four native species and two introduced were identified in a catch of 63 individuals (**Table 3-5.2**). Field staff believed they extracted two specimens of *Hypseleotris* sp. 4 from the seine net but they were not in the bucket when the fish were measured. Yellowbelly ranged from 108 to 435mm in length with all but one of those captured in the gill nets of legal size to keep if caught on a line.

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

Species	Common name	Gill nets	Seine net (2)	Fyke nets	Bait traps	Dip net	Total Numbers caught
<i>Macquaria ambigua</i>	Yellowbelly	10	1	2			13
<i>Nematolosa erebi</i>	Bony bream		6				6
<i>Retropinna semoni</i>	Smelt		21				21
<i>Melanotaenia fluviatilis</i>	Rainbowfish		1				1
<i>Cyprinus carpio</i>	Carp	1					1
<i>Gambusia holbrooki</i>	Mosquitofish		21				21
<b>Total Numbers</b>		<b>11</b>	<b>50</b>	<b>2</b>	<b>0</b>		<b>63</b>

### 3.5.4 Macroinvertebrates

Surber samples were collected from both soft and compact clay and included bath-tub ring alga and leaf litter when present. No dip net samples were collected. Sixteen taxa were identified from the edge habitat (**Table 3-5.3**). The most common elements were ceratopogonids and nematodes. Bait traps collected 19 *Macrobrachium* and one *Cherax*. A small number of prawns were also captured in the seine haul.

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

	Edge surber	
	Mean	Stdev
<b>Nematoda</b>	26.6	6.9
<b>Oligochaeta</b>	2.0	2.1
<b>Ancylidae</b>	0.4	0.9
<b>Cladocera</b>	0.6	0.9
<b>Copepoda</b>	2.8	3.0
<b>Ostracoda</b>	0.2	0.4
<b>Atyidae</b>	2.0	1.6
<b>Ceratopogonidae</b>	26.8	14.1
<b>Chironominae</b>	5.6	4.3
<b>Tanypodinae</b>	1.6	0.5
<b>Culicidae</b>	0.2	0.4
<b>Caenidae</b>	4.2	5.4
<b>Corixidae</b>	0.4	0.5
<b>Gomphidae</b>	0.2	0.4
<b>Zygoptera</b>	0.2	0.4
<b>Ecnomidae</b>	0.2	0.4
<b>Taxa</b>	<b>9.0</b>	<b>2.3</b>
<b>Abundance</b>	<b>74</b>	<b>30</b>
<b>Total taxa</b>		<b>16</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 single long, shallow (generally <0.5m) pool. There were no macrophytes and fringing benthic algae was sparse. Pig tracks were common.

#### 3.6.1 Water quality

Results from spot water quality profiling are shown in **Table 3-6.1**. Thermal stratification was evident and a dissolved oxygen gradient existed.

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

Sample Time	Depth (m)	Temp. (°C)	Dissolved Oxygen (%sat)	Conductivity (µS/cm)	Turbidity (NTU)	pH
1500	Surface	28.8	100	260	>600	7.9
	1.0	22.8	76	260	>600	7.6

#### 3.6.2 Macrophytes

No macrophytes or fringing aquatic plants were noted.

#### 3.6.3 Fish

Two gill nets could not be set due to the shallow water. The effectiveness of one fyke net was reduced because a string holding open the first non-return cone broke. Five native fish species plus two introduced were captured (**Table 3-6.2**).

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

Species	Common name	Gill nets (2)	Seine net (2)	Fyke nets	Bait traps	Dip net	Total Numbers caught
<i>Macquaria ambigua</i>	Yellowbelly			1	1		2
<i>Nematolosa erebi</i>	Bony Bream		12	7			19
<i>Retropinna semoni</i>	Smelt		2				2
<i>Hypseleotris klunzingeri</i>	Western Carp Gudgeon		2				2
<i>Neosilurus hyrtlilii</i>	Hyrtl's tandan			1			1
<i>Carassius auratus</i>	Goldfish			8			8
<i>Gambusia holbrooki</i>	Mosquitofish		9				9
<b>Total Numbers</b>		<b>0</b>	<b>25</b>	<b>17</b>			<b>43</b>

#### 3.6.4 Macroinvertebrates

No specialised habitats were available for sampling. Surber samples were collected from compact clay/silt (3) or loose silt (2). Seventeen taxa were identified with ceratopogonids and caenids most common (**Table 3-6.3**). Forty-six prawns and 19 yabbies were captured in bait traps and they were also common in fyke and seine nets.

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

	Edge surber	
	Mean	Stddev
<b>Acarina</b>	0.2	0.4
<b>Nematoda</b>	1.0	0.7
<b>Oligochaeta</b>	3.0	3.1
<b>Ancylidae</b>	0.2	0.4
<b>Cladocera</b>	57.6	54.4
<b>Copepoda</b>	5.4	5.8
<b>Ostracoda</b>	1.2	0.8
<b>Atyidae</b>	0.8	0.4
<b>Ceratopogonidae</b>	74.8	73.7
<b>Chironominae</b>	7.4	1.1
<b>Tanypodinae</b>	6.0	2.1
<b>Tipulidae</b>	0.2	0.4
<b>Baetidae</b>	0.2	0.4
<b>Caenidae</b>	9.8	11.8
<b>Corixidae</b>	5.8	11.1
<b>Ecnomidae</b>	0.8	1.1
<b>Leptoceridae</b>	0.4	0.5
<b>Taxa</b>	<b>10.4</b>	<b>2.9</b>
<b>Abundance</b>	<b>175</b>	<b>86</b>
<b>Total taxa</b>		<b>17</b>

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

The only water present at this site consisted of two remnant pools about 80m downstream from the normal sampling location. The pool sampled was about 60m x 5m and about 30cm deep. Pig and roo tracks were observed but the edge was relatively undisturbed. A strong green scum was present over most of the pool surface but no benthic alga was observed.

#### **3.7.1 Water quality**

No water quality data was collected.

#### **3.7.2 Macrophytes**

No macrophytes or algal fringe were visible but a surface scum covered most of the pool.

#### **3.7.3 Fish**

Seine netting was the only possible sampling technique at this site but snags affected the efficiency such that only two short hauls were collected. Five native species and two introduced were recorded (**Table 3-7.1**). Some of the fish captured were large,

for example one Yellowbelly measured 300mm while the carp measured 238mm. The fish were in a healthy condition.

■ **Table 3-7.1 Results of fishing the Culgoa River at Balandool in May 2005, by fishing method**

Species	Common name	Gill nets	Seine net (2)	Fyke nets	Bait traps	Dip net	Total Numbers caught
<i>Macquaria ambigua</i>	Yellowbelly		2				2
<i>Nematolosa erebi</i>	Bony Bream		12				12
<i>Retropinna semoni</i>	Smelt		1				1
<i>Melanotaenia fluviatilis</i>	Rainbowfish		6				6
<i>Hypseleotris klunzingeri</i>	Western Carp Gudgeon		1				1
<i>Cyprinus carpio</i>	Carp		1				1
<i>Gambusia holbrooki</i>	Mosquitofish		2				2
<b>Total Numbers</b>		<b>N/A</b>	<b>25</b>	<b>N/A</b>	<b>N/A</b>		<b>25</b>

### 3.7.4 Macroinvertebrates

Surber samples were collected from compact mud substrate with a soft surface layer. Ten taxa were recorded (**Table 3-7.2**). Ceratopogonids and oligochaetes were most common but none were abundant. *Macrobrachium* were common in the seine hauls and several large yabbies were also collected.

■ **Table 3-7.2 Numbers of aquatic macroinvertebrates recorded from the Culgoa River at Balandool.**

	Edge surber	
	Mean	Stddev
<b>Oligochaeta</b>	5.8	1.9
<b>Ostracoda</b>	0.2	0.4
<b>Copepoda</b>	1.0	1.2
<b>Cladocera</b>	0.2	0.4
<b>Atyidae</b>	1.2	0.8
<b>Ceratopogonidae</b>	18.6	16.1
<b>Chironominae</b>	2.6	2.2
<b>Tanypodinae</b>	1.6	0.9
<b>Caenidae</b>	1.4	1.1
<b>Corixidae</b>	0.4	0.5
<b>Taxa</b>	<b>7.0</b>	<b>0.7</b>
<b>Abundance</b>	<b>33</b>	<b>19</b>
<b>Total taxa</b>		<b>10</b>

### 3.8 Balonne Minor River at Meigunyah

The mouth of Middle Creek marks the downstream end of a significant pool. At this point the Balonne Minor constricts and flows through a well-treed shallow section with more sand and gravel than the pool upstream. The water level was very low, similar to November 2004. A number of rings of leaf litter at the downstream end testified to the slow drying of the pool. Only a limited algal fringe and surface scum was present and while many snags were exposed, there were still many covered by water. A fire had occurred recently over about 100m<sup>2</sup> of the riparian zone on the Meigunyah (eastern) side and it appeared to have started from a lightning strike. The waters' edge was relatively undisturbed except for a single set of pig tracks.

#### 3.8.1 Water quality

Spot water quality readings were taken near the tarzan swing (**Table 3-8.1**) and the logger was set here overnight. Mild stratification was evident within 0.5m of the surface.

■ **Table 3-8.1 Spot water quality readings – Balonne Minor at Meigunyah**

Sample Time	Depth (m)	Temp. (°C)	Dissolved Oxygen (%sat)	Conductivity (µS/cm)	Turbidity (NTU)	pH
1530	Surface	28.6	79	172	>600	7.0
	0.5	24.6	60	167	>600	6.8
	1.0	24.1	62	168	>600	6.8

The ranges recorded overnight for each parameter were:

Temperature: 23.8 – 27.8°C

Dissolved oxygen: 46 - 86% sat, 3.8 – 6.8mg/l

pH: 6.9 – 7.7

Conductivity: 148 - 174µS/cm

Turbidity: >600 NTU.

#### 3.8.2 Macrophytes

No macrophytes or algae were present.

#### 3.8.3 Fish

All nets were used at this site. Eight native species and one introduced were identified from a total of 122 fish (**Table 3-8.2**). This is an excellent species complement though many of the species were represented by low numbers of individuals. Yellowbelly ranged from 145mm to 308mm and the Silver perch was 188mm long.

■ **Table 3-8.2 Results of fishing the Balonne Minor River at Meigunyah in May 2005, by fishing method**

Species	Common name	Gill nets	Seine net	Fyke nets	Bait traps	Dip net	Total Numbers caught
<i>Macquaria ambigua</i>	Yellowbelly	4		1			5
<i>Bidyanus bidyanus</i>	Silver perch	1					1
<i>Leiopotherapon unicolor</i>	Spangled perch		2				2
<i>Nematolosa erebi</i>	Bony Bream		56				56
<i>Hypseleotris klunzingeri</i>	Western Carp Gudgeon		47				47
<i>Retropinna semoni</i>	Smelt		2				2
<i>Melanotaenia fluviatilis</i>	Rainbowfish		1				1
<i>Neosilurus hyrtlilii</i>	Hyrtl's tandan			2			2
<i>Cyprinus carpio</i>	Carp	1		5			6
<b>Total Numbers</b>		<b>6</b>	<b>108</b>	<b>8</b>	<b>0</b>		<b>122</b>

### 3.8.4 Macroinvertebrates

Surber samples were collected from coarse sand (2), silty sand (2) and silt (1). Eighteen taxa were recorded (**Table 3-8.3**). The most common elements were Chironominae, ceratopogonids and copepods. Bait traps collected 46 prawns and 1 yabby. Prawns were highly abundant in the seine haul.

■ **Table 3-8.3 Numbers of aquatic macroinvertebrates recorded from the Balonne Minor at Meigunyah**

	Edge surber	
	Mean	Stddev
<b>Nematoda</b>	0.2	0.4
<b>Oligochaeta</b>	1.6	1.5
<b>Sphaeriidae</b>	0.2	0.4
<b>Ancylidae</b>	0.8	1.3
<b>Cladocera</b>	1.2	2.2
<b>Copepoda</b>	5.8	6.3
<b>Ostracoda</b>	3.0	3.7
<b>Atyidae</b>	1.2	0.8
<b>Parastacidae</b>	0.2	0.4
<b>Ceratopogonidae</b>	14.0	7.2
<b>Chironominae</b>	19.4	10.9
<b>Orthoclaadiinae</b>	0.6	0.9
<b>Tanypodinae</b>	3.2	2.5
<b>Baetidae</b>	0.2	0.4
<b>Caenidae</b>	1.8	1.9
<b>Corixidae</b>	0.4	0.5
<b>Notonectidae</b>	0.4	0.9
<b>Leptoceridae</b>	0.4	0.9

<b>Taxa</b>	<b>9.4</b>	<b>1.9</b>
<b>Abundance</b>	<b>55</b>	<b>21</b>
<b>Total taxa</b>		<b>18</b>

### 3.9 Balonne Minor at Trafalgar

This site is at the upper end of the weir pool. The water level was similar to that recorded in November, that is, it was very low. Many snags and tree trunks were submerged but all lignum and roots of riparian trees were exposed. No surface scum was observed but a large volume of wattle flowers were on the water surface. Fringing benthic algal growth was minor. There was little disturbance of the edge though goat droppings were common.

#### 3.9.1 Water quality

Spot readings are shown in **Table 3-9.1**. Turbidity readings indicate the suspended sediment is settling and the low dissolved oxygen readings indicate algal productivity may be significant in surface waters.

■ **Table 3-9.1 Spot water quality readings – Balonne Minor at Trafalgar**

Sample Time	Depth (m)	Temp. (°C)	Dissolved Oxygen (%sat)	Conductivity (µS/cm)	Turbidity (NTU)	pH
1030	Surface	23.3	58	395	270	8.2
	0.5	22.0	48	393	420	8.3
	1.0	22.1	47	392	>600	8.2

#### 3.9.2 Macrophytes

No macrophytes were observed and benthic filamentous algae were poorly developed.

#### 3.9.3 Fish

All nets were used at this site. Four native species and two introduced were captured (**Table 3-9.2**). Yellowbelly captured ranged from 105 to 423mm. Bony bream in the gill nets were generally around 220-230mm while those in the fyke and seine were mainly in the 50 to 85mm range. A long neck turtle (*Chelodina longicollis*) was captured in a gill net and four were captured in a fyke net.

■ **Table 3-9.2 Results of fishing the Balonne Minor at Trafalgar in May 2005.**

Species	Common name	Gill	Seine	Fyke nets	Bait traps	Dip	Total Numbers
<i>Macquaria ambigua</i>	Yellowbelly	9		2	2		13
<i>Leiopotherapon unicolor</i>	Spangled perch			4			4
<i>Nematolosa erebi</i>	Bony Bream	19	80	32			131
<i>Neosilurus hyrtlilii</i>	Hyrtl's tandan			4			4
<i>Cyprinus carpio</i>	Carp	2			1		3
<i>Gambusia holbrooki</i>	Mosquitofish		11				11
<b>Total Numbers</b>		<b>30</b>	<b>91</b>	<b>42</b>	<b>3</b>		<b>166</b>

### 3.9.4 Macroinvertebrates

Five surbers were collected from areas of soft silt with some filamentous algae and occasional leaf litter. Eighteen taxa were recorded with common taxa including nematodes, copepods and ostracods (Table 3-9.3). Thirty-one prawns and two yabbies were captured in bait traps.

■ **Table 3-9.3 Numbers of aquatic macroinvertebrates recorded from the Balonne Minor at Trafalgar.**

	Edge surber	
	Mean	Stddev
<b>Nematoda</b>	26.8	14.7
<b>Oligochaeta</b>	4.0	2.0
<b>Cladocera</b>	0.4	0.5
<b>Copepoda</b>	12.4	16.1
<b>Ostracoda</b>	11.8	15.9
<b>Atyidae</b>	0.2	0.4
<b>Parastacidae</b>	0.2	0.4
<b>Dytiscidae</b>	0.2	0.4
<b>Ceratopogonidae</b>	8.8	8.8
<b>Chironominae</b>	5.4	2.3
<b>Orthoclaadiinae</b>	0.8	1.8
<b>Tanypodinae</b>	2.8	1.9
<b>Culicidae</b>	0.2	0.4
<b>Tipulidae</b>	0.8	0.8
<b>Caenidae</b>	0.2	0.4
<b>Corixidae</b>	1.8	1.8
<b>Gerridae</b>	0.2	0.4
<b>Leptoceridae</b>	0.2	0.4
<b>Taxa</b>	<b>9.6</b>	<b>1.1</b>
<b>Abundance</b>	<b>77</b>	<b>38</b>
<b>Total taxa</b>		<b>18</b>

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

The water level was very low such that the river consisted of a series of disconnected pools. Two pools were sampled, a deep pool on a tight meander bend and a shallow pool some 50m downstream. The deep pool measured 50m x 5-15m and was up to 1.5m deep while the other pool was about 50m x 4m x 0.3m. The outer edge of the meander was very steep with little vegetation while the inner edge was well treed. Fishers and campers had frequented the deep pool and significant litter was scattered about. The downstream pool was far less disturbed, with only kangaroo, emu and dog tracks near the edge. The riparian zone was in reasonable condition here on both sides.

#### 3.10.1 Water quality

The water quality meter was suspended from a stake about 1m from the edge and near the bottom in shallow water. The ranges recorded overnight for each parameter were:

Temperature: 20.6 – 24.8°C

Dissolved oxygen: 58 - 97% sat; 5.2 – 8.1mg/l

pH: 7.9 – 8.5

Conductivity: 228 - 236µS/cm

Turbidity: >600 NTU.

#### 3.10.2 Macrophytes

Patchy sedges occurred above the water line but there were no macrophytes.

#### 3.10.3 Fish

Two gill nets could not be set because of the small area of the pool with suitable depth but all other nets were set. Seine netting was conducted in the downstream pool. Six native species and three introduced were captured (**Table 3-10.1**). The Murray Cod measured 300mm in length while Yellowbelly ranged from 81mm to 411mm, Bony bream from 36mm to 235mm, Hyrtl's tandan from 118mm to 179mm (with most in a much smaller range around 150mm) and Carp from 106mm to 203mm.

■ **Table 3-10.1 Results of fishing at Donegri Creek in May 2005, by fishing method**

Species	Common name	Gill nets (2)	Seine net	Fyke nets	Bait traps	Dip net	Total Numbers caught
<i>Maccullochella peeli peeli</i>	Murray Cod	1					1
<i>Macquaria ambigua</i>	Yellowbelly	3	2				5
<i>Nematolosa erebi</i>	Bony Bream	2	206	1			209
<i>Leiopotherapon unicolor</i>	Spangled perch		2				2
<i>Neosilurus hyrtlil</i>	Hyrtl's tandan			19			19
<i>Melanotaenia fluviatilis</i>	Rainbowfish		2				2
<i>Cyprinus carpio</i>	Common Carp		17		5		22
<i>Carrasius auratus</i>	Goldfish		1				1
<i>Gambusia holbrooki</i>	Mosquitofish		3				3
<b>Total Numbers</b>		<b>6</b>	<b>233</b>	<b>20</b>	<b>5</b>		<b>264</b>

### 3.10.4 Macroinvertebrates

Surbers were collected from the downstream pool because it had the least disturbed edge. The substrate was silty sand with leaf litter and some algae. Eleven taxa were recorded with the most common being ceratopogonids, copepods and Chironominae (Table 3-10.2). Bait traps captured 11 prawns and one yabby. Both were also common in the seine haul and yabbies were captured in a fyke net.

■ Table 3-10.2 Numbers of aquatic macroinvertebrates recorded from Donegri Creek (Narran River)

	Edge Surber	
	Mean	Stdev
<b>Oligochaeta</b>	0.4	0.5
<b>Spaeriidae</b>	1.0	1.7
<b>Cladocera</b>	1.4	3.1
<b>Copepoda</b>	50.4	60.0
<b>Parastacidae</b>	0.2	0.4
<b>Ceratopogonidae</b>	57.6	31.3
<b>Chironominae</b>	11.0	14.0
<b>Tanypodinae</b>	0.2	0.4
<b>Tipulidae</b>	0.4	0.8
<b>Corixidae</b>	1.0	1.0
<b>Leptoceridae</b>	0.2	0.4
<b>Taxa</b>	<b>5.6</b>	<b>0.9</b>
<b>Abundance</b>	<b>124</b>	<b>101</b>
<b>Total taxa</b>		<b>11</b>

### 3.11 Narran River at Clyde

This site consisted of two elongate shallow pools separated by a sediment mound derived from an erosion gully. Each pool was about 60m x 5m x 0.3m. There were no macrophytes and a very limited filamentous algal ring. Cattle were accessing the water at the time of sampling and had caused severe pugging of the edge and deposited significant amounts of dung.

#### 3.11.1 Water quality

The results of spot measurements are shown in Table 3-11.1. The water depth only allowed a surface reading.

■ 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
1330	Surface	23.5	68	409	>600	7.9

### 3.11.2 Macrophytes

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

### 3.11.3 Fish

Only the seine net could be used at this site and the catch comprised of four native species and two introduced (**Table 3-11.2**). Unlike the site at nearby Clyde Lagoon this riverine site did receive some flow in December 2004 hence the increase in species complement compared to the November sample may actually reflect recolonisation though given the low numbers of some of the species captured it may simply reflect the interaction between sampling intensity and species rarity.

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

Species	Common name	Gill nets	Seine net (2)	Fyke nets	Bait traps	Dip net	Total Numbers caught
<i>Macquaria ambigua</i>	Yellowbelly		2				2
<i>Nematolosa erebi</i>	Bony Bream		64				64
<i>Melanotaenia fluviatilis</i>	Rainbowfish		1				1
<i>Neosilurus hyrtlil</i>	Hyrtl's tandan		1				1
<i>Cyprinus carpio</i>	Carp		2				2
<i>Carrasius auratus</i>	Goldfish		1				1
<i>Gambusia holbrooki</i>	Mosquitofish		1				1
<b>Total Numbers</b>		<b>N/A</b>	<b>72</b>	<b>N/A</b>	<b>N/A</b>		<b>72</b>

### 3.11.4 Macroinvertebrates

No specialised habitats were available to sample at this site. Three surbers were collected from firm undisturbed clay in an area protected by tree roots and two were collected from soft, pugged silt. Thirteen discrete taxa were recorded with ceratopogonids and copepods most common (**Table 3-11.3**). Several *Cherax* were captured in each seine haul.

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

	Edge Surber	
	Mean	Stdev
<b>Nematoda</b>	0.6	0.9
<b>Oligochaeta</b>	3.6	4.2
<b>Cladocera</b>	0.8	1.1
<b>Copepoda</b>	12.4	6.7
<b>Ostracoda</b>	0.8	1.8
<b>Atyidae</b>	2.0	1.6
<b>Parastacidae</b>	0.2	0.4
<b>Ceratopogonidae</b>	35.8	34.5
<b>Chironominae</b>	2.4	2.3
<b>Tanypodinae</b>	0.6	0.9

<b>Culicidae</b>	0.2	0.4
<b>Tipulidae</b>	0.2	0.4
<b>Gerridae</b>	0.6	1.3
<b>Taxa</b>	<b>6.6</b>	<b>1.8</b>
<b>Abundance</b>	<b>60</b>	<b>36</b>
<b>Total Taxa</b>		<b>13</b>

### 3.12 Narran River at Booligar

The water level was very low, similar to November 2004, and only the main pool and a smaller one about 60m upstream remained. The main pool was approximately 30m x 15m x > 1.0m deep in parts. The upstream pool was just a small remnant. No macrophytes or filamentous algal fringe were noted though the water had a green tinge near the edge. No snags were observed in the water. There had been no recent cattle access and there was no evidence of other animals using the pool.

#### 3.12.1 Water quality

Spot water quality readings were collected from the upper end of the main pool at the site used for logging (**Table 3-12.1**). Little stratification was evident but overnight logging showed major variation in dissolved oxygen.

■ **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
1000	Surface	24.8	68	319	>600	8.2
	1.0	23.4	56	315	>600	8.0

The ranges recorded overnight for each parameter were:

Temperature: 23.0 – 26.1 °C

Dissolved oxygen: 38 – 95% sat; 3.2 – 7.8mg/l

pH: 7.9 – 8.4

Conductivity: 310 - 321µS/cm

Turbidity: >600 NTU.

#### 3.12.2 Macrophytes

No macrophytes or filamentous alga were observed.

#### 3.12.3 Fish

Gill nets and one fyke net were not set due to the lack of deep water. Five native species and two introduced were captured (**Table 3-12.2**). The tandan were between 148mm and 162mm. The Yellowbelly in the seine haul measured 380mm and the Bony bream all exceeded 104mm.

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

Species	Common name	Gill nets	Seine net (2)	Fyke nets (1)	Bait traps	Dip net	Total Numbers caught
<i>Macquaria ambigua</i>	Yellowbelly		1	1			2
<i>Nematolosa erebi</i>	Bony Bream		4				4
<i>Leiopotherapon unicolor</i>	Spangled Perch		2				2
<i>Neosilurus hyrtlii</i>	Hyrtl's tandan			5			5
<i>Retropinna semoni</i>	Smelt		3				3
<i>Cyprinus carpio</i>	Carp			4			4
<i>Gambusia holbrooki</i>	Mosquitofish		3				3
<b>Total Numbers</b>		<b>NA</b>	<b>13</b>	<b>10</b>	<b>0</b>		<b>23</b>

### 3.12.4 Macroinvertebrates

All surbers were collected from the lower end of the pool from red sandy silt substrate that was at times firm but otherwise very soft. No dip nets were collected due to lack of habitat. Fifteen taxa were recorded. The fauna was dominated by ceratopogonids and ostracods (**Table 3-12.3**). Bait traps collected 36 prawns and 3 yabbies.

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

	Edge surber	
	Mean	Stddev
<b>Nematoda</b>	2.4	2.1
<b>Oligochaeta</b>	1.8	1.5
<b>Ancyliidae</b>	0.6	1.3
<b>Cladocera</b>	4.8	10.7
<b>Copepoda</b>	7.6	8.8
<b>Ostracoda</b>	25.0	42.4
<b>Atyidae</b>	0.6	0.9
<b>Ceratopogonidae</b>	68.4	40.3
<b>Chironominae</b>	8.2	6.3
<b>Orthoclaadiinae</b>	0.2	0.4
<b>Tanypodinae</b>	5.0	4.8
<b>Culicidae</b>	0.4	0.9
<b>Caenidae</b>	0.6	0.9
<b>Corixidae</b>	1.0	1.2
<b>Leptoceridae</b>	0.2	0.4
<b>Taxa</b>	<b>8.6</b>	<b>1.7</b>
<b>Abundance</b>	<b>127</b>	<b>82</b>
<b>Total taxa</b>		<b>15</b>

### 3.13 Balandool River at Cubbie

The usual site was dry but a site several kilometres upstream that had previously been noted as more permanent, still held water so was sampled. 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 substrate was very soft and pigs and kangaroos had been sinking in it as they approached the water. The pool was about 8m wide and at least 100m long, continuing upstream past the fallen tea tree. Depth did not exceed 30cm. Benthic algae were not observed.

#### 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**.

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

Sample Time	Depth (m)	Temp. (°C)	Dissolved Oxygen (%sat)	Conductivity (µS/cm)	Turbidity (NTU)	pH
1600	Surface	30.2	68	416	>600	7.7

#### 3.13.2 Macrophytes and algae

No macrophytes or algae were observed.

#### 3.13.3 Fish

Only seine netting could be conducted due to the depth. Four native species and three introduced were recorded from two hauls that covered much of the pool downstream of the tea tree (**Table 3-13.2**). The Yellowbelly measured between 276 and 325mm and two had small tail ulcers. Bony bream ranged between 41 and 140mm while the Carp, Goldfish and Spangled perch were all between 119 and 168mm.

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

Species	Common name	Gill nets	Seine net (2)	Fyke nets	Bait traps	Dip net	Total Numbers caught
<i>Macquaria ambigua</i>	Yellowbelly		3				3
<i>Leiopotherapon unicolor</i>	Spangled perch		1				1
<i>Nematolosa erebi</i>	Bony Bream		13				13
<i>Melanotaenia fluviatilis</i>	Rainbowfish		2				2
<i>Cyprinus carpio</i>	Carp		1				1
<i>Carrasius auratus</i>	Goldfish		6				6
<i>Gambusia holbrooki</i>	Mosquitofish		27				27
<b>Total Numbers</b>		<b>NA</b>	<b>53</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>53</b>

### 3.13.4 Macroinvertebrates

Surber samples were collected from soft mud substrate with little or no algae or leaf litter. Eleven taxa were recorded with copepods and ceratopogonids dominating the catch (Table 3-13.3). The seine hauls collected numerous prawns and yabbies.

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

	Edge surber	
	Mean	Stddev
<b>Nematoda</b>	1.0	1.4
<b>Oligochaeta</b>	0.8	1.3
<b>Cladocera</b>	6.0	8.0
<b>Copepoda</b>	60.0	80.0
<b>Ceratopogonidae</b>	35.4	24.6
<b>Chironominae</b>	1.8	0.8
<b>Tanypodinae</b>	2.8	2.7
<b>Culicidae</b>	0.4	0.5
<b>Tipulidae</b>	0.4	0.9
<b>Corixidae</b>	8.6	8.0
<b>Leptoceridae</b>	0.2	0.4
<b>Taxa</b>	<b>7.4</b>	<b>1.1</b>
<b>Abundance</b>	<b>117</b>	<b>41</b>
<b>Total taxa</b>		<b>11</b>

### 3.14 Balandool River at Euraba

This site was also dry and was not sampled.

### 3.15 Bokhara River at Kirrima

This site is another intermittent waterway. The site sampled was immediately upstream of the weir, matching the location sampled on recent occasions. The river was dry downstream of the weir. One small pool remained immediately upstream of the weir and measured approximately 15m x 6m by up to 0.5m deep, though sections of the latter were rare. The pool had a few small snags and recent twig and leaf litter. Half of the pool surface was covered in a green algal scum. Pig, kangaroo and wader tracks were common.

#### 3.15.1 Water quality

Spot water quality measurements were taken at the centre of the pool (**Table 3-15.1**).

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

Sample time	Depth (m)	Temp. (°C)	Dissolved Oxygen (%sat)	Conductivity (µS/cm)	Turbidity (NTU)	pH
1650	Surface	27.6	62	277	>600	7.7

#### 3.15.2 Macrophytes

No macrophytes were observed and the benthic algal fringe was poorly developed.

#### 3.15.3 Fish

Only the seine net could be used at this site and it captured two native species and two introduced (**Table 3-15.2**). The haul covered nearly 40% of the pool. The Yellowbelly measured 56 and 64mm while the Carp measured 187mm. Bony bream ranged from 54 to 111mm in length.

■ **Table 3-15.2 Results of fishing the Bokhara River at Kirrima in May 2005.**

Species	Common name	Gill nets	Seine net	Fyke nets	Bait traps	Dip net	Total Numbers caught
<i>Macquaria ambigua</i>	Yellowbelly		2				2
<i>Nematolosa erebi</i>	Bony Bream		12				12
<i>Cyprinus carpio</i>	Carp		1				1
<i>Gambusia holbrooki</i>	Mosquitofish		46				46
<b>Total Numbers</b>		<b>NA</b>	<b>61</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>61</b>

#### 3.15.4 Macroinvertebrates

Surber samples were collected from a substrate of compact clay with a thin soft surface layer. No habitat was available for dip net sampling. Ten taxa were captured with the most common being copepods and ceratopogonids (**Table 3-15.3**). Prawns and yabbies were abundant in the seine haul.

■ Table 3-15.3 Numbers of aquatic macroinvertebrates recorded from the Bokhara River at Kirrima

	Edge surber	
	Mean	Stddev
<b>Nematoda</b>	0.4	0.5
<b>Oligochaeta</b>	5.0	5.1
<b>Cladocera</b>	3.4	3.2
<b>Copepoda</b>	26.6	15.1
<b>Ostracoda</b>	4.6	2.5
<b>Ceratopogonidae</b>	20.0	8.6
<b>Chironominae</b>	9.6	2.5
<b>Tanypodinae</b>	8.4	7.6
<b>Tipulidae</b>	0.4	0.5
<b>Corixidae</b>	2.0	2.3
<b>Taxa</b>	<b>8.4</b>	<b>0.5</b>
<b>Abundance</b>	<b>80</b>	<b>27</b>
<b>Total taxa</b>		<b>10</b>

### 3.16 Bokhara River at Koala

The site is basically a long and near-permanent pool that has continued to contract. While still continuous from the bridge it was a maximum of 8m wide and rarely reached 0.5m in depth. *Ludwigia* and *Azolla* lined 90% of the eastern bank, reaching up to 4m into the pool. There was no *Ludwigia* on the western bank but *Azolla* lined 90% of this bank. Benthic filamentous alga was uncommon. Cattle were accessing the water and walking across the river. Pugging along the edge was very common and led to breaking of stems of *Ludwigia*. Though the banks are very gently sloped, small sediment mounds were obvious in the river at the base of short surface run-off scalds.

#### 3.16.1 Water quality

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

Temperature: 23.0 – 27.1°C

Dissolved oxygen: 54 - 97% sat; 4.6 – 7.7mg/l

pH: 7.9 – 8.3

Conductivity: 361 - 369µS/cm

Turbidity: 279 - 592 NTU.

The range of turbidity values is surprising, and given that fluctuations of 217NTU occurred over just 15 minute intervals in the early evening but turbidity settled during the night to around 300NTU, the result may indicate the effect of cattle at the edge of the waterbody or crossing the shallow lagoon near the probe.

#### 3.16.2 Macrophytes

*Ludwigia* and *Azolla* were significant.

### 3.16.3 Fish

All nets were used at this site and captured three native species plus three introduced (Table 3-16.1). The seine net encountered a lot of alga that rolled in mud so extraction of fish may not have been complete. A long-necked turtle (*Chelodina longicollis*) was captured in a fyke net.

■ Table 3-16.1 Results of fishing the Bokhara River at Koala in May 2005.

Species	Common name	Gill nets	Seine net	Fyke nets	Bait traps	Dip net	Total Numbers caught
<i>Macquaria ambigua</i>	Yellowbelly	4	2				6
<i>Nematolosa erebi</i>	Bony Bream	14	13	32			59
<i>Hypseleotris klunzingeri</i>	Carp gudgeon		6				6
<i>Cyprinus carpio</i>	Carp	2					2
<i>Carrasius auratus</i>	Goldfish		1				1
<i>Gambusia holbrooki</i>	Mosquitofish		72				72
<b>Total Numbers</b>		<b>20</b>	<b>94</b>	<b>32</b>	<b>0</b>		<b>146</b>

### 3.16.4 Macroinvertebrates

Surber samples were collected from soft silt substrate and usually included some *Ludwigia* and *Azolla*. A dip net sample was collected from a mixture of *Ludwigia* and *Azolla*. Twenty taxa were recorded, 14 from the surbers and 18 from the dip net. The dominant taxa in surbers were ceratopogonids and nematodes (Table 3-16.2) while the dip nets recorded more hemipterans, dragonflies and baetid mayflies. Bait traps captured 123 prawns and three *Cherax* and small specimens of the latter were also abundant in the seine haul.

■ Table 3-16.2 Numbers of aquatic macroinvertebrates recorded from Bokhara River at Koala in May 2005

	Edge surber		Macrophyte dip net
	Mean	Stddev	
<b>Nematoda</b>	33.6	46.7	1
<b>Oligochaeta</b>	3.4	3.0	1
<b>Planobidae</b>	0.2	0.4	7
<b>Cladocera</b>	0.4	0.5	1
<b>Copepoda</b>	0.2	0.4	2
<b>Ostracoda</b>	1.8	1.6	40
<b>Atyidae</b>	0.8	0.8	37
<b>Dytiscidae</b>			1
<b>Ceratopogonidae</b>	67.4	71.4	32
<b>Chironominae</b>	3.6	1.1	1
<b>Tanypodinae</b>	5.6	5.5	7
<b>Tipulidae</b>	0.2	0.4	1
<b>Baetidae</b>			2
<b>Caenidae</b>	0.2	0.4	1

<b>Corixidae</b>	6.6	8.9	
<b>Mesoveliidae</b>			1
<b>Naucoridae</b>			1
<b>Notonectidae</b>			3
<b>Coenagrionidae</b>			17
<b>Libellulidae</b>	0.2	0.4	
<b>Taxa</b>	<b>7.8</b>	<b>3.0</b>	<b>18</b>
<b>Abundance</b>	<b>124</b>	<b>85</b>	<b>156</b>
<b>Total taxa</b>	<b>14</b>		<b>20</b>

### **3.17 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 as shallow or shallower than when sampled the previous November such that the boat needed to be pushed through the mid-section of the site. The sand/gravel substrate contained low quantities of silt but significant amount of leaf litter. Most tree root habitat was exposed and the smaller roots on the vertical eastern bank were being undermined for the 0.5m depth that could be seen. Recently germinated Noogoora burr was common on the banks and bench while eucalypt seedlings to 2m high were common under some trees.

Debris left by campers and fishers was significant, including numerous beer bottles in and near the river, plastic bags and food tins.

#### **3.17.1 Water quality**

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

Temperature: 24.6 – 28.5°C

Dissolved oxygen: 42 - 79% sat; 3.5 – 6.5mg/l

pH: 7.4 – 7.6

Conductivity: 202 - 210µS/cm

Turbidity: malfunctioned.

#### **3.17.2 Macrophytes**

No macrophytes were recorded but filamentous green alga and a slight surface scum was present at the upstream end.

#### **3.17.3 Fish**

All nets were deployed at this site. Seven species of native fish plus one introduced were captured (**Table 3-17.1**). This catch is very comparable to other catches at this site, including the large number of tandans. Yellowbelly ranged from 95mm to 417mm, tandans from 73mm to 247mm (though the next smallest was 134mm) and Bony bream from 37mm to 315mm.

■ **Table 3-17.1 Results of fishing the Warrego River at Shannonvale in May 2005.**

Species	Common name	Gill nets	Seine net	Fyke nets	Bait traps	Dip net	Total Numbers caught
<i>Macquaria ambigua</i>	Yellowbelly	10		8			18
<i>Bidyanus bidyanus</i>	Silver perch			1			1
<i>Leiopotherapon unicolor</i>	Spangled perch			1			1
<i>Nematolosa erebi</i>	Bony Bream	3	11	29			43
<i>Hypseleotris klunzingeri</i>	Western Carp Gudgeon		114		1		115
<i>Retropinna semoni</i>	Smelt		2				2
<i>Neosilurus hyrtlilii</i>	Hyrtl's tandan			134			134
<i>Cyprinus carpio</i>	Common Carp	4		1			5
<b>Total Numbers</b>		<b>17</b>	<b>127</b>	<b>174</b>	<b>1</b>		<b>319</b>

Three long-necked turtles (*Chelodina longicollis*) and a Broad shelled turtle (*Chelodina expansa*) were captured in a fyke net.

### 3.17.4 Macroinvertebrates

Surber samples were collected from a mix of sand and silty sand substrate; some including leaf litter. A dip net sample was collected from tea tree root. Twenty-six taxa were recorded (**Table 3-17.2**), 20 from the surbers and 17 from the dip net. Ceratopogonids and copepods dominated the surbers while mites (Acarina), Chironominae, shrimps (Atyidae) and Cladocera were common in the dip net. Thirty-one *Macrobrachium* and 3 *Cherax* were captured in bait traps. Both were also captured in fyke and seine nets.

■ **Table 3-17.2 Numbers of aquatic macroinvertebrates recorded from Shannonvale**

	Edge surber		Tree root dip
	Mean	Stddev	
<b>Acarina</b>	0.8	1.8	93
<b>Nematoda</b>	0.6	0.9	
<b>Oligochaeta</b>	1.2	0.8	4
<b>Sphaeriidae</b>	0.4	0.9	1
<b>Ancylidae</b>			2
<b>Cladocera</b>	0.8	0.8	30
<b>Copepoda</b>	29.2	55.8	16
<b>Ostracoda</b>	5.8	4.5	
<b>Isopoda</b>			1
<b>Atyidae</b>	0.2	0.4	39
<b>Parastacidae</b>	0.4	0.5	
<b>Dytiscidae</b>	3.4	4.4	
<b>Hydrophilidae</b>	3.6	5.5	
<b>Ceratopogonidae</b>	41.0	24.2	13
<b>Chironominae</b>	9.8	7.0	82
<b>Orthoclaadiinae</b>	0.6	1.3	6
<b>Tanypodinae</b>	1.6	1.1	10

<b>Culicidae</b>			2
<b>Tipulidae</b>	0.4	0.5	
<b>Baetidae</b>			1
<b>Caenidae</b>	4.0	2.5	3
<b>Corixidae</b>	2.2	3.2	
<b>Gerridae</b>	0.2	0.4	
<b>Sisyridae</b>			1
<b>Gomphidae</b>	0.2	0.4	
<b>Ecnomidae</b>			1
<b>Taxa</b>	<b>10.0</b>	<b>3.8</b>	<b>17</b>
<b>Abundance</b>	<b>106</b>	<b>55</b>	<b>305</b>
<b>Total taxa</b>	<b>20</b>		<b>26</b>

### 3.18 Warrego River at Tinnenburra

On this occasion the site consisted of the same small pool that had been sampled in November. Another smaller pool existed a further 100m upstream. The sampled pool was 200m upstream of the causeway, approximately 50m long, up to 8m wide and generally less than 30cm deep. The substrate was a red clay silt overlaying sand. A few isolated snags occurred in places and there was little alga. The riparian habitat was exposed away from the water. Disturbance to the edge was limited to kangaroo and bird tracks.

#### 3.18.1 Water quality

Results of spot water quality samples are shown in **Table 3-18.1**. Despite mild stratification, even bottom waters were supersaturated with oxygen.

■ **Table 3-18.1 Spot water quality readings – Warrego River at Tinnenburra**

Sample time	Depth (m)	Temp. (°C)	Dissolved Oxygen (%sat)	Conductivity (µS/cm)	Turbidity (NTU)	PH
1320	Surface	28.6	129	311	520	8.3
	0.5	26.3	119	310	>600	8.2

#### 3.18.2 Macrophytes

No macrophytes were observed and only a slight algal fringe was present.

#### 3.18.3 Fish

Only seining was undertaken as the site was too small and shallow for set nets. Eight native fish species and one introduced were captured (**Table 3-18.2**). This is a good result considering the low sampling effort. The fish tended to be small, for example while at Shannonvale there was only one Hyrtl's tandan smaller than 134mm, all specimens here were less than 99mm long. Similarly only four Bony bream exceeded 100mm with the largest at 116mm. The Silver perch were 63 and 65mm long while the Yellowbelly were 40 and 284mm long.

■ Table 3-18.2 Results of fishing the Warrego River at Tinnenburra in May 2005.

Species	Common name	Gill nets (0)	Seine net (1)	Fyke nets (0)	Bait traps (0)	Dip net	Total Numbers caught
<i>Macquaria ambigua</i>	Yellowbelly		2				2
<i>Bidyanus bidyanus</i>	Silver perch		2				2
<i>Leiopotherapon unicolor</i>	Spangled perch		5				5
<i>Nematolosa erebi</i>	Bony Bream		621				621
<i>Hypseleotris klunzingeri</i>	Western Carp Gudgeon		14				14
<i>Melanotaenia fluviatilis</i>	Rainbowfish		22				22
<i>Retropinna semoni</i>	Smelt		1				1
<i>Neosilurus hyrtlil</i>	Hyrtl's tandan		21				21
<i>Cyprinus carpio</i>	Common Carp		11				11
<b>Total Numbers</b>		<b>NA</b>	<b>699</b>	<b>NA</b>	<b>NA</b>		<b>699</b>

### 3.18.4 Macroinvertebrates

No specialised habitats were present at Tinnenburra so sampling was restricted to surbers collected from silty and at times compact substrate, occasionally with leaf litter or algae. Eleven taxa were recorded with ceratopogonids, Chironominae and copepods most common (Table 3-18.3). *Macrobrachium* were captured in good numbers in the seine haul.

■ Table 3-18.3 Numbers of aquatic macroinvertebrates recorded from Tinnenburra

	Edge surber	
	Mean	Stddev
<b>Acarina</b>	6.2	5.2
<b>Oligochaeta</b>	1.0	0.7
<b>Cladocera</b>	0.6	1.3
<b>Copepoda</b>	11.6	22.6
<b>Ostracoda</b>	0.4	0.5
<b>Atyidae</b>	0.6	0.5
<b>Ceratopogonidae</b>	68.4	43.5
<b>Chironominae</b>	23.6	9.3
<b>Tipulidae</b>	0.4	0.9
<b>Caenidae</b>	1.2	2.2
<b>Leptoceridae</b>	0.2	0.4
<b>Taxa</b>	<b>6.6</b>	<b>1.1</b>
<b>Abundance</b>	<b>114</b>	<b>58</b>
<b>Total taxa</b>		<b>11</b>

### 3.19 Moonie River at Nindigully

The water level at this site was very low, with maximum depth rarely exceeding 0.5m. The pool still exceeded 150m in length and was generally 15-20m wide. The riffle at the lower end of the site was not flowing. No *Ludwigia* was present and the *Schoenoplectus* near the gauge was entirely out of the water. The fringe of filamentous algae was strongly developed. The substrate tended to be very soft.

#### 3.19.1 Water quality

Results of spot water quality samples are shown in **Table 3-19.1**. The water column was well mixed.

■ **Table 3-19.1 Spot water quality readings – Moonie River at Nindigully**

Sample time	Depth (m)	Temp. (°C)	Dissolved Oxygen (%sat)	Conductivity (µS/cm)	Turbidity (NTU)	pH
1205	Surface	21.6	67	149	>600	7.5
	0.5	20.3	64	152	>600	7.7

#### 3.19.2 Macrophytes

No macrophytes were observed but a strong fringe of benthic filamentous green alga was present.

#### 3.19.3 Fish

All nets were set at this site. Two native fish species and one introduced were recorded (**Table 3-19.2**). This is the lowest diversity of native species recorded at the site though a total of 3 species have been recorded on three previous occasions. The number is also not surprising given that the four further native species historically recorded here have never been recorded as more than single specimens. The total catch is within the historical range and the size of fish in the gill nets is also in accord with historical data (Bony bream 186 – 262mm). As has been observed previously, the seine was relatively unsuccessful and few small specimens were encountered.

■ **Table 3-19.2 Results of fishing the Moonie River at Nindigully in May 2005.**

Species	Common name	Gill nets	Seine net (2)	Fyke nets	Bait traps (3)	Dip net	Total Numbers caught
<i>Macquaria ambigua</i>	Yellowbelly	2					2
<i>Nematolosa erebi</i>	Bony Bream	28	4	3			35
<i>Gambusia holbrooki</i>	Mosquitofish		2				2
<b>Total Numbers</b>		<b>30</b>	<b>6</b>	<b>3</b>			<b>39</b>

#### 3.19.4 Macroinvertebrates

Two surber samples were collected from soft mud with filamentous alga and three were collected from compact mud substrate with either organic matter or algae. Fifteen taxa were identified (**Table 3-19.3**). Ceratopogonids, chironominae and copepods dominated the catch. Twenty-nine *Macrobrachium* were captured in bait traps and low numbers were recorded in seine hauls.

■ Table 3-19.3 Numbers of aquatic macroinvertebrates recorded from Nindigully

	Edge surber	
	Mean	Stddev
<b>Nematoda</b>	0.2	0.4
<b>Oligochaeta</b>	0.4	0.5
<b>Planorbidae</b>	0.2	0.4
<b>Cladocera</b>	1.6	1.7
<b>Copepoda</b>	18.4	11.4
<b>Ostracoda</b>	1.4	1.5
<b>Atyidae</b>	3.2	2.6
<b>Dytiscidae</b>	0.4	0.5
<b>Ceratopogonidae</b>	100.2	69.0
<b>Chironominae</b>	29.8	24.0
<b>Orthoclaadiinae</b>	0.2	0.4
<b>Tanypodinae</b>	2.6	1.9
<b>Caenidae</b>	0.4	0.9
<b>Corixidae</b>	1.0	1.2
<b>Notonectidae</b>	0.4	0.5
<b>Taxa</b>	<b>8.4</b>	<b>1.5</b>
<b>Abundance</b>	<b>160</b>	<b>82</b>
<b>Total taxa</b>		<b>15</b>

### 3.20 Moonie River at Fenton

On this occasion the water level was similar to that of November, which was relatively low, though the pool was still continuous in both directions and generally about 25m wide. Maximum depth was about 1m but generally the pool was less than 0.5m deep. The grass cover on the banks was reasonable and there was evidence of recent cattle use, though the fringing sedges were undamaged. The fringe of benthic filamentous green algae was well developed and a light surface scum was evident on the second morning. A significant quantity of recent litterfall, particularly of small-wood, was concentrated in certain areas.

#### 3.20.1 Water Quality

Spot water quality data are shown in **Table 3-20.1**. Little variation was present other for temperature.

■ Table 3-20.1 Spot water quality readings – Fenton May 2005

Sampling Time	Depth (m)	Temp. (°C)	DO (% sat.)	Conductivity (µS/cm)	Turbidity (NTU)	pH
1510	Surface	23.6	61	130	>600	7.1
	0.5	20.8	58	129	>600	6.9

Overnight logging of water quality parameters was also undertaken at this site. Much greater variation was evident in the overnight data. The recorded ranges for each parameter were:

Temperature: 20.5 – 26.9°C

Dissolved oxygen: 45 - 107% sat; 3.9 – 8.7mg/l

pH: 7.0 – 8.5

Conductivity: 127 - 198µS/cm

Turbidity: >600NTU.

### 3.20.2 Macrophytes

Only a few strands of *Ludwigia* were evident but the fringe of green alga was well developed.

### 3.20.3 Fish

All nets were deployed at this site. Two native species and two introduced were captured (**Table 3-20.2**). This is very similar to historical catches. The fish captured in all nets tended to be relatively large and healthy and no small Bony bream were recorded.

**Table 3-20.2 Results of fishing at Fenton in May 2005.**

Species	Common name	Gill nets	Seine net (2)	Fyke nets	Bait traps	Dip net	Total Numbers caught
<i>Macquaria ambigua</i>	Yellowbelly	2	1	1			4
<i>Nematolosa erebi</i>	Bony Bream	7					7
<i>Cyprinus carpio</i>	Carp			1			1
<i>Gambusia holbrooki</i>	Mosquitofish		3				3
<b>Total Numbers</b>		<b>9</b>	<b>4</b>	<b>2</b>	<b>0</b>		<b>15</b>

### 3.20.4 Macroinvertebrates

Surber samples were collected from both soft and compact silt and most included green algae. No dip net samples were collected. Twenty-one taxa were identified with the most common being Chironominae, ceratopogonids and copepods (**Table 3-20.3**). Bait traps captured 5 *Macrobrachium* and they were not noted in fyke and seine nets. Yabbies were not recorded.

■ Table 3-20.3 Macroinvertebrates captured at Fenton in May 2005

	Edge surber	
	Mean	Stddev
<b>Acarina</b>	6.4	6.7
<b>Oligochaeta</b>	0.8	0.8
<b>Ancyliidae</b>	1.8	1.9
<b>Physidae</b>	0.4	0.9
<b>Planorbidae</b>	0.2	0.4
<b>Cladocera</b>	2.4	3.2
<b>Copepoda</b>	10.6	19.3
<b>Ostracoda</b>	5.2	6.2
<b>Atyidae</b>	2.8	1.3
<b>Dytiscidae</b>	0.4	0.5
<b>Ceratopogonidae</b>	19.2	12.3
<b>Chironominae</b>	48.4	41.6
<b>Orthoclaadiinae</b>	0.4	0.5
<b>Tanypodinae</b>	2.2	1.1
<b>Culicidae</b>	0.2	0.4
<b>Tipulidae</b>	0.2	0.4
<b>Caenidae</b>	1.4	2.1
<b>Corixidae</b>	0.4	0.5
<b>Pleidae</b>	0.4	0.5
<b>Anisoptera</b>	0.2	0.4
<b>Leptoceridae</b>	0.2	0.4
<b>Taxa</b>	<b>12.4</b>	<b>2.8</b>
<b>Abundance</b>	<b>104</b>	<b>33</b>
<b>Total taxa</b>		<b>21</b>

### 3.23 Whyenbah Lagoon

This lagoon is adjacent the Balonne River at Whyenbah and had been dry from early 2002 till February 2004. No flows have reached it since the February flood. The water level had dropped a further 20cm since sampled in November; meaning most of the lagoon was less than 0.3m deep and up to 6m wide. There had been no recent cattle access. The water appeared milky rather than turbid. *Ludwigia* covered most of the water surface. This site was previously referred to as Sevil's Lagoon.

#### 3.23.1 Water Quality

Due to a computer malfunction, no water quality data is available.

#### 3.23.2 Macrophytes

*Ludwigia* grew along about 99% of the waters edge and extended across much of the water surface. Spiny Mud Grass was only present in very isolated patches.

### 3.23.3 Fish

Gill nets were not deployed at this site. Five native species and two introduced were captured (**Table 3-23.1**). Approximately 50% of the fish captured in the seine haul were not extracted. Staff searched the net for species and attempted to extract a representative size range. It is rare that neither Yellowbelly nor Carp is recorded at a site. A long-necked turtle was captured in a fyke net.

■ **Table 3-23.1 Results of fishing Whyenbah Lagoon in May 2005.**

Species	Common name	Gill nets	Seine net	Fyke nets	Bait traps	Dip net	Total Numbers caught
<i>Nematolosa erebi</i>	Bony Bream		50	242	1		293
<i>Hypseleotris klunzingeri</i>	Western Carp Gudgeon		3				3
<i>Leiopotherapon unicolor</i>	Spangled Perch		1	6			7
<i>Melanotaenia fluviatilis</i>	Rainbowfish		38	16			54
<i>Retropinna semoni</i>	Smelt		15				15
<i>Carrasius auratus</i>	Goldfish		6				6
<i>Gambusia holbrooki</i>	Mosquitofish		29		5		34
<b>Total Numbers</b>		<b>NA</b>	<b>142</b>	<b>264</b>	<b>6</b>		<b>412</b>

### 3.23.4 Macroinvertebrates

Surber samples were collected from mud with varying amounts of *Ludwidgia*. A dip net sample was taken amongst *Ludwidgia*. Twenty-five taxa were collected; 20 by dip net and 18 by surber (**Table 3-23.2**). The most common taxa in surbers were ceratopogonids, Chironominae and corixids. Common taxa in the dip net were the micro-crustaceans and chironomids. Bait traps captured 53 *Macrobrachium* and 8 *Cherax*. *Cherax* were very common in fyke nets (20-30 per net) and *Macrobrachium* was abundant in the seine haul.

■ **Table 3-23.2 Macroinvertebrates captured at Whyenbah Lagoon**

	Edge surber		Macrophyte dip
	Mean	Stddev	
<b>Acarina</b>	1.8	2.5	
<b>Nematoda</b>	0.2	0.4	
<b>Oligochaeta</b>	8.4	8.1	5
<b>Cladocera</b>	0.2	0.4	103
<b>Copepoda</b>	8.0	12.4	120
<b>Ostracoda</b>	10.0	9.1	47
<b>Atyidae</b>	1.8	2.0	1
<b>Dytiscidae</b>	0.4	0.5	1
<b>Hydrophilidae</b>			1
<b>Ceratopogonidae</b>	57.0	46.3	29
<b>Chironominae</b>	36.6	45.4	39
<b>Orthoclaadiinae</b>	2.6	0.9	42
<b>Tanypodinae</b>	8.6	4.9	4
<b>Culicidae</b>			1

<b>Tipulidae</b>			1
<b>Baetidae</b>	1.2	1.6	12
<b>Corixidae</b>	25.4	52.4	2
<b>Gerridae</b>			2
<b>Mesoveliidae</b>	1.6	1.8	8
<b>Veliidae</b>			1
<b>Pyralidae</b>	0.2	0.4	
<b>Aeschnidae</b>			1
<b>Coenagrionidae</b>			2
<b>Zygoptera</b>	0.4	0.9	
<b>Leptoceridae</b>	0.2	0.4	
<b>Taxa</b>	<b>11.2</b>	<b>2.5</b>	<b>20</b>
<b>Abundance</b>	<b>165</b>	<b>129</b>	<b>422</b>
<b>Total taxa</b>	<b>18</b>		<b>25</b>

### 3.24 Police Lagoon

This site had been dry from November 2001 till February 2004. The lagoon still holds considerable water, being several hundred metres long, generally between 20 and 40m wide and the depth still exceeds 2m in places. Much of the Nardoo is now above the water level and dry. In places this means it covers many square metres of the near water edge. The tree roots on the steep western edge were still largely submerged. 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 and no recent vehicle tracks despite the site being very close to town.

#### 3.24.1 Water Quality

Results from spot water quality sampling are shown in **Table 3-24.1**. The very surface layer was warmer, less turbid and showed a supersaturated level of dissolved oxygen.

■ **Table 3-24.1 Spot water quality readings – Police Lagoon in May 2005**

Sampling Time	Depth (m)	Temp. (°C)	DO (% sat.)	Conductivity (µS/cm)	Turbidity (NTU)	pH
1500	Surface	27.5	102	195	483	7.8
	0.5	23.8	81	190	>600	7.2
	1.0	23.5	79	191	>600	7.1
	1.5	23.5	75	191	>600	7.1
	2.0	23.5	71	191	>600	7.3

Overnight logging of water quality parameters showed considerable variation with peaks in the mid to late afternoon and minima in the early morning. The recorded ranges for each parameter were:

Temperature: 23.2 – 26.9°C

Dissolved oxygen: 64 - 109% sat; 5.4 – 8.7mg/l

pH: 7.9 – 8.5

Conductivity: 189 - 198 $\mu$ S/cm

Turbidity: >600NTU.

### 3.24.2 Macrophytes

Nardoo occurred in extensive patches in recently dried backwaters and generally as a thin band adjacent to the water's edge. Rice sedge (*Cyperus difformis*) was also common in the riparian zone.

### 3.24.3 Fish

All nets were deployed at this site. Three native species and two introduced were captured (**Table 3-24.2**). Bony Bream captured in the gill nets were consistently in the size range 200-250mm while those in the seine net were as small as 22mm. This is very similar to the result from November and would indicate continuous breeding by adults that recolonised in February 2004.

■ **Table 3-24.2 Results of fishing at Police Lagoon in May 2005.**

Species	Common name	Gill nets	Seine net	Fyke nets	Bait traps	Dip net	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>	Common 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>

### 3.24.4 Macroinvertebrates

Surber samples were collected from firm mud with a soft surface. Algae and leaf litter were generally present in minor amounts. A dip net sample was taken amongst Nardoo. Twenty taxa were collected in total; 15 by both dip net and surber (**Table 3-24.3**). The most common taxa in surbers were ceratopogonids, mites and Chironominae. In the dip net the most common taxa were mites, Chironominae and Orthoclaadiinae. Eighteen *Macrobrachium* and 3 *Cherax* were captured in bait traps and small numbers of prawns were recorded in the seine net. Two yabbies were captured in a fyke net.

■ **Table 3-24.3 Macroinvertebrates captured at Police Lagoon**

	Edge surber		Macrophyte dip
	Mean	Stddev	
<b>Acarina</b>	36.4	60.3	210
<b>Nematoda</b>	1.8	1.3	1
<b>Oligochaeta</b>	0.8	1.3	7
<b>Planorbidae</b>			2
<b>Cladocera</b>	9.0	8.5	
<b>Copepoda</b>			7
<b>Ostracoda</b>	11.8	17.1	3
<b>Atyidae</b>			2
<b>Parastacidae</b>	0.2	0.4	

<b>Dytiscidae</b>	0.2	0.4	1
<b>Ceratopogonidae</b>	109.4	64.1	22
<b>Chironominae</b>	25.6	24.7	60
<b>Orthoclaadiinae</b>	2.0	3.1	40
<b>Tanypodinae</b>	5.2	4.7	
<b>Caenidae</b>	6.8	4.9	1
<b>Naucoridae</b>			1
<b>Isostictidae</b>			2
<b>Zygoptera</b>	0.2	0.4	
<b>Ecnomidae</b>	0.6	0.9	
<b>Leptoceridae</b>	1.0	0.7	1
<b>Taxa</b>	<b>10.4</b>	<b>2.3</b>	<b>15</b>
<b>Abundance</b>	<b>211</b>	<b>140</b>	<b>360</b>
<b>Total taxa</b>	<b>15</b>		<b>20</b>

### 3.25 Belah Waterhole

The water level was similar to that of November, giving a maximum depth of between 0.5m and 1.0m. No backwaters contained water, the lignum was at least 0.5m above the water and many snags were above the waterline. Green filamentous algae grew weakly near the waterline and a strong herb line covered a width of up to 4m above the waterline, presumably this resulted from the flow in December. Numerous midges were flying in the late afternoon. There was evidence of pig rooting and goat and kangaroo tracks were common.

#### 3.25.1 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.

#### 3.25.2 Macrophytes

No macrophytes were recorded and benthic green filamentous alga was uncommon. A light scum was apparent on the second morning.

#### 3.25.3 Fish

All nets were deployed at this site. Four native species and two introduced were recorded (**Table 3-25.1**). Smelt, Rainbowfish and Hyrtl's tandan had been captured in November along with Goldfish. Large fish are usually uncommon here but on this occasion those captured in the gill nets were of reasonable size (Bony bream 218 – 240mm, Yellowbelly 221mm, Carp 262 and 348mm). Fish in other nets were small specimens.

■ **Table 3-25.1 Results of fishing Belah Waterhole in May 2005.**

Species	Common name	Gill nets	Seine net (1)	Fyke nets	Bait traps	Dip net	Total Numbers caught
<i>Macquaria ambigua</i>	Yellowbelly	1					1
<i>Nematolosa erebi</i>	Bony Bream	4	6	8	1		19
<i>Leiopotherapon unicolor</i>	Spangled Perch		2				2
<i>Hypseleotris klunzingeri</i>	Western Carp Gudgeon		5				5
<i>Cyprinus carpio</i>	Common Carp	2					2
<i>Gambusia holbrooki</i>	Mosquitofish		21				21
<b>Total Numbers</b>		<b>7</b>	<b>34</b>	<b>8</b>	<b>1</b>		<b>50</b>

### 3.25.4 Macroinvertebrates

Five surber samples were collected from a range of firm and soft silt substrates, some with filamentous alga or leaf litter (**Table 3-25.2**). Twelve taxa were identified. Ceratopogonids and copepods dominated the catch. Bait traps captured three *Cherax*, and 28 *Macrobrachium*. Both were also recorded in fyke and seine nets and several yabbies were attacking fish caught in the gill nets.

■ **Table 3-25.2 Macroinvertebrates captured at Belah Waterhole**

	Edge surber	
	Mean	Stddev
<b>Nematoda</b>	16.2	8.9
<b>Oligochaeta</b>	0.8	1.1
<b>Cladocera</b>	1.2	2.7
<b>Copepoda</b>	110.0	84.6
<b>Ostracoda</b>	33.0	26.8
<b>Parastacidae</b>	0.2	0.4
<b>Ceratopogonidae</b>	124.0	71.6
<b>Chironominae</b>	4.6	2.9
<b>Tanypodinae</b>	1.2	2.2
<b>Tipulidae</b>	0.2	0.4
<b>Corixidae</b>	14.6	16.5
<b>Libellulidae</b>	0.8	1.1
<b>Taxa</b>	<b>7.8</b>	<b>0.4</b>
<b>Abundance</b>	<b>307</b>	<b>164</b>
<b>Total taxa</b>		<b>12</b>

### 3.26 Clyde Lagoon

*Ludwigia* regrowth has continued such that approximately 75% of the edge was covered and strands extended up to 8m over the water surface. *Azolla* and fringing green filamentous alga was also present. Cattle were accessing the lagoon at the time of sampling such that the edge was very disturbed by pugging. This was also breaking the *Ludwigia* stems. This lagoon has no snags and riparian vegetation only exists

between the fences at the windmill. The lagoon was over 100m long, 25m wide and up to 2m deep. The edges were steep such that seine and fyke nets were only effective to a short distance from the edge. The dredged spoil to the west showed some seedling germination including coolibah, black wattle, lignum and roly poly. The pile was also eroding and depositing small sediment piles in the lagoon.

### 3.26.1 Water Quality

Spot water quality data are shown in **Table 3-26.1**. The water column was well mixed but with a warmer, more highly oxygenated surface layer.

■ **Table 3-26.1 Spot water quality readings – Clyde Lagoon in May 2005**

Sampling Time	Depth (m)	Temp. (°C)	DO (% sat.)	Conductivity (µS/cm)	Turbidity	pH
1615	Surface	24.6	81	328	570	8.1
	0.5	22.8	69	325	>600	7.9
	1.0	22.5	65	326	>600	7.9
	1.5	22.5	62	326	>600	8.2

### 3.26.2 Macrophytes

*Ludwigia* occurred over approximately 75% of the edge and *Azolla* was sparsely mixed with it.

### 3.26.3 Fish

All nets were set at this site (**Table 3-26.2**). Four native species and three introduced were captured. Rainbowfish and Western Carp Gudgeon had been captured in November while Goldfish had not. The lagoon had been isolated before and between sampling events so changes probably relate to sampling intensity rather than true absence at any particular time. Most species were represented by fish of various sizes, including Yellowbelly from 120mm to 433mm and Bony bream from 31mm to 225mm.

■ **Table 3-26.2 Results of fishing Clyde lagoon in May 2005.**

Species	Common name	Gill nets	Seine net	Fyke nets	Bait traps	Dip net	Total Numbers caught
<i>Macquaria ambigua</i>	Yellowbelly	2		2			4
<i>Nematolosa erebi</i>	Bony Bream	6	34	10	1		51
<i>Leiopotherapon unicolor</i>	Spangled Perch			1			1
<i>Neosilurus hyrtl</i>	Hyrtl's tandan			3			3
<i>Cyprinus carpio</i>	Carp	1		1	2		4
<i>Carrasius auratus</i>	Goldfish		2	2			4
<i>Gambusia holbrooki</i>	Mosquitofish		41				41
<b>Total Numbers</b>		<b>9</b>	<b>77</b>	<b>19</b>	<b>3</b>		<b>108</b>

### 3.26.4 Macroinvertebrates

Two surber samples were collected from pugged soft silt and three were collected from silt with *Ludwigia* and filamentous algae. A dip net sample was collected from *Ludwigia*. Twenty taxa were identified (**Table 3-26.3**) in total, 17 from the dip net and 11 from the surbers. The surber fauna was dominated by ceratopogonids while the

dip net was strongly dominated by cladocerans. Thirty-nine *Macrobrachium* and one *Cherax* were captured in bait traps and *Macrobrachium* was captured in low numbers in fyke nets and the seine haul.

■ **Table 3-26.3 Macroinvertebrates captured at Clyde Lagoon**

	Edge Surber		Macrophyte dip
	Mean	Stdev	
<b>Acarina</b>	0.6	0.9	1
<b>Nematoda</b>	0.2	0.4	
<b>Oligochaeta</b>			1
<b>Cladocera</b>	0.6	0.9	5500
<b>Copepoda</b>	2.6	3.2	22
<b>Ostracoda</b>	2.0	1.9	101
<b>Atyidae</b>	6.2	1.1	45
<b>Dytiscidae</b>	0.2	0.4	1
<b>Hydrophilidae</b>			6
<b>Ceratopogonidae</b>	45.6	41.1	33
<b>Chironominae</b>	6.3	4.7	23
<b>Orthoclaadiinae</b>			20
<b>Tanypodinae</b>	1.8	1.3	8
<b>Ephydriidae</b>			1
<b>Baetidae</b>			23
<b>Corixidae</b>	0.2	0.4	
<b>Pyralidae</b>			
<b>Caenogrionidae</b>			2
<b>Leptoceridae</b>			7
			1
<b>Taxa</b>	<b>6.8</b>	<b>1.3</b>	<b>17</b>
<b>Abundance</b>	<b>65</b>	<b>42</b>	<b>5795</b>
<b>Total taxa</b>	<b>11</b>		<b>20</b>

### **3.28 Pilgra Lagoon Downstream**

The lagoon was continuous in both directions, about 40m wide and generally less than 0.5m deep. The volume of water suggests the lagoon had received local storm run-off since the last sampling event. The substrate was firm sandy silt. No snags were noted and alga was sparse near the edge. Disturbance of the edge was minimal. The water appeared muddy, relative to the milky appearance at Walla. Many seedlings that had germinated following the floods of February 2004 continued to survive. Unlike Walla, there was no evidence of significant waterbird roosting or feeding at this site.

#### **3.28.1 Water Quality**

Spot water quality data are shown in **Table 3-28.1**. The water column was well mixed. Given the time of day that readings were taken, the DO suggests this is not a

limiting factor. Conductivity and pH have increased though the conductivity is only half what it was in November 2001.

■ **Table 3-28.1 Spot water quality readings –Pilgra Lagoon downstream in May 2005**

Sampling Time	Depth (m)	Temp. (°C)	DO (% sat.)	Conductivity (µS/cm)	Turbidity	pH
1430	Surface	27.7	124	415	>600	8.6
	0.8	27.1	113	420	>600	8.7

### 3.28.2 Macrophytes

No macrophytes were present.

### 3.28.3 Fish

One gill net was not deployed at this site due to the water depth. Three native species and three introduced were captured (**Table 3-28.2**).

■ **Table 3-28.2 Results of fishing Pilgra Lagoon Downstream in May 2005.**

Species	Common name	Gill nets (3)	Seine net (2)	Fyke nets	Bait traps	Dip net	Total Numbers caught
<i>Macquaria ambigua</i>	Yellowbelly			3			3
<i>Nematolosa erebi</i>	Bony Bream	8	6	3			17
<i>Leiopotherapon unicolor</i>	Spangled Perch			3	1		4
<i>Cyprinus carpio</i>	Carp		1				1
<i>Carrasius auratus</i>	Goldfish			1			1
<i>Gambusia holbrooki</i>	Mosquitofish		20				20
<b>Total Numbers</b>		<b>8</b>	<b>27</b>	<b>10</b>	<b>1</b>		<b>46</b>

The Yellowbelly were between 126 and 173mm in length and the Carp was 186mm. Bony bream covered a broad size range. A long-neck turtle (*Chelodina longicollis*) was captured in a fyke net.

### 3.28.4 Macroinvertebrates

Surber samples were collected from compact mud with some leaf litter. No dip net sample was collected. Thirteen taxa were recorded (**Table 3-28.3**). Ceratopogonids, ostracods and copepods were most common. Bait traps captured 32 *Macrobrachium* and 2 *Cherax*. They were also present in seine hauls and fyke nets.

■ **Table 3-28.3 Macroinvertebrates captured at Pilgra Lagoon Downstream**

	Edge surber	
	Mean	Stddev
<b>Acarina</b>	0.4	0.9
<b>Oligochaeta</b>	1.6	2.5
<b>Ancylidae</b>	0.4	0.5
<b>Cladocera</b>	0.2	0.4
<b>Copepoda</b>	60.0	33.2
<b>Ostracoda</b>	67.0	55.7
<b>Ceratopogonidae</b>	74.2	60.9

<b>Chironominae</b>	8.8	6.4
<b>Orthoclaadiinae</b>	0.6	1.3
<b>Tanypodinae</b>	3.6	1.5
<b>Tipulidae</b>	0.6	0.9
<b>Caenidae</b>	0.4	0.5
<b>Corixidae</b>	14.4	5.3
<b>Taxa</b>	<b>8.4</b>	<b>1.8</b>
<b>Abundance</b>	<b>232</b>	<b>129</b>
<b>Total taxa</b>		<b>13</b>

### 3.29 Chinaman Creek

Water levels were very similar to that seen in November. The length of the pool was complete in both directions. Fringing green alga was poorly developed and there was no macrophyte growth in the water or surface scum. A patch of *Juncus* (5m x 2m) grew about 1.5m above the waterline just upstream from the bridge. The edge appeared undisturbed. A significant amount of recent twig and leaf fall littered the edge.

#### 3.29.1 Water Quality

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

Temperature: 20.9 – 24.6°C

Dissolved oxygen: 72 - 83% sat; 6.4 – 6.9mg/l

pH: 8.0 – 8.2

Conductivity: 313 - 323µS/cm

Turbidity: >600 NTU.

#### 3.29.2 Macrophytes

No macrophytes were present and the bath-tub ring of filamentous green alga was poorly developed.

#### 3.29.3 Fish

All nets were deployed at this site. Five native species and two introduced were captured (**Table 3-29.1**). The Carp recorded from the fyke nets was a carp / goldfish hybrid. Many of the Bony bream captured in the seine net were less than 25mm in length while the Yellowbelly measured 34mm.

■ **Table 3-29.1 Results of fishing Chinaman Creek in May 2005.**

Species	Common name	Gill nets	Seine net (1)	Fyke nets	Bait traps	Dip net	Total Numbers caught
<i>Macquaria ambigua</i>	Yellowbelly	2	1	1			4
<i>Nematolosia erebi</i>	Bony Bream	6	160	24	1		191
<i>Leiopotherapon unicolor</i>	Spangled Perch		1	3			4
<i>Retropinna semoni</i>	Smelt		8				8
<i>Hypseleotris klunzingeri</i>	Carp gudgeon		1				1
<i>Cyprinus carpio</i>	Carp	1		1	2		4
<i>Gambusia holbrooki</i>	Mosquitofish		4				4
<b>Total Numbers</b>		<b>9</b>	<b>175</b>	<b>29</b>	<b>3</b>		<b>216</b>

### 3.29.4 Macroinvertebrates

Surber samples were collected from both soft and firm silt. Fifteen taxa were recorded and ceratopogonids strongly dominated (**Table 3-29.2**). Bait traps captured 20 *Macrobrachium* and 3 *Cherax*. Both were also captured in fyke or seine nets.

■ **Table 3-29.2 Macroinvertebrates captured at Chinaman Creek**

	Edge surber	
	Mean	Stddev
<b>Nematoda</b>	4.2	4.9
<b>Oligochaeta</b>	0.6	0.9
<b>Ancylidae</b>	0.4	0.5
<b>Cladocera</b>	0.4	0.9
<b>Copepoda</b>	7.4	2.8
<b>Ostracoda</b>	0.4	0.9
<b>Atyidae</b>	0.2	0.4
<b>Parastacidae</b>	0.4	0.5
<b>Ceratopogonidae</b>	66.4	58.3
<b>Chironominae</b>	4.2	5.4
<b>Orthoclaadiinae</b>	1.0	1.4
<b>Tanypodinae</b>	3.2	2.3
<b>Culicidae</b>	0.4	0.5
<b>Caenidae</b>	1.0	1.0
<b>Ecnomidae</b>	0.2	0.4
<b>Taxa</b>	<b>8.0</b>	<b>2.3</b>
<b>Abundance</b>	<b>90</b>	<b>57</b>
<b>Total taxa</b>		<b>15</b>

### 3.30 Walla Lagoon

Maximum depth in the lagoon was similar to what it had been in November, about 0.5m, and this lagoon relies on a small local catchment or significant regional flooding for its supply. As no floodwaters had reached it, the depth must have been

maintained through local runoff. Water was continuous in both directions and generally 25-35m wide. The water appeared milky turbid. Goat, waterbird and kangaroo tracks were seen at the waters edge, which was relatively undisturbed. The substrate was fine silt with a strong cover of green filamentous alga and entrapped small organic particles (pieces of gum flower etc). The alga also lined the near shore substrate, perhaps having been washed ashore by wind action. No large and very few small snags were noted but a large number of twigs and small branches still bearing leaves were present under most riparian trees. This may be related to the high numbers of roosting cormorants and other waterbirds at the site.

### 3.30.1 Water Quality

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

Temperature: 23.7 – 26.8°C

Dissolved oxygen: 43 - 70% sat; 3.6 – 5.6mg/l

pH: 8.3 – 8.4

Conductivity: 453 - 465µS/cm

Turbidity: 571 - >600NTU.

### 3.30.2 Macrophytes

No macrophytes were observed.

### 3.30.3 Fish

Gill nets were not set due to the depth and the risk of accidental death to the local waterbirds. Two native species and two introduced were captured (**Table 3-30.1**). The Spangled Perch ranged between 44mm and 82mm in length.

■ **Table 3-30.1 Results of fishing Walla Lagoon in May 2005.**

Species	Common name	Gill nets	Seine net	Fyke nets	Bait traps	Dip net	Total Numbers caught
<i>Leiopotherapon unicolor</i>	Spangled Perch		7	4			11
<i>Nematolosa erebi</i>	Bony bream			2			2
<i>Cyprinus carpio</i>	Carp			1			1
<i>Gambusia holbrooki</i>	Mosquitofish		44	2			46
<b>Total Numbers</b>		<b>NA</b>	<b>51</b>	<b>9</b>	<b>0</b>		<b>60</b>

Four long-neck turtles (*Chelodina longicollis*) were captured in fyke nets.

### 3.30.4 Macroinvertebrates

Surber samples were collected from firm silt with a soft surface coating. Some samples included algae and/or leaves. Thirteen taxa were recorded with ostracods, copepods and corixids the most common (**Table 3-30.2**). Eight *Macrobrachium* and 9 *Cherax* were captured in bait traps and they were also present in fyke and seine samples.

■ Table 3-30.2 Macroinvertebrates captured at Walla Lagoon

	Edge surber	
	Mean	Stddev
<b>Nematoda</b>	1.2	1.3
<b>Oligochaeta</b>	8.6	4.9
<b>Cladocera</b>	7.6	7.7
<b>Copepoda</b>	80.2	96.0
<b>Ostracoda</b>	213.2	166.9
<b>Parastacidae</b>	0.2	0.4
<b>Ceratopogonidae</b>	6.2	5.8
<b>Chironominae</b>	3.8	2.4
<b>Tanypodinae</b>	14.8	9.0
<b>Tipulidae</b>	0.8	1.1
<b>Corixidae</b>	69.0	25.0
<b>Libellulidae</b>	0.2	0.4
<b>Leptoceridae</b>	0.4	0.5
<b>Taxa</b>	<b>9.6</b>	<b>1.5</b>
<b>Abundance</b>	<b>406</b>	<b>254</b>
<b>Total taxa</b>		<b>13</b>

## 4. Discussion

### 4.1 Water quality

**Table 4-1.1** summarises the results from all sites sampled in May 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.

The single channel of the Balonne to Whyenbah shows little variation along its length, as might be expected and also shows generally lower pH and conductivity than sites on the smaller and less permanent channels downstream. Conductivity was generally higher than recorded in November but this was not consistent, for example Walla lagoon was very similar and Pilgra Lagoon Downstream was approximately 15% lower. Changes in pH were also not uniform with most sites showing similar results to November while others tended to decrease rather than increase. Turbidity generally exceeded the maximum range of the meter. The results are quite surprising given the generally very low water levels and it suggests the small flows of December were sufficient to flush the standing water and that drying since those flows has not yet caused the expected increases in conductivity or pH. Conductivity and pH were generally higher at floodplain sites than at riverine sites, probably reflecting the effects of a lack of flushing flow.

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

	Temperature °C	Dissolved O <sub>2</sub> % sat	Conductivity µS/cm	Turbidity NTU	pH
Balonne-St George	27.9	90	125	>600	6.8
Balonne-Mooramanna	24.8 – 26.9	74 - 82	186 - 195	>600	7.5 – 7.8
Balonne at Whyenbah	25.0 – 27.8	73 - 86	148 - 155	>600	7.4 – 7.7
Culgoa at Whyenbah	31.9	92	320	>600	7.7
Culgoa at Cubbie	23.1	58	213	>600	7.3
Culgoa at Woolerbilla	28.8	100	260	>600	7.9
Culgoa at Balandool					
Balonne Minor-Meigunyah	23.8 – 27.8	46 - 86	148 - 174	>600	6.9 – 7.7
Balonne Minor-Trafalgar	23.3	58	395	270	8.2
Narran at Donegri	20.6 – 24.8	58 - 97	228 - 236	>600	7.9 – 8.5
Narran at Clyde	23.5	68	409	>600	7.9
Narran at Booligar	23.0 – 26.1	38 - 95	310 - 321	>600	7.9 – 8.4
Balandool on Cubbie	30.2	68	416	>600	7.7
Bokhara at Kirrima	27.6	62	277	>600	7.7
Bokhara at Koala	23.0 – 27.1	54 - 97	361 - 369	279 - 592	7.9 – 8.3
Warrego-Shannonvale	24.6 – 28.5	42 - 79	202 - 210	NA	7.4 – 7.6
Warrego-Tinnenburra	28.6	129	311	520	8.3
Moonie at Nindigully	21.6	67	149	>600	7.5
Moonie at Fenton	20.5 – 26.9	45 - 107	127 - 198	>600	7.0 – 8.5
Whyenbah Lagoon					
Police Lagoon	23.2 – 26.9	64 - 109	189 - 198	>600	7.9 – 8.5
Belah Creek	20.2 – 25.9	58 - 93	423 - 432	>600	8.2 – 8.5
Clyde Lagoon	24.6	81	328	570	8.1
Pilgra D/S	27.7	124	415	>600	8.6
Chinaman Ck	20.9 – 24.6	72 - 83	313 - 323	>600	8.0 – 8.2
Walla Lagoon	23.7 – 26.8	43 - 70	453 - 465	571 - >600	8.3 – 8.4

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. NA=Not Available.

## 4.2 Macrophytes

Macrophytes were very limited in their distribution and *Ludwigia* remains the most commonly encountered species but it was only significant at one riverine site. *Azolla* is 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 development was often not pronounced.

## 4.3 Fish

In a total catch of 3644 individuals, nine native species of fish (with *Hypseleotris* pooled) were identified from fifteen river sites in the Lower Balonne, eight from the seven floodplain sites and seven from the four river reference sites. Three introduced species were captured at test sites and two at reference sites. The number of taxa is in accord with historical sampling and the species list is identical to that from November 2004 with the addition of Murray Cod. Other than cod and Silver perch, the species complement at test river and lagoon sites was identical while that at reference river sites did not include cod or Goldfish.

The overall abundance at river test sites was 60% greater than that captured in November 2004 and this related mainly to differences in the catch of Bony bream, Mosquitofish and Hyrtl's tandan. While several native species increased in abundance in the catch, Carp and Goldfish decreased. While only 7 lagoon sites were sampled on this occasion compared to 12 in November 2004, the abundance was only 15% less (1011 cf 1195). Four of the lagoons not sampled on this occasion were of low diversity and abundance when sampled in November while Lower Plains at that time recorded large numbers of Mosquitofish. Five of the sites in common between the events actually decreased in abundance while Whyenbah Lagoon and Chinaman Ck showed significant increases. Most species were less abundant on this occasion, particularly Spangled perch, Hyrtl's tandan, Carp gudgeon, Smelt and Carp. Bony bream more than doubled in abundance and this was driven by the catch at Whyenbah Lagoon and Chinaman Ck.

Reference river sites showed a 380% increase in abundance, driven by large increases at Warrego sites in the catch of Bony bream, Carp gudgeon and Hyrtl's tandan.

**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 or reference sites varied between two and eight. Floodplain sites recorded between two and five native species. The number of individuals captured varied from 23 to 264 at test river sites and from 46 to 412 at test lagoon sites. At reference sites the number of individuals captured varied from 15 to 699. It should be remembered that the use of the various fishing nets varied among sites.

The most diverse native fauna was found at Tinnenburra and Meigunyah (8 species), followed by Shannonvale (7) and Mooramanna, Whyenbah and Donegri Ck (6 species). The least diverse fauna was recorded at Walla Lagoon, Bokhara River at Kirrima and the two Moonie River reference sites (2 native species).

The most commonly encountered species were Bony Bream (all sites), Yellowbelly (all river sites but not at 3 lagoon sites), Carp (all but two river sites and one lagoon site) and Mosquitofish (all but three river sites and one lagoon site). Spangled Perch was found at 1/3 of all river sites but at all lagoon sites. The most abundant species at river test sites were Bony bream (51% of the total catch), Smelt and Mosquitofish (each 13.1%) and Carp Gudgeon (7.9%). At lagoon sites the most abundant species were Bony Bream (62.6%), Mosquitofish (21.5%) and Rainbow fish (5.4%). At reference river sites the most abundant species were Bony Bream (65.9%), Hyrtl's tandan (14.5%) and Carp Gudgeon (12%).

Introduced species contributed 18.5% of the catch at test river sites, 23.8% at lagoon sites and just 2.1% 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) and that for reference rivers is also much less than either May or November 2004 (13.2% and 14.8%).

■ Table 4-3.1 Summary of fish catch by site; May 2005

Site	<i>Maccullochella peelii peilii</i>	<i>Maquaria ambigua</i>	<i>Leiopotherapon unicolor</i>	<i>Bidayanus bidyanus</i>	<i>Nematalosa erebi</i>	<i>Hypseleotris spp</i>	<i>Melanotaenia fluviatilis</i>	<i>Retropinna semoni</i>	<i>Tandanus tandanus</i>	<i>Neosilurus hyrtlii</i>	<i>Ambassis agassizi</i>	<i>Cyprinus carpio</i>	<i>Carrasius auratus</i>	<i>Gambusia holbrooki</i>	Total count	Natives	Introduced
St George	0	2	0	0	33	23	4	37	0	0	0	1	0	3	103	5	2
Mooramanna	0	4	0	1	70	17	2	48	0	0	0	1	0	2	145	6	2
Whyenbah	1	9	0	0	13	22	2	29	0	0	0	1	0	4	81	6	2
Culgoa at Whyenbah	0	8	0	2	95	6	0	61	0	0	0	21	1	0	194	5	2
Culgoa at Cubbie	0	13	0	0	6	0	1	21	0	0	0	1	0	21	63	4	2
Culgoa at Woolerbilla	0	2	0	0	19	2	0	2	0	1	0	0	8	9	43	5	2
Culgoa at Balandool	0	2	0	0	12	1	6	1	0	0	0	1	0	2	25	5	2
Meigunyah	0	5	2	1	56	47	1	2	0	2	0	6	0	0	122	8	1
Trafalgar	0	13	4	0	131	0	0	0	0	4	0	3	0	11	166	4	2
Balandool on Cubbie	0	3	1	0	13	0	2	0	0	0	0	1	6	27	53	4	3
Balandool at Euraba		dry															
Bokhara at Kirrima	0	2	0	0	12	0	0	0	0	0	0	1	0	46	61	2	2
Bokhara at Koala	0	6	0	0	59	6	0	0	0	0	0	2	1	72	146	3	3
Donegri Ck	1	5	2	0	209	0	2	0	0	19	0	22	1	3	264	6	3
Narran at Clyde	0	2	0	0	64	0	1	0	0	1	0	2	1	1	72	4	3
Narran at Booligar	0	2	2	0	4	0	0	3	0	5	0	4	0	3	23	5	2
<b>River summary</b>	<b>2</b>	<b>78</b>	<b>11</b>	<b>4</b>	<b>796</b>	<b>124</b>	<b>21</b>	<b>204</b>	<b>0</b>	<b>32</b>	<b>0</b>	<b>67</b>	<b>18</b>	<b>204</b>	<b>1561</b>	<b>9</b>	<b>3</b>
Whyenbah Lagoon	0	0	7	0	293	3	54	15	0	0	0	0	6	34	412	5	2
Belah Waterhole	0	1	2	0	19	5	0	0	0	0	0	2	0	21	50	4	2
Police Lagoon	0	0	6	0	60	0	1	0	0	0	0	3	0	49	119	3	2
Clyde Lagoon	0	4	1	0	51	0	0	0	0	3	0	4	4	41	108	4	3
Pilgra D/S	0	3	4	0	17	0	0	0	0	0	0	1	1	20	46	3	3
Chinaman Ck	0	4	4	0	191	1	0	8	0	0	0	4	0	4	216	5	2
Walla Lagoon	0	0	11	0	2	0	0	0	0	0	0	1	0	46	60	2	2
<b>Lagoon summary</b>	<b>0</b>	<b>12</b>	<b>35</b>	<b>0</b>	<b>633</b>	<b>9</b>	<b>55</b>	<b>23</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>15</b>	<b>11</b>	<b>215</b>	<b>1011</b>	<b>7</b>	<b>3</b>
<b>Test site summary</b>	<b>2</b>	<b>90</b>	<b>46</b>	<b>4</b>	<b>1429</b>	<b>133</b>	<b>76</b>	<b>227</b>	<b>0</b>	<b>35</b>	<b>0</b>	<b>82</b>	<b>29</b>	<b>419</b>	<b>2572</b>	<b>9</b>	<b>3</b>
Shannonvale	0	18	1	1	43	115	0	2	0	134	0	5	0	0	319	7	1
Tinnenburra	0	2	5	2	621	14	22	1	0	21	0	11	0	0	699	8	1
Nindigully	0	2	0	0	35	0	0	0	0	0	0	0	0	2	39	2	1
Fenton	0	4	0	0	7	0	0	0	0	0	0	1	0	3	15	2	2
<b>Reference summ</b>	<b>0</b>	<b>26</b>	<b>6</b>	<b>3</b>	<b>706</b>	<b>129</b>	<b>22</b>	<b>3</b>	<b>0</b>	<b>155</b>	<b>0</b>	<b>17</b>	<b>0</b>	<b>5</b>	<b>1072</b>	<b>8</b>	<b>2</b>

## 4.4 Macroinvertebrates

**Table 4-4.1** summarises the macroinvertebrate data for all sites. A trend observed in several earlier data sets wherein both the number of taxa and the number of individuals per surber sample increased downstream within each test river, is only evident in the Balonne Minor and Bokhara and with respect to only taxonomic richness in the Narran and Moonie.

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

	Mean taxa (Surbers)	Taxa (dip nets)	Taxa Total	Individuals (surber)
Balonne at St George	8.0 +/- 0.1	23	26	58 +/- 35
Balonne at Mooramanna	10.2 +/- 1.1		16	109 +/- 23
Balonne at Whyenbah	9.4 +/- 0.9		12	76 +/- 25
Culgoa at Whyenbah	10.2 +/- 2.9		19	173 +/- 100
Culgoa at Cubbie	9.0 +/- 2.3		16	74 +/- 30
Culgoa at Woolerbilla	10.4 +/- 2.9		17	175 +/- 86
Culgoa at Balandool	7.0 +/- 0.7		10	33 +/- 19
Balonne Minor at Meigunyah	9.4 +/- 1.9		18	55 +/- 29
Balonne Minor at Trafalgar	9.6 +/- 1.1		18	77 +/- 38
Narran at Donegri	5.6 +/- 0.9		11	124 +/- 101
Narran at Clyde	6.6 +/- 1.8		13	60 +/- 36
Narran at Booligar	8.6 +/- 1.7		15	127 +/- 82
Balandool on Cubbie	7.4 +/- 1.1		11	117 +/- 41
Balandool on Euraba	DRY			
Bokhara at Kirrima	8.4 +/- 0.5		10	80 +/- 27
Bokhara at Koala	7.8 +/- 3.0	18	20	124 +/- 85
Briarie Ck	DRY			
Beardie Lagoon	DRY			
Lower Plains Lagoon	DRY			
Whyenbah Lagoon	11.2 +/- 2.5	20	25	165 +/- 129
Belah Creek	7.8 +/- 0.4		12	307 +/- 164
Police Lagoon	10.4 +/- 2.3	15	20	211 +/- 140
Clyde Lagoon	6.8 +/- 1.3	17	20	65 +/- 42
Pilgra U/S	DRY			
Pilgra D/S	8.4 +/- 1.8		13	232 +/- 129
Chinaman Ck	8.0 +/- 2.3		15	90 +/- 57
Walla Lagoon	9.6 +/- 1.5		13	406 +/- 254
Woolerbilla Lagoon	DRY			
Warrego at Shannonvale	10.0 +/- 3.8	17	26	106 +/- 55
Warrego at Tinnenburra	6.6 +/- 1.1		11	114 +/- 58
Moonie at Nindigully	8.4 +/- 1.5		15	160 +/- 82
Moonie at Fenton	12.4 +/- 2.8		21	104 +/- 33

The 130 surber samples and 6 dip net samples produced over 25,000 individuals. Sampling in November 2004 showed a major reduction in the number of individuals recorded when compared to the result from May 2004 and this result continues that trend. Surbers recorded 17,116 individuals in May 2005 while the dip nets produced 7,905. The number of taxa recorded from all surber samples in May 2005 was 38 while from the 6 dip nets it was 36. Forty-five taxa were recorded in total and this is also less (12 taxa) than recorded in May 2004 but very similar to that of November 2004. The result is partly due to more dip net samples (18) being taken in May 2004 because more habitats were available to sample but it also a simple reduction in the

number of individuals and the number of taxa per sample. Very few sites showed increases in either abundance; Belah Waterhole was the only notable exception, or diversity. The degree of change was generally less at reference sites except for the decrease in diversity at Tinnenburra.

Floodplain sites often showed higher abundance than riverine sites with the notable exceptions of Clyde Lagoon and Chinaman Ck. When compared to the results of either May 2004 or November 2003, all numbers are quite low.

The most common taxa in surbers were ceratopogonids, copepods, ostracods, Chironominae and corixids. These taxa provided 81.2% of the total catch with the top two providing 37.5% and 15.8% respectively. The most common taxa in dip nets were cladocerans, copepods, Chironominae, acarines and ostracods. These taxa provided 90.8% of the total catch with cladocerans alone providing 71.4%. The latter were largely from one macrophyte sample at Clyde Lagoon.

#### **4.5 Current Status**

The flows of summer 2004 were not followed by further substantial flows with only a minor flow event occurring in December 2004. This was not a flood flow and would only have entered the very lowest of secondary channels.

That flow does appear to have partly relieved water quality stresses associated with drying waterholes in the river. Some floodplain sites must have received significant runoff from local storm events because the water levels had not reduced since sampled in November 2004. No immigration of aquatic fauna will have occurred so those systems are still essentially operating as closed systems. Bird life around some waterholes and farm storages was abundant with the majority being waterbirds that feed on fish and crustaceans.

The fish species complement is in line with historical results but the recording of Cod at 65mm and 300mm length is both unusual and encouraging. The continued decline in the relative abundance of introduced species since the peak after the flows of summer 2004 is also encouraging. 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. The very dry environment, the differing degree of severity of drying at the various sites and the variation in the extent of impact from watering stock are likely causes of the current results. The number of small yabbies was the largest seen since sampling commenced.

### **5. References**

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