

*Dumaresq-Barwon
Border Rivers Commission*



*Annual Statistics
1997-99*

Forward

From the Chairman

This document provides a summary of the annual water statistics associated with the activities overseen by the Dumaresq-Barwon Border Rivers Commission along the Queensland-New South Wales border.

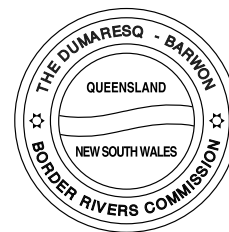
It is the first time that the Commission has produced a separate Annual Statistics Report. Previously some of the statistics and other information contained in this report were provided in the Commission's Annual Report to the Queensland and New South Wales Governments.

Generally the statistics contained in this report are based on the "hydrologic" water year and the "irrigation project" water year, both of which commence on 1 October and finish 30 September. This first report includes statistics from both the 1997/98 and 1998/99 water years to link up with the 1996/97 Border Rivers Commission Annual Report which was the last annual report containing statistics.

The Commission considers that this document will be a valuable record of activities carried out by the Commission as well as a useful archive of water related information in both Queensland and New South Wales. I am well aware of the considerable effort involved in collecting and collating the information in this report. My sincere thanks go to the staff from both the Queensland Department of Natural Resources and the New South Wales Department of Land & Water Conservation for their contribution to the production of this report.



B.A. Cummings
CHAIRMAN



Dumaresq-Barwon Border Rivers Commission 1997-1999 Annual Statistics

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Water Infrastructure

Table 1 - Key Features of Border Rivers Works

Name	Stream	AMTD (km)	Nearest Town/s	Description	F.S.L. above Bed EL	Storage Capacity (ML)	Date Completed
DAMS							
Glenlyon Dam	Pike Creek	6.4	Stanthorpe Tenterfield Texas	Earth & Rockfill	47.4	254,000	1976
WEIRS							
Boggabilla Weir	Macintyre River	283.5	Boggabilla Goondiwindi	Reinforced Concrete and Earthfill	8.5	5,850	1991
Boomi Weir	Macintyre River	184.3	Boomi	Steel Sheetpiling	4.1	354	1960
Bonshaw Weir	Dumaresq River	126.7	Texas	Steel Sheetpiling	2.9	617	1953/58
Coomonga Weir	Coomonga Creek		Toobeah	Steel Sheetpiling			1986
Cunningham Weir	Dumaresq River	67.9	Texas	Timber Piled (Written-off)	4.6	543	1954
Glenarbon Weir	Dumaresq River	5.7	Yelarbon	Steel Sheetpiling	2.7	353	1959
Goondiwindi Weir	Macintyre River	268.8	Goondiwindi	Timber Crib (Fish ladder added)	2.8	1,800	1942
Mungindi Weir	Barwon River	4.8	Mungindi	Steel Sheetpiling	3.6	730	1936/65
REGULATORS							
Boomi Regulator	Boomi River		Boomi	Steel Sheetpiling with Hardwood Dropboards			1960
Newinga Regulator	Barwon to Weir River flood channel		Talwood	Reinforced Concrete with Aluminium Dropboards			1993
Regulator No 1	Balonne Minor	163.5	Dirranbandi	Steel Sheetpiling with rock protection			1974
	Culgoa River	162.6	Dirranbandi	Steel Sheetpiling with rock protection			1974
Regulator No 2	Balonne Minor	128.9	Dirranbandi	Steel Sheetpiling with rock protection			1974
	Donnegri River	14.9	Dirranbandi	Steel Sheetpiling with rock protection			1974
Regulator No 3	Ballandool River	91.4	Dirranbandi	Steel Sheetpiling with rock protection			1974
	Bokhara River	79.8	Dirranbandi	Steel Sheetpiling with rock protection			1974
Regulator No 4	Birrie River	274.7	Goodooga	Steel Sheetpiling with rock protection			1974
	Bokhara River	276.2	Goodooga	Steel Sheetpiling with rock protection			1974
OTHER							
Little Weir River Diversion	Barwon River		Mungindi	Excavated Channel and Box Culverts			1986

Table 2 - Glenlyon Dam Monthly Storage Volumes 1997-99 (Megalitres)

End of Month	1997/98	1998/99
September	196,341	254,000
October	196,825	254,000
November	204,337	254,000
December	177,795	243,642
January	153,022	215,095
February	162,287	213,277
March	159,827	226,409
April	157,885	225,809
May	157,755	224,750
June	158,920	223,291
July	234,554	223,024
August	254,000	221,424
September	254,000	214,253

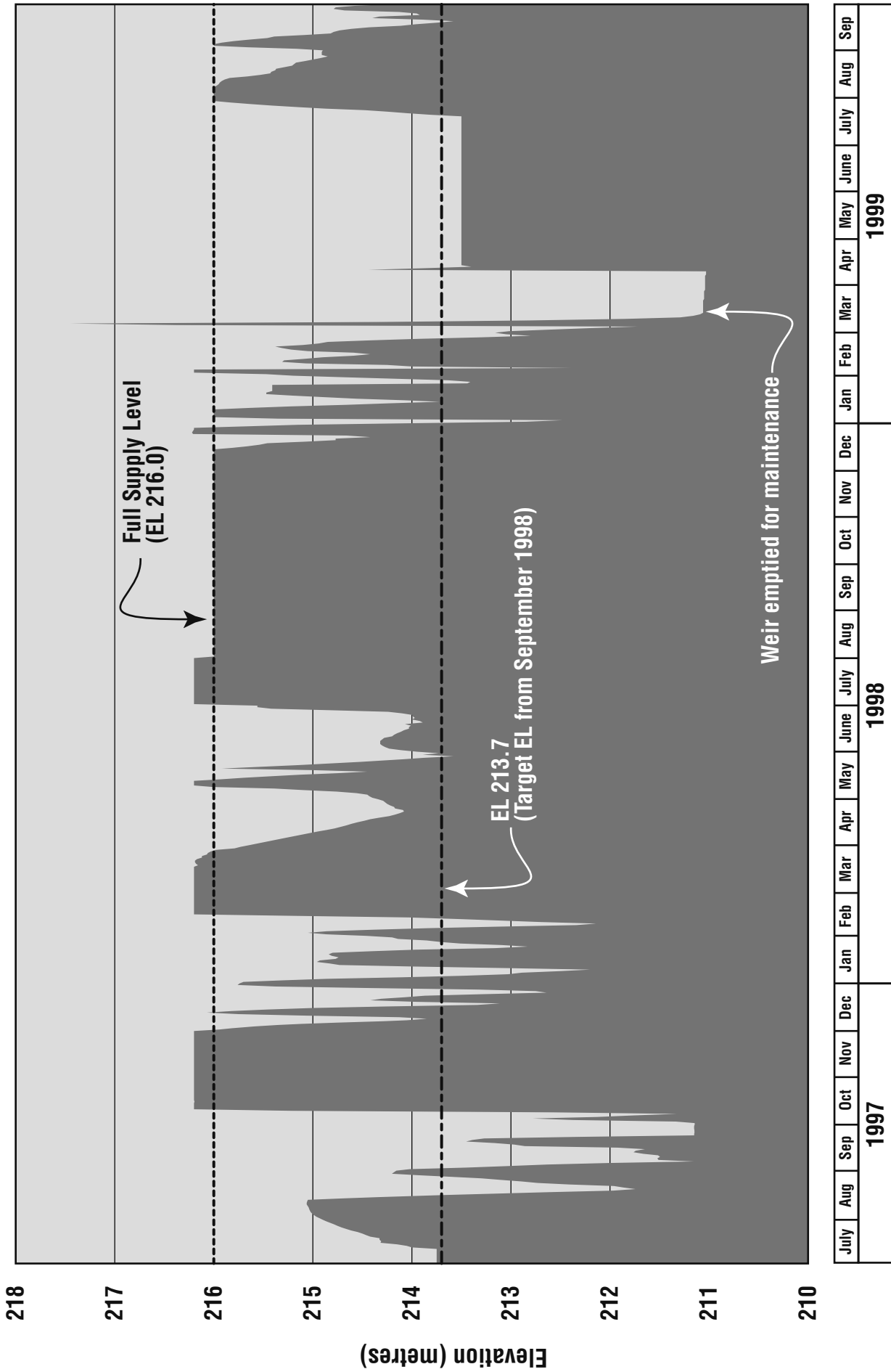
Table 3 - Glenlyon Dam Monthly Releases / Spillway Flows 1997-99 (Megalitres)

Month	1997/98		1998/99	
	Release	Spillway Flows	Release	Spillway Flows
October	1,920	0	168	2,366
November	0	0	120	1,190
December	28,595	0	9,454	152
January	27,255	0	25,346	0
February	5,540	0	1,743	0
March	0	0	129	0
April	533	0	120	0
May	124	0	124	0
June	120	0	120	0
July	120	0	124	0
August	124	45,105	1,090	0
September	120	14,222	6,116	0

Table 4 - Recreation Statistics - Glenlyon Dam

1997/98		1998/99	
Number of Visitors	Number of Camper Days	Number of Visitors	Number of Camper Days
40,449	6,622	49,749	7,670

Figure 1 - Boggabilla Weir Storage Levels 1997-99



Resource Allocation, Sharing and Use

Table 5 - Irrigation Licences - Border Rivers Catchment Upstream of Mingoola

	Number of Licences		
	New South Wales	Queensland	Total
Dumaresq River and Tributaries above Mingoola (excluding licences on Glenlyon Dam or Pike Creek downstream of Glenlyon Dam)	102	369	471

Table 6 - Irrigation, Off-Allocation, Waterharvesting, Industrial & Town Water Licences and Offstream Storages - Border Rivers (Regulated Section)

	Number of Licences		Allocations (Megalitres)		Off-stream Storages (ML) (Number of Storages)	
	NSW	QLD	NSW	QLD	NSW	QLD
Pike Creek and Dumaresq River from Glenlyon Dam to Bonshaw Weir	25	32	7,144	6,658		
Dumaresq River from Bonshaw Weir to Cunningham Weir (excluding Texas town)	19	26	5,723	7,463		
Texas Town		1		270		
Dumaresq River from Cunningham Weir to Macintyre River junction (excluding Yelarbon town)	15	36	4939	6,883	400 (1)	2,300 (3)
Yelarbon Town		1		106		
Macintyre River from Dumaresq River junction to Goondiwindi Weir (excluding Goondiwindi & Boggabilla towns)	11	48	58,060	32,519	24,200 (5)	66,175 (24)
Boggabilla Town	1		320			
Goondiwindi Town		1		1,800		
Macintyre River from Goondiwindi Weir to Boomi Weir	16	21	105,191	9,240	66,510 (16)	20,450 (10)
Macintyre River and Barwon River from Boomi Weir to Mungindi Weir (excluding Mungindi town)	19	41	61,590	21,570	45,650 (8)	72,200 (28)
Mungindi Town	1		320			
Totals	107	207	243,287	86,509	136,760	161,125

Table 7 - Water Use from the Border Rivers 1997/98

	On-allocation			Off-allocation		
	NSW	QLD	Total	NSW	QLD	Total
Pike Creek and Dumaresq River from Glenlyon Dam to Bonshaw Weir	1,116	1,079	2,195	568	819	1,387
Dumaresq River from Bonshaw Weir to Cunningham Weir (excluding Texas town)	1,358	1,111	2,469	980	145	1,125
Texas Town		151	151			
Dumaresq River from Cunningham Weir to Macintyre River junction (excluding Yelarbon town)	114	1,709	1,823	65	2,417	2,482
Yelarbon Town		61	61			
Macintyre River from Dumaresq River junction to Goondiwindi Weir (excluding Goondiwindi & Boggabilla towns)	25,742	13,189	38,931	16,228	37,955	54,183
Boggabilla Town	140		140			
Goondiwindi Town		1,315	1315			
Macintyre River from Goondiwindi Weir to Boomi Weir	45,097	4,885	49,982	40,565	16,340	56,905
Macintyre River and Barwon River from Boomi Weir to Mungindi Weir (excluding Mungindi town)	21,744	8,364	30,108	25,844	23,179	49,023
Mungindi Town	216		216			
Totals	95,527	31,864	127,391	84,250	80,855	165,105

Note that the above water use statistics includes the use of water released into the Border Rivers from Pindari Dam which is owned and operated by the State of New South Wales and Coolmunda Dam which is owned and operated by the State of Queensland.

Table 8 - Water Use from the Border Rivers 1998/99

	On-allocation			Off-allocation		
	NSW	QLD	Total	NSW	QLD	Total
Pike Creek and Dumaresq River from Glenlyon Dam to Bonshaw Weir	1,016	1,149	2,165	897	552	1,449
Dumaresq River from Bonshaw Weir to Cunningham Weir (excluding Texas town)	1,621	1,784	3,405	1,252	602	1,854
Texas Town		127	127			
Dumaresq River from Cunningham Weir to Macintyre River junction (excluding Yelarbon town)	329	1,443	1,772	118	564	682
Yelarbon Town		58	58			
Macintyre River from Dumaresq River junction to Goondiwindi Weir (excluding Goondiwindi & Boggabilla towns)	25,409	7,984	33,393	9,887	25,684	35,571
Boggabilla Town	132		132			
Goondiwindi Town		1,254	1,254			
Macintyre River from Goondiwindi Weir to Boomi Weir	40,540	5,270	45,810	20,176	11,686	31,862
Macintyre River and Barwon River from Boomi Weir to Mungindi Weir (excluding Mungindi town)	24,063	5,023	29,086	32,788	18,468	51,256
Mungindi Town	221		221			
Totals	93,331	24,092	117,423	65,118	57,556	120,956

Note that the above water use statistics includes the use of water released into the Border Rivers from Pindari Dam which is owned and operated by the State of New South Wales and Coolmunda Dam which is owned and operated by the State of Queensland.

Table 9 - Sharing of Regulated Border Rivers Water Resources (Megalitres)

	1997/98			1998/99		
	NSW	QLD	Total	NSW	QLD	Total
Carry-over allowed from previous water year.	0	5,487		0	7,820	
Share of resource available at commencement of water year (1 October)	67,119	50,634		92,357	69,673	
Additional share made available during water year	0	0		0	0	
Total share available during water year	67,119	56,121	123,240	92,357	77,493	169,850
Volume used from regulated flows during water year	100,480	30,485		93,331	24,092	
Net volume released into the Border Rivers from States own Dams	63,360	0		27,050	6,240	
Volume of "total share available" used during water year	43,503	30,485	73,988	66,281	17,852	75,495
Volume of carry-over water used during water year	0	5,487		0	7,820	
Volume of resources made available during year used	43,503	24,998		66,281	10,032	
Share available to carry-over to next water year.	0	7,820		0	39,970*	

* Carry-over allowed will be subject to rules about maximum permissible share to each State.

Table 10 - Access Opportunities to Unregulated Flows - Border Rivers

Month	Number of Days			
	1997/98		1998/99	
	Glenlyon to Goondiwindi	Goondiwindi to Mungindi	Glenlyon to Goondiwindi	Goondiwindi to Mungindi
October		3	Note (3)	Note (4)
November	3	1	Note (3)	Note (4)
December			Note (3)	Note (4)
January			2	
February	2	3		2
March			Note (5)	Note (6)
April			Note (5)	Note (6)
May	1	12	Note (5)	Note (6)
June			Note (5)	Note (6)
July	2 + Note (3)	3 + Note (4)	Note (5)	Note (6)
August	Note (3)	Note (4)		
September	Note (3)	Note (4)		

(1) Pumping during unregulated flows is referred to as "off-allocation" in NSW and "waterharvesting" in Qld

(2) For each day that Qld irrigators are permitted to "waterharvest" NSW irrigators are permitted to take up to 3% of their allocation without it being credited to allocation use

(3) Unrestricted access to unregulated flows permitted from 20/7/98 – 14/12/99 i.e. 146 days

(4) Unrestricted access to unregulated flows permitted from 27/7/98 – 14/12/98 i.e. 139 days

(5) Unrestricted access to unregulated flows permitted from 4/3/99 – 20/7/99 i.e. 138 days.

(6) Unrestricted access to unregulated flows permitted from 2/3/99 – 20/7/99 i.e. 140 days.

Table 11 - Production - Border Rivers 1997-99

CROP	1997/98			1998/99		
	NSW	QLD	Total	NSW	QLD	Total
Cotton	34,247	18,555	52,802	34,600	22,482	57,082
Lucerne	500	454	954	480	369	849
Cereals	1,100	1,217	2,317	1,120	1,248	2,368
Fodder Crops	850	719	1,569	890	887	1,777
Horticultural Crops	250	252	502	300	164	464
Other	700	3	703	775	8	783

Table 12 - Distribution of Groundwater Licences (Border Rivers Area)

	NSW	QLD
Issued Allocation	22,670	14,191
Issued Allocation (100% surface water allocation)	14,538	-
Issued Allocation (0% surface water allocation)	22,670	-
Allocation Issued, bores constructed	11,595	11,749
Allocation Issued, bores not constructed	11,075	2,442
Number of Licences	65	39
Number of Bores Constructed	24 (Monitored)	27
Number of Applications Outstanding	0	12

Table 13 - Groundwater Water Use - Border Rivers Groundwater Area 1997-99 (Megalitres)

1997/98		1998/99	
NSW	QLD	NSW	QLD
1,852	3,222	1,687	3,100

Resource Management

Table 14 - Compensation Inflow, Storage and Releases (Beardmore Dam) 1997-99

Month	1997/98			1998/99		
	Inflow (ML)	Release (ML)	Storage at End of Month	Inflow (ML)	Release (ML)	Storage at End of Month
June			666	3,780	2,680	1,100
July	0	0	625	1,910	3,080	0
August	0	0	631	21,780	21,780	0
September	0	0	581	21,900	21,900	0
October	10,310	0	10,400	21,250	21,250	0
November	15,500	11,600	13,390	7,660	4,660	2,930
December	18,900	31,400	0	14,260	0	16,701
January	5,560	4,420	1,1400	15,460	31420	10
February	17,330	18,480	0	20,440	20,440	0
March	9,040	9,040	0	22,630	22,630	0
April	0	0	0	12,400	12,720	0
May	21,360	21,360	0	4,700	4,460	0
June	3,780	2,680	1,100	2,960	2,960	0
Totals	101,780	98,980		171,130	169,980	

Report on Water Quality Monitoring (Border Rivers and Intersecting Streams) 1998/99

The Data

Water quality at a site generally fluctuates considerably over time, and is therefore best described by using the median, tenth percentile, and ninetieth percentile values. These values for electrical conductivity, total phosphorus, total nitrogen and turbidity are presented in Table 17. These data are given for each site in the Border Rivers catchment, and for each on the Intersecting Streams. The median provides information on the middle of the range value measured for each water quality parameter at each site. Half the measurements taken were above this value, and half below it. The extent to which each parameter varies is described by the percentile values. Some data fall beyond these percentile values, but in many cases these may be extreme values and may be unrepresentative of the water quality usually found at a site. Thus, to exclude any potentially unrepresentative outlying values, the tenth and ninetieth percentiles are used.

Salinity.

Electrical conductivity (EC) is used as an easy means to measure the salinity of the water at each site. As the concentrations of dissolved salts in the water increases, so does the water's ability to conduct an electric current. In Australia, the relationship between electrical conductivity (in S/cm) and salinity (in mg/L) is around EC times 0.68.

The summary data in Table 17 indicate generally low salinity waters at most sites in the Border River catchment, when compared to current (ANZECC 1992) Australian water quality guidelines for the protection of aquatic ecosystems and for irrigation. The main exception was Oaky Creek at Texas. Likewise electrical conductivity in the Intersecting Streams was also low. These electrical conductivity data are comparable to data for 1996/97 and for 1997/98. The spatial pattern was similar all three years, with highest the highest salinity every year in Oaky Creek at Texas, and the second highest in Macintyre Brook at Booba Sands. There was little apparent difference in the median electrical conductivity at many of the Border Rivers sites over the three years. The differences that do occur are within the realm expected from natural temporal variation, and some may be partly due to different sample sizes each year. The differences are insufficient to be attributed to any major catchment or water quality change. Median electrical conductivity in the Intersecting Streams was higher in 1998/99 than in 1997/98, but similar to that in 1996/97. Very few samples were taken in 1997/98, which would possibly bias the data for that year. The median 1998/99 data from both the Border Rivers catchment and the Intersecting Streams were generally lower than the medians of the long term measurements recorded from 1960 onwards. However the sampling routines for the two data sets were considerably different, making it impossible to determine if there has been an actual decrease in salinity at the sampling sites over time.

Nutrients

Total phosphorus concentrations in the Border Rivers catchment were high, being within, and at the downstream end of the basin, exceeding the indicative values known to cause eutrophication problems in rivers and streams (ANZECC 1992). Concentrations tended to increase with distance downstream, although concentrations were also high in the upper catchment tributaries of Tenterfield Creek and Macintyre Brook. Median total phosphorus concentrations in the Intersecting Streams were all very high, and well in excess of the indicative values suggested by ANZECC. A number of the Border Rivers catchment sites had slightly higher TP concentrations in 1998/99 than in the previous two years, but the data are insufficient to determine if these are trends in increasing eutrophication, or due instead to natural temporal variation or changed sampling routines. There was little difference between years at the Intersecting Streams sites. Comparisons with the longer term data base suggest little change over time.

Median total nitrogen concentrations at many sites were moderate to high, but frequently within the indicative range given by ANZECC (1992) where water quality deterioration due to excess nutrients are known to have occurred. Unlike the total phosphorus results, spatial variability in total nitrogen

concentrations across the catchment was less marked, the main exception being the generally higher concentrations in the Weir River at Talwood. There was little temporal difference in the median concentrations for each site for 1998/99 compared with those for 1997/98 and 1996/97, although the 1998/99 data may have been slightly higher than that of the previous two years. The 1998/99 median data are also slightly higher than the medians for the long term data base collected between 1960 and 1995. Median total nitrogen concentrations in the Intersecting Streams were also a little above the indicative values suggested by ANZECC for the protection of aquatic ecosystems, but with few differences between the data collected annually over the past three years, or with the long term data base for 1962 onwards.

Turbidity

Turbidity is another parameter that tends to increase with distance downstream through the catchment. Although there are no directly comparable ANZECC (1992) guideline values for turbidity for the protection of Aquatic ecosystems, values below 5 NTU can be considered low, 5 to 50 NTU and moderate, and above 50 NTU as high. On this scale, most sites in the Border Rivers catchment apart from Boomi and Talwood would more often have water with turbidity in the moderate range, while Boomi and Talwood would most frequently have high turbidity waters. Turbidity of the Intersecting Streams was always very high during 1998/99.

Comparisons with 1997/98 and 1996/97 indicate that the turbidity of the Border Rivers can vary considerably on a year to year basis. Median turbidity at most sites in 1998/99 was considerably more than median turbidity in the previous year, but comparable to those in 1996/97. The 1998/99 median values were also considerably greater than the median values calculated for the long-term database. The turbidity at sites on the Intersecting Streams in 1998/99 was similar to that in 1996/97, but is not comparable to the 1997/98 data as so few samples were taken that year. The few turbidity data that were collected considerably bias the 1997/98 data towards the higher end of the range.

Table 15 - Published Water Quality Guidelines

Water Quality Indicator	Reference	Value	Purpose
Turbidity	ANZECC (1992)	Site Specific	Untreated drinking water; environmental requirements
	SPCC (1990)	5 NTU 50 NTU	Untreated Drinking Water Environmental requirements
Salinity (measured as electrical conductivity)	ANZECC (1992)	0 - 280 μ S/cm 280 - 800 μ S/cm 800 - 2300 μ S/cm 2300 - 5500 μ S/cm >5500 μ S/cm	LOW MEDIUM HIGH VERY HIGH EXTREME Categories for irrigation uses Taste threshold: 1500 μ S/cm
Nutrients	ANZECC (1992)	Total Phosphorus streams: 0.01-0.10 mg/L lakes: 0.005-0.05 mg/L Total Nitrogen streams: 0.10-0.75 mg/L lakes: 0.10-0.5 mg/L	Levels at or above which excessive algal growth known to occur

Table 16 - Summary of Water Quality 1997/98

Basin	Site No	Location	Electrical Conductivity mS/cm				Total Phosphorus (mg/L)				Total Nitrogen (mg/L)				Turbidity (NTU)			
			N	10th %ile	Med	90th %ile	N	10th %ile	Med	90th %ile	N	10th %ile	Med	90th %ile	N	10th %ile	Med	90th %ile
Dumaresq Tributaries	416003	Tenterfield Ck. Clifton	4	178	337	534	4	0.32	0.63	1.32	4	0.02	0.08	0.19	4	1.59	4.3	79.0
	416310	Severn R. at Farnbro	1		177		1		0.80		1		0.03		1		4.8	
	416303	Pike Ck U/S Glenlyon Dam	3	286	299	443	3	0.23	0.35	0.39	3	0.02	0.03	0.03	3	0.82	1.9	3.5
	416309	Pike Creek at Glenlyon Dam Tailwater	3	216	363	437	3	0.53	0.65	0.69	3	0.02	0.03	0.04	3	2.42	4.1	11.2
	416032	Mole R. Donaldson	4	179	228	258	4	0.26	0.43	0.52	4	0.03	0.04	0.05	4	5.90	8.1	14.6
	416008	Beardy R. Haystack No. 4	4	138	174	199	4	0.37	0.58	0.89	4	0.03	0.09	0.14	4	7.96	51.5	202
	416312	Oaky Ck at Texas	12	591	675	738	12	0.38	0.75	0.95	12	0.05	0.08	0.10	12	15.3	31.5	49.5
	416415	Macintyre Bk Booba Sands	12	279	553	814	12	0.51	0.83	1.56	12	0.05	0.09	0.16	12	14.1	17.5	222
Dumaresq	416007	Bonshaw Weir	12	188	214	294	12	0.45	0.48	0.55	12	0.03	0.04	0.06	12	5.87	9.6	23.8
	416049	Mauro	12	190	264	339	12	0.36	0.43	0.50	12	0.03	0.05	0.08	12	6.19	10.7	19.0
Macintyre	416012	Holdfast	11	174	270	358	11	0.40	0.50	0.60	11	0.06	0.11	0.13	11	11.0	20.0	25.0
	416201	Goondiwindi	10	183	258	350	10	0.50	0.58	1.02	10	0.07	0.09	0.15	10	17.7	31.0	67.0
	416043	Boomi Weir	11	195	239	310	11	0.45	0.50	0.80	11	0.66	0.10	0.14	11	40.0	65.0	95.0
Weir	416202	Talwood	12	133	206	280	12	1.07	1.30	1.59	12	0.12	0.18	0.24	12	550	825	1190
Intersecting Streams	424002	Willara Crossing on Paroo	5	43	65	80	5	0.12	0.13	0.21	5	0.55	0.65	0.90	5	260	500	750
	423002	Fords Bridge Bywash on Warrego	5	91	96	120	5	0.19	0.21	0.26	5	0.60	0.70	0.90	5	5	650	850
	422015	Culgoa at Brenda	2	93	108	123	2	0.20	0.20	0.20	2	0.60	0.80	1.00	2	500	650	800
	422014	Bokhara at Goodooga	2	118	127	136	2	0.17	0.22	0.26	2	0.65	0.83	1.00	2	95	105	114
	422013	Birrie near Goodooga	2	132	142	152	2	0.22	0.22	0.22	2	0.80	0.85	0.90	2	450	600	750
	422012	Narran at New Angledool	2	96	105	114	2	0.22	0.23	0.23	2	0.75	0.88	1.00	2	600	675	750
Storages	416315	Glenlyon 1: Top																
		Glenlyon 1: Middle																
		Glenlyon 1: Bottom																

Table 17 - Summary of Water Quality 1998/99

Basin	Site No	Location	Electrical Conductivity mS/cm				Total Phosphorus (mg/L)				Total Nitrogen (mg/L)				Turbidity (NTU)			
			90th %ile	N	10th %ile	Med	90th %ile	N	10th %ile	Med	90th %ile	N	10th %ile	Med	90th %ile	10th %ile	Med	90th %ile
Dumaresq Tributaries	416003	Tenterfield Ck. Clifton	12	142	207	300	12	0.04	0.08	0.12	12	0.60	0.70	1.09	12	3.0	13.0	24.9
	416310	Severn R. at Farnbro	12	139	174	192	12	0.03	0.05	0.06	12	0.66	0.85	1.00	12	5.0	11.0	21.0
	416303	Pike Ck U/S Glenlyon Dam	12	12	254	296	11	0.02	0.04	0.05	11	0.45	0.55	0.70	12	3.9	8.7	26.0
	416309	Pike Creek at Glenlyon Dam Tailwater	11	11	170	182	9	0.03	0.05	0.09	9	0.50	0.70	0.71	11	6.7	11.0	15.0
	416032	Mole R. Donaldson	12	12	167	285	12	0.03	0.04	0.06	12	0.35	0.45	0.89	12	2.1	13.0	23.6
	416008	Beardy R. Haystack No. 4	12	104	135	184	12	0.03	0.05	0.22	12	0.41	0.65	2.86	12	14.2	31.0	44.6
	416312	Oaky Ck at Texas	12	401	507	657	12	0.03	0.04	0.05	12	0.20	0.35	0.55	12	10.2	25.0	49.5
	416415	Macintyre Bk Booba Sands	12	211	355	509	12	0.05	0.08	0.11	12	0.51	0.85	1.19	12	12.6	39.5	79.5
Dumaresq	416007	Bonshaw Weir	12	164	177	210	12	0.04	0.05	0.06	12	0.40	0.55	0.79	12	14.1	19.0	30.3
	416049	Mauro	12	162	184	218	12	0.04	0.05	0.08	12	0.41	0.55	0.83	12	17.0	22.5	44.5
Macintyre	416012	Holdfast	12	160	274	394	12	0.08	0.12	0.18	12	0.36	0.63	1.09	12	13.0	27.0	84.5
	416201	Goondiwindi	12	188	248	291	10	0.07	0.09	0.12	10	0.44	0.50	0.75	12	21.6	35.5	86.5
	416043	Boomi Weir	7	226	250	299	5	0.10	0.13	0.14	5	0.44	0.75	0.81	7	44.4	85.0	131
Weir	416202	Talwood	7	121	178	203	7	0.12	0.17	0.25	7	0.90	1.30	1.66	7	316	390	450
Intersecting Streams	424002	Willara Crossing on Paroo	10	41	83	151	10	0.12	0.18	0.25	10	0.53	0.90	1.22	10	397	600	810
	423002	Fords Bridge Bywash on Warrego	10	82	108	155	10	0.15	0.19	0.26	10	0.53	0.70	0.95	10	352	650	895
	422015	Culgoa at Brenda	10	133	192	210	10	0.19	0.23	0.36	10	0.74	0.83	1.35	10	235	390	503
	422014	Bokhara at Goodooga	10	134	178	240	10	0.22	0.27	0.29	10	0.85	0.98	1.10	10	267	350	505
	422013	Birrie near Goodooga	7	124	163	209	7	0.25	0.26	0.30	7	0.80	0.95	1.10	7	268	400	510
	422012	Narran at New Angledool	10	90	155	191	10	0.18	0.26	0.29	10	0.59	0.78	1.21	10	188	315	590
Storages	416315	Glenlyon 1: Top																
		Glenlyon 1: Middle																
		Glenlyon 1: Bottom																

Table 18 - Stream Gauging Stations (Border Rivers) 1997-99

AWRC NO	Stream	Station	Equipment (See Note)	Telemetry	Established Date	Maintained by	97/98 Total Flow (Mlx10 ³)	98/99 Total Flow (Mlx10 ³)	Historical Annual Total & (Year) (Mlx10 ³)		
									Min	Max	Median
416001	Barwon River	Mungindi	AR	Yes	1889	DLWC	1,398	422	21 (94/95)	3,288 (55/56)	431
416002	Macintyre River	Boggabilla	AR	Yes	1895	DLWC	2,128	661	59 (01/02)	5393 (89/90)	647
416003	Tenterfield Creek	Clifton	AR	Yes	1921	DLWC	47	30	4 (94/95)	114 (87/88)	20
416006	Severn River	Ashford	AR	Yes	1970	DLWC	475	95	30 (94/95)	695 (77/78)	232
416007	Dumaresq River	Bonshaw Weir	AR	Yes	1934	DLWC	712	261	49 (93/94)	1200 (75/76)	276
416008	Beardy River	Haystack	AR	Yes	1970	DLWC	153	30	7 (71/72)	184 (95/96)	49
416010	Macintyre River	Wallangra	AR	Yes	1973	DLWC	319	94	9 (94/95)	371 (83/84)	69
416011	Dumaresq River	Roseneath	AR	Yes	1972	DLWC	534	209	35 (93/94)	1182 (75/76)	245
416012	Macintyre River	Holdfast	AR	Yes	1951	DLWC	875	190	53 (60/61)	1865 (55/56)	308
416020	Ottleys Creek	Coolatai	AR	Yes	1967	DLWC	43	11	1 (92/93)	54 (95/96)	8
416032	Mole River	Donaldson	AR	Yes	1969	DLWC	132	72	12 (93/94)	442 (75/76)	105
416037	Boomi River	Offtake	AR	Yes	1973	DLWC	86	35	3 (94/95)	125 (83/84)	33
416040	Dumaresq River	Glenarbon Weir	AR	Yes	1996	DLWC	819	261	261 (98/99)	819 (87/98)	247
416043	Macintyre River	Boomi Weir	AR	Yes	1976	DLWC	314	286	36 (93/94)	371 (95/96)	141
416047	Macintyre River	Terrewah	AR	Yes	1985	DLWC	933	407	70 (93/94)	1274 (97/88)	300
416048	Macintyre River	Kanowna	AR	Yes	1988	DLWC	526	300	50 (93/94)	536 (89/90)	185
416060	Macintyre River	Boggabilla Weir D/S	AR	Yes	1997	DLWC					
416201A	Macintyre River	Goondiwindi	AR	Yes	1917	DNR	1,962	541	61 (94/95)	4,488 (55/56)	752
416201B	Macintyre River	Goondiwindi Weir	AR	Yes	1997	DNR	1,625	515	515 (98/99)	1,625 (97/98)	
416202A	Weir River	Talwood	AR	Yes	1949	DNR	469	164	1 (79/80)	688 (95/96)	70
416305B	Brush Creek	Beebo	AR	Yes	1950	DNR	20	4	0 (Several)	55 (95/96)	4
416309B	Pike Creek	Glenlyon Dam TW	AR	Yes	1973	DNR	124	50	3 (76/77)	173 (90/91)	78
416310A	Dumaresq River	Farnbro	AR	Yes	1962	DNR	104	34	2 (93/94)	407 (75/76)	61
416312A	Oakey Creek	Texas	AR	Yes	1969	DNR	49	4	0 (73/74)	100 (95/96)	9
416315A	Pike Creek	Glenlyon Dam HW	AR	Yes	1977	DNR	68	3	0 (Several)	178 (83/84)	
416402C	Macintyre Brook	Inglewood	AR	Yes	1953	DNR	189	82	8 (94/95)	549 (95/96)	50
416415A	Macintyre Brook	Booba Sands	AR	Yes	1987	DNR	247	89	4 (94/95)	637 (95/96)	58

Note: AR = Automatic Recorder; SG = Staff Gauge, Established Date = HYDSYS Period of Record (from which all long term calculations are made)

Table 19 - Stream Gauging Stations (Intersecting Streams) 1997-99

AWRC NO	Stream	Station	Equipment (See Note)	Telemetry	Established Date	Maintained by	97/98 Total Flow (Mlx10 ³)	98/99 Total Flow (Mlx10 ³)	Historical Annual Total & (Year) (Mlx10 ³)		
									Min	Max	Median
417001	Moonie River	Gundablouie	AR	Yes	1945	DLWC	274	104	0 (51/52)	628 (82/83)	69
417204A	Moonie River	Fenton	AR	Yes	1971	DNR	314	116	0 (79/80)	669 (75/76)	72
422005	Bokhara River	Goodwin's	AR	Yes	1944	DLWC			0 (64/65)	771 (55/56)	24
422006	Culgoa River	D/S Collierina (Kenebree)	SG	No	1944	DLWC		466	5 (79/80)	2337 (82/83)	315
422010	Birrie River	Talawanta	SG	No	1964	DLWC			0 (68/69)	380 (75/76)	30
422011	Culgoa River	U/S Collierina (Mundiwa)	AR	Yes	1964	DLWC			112 (94/95)	1009 (70/71)	217
422012	Narran River	Angledool	SG	No	1959	DLWC			0 (92/93)	627 (82/83)	114
422013	Birrie River	Near Goodooga	SG	No	1964	DLWC	74		0 (92/93)	659 (82/83)	33
422014	Bokhara River	Goodooga	SG	No	1915	DLWC	70		0 (92/93)	442 (82/83)	24
422015	Culgoa River	Brenda	AR	Yes	1960	DLWC		307	0 (92/93)	2409 (82/83)	280
422016	Narran River	Wilby Wilby	SG	No	1964	DLWC	152	194	0 (79/80)	558 (82/83)	119
422017	Culgoa River	Weilmoringle	SG	No	1964	DLWC	194		0 (92/93)	946 (83/84)	256
422204A	Culgoa River	Whyenbah	AR	Yes	1965	DNR	693	421	2 (92/93)	1,822 (82/83)	357
422206A	Narran River	Dirranbandi-Hebel Road	AR	Yes	1965	DNR	235	170	0 (92/93)	1,063 (82/83)	152
422207A	Ballandool River	Hebel-Bollon Road	AR	Yes	1965	DNR	50	50	0 (92/93)	532 (82/83)	23
422209A	Bokhara River	Hebel	AR	Yes	1967	DNR	63	53	1 (92/93)	367 (82/83)	41
422211A	Briarie Creek	Woolerbilla-Hebel Road	AR	Yes	1992	DNR	109	81	0	701 (82/83)	22
423001	Warrego River	Fords Bridge	AR	No	1921	DLWC	42	3	0 (97/98)	307 (89/90)	9
423002	Warrego River	Fords Bridge (Bywash)	AR	No	1921	DLWC	90	39	0 (57/58)	315 (55/56)	36
423202C	Warrego River	Cunnamulla Weir	AR	Yes	1992	DNR	122	131	41 (94/95)	1,587 (96/97)	184
424002	Paroo River	Willara Crossing	AR	No	1975	DLWC	795	98	16 (84/85)	1265 (82/83)	36
424201A	Paroo River	Caiwarro	AR	Yes	1967	DNR	992	142	26 (84/85)	2,037 (89/90)	379
011202	Bulloo River	Autumnvale	AR	Yes	1967	DNR	761	497	48 (79/80)	2,298 (88/89)	403

Note: AR = Automatic Recorder; SG = Staff Gauge, Established Date = HYDSYS Period of Record (from which all long term calculations are made)

Table 20 - Groundwater Monitoring Network 1997-99

Bore No	Location	State	Piezometer	Depth (m)	Automatic W.L. Recorder (Yes/No)	Year Installed	Depth to WL 1997/98		Depth to WL 1998/99	
							Max (m)	Min (m)	Max (m)	Min (m)
41640001	Keetah Crossing	Q	A	87.3	No	1985	-2.02	-2.24	-2.52	-2.84
41640001	Keetah Crossing	Q	B	46.8	No	1985	-4.59	-4.63	-4.41	-4.86
41640002	Keetah Crossing	Q	A	17.8	No	1985	-7.93	-7.97	-6.66	-7.83
41640003	Yelarbon Desert	Q	A	92.4	No	1985	-1.55	-1.84	-2.04	-2.33
41640003	Yelarbon Desert	Q	B	47.9	No	1985	-3.29	-3.45	-3.37	-3.95
41630053	' Tranquil' - Val Lennon	Q	A	13.0	No	1958	-7.71	-7.75		
41630009	Glenarbron	Q	A	93	No	1996	-15.19	-24.34	-15.17	-24.89
41630042	David Muggleton	Q	A	13.3	No	1959	-7.07	-7.09	-6.47	-6.72
41630039	' Eldorado' - Harley Girle	Q	A	16.7	No	1959	-5.38	-5.60	-4.04	-5.17
41630072	Cunningham Weir	Q	A	90.4	Yes	1985	-16.06	-29.48	-16.63	-27.62
41630072	Cunningham Weir	Q	B	41.4	Yes	1985	-14.98	-27.19	-15.43	-24.84
41630072	Cunningham Weir	Q	C	10.4	Yes	1985	-3.50	-5.50	-4.37	-5.31
41630064	Texas	Q	A	52.5	No	1985	-11.43	-15.38	-9.11	-15.12
41630064	Texas	Q	B	28.5	No	1985	-10.12	-12.25	-7.90	-12.26
41630066	Bill & Tater	Q	A	90.4	Yes	1985	-9.56	-13.37	-8.11	-12.59
41630066	Bill & Tater	Q	B	45.9	Yes	1985	-9.00	-12.44	-7.58	-12.44
41630067	Bill & Tater	Q	A	12.2	Yes	1985	-3.60	-4.58	-3.22	-4.13
41630063	Finlay' s	Q	A	100.6	No	1983	-5.01	-5.58	-3.64	-7.92
41630063	Finlay' s	Q	B	64.6	No	1983	-4.98	-5.77	-3.62	-7.75
41630062	Finlay' s	Q	A	17.4	No	1985	-4.01	-4.22	-3.12	-4.22
41630071	Finlay' s	Q	A	48.2	No	1985	-3.83	-4.25	-2.72	-5.30
41630071	Finlay' s	Q	B	41.2	No	1985	-3.85	-4.26	-2.75	-5.19
41630059	John Moore	Q	A	101.7	No	1985	-6.13	-6.14	-5.53	-5.96
41630069	John Moore	Q	A	92	No	1985	-9.36	-11.72	-6.43	-13.17
41630069	John Moore	Q	B	35.9	No	1985	-8.74	-11.75	-6.07	-12.92
41630069	John Moore	Q	C	15.4	No	1985	-5.85	-6.20	-5.13	-5.88
41630060	John Moore	Q	A	12.1	No	1985	-7.86	-8.03	-7.13	-7.85
41630058	John Moore	Q	A	10.6	No	1985	-6.88	-7.01	-6.15	-6.83
41630070	Phillip Harpham	Q	A	9.2	No	1985	-4.41	-4.83	-3.91	-4.79
4163000A	V and E Sattolo	Q	A	11.8	No	1960	-7.81	-8.30	-6.41	-8.03
41630003	V and E Sattolo	Q	A	27.1	No	1961	-9.40	-9.95	-7.46	-8.66

Table 20 - Groundwater Monitoring Network 1997-99 (Continued)

Bore No	Location	State	Piezometer	Depth (m)	Automatic W.L. Recorder (Yes/No)	Year Installed	Depth to WL 1997/98		Depth to WL 1998/99	
							Max (m)	Min (m)	Max (m)	Min (m)
41630002	V and E Sattolo	Q	A	29.9	No	1961	-7.54	-7.75	-6.32	-7.26
GW036697	Keetah Bridge	NSW	1	20	No		-8.69	-8.5	-8.64	-5.62
GW036697	Keetah Bridge	NSW	2	64	No		-10.46	-5.86	-5.86	-5.81
GW036697	Keetah Bridge	NSW	3	83.5	No		-1.40	-0.19	-2.92	-1.08
GW040635	Smithfield Section	NSW	1	15.9	No		-8.30	-6.05	-8.19	-6.95
GW040636	Smithfield Section	NSW	1	11.3	No		-7.22	-5.07	-7.05	-5.07
GW040637	Smithfield Section	NSW	1	7.9	No		-5.71	-5.16	-5.46	-4.17
GW040638	Smithfield Section	NSW	1	11.9	No		-9.32	-8.52	-9.32	-8.80
GW040639	Smithfield Section	NSW	1		No		-8.45	-8.45	-8.44	-8.44
GW040640	Smithfield Section	NSW	1	10.2	No		-9.90	-9.45		
GW40771	Smithfield Section	NSW	1	30	Yes					
GW40771	Smithfield Section	NSW	2	37	Yes					
GW40771	Smithfield Section	NSW	3	50	No				-21.32	-20.53
GW40771	Smithfield Section	NSW	4	69	Yes					
GW040641	Riverstone Section	NSW	1	35	No		-16.18	-6.59	-8.85	-7.3
GW040642	Riverstone Section	NSW	1	9.7	No		-6.66	-5.91		
GW040644	Riverstone Section	NSW	1	9.5	No		-7.97	-7.72	-7.79	-7.30
GW040645	Riverstone Section	NSW	1	7.5	No		-6.30	-6.00		
GW040646	Riverstone Section	NSW	1	7.7	No		-6.65	-5.74	-6.12	-5.21
GW040647	Hopwood Section	NSW	1	12.8	No		-9.40	-7.64	-9.28	-8.54
GW040648	Hopwood Section	NSW	1	10.1	No		-8.50	-7.54		
GW040649	Hopwood Section	NSW	1	28.9	No		-7.33	-6.68	-7.25	-6.94
GW040650	Hopwood Section	NSW	1	11.4	No		-8.12	-7.86		
GW040652	Hopwood Section	NSW	1	12.2	No		-7.51	-6.99		
GW040653	Hopwood Section	NSW	1	10.3	No		-7.99	-7.75		
GW40829	Lochiel Section	NSW	1	12	No		-10.28	-7.69	-8.34	-7.52
GW40829	Lochiel Section	NSW	2	42	Yes					
GW40830	Lochiel Section	NSW	1	27	No		-8.33	-7.92	-8.03	-7.91
GW40831	Lochiel Section	NSW	1	44	No				-25.03	-17.18
GW40831	Lochiel Section	NSW	2	96	Yes					

Notes
