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1. Introduction

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

At the time of sampling in November 2004, the area had seen no further flows since those recorded in the report of May 2004, those flows having occurred mainly in January/February of 2004. Some of the sites sampled in May no longer held any standing water while many others were at very low levels, often as low as seen at the height of the drought. This might be as a result of a number of factors, including;

- A significant proportion of the flow was harvested by water supply schemes throughout the Condamine Balonne as it was the first significant opportunity to do so for a number of years.
- Some of the floodwater simply passed through this part of the system, as it would naturally.
- As the flood was at the very lower end of the “moderate” scale, it did not reach large areas of floodplain hence these areas remained dry.
- The flood may not have been sufficient to recharge local aquifers and these may have drawn on the surface water remaining after the flood and hastened the reduction in water levels.
- The riparian and floodplain vegetation had been very dry and may have replenished its’ tissue water levels and used more water than usual to promote growth and flowering.

2. Methods

Eighteen riverine and twelve floodplain sites were sampled between 5 November and 23 November 2004. 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. For sites added since June 2000, riparian zones and stream physical habitat will need to be described according to State of the Rivers protocols in the near future.

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

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 sampling events and a herb line existed about 15cm (vertical distance) above the water line. The areas of rock and shrub that often constitute islands were fully connected to the shore, indicating a lower water level than usual.

3.1.1 Water quality

Overnight logging of water quality parameters was undertaken and some 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: 22.3 – 25.1°C

Dissolved oxygen: 89 – 102 % sat, 7.6 – 8.5 mg/l

pH: 7.1 – 8.0

Conductivity: 158 – 165 µS/cm

Turbidity: >600 NTU.

All parameters showed higher levels than in May. Spot water quality profiling was undertaken at the logger site. Only the deepest water showed stratification.

■ **Table 31.1 Water quality depth profiling at St George in November 2004.**

Sample Time	Depth (m)	Temp. (°C)	Dissolved Oxygen (%sat)	Conductivity (µS/cm)	Turbidity (NTU)	pH
0700	Surface	22.3	93	162	>600	7.8
	1.0	22.3	94	162	>600	7.8
	2.0	22.3	86	166	>600	7.7
	3.0	20.5	54	200	>600	7.5

3.1.2 Macrophytes

Some patches of *Ludwigia* were present, the largest being 5m x 4m. A narrow herb line grew about 15cm (vertical distance) above the water line.

3.1.3 Fish

All nets were set at this site. **Table 3-1.2** shows the catch by netting technique. The result of eight native species (with *Hypseleotris* species counted separately) and two introduced for a total catch of 150 individuals is good when compared to previous sampling events, particularly when recalling that the seine net has not always been used at this site. Two species captured in May were not captured in November, *Tandanus* and *Gambusia*, while Rainbowfish, Hyrtl's Tandan and Goldfish had not been captured in May. Many fewer Bony Bream and more Smelt were captured compared to the May sample.

■ **Table 3-1.2 Results of fishing at St George in November 2004, by fishing method**

Species	Common name	Gill nets	Seine nets	Fyke nets	Bait traps	Dip net	Total Numbers caught
<i>Macquaria ambigua</i>	Yellowbelly			5			5
<i>Nematolosa erebi</i>	Bony Bream	2	18	10			30
<i>Leioptherapon unicolor</i>	Spangled Perch			3			3
<i>Retropinna semoni</i>	Smelt		71				71
<i>Hypseleotris klunzingeri</i>	Western Carp Gudgeon		24		2		26
<i>Hypseleotris sp.IV</i>	Sp 4		1				1
<i>Melanotaenia fluviatilis</i>	Rainbowfish			1			1
<i>Neosilurus hyrtlii</i>	Hyrtl's Tandan			4			4
<i>Cyprinus carpio</i>	Carp	1		5			6
<i>Carrasius auratus</i>	Goldfish			3			3
Total Numbers		3	114	31	2		150

The fishing techniques also captured one river turtle (*Emydura*) and 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 *Ludwigia*. A total of 27 discrete (non-overlapping) taxa were identified, 20 from the surbers and 16 from the dip net (**Table 3-1.3**). Bait traps also collected 20 *Macrobrachium* and they were common in the seine haul. The surber fauna was dominated by ceratopogonids, copepods, corixids and oligochaetes while copepods, palaeomonids and tanypodids dominated the dip net. Taxa captured by the dip net but not in surbers included palaeomonids, planorbids, baetids and pyralids (moths). Oligochaetes and nematodes were not caught in the dip net but were captured in the surber.

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

	Edge surber		Macrophyte
	Mean	Stddev	dip
Spaeriidae	0.2	0.4	
Ancylidae	0.2	0.4	10
Planorbidae			20
Atyidae			150
Dytiscidae	0.2	0.4	
Elmidae			10
Hydrophilidae			10
Ostracoda	4.4	6.8	60
Copepoda	6.2	6.6	170
Cladocera	0.8	1.3	
s-f Chironominae	1.0	1.7	10
s-f Tanypodinae	2.6	2.7	70
s-f Orthocladiinae	0.4	0.5	30
Ceratopogonidae	15.4	17.4	30

Muscidae	0.4	0.5	
Stratiomyidae			20
Caenidae	1.0	1.4	
Baetidae			60
Corixidae	5.8	6.3	20
Coenagrionidae	0.2	0.4	40
Gomphidae	0.8	0.4	
Ecnomidae	0.2	0.4	
Leptoceridae	0.8	0.8	
Pyralidae			20
Nematoda	2.4	0.9	
Oligochaeta	6.4	4.7	
Taxa	10.6	2.9	16
Abundance	49.6	37.5	720
Total taxa	19		27

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 much shallower such that most tree roots on the western bank were fully exposed. There were no macrophytes or tufts of filamentous green alga but a fine algal film was present on the sand. The area was obviously frequented by recreational fishers and campers.

The site was generally very shallow, though small areas reached about 1m. There was no flow at the time of sampling.

3.2.1 Water quality

Overnight logging of water quality parameters was undertaken and some 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: 20.3 – 25.4°C

Dissolved oxygen: 70 – 106 % sat, 6.3 – 8.6 mg/l

pH: 7.0 – 7.9

Conductivity: 176 – 181 µS/cm

Turbidity: >600NTU.

Results from spot water quality profiling are shown in Table 3.2.1. Slight stratification was evident.

■ **Table 32.1 Water quality depth profiling at Mooramanna in November 2004.**

Sample Time	Depth (m)	Temp. (°C)	Dissolved Oxygen (%sat)	Conductivity (µS/cm)	Turbidity (NTU)	pH
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1000	Surface	23.5	78	179	>600	7.4
	1.0	20.2	72	180	>600	6.9

3.2.2 Macrophytes

Juncus sp. was present on the edge and a green algal film was common on the bed in shallow areas.

3.2.3 Fish

Table 3-2.2 shows the fish catch by netting technique. All nets were set.

■ Table 32.2 Fish catch by fishing technique at Mooramanna in May 2004.

Species	Common name	Gill nets	Seine net (1)	Fyke nets	Bait traps	Dip net	Total Numbers caught
<i>Macquaria ambigua</i>	Yellowbelly	2		2	1		5
<i>Nematolosa erebi</i>	Bony Bream		72	3			75
<i>Hypseleotris klunzingeri</i>	Western Carp Gudgeon		23		5		28
<i>Hypseleotris</i> sp IV	Sp 4				3		3
<i>Melanotaenia fluviatilis</i>	Rainbowfish		2	4			6
<i>Retropinna semoni</i>	Smelt		12				12
<i>Cyprinus carpio</i>	Carp	1					1
<i>Carrasius auratus</i>	Goldfish		1				1
<i>Gambusia holbrooki</i>	Mosquitofish		3				3
Total Numbers		3	113	9	9		134

Six native fish species (five if *Hypseleotris* is pooled) and three introduced were captured, predominantly in the seine net. The number of fish captured on this occasion is similar to previous catches. Four river turtles were captured in a fyke net.

3.2.4 Macroinvertebrates

Surber samples were collected from sand/gravel and silt substrates on different sides of the river. Nineteen discrete taxa were recorded at the site with caenid mayflies, ceratopogonids and corixids the most common (Table 3-2.3). While the caenids were captured in all surbers, they were highly abundant in two. Bait traps collected 69 *Macrobrachium*. The seine haul captured numerous *Macrobrachium*.

■ Table 32.3 Numbers of aquatic macroinvertebrates recorded from Mooramanna

	Edge surber	
	Mean	Stddev
Spaeriidae	1.8	2.5
Ancylidae	0.8	1.8
Dytiscidae	1.2	2.2
Elmidae	0.2	0.4

Ostracoda	8.4	11.1
Copepoda	4.2	7.8
Cladocera	0.2	0.4
s-f Chironominae	29.8	33.2
s-f Tanypodinae	15.8	8.8
s-f Orthoclaadiinae	0.2	0.4
Ceratopogonidae	52.8	45.0
Caenidae	250.4	364.9
Baetidae	1.6	2.6
Corixidae	37.2	30.4
Gomphidae	1.0	2.2
Ecnomidae	0.2	0.4
Leptoceridae	0.8	1.1
Nematoda	1.4	2.1
Oligochaeta	7.4	3.1
Taxa	10.4	2.1
Abundance	415.4	407.5
Total taxa	19	

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 flat camping area is reasonably cleared with only a thin line of young melaleuca at the water's edge, though this improves upstream. The left bank is better treed. No Melaleuca roots trailed in the water but vegetation overhang was significant on the left bank. The pool was approximately 60m across and the sampling gear was spaced over about 150m. No algal scum was present. Filamentous algal tufts were common and occasionally sloughed off and floated on the surface. Small numbers of cattle had been accessing the water. There was no flow.

3.3.1 Water quality

Both overnight logging and depth stratified sampling of water quality parameters was undertaken at this site. Little variation was evident in the logged data. The recorded ranges for each parameter were:

Temperature: 21.2 – 24.8°C

Dissolved oxygen: 77 – 102 % sat; 6.4 – 8.5mg/l

pH: 7.8 - 8.4

Conductivity: 153 – 160 µS/cm

Turbidity: >600NTU.

Results from spot water quality profiling are shown in Table 3-3.1.

■ **Table 33.1 Water quality depth profiling at Whyenbah in November 2004.**

Sample Time	Depth (m)	Temp. (°C)	Dissolved Oxygen (%sat)	Conductivity (µS/cm)	Turbidity (NTU)	pH
0715	Surface	21.3	88	159	>600	7.9
	1.0	21.2	88	159	>600	8.2

3.3.2 Macrophytes

Juncus occurred above the water line in patches. Small tufts of submerged alga were noted in shallow water. A small patch 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 3-3.2**.

■ **Table 33.2 Results of fishing the Balonne River at Whyenbah in November 2004, by fishing method**

Species	Common name	Gill nets	Seine net (1)	Fyke nets	Bait traps	Dip net (0)	Total Numbers caught
<i>Macquaria ambigua</i>	Yellowbelly			1			1
<i>Nematolosa erebi</i>	Bony Bream	2	34	1			37
<i>Hypseleotris klunzingeri</i>	Western Carp Gudgeon		23				23
<i>Melanotaenia fluviatilis</i>	Rainbowfish			2			2
<i>Retropinna semoni</i>	Smelt		74				74
<i>Neosilurus hyrtlil</i>	Hyrtl's Tandan			1			1
<i>Bidyanus bidyanus</i>	Silver Perch	2					2
<i>Cyprinus carpio</i>	Carp	1					1
Total Numbers		5	131	5	0		141

The catch of 7 native species and one introduced is in line with previous catches. The Silver Perch measure 362 and 392mm and were in a healthy condition. Many more Smelt, Bony Bream and Carp Gudgeon were captured on this occasion and this change in relative abundance from one season to the next occurs commonly.

3.3.4 Macroinvertebrates

Surber samples were collected from sandy/silt and silt substrates and some samples included leaf litter and algal tufts. A dip net sample was collected from *Ludwigia*. Twenty-two discrete taxa were identified. Corixids, ostracods, oligochaetes and tanypodids were the most common taxa in surber samples (**Table 3-3.3**) while tanypodid and orthoclad chironomids were well represented in the dip net sample. Forty-seven prawns were captured in bait traps.

■ **Table 33.3 Numbers of aquatic macroinvertebrates recorded from the Balonne River at Whyenbah**

	Edge surber	<i>Ludwigia</i>
	Mean	Stddev
Spaeriidae	0.6	0.9
		dip

Hydrophilidae	3.2	4.3	
Dytiscidae	0.4	0.5	
Elmidae	0.4	0.9	
Parastacidae	0.2	0.4	
Ostracoda	42.2	53.2	10
Copepoda	1.0	1.4	
Cladocera	2.2	2.5	
s-f Chironominae	7.8	8.4	30
s-f Tanypodinae	12.0	10.7	210
s-f Orthoclaadiinae	0.4	0.5	190
Ceratopogonidae	3.4	3.5	40
Tabanidae	0.2	0.4	
Caenidae	8.4	15.5	10
Baetidae	2.6	2.7	20
Corixidae	99.8	61.8	10
Notonectidae	0.2	0.4	10
Gomphidae	0.4	0.5	
Hydroptilidae	0.4	0.5	
Leptoceridae	1.4	1.3	20
Acarina	1.8	1.9	
Oligochaeta	27.6	43.4	
Taxa	12.4	3.6	10
Abundance	216.6	135.0	550
Total taxa	22		22

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. When sampled in May 2004 the depth had reached 2m in places and the river was flowing well. A solid tree had fallen across the river at the upstream end and a sand dam had formed. By 2004 November the site consisted of a series of very shallow isolated pools, as it had done in November 2003. 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. Grass cover on the banks was good except in very steep areas.

3.4.1 Water quality

Logged water quality data was collected from near a large tree at the entrance point.

The recorded ranges for each parameter were:

Temperature: 16.1 – 26.2°C

Dissolved oxygen: 64 – 94 % sat; 6.1 – 7.5mg/l

pH: 7.0 - 8.3

Conductivity: 223 – 230 µS/cm

Turbidity: >600NTU.

3.4.2 Macrophytes

No macrophytes were present.

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, with Smelt and Carp not captured in May but Spangled Perch not captured in November (**Table 3-4.1**). Carp measured up to 318mm and Yellowbelly to 271mm, suggesting that seine netting in these small pools captures most of the fish present, irrespective of their size.

■ **Table 34.1 Results of fishing the Culgoa River at Whyenbah in November 2004, 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		4				4
<i>Nematolosa erebi</i>	Bony Bream		56				56
<i>Hypseleotris klunzingeri</i>	Western Carp Gudgeon		18				18
<i>Retropinna semoni</i>	Smelt		13				13
<i>Melanotaenia fluviatilis</i>	Rainbowfish		21				21
<i>Cyprinus carpio</i>	Carp		3				3
<i>Gambusia holbrooki</i>	Mosquitofish		1				1
Total Numbers		N/A	113	N/A	0		113

3.4.4 Macroinvertebrates

Four surber samples were collected from coarse sand and one from fine compact silt. Eighteen discrete taxa were recorded at the site with copepods, corixids and tanypodids being most common (**Table 3-4.2**). Bait traps captured 12 prawns and 15 yabbies (Parastacidae).

■ **Table 34.2 Numbers of aquatic macroinvertebrates recorded from Culgoa River at Whyenbah**

	Edge surber	
	Mean	Stddev
Dytiscidae	0.6	0.9
Elmidae	0.2	0.4
Parastacidae	0.2	0.4
Ostracoda	0.4	0.9
Copepoda	15.6	3.7
Cladocera	6.4	13.8
s-f Tanypodinae	6.6	5.3
Ceratopogonidae	1.8	2.5
Tabanidae	0.2	0.4
Culicidae	0.4	0.9
Caenidae	2.0	2.0
Baetidae	0.4	0.5
Corixidae	14.6	13.3
Notonectidae	1.4	2.6

Gelastocoridae	0.2	0.4
Gomphidae	0.2	0.4
Leptoceridae	0.8	0.8
Oligochaeta	0.8	1.3
Taxa	8.2	1.9
Abundance	52.8	21.7
Total taxa	18	

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 at the lower bend in the site had reformed after having been washed away in February. The substrate tends to be very compact clay. The site had been heavily fished shortly after the February flood, so Cubbie Station had closed the area to fishing and shooting.

Water levels were the lowest seen at the site. The river consisted of a series of disconnected pools, the deepest parts of which reached 1m and the river was up to 10m wide but more usually less than 5m. A strong algal fringe was present.

3.5.1 Water quality

Results from spot water quality profiling are shown in Table 3-5.1. The water column was well mixed. The pH was noticeably lower than at sites upstream.

■ **Table 35.1 Water quality depth profiling at Cubbie in November 2004.**

Sample Time	Depth (m)	Temp. (°C)	Dissolved Oxygen (%sat)	Conductivity (µS/cm)	Turbidity (NTU)	pH
0900	Surface	19.3	61	194	>600	6.3
	0.75	19.2	60	191	>600	6.0

3.5.2 Macrophytes

No macrophytes or fringing aquatic plants were observed.

3.5.3 Fish

All nets bar one gill net were set at the site. Six native species and two introduced were identified in a catch of 53 individuals. As had been the case in May, good-sized Yellowbelly were captured in the gill nets while Silver Perch were again captured, but in the fyke net (fork lengths of 85mm and 122mm).

■ **Table 35.2 Results of fishing the Culgoa River at Cubbie in November 2004, by fishing method**

Species	Common name	Gill nets (3)	Seine net (1)	Fyke nets	Bait traps	Dip net	Total Numbers caught
<i>Macquaria ambigua</i>	Yellowbelly	11		5			16
<i>Bidyanus bidyanus</i>	Silver perch			2			2
<i>Leioptherapon unicolor</i>	Spangled Perch			1			1
<i>Nematolosa erebi</i>	Bony bream	2	2	3			7
<i>Retropinna semoni</i>	Smelt		6				6
<i>Melanotaenia fluviatilis</i>	Rainbowfish		8				8
<i>Cyprinus carpio</i>	Carp	1		10			11
<i>Carassius auratus</i>	Goldfish			2			2
Total Numbers		14	16	23	0		53

3.5.4 Macroinvertebrates

Surber samples were collected from compact clay on the edge and included bath-tub ring alga when present. No dip net samples were collected. Seventeen discrete taxa were identified from the edge habitat. The most common elements were corixids, tanypodids and copepods. Bait traps collected 13 *Macrobrachium* and two *Cherax*.

■ **Table 35.2. Numbers of aquatic macroinvertebrates recorded from Culgoa River at Cubbie**

	Edge surber	
	Mean	Stdev
Ancylidae	0.4	0.5
Dytiscidae	0.4	0.5
Haliplidae	0.2	0.4
Parastacidae	0.6	0.9
Ostracoda	1.0	1.0
Copepoda	5.0	6.2
s-f Chironominae	0.2	0.4
s-f Tanypodinae	24.4	9.2
Ceratopogonidae	3.6	3.7
Tabanidae	0.2	0.4
Caenidae	0.8	0.8
Baetidae	1.4	2.1
Corixidae	43.0	32.6
Libellulidae	0.6	0.9
Leptoceridae	0.2	0.4
Oligochaeta	2.2	1.3
Nematoda	0.8	0.8
Taxa	9.8	1.3
Abundance	85.0	26.0
Total taxa	17	

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. On the eastern side, the riparian zone on the top levee is relatively thick and includes red gum, coolibah, cooba, and some Belah. A fence runs about 12m from the top levee and separates grazed country that was partly cleared many years ago and contains significant roly-poly. The riparian zone on the western side is not fenced and consists of coolibah woodland. The river was not flowing when sampled but consisted of separate long, shallow (<0.5m) pools. There were no macrophytes and fringing algae varied from being reasonably dense to being not present. Pig tracks were common.

3.6.1 Water quality

Results from spot water quality profiling are shown in Table 3-6.1. The results appear to reflect a system which is drying out, including higher conductivity and pH than was observed at the Cubbie site.

■ **Table 36.1 Water quality depth profiling at Woolerbilla in November 2004.**

Sample Time	Depth (m)	Temp. (°C)	Dissolved Oxygen (%sat)	Conductivity (µS/cm)	Turbidity (NTU)	pH
1100	Surface	28.2	81	280	>600	8.1

3.6.2 Macrophytes

No macrophytes or fringing aquatic plants were noted.

3.6.3 Fish

Only seine hauls were undertaken due to the shallow water. Five native fish species plus three introduced were captured. This is the highest species count recorded at Woolerbilla but the proportion of the catch represented by introduced species is high with Goldfish dominating as it has done traditionally (**Table 3-6.2**). The Goldfish were between 20mm and 40mm in length (most less than 27mm) while the Yellowbelly, Bony Bream and Carp were between 166mm and 205mm.

■ **Table 36.2 Results of fishing the Culgoa River at Woolerbilla in November 2004, 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		1				1
<i>Nematolosa erebi</i>	Bony Bream		4				4
<i>Retropinna semoni</i>	Smelt		1				1
<i>Melanotaenia fluviatilis</i>	Rainbowfish		1				1
<i>Hypseleotris klunzingeri</i>	Western Carp Gudgeon		1				1
<i>Cyprinus carpio</i>	Carp		1				1
<i>Carassius auratus</i>	Goldfish		18				18
<i>Gambusia holbrooki</i>	Mosquitofish		3				3
Total Numbers		NA	30	NA	NA		30

3.6.4 Macroinvertebrates

No specialised habitats were available for sampling. Surber samples were collected from compact clay/silt (3) or loose silt (2). Eighteen discrete taxa were identified with corixids and micro-crustacea most common (**Table 3-6.3**). Prawns were captured in the seine hauls.

■ **Table 36.3 Numbers of aquatic macroinvertebrates recorded from the Culgoa River at Woolerbilla**

	Edge surber	
	Mean	Stddev
Dytiscidae	0.2	0.4
Hydrophilidae	0.2	0.4
Parastacidae	0.4	0.9
Ostracoda	12.2	11.4
Copepoda	20.0	14.3
Cladocera	9.4	8.7
s-f Chironominae	1.0	1.7
s-f Tanypodinae	0.6	0.9
Ceratopogonidae	8.2	4.3
Muscidae	0.2	0.4
Tabanidae	0.2	0.4
Baetidae	2.8	0.8
Caenidae	0.4	0.5
Corixidae	42.0	26.5
Notonectidae	0.2	0.4
Libellulidae	0.2	0.4
Leptoceridae	0.4	0.5
Nematoda	0.6	0.9
Oligochaeta	2.0	1.6
Taxa	10.0	1.4
Abundance	156.6	83.4
Total taxa	18	

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 pools were about 20m x 5m and about 20cm deep. Pigs and other animals were accessing the pools. The more upstream pool was sampled.

3.7.1 Water quality

Spot water quality readings were collected from the centre of the sampled pool and the rising conductivity and pH possibly reflect the remnant nature of the pool.

■ **Table 37.1 Spot water quality at Balandool in November 2004.**

Sample Time	Depth (m)	Temp. (°C)	Dissolved Oxygen (%sat)	Conductivity (µS/cm)	Turbidity (NTU)	pH
1230	Surface	26.5	72	292	>600	9.0

3.7.2 Macrophytes

No macrophytes or algal fringe were visible.

3.7.3 Fish

Seine netting was the only possible sampling technique at this site. Three native species and two introduced were recorded. The species complement was the same as in May except Smelt had not been captured then while Spangled Perch had been. Previous samples had captured four, six and three native species respectively. Most fish captured were large, for example three Yellowbelly measured 345mm, 349mm and 365mm while the carp were between 206mm and 225mm. The fish were in a healthy condition.

■ **Table 37.2 Results of fishing the Culgoa River at Balandool in November 2004, 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		4				4
<i>Nematolosa erebi</i>	Bony Bream		2				2
<i>Retropinna semoni</i>	Smelt		1				1
<i>Cyprinus carpio</i>	Carp		3				3
<i>Gambusia holbrooki</i>	Mosquitofish		1				1
Total Numbers		N/A	11	N/A	N/A		11

3.7.4 Macroinvertebrates

Surber samples were collected from compact mud substrate. Fourteen discrete taxa were recorded (**Table 3-7.3**). The fauna was dominated by copepods, ceratopogonids and corixids. *Macrobrachium* were common in the seine hauls.

■ **Table 37.3 Numbers of aquatic macroinvertebrates recorded from the Culgoa River at Balandool.**

	Edge surber	
	Mean	Stddev
Ostracoda	1.0	1.4
Copepoda	71.8	64.5
Cladocera	10.6	7.3
Parastacidae	0.2	0.4
s-f Chironominae	2.8	2.5
s-f Tanypodinae	3.4	0.5
Ceratopogonidae	61.6	45.7
Tabanidae	0.2	0.4

Baetidae	0.2	0.4
Caenidae	1.6	1.3
Corixidae	29.2	22.9
Notonectidae	0.6	0.5
Nematoda	0.6	0.9
Oligochaeta	1.8	2.5
Taxa	9.2	1.8
Abundance	185.6	100.1
Total taxa		14

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 section with more sand and gravel than the pool upstream. The riffle has usually been flowing during sampling in May but not in November. In November 2004 the water level was the lowest since sampling commenced in June 2000, being about 1.5m below the level needed to commence flow in the riffle. While the pool under the tarzan swing was nearly 1.5m deep, most was less than 0.5m deep. Only a limited algal fringe was present and while many snags were exposed, there were still many covered by water.

3.8.1 Water quality

Spot water quality readings were taken near the tarzan swing (**Table 3-8.1**). Mild stratification was evident.

■ **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
1245	Surface	21.0	69	150	>600	7.7
	1.0	18.0	44	151	>600	7.7

3.8.2 Macrophytes

No macrophytes or algae were present.

3.8.3 Fish

All nets were used at this site. Four native species and three introduced were identified from a total of 96 fish. Sampling in May 2004 recorded 6 native species being those shown below except Smelt but with the addition of Spangled Perch, Eeltailed catfish (a single individual) and Rainbowfish. One river turtle and a long-neck turtle were captured in a fyke net. Yellowbelly captured in the fyke nets were 53mm and 89mm in length.

■ **Table 38.2 Results of fishing the Balonne Minor River at Meigunyah in November 2004, by fishing method**

Species	Common name	Gill nets	Seine net	Fyke nets	Bait traps	Dip net	Total Numbers caught
<i>Macquaria ambigua</i>	Yellowbelly	3		2			5
<i>Nematolosa erebi</i>	Bony Bream		7	12			19
<i>Hypseleotris klunzingeri</i>	Western Carp Gudgeon		2				2
<i>Retropinna semoni</i>	Smelt		46				46
<i>Cyprinus carpio</i>	Carp	2	3	11	6		22
<i>Carrasius auratus</i>	Goldfish		1				1
<i>Gambusia holbrooki</i>	Mosquitofish		1				1
Total Numbers		5	60	25	6		96

3.8.4 Macroinvertebrates

Surber samples were collected from compact silt (2) and sandy gravel (3). Nineteen discrete taxa were recorded (**Table 3-8.3**). The most common elements were ostracods, ceratopogonids and corixids. Bait traps collected 7 prawns and 1 yabby. Prawns were highly abundant in the seine haul.

■ **Table 38.3 Numbers of aquatic macroinvertebrates recorded from the Balonne Minor at Meigunyah**

	Edge surber	
	Mean	Stddev
Ancylidae	0.2	0.4
Dytiscidae	0.2	0.4
Parastacidae	0.8	1.8
Ostracoda	51.0	70.3
Copepoda	2.6	2.4
Cladocera	0.6	0.9
s-f Chironominae	1.4	1.1
s-f Tanypodinae	11.0	7.1
Ceratopogonidae	45.8	58.7
Muscidae	0.4	0.5
Tabanidae	1.0	1.7
Caenidae	2.6	3.1
Baetidae	1.0	1.4
Corixidae	27.6	32.3
Notonectidae	1.0	1.2
Gomphidae	0.2	0.4
Ecnomidae	0.2	0.4
Leptoceridae	1.2	1.3
Oligochaeta	1.6	1.5
Taxa	10.6	3.5
Abundance	150.4	140.2
Total taxa	19	

3.9 Balonne Minor at Trafalgar

This site is at the upper end of the weir pool. The water was much shallower than on any previous occasion such that no lignum and many fewer tree trunks were submerged. Filamentous green alga was common where the water surface met the stems of trees, snags or along the bank. A light filamentous algal scum covered 25% of the pool. Cubbies intake channel marks the lower end of the site and they were undertaking maintenance works on the channel at the time of sampling. A coffer dam separated the works from the weir pool.

3.9.1 Water quality

Spot readings are shown in Table 3-9.1. Stratification may have become more significant later in the day and the dissolved oxygen in surface waters would probably increase markedly as a result of the high algal content.

■ 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
0800	Surface	20.7	45	182	>600	7.4
	1.0	18.6	25	182	>600	7.2

3.9.2 Macrophytes

No macrophytes were observed but a filamentous algal fringe was strongly developed.

3.9.3 Fish

All nets were used at this site. Three native species and three introduced were captured. Fish captured in gill nets were healthy and good sized, with Yellowbelly to 413mm and Bony Bream to 381mm. The two Yellowbelly captured in the seine haul were 65mm long and 79mm long respectively. A broad shelled turtle (*Chelodina expansa*) was captured in a fyke net.

■ Table 39.2 Results of fishing the Balonne Minor at Trafalgar in November 2004.

Species	Common name	Gill	Seine	Fyke nets	Bait traps	Dip	Total Numbers
<i>Macquaria ambigua</i>	Yellowbelly	8	2				10
<i>Nematolosa erebi</i>	Bony Bream	3	22	9			34
<i>Retropinna semoni</i>	Smelt		3				3
<i>Cyprinus carpio</i>	Carp	1	2	9	1		13
<i>Carrasius auratus</i>	Goldfish		1				1
<i>Gambusia holbrooki</i>	Mosquitofish		4				4
Total Numbers		12	34	18	1		65

3.9.4 Macroinvertebrates

Five surbers were collected from areas of deep silt with filamentous algae and occasional leaf litter. Twenty taxa were recorded with common taxa including

ceratopogonids, culicids (mosquitos), tanypodids and oligochaetes (**Table 3-9.3**).
Twenty-nine prawns were captured in bait traps.

■ **Table 39.3 Numbers of aquatic macroinvertebrates recorded from the Balonne Minor at Trafalgar.**

	Edge surber	
	Mean	Stddev
Physidae	0.2	0.4
Hydraenidae	0.2	0.4
Hydrophilidae	1.4	3.1
Dytiscidae	0.4	0.9
Parastacidae	0.4	0.5
Ostracoda	1.4	2.2
Copepoda	13.2	18.1
Cladocera	3.6	6.4
s-f Chironominae	3.0	4.5
s-f Tanypodinae	22.8	27.1
Ceratopogonidae	58.0	99.5
Culicidae	53.6	83.2
Tabanidae	4.0	6.3
Caenidae	2.4	4.3
Baetidae	1.6	2.3
Corixidae	21.6	14.7
Notonectidae	0.4	0.9
Ecnomidae	0.2	0.4
Leptoceridae	0.2	0.4
Oligochaeta	19.2	24.6
<hr/>		
<i>Taxa</i>	10.2	3.3
<i>Abundance</i>	207.8	150.1
<i>Total taxa</i>	20	

3.10 Donegri Ck (Narran River) at Dirranbandi

The site conditions were as per earlier descriptions but the water level was very low. The substrate of black clay varied from being very compact in shallow “riffle” areas to being very soft in pools. Some pools showed significant green colouration and surface scum. Quite a few snags were still submerged and green filamentous algae was well developed but in patches.

3.10.1 Water quality

Spot water quality readings were recorded near the red gum with a mass of exposed roots (**Table 3-10.1**). The water was strongly thermally stratified.

■ **Table 3-10.1 Spot water quality readings – Donegri Creek**

Sample Time	Depth (m)	Temp. (°C)	Dissolved Oxygen (%sat)	Conductivity (µS/cm)	Turbidity (NTU)	pH

1415	Surface	27.1	96	181	>600	7.9
	1.0	18.5	76	179	>600	8.6

3.10.2 Macrophytes

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

3.10.3 Fish

All nets were set at this site. Four native species and one introduced were captured. A small long-neck turtle was captured in a fyke net.

■ **Table 310.2 Results of fishing at Donegri Creek in November 2004, 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			3			3
<i>Nematolosa erebi</i>	Bony Bream	1	8	2			11
<i>Bidyanus bidyanus</i>	Silver Perch			1			1
<i>Neosilurus hyrtlii</i>	Hyrtl's tandan			1			1
<i>Cyprinus carpio</i>	Common Carp	1		1			1
Total Numbers		2	8	8			18

3.10.4 Macroinvertebrates

Surbers were collected from both compact and soft mud substrate. Twenty-two discrete taxa were recorded with the most abundant being corixids, copepods and caenids (Table 3-10.3). Bait traps captured 7 prawns.

■ **Table 310.3 Numbers of aquatic macroinvertebrates recorded from Donegri Creek (Narran River)**

	Edge Surber	
	Mean	Stdev
Spaeriidae	0.2	1.0
Ancylidae	2.2	1.1
Parastacidae	1.0	1.0
Ostracoda	2.0	2.9
Copepoda	19.6	34.0
Cladocera	0.8	0.8
s-f Chironominae	0.6	0.9
s-f Tanypodinae	6.0	6.5
s-f Orthocladiinae	0.2	1.0
Ceratopogonidae	0.2	1.0
Culicidae	5.4	27.0
Tabanidae	0.8	0.8
Muscidae	0.2	1.0
Caenidae	6.8	6.1
Baetidae	4.6	4.4
Corixidae	15.6	14.5
Notonectidae	2.6	3.2
Gomphidae	0.2	1.0

Libellulidae	0.2	1.0
Hydroptilidae	0.2	1.0
Leptoceridae	0.6	3.0
Oligochaeta	2.2	2.9
Taxa	10.6	2.9
Abundance	72.2	50.7
Total taxa	22	

3.11 Narran River at Clyde

This site consisted of an elongate shallow pool with some small submerged snags and coolibah roots but no fibrous tree roots, no macrophytes and a very limited filamentous algal ring. Maximum depth reached 0.5m but most was much shallower. There was no evidence of recent access by cattle or pigs.

3.11.1 Water quality

The results of spot measurements are shown in **Table 3-11.1**. The water column was well mixed and highly turbidity. The water quality reflects the shallow open nature of the pool.

■ **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
1300	Surface	25.5	90	295	>600	8.2
	0.5	24.3	83	292	>600	7.8

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 two native species and one introduced (**Table 3-11.2**). Sampling in November 2003 was similarly restricted to a seine haul only and five native species (Yellowbelly, Bony Bream, Smelt, Carp Gudgeon (*H. klunzingeri*) and *H. sp4*) plus Mosquitofish were recorded. Smelt accounted for 157 of the 169 specimens captured at that time. In May 2004 no Smelt or Carp Gudgeon were recorded but Hyrtl's tandan was in a catch of three native species and three introduced.

■ **Table 311.2 Results of fishing the Narran River at Clyde in November 2004, by fishing method**

Species	Common name	Gill nets	Seine net (2)	Fyke nets	Bait traps	Dip net	Total Numbers caught
<i>Nematolosa erebi</i>	Bony Bream		12				12
<i>Melanotaenia fluviatilis</i>	Rainbowfish		1				1

<i>Gambusia holbrooki</i>	Mosquitofish		6				6
Total Numbers		N/A	19	N/A	N/A		19

3.11.4 Macroinvertebrates

No specialised habitats were available to sample at this site. The surbers were all collected from firm clay. Sixteen discrete taxa were recorded with copepods, corixids and ceratopogonids most common (**Table 3-11.3**). Prawns, yabbies and particularly nepids were abundant in the seine hauls.

■ **Table 311.3 Numbers of aquatic macroinvertebrates recorded from the Narran River at Clyde**

	Edge Surber	
	Mean	Stdev
Dytiscidae	0.2	0.4
Ostracoda	5.8	5.4
Copepoda	43.6	24.1
Cladocera	2.0	2.5
Palaemonidae	0.4	0.5
s-f Chironominae	0.4	0.5
s-f Tanypodinae	0.2	0.4
Ceratopogonidae	7.6	5.3
Culicidae	0.4	0.5
Tabanidae	0.2	0.4
Caenidae	1.6	1.1
Corixidae	11.4	15.1
Notonectidae	0.2	0.4
Libellulidae	0.2	0.4
Nematoda	0.2	0.4
Oligochaeta	4.2	3.1
Taxa	8.4	1.7
Abundance	78.6	44.2
Total Taxa		16

3.12 Narran River at Booligar

The water level was very low, similar to November 2003, and only the main pool and a smaller one about 60m upstream remained. The main pool was approximately 40m x 18m x perhaps 1.5m deep in parts. The upstream pool was 20m x 6m x 0.2m. No macrophytes or filamentous algal fringe were noted and no snags were observed in the water. Cattle access did not appear recent and there was no evidence of other animals using the pool.

3.12.1 Water quality

Spot water quality readings were collected from near the centre of the main pool (Table 3-12.1). Dissolved oxygen and pH showed strong stratification.

■ 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
1100	Surface	22.1	72	230	>600	7.3
	1.0	19.0	32	238	>600	6.7

3.12.2 Macrophytes

No macrophytes or filamentous algae were observed.

3.12.3 Fish

Gill nets were not set due to the lack of deep water. Five native species and two introduced were captured (Table 3-12.2). One specimen of *Gambusia* was captured in a third seine haul which is not reported here. Many fewer Yellowbelly and Bony Bream and more Carp and Goldfish were captured relative to the May sample. The Carp were predominantly between 290mm and 360mm with one specimen of 622mm. The Yellowbelly were between 110mm and 190mm.

■ Table 312.2 Results of fishing the Narran River at Booligar in November 2004.

Species	Common name	Gill nets	Seine net (2)	Fyke nets	Bait traps	Dip net	Total Numbers caught
<i>Macquaria ambigua</i>	Yellowbelly		1	4	1		6
<i>Nematolosa erebi</i>	Bony Bream		1				1
<i>Leiopotherapon unicolor</i>	Spangled Perch			1			1
<i>Hypseleotris klunzingeri</i>	Western Carp Gudgeon		1				1
<i>Retropinna semoni</i>	Smelt		2				2
<i>Cyprinus carpio</i>	Carp			40			40
<i>Carrasius auratus</i>	Goldfish			6			6
Total Numbers		NA	5	51	1		57

3.12.4 Macroinvertebrates

All surbers were collected from the lower end of the pool from red sandy silt substrate. No dip nets were collected due to lack of habitat. Nineteen discrete taxa were recorded. The fauna was dominated by corixids, copepods and ostracods (Table 3-12.3). Bait traps collected 2 prawns.

■ Table 312.3 Numbers of aquatic macroinvertebrates recorded from Narran River at Booligar

	Edge surber	
	Mean	Stddev
Dytiscidae	0.2	0.4
Ostracoda	12.2	11.4
Copepoda	20.0	14.3

Cladocera	9.4	8.7
Parastacidae	0.4	0.9
Chironominae	1.0	1.7
Tanypodinae	0.6	0.9
Ceratopogonidae	8.2	4.3
Muscidae	0.2	0.4
Tabanidae	0.2	0.4
Baetidae	2.8	0.8
Caenidae	0.4	0.5
Corixidae	42.0	26.5
Notonectidae	0.2	0.4
Libellulidae	0.2	0.4
Leptoceridae	0.4	0.5
Nematoda	0.6	0.9
Oligochaeta	2.0	1.6
Taxa	9.8	0.8
Abundance	101.2	46.7
Total taxa		19

3.13 Balandool River at Cubbie

This site is characteristically dry by spring and was so on this occasion.

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 the previous November. The river was dry downstream of the weir. Two small pools remained at the location, the largest being 25m x 8m by up to 0.5m deep. A smaller pool upstream was a deep green colour as a result of algal growth. The larger pool had a few small snags but limited algal growth and was very turbid. There was no evidence of disturbance by cattle or feral animals. A similar pool remained upstream of the nearby weir on the Balandool River and each pool was separated from a larger pool that formed at the split of the two rivers. This pool appears permanent.

3.15.1 Water quality

Spot water quality measurements were taken at the centre of the larger pool (**Table 3-15.1**). There was a marked difference between top and bottom readings for most parameters.

■ **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
1400	Surface	33.6	92	260	>600	9.5
	0.5	20.6	52	260	>600	9.0

3.15.2 Macrophytes

No macrophytes were observed.

3.15.3 Fish

Only the seine net could be used at this site and it captured four native species and one introduced (**Table 3-15.2**). Numerous small snags decreased the efficiency of the technique but the two hauls covered nearly 90% of the main pool.

■ **Table 3-15.2 Results of fishing the Bokhara River at Kirrima in November 2004.**

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>Nematolosa erebi</i>	Bony Bream		6				6
<i>Hypseleotris klunzingeri</i>	Western Carp Gudgeon		10				10
<i>Hypseleotris sp.IV</i>	H.sp.4		2				2
<i>Carrasius auratus</i>	Goldfish		6				6
<i>Gambusia holbrooki</i>	Mosquitofish		25				25
Total Numbers		NA	52	NA	NA	NA	52

3.15.4 Macroinvertebrates

Four surber samples were collected from the weir pool and one from the small pool upstream. The substrate was compact clay with a thin soft surface layer. No habitat was available for dip net sampling. Eighteen discrete taxa were captured with the most common being ostracods and corixids (**Table 3-15.3**). Prawns and nepids were abundant in the seine hauls and several *Cherax* were also captured.

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

	Edge surber	
	Mean	Stddev
Ancylidae	0.2	0.4
Dytiscidae	0.2	0.4
Copepoda	1.4	1.3
Cladocera	3.0	4.2
Ostracoda	40.2	67.2
Parastacidae	0.2	0.4
s-f Chironominae	0.2	0.4
s-f Tanypodinae	3.0	2.5
Ceratopogonidae	3.4	1.8

Culicidae	0.2	0.4
Tabanidae	1.2	1.6
Baetidae	0.8	0.8
Caenidae	1.6	1.7
Corixidae	24.8	27.4
Libellulidae	0.2	0.4
Leptoceridae	0.2	0.4
Oligochaeta	4.4	4.4
Acarina	0.2	0.4
Taxa	9.4	3.4
Abundance	85.4	79.9
Total taxa		18

3.16 Bokhara River at Koala

The site is basically a long and near-permanent pool that usually reaches 2m deep in places but on this occasion it rarely reached 1m. A few significant snags were submerged, as was a remnant fence line. *Ludwidgia* lined 70% of the eastern bank, reaching between 1m and 3m into the pool. There was no *Ludwidgia* on the western bank though *Azolla* lined both banks and covered the entire surface at the northern end. There was little evidence of recent animal access to the water.

3.16.1 Water quality

Overnight water quality data were recorded at this site. The now shallow and open nature of the pool may explain the marked diurnal variation in some parameters.

The ranges recorded overnight for each parameter were:

Temperature: 20.3 – 29.6°C

Dissolved oxygen: 56 – 106 % sat; 5.0 – 8.0mg/l

pH: 6.1 – 9.6

Conductivity: 217-227 µS/cm

Turbidity: >600 NTU.

3.16.2 Macrophytes

Ludwidgia and *Azolla* were significant but the sedges and lignum noted previously, while present, were all well above the water line.

3.16.3 Fish

All nets were used at this site and captured four native species plus three introduced (**Table 3-16.1**). The tandan is the only addition to that recorded in May 2004. Unlike many other sites the Bony Bream count did not include small individuals, with the smallest being 143mm. Two Carp/Goldfish hybrids were captured and are included in the Goldfish count. A long-neck turtle was captured in a fyke net.

■ **Table 3-16.1 Results of fishing the Bokhara River at Koala in November 2004.**

Species	Common name	Gill nets	Seine net	Fyke nets	Bait traps	Dip net	Total Numbers caught
<i>Macquaria ambigua</i>	Yellowbelly	2		1			3
<i>Nematolosa erebi</i>	Bony Bream	4	2	1			7
<i>Leiopotherapon unicolor</i>	Spangled Perch			6			6
<i>Neosilurus hyrtlii</i>	Hyrtl's tandan			1			1
<i>Cyprinus carpio</i>	Carp	1		5			6
<i>Carrasius auratus</i>	Goldfish			11			11
<i>Gambusia holbrooki</i>	Mosquitofish		3				3
Total Numbers		7	5	25	0		37

3.16.4 Macroinvertebrates

Surber samples were collected from soft silt/sand substrate. A dip net sample was collected from a mixture of *Ludwigia* and *Azolla*. Thirty-two discrete taxa were recorded, 28 from the surbers and 20 from the dip net. The more common taxa in surbers were corixids, ceratopogonids and orthoclad chironomids (**Table 3-16.2**) while the dip nets recorded more copepods and baetid mayflies. Bait traps captured 15 prawns and a *Cherax* was captured in the seine haul.

■ **Table 3-16.2 Numbers of aquatic macroinvertebrates recorded from Bokhara River at Koala in November 2004**

	Edge surber		Macrophyte dip net
	Mean	Stddev	
Ancylidae	0.2	0.4	
Dytiscidae	0.2	0.4	
Hydraenidae	0.2	0.4	
Hydrophilidae	0.6	0.9	
Ostracoda	11.4	6.5	60
Copepoda	5.6	4.6	370
Cladocera	1.8	3.0	10
Atyidae			10
Parastacidae	1.4	1.1	
s-f Chironominae	3.6	3.5	20
s-f Tanypodinae	17.6	13.0	20
s-f Orthoclaadiinae	20.2	18.3	80
Ceratopogonidae	22.2	10.8	20
Tabanidae	0.4	0.9	
Tipulidae	0.2	0.4	
Sciomyzidae			20
Culicidae	1.2	1.1	
Empididae	0.6	0.9	
Ephydriidae	0.2	0.4	
Muscidae	1.2	1.6	
Baetidae	16.2	9.9	120

Caenidae	5.6	5.6	10
Corixidae	57.4	39.7	20
Notonectidae	3.2	4.1	30
Aeshnidae			10
Coenagrionidae	2.0	2.3	10
Libellulidae			10
Ecnomidae	0.2	0.4	30
Hydroptilidae			20
Leptoceridae	0.4	0.5	50
Pyralidae	2.6	3.6	20
Nematoda	0.4	0.5	
Oligochaeta	3.2	1.9	
Taxa	16.6	4.9	20
Abundance	180.0	88.5	940
Total taxa	28		33

3.16 Briarie Ck

Briarie Ck is rarely sampled because it does not hold water for long once flow ceases. Compensation-level flows do not reach it. The pool usually sampled was dry but another site approximately 4km downstream was found on Balandool property. This was a very different part of the creek. The site was just upstream of a high level bridge and low level crossing which acts as a small weir. It is apparently a permanent pool and not used as part of the farms water infrastructure. The creek occupies a small floodway between cropped areas. The pool was at least 400m long and generally 15m wide. Boat access could not be found so the maximum depth was not determined but was certainly over one metre. Riparian vegetation was good and consisted of primarily coolibah and wattle with a grassy understorey. The water had a green tinge and some surface scum but appeared much less turbid than other sites. *Ludwigia* was present along about 90% of the waters edge and grew from 1 to 3 metres from the bank. Green filamentous algae occurred in patches.

3.16.1 Water quality

Spot water quality readings indicated strong thermal stratification of the water column and very high pH. These changes are characteristic of isolated pools as they dry out though this is a large pool and the pH is particularly high. The relatively low turbidity may relate to the lack of cattle access and the time since flow ceased. The super saturated dissolved oxygen reflects the time of day and high algal productivity. Overnight readings could well show very low levels.

■ **Table 3-16.1 Spot water quality readings – Briarie Ck at Balandool**

Sample time	Depth (m)	Temp. (°C)	Dissolved Oxygen (%sat)	Conductivity (µS/cm)	Turbidity (NTU)	pH
1400	Surface	27.2	194	370	197	10.2
	1.0	21.2	81	374	266	9.7

3.16.2 Macrophytes

Ludwigia was very common and filamentous green alga was present.

3.16.3 Fish

As boat access was not possible, only seine netting was conducted. It would be worthwhile attempting to find boat access in future. Three species of fish were recorded and two of these were introduced (**Table 3-16.2**).

■ **Table 3-16.2 Results of fishing the Briarie Ck in November 2004.**

Species	Common name	Gill nets	Seine net (2)	Fyke nets	Bait traps	Dip net	Total Numbers caught
<i>Nematolosa erebi</i>	Bony Bream		10				10
<i>Carrasius auratus</i>	Goldfish		6				6
<i>Gambusia holbrooki</i>	Mosquitofish		6				6
Total Numbers		NA	22	NA	NA		22

3.16.4 Macroinvertebrates

Surber samples were collected from soft mud and a dip net sample was taken from *Ludwigia*. Fifteen discrete taxa were recorded, with particularly large numbers of ostracods and oligochaetes in the surbers and ostracods, corixids and caenogronids in the dip net (**Table 3-16.3**). Prawns and yabbies were not recorded by any sampling technique.

■ **Table 3-16.3 Numbers of aquatic macroinvertebrates recorded from Briarie Ck on Balandool**

	Edge surber		Macrophyte dip
	Mean	Stddev	
Ancylidae	0.2	0.4	
Dytiscidae	0.2	0.4	
Ostracoda	540.2	559.4	1850
s-f Chironominae	10.0	6.3	
s-f Tanypodinae	6.8	4.7	40
Ceratopogonidae	16.6	13.0	
Culicidae			20
Tabanidae	3.2	1.8	10
Baetidae	0.8	0.8	20
Corixidae	9.6	6.5	570
Notonectidae	7.0	5.7	60
Coenagrionidae	1.0	0.7	510
Leptoceridae	0.2	0.4	50
Nematoda	0.4	0.5	
Oligochaeta	97.6	132.5	
Taxa	10.0	1.2	9
Abundance	693.8	670.6	3130
Total taxa	14		15

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 shallower than previously noted, being a maximum of 1.5m deep. Much more sand substrate was exposed than on previous sampling events and the upper end of the pool contained significant green filamentous algae.

3.17.1 Water quality

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

Temperature: 20.0 – 29.5°C

Dissolved oxygen: 65 – 101 % sat; 5.7 – 7.5mg/l

pH: 7.4 – 9.5

Conductivity: 190 – 195 µS/cm

Turbidity: 86 – 93 NTU.

The turbidity was approximately 50% higher than recorded in May 2004, with pH and conductivity also higher, perhaps indicating the pool is drying out.

3.17.2 Macrophytes

No macrophytes were recorded but filamentous green alga was common at the upstream end.

3.17.3 Fish

All nets were deployed at this site. Seven species of native fish plus two introduced were captured (**Table 3-17.2**). This catch is very comparable to other catches at this site except that *Gambusia* was recorded for the first time since June 2000.

■ **Table 3-17.2 Results of fishing the Warrego River at Shannonvale in November 2004.**

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	1	47	19			67
<i>Hypseleotris klunzingeri</i>	Western Carp Gudgeon		27		1		28
<i>Hypseleotris splV</i>	H sp 4		1				1
<i>Leiopotherapon unicolor</i>	Spangled Perch			2			2
<i>Retropinna semoni</i>	Smelt		5				5
<i>Neosilurus hyrtlilii</i>	Hyrtl's tandan			37			37
<i>Cyprinus carpio</i>	Common Carp	2					2
<i>Gambusia holbrooki</i>	Mosquitofish		11				11
Total Numbers		5	91	58	1		155

3.17.4 Macroinvertebrates

Surber samples were collected from a mix of sand and gravel substrate; some including roots and algae. A dip net sample was collected from tea tree root.

Twenty-five taxa were recorded by the two sampling methods (**Table 3-17.3**), 20 from the surbers and 21 from the dip net. Corixids, cladocera and ceratopogonids dominated the surbers while ostracods, tanypodid chironomids and mites (Acarina) dominated the dip net. Seven *Macrobrachium* and 5 *Cherax* were captured in bait traps. Both were also captured in a fyke net and *Cherax* were found eating fish captured in the gill nets.

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

	Edge surber		Tree
	Mean	Stddev	root dip
Acarina	3.8	7.9	32
Dytiscidae	1.0	1.2	2
Hydrophilidae	0.2	0.4	1
Ostracoda	9.6	8.4	57
Copepoda	16.2	23.4	8
Cladocera	44.0	62.7	10
Atyidae			1
Parastacidae			1
s-f Chironominae	3.4	1.9	4
s-f Tanypodinae	7.6	2.9	38
s-f Orthoclaadiinae			3
Ceratopogonidae	40.2	31.5	8
Tabanidae	0.8	1.1	
Culicidae	0.4	0.9	
Baetidae	0.2	0.4	2
Caenidae	21.0	25.8	9
Corixidae	56.4	27.4	9
Gerridae	0.2	0.4	2
Notonectidae	0.6	0.9	19
Pyrallidae	0.2	0.2	
Sisyridae			2
Isostictidae			1
Libellulidae	0.8	1.3	
Leptoceridae	0.4	0.5	4
Oligochaeta	0.2	0.4	
Taxa	10.8	1.3	21
Abundance	206.2	74.7	213
Total taxa	20		25

3.18 Warrego River at Tinnenburra

On this occasion the site consisted of a single small pool 200m upstream of the causeway. The pool was approximately 35m 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. The riparian zone was very sparse, represented more by

floodplain vegetation reaching the waters edge. Cattle, sheep, pigs and birds had been frequenting the site.

3.18.1 Water quality

Results of spot water quality samples are shown in **Table 3-18.1**. Sub-surface water was noticeably cooler. Turbidity and conductivity were much higher than at Shannonvale.

■ **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	30.6	126	306	483	9.2

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. Six native fish species and one introduced were captured (**Table 3-18.2**). This is a good result considering the low sampling effort. The Yellowbelly ranged from 56mm to 64mm in length. Historical sampling at this site shows far less consistent results than have been recorded from Shannonvale. This may reflect the much more variable nature of the site and the resultant variation in sampling effort.

■ **Table 3-18.2 Results of fishing the Warrego River at Tinnenburra in November 2004.**

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		4				4
<i>Nematolosa erebi</i>	Bony Bream		34				34
<i>Hypseleotris klunzingeri</i>	Western Carp Gudgeon		2				2
<i>Hypseleotris spIV</i>	H sp 4		1				1
<i>Melanotaenia fluviatilis</i>	Rainbowfish		13				13
<i>Retropinna semoni</i>	Smelt		3				3
<i>Cyprinus carpio</i>	Common Carp		2				2
Total Numbers		NA	59	NA	NA		59

3.18.4 Macroinvertebrates

No specialised habitats were present at Tinnenburra so sampling was restricted to surfers collected from silty and at times compact substrate, occasionally with algae. Eighteen discrete taxa were recorded with cladocerans, corixids and ostracods most common (**Table 3-18.3**). *Macrobrachium* were captured in the seine haul.

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

Edge surber
Mean Stddev

Acarina	0.8	0.4
Dytiscidae	0.6	1.3
Hydrophilidae	0.2	0.4
Ostracoda	10.2	22.3
Copepoda	7.2	8.0
Cladocera	49.4	86.2
Parastacidae	1.2	0.8
s-f Chironominae	0.2	0.4
s-f Tanypodinae	2.6	3.4
Ceratopogonidae	4.0	2.2
Tabanidae	0.4	0.5
Culicidae	0.2	0.4
Caenidae	0.6	1.3
Corixidae	34.0	24.2
Notonectidae	1.0	1.4
Gomphidae	0.2	0.4
Leptoceridae	0.2	0.4
Oligochaeta	1.0	0.7
Taxa	9.4	2.1
Abundance	114.0	77.7
Total taxa		18

3.19 Moonie River at Nindigully

On arrival the water level at this site was relatively low but storms in the catchment that afternoon caused the river to commence flowing. The water level rose by over 1m overnight. On the second day the water surface was covered with significant twig, leaf, and bark debris and the water was very turbid. The riffle at the lower end of the site was not flowing on day one but was flowing strongly on day two, No *Ludwigia* was present and the fringe of filamentous algae was poorly developed, though snags were often densely covered at the water line.

3.19.1 Water quality

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

Temperature: 21.0 – 23.0°C

Dissolved oxygen: 25 – 59 % sat; 2.2 – 5.0mg/l

pH: 7.3 – 8.1

Conductivity: 74 – 155 µS/cm

Turbidity: >600 NTU.

Conductivity halved, pH decreased by 0.6units and ORP increased from 131 to 156 millivolts over a 3hr period. A major decrease in dissolved oxygen also occurred but it commenced 5 hours earlier than the other changes. The time difference is surprising but it can be assumed that the changes reflect the first flush of storm runoff water.

3.19.2 Macrophytes

No macrophytes were observed.

3.19.3 Fish

All nets were set at this site. Seine netting was conducted before flow recommenced. Fyke nets were fully submerged when retrieved and 7 bait traps were not recovered. Four native fish species and two introduced were recorded (**Table 3-19.1**). As has been observed previously, the seine was relatively unsuccessful and few small specimens were encountered. The species list and total abundance is fairly representative of historic results from this site but less diverse and abundant than the results from May 2004 which were relatively unusual. A river turtle was recorded from a fyke net.

■ **Table 3-19.1 Results of fishing the Moonie River at Nindigully in November 2004.**

Species	Common name	Gill nets	Seine net (2)	Fyke nets	Bait traps (3)	Dip net	Total Numbers caught
<i>Macquaria ambigua</i>	Yellowbelly	6	1	2			9
<i>Nematolosa erebi</i>	Bony Bream	6					6
<i>Tandanus tandanus</i>	Eel-tailed catfish			1			1
<i>Hypseleotris klunzingeri</i>	Western Carp Gudgeon		1				1
<i>Cyprinus carpio</i>	Common Carp	6		2			8
<i>Gambusia holbrooki</i>	Mosquitofish		7				7
Total Numbers		18	9	5	0		32

3.19.4 Macroinvertebrates

Surber samples were collected from compact mud substrate with some organic matter. Thirteen discrete taxa were identified (**Table 3-19.2**). Copepods, corixids and ostracods dominated the catch. One *Macrobrachium* was captured in bait traps, recalling that only three were recovered.

■ **Table 3-19.2 Numbers of aquatic macroinvertebrates recorded from Nindigully**

	Edge surber	
	Mean	Stddev
Ostracoda	17.4	29.7
Copepoda	45.2	26.3
Cladocera	0.6	0.9
s-f Chironominae	1.6	2.6
s-f Tanypodinae	5.0	3.2
Ceratopogonidae	3.6	4.8
Baetidae	3.0	2.8
Caenidae	0.6	0.5
Corixidae	34.0	35.1
Notonectidae	0.2	0.4
Leptoceridae	0.2	0.4
Nematoda	0.2	0.4
Oligochaeta	4.0	1.9

Taxa	8.0	2.3
Abundance	115.6	58.1
Total taxa		13

3.20 Moonie River at Fenton

This site was not sampled in May 2004 due to problems with the boat trailer. On this occasion the water level was relatively low, being about 1m below the sedge line, though the pool was still continuous in both directions. Maximum depth was about 1m. Storms the previous evening dropped between 60 and 125mm of rain in the region and local runoff had increased the turbidity. The flows recorded at Nindigully (over 80km upstream by road) had not reached Fenton by the time the nets were retrieved.

3.20.1 Water Quality

Spot water quality data are shown in **Table 3-20.1**. Conditions varied markedly between top and bottom.

■ **Table 3-20.1 Spot water quality readings – Fenton November 2004**

Sampling Time	Depth (m)	Temp. (°C)	DO (% sat.)	Conductivity (µS/cm)	Turbidity (NTU)	pH
1400	Surface	29.1	80.0	136	>600	8.6
	1.0	19.7	30.5	128	>600	7.5

3.20.2 Fish

All nets were deployed at this site. Three native species and two introduced were captured. This is very similar to historical catches except that this is the first record of Rainbowfish from the site. The fish captured in gill nets tended to be relatively large and healthy, with one carp measuring 608mm in length. The smallest Yellowbelly recorded here was 134mm in length. A river turtle was captured in a fyke net.

Table 3-20.2 Results of fishing at Fenton in November 2004.

Species	Common name	Gill nets	Seine net (2)	Fyke nets	Bait traps	Dip net	Total Numbers caught
<i>Macquaria ambigua</i>	Yellowbelly	8		3			11
<i>Nematolosa erebi</i>	Bony Bream	9		4			13
<i>Melanotaenia fluviatilis</i>	Rainbowfish		1				1
<i>Cyprinus carpio</i>	Carp	3					3
<i>Gambusia holbrooki</i>	Mosquitofish		9				9
Total Numbers		20	10	7			37

3.20.3 Macrophytes

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

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 discrete taxa were identified with the most common being copepods, ceratopogonids and corixids. Bait traps captured just one *Macrobrachium* but they were also noted in fyke and seine nets.

■ Table 3-20.3 Macroinvertebrates captured at Fenton in November 2004

	Edge surber	
	Mean	Stddev
Ancylidae	0.6	0.5
Parastacidae	1.1	1.1
Ostracoda	5.4	5.1
Copepoda	120.8	54.9
Cladocera	3.5	2.6
s-f Chironominae	1.2	1.6
s-f Tanypodinae	3.8	3.8
Ceratopogonidae	8.0	8.0
Culicidae	0.2	0.4
Tabanidae	0.5	1.1
Muscidae	0.4	0.5
Caenidae	0.4	0.9
Baetidae	5.2	3.3
Corixidae	7.0	6.2
Notonectidae	1.9	0.9
Gomphidae	1.4	2.2
Libellulidae	0.6	0.5
Economidae	0.4	0.9
Leptoceridae	1.4	1.5
Oligochaeta	1.0	1.0
Taxa	12.0	2.1
Abundance	165.6	49.4
Total taxa	20	

3.21 Lower Plains Lagoon

This site was first sampled in May 2004. At that time the pool was over 500m long and up to 1m deep but by November it had contracted to just two small remnant pools. The largest pool was approximately 25m x 7m and generally about 30cm deep. It contained very few snags and little vegetation and surprisingly, despite tracks of pigs, kangaroos and birds, the water appeared clear with a strong green tinge. *Alathyria* shells were common.

3.21.1 Water Quality

Spot water quality data are shown in **Table 3-21.1**. Strong stratification was evident along with oxygen supersaturation, relatively high conductivity and very high pH.

■ **Table 3-21.1 Spot water quality readings –Lower Plains Lagoon November 2004**

Sampling Time	Depth (m)	Temp. (°C)	DO (% sat.)	Conductivity (µS/cm)	Turbidity (NTU)	pH
1430	Surface	31.4	195	415	>600	10.2
	1.0	22.7	115	414	>600	9.0

3.21.2 Fish

Only seine netting was possible at this site due to the water depth. Two native species and one introduced were captured with Mosquitofish by far the most common. Yellowbelly, Spangled Perch, Rainbowfish and Carp had also been captured in May but Smelt had not. All fish captured were in very good health. Four river turtles were also captured.

Table 3-21.2 Results of fishing Lower Plains Lagoon in November 2004.

Species	Common name	Gill nets	Seine net	Fyke nets	Bait traps	Dip net	Total Numbers caught
<i>Nematolosa erebi</i>	Bony Bream		4				4
<i>Retropinna semoni</i>	Smelt		1				1
<i>Gambusia holbrooki</i>	Mosquitofish		200				200
Total Numbers		NA	205	NA	NA		205

3.21.3 Macrophytes

No macrophytes were observed.

3.21.4 Macroinvertebrates

Surber samples were collected from soft silt substrate. No dip net samples were collected. Eleven discrete taxa were identified with the most common being ceratopogonids, ostracods and corixids. *Alathyria* was common on the water's edge. Some *Macrobrachium* were recorded in the seine net and notonectids were highly abundant.

■ **Table 3-21.3 Macroinvertebrates captured at Lower Plains Lagoon in November 2004**

	Edge surber	
	Mean	Stddev
Planorbidae	0.2	0.4
Physidae	0.2	0.4
Dytiscidae	2.0	2.1
Hydrophilidae	0.4	0.5
Ostracoda	17.6	9.9
s-f Chironominae	12.0	4.8
s-f Tanypodinae	14.4	8.1

Ceratopogonidae	41.0	21.0
Corixidae	16.0	7.5
Oligochaeta	0.8	1.3
Nematoda	2.8	2.6
Taxa	7.6	0.9
Abundance	107.4	26.3
Total taxa		11

3.22 Beardie Lagoon

Like Lower Plains Lagoon, this site was added in May 2004 as an example of a wetland on the Balonne River Flooplain. The width of the combined channels had contracted significantly since May and the depth was generally now less than 25cm (in May it had been 50-75cm, with occasional deeper pockets). The water was now generally more than 30m from the riparian zone and the substrate in and near the water was deep silt. Cattle pugging was common, even intense in places. Significant land clearing has occurred to the west of the lagoon on the sandy terraces and slopes. No significant snags were noted in the water and algal tufts were uncommon. The strong band of recently germinated eucalypts noted in May had all but disappeared. Quite a few waterbirds were present including plovers, spoonbills and moorhens.

3.22.1 Water Quality

Spot water quality data are shown in **Table 3-22.1**. The water was very warm, highly conductive and was supersaturated with oxygen, indicating the pool is drying out but also clearing and allowing considerable algal productivity to occur. Despite the apparently clearer water, the turbidity, being measured by a nephelometer, did not drop below 600NTU.

■ **Table 3-22.1 Spot water quality readings – Beardie Lagoon in November 2004**

Sampling Time	Depth (m)	Temp. (°C)	DO (% sat.)	Conductivity (µS/cm)	Turbidity (NTU)	pH
1345	Surface	32.1	153	1028	>600	8.8

3.22.2 Fish

Only seine netting was conducted at this site and it produced one native species and one introduced. Sampling was very difficult due to the depth of the silt and the distance from the water to firm substrate near the edge. While the two species caught had been the most commonly recorded from sampling in May, it is surprising that no Carp, Rainbowfish, Spangled Perch or Carp Gudgeon were recorded, given their relatively good numbers in May. More intensive sampling may have found more species but it may also be that the conditions were simply unsuitable for their survival in significant numbers.

■ **Table 3-22.2 Results of fishing Beardie Lagoon in November 2004.**

Species	Common name	Gill nets	Seine net	Fyke nets	Bait traps	Dip net	Total Numbers caught
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<i>Nematolosa erebi</i>	Bony Bream		2				2
<i>Gambusia holbrooki</i>	Mosquitofish		12				12
Total Numbers		NA	14	NA	NA		14

3.22.3 Macrophytes

The *Ludwigia* and *Lemna* which had been common in May was no longer evident and similarly, when the lagoon is full a large amount of *Lignum* is partly submerged but this was no longer the case.

3.22.4 Macroinvertebrates

Surber samples were collected from deep silt in shallow water. No dip net habitat was available. Twelve discrete taxa were collected. Micro-crustacea dominated, particularly copepods, while corixids, nematods and tanypodid chironomids were also common. While the number of taxa captured was low, the abundance of those caught was often high. *Macrobrachium* was not noted.

■ Table 3-22.3 Macroinvertebrates captured at Beardie Lagoon in November 2004

	Edge surber	
	Mean	Stddev
Dytiscidae	25.0	17.2
Hydrophilidae	0.2	0.4
Ostracoda	42.4	23.1
Copepoda	157.6	247.6
Cladocera	10.0	22.4
s-f Tanypodinae	25.4	16.5
Ceratopogonidae	13.4	6.8
Caenidae	0.2	0.4
Corixidae	55.4	15.4
Leptoceridae	2.2	3.3
Nematoda	44.2	39.8
Acarina	11.0	21.8
Taxa	8.8	0.8
Abundance	387.0	306.1
Total taxa	12	

3.23 Sevel's 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 about 1m since sampled in May, meaning most of the lagoon was less than 0.5m deep. Cattle pugging suggested they had not accessed the water for some time as the marks stopped about 0.5m above the current water line.

3.23.1 Water Quality

Results from spot water quality sampling are shown in **Table 3-23.1**. The water appeared quite turbid, certainly unlike in May when it was relatively clear and with a green tinge. While the conductivity had risen since May (when it was about 200 μ S/cm) neither it nor pH were as high as Beardie Lagoon or Lower Plains, despite the water originating from the same source at the same time. This possibly largely reflects the more incised nature and greater shading of the lagoon meaning evaporation has not caused concentration of the salts to such a degree as yet. Conductivity in the river, just a few hundred metres away, was 159 μ S/cm.

■ **Table 3-23.1 Spot water quality readings – Sevels Lagoon in November 2004**

Sampling Time	Depth (m)	Temp. (°C)	DO (% sat.)	Conductivity (μ S/cm)	Turbidity (NTU)	pH
1445	Surface	25.5	86	276	>600	7.8
	0.5	20.5	58	275	>600	8.0

3.23.2 Fish

Other than two gill nets, all nets were deployed at this site. Six native species and two introduced were captured. Single specimens of Agassiz's glassfish and Hyrtl's Tandan had been captured in May but Smelt had not. Yellowbelly ranged from 75mm to 313mm in length.

■ **Table 3-23.2 Results of fishing Sevel's Lagoon in November 2004.**

Species	Common name	Gill nets (2)	Seine net	Fyke nets	Bait traps	Dip net	Total Numbers caught
<i>Macquaria ambigua</i>	Yellowbelly	1	1	10			12
<i>Nematolosa erebi</i>	Bony Bream		2	8			10
<i>Hypseleotris klunzingeri</i>	Western Carp Gudgeon		65				65
<i>Leiopotherapon unicolor</i>	Spangled Perch			1			1
<i>Melanotaenia fluviatilis</i>	Rainbowfish		9	13			22
<i>Retropinna semoni</i>	Smelt		79	1			80
<i>Cyprinus carpio</i>	Carp	1		2			3
<i>Gambusia holbrooki</i>	Mosquitofish		3	1			4
Total Numbers		2	159	36	0		197

3.23.3 Macrophytes

Ludwigia grew along about 30% of the waters edge and barely extended into the water. Spiny Mud Grass was only present in very isolated patches.

3.23.4 Macroinvertebrates

Surber samples were collected from mud with algae. A dip net sample was taken amongst *Ludwigia*. Twenty-two taxa were collected; 21 by dip net and 20 by surber. The most common taxa in surbers were ostracods, tanypodinae, ceratopogonids and oligochaetes. Common taxa in the dip net were baetid mayflies, orthoclad chironomids, corixids and notonectids. Bait traps captured 19 *Macrobrachium* and

four *Cherax*, both were captured in fyke nets and *Macrobrachium* was also very common in the seine haul.

■ **Table 3-23.3 Macroinvertebrates captured at Sevel's Lagoon**

	Edge surber		Macrophyte dip
	Mean	Stddev	
Ancylidae	0.2	0.4	
Planorbidae	0.2	0.4	8
Physidae	0.4	0.5	
Atyidae	0.4	0.9	3
Ostracoda	40.6	43.4	3
Copepoda	15.8	10.6	19
Dytiscidae	0.4	0.9	
s-f Chironominae	2.6	1.1	15
s-f Tanypodinae	30.4	23.8	11
s-f Orthoclaadiinae			49
Ceratopogonidae	25.2	16.0	11
Tipulidae	0.4	0.9	
Tabanidae	2.0	1.6	
Caenidae	1.8	2.0	1
Baetidae	10.6	8.1	113
Corixidae	21.0	6.8	28
Notonectidae	1.6	0.9	24
Coenagrionidae	0.8	1.3	12
Aeschnidae			2
Economidae	0.6	0.9	2
Leptoceridae	9.8	10.7	9
Oligochaeta	23.8	22.5	5
Taxa	12.8	2.9	21
Abundance	188.6	120.7	345
Total taxa	20		22

3.24 Police Lagoon

This site had been dry from November 2001 till February 2004. The lagoon now held considerable water, being several hundred metres long, but the depth had been reduced by about 1m since sampled in May. Much of the Nardoo was now above the water level and dry. The tree roots on the steep western edge were still largely submerged. The riparian zone was otherwise generally several metres from the water. Recent growth of Noogoora Burr and *Sesbania* was apparent.

3.24.1 Water Quality

Overnight logging of water quality parameters showed some variation in pH, temperature and dissolved oxygen, the latter always remaining at high levels.

Conductivity has risen since May (when it was <200µS/cm), as has pH (by 0.4 units).

The recorded ranges for each parameter were:

Temperature: 22.0 – 27.1°C

Dissolved oxygen: 84 – 122 % sat; 7.1 – 9.8mg/l

pH: 8.1 – 8.8

Conductivity: 256 – 262 µS/cm

Turbidity: >600 NTU.

3.24.2 Fish

All nets were deployed at this site. Four native species and two introduced were captured. Carp Gudgeon and Smelt had been captured in low numbers in May but Rainbowfish had not. Nearly 800 Mosquitofish had been captured in May. Bony Bream captured in the gill nets were consistently in the size range 215-235mm while those in the seine net were as small as 12mm.

■ **Table 3-24.2 Results of fishing at Police Lagoon in November 2004.**

Species	Common name	Gill nets	Seine net	Fyke nets	Bait traps	Dip net	Total Numbers caught
<i>Macquaria ambigua</i>	Yellowbelly			1			1
<i>Nematolosa erebi</i>	Bony Bream	42	21	6			69
<i>Leiopotherapon unicolor</i>	Spangled Perch	1		26			27
<i>Melanotaenia fluviatilis</i>	Rainbowfish			1			1
<i>Cyprinus carpio</i>	Common Carp	15		2			17
<i>Gambusia holbrooki</i>	Mosquitofish		9				9
Total Numbers		58	30	36	0		124

3.24.3 Macrophytes

Nardoo occurred in small patches as a thin band on the water's edge.

3.24.4 Macroinvertebrates

Surber samples were collected from fine mud with a soft surface. Algae and leaf litter were generally present. A dip net sample was taken amongst Nardoo. Twenty taxa were collected in total; 15 by dip net and 15 by surber. The most common taxa in surbers were corixids, tanytopodinae and ceratopogonids. In the dip net the most common taxa were corixids, mites and baetid mayflies. Three *Macrobrachium* were captured in bait traps but they were not recorded from other nets. None were captured in May.

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

	Edge surber		Macrophyte
	Mean	Stddev	dip
Dytiscidae	0.2	0.4	1
Elmidae			1
Hydrophilidae			1
Ostracoda	0.2	0.4	
Copepoda	5.6	6.3	

Cladocera	0.6	0.9	2
s-f Chironominae	6.0	7.9	2
s-f Orthocladinae			5
s-f Tanypodinae	16.2	22.0	4
Ceratopogonidae	16.2	34.0	
Tabanidae	1.6	1.5	1
Baetidae	3.8	2.6	13
Caenidae	2.0	1.2	
Corixidae	59.4	24.0	93
Notonectidae	0.2	0.4	2
Coenagrionidae	0.6	0.9	6
Zygoptera			2
Ecnomidae	0.4	0.5	
Leptoceridae	1.0	1.2	1
Acarina			46
Taxa	9.4	1.5	15
Abundance	114.0	76.0	180
Total taxa	15		20

3.25 Belah Waterhole

Water level had decreased by about 1m since May, leaving maximum depth of about 0.5m. No backwaters now contained water, the lignum no longer reached the water and many snags were above the waterline. Green filamentous algae grew strongly near the waterline. There was evidence of pig rooting and four pigs carcasses were nearby trap.

3.25.1 Water Quality

Results from spot water quality sampling are shown in Table 3-25.1. As noted at other lagoons, conductivity and pH have risen since May.

■ **Table 3-25.1 Spot water quality readings – Belah Waterhole in November 2004**

Sampling Time	Depth (m)	Temp. (°C)	DO (% sat.)	Conductivity (µS/cm)	Turbidity (NTU)	pH
1330	Surface	31.6	109	347	>600	8.2

3.25.2 Fish

All nets were deployed at this site. Seven native species and three introduced were recorded. Smelt had not previously been captured here. As has been noted previously, large fish are uncommon here.

■ **Table 3-25.2 Results of fishing Belah Waterhole in November 2004.**

Species	Common name	Gill nets	Seine net (1)	Fyke nets	Bait traps	Dip net	Total Numbers caught
<i>Macquaria ambigua</i>	Yellowbelly		1	4			5
<i>Nematolosa erebi</i>	Bony Bream			39	1		40

<i>Leiopotherapon unicolor</i>	Spangled Perch			9			9
<i>Hypseleotris klunzingeri</i>	Western Carp Gudgeon		12				12
<i>Melanotaenia fluviatilis</i>	Rainbowfish			2			2
<i>Retropinna semoni</i>	Smelt		1				1
<i>Neosilurus hyrtl</i>	Hyrtl's tandan			5			5
<i>Cyprinus carpio</i>	Common Carp	1		15			16
<i>Carrasius auratus</i>	Goldfish			3			3
<i>Gambusia holbrooki</i>	Mosquitofish		8				8
Total Numbers		1	22	77	1		101

3.25.3 Macrophytes

No macrophytes were recorded but green filamentous alga was common.

3.25.4 Macroinvertebrates

Five surber samples were collected from firm silt substrate with filamentous algae (Table 3-25.3). Eighteen discrete taxa were identified. The most common elements were tanypodinae, corixids, ostracods and copepods. Bait traps captured two *Cherax*, and 7 *Macrobrachium*. Both were also recorded in fyke and seine nets.

■ Table 3-25.3 Macroinvertebrates captured at Belah Waterhole

	Edge surber	
	Mean	Stddev
Ancylidae	0.4	0.5
Dytiscidae	0.6	0.9
Hydrophilidae	0.2	0.4
Ostracoda	10.0	9.3
Copepoda	7.4	10.8
Cladocera	2.4	3.4
Parastacidae	0.4	0.5
s-f Chironominae	2.0	1.6
s-f Tanypodinae	26.6	10.7
Ceratopogonidae	1.2	1.3
Culicidae	0.6	0.5
Tabanidae	0.8	0.8
Baetidae	3.8	6.3
Corixidae	13.8	7.6
Notonectidae	0.2	0.4
Ecnomidae	0.2	0.4
Leptoceridae	0.4	0.9
Oligochaeta	2.0	1.2
Taxa	10.6	1.7
Abundance	73.2	19.2
Total taxa	18	

3.26 Clyde Lagoon

Ludwigia regrowth has continued such that some patches are up to 5m long and extend 2m into the water. *Azolla* was also present but fringing green filamentous alga was uncommon. Cattle had not recently accessed the lagoon. This lagoon has no snags and riparian vegetation only exists between the fences at the windmill. The lagoon was up to 2m deep and the edges were steep such that seine and fyke nets were only effective to a short distance from the edge.

3.26.1 Water Quality

Overnight logging of water quality parameters showed only minor variation. The probe was attached to a fence such that it was approximately 1.5m from the edge and in 25cm depth. The recorded ranges for each parameter were:

Temperature: 21.5 – 24.0°C

Dissolved oxygen: 80 – 90 % sat; 6.9 – 7.5mg/l

pH: 7.0 – 7.5

Conductivity: 273 – 290 µS/cm

Turbidity: 384 – 433 NTU.

Conductivity has increased since May (when it was about 210µS/cm) while pH is less (it had been 7.9 in May) and this is an unusual result.

3.26.2 Fish

All nets were set at this site (**Table 3-26.1**). Six native species and two introduced were captured. Most species were represented by fish of various sizes, including Yellowbelly as small as 72mm and Carp from 93mm. The smallest Spangled Perch was 115mm. A long-neck turtle was captured in a fyke net.

■ **Table 3-26.1 Results of fishing Clyde lagoon in November 2004.**

Species	Common name	Gill nets	Seine net	Fyke nets	Bait traps	Dip net	Total Numbers caught
<i>Macquaria ambigua</i>	Yellowbelly	3		5			8
<i>Nematolosa erebi</i>	Bony Bream	9	13	6			28
<i>Leiopotherapon unicolor</i>	Spangled Perch			14			14
<i>Hypseleotris klunzingeri</i>	Western Carp Gudgeon		1				1
<i>Melanotaenia fluviatilis</i>	Rainbowfish		1				1
<i>Neosilurus hyrtlii</i>	Hyrtl's tandan			88	1		89
<i>Cyprinus carpio</i>	Carp	1		19	4		24
<i>Gambusia holbrooki</i>	Mosquitofish		1				1
Total Numbers		13	16	132	5		166

3.26.3 Macrophytes

Ludwigia occurred over approximately 30% of the edge and *Azolla* over slightly more.

3.26.4 Macroinvertebrates

Surber samples were collected from compact fine sand/silt substrate. No algae and very little leaf litter were encountered. A dip net sample was collected from

Ludwidgia. Nineteen discrete taxa were identified (**Table 3-26.3**) in total, 14 from the dip net and 15 from the surbers. The surber fauna was dominated by ceratopogonids and corixids while the dip net was dominated by ostracods and copepods. Twelve *Macrobrachium* were captured in bait traps and *Cherax* was captured in gill and fyke nets.

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

	Edge	Surber	Macrophyte
	Mean	Stdev	dip
Atyidae			5
Dytiscidae	0.2	0.4	
Ostracoda	9.6	10.7	201
Copepoda	9.4	14.6	108
Cladocera	0.2	0.4	
s-f Chironominae	2.4	1.9	3
s-f Tanypodinae	4.6	2.7	3
s-f Orthoclaadiinae	0.2	0.4	
Ceratopogonidae	32.8	24.2	8
Culicidae			2
Tabanidae	0.2	0.4	1
Baetidae	0.2	0.4	3
Caenidae	0.8	1.3	
Corixidae	20.6	22.7	50
Notonectidae			21
Caenagrionidae	0.2	0.4	9
Pyralidae			2
Nematoda	1.5	1.7	
Oligochaeta	0.6	0.9	
Taxa	7.8	3.2	14
Abundance	83.2	74.0	414
Total taxa	15		19

3.27 Pilgra Lagoon Upstream

Water level in the lagoon had dropped by about 1m since May, leaving a maximum depth of approximately 0.5m. The substrate was very soft silt. Some filamentous green alga was present on the edge, there were few snags and the edge appeared undisturbed in recent times.

3.27.1 Water Quality

Results from spot water quality sampling are shown in Table 3-27.1. As noted at other lagoons, conductivity and pH have risen since May but turbidity indicates a slow settling of the sediment within the water column. Dissolved oxygen readings indicate significant productivity, particularly given the time of day that readings were taken.

■ Table 3-27.1 Spot water quality readings – Pilgra Ustream in November 2004

Sampling Time	Depth (m)	Temp. (°C)	DO (% sat.)	Conductivity (µS/cm)	Turbidity	pH
1045	Surface	29.1	101	495	270	8.7
	0.3m	26.0	98	497	485	8.3

3.27.2 Fish

Gill nets were not deployed due to the shallow water. Three native species and two introduced were captured with the lack of Goldfish the only difference in species complement between this sampling event and that in May. The total number of fish captured was much lower with all species except Bony Bream showing noticeable reductions. Small fish were again common, for example Yellowbelly ranged between 49mm and 71mm. As lagoons are not stocked, these species had bred locally.

■ Table 3-27.2 Results of fishing Pilgra Lagoon Upstream in November 2004.

Species	Common name	Gill nets	Seine net	Fyke nets	Bait traps	Dip net	Total Numbers caught
<i>Macquaria ambigua</i>	Yellowbelly			12			12
<i>Nematolosa erebi</i>	Bony Bream		17	4			21
<i>Leiopotherapon unicolor</i>	Spangled Perch			1			1
<i>Cyprinus carpio</i>	Carp				1		1
<i>Gambusia holbrooki</i>	Mosquitofish		10				10
Total Numbers		NA	27	17	1		45

3.27.3 Macrophytes

No macrophytes were present.

3.27.4 Macroinvertebrates

Five surber samples were collected from deep silt, one with leaf litter and algae. No dip net samples were collected. Fourteen discrete taxa were recorded with ostracods being very abundant and the most common of the others being corixids and chironomids. Bait traps captured twelve *Macrobrachium* and one *Cherax*. Both were also present in the fyke nets.

■ **Table 3-27.3 Macroinvertebrates captured at Pilgra Lagoon Upstream**

	Edge surber	
	Mean	Stddev
Dytiscidae	0.2	0.4
Ostracoda	221.0	75.7
Copepoda	1.8	2.5
Cladocera	1.4	2.6
s-f Chironominae	11.6	9.7
s-f Tanypodinae	12.6	6.5
s-f Orthoclaadiinae	0.2	0.4
Ceratopogonidae	2.6	1.5
Tabanidae	1.8	1.3
Baetidae	0.4	0.9
Caenidae	0.4	0.5
Corixidae	38.6	29.9
Libellulidae	0.2	0.4
Leptoceridae	1.4	0.9
Taxa	8.8	1.6
Abundance	294.2	74.1
Total taxa		14

3.28 Pilgra Lagoon Downstream

The lagoon was reduced to approximately 200m long, 40m wide and up to 0.5m deep. The substrate was firm sandy/silt. No snags were noted and alga was sparse near the edge but filamentous surface alga was detected in seine hauls. Disturbance of the edge was minimal. Many seedlings that had germinated following the February floods continued to survive.

3.28.1 Water Quality

Spot water quality data are shown in **Table 3-28.1**. 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. Turbidity was low relative to most river sites and many other lagoon sites.

■ **Table 3-28.1 Spot water quality readings –Pilgra Lagoon downstream in November 2004**

Sampling Time	Depth (m)	Temp. (°C)	DO (% sat.)	Conductivity (µS/cm)	Turbidity	pH
0900	Surface	24.5	74	587	159	8.9
	0.5	23.4	73	590	180	8.7

3.28.2 Fish

Two gill nets were not deployed at this site due to the water depth. Four native species and three introduced were captured. Rainbowfish and Goldfish had not been captured

in May though they must have been present because the water body was isolated at the time and has remained so. Bony Bream covered the full size range and Spangled Perch ranged from 69mm to 226mm. No small Yellowbelly or Carp were captured.

■ **Table 3-28.2 Results of fishing Pilgra Lagoon Downstream in November 2004.**

Species	Common name	Gill nets	Seine net (2)	Fyke nets	Bait traps	Dip net	Total Numbers caught
<i>Macquaria ambigua</i>	Yellowbelly	1					1
<i>Nematolosa erebi</i>	Bony Bream	2	52	45			99
<i>Leiopotherapon unicolor</i>	Spangled Perch	1		11			12
<i>Melanotaenia fluviatilis</i>	Rainbowfish		1				1
<i>Cyprinus carpio</i>	Carp	4					4
<i>Carrasius auratus</i>	Goldfish		2				2
<i>Gambusia holbrooki</i>	Mosquitofish		2		1		3
Total Numbers		8	57	56	1		122

3.28.3 Macrophytes

No macrophytes were present.

3.28.4 Macroinvertebrates

Surber samples were collected from compact mud with some leaf litter. No dip net sample was collected. Fourteen taxa were collected. Ostracods and ceratopogonids were very abundant. Bait traps captured 8 *Macrobrachium* and they were also present in seine hauls and fyke nets. Six *Cherax* were captured in fyke nets.

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

	Edge surber	
	Mean	Stddev
Dytiscidae	0.2	0.4
Ostracoda	657.2	231.5
Copepoda	7.6	7.2
Cladocera	1.0	0.7
s-f Chironominae	6.0	5.2
s-f Tanypodinae	3.4	3.4
Ceratopogonidae	115.6	128.5
Tabanidae	1.0	1.0
Caenidae	1.0	1.2
Corixidae	10.0	2.9
Leptoceridae	1.0	0.7
Nematoda	2.3	3.6
Oligochaeta	0.6	0.9
Acarina	0.4	0.9
Taxa	9.8	1.3
Abundance	806.8	318.6

3.29 Chinaman Creek

Water levels had declined by about 1m (to 1.5m maximum) since May such that the sand bar at the northern end was exposed and the channel reduced to just 0.5m wide beside it. Saplings to 4m covered the sand bar. The length of the pool was complete in both directions. Fringing green alga was poorly developed.

3.29.1 Water Quality

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

Temperature: 18.9 – 22.6°C

Dissolved oxygen: 63 – 86 % sat; 5.7 – 7.4mg/l

pH: 5.9 – 7.7

Conductivity: 256 – 261 µS/cm

Turbidity: >600 NTU.

A storm occurred at the commencement of sampling and the higher readings for most parameters were recorded at this time then gradually declined such that the minima were recorded early next morning. Following logging the meter was lowered to the bottom and the following data were recorded in **Table 3-29.1**. There was little variation with depth, possibly a result of mixing related to the strong winds the previous afternoon. Unlike many other floodplain sites the dissolved oxygen does not appear to be limiting and though conductivity has increased since May, pH has apparently not, though it shows a wide range.

■ **Table 3-29.1 Spot water quality readings – Chinaman Creek in November 2004**

Sampling Time	Depth (m)	Temp. (°C)	DO (% sat.)	Conductivity (µS/cm)	Turbidity (NTU)	pH
0745	1m	18.8	62	258	>600	5.7

3.29.2 Fish

All nets were deployed at this site. Five native species and two introduced were captured. Rainbowfish and Mosquitofish had been captured in May but Smelt had not. The previous highest number of Carp recorded in one sampling event at this site was six in November 2001. A single long-neck turtle was captured in a fyke net.

■ **Table 3-29.2 Results of fishing Chinaman Creek in November 2004.**

Species	Common name	Gill nets	Seine net (1)	Fyke nets	Bait traps	Dip net	Total Numbers caught
<i>Macquaria ambigua</i>	Yellowbelly		1	4			5
<i>Nematolosa erebi</i>	Bony Bream	3	2	5			10
<i>Leiopotherapon unicolor</i>	Spangled Perch			1			1
<i>Retropinna semoni</i>	Smelt		1				1
<i>Neosilurus hyrtlil</i>	Hyrtl's tandan			1			1
<i>Cyprinus carpio</i>	Carp	3	1	17	3		24

<i>Carrasius auratus</i>	Goldfish			3			3
Total Numbers		6	5	31	3		45

3.29.3 Macrophytes

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

3.29.4 Macroinvertebrates

Surber samples were collected from both soft and firm silt. Fourteen taxa were collected with the most common being copepods, corixids and chironominae. Bait traps captured 7 *Macrobrachium* and one *Cherax*. *Macrobrachium* were also captured in fyke and seine nets.

■ **Table 3-29.3 Macroinvertebrates captured at Chinaman Creek**

	Edge surber	
	Mean	Stddev
Ancylidae	0.6	0.5
Ostracoda	0.2	0.4
Copepoda	50.4	67.8
Parastacidae	0.4	0.5
s-f Chironominae	6.0	4.8
s-f Tanypodinae	4.6	3.6
Ceratopogonidae	4.0	7.9
Baetidae	2.4	1.9
Caenidae	2.0	2.8
Corixidae	8.2	6.0
Notonectidae	0.8	1.1
Nematoda	1.0	1.2
Oligochaeta	2.4	1.3
Leptoceridae	0.6	0.9
Taxa	9.0	1.0
Abundance	83.6	59.9
Total taxa	14	

3.30 Walla Lagoon

Maximum depth in the lagoon had declined to about 0.4m from the 1.5m recorded in May. The water appeared clear but with a green tinge. There was no sign of recent use of the site by cattle and only waterbird and kangaroo tracks were seen at the waters edge. The substrate was fine silt with a strong cover of green filamentous alga and entrapped small organic particles (pieces of gum flower etc). Some of the algae had sloughed off and was floating on the water surface. No large and very few small snags were noted.

3.30.1 Water Quality

Results from spot water quality sampling are shown in **Table 3-30.1**. The water column was well mixed with high conductivity and very high pH and dissolved oxygen, suggesting the site has been isolated and steadily drying since originally flooded in February and that algal productivity is very high.

■ **Table 3-30.1 Spot water quality readings – Walla Lagoon in November 2004**

Sampling Time	Depth (m)	Temp. (°C)	DO (% sat.)	Conductivity (µS/cm)	Turbidity (NTU)	pH
1445	Surface	30.9	147	459	>600	10.9
	0.4m	30.9	147	459	>600	10.9

3.30.2 Fish

Only seine netting was undertaken at this site. One native species and one introduced were captured (**Table 3-30.2**). The largest Spangled Perch captured was 48mm in length while many were less than 15mm. Seine netting in May recorded only one species whereas fyke netting recorded three natives, two introduced and nearly 90% of all the individuals captured at the site.

■ **Table 3-30.2 Results of fishing Walla Lagoon in November 2004.**

Species	Common name	Gill nets	Seine net	Fyke nets	Bait traps	Dip net	Total Numbers caught
<i>Leiopotherapon unicolor</i>	Spangled Perch		100				100
<i>Gambusia holbrooki</i>	Mosquitofish		4				4
Total Numbers		NA	104	NA	NA		104

3.30.3 Macrophytes

No macrophytes were observed.

3.30.4 Macroinvertebrates

Surber samples were collected from very soft silt with some algae. Twelve taxa were collected with ostracods by far the most abundant followed by corixids, oligochaetes and ceratopogonids. Some *Macrobrachium* were captured in the seine haul.

■ **Table 3-30.3 Macroinvertebrates captured at Walla Lagoon**

	Edge surber	
	Mean	Stddev
Dytiscidae	2.0	2.1
Hydrophilidae	0.2	0.4
Ostracoda	393.0	243.5
Copepoda	4.0	8.9
Cladocera	6.0	13.4
s-f Chironominae	2.2	1.9
s-f Tanypodinae	12.2	24.1

Ceratopogonidae	22.0	38.0
Baetidae	2.0	4.5
Caenidae	1.0	2.2
Corixidae	72.6	61.7
Oligochaeta	22.4	43.6
Taxa	6.4	1.7
Abundance	539.6	166.8
Total taxa		12

3.31 Woolerbilla Lagoon

The lagoon had contracted significantly since May and was a maximum of 30cm deep. Green filamentous alga was strongly developed but in patches. The water was very clear such that the bottom was easily visible. The recent storm had deposited eucalypt litter (flowers leaves and twigs) around the edge but there was no substantial structural habitat in the water. Numerous pelicans, ducks, egrets and herons were present. Some pig and kangaroo tracks were evident.

3.31.1 Water Quality

Spot surface water quality data were collected from this site (**Table 3-31.1**). Conductivity has apparently doubled since May while pH has possibly decreased slightly. While the turbidity meter did not appear to read correctly, it was probably similar to or less than that recorded in May (85NTU).

■ **Table 3-31.1 Spot water quality readings – Woolerbilla Lagoon in November 2004**

Sampling Time	Depth (m)	Temp. (°C)	DO (% sat.)	Conductivity (µS/cm)	Turbidity	pH
1230	Surface	31.9	174	870	NA	8.4

3.31.2 Fish

Only seine netting was conducted at this site. Five native species and two introduced were captured with Western Carp Gudgeon and Smelt being in addition to those captured in May. As the lagoon was isolated prior to the sampling in May these species must have been present at that time but they were not captured. In terms of abundance, many fewer Spangled Perch and Mosquitofish were captured on this occasion. The Spangled Perch were mainly between 20mm and 46mm in length while the Carp measured 390mm, 420mm and 560mm.

■ **Table 3-31.2 Results of fishing Woolerbilla Lagoon in November 2004.**

Species	Common name	Gill nets	Seine net	Fyke nets	Bait traps	Dip net	Total Numbers caught
<i>Nematolosa erebi</i>	Bony Bream		15				15
<i>Leiopotherapon unicolor</i>	Spangled Perch		8				8
<i>Hypseleotris klunzingeri</i>	Western Carp Gudgeon		3				3

<i>Melanotaenia fluviatilis</i>	Rainbowfish		7				7
<i>Retropinna semoni</i>	Smelt		1				1
<i>Cyprinus carpio</i>	Carp		3				3
<i>Gambusia holbrooki</i>	Mosquitofish		13				13
Total Numbers		NA	50	NA	NA		50

3.31.3 Macrophytes

No macrophytes were present.

3.31.4 Macroinvertebrates

Surber samples were collected from soft silt with algae. Fourteen taxa were collected with ostracods very abundant and ceratopogonids in good numbers.

■ **Table 3-31.3 Macroinvertebrates captured at Woolerbilla Lagoon**

	Edge surber	
	Mean	Stddev
Acarina	1.2	2.2
Physidae	0.2	0.4
Dytiscidae	0.4	0.5
Hydrophilidae	0.6	1.3
Ostracoda	1874	2606
Copepoda	0.6	0.9
Cladocera	4.0	8.9
s-f Chironominae	2.0	1.9
s-f Tanypodinae	16.0	14.7
Ceratopogonidae	168.0	158.5
Tabanidae	0.2	0.4
Corixidae	33.4	27.9
Nematoda	1.8	3.0
Oligochaeta	0.4	0.5
Taxa	7.6	2.7
Abundance	2103	2773
Total taxa		14

4. Discussion

4.1 Water quality

Table 4-1.1 summarises the results from all sites sampled in November 2004. 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 between 1300 and 1430, though this is not always so (Culgoa at Cubbie and Balonne Minor at Trafalgar were sampled in the early morning for example hence show low temperature, dissolved oxygen and pH).

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. The system generally shows the effects of drying out since the flows of January / February with conductivity and pH often much higher than recorded in May. Turbidity generally exceeded the maximum range of the meter but it appears that isolated sites with little disturbance can clear up to an extent while open sites with unrestricted stock access remain highly turbid.

The flow event that occurred at Nindigully appears to have lowered the water temperature, the level of dissolved oxygen and the pH and truncated the temperature range. The storm event that affected Chinaman Ck and Culgoa at Cubbie, though it was not accompanied by flow or even significant rainfall, probably had a similar effect.

The floodplain sites are highly variable with the more open shallow sites tending to show higher productivity, conductivity and pH than the more incised, deeper, shaded sites. Conductivity and pH were much higher than at riverine sites, probably reflecting the effects of drying out. Apparent clarity of the water was often higher at floodplain sites though the turbidity readings did not reflect this, possibly because of the means by which turbidity is measured.

4.2 Macrophytes

Macrophytes were very limited in their distribution and *Ludwigia* remains the most commonly encountered species. *Azolla* is occasionally seen but was only significant at one site. Nardoo was present at one site. The fringe of filamentous green algae was a common though not uniform sight and development was often not pronounced. At some floodplain sites the algae was not restricted to the edge as the shallow water was relatively clear throughout the waterbody.

■ Table 4-1.1 Summary Water Quality Data for November 2004.

	Temperature °C	Dissolved O ₂ % sat	Conductivity µS/cm	PH	Turbidity NTU
Balonne-St George	22.3 - 25.1	89 - 102	168 - 165	7.1 - 8.0	>600
Balonne-Mooramanna	20.3 - 25.4	70 - 106	176 - 181	7.0 - 7.9	>600
Balonne at Whyenbah	21.2 - 24.8	77 - 102	153 - 160	7.8 - 8.4	>600
Culgoa at Whyenbah	16.1 - 26.2	64 - 94	223 - 230	7.0 - 8.3	>600
Culgoa at Cubbie	19.3	61	194	6.3	>600
Culgoa at Woolerbilla	28.2	81	280	8.1	>600
Culgoa at Balandool	26.5	72	292	9.0	>600
Balonne Minor-Meigunyah	21.0	69	150	7.7	>600
Balonne Minor-Trafalgar	20.7	45	182	7.4	>600
Narran at Donegri	27.1	96	181	7.9	>600
Narran at Clyde	25.5	90	295	8.2	>600
Narran at Booligar	22.1	72	165	7.3	>600
Balandool on Cubbie	DRY	DRY	DRY	DRY	DRY
Balandool at Euraba	DRY	DRY	DRY	DRY	DRY
Bokhara at Kirrima	33.6	92	260	9.5	>600
Bokhara at Koala	20.3 - 29.6	56 - 106	217 - 227	6.1 - 9.6	>600
Briarie Ck	27.2	194	370	10.2	197
Warrego-Shannonvale	20.0 - 29.5	65 - 101	190 - 195	7.4 - 9.5	86 - 93
Warrego-Tinnenburra	30.6	126	306	9.2	483
Moonie at Nindigully	21.0 - 23.0	25 - 59	74 - 155	7.3 - 8.1	>600
Moonie at Fenton	29.1	80	136	8.6	>600
Beardie Lagoon	32.1	153	1028	8.8	>600
Lower Plains	31.4	195	415	10.2	>600
Sevels Lagoon	25.5	86	276	7.8	>600
Police Lagoon	22.0 - 27.1	84 - 102	256 - 262	8.1 - 8.8	>600
Belah Creek	31.6	109	347	8.2	>600
Clyde Lagoon	21.5 - 24.0	80 - 90	273 - 290	7.0 - 7.5	384 - 433
Pilgra U/S	29.1	101	495	8.7	270
Pilgra D/S	24.5	74	587	8.9	159
Chinaman Ck	18.9 - 22.6	63 - 86	256 - 261	5.9 - 7.7	>600
Walla Lagoon	30.9	147	459	10.9	>600
Woolerbilla Lagoon	31.9	174	870	8.4	NA

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.

4.3 Fish

In a total catch of 2457 individuals, eight native species of fish (with *Hypseleotris* pooled) were identified from each of river sites in the Lower Balonne, floodplain sites and 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 that were encountered at test sites in May but not in November are uncommon or are species rarely caught by the sampling techniques used (Murray Cod, *Tandanus tandanus* and *Ambassis agassizi*). The species complement at test river and lagoon sites was identical while that at reference river sites did not include Silver Perch or Goldfish but did include *Tandanus tandanus*.

The overall abundance was much less than that captured in May 2004 or November 2003 and this related mainly to differences at lagoon sites. The main differences are that the number of *Gambusia* has decreased from 1883 to 344 and Bony Bream from

1402 to 730 though Spangled Perch, Yellowbelly and Hyrtl's tandan also showed marked reductions. Smelt increased from 31 to 321 and gudgeons increased from 138 to 229.

Table 4-3.1 summarises the fish catch across all sites. Shading in the table marks each river and sites are placed from upstream to downstream within each river. The number of native species recorded at river test sites varied between two and seven and at reference sites between three and seven. Floodplain sites were far more variable and recorded between one and seven native species. The number of individuals captured varied from 11 to 150 at test river sites and from 14 to 205 at test lagoon sites. At reference sites the number of individuals captured varied from 32 to 155. It should be remembered that the use of the various fishing nets varied among sites.

The most diverse native fauna was found at St George and Whyenbah on the Balonne River, Shannonvale on the Warrego River, and Belah Waterhole. These were closely followed by Tinnenburra on the Warrego, Culgoa at Cubbie, Sevel's Lagoon and Clyde Lagoon. The least diverse fauna was recorded at several floodplain sites; Beardie, Lower Plains, Walla and Briarie Ck, and at the Narran River at Clyde. Most of these sites consisted of remnant shallow water with little habitat diversity and no means of immigration.

The most commonly encountered species at test sites were Bony Bream (all river sites and all but two lagoon sites), Yellowbelly (all but one river site but not at 5 lagoon sites) and Carp (all but two river sites and four lagoon sites). Mosquitofish was found at all but one lagoon site and Spangled Perch at all but three but neither was particularly common at river sites. The most abundant species at river test sites were Bony bream (31.3% of the total catch), Smelt (23.4%), Carp Gudgeon (11.7%) and Carp (11.1%). At lagoon sites the most abundant species were Bony Bream (25.4%), Mosquitofish (22.6%), Spangled Perch (14.5%) and Hyrtl's tandan (7.9%). At reference river sites the most abundant species were Bony Bream (42.4%), Hyrtl's tandan (13.1%), Carp Gudgeon (11.7%) and Mosquitofish (9.5%). Introduced species contributed 20.1% of the catch at test river sites, 31.5% at lagoon sites and 14.8% at reference river sites. The latter figures for test sites are a significant decrease on the samples from May 2004 (30.5% for river sites and 60.3% for lagoon sites) and that for references rivers is essentially the same (13.2%).

The small size and location of many individuals of some species suggested breeding had occurred some time after the floods of January / February and was not related to a flow event. Those species include Bony Bream, Yellowbelly, Spangled Perch, Smelt and Goldfish. While no very small Carp were captured, some very large specimens were encountered.

■ 4-3.1 Summary of fish catch by site; November 2004

Note the count of native species includes *Hypseleotris* sp IV where it was present.

Site	<i>Maccullochella peelii peelfii</i>	<i>Maquaria ambigua</i>	<i>Leipotheapon unicolor</i>	<i>Bicyanus bityanus</i>	<i>Nematolosa erebi</i>	<i>Hypseleotris</i> spp	<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	5	3	0	30	27	1	71	0	4	0	6	3	0	150	8	2
Mooramanna	0	5	0	0	75	31	6	12	0	0	0	1	1	3	134	6	3
Whyenbah	0	1	0	2	37	23	2	74	0	1	0	1	0	0	141	7	1
Culgoa at Whyenbah	0	4	0	0	56	18	21	13	0	0	0	3	0	1	116	5	2
Culgoa at Cubbie	0	16	1	2	7	0	8	6	0	0	0	11	2	0	53	6	2
Culgoa at Woolerbilla	0	1	0	0	4	1	1	1	0	0	0	1	18	3	30	5	3
Culgoa at Balandool	0	4	0	0	2	0	0	1	0	0	0	3	0	1	11	3	2
Meigunyah	0	5	0	0	19	2	0	46	0	0	0	22	1	1	96	4	3
Trafalgar	0	10	0	0	34	0	0	3	0	0	0	13	1	4	65	3	3
Balandool on Cubbie																	
Balandool at Euraba																	
Bokhara at Kirrima	0	3	0	0	6	12	0	0	0	0	0	0	6	25	52	4	2
Bokhara at Koala	0	3	1	0	12	0	0	0	0	1	0	6	11	3	37	4	3
Donegri Ck	0	3	0	1	11	0	0	0	0	1	0	2	0	0	18	4	1
Narran at Clyde	0	0	0	0	12	0	1	0	0	0	0	0	0	6	19	2	1
Narran at Booligar	0	6	1	0	1	1	0	2	0	0	0	40	6	0	57	5	2
River summary	0	66	6	5	306	115	40	229	0	7	0	109	49	47	979	9	3
Briarie Ck	0	0	0	0	10	0	0	0	0	0	0	0	6	6	22	1	2
Beardie Lagoon	0	0	0	0	2	0	0	0	0	0	0	0	0	12	14	1	1
Lower Plains	0	0	0	4	0	0	0	1	0	0	0	0	0	200	205	2	1
Sevels Lagoon	0	12	1	0	10	65	22	80	0	0	0	3	0	4	197	6	2
Belah Waterhole	0	5	9	0	40	12	2	1	0	5	0	16	3	8	101	7	3
Police Lagoon	0	1	27	0	69	0	1	0	0	0	0	17	0	9	124	4	2
Clyde Lagoon	0	8	14	0	28	1	1	0	0	89	0	24	0	1	166	6	2
Pilgra U/S	0	12	1	0	21	0	0	0	0	0	0	1	0	10	45	3	2
Pilgra D/S	0	1	12	0	99	0	1	0	0	0	0	4	2	3	122	4	3
Chinaman Ck	0	5	1	0	10	0	0	1	0	1	0	24	3	0	45	5	2
Walla Lagoon	0	0	100	0	0	0	0	0	0	0	0	0	0	4	104	1	1
Woolerbilla Lagoon	0	0	8	0	15	3	7	1	0	0	0	3	0	13	50	5	2
Lagoon summary	0	44	173	4	304	81	34	84	0	95	0	92	14	270	1195	8	3
Test site summary	0	110	179	9	610	196	74	313	0	102	0	201	63	317	2174	8	3
Shannonvale	0	2	2	0	67	29	0	5	0	37	0	2	0	11	155	7	2
Tinnenburra	0	4	0	0	34	3	13	3	0	0	0	2	0	0	59	6	1
Nindigully	0	9	0	0	6	1	0	0	1	0	0	8	0	7	32	4	2
Fenton	0	11	0	0	13	0	1	0	0	0	0	3	0	9	37	3	2
Reference summ	0	26	2	0	120	33	14	8	1	37	0	15	0	27	283	9	2

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 evident with respect to abundance but not to species richness. The pattern was not evident in May.

The 150 surber samples and 8 dip net samples produced over 47,000 individuals. This is less than one third of the number of individuals recorded in May from a similar number of samples. Forty-six discrete taxa were recorded in total and this is also less (11 taxa) than recorded in May. The result is partly due to more dip net samples being taken in May because more habitat was available to sample. Riverine sites in November tended to show higher numbers of taxa per surber but the taxa were the same across sites whereas in May there were greater differences between sites in terms of which taxa were present. The number of taxa in edge samples from lagoon sites tended to be less in November than in May and abundances, with the exception of ostracods at some sites, were markedly lower at several sites including Beardie, Lower Plains, Briarie Ck and Sevels. The very high abundance at Woolerbilla Lagoon was retained but the taxa causing it were different. In May the result was due to copepods, ceratopogonids and tanypodids while in November it was primarily due to ostracods.

Abundances at riverine sites were generally the same order of magnitude as recorded in May and while some sites did show noticeable differences the direction of the difference was not consistent. The Narran River at Clyde showed a marked decrease in abundances while the Culgoa at Balandool and the sites on the Balonne Minor showed marked increases. The largest change was recorded at the Bokhara River at Koala where the abundance per surber in May was 1893 +/- 883 individuals while in November it was 180 +/- 89. The difference was mainly due to the number of copepods per surber reducing from 1560 to less than 6. The number of taxa at river reference sites has remained stable but abundances were reduced, particularly at Shannonvale.

The most common taxa were ostracods, corixids, ceratopogonids, copepods, tanypodinae and caenids. These taxa were the most abundant at most sites while the occurrence of others was much patchier, such as culicids (Trafalgar), stratiomyids (St George) or sciomyzids (Koala). Taxa such as Odonata, Trichoptera, Hemiptera, Coleoptera, Palaeomonidae and Lepidoptera tended to be more common in dip net samples, as would be expected. In May the most abundant taxa overall were copepods, ceratopogonids, chironominae and tanypodinae.

Ostracods were by far the most abundant taxa and this was based on very high abundances at some floodplain sites, particularly Briarie Ck, Woolerbilla Lagoon, Walla Lagoon and the two Pilgra sites.

While these changes over time appear to suggest that the floodplain sites initially boomed after the floods of early 2004 and are now becoming harsher environments, the trend is not uniform because the sites are at various stages of drying and they differ in their physical characteristics.

■ **Table 4-4.1 Summary of macroinvertebrate data from November 2004**

	Taxa (Surbers)	Taxa (dip nets)	Taxa Total	Individuals (surber)
Balonne at St George	10.6 +/- 2.9	16	19 (27)	50 +/- 38
Balonne at Mooramanna	10.4 +/- 2.1		19	415 +/- 408
Balonne at Whyenbah	12.4 +/- 3.6	10	22 (22)	217 +/- 135
Culgoa at Whyenbah	8.2 +/- 1.9		18	53 +/- 22
Culgoa at Cubbie	9.8 +/- 1.3		17	85 +/- 26
Culgoa at Woolerbilla	10.0 +/- 1.4		18	157 +/- 83
Culgoa at Balandool	9.2 +/- 1.8		14	186 +/- 100
Balonne Minor at Meigunyah	10.6 +/- 3.5		19	150 +/- 140
Balonne Minor at Trafalgar	10.2 +/- 3.3		20	208 +/- 150
Narran at Donegri	10.6 +/- 2.9		22	72 +/- 51
Narran at Clyde	8.4 +/- 1.7		16	79 +/- 44
Narran at Booligar	9.8 +/- 0.8		19	101 +/- 47
Balandool on Cubbie		DRY		
Balandool on Euraba		DRY		
Bokhara at Kirrima	9.4 +/- 3.4		18	85 +/- 80
Bokhara at Koala	16.6 +/- 4.9	28	20 (33)	180 +/- 89
Briarie Ck	10.0 +/- 1.2	9	14 (15)	694 +/- 671
Beardie Lagoon	8.8 +/- 0.8		12	387 +/- 306
Lower Plains Lagoon	7.6 +/- 0.9		11	107 +/- 26
Sevels Lagoon	12.8 +/- 2.9	20	21 (22)	189 +/- 121
Belah Creek	10.6 +/- 1.7		18	65 +/- 11
Police Lagoon	9.4 +/- 1.5	15	15 (20)	114 +/- 76
Clyde Lagoon	7.8 +/- 3.2	14	15 (19)	83 +/- 74
Pilgra U/S	8.8 +/- 1.6		14	294 +/- 74
Pilgra D/S	9.8 +/- 1.3		14	807 +/- 319
Chinaman Ck	9.0 +/- 1.0		14	84 +/- 60
Walla Lagoon	6.4 +/- 1.7		12	540 +/- 167
Woolerbilla Lagoon	7.6 +/- 2.7		14	2103 +/- 2773
Warrego at Shannonvale	10.8 +/- 1.3	21	20 (25)	206 +/- 75
Warrego at Tinnenburra	9.4 +/- 2.1		18	114 +/- 78
Moonie at Nindigully	8.0 +/- 2.3		13	116 +/- 58
Moonie at Fenton	12 +/- 2.1		20	166 +/- 49

Note: Taxa total column shows the surber total then site total in brackets.

4.5 Current Status

This sampling event was undertaken nearly nine months after a moderate summer flood had broken an extreme drought. Sampling in May, three months after major flows, had shown that the fauna had recovered through recolonisation and redistribution such that relatively high diversity and abundance was achieved. It also pointed to the potential barrier effect of significant weirs on Yellowbelly migration during times of low flow or small flood events. Any such effect has apparently not led to local population decline in the long term because the species is widely distributed and common throughout the region.

The water level in the rivers in November was very low. This may be in part a result of the lack of further flow since the flood, in part due to the interaction of surface water and nearby groundwater and perhaps the action of parched earth and plants replenishing their stocks from the small flood. The end result is a contraction in the available habitat with some of what remains becoming unsuitable for some species. The lower number of fish on this occasion may reflect a lower fishing effort because all nets could not be used at many sites but it may also reflect the effects of unsuitable habitat or the feeding behaviour of other fish and waterbirds in the contracting habitat.

While some fish species “boomed” following the flood, those species have now returned to more “normal” numbers. In the case of the introduced species this is good news but as they appeared to take advantage of the floodplain when it was available, as did a number of native fish species, it does make the design of a management strategy for introduced species difficult.

The macroinvertebrates show significant decreases in abundance in floodplain sites and a return to the pattern of downstream increases in abundance in riverine sites. This may suggest that the flood temporarily broke down this pattern and allowed dispersal, redistribution and breeding while the more benign no-flow period brings a successional pattern related to decreasing habitat diversity and generally harsher conditions.

5. References

EM (Ecology Management) Pty Ltd. *Lower Balonne Ecological Condition Report – Survey of November 2003*. Prepared for Smartrivers.

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