Molonglo Catchment Health indicator Program Report

July to December, 2010.

Viaduct, Queanbeyan River, a few days after the flood, December 2010 (*Photo: John Bruggeman*).

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Executive Summary

In a turnaround that can only be attributed to the better than normal rainfall and stream flow conditions from February of 2010, ten of the twelve sub-Catchments in the Molonglo Catchment rate as in Good Health, in relation to Water Quality

Coppins sub-Catchment is demonstrating end of stream Poor Health this half year, both because of flooding upstream and the proximity to an active new urban development. It is that urban development that has taken the Weston Ck sampling point out of reporting for the period. Yarralumla Ck is a waterway under stress even in a favourable period, and this is reflected in the Moderate Health rating for Woden-Weston sub-Catchment.

The two newly separated sub-catchments, Lake Burley Griffin and Kowen, both rate in the 'Good towards moderate' range. For the urban Lake catchment this is pleasant, but in line with both Sullivans Ck and Fyshwick-Woolshed, and the actual improvement can be put down to the cleansing effect of rain and its maintenance through persistent flows. The quite elevated score for a rural sub-Catchment shown by Kowen is less easy to reconcile. Rural catchments are often unpredictable, especially where peri-urban development or infrastructure maintenance and improvement may occur for short periods.

The key recommendation to come out of the second half of 2010 would be that there is a real opportunity, post flood, to improve riparian condition by renewal of fencing, weed surveillance and suppression and judicious revegetation.

Acknowledgements

I would like to thank Lynton Bond, the president of the Molonglo Catchment Group for all his IT support; we would like to thank Natasha Abbott and her team at Queanbeyan City Council for sharing their water quality data for the Lower Queanbeyan and Jerrabomberra sub-catchments; we would like to thank Dan and Eric, who belong to SACTCG, for the use of their Coppins Crossing data; and I would especially like to thank all the Waterwatch Volunteers who contributed their time, skills and enthusiasm to provide the bulk of the data that make this report what it is. The Molonglo Catchment Group supports Molonglo Waterwatch with assistance from the Australian Government's Caring for our Country and the ACT Government. *SS*

Introduction

The Molonglo Catchment Group supports and maintains a volunteer Waterwatch program throughout its catchment. Support for the program comes from the Australian Capital Territory Natural Resources Management Council through the Australian Government's Caring for Our Country. With guidance from the Upper Murrumbidgee Catchment Waterwatch Facilitator, the MCG has a Waterwatch Coordinator one of whose duties is to collect, analyse and report on the data on the catchment's waterways collected by the volunteer Waterwatchers. There are presently 53 active sites looked after by twenty five volunteer teams.

The Waterwatch monitoring program is a component of the on-going Molonglo Catchment Health indicators Program. It will be a comprehensive and valuable monitoring and evaluation tool, using data collected by the Molonglo Landcare community

- to determine the current condition of the Molonglo catchment
- the assess the efficacy of current Landcare/Rivercare on-ground works
- to establish the criteria and location for future works
- and to support applications for funding of projects by using the data collected to evidence degradation or remediation

Each month, usually on the third weekend of that month, the volunteers visit their sites and conduct the tests. They report in about the condition of the site, the level and flow of the water and the weather conditions in the last 48 hours. They keep notes on the biodiversity of the sites and report back everything from the presence of filamentous algae to the appearance of the local water dragon family and even if the neighbour's stock are in the creek line. All this information is compiled and analysed.

Each month the Coordinator presents a summary of what the volunteers have found, as *This month in Our Catchment* posted on the Molonglo Catchment web site. Also there, is a link to the database, and each site has a page of current and past data.

Every six months the data, together with supplementary data from the Queanbeyan City Council is analysed using the Catchment Health indicators Program devised by Land & Water Australia. This Report is the product of that analysis. It allows for a snapshot of the health of the sub-catchments, a comparison between sub-catchments and a review of progress in the health of the overall catchment.

Where the Data came from:

We have had data sent to us by the following volunteer groups

Table 1. Contributions from MCG Waterwatch Volunteers.

Group Name	Site Codes	J	A	S	O	N	D
Coppins (Lower Molonglo WMA)							
Dan and Eric (SACTCG)	MOL350		+		+	+	
Woden-Weston(Lower Molonglo WMA)							
Mirinjani	WES410						
Harriden & Thompson	YAR400	+	+	+	+	+	+
Sullivans Creek (Central Molonglo WMA)							
Andy Kaye	SUL010; SUL012; SUL015, SUL018	+	+	+		+	+
Richard Larson	WAT010; WAT020; WAT030; WAT040	+	+	+	+	+	+
Perraud/Stenekes	SUL455			+			
Allen & Banister	SUW020		+	+	+	+	
The Dyer family	SUW010		+	+	+	+	+
Su Wild River's ANU group	SUL735; SUL745; SUL765	+	+	+		+	+
Lake Burley Griffin (National Capital Authority)							
	LBG100			+			
Kate de Smet and Melati	LBG060; LBG040			+	+	+	+
Claudia Townes	LBG015; NOR010				+		+
ADFA students	3 sites						
John Bruggeman	WOO090; MOL295	+	+	+	+	+	
Fyshwick , Woolshed, Kowen (Central Molonglo WMA)							
John Bruggeman	MOL280; MOL270; MOL260;REE095	+	+	+	+	+	+
Roy Watson	MOL240					+	+
Karen Butler	SCA200; WEE040				+	+	+
Jerrabomberra (Central Molonglo WMA)							
Old Narrabundah Landcare	JER175		+	+	+		+
Jerrabomberra(Jerrabomberra Headwaters WMA)							
Fernleigh Park Landcare	JER095	+		+	+	+	+
Robertson/Shaw	JER065	+	+	+	+	+	
Royalla Landcare	JER020	+	+	+	+	+	+
Lower Queanbeyan(Lower Queanbeyan WMA)							
John Bruggeman	QUE495	+	+	+	+	+	+
Upper Molonglo (Upper Molonglo WMA)							
Carwoola Landcare (Bernard K)	MOL216; MOL210	+	+	+	+	+	+
Carwoola Landcare (Hilary & Glen)	CHI095;STO060;WHI090		+	+	+	+	
Waterwatch Coordinator	YAN020;YAN080		+			+	
Captains Flat Landcare	MOL109	+	+	+	+	+	+
Burra (Googong WMA)							
Friends of Googong	QUE400	+					
Bidgee Blue	BUR075		+			+	+
Burra Creek Landcare	BUR055	+	+	+	+	+	+
Upper Queanbeyan (Googong WMA)							
Sandy Lloyd	QUE300; TIN080; URI040	+	+	+	+	+	+
Boolboolma Landcare	ROB180; QUE125	+	+	+	+		+
Terry Korodaj	QUE110;TOW130			+			

These data were collected with the Waterwatch kits supplied by the Molonglo Catchment Group and in the manner specified in the Molonglo Catchment Group M-CHiP Manual, which is annually reviewed. Waterwatch volunteers are supported by a Waterwatch Coordinator from MCG and the Upper Murrumbidgee Waterwatch

Facilitator, and are encouraged to attend at least one Quality Assurance / Quality Control session each year to maintain their accreditation. The volunteers, except those visiting remote sites, usually take their readings on the third weekend of each calendar month. Volunteers from the Ginninderra Catchment Group and the Southern ACT Catchment Group supplied their data from Coppins Crossing to complete the picture of the whole valley.

We have also included data supplied by Queanbeyan City Council for six sites (QUE430, 440, 455, 460, 470, 496) in the Queanbeyan River below Googong Dam (Lower Queanbeyan WMA), and two sites (JER120, 121) in Jerrabomberra Creek (Jerrabomberra Headwaters WMA). The Council data were collected with an electronic data collector and were compiled once a month.

The rating system, similar to that promoted by Waterwatch Victoria and based around ANZECC (2000) guidelines, follows the pattern in the table below:

Table 2a: Catchment Health Ratings, URBAN

Indicator Rating	Excellent 1	Good 2	Moderate 3	Poor 4	Degraded 5
pH	6.1-7.0	7.1-8.0	8.1-8.5	5.0-6.0 or 8.5-9.0	<5.0 or >9.0
Electrical Conductivity, $\mu S.cm^{-1}$	<80	<250	<400	<500	>500
Turbidity, NTU	<10	<15	<20	<30	>30
Dissolved Oxygen, $mg.L^{-1}$	>8.0	>7.0	>6.0	>4.6	<4.6
Phosphate, $mg.L^{-1}$	<0.01	<0.05	<0.09	<0.15	>0.15
Nitrate, $mg.L^{-1}$	<1.0	>1.0	>10.0	>15.0	>20.0

Table 2b: Catchment Health Ratings, RURAL

Indicator rating	Excellent 1	Good 2	Moderate 3	Poor 4	Degraded 5
pH	6.5-7.0	7.1-8.0	8.1-8.5	6.0-6.5 or 8.5-9.0	<6.0 or >9.0
Electrical Conductivity, $\mu S.cm^{-1}$	<60	<200	<350	<400	>400
Turbidity, NTU	<10	<12.5	<15	<20	>20
Dissolved Oxygen, $mg.L^{-1}$	>10.5	>9.0	>8.0	>6.0	<6.0
Phosphate, $mg.L^{-1}$	<0.01	<0.02	<0.05	<0.09	>0.09
Nitrate, $mg.L^{-1}$	<1.0	>1.0	>5.0	>10.0	>15.0

For each parameter at each site, the long-term mode for the data (or median if no clear mode) is assigned a score from Table 2 above. The scores are then summed and divided by the number of parameters reported for the site. This gives the Long Term Site Score. The average of the Long Term Site Scores for each subcatchment provides the Long Term CHiP Water Score for that subcatchment.

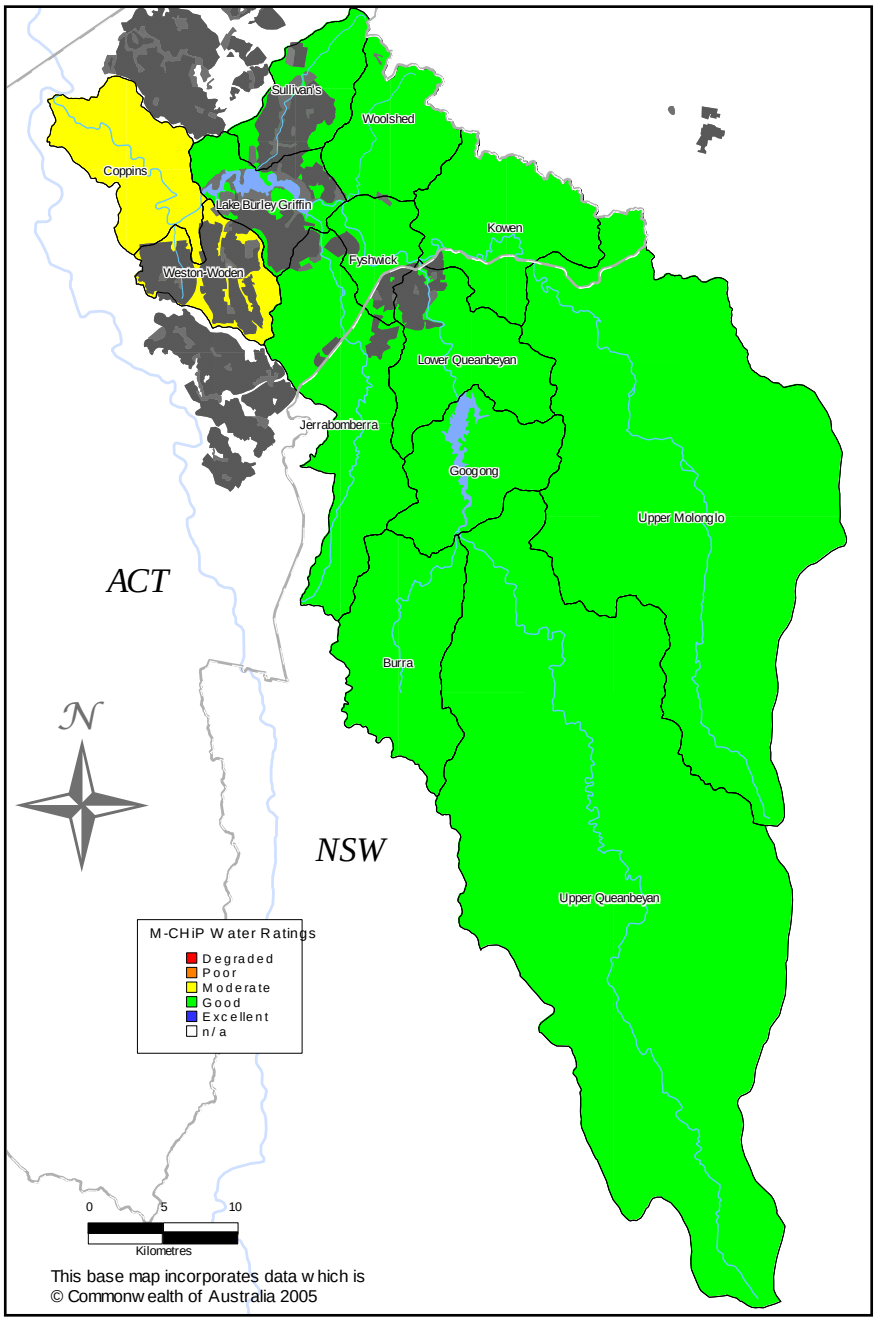
For each parameter (except Water Temperature and percent Oxygen Saturation) at each site, we calculate the **median** for the six-month reporting period. (To do so we arrange the scores from lowest to highest, and report the median as the number that lies in the middle of the data set.) Data from sites where there have only been a single report or two reports of an expected six are not included but are published in the sub-catchment tables. For the sites that only get sampled every second month, we include all data reported. Each median is assigned a score from Table 2 and those scores for the site are summed and then divided by the number of parameters. This gives a **Site CHiP Water Score**, and subsequently in the same manner a **sub-Catchment CHiP Water Score**. These values are used to generate Table 3 and the Map (Figure 1). A more precise set of scores may be generated by assigning each monthly value a score from Table 2 and then finding the score median or mean. This is probably more rigorous than the actual results will support.

Results

Table 3: Summary of results from the Catchments July- December 2010

Subcatchment	Current M-CHiP rating	July-December, 2009 rating	Comment
Coppins	3.0	2.4	A drop to Moderate
Weston-Woden	3.17	2.9	Moderate
Sullivans Creek	2.27	3.3	Good and improving
Lake Burley Griffin	2.65	Not rated	Good tending to moderate
Fyshwick Woolshed	2.52	2.9	Good, improving
Kowen	2.60	[2.9]	Good tending to moderate
Jerrabomberra Creek	2.42	3.0	Good, improving
Lower Queanbeyan	2.32	2.4	Good, steady
Upper Molonglo	2.01	2.5	Good, almost excellent
Burra Creek	2.65	2.7	Good, but towards moderate
Upper Queanbeyan	2.06	2.0	Good, as usual

Figure 1. M-CHiP ratings for the Molonglo Catchment, July - December 2010



Coppins Sub-Catchment

The Molonglo River, having come over Scrivener Dam, and picked up both Yarralumla and Weston Creeks, passes Misery Point and flows in a westerly direction between the causeway at Coppins Crossing and the confluence with the Murrumbidgee opposite Woodstock Reserve. Although severely affected in the 2003 bushfire, the riparian areas downstream of Misery Point are in good condition, with Sheoak Tableland Riparian Woodland throughout, and remnants of Snowgum grassy woodland and Black Cypress woodland in the valley slopes. The Lower Molonglo Gorge is rimmed by Peppermint Stringybark Tall Woodland. Tongs Hole, just above the Canberra Water Treatment Works, has Sheoak Woodland in the valley and remnants of both Cypress and Red Gum Yellow Box Grassy Woodland on the slopes.

There is one active site in this sub-catchment. For historic reasons, the sampling has been done by members of either Ginninderra Catchment Group or Southern ACT Catchment Group. The sample site at Coppins Crossing is at the causeway over the Molonglo River at the eastern end of the proposed Lower Molonglo River Corridor. This point forms an interface between the urban and peri-urban areas upstream, going back to Scrivener Dam and the reserve corridor between the leasehold on the Belconnen or north side and the former forested area on the Stromlo or south side.

Coppins Crossing, lower Molonglo River, 3 December 2010. (DECCEW)

Although there are only three sample sets from the one site the data indicate a subcatchment under pressure. The sampling site is at the low level causeway at Coppins Crossing and so downstream of the whole catchment except one or two minor creek-lines below William Hovel Drive. The poor dissolved oxygen readings, together with the elevated nitrogen levels, indicate that discharges downstream of the metropolitan area contain materials stirred up by the unusually frequent rain events in this half of 2010. A CHiP score of 3.0 indicates a waterway in moderate condition, which is a reasonable view of a river in almost continuous elevated flow for six months.

Table 4: Coppins Sub-Catchment

	Parameter	Standard	Long Term Median	Jul	Aug	Sep	Oct	Nov	Dec	M-CHiP score
M-CHiP			17/6 = **2.8**							18/6 = 3.0
MOL350	Molonglo R., Coppins Crossing		17/6 = 2.8							18/6 = 3.0
	Temp. °C				13.1		18.0	23.4		
	pH	6.5–9.0	7.8		7.9		7.8	7.8		
	E C µS.cm^{-1}	30–350	410		294		276	237		
	Turbidity, NTU	<30	<10		<10		20	40		
	Dissolved Oxygen, mg.L^{-1}	>4	7.0		7.2		5.3	5.0		
	% Dissolved Oxygen	80–120			70		58	55		
	Phosphate, mg.L^{-1}	<0.10	0.01		0.01		0.02	0.05		
	Nitrate, mg.L^{-1}	<15.0[1]	10.0		10.0		10.0	10.0		

Weston–Woden Sub-Catchment

There are two active sites in this subcatchment. The Weston Creek site is in the creek below Cotter Road, where it becomes a natural waterway after being an open drain through the Waramanga, Weston and Holder areas. This situation is about to change very drastically as the urban development includes the construction of a long, narrow urban wetland in the creek valley starting at the present sampling site. The Yarralumla Creek site is in the old natural streamline, although the creek has only just escaped the drain that contains it from Isaacs to Curtin, again being sampled near its discharge into the Molonglo below Cotter Rd.

Weston Creek below Cotter Rd, as a construction site.

Both sites frequently show elevated levels of electrical conductivity, which is a common observation in built-up areas with plenty of hard surfaces, alkaline building materials and commercial pollution of stormwater systems.

With no results from Weston Creek in this period (the site is a construction site and difficult to access) the sampling point on Yarralumla Ck at Cotter Rd, just below Curtin, is the only information we have for this sub-catchment. All the parameters are elevated throughout the sample period, indicating repeated disturbance of the catchment. The persistently high nitrate levels indicate that the local horse paddocks act as a sink for such nutrients in dry times with release in times of high soil moisture. A CHiP score of 3.17 indicates that Yarralumla Creek, rather than the whole sub-catchment, is in only **moderate** condition compared to its own long term score of 2.3.

Table 5: Weston Woden Sub-Catchment

	Parameter	Standard	Long Term Median	Jul	Aug	Sep	Oct	Nov	Dec	M-CHiP score
M-CHiP			4.9/2=**2.5**							**3.17**
WES410	Weston Ck, below Cotter Rd		8/3=2.6							
	Temp. °C									
	pH	6.5–9.0	7.3							
	E C µS.cm^{-1}	30–350	520							
	Turbidity, NTU	<30	10							
YAR400	Yarralumla Ck, at Cotter Rd		14/6= 2.3							19/6 = **3.17**
	Temp. °C			9.0	10.0	17.5	18.0	26.0	21.5	
	pH	6.5–9.0	8.2	8.6	8.4	8.9	7.9	8.9	8.4	
	E C µS.cm^{-1}	30–350	570	630	600	630	520	680	210	
	Turbidity, NTU	<30	<10	20	15	<10	30	<10	40	
	Dissolved Oxygen, mg.L^{-1}	>4	8.3	12.0	12.6	12.6	8.4	8.2	8.6	
	% Dissolved Oxygen	80–120		130	150	150	125	150	135	
	Phosphate, mg.L^{-1}	<0.10	0.03	0.07	0.01	0.01	0.13	0.05	0.10	
	Nitrate, mg.L^{-1}	<15.0	5.0	20.0	25.0	15.0	30.0	10.0	15.0	

Sullivans Creek Sub-Catchment

Sullivans Creek is one of the more densely urbanised creek catchments in the ACT, at least from the Racecourse along either side of Northbourne Avenue to the shores of Lake Burley Griffin. Sullivans Creek is a 'flood and dry' drainage system that rises on the south western face of Goorooyaroo Hill at the ACT–NSW border. It crosses the limestone plains and enters the urban area through the industrial suburb of Mitchell. From there it is a regulated waterway in a concrete channel going through parts of Lyneham and O'Connor before entering the grounds of ANU, and eventually entering the western end of Lake Burley Griffin. The catchment is flanked on the east by the western face of Mount Majura and Mount Ainslie and on the south west by O'Connor Ridge and Black Mountain.

Banksia Street Wetland, now 1 year old

There are tributaries rising on O'Connor Ridge, which feed water into Banksia Street and David Street wetlands. Drain-lines on Mount Majura and Mount Ainslie contribute to intermittent waterways on the eastern side of the main creek line. There are also considerable groundwater flows across the sub-catchment.

A recent addition to Sullivans Creek has been an inline wetland upstream from Flemington Road near the racecourse. The four off-line wetlands in North Watson and Justice Robert Hope Reserve are now being monitored, as are both of the wetlands in the O'Connor hill drain-line at Banksia Street and David Street. Except in the wetland, meaningful dissolved Oxygen determinations cannot be made in this sub-catchment upstream of the ANU sites.

Sullivans Creek sub-catchment has frequently shown elevated pH levels and high EC readings as it drains the Limestone Plains. In a half-year when a usually 'flood-and-dry' drainage system has been a continuous creek system the results have been quite different; the pH has remained alkaline, but less elevated, the EC has been generally close to tap-water levels (below 300µS.cm^{-1}) and nutrient levels have been moderate. Most of the wetlands have scored well for water quality, and the in-channel readings have also been down on past years. The score in the Good range, of 2.27 is a very real improvement on the 3.3 (Moderate Catchment Health) of the previous July to December and inside the long term median score for this sub-catchment.

Sullivans Creek at Flemington Rd, Mitchell SUL018 (Andrew Kaye)

Table 6:. Sullivans Creek Sub-Catchment

	Parameter	Standard	Long Term Median	Jul	Aug	Sep	Oct	Nov	Dec	M-CHiP score
M-CHiP			35.2/14 = 2.5							29.5/13 = **2.27**
SUL010	Sullivans Ck, Wells Station Rd		14/4 = 3.5							8/4 = 2.0
	Temp. °C				11.0	19.0		No Flow	19	
	pH	6.5–9.0	8.4		7.5	9.8			7.4	
	E C µS.cm^{-1}	30–350	315		280	200			530	
	Turbidity, NTU	<30	15		15	<10			<10	
	Phosphate, mg.L^{-1}	<0.10	0.25		0.03	0.07			0.03	

	Parameter	Standard	Long Term Median	Jul	Aug	Sep	Oct	Nov	Dec	M-CHiP score
WAT010	North Watson Wetland		10/6 = 1.7							11/6 = 1.8
	Temp. °C			10.0	19.5	13.4	18.7	26.6	20.0	
	pH	6.5–9.0	7.5	7.5	7.6	9.1	7.1	7.4	7.6	
	E C µS.cm^{-1}	30–350	125	80	120	220	140	140	300	
	Turbidity, NTU	<30	<10	<10	<10	<10	<10	15	15	
	Dissolved Oxygen, mg.L^{-1}	>4	9.0	8.0	8.0	9.0	7.6	5.4	5.0	
	% Dissolved Oxygen	80–120		70	95	86	80	65	54	
	Phosphate, mg.L^{-1}	<0.10	0.0025	0.2	0.0	0.0	0.25	0.0	0.0	
	Nitrate, mg.L^{-1}	<15.0	10.0	15.0	15.0	20.0	10.0	15.0	20.0	
WAT020	Farm dam, Justice Hope Woodland		16/6 = 2.7							15/6 = 2.5
	Temp. °C			10.0	18.9	13.0	18.9	30.0	23.0	
	pH	6.5–9.0	7.4	7.6	7.4	7.4	7.1	6.9	7.4	
	E C µS.cm^{-1}	30–350	90	70	80	90	80	90	150	
	Turbidity, NTU	<30	30	80	30	30	25	40	30	
	Dissolved Oxygen, mg.L^{-1}	>4	5.6	8.0	7.0	7.0	6.0	6.6	5.1	
	% Dissolved Oxygen	80–120		70	75	65	65	85	57	
	Phosphate, mg.L^{-1}	<0.10	0.015	0.0	0.0	0.08	0.0	0.0	0.0	
	Nitrate, mg.L^{-1}	<15.0	10.0	10.0	0.0	10.0	5.0	10.0	10.0	
WAT030	Run-off pond, Roma Mitchell Ct		11/6 = 1.8							12/6 = 2.0
	Temp. °C			10.0	16.5	12.4	18.3	29.4	22.0	
	pH	6.5–9.0	7.6	7.6	7.6	7.6	7.1	6.9	7.9	
	E C µS.cm^{-1}	30–350	90	60	90	120	90	80	220	
	Turbidity, NTU	<30	10	70	25	10	20	10	10	
	Dissolved Oxygen, mg.L^{-1}	>4	8.0	8.0	8.0	8.0	5.4	5.0	7.2	
	% Dissolved Oxygen	80–120		70	80	75	55	65	80	
	Phosphate, mg.L^{-1}	<0.10	0.01	0.0	0.0	0.0	0.0	0.0	0.0	
	Nitrate, mg.L^{-1}	<15.0	10.0	10.0	0.0	15.0	5.0	10.0	10.0	
WAT040	Overflow pond, North Watson Wetland		10/6 = 1.7							11/6 = 1.8
	Temp. °C			10.0	16.5	12.7	18.1	29.5	19.0	
	pH	6.5–9.0	7.6	7.5	7.6	8.5	7.2	7.4	7.8	
	E C µS.cm^{-1}	30–350	70	70	100	170	120	130	260	
	Turbidity, NTU	<30	<10	10	<10	<10	<10	<10	10	
	Dissolved Oxygen, mg.L^{-1}	>4	7.0	8.0	9.0	9.0	6.0	7.0	5.0	
	% Dissolved Oxygen	80–120		70	90	85	63	90	52	
	Phosphate, mg.L^{-1}	<0.10	0.00	0.0	0.0	0.0	0.0	0.0	0.0	
	Nitrate, mg.L^{-1}	<15.0	10.0	10.0	0.0	15.0	5.0	15.0	15.0	
SUL012	Sullivans Ck, Mitchell		10/4 = 2.5							8/4 = 2.0
	Temp. °C			10	12	20		25	16	
	pH	6.5–9.0	8.8	8.2	8.8	9.9		8.8	8.0	
	E C µS.cm^{-1}	30–350	120	80	120	220		250	270	
	Turbidity, NTU	<30	<10	15	<10	<10		<10	<10	
	Phosphate, mg.L^{-1}	<0.10	0.05	0.02	0.02	0.03		0.03	0.07	
SUL015	Sullivans Ck, Flemington Rd		14/4 = 3.5							14/4 = 3.5
	Temp. °C			9.0	12.0	15.0		25.0	16.0	
	pH	6.5–9.0	9.0	8.1	8.3	8.5		9.7	8.2	
	E C µS.cm^{-1}	30–350	290	80	300	640		930	810	
	Turbidity, NTU	<30	<10	15	15	<10		150	<10	
	Phosphate, mg.L^{-1}	<0.10	0.33	0.03	0.08	0.20		0.07	0.50	
SUL018	Flemington Pond		9/4 = 2.25							8/4 = 2.0
	Temp. °C			10.0	14.0	19.0		27.0	20.0	
	pH	6.5–9.0	8.9	8.6	8.9	9.8		10.0	8.2	
	E C µS.cm^{-1}	30–350	110	120	150	200		170	320	
	Turbidity, NTU	<30	<10	100	40	<10		<10	10	
	Phosphate, mg.L^{-1}	<0.10	0.05	0.03	0.07	0.07		0.03	0.03	
SUL455	Sullivans Ck, Wattle St bridge		9/3 = 3.0							
	Temp. °C					22.5				
	pH	6.5–9.0	10			10.0				
	E C µS.cm^{-1}	30–350	310			310				
	Turbidity, NTU	<30	<10			15				
SUW020	Banksia St Wetland		14/6 = 2.3							13/6 = 2.2
	Temp. °C				11.5	18.7	22.2	29.4		
	pH	6.5–9.0	8.2		8.2	8.4	8.2	8.2		
	E C µS.cm^{-1}	30–350	110		130	170	180	190		
	Turbidity, NTU	<30	20		20	15	<10	15		
	Dissolved Oxygen, mg.L^{-1}	>4	5.5		5.0	8.0	6.0	10.0		
	% Dissolved Oxygen	80–120			68	120	105	120		
	Phosphate, mg.L^{-1}	<0.10	0.0		0.01	0.0	0.0	0.0		
	Nitrate, mg.L^{-1}	<15.0	0.0		0.0	25.0	10.0	10.0		

	Parameter	Standard	Long Term Median	Jul	Aug	Sep	Oct	Nov	Dec	M-CHiP score
SUW010	David St Wetland		13/6 = 2.2							12/6 = 2.0
	Temp. °C			11.4	12.2		18.6	24.4		
	pH	6.5–9.0	6.8	7.8	7.9		8.6	7.8		
	E C µS.cm^{-1}	30–350	130	130	150		130	150		
	Turbidity, NTU	<30	20	30	30		10	14		
	Dissolved Oxygen, mg.L^{-1}	>4	6.0	8.25	8.0		5.5			
	% Dissolved Oxygen	80–120		73	78		60			
	Phosphate, mg.L^{-1}	<0.10	0.005	0.005			0.0	0.0		
	Nitrate, mg.L^{-1}	<15.0	10.0	5.0	0.0		10.0	10.0		
SUL735	Sullivans Ck, Toad Hall		10/4 = 2.5							11/4 = 2.75
	Temp. °C			9.0	11.0	19.0		22.5	17.0	
	pH	6.5–9.0	7.3	7.7	8.3	7.9		7.7	7.5	
	E C µS.cm^{-1}	30–350	175	78	175	409		711	282	
	Turbidity, NTU	<30	10	30	10	<10		15	15	
	% Dissolved Oxygen	80–120		61	63	52		57	42	
	Phosphate, mg.L^{-1}	<0.10	0.17	0.05	0.06	0.08		0.12	0.36	
SUL745	Sullivans Ck, ANU		10/4 = 2.5							9/4 = 2.25
	Temp. °C			9.5	12.0	19.5		23.5	18.5	
	pH	6.5–9.0	7.5	7.9	8.6	9.7		8.5	7.7	
	E C µS.cm^{-1}	30–350	172	109	249	113		384	292	
	Turbidity, NTU	<30	<10	20	<10	15		<10	<10	
	% Dissolved Oxygen	80–120		71	69	113		64	51	
	Phosphate, mg.L^{-1}	<0.10	0.25	0.07	0.0	0.02		0.18	0.37	
SUL765	Sullivans Ck, below Ward St bridge		12/4 = 3.0							10/4 = 2.5
	Temp. °C			9.5	11.0	16.5		22.0	18.0	
	pH	6.5–9.0	7.6	7.6	7.6	7.5		7.8	7.6	
	E C µS.cm^{-1}	30–350	331	125	156	478		355	80	
	Turbidity, NTU	<30	20	30	20	20		20	15	
	% Dissolved Oxygen	80–120		52	49	47		50	49	
	Phosphate, mg.L^{-1}	<0.10	0.12	0.06	0.02	0.02	0.07	0.29	0.06	

Lake Burley Griffin Sub-Catchment

Lake Burley Griffin is an artificial water impoundment created by the placement of the Scrivener Dam across the Molonglo River at Lady Denman Drive. A number of small drainage lines were flooded in the lake's development, and most were enclosed in stormwater drains. On the south bank the open drain in Barton and the Norgrove Wetland in Kingston, Jerrabomberra Creek and Jerrabomberra Wetlands drain directly into the lake, and form part of the East Basin. On the north shore, in the immediate vicinity of the city, there are several wetlands associated with the stormwater drain-lines, including Nerang Pool and the pools at the bottom of Anzac Parade, and in Parkes Way. Sullivans Creek empties into the West Lake, while there are numerous occasional flood-ways draining Black Mountain and Yarralumla. We will include the data from the boundary sites, SUL765, WOO090, MOL295 and JER175 in the calculations, even though they will also be counted in their respective Sub-Catchments.

Lake Burley Griffin, just before the Scrivener Dam wall.

The waters of the Lake Burley Griffin subcatchment in the second half of 2010 give an indicator score of 2.65, indicating good water health, tending a little to moderate. With higher than usual rainfall and runoff over the period, this is a good result. Turbidity rarely dropped to 20 NTU, although the Lake, being soft bottomed, is unlikely to become clearer than that even in years of little rainfall. The volunteers sample close to shore, and the Dissolved Oxygen reports remained satisfactory in the sample period, even in Norgrove Wetland, where good primary productivity by both algae and aquatic plants was to be expected, and may have shown either too elevated or depleted levels. The west and central basins of the east lake had consistently elevated pH values, a condition often encountered in deeper inland water impoundments.

Table 7:. Lake Burley Griffin Sub-Catchment

	Parameter	Standard	Long Term Median	Jul	Aug	Sep	Oct	Nov	Dec	M-CHiP score
M-CHiP			11.5=**2.2**							15.9/6 = **2.65**
LBG100	Lake, above Scrivener Dam									
	Temp. °C					17.5				
	pH	6.5–9.0				8.0				
	E C µS.cm^{-1}	30–350				260				
	Turbidity, NTU	<30				15				
	Dissolved Oxygen, mg.L^{-1}	>4				8.0				
	% Dissolved Oxygen	80–120				83				
	Phosphate, mg.L^{-1}	<0.10				0.02				
	Nitrate, mg.L^{-1}	<15.0				0.0				
SUL765	Sullivans Ck, below Ward St bridge		12/4 = 3.0							10/4 = 2.5
	Temp. °C			9.5	11.0	16.5		22.0	18.0	
	pH	6.5–9.0	7.6	7.6	7.6	7.5		7.8	7.6	
	E C µS.cm^{-1}	30–350	332	125	156	478		355	80	
	Turbidity, NTU	<30	20	30	20	20		20	15	
	% Dissolved Oxygen	80–120		52	49	47		50	49	
	Phosphate, mg.L^{-1}	<0.10	0.12	0.06	0.02	0.02	0.07	0.29	0.06	
LBG060	Lake, at Hospital Point									14/6 = 2.3
	Temp. °C					13.6	16.4	25.9	20.0	
	pH	6.5–9.0				9.0	8.6	8.2	8.5	
	E C µS.cm^{-1}	30–350				220	250	210	130	
	Turbidity, NTU	<30				50	40	20	40	
	Dissolved Oxygen, mg.L^{-1}	>4				10.8	7.5	9.2	4.0	
	% Dissolved Oxygen	80–120				125	109	112	45	
	Phosphate, mg.L^{-1}	<0.10				0.02	0.0	0.0	0.02	
	Nitrate, mg.L^{-1}	<15.0				0.0	0.0	0.0	0.0	

	Parameter	Standard	Long Term Median	Jul	Aug	Sep	Oct	Nov	Dec	M-CHiP score
LBG040	Lake, at Regatta Point									15/6 = 2.5
	Temp. °C						16.4	28.5	19.9	
	pH	6.5–9.0					8.0	8.5	8.1	
	E C µS.cm^{-1}	30–350					210	230	150	
	Turbidity, NTU	<30					150	20	50	
	Dissolved Oxygen, mg.L^{-1}	>4					6.8	9.0	6.6	
	% Dissolved Oxygen	80–120					99	115	70	
	Phosphate, mg.L^{-1}	<0.10					0.0	0.0	0.07	
	Nitrate, mg.L^{-1}	<15.0					0.0	0.0	0.0	
LBG015	Lake, at Kingston									
	Temp. °C						15.5		23.3	
	pH	6.5–9.0					7.0		7.5	
	E C µS.cm^{-1}	30–350					120		210	
	Turbidity, NTU	<30					100		100	
	Dissolved Oxygen, mg.L^{-1}	>4					6.0		6.0	
	% Dissolved Oxygen	80–120					60		80	
	Phosphate, mg.L^{-1}	<0.10					0.03		0.01	
	Nitrate, mg.L^{-1}	<15.0					0.0		5.0	
NOR010	Norgrove Park wetland, at Bandstand									
	Temp. °C						17.5		26.5	
	pH	6.5–9.0					7.5		8.0	
	E C µS.cm^{-1}	30–350					380		560	
	Turbidity, NTU	<30					15		100	
	Dissolved Oxygen, mg.L^{-1}	>4					8.0		6.0	
	% Dissolved Oxygen	80–120					85		75	
	Phosphate, mg.L^{-1}	<0.10					0.0		0.01	
	Nitrate, mg.L^{-1}	<15.0					0.0		0.0	
JER175	Jerrabomberra Ck, Hindmarsh Dr		9/3=3.0							10/3 = 3.3
	Temp. °C				9.0	15.0	13.0		18.0	
	pH	6.5–9.0	7.7		7.9	7.9	8.0		7.7	
	E C µS.cm^{-1}	30–350	400		200	320	110		380	
	Turbidity, NTU	<30	17.5		30	20	60		30	
	Dissolved Oxygen, mg.L^{-1}	>4					8.5			
	% Dissolved Oxygen	80–120					80			
MOL295	Molonglo R., ski ramp		12/5=2.4							17/6 = 2.8
	Temp. °C			9.1	12.0	16.2	18.7	22.2	17.4	
	pH	6.5–9.0	8.0	6.5	6.8	6.8	7.0	7.2	6.7	
	E C µS.cm^{-1}	30–350	445	137	290	264	140	228	155	
	Turbidity, NTU	<30	20	200	50	60	100	40	10	
	Dissolved Oxygen, mg.L^{-1}	>4	7.3	6.8	10.0	6.6	7.7	4.8	6.2	
	% Dissolved Oxygen	80–120		58	92	66	86	53	63	
	Phosphate, mg.L^{-1}	<0.10	0.01	0.05	0.0	0.02	0.05	0.07	0.05	
	Nitrate, mg.L^{-1}	<15.0		10.0	10.0	10.0	10.0	10.0	10.0	
WOO090	Woolshed Ck, Fairburn Avenue		18/5=3.6							15/6 = 2.5
	Temp. °C			8.8	13.0	17.5	16.3	21.7	15.9	
	pH	6.5–9.0	7.6	7.1	7.1	7.5	6.7	7.1	7.0	
	E C µS.cm^{-1}	30–350	553	224	359	660	254	469	630	
	Turbidity, NTU	<30	155	60	30	10	15	10	10	
	Dissolved Oxygen, mg.L^{-1}	>4	6.5	9.4	9.6	8.54	6.2	4.4	6.4	
	% Dissolved Oxygen	80–120		80	90	83	62	48	62	
	Phosphate, mg.L^{-1}	<0.10	0.01	0.25	0.02	0.01	0.05	0.05	0.07	
	Nitrate, mg.L^{-1}	<15.0[1]		0.0	10.0	0.0	0.0	0.0	0.0	

Fyshwick and Woolshed Sub-Catchments

Woolshed Creek rises near Gins Gap and runs between Mount Majura and Greenwood Hill, past the airport and enters the river just above Sylvia Curley Bridge at Dairy Flat. The creek only runs after rain, but the lower creek, near Duntroon, and the nearby Pialligo Brook, usually holds water. The upper creek has only had water following the good April rains. The upper sub-catchment has grazing land, a truffery, vineyards and some remnants of Forestry. The Pialligo area has been used for horticulture for many years. The broad, flat valley bottom is flanked on the west by Mount Majura, and the slopes of Mount Ainslie and Mount Pleasant. The eastern rim is developed along the lower ridge system that runs from Greenwood Hill to the Fairburn Forest. The area is subject to major road works close to the sample site at the present time and these may continue into the foreseeable future with the development of Majura Parkway. A discontinued sample site at *Avonley* may need to be re-established in the future, as the roadwork extends. There may also be good reason to re-establish the Pialligo Brook site as well.

Oaks Estate Rd Crossing, at the height of the December flood. (John Bruggeman)

The Molonglo River in this area meets the Queanbeyan River at Oaks Estate, and continues through Beard and Fyshwick on the south bank and Pialligo on the north, until it becomes Lake Burley Griffin. The Beard area has a number of minor creek lines that carry water from the HMAS Harman and *Bonshaw* area to the river. This reach is a major area for recovery works proposed in the recently released *Molonglo River Rescue Action Plan*. One of our sites (MOL270) is near the river confluence, one (MOL280) is at the bottom of Gladstone St in Fyshwick, just upstream of the Canturf water meadows, and downstream of the Queanbeyan water treatment works, and a third (MOL295) is at the water ski park. The fourth site (MOL260) is at the causeway under the Yass Road bridge, a sampling site for both Waterwatch and the AUSRIVAS macroinvertebrate program from Canberra University and eWater CRC. A monitoring site at Beard, along the creek that is proposed as a wetland system is overdue!

The ameliorating effects of regular medium to high flow on pH, Electrical conductivity and Dissolved Oxygen levels are clearly at work in the Molonglo above the Lake. In July-December 2009, the pH for the subcatchment was generally between 7.6 and 8.5, with electrical conductivity frequently greater than 350 µS.cm^{-1}. This spring-summer the pH is very close to neutral (7.0) and the electrical conductivity rarely above 250 µS.cm^{-1} except in the Woolshed Ck area where some roadwork continued into the spring. The indicator score of 2.52 is an improvement on the 2.86 of the same period last year.

Table 8: Fyshwick and Woolshed sub-catchment

	Parameter	Standard	Long Term Median	Jul	Aug	Sep	Oct	Nov	Dec	M-CHiP Score
M-CHiP			11.2/4=**2.8**							12.6/5 = **2.52**
MOL295	Molonglo R., water ski ramp		12/5=2.4							17/6 = 2.8
	Temp. °C			9.1	12.0	16.2	18.7	22.2	17.4	
	pH	6.5–9.0	8.0	6.5	6.8	6.8	7.0	7.2	6.7	
	E C µS.cm^{-1}	30–350	445	137	290	264	140	228	155	
	Turbidity, NTU	<30	20	200	50	60	100	40	10	
	Dissolved Oxygen, mg.L^{-1}	>4	7.3	6.8	10.0	6.6	7.7	4.8	6.2	
	% Dissolved Oxygen	80–120		58	92	66	86	53	63	
	Phosphate, mg.L^{-1}	<0.10	0.01	0.05	0.0	0.02	0.05	0.07	0.05	
	Nitrate, mg.L^{-1}	<15.0		10.0	10.0	10.0	10.0	10.0	10.0	

	Parameter	Standard	Long Term Median	Jul	Aug	Sep	Oct	Nov	Dec	M-CHiP Score
WOO090	Woolshed Ck, Fairburn Rd bridge		18/5=3.6							15/6 = 2.5
	Temp. °C			8.8	13.0	17.5	16.3	21.7	15.9	
	pH	6.5–9.0	7.6	7.1	7.1	7.5	6.7	7.1	7.0	
	E C µS.cm^{-1}	30–350	553	224	359	660	254	469	630	
	Turbidity, NTU	<30	155	60	30	10	15	10	10	
	Dissolved Oxygen, mg.L^{-1}	>4	6.5	9.4	9.6	8.54	6.2	4.4	6.4	
	% Dissolved Oxygen	80–120		80	90	83	62	48	62	
	Phosphate, mg.L^{-1}	<0.10	0.01	0.25	0.02	0.01	0.05	0.05	0.07	
	Nitrate, mg.L^{-1}	<15.0		0.0	10.0	0.0	0.0	0.0	0.0	
MOL280	Molonglo R., Gladstone Rd, Fyshwick									14/6 = 2.3
	Temp. °C					21.1	17.1	26.5	16.6	
	pH	6.5–9.0				7.3	6.9	7.0	6.6	
	E C µS.cm^{-1}	30–350				298	129	240	175	
	Turbidity, NTU	<30				40	80	30	40	
	Dissolved Oxygen, mg.L^{-1}	>4				8.2	7.4	6.2	6.7	
	% Dissolved Oxygen	80–120				90	76	75	67	
	Phosphate, mg.L^{-1}	<0.10				0.03	0.03	0.02	0.07	
	Nitrate, mg.L^{-1}	<15.0				0.0	0.0	10.0	25.0	
MOL270	Molonglo R., Oaks Estate Crossing		8/5=1.6							16/6 = 2.7
	Temp. °C			9.4	11.6	16.8	17.0	23.6	15.9	
	pH	6.5–9.0	7.6	7.1	7.3	7.2	7.0	6.6	5.6	
	E C µS.cm^{-1}	30–350	313	168	244	274	132	213	134	
	Turbidity, NTU	<30	10	50	20	30	60	30	40	
	Dissolved Oxygen, mg.L^{-1}	>4	7.7	9.1	10.0	7.7	8.0	6.3	6.6	
	% Dissolved Oxygen	80–120		79	91	78	82	73	65	
	Phosphate, mg.L^{-1}	<0.10	0.02	0.01	0.03	0.03	0.03	0.03	0.05	
	Nitrate, mg.L^{-1}	<15.0		0.0	0.0	0.0	0.0	0.0	0.0	
MOL260	Molonglo R., Yass Rd bridge, Queanbeyan									14/6 = 2.3
	Temp. °C			8.2	11.1	15.8	15.3	23.2	16.1	
	pH	6.5–9.0		7.1	7.3	7.2	6.7	6.6	5.9	
	E C µS.cm^{-1}	30–350		141	222	247	122	258	224	
	Turbidity, NTU	<30		60	20	15	40	20	15	
	Dissolved Oxygen, mg.L^{-1}	>4		9.1	9.4	8.0	7.2	5.4	6.8	
	% Dissolved Oxygen	80–120		77	85	79	70	62	67	
	Phosphate, mg.L^{-1}	<0.10		0.01	0.02	0.02	0.02	0.03	0.07	
	Nitrate, mg.L^{-1}	<15.0		0.0	0.0	0.0	10.0	0.0	0.0	

Kowen Sub-Catchment

From the ACT Border at Burbong Bridge, the Molonglo flows in a sweeping westward curve in a broad valley. The river joins with the Glen Burn Creek, which drains from the north or Wamboin side, before the valley closes just below Blue Tiles to form the Molonglo Gorge.

The downstream end of the Molonglo Gorge, in quiet times.

The Molonglo Gorge is a narrow defile through the Cullarin Uplift, on which the Kowen Forest has been planted.

The other large tributary, Scabbing Flat Creek, drains the higher south side and enters the river just downstream. The Glen Burn Creek is a base-flow creek while Scabbing Flat Creek can be intermittent in prolonged dry weather. As well as the forestry, there are small agricultural holdings on the north side of the river. On the southern side peri-urban development is found from the outskirts of Queanbeyan east. The railway snakes along the ridge on the south side, above the river.

Reedy Creek is a minor tributary of the Molonglo River that runs through the valley at the west-facing base of the uplift of the Kowen Forest, and enters the river not far downstream of the Molonglo Gorge. It is almost entirely in grazing country.

Molonglo R. in Molonglo Gorge in December 2010 (Roy Watson)

This sub-catchment, considered part of the Central Molonglo Water Management Area by the ACT Government for administrative reasons, is similar in many ways to the Upper Molonglo rather than the Sullivans Creek, Woolshed Creek, Fyshwick or Jerrabomberra parts of Central Molonglo. There is little infrastructure impact, and neither the urban residential or light commercial developments of the other sub-catchments. The Catchment Health indicator score for July–December 2010 is 2.6, in the upper range of Good Health tending towards moderate. As data accumulate it is expected that this score will tend towards 2.0; both Scabbing Flat and Reedy Creeks have variable Phosphate loads, which may at times lead to higher scores.

Table 10: Kowen Sub-Catchment

	Parameter	Standard	Long Term Median	Jul	Aug	Sep	Oct	Nov	Dec	M-CHiP Score
M-CHiP			n.a.							7.8/3 = 2.6
REE095	Reedy Ck, Sutton Rd		18/5=3.6							17/6 = 2.8
	Temp. °C			8.8	12.0	18.6	15.9	23.2	15.1	
	pH	6.5–9.0	7.4	7.1	7.1	7.3	6.9	6.6	7.3	
	E C µS.cm^{-1}	30–350	580	22	217	326	170	271	265	
	Turbidity, NTU	<30	58	30	20	10	60	15	15	
	Dissolved Oxygen, mg.L^{-1}	>4	5.8	9.4	10.9	7.8	8.0	4.8	7.4	
	% Dissolved Oxygen	80–120		80	100	83	80	55	72	
	Phosphate, mg.L^{-1}	<0.10	0.01	0.02	0.02	0.01	0.03	0.03	0.05	
	Nitrate, mg.L^{-1}	<15.0		0.0	10.0	0.0	10.0	0.0	0.0	

MOL240	Molonglo R., Blue Tiles									
	Temp. °C							22.8	18.3	
	pH	6.5–9.0						8.3	8.5	
	E C µS.cm^{-1}	30–350						250	210	
	Turbidity, NTU	<30						<10	<10	
	Dissolved Oxygen, mg.L^{-1}	>4						7.0	7.0	
	% Dissolved Oxygen	80–120						80	7.5	
	Phosphate, mg.L^{-1}	<0.10							0.0	
	Nitrate, mg.L^{-1}	<15.0						0.0	0.0	
SCA250	Scabbing Flat Ck, Weetalabah									16/6 = 2.7
	Temp. °C						19.8	23.9	15.6	
	pH	6.5–9.0					8.0	7.6	7.7	
	E C µS.cm^{-1}	30–350					150	180	200	
	Turbidity, NTU	<30					15	10	30	
	Dissolved Oxygen, mg.L^{-1}	>4					9.0	9.2	8.4	
	% Dissolved Oxygen	80–120					98	105	84	
	Phosphate, mg.L^{-1}	<0.10					0.25	0.0	*	
	Nitrate, mg.L^{-1}	<15.0					0.0	0.0	0.0	
WEE040	Stormwater pond, Weetalabah Drive									14/6 = 2.3
	Temp. °C						25.0	25.2	18.7	
	pH	6.5–9.0					7.3	7.5	7.2	
	E C µS.cm^{-1}	30–350					150	190	160	
	Turbidity, NTU	<30					15	10	15	
	Dissolved Oxygen, mg.L^{-1}	>4					6.4	7.4	3.8	
	% Dissolved Oxygen	80–120					75	90	40	
	Phosphate, mg.L^{-1}	<0.10					0.15	0.0	0.0	
	Nitrate, mg.L^{-1}	<15.0					10.0	0.0	0.0	

Jerrabomberra Sub-Catchment

Jerrabomberra Creek rises between Lobb Hill and Gibraltar Hill and travels north along an undulating valley from Royalla through to Fernleigh Park and the Tralee Hills into the hills to the south of Jerrabomberra township. The upper sub-catchment is dotted with small holdings and provides a good example of peri-urban development. After the Jerrabomberra Falls, the creek passes to the west of the town, and is joined by water from Lake Jerrabomberra before crossing Lanyon Dr near Hume. It picks up Woden Creek (that runs below the Mugga Lane Tip) and Dog Trap Ck from Rose Cottage, then goes past the Monaro Highway and under both Hindmarsh Drive and Canberra Avenue to enter the Jerrabomberra Wetlands near the CIT in Fyshwick.

Lake Jerrabomberra with blanket-weed bloom, November 2010

Waterwatch volunteers currently maintain sites at Royalla, along the Old Cooma Rd and Fernleigh Park as well as near Hindmarsh Drive. Waterwatch may work towards setting up sites on the creek at Hume and on Dog Trap Ck at Hume and on Woden Ck downstream of the tip. We also need volunteer Waterwatchers at the Jerrabomberra Wetland. Queanbeyan Council provides data for Jerrabomberra Falls and Lake Jerrabomberra.

The upper Jerrabomberra has site scores in the Good Health range although the score for the Falls is towards the Moderate range. The consistently high Phosphate reading there probably reflects soil disturbance activity in the valley above. The floods have changed the state of the creek bank vegetation again. The on-going restoration work being undertaken by Royalla Landcare, Palerang Council and Murrumbidgee CMA should see improvements in the riparian areas in the future.

The long term condition score is in the slightly declining Good range. The indication is that for this six month period the Creek is in Good Health. The return of consistent flows in the main stream and the replenishment of the aquifers have seen generally lower Electrical Conductivity and pH levels close to neutral. The Catchment Health indicator score of 2.42 is inside the long term score, and a distinct improvement on the July-December 2009 score.

Table 11: Jerrabomberra Creek Sub-Catchment

	Parameter	Standard	Long Term Median	Jul	Aug	Sep	Oct	Nov	Dec	M-CHiP Score
M-CHiP			15.9/6=**2.65**							14.5/6 = **2.42**
JER175	Jerrabomberra Ck, Hindmarsh Dr, Narrabundah		9/3=3.0							8/3 = 2.7
	Temp. °C				9.0	15.0	13.0		15.0	
	pH	6.5–9.0	7.7		7.9	7.9	8.0		7.7	
	E C µS.cm^{-1}	30–350	400		200	320	110		380	
	Turbidity, NTU	<30	17.5		30	20	60		30	
	Dissolved Oxygen, mg.L^{-1}	>4.5					8.5			
	% Dissolved Oxygen	80–120					80			
JER120	Lake Jerrabomberra									10/5 = 2.0
	Temp. °C			9.1	8.9	16.3	20.3	24.9	22.7	
	pH	6.5–9.0		7.4	7.5	7.3	8.5	8.6	7.3	
	E C µS.cm^{-1}	30–350		222	253	178	181	190	224	
	Dissolved Oxygen, mg.L^{-1}	>4.5		8.7	10.9	8.2	8.0	7.4	3.4	
	% Dissolved Oxygen	80–120		70	93	81	87	90	39	
	Phosphate, mg.L^{-1}	<0.1		0.07	0.17	0.41	0.09	0.09	0.12	
	Nitrate, mg.L^{-1}	<15.0		1.6	2.5	1.5	1.2	2.0	1.3	

	Parameter	Standard	Long Term Median	Jul	Aug	Sep	Oct	Nov	Dec	M-CHiP Score
JER121	Jerrabomberra Waterfall		11/4=2.75							14/5 = 2.8
	Temp. °C			8.4	8.0	15.0	18.8	22.7	18.1	
	pH	6.5–9.0	7.6	7.7	7.5	7.6	8.4	7.4	7.8	
	E C µS.cm^{-1}	30–350	281	315	259	219	215	223	201	
	Dissolved Oxygen, mg.L^{-1}	>4.5	8.5	11.0	10.3	8.5	8.7	6.9	8.3	
	% Dissolved Oxygen	80–120		90	86	83	95	83	88	
	Phosphate, mg.L^{-1}	<0.01	0.14	0.1	0.92	0.03	0.13	0.03	0.09	
	Nitrate, mg.L^{-1}	<15.0		1.8	3.8	1.4	0.6	0.9	0.1	
JER095	Jerrabomberra Ck, Fernleigh Park Estate		11/5=2.75							10/4 = 2.5
	Temp. °C			7.0		15.0	13.0	25.0	20.0	
	pH	6.5–9.0	8.0	8.4		8.2	7.7	9.1	8.2	
	E C µS.cm^{-1}	30–350	715	170		270	80	260	240	
	Turbidity, NTU	<30	5	20		<10	60	<10	15	
	Phosphate, mg.L^{-1}	<0.01	0.02	0.02		0.02	0.05	0.02	0.02	
JER065	Jerrabomberra Ck, Old Cooma rd		13/5=2.6							13/6 = 2.2
	Temp. °C			8.0	11.4	18.4	12.2	28.7		
	pH	6.5–9.0	7.4	7.0	7.5	7.6	7.3	7.7		
	E C µS.cm^{-1}	30–350	460	220	230	300	160	340		
	Turbidity, NTU	<30	10	15	10	<10	20	<10		
	Dissolved Oxygen, mg.L^{-1}	>4.5	6.6	5.0	6.0	10.0	8.0	6.0		
	% Dissolved Oxygen	80–120		40	55	105	75	75		
	Phosphate, mg.L^{-1}	<0.01	0.02	0.02	0.02	0.0	0.02	0.01		
	Nitrate, mg.L^{-1}	<15.0	0.00	0.0	1.0	1.0	0.0	0.0		
JER020	Jerrabomberra Ck, Royalla		13/5=2.6							7/3 = 2.3
	Temp. °C			3.5	6.0	9.0	9.0	5.0	15.0	
	pH	6.5–9.0	7.8	6.9	7.6	7.8	8.1	7.5	7.8	
	E C µS.cm^{-1}	30–350	410	130	120	180	70	260	290	
	Turbidity, NTU	<30	10	40	30	<10	100	<10	<10	
	Phosphate, mg.L^{-1}	<0.01	0.01							

Lower Queanbeyan Sub-Catchment

The Lower Queanbeyan Sub-catchment includes the river and its tributaries from the base of Googong Dam to the confluence with the Molonglo at the railway viaduct. At present the active sampling sites are within the Queanbeyan city limits from Wickerslack Lane (QUE440) to the Railway viaduct (QUE496). Two conspicuous tributaries are Valley Ck, that joins the river opposite Doeberl Reserve, Barracks Flat after draining the slopes to the south-east of the city, and Barracks Creek, that rises on the Knoll, and enters the river at the end of Barracks Flat reach. Much of the river has manicured banks in public space, but there are also significant areas, between Wickerslack Lane and the southern end of Barracks Flat, and the Gorge above Dane Street, where natural or restored vegetation forms the riparian zone. Although flood clearance has occurred in these areas, native vegetation still dominates the riparian zones.

Rearranged channels, Queanbeyan River in Dane St Gorge, 2011

The lower Queanbeyan sub-catchment was under higher than usual flow for much of this half-year. As the new Googong spillway was completed, and water transfers were made from Bendora reservoir on the Cotter R while the Cotter Dam wall was raised, Googong Reservoir reached capacity before the December rains, and water was released at 100ML/day for much of October and November. The sub-catchment shows consistently close to standard water conditions and has a condition rating of 2.32 well into the **Good** range. This is remarkable for a built-up area. While turbidity was generally elevated (rain and flow assisted) the Electrical Conductivity improved steadily and the pH and Dissolved Oxygen levels were satisfactory.

There are several accessible sites along Barracks Ck, including the retention dam below the Edwin Land Parkway road reserve, and in Doyle Reserve, that would make good sites for volunteer Waterwatching. This would add to our appraisal of the health of the river catchment in the city.

Table 12: Lower Queanbeyan River Sub-Catchment

	Parameter	Standard	Long Term Median	Jul	Aug	Sep	Oct	Nov	Dec	M-CHiP Score
M-CHiP			12.8/6= **2.16**							**11.6/5 = 2.32**
QUE496	Queanbeyan R., Riverside cemetery		14/5 = 2.8							14/5 = 2.8
	Temp. °C			9.3	8.8	18.4	18.5	22.7	19.1	
	pH	6.5–9.0	7.0	7.0	7.4	7.7	7.8	7.4	7.1	2
	E C µS.cm^{-1}	30–350	241	448	352	294	275	214	97	3
	Dissolved Oxygen, mg.L^{-1}	>4	5.7	6.9	8.8	8.8	7.4	2.4	7.5	2
	% Dissolved Oxygen	80–120		60	75	93	77	27	82	
	Phosphate, mg.L^{-1}	<0.10	0.08	0.11	0.23	0.11	0.30	0.18	0.08	5
	Nitrate, mg.L^{-1}	<15.0	1.0	1.2	1.5	1.0	1.6	0.0	1.3	2
QUE495	Queanbeyan R., upstream of railway viaduct		13/6 = **2.2**							13/6 = 2.2
	Temp. °C			10.3	11.7	16.4	13.5	24.6	16.7	
	pH	6.5–9.0	7.7	7.2	7.2	7.2	6.6	6.8	5.6	1
	E C µS.cm^{-1}	30–350	210	221	275	307	247	169	99	2
	Turbidity, NTU	<30	10	20	30	30	30	30	50	5
	Dissolved Oxygen, mg.L^{-1}	>4	5.4	9.0	9.1	6.1	7.4	5.3	8.0	2
	% Dissolved Oxygen	80–120		80	102	61	71	62	81	
	Phosphate, mg.L^{-1}	<0.10	0.03	0.02	0.03	0.05	0.03	0.03	0.03	2
	Nitrate, mg.L^{-1}	<15.0	0.0	0	10.0	0	0	0	0	1

	Parameter	Standard	Long Term Median	Jul	Aug	Sep	Oct	Nov	Dec	M-CHiP Score
QUE470	Queanbeyan R., weir pool		9/5 = 1.8							10/5 = 2.0
	Temp. °C			8.9	8.6	16.8	20.9	22.5	18.3	
	pH	6.5–9.0	6.5	7.0	7.3	7.0	8.2	7.7	7.6	
	E C µS.cm^{-1}	30–350	178	389	336	262	236	150	91	
	Dissolved Oxygen, mg.L^{-1}	>4	7.15	6.7	9.8	6.6	9.5	7.5	7.2	
	% Dissolved Oxygen	80–120		57	85	60	105	86	76	
	Phosphate, mg.L^{-1}	<0.10	0.06	0.29	0.23	0.03	0.04	0.06	0.05	
	Nitrate, mg.L^{-1}	<15.0	1.0	0.6	3.9	1.5	0.2	0.5	0	
QUE460	Queanbeyan R., Dane St		9/5 = 1.8							11/5 = 2.2
	Temp. °C			8.2	8.3	15.5	20.1	22.8	17.2	
	pH	6.5–9.0	6.5	6.7	6.9	7.5	7.4	7.6	6.9	
	E C µS.cm^{-1}	30–350	188	386	323	257	252	173	82	
	Dissolved Oxygen, mg.L^{-1}	>4	7.0	8.4	10.3	8.2	9.1	5.9	7.5	
	% Dissolved Oxygen	80–120		70	85	80	97	69	79	
	Phosphate, mg.L^{-1}	<0.10	0.06	0.07	0.09	0.04	0.1	0.06	0.16	
	Nitrate, mg.L^{-1}	<15.0	1.0	0.8	3.4	1.7	0.5	1.1	1.6	
QUE455	Queanbeyan R., Barracks Flat		10/5 = 2.0							12/5 = 2.4
	Temp. °C			8.5	8.5	15.9	19.8	22.3	17.7	
	pH	6.5–9.0	6.5	6.7	6.9	7.2	7.2	7.8	7.3	
	E C µS.cm^{-1}	30–350	148	302	343	154	220	158	88	
	Dissolved Oxygen, mg.L^{-1}	>4	9.2	9.5	9.5	8.0	7.6	7.5	7.2	
	% Dissolved Oxygen	80–120		80	80	80	82	91	70	
	Phosphate, mg.L^{-1}	<0.10	0.15	0.11	0.17	0.13	0.08	0.03	0.00	
	Nitrate, mg.L^{-1}	<15.0	1.0	0.8	1.2	1.2	1.0	0.5	2.5	
QUE440	Queanbeyan R., Wickerslack Lane		11/5 = 2.2							
	Temp. °C							17.8	17.4	
	pH	6.5–9.0	6.5					7.8	7.5	
	E C µS.cm^{-1}	30–350	104					107	68	
	Dissolved Oxygen, mg.L^{-1}	>4	9.0					7.3	8.2	
	% Dissolved Oxygen	80–120						75	85	
	Phosphate, mg.L^{-1}	<0.01	0.06					0.00	0.06	
	Nitrate, mg.L^{-1}	<15.0	1.0					1.0	1.4	

Upper Molonglo Sub-Catchment

Molonglo River at Molonglo River Park, in spate. (Bernard Kertesz)

The Molonglo River rises in the high country above Captains Flat. Below the reservoir at Captains Flat, the river becomes a somewhat sluggish stream running through well timbered country until it opens out onto the Carwoola Plain, a wide flat valley with gentle slopes well back from the river. The often deeply inset channel meanders across the plain and then re-enters hilly country at Balcombe Hill, the back of the uplift that makes the upper Molonglo Gorge. The east draining Yandyguinula Creek tributary continued to flow throughout this half-year. Chimney Creek drains Primrose Valley from the south west into the river above *Carwoola* station. Very few of the creeks and drain-lines that once fed the river from the north-east across the Hoskinstown Plain still flow except after downpours. Whiskers Creek and Stony Creek drain the south slopes above the gorge.

The Catchment Health Rating is at 2.0 on the boundary between Good and Excellent. The water in the upper reaches (YAN020 and MOL109) score in the Excellent range in this reporting period; higher than usual phosphate levels at the Briars-Sharrow Rd causeway reflect soil disturbance on the Plain. The efforts of the Waterwatchers and other Landcare volunteers, along with the riparian revegetation program promoted by Molonglo River Rescue, in conjunction with the Murrumbidgee Catchment Management Authority, Greening Australia and the Palerang Council should continue to support sub-catchment health.

Table 13: Upper Molonglo Sub-Catchment

	Parameter	Standard	Long Term Median	Jul	Aug	Sep	Oct	Nov	Dec	M-CHiP Score
M-CHiP			11.7/5 = **2.32**							16.1/8 = **2.01**
MOL216	Molonglo R., Molonglo River Park		7/3=2.3							11/5 = 2.2
	Temp. °C			5.0	7.0	10.0	13.0	20.0	17.0	
	pH	6.5–9.0		6.9	6.7	6.5	6.8	6.9	6.6	
	E C µS.cm^{-1}	30–350		120	190	220	100	240	200	
	Turbidity, NTU	<30		50	15	<10	40	<10	15	
	Phosphate, mg.L^{-1}	<0.10					0.01	0.1	0.1	
	Nitrate, mg.L^{-1}	<15.0					0.0	0.0	0.0	
STO060	Stony Ck		11/5 = 2.2							13/6 = 2.2
	Temp. °C			6.5	11.5	10.0	11.5	17.5	15.1	
	pH	6.5–9.0	7.1	7.8	7.9	7.6	7.6	7.7	7.6	
	E C µS.cm^{-1}	30–350	1070	520	470	780	340	850	810	
	Turbidity, NTU	<30	<10	<10	<10	<10	15	<10	<10	
	Dissolved Oxygen, mg.L^{-1},	>4.0	9.0	8.7	8.8	7.6	8.8	6.4	8.1	
	% Dissolved Oxygen	80–120		82	100	85	102	65	105	
	Phosphate, mg.L^{-1}	<0.10	0.00	0.0	0.0	0.0	0.0	0.01	0.03	
	Nitrate, mg.L^{-1}	<15.0		0.0	0.0	0.0	0.0	0.0	0.0	
MOL210	Molonglo R., Briars Sharrow Rd									13/5 = 2.6
	Temp. °C			6.0	8.0	9.0	12.0	23.0	17.0	
	pH	6.5–9.0		7.8	6.8	6.4	6.7	7.4	6.9	
	E C µS.cm^{-1}	30–350		160	190	220	90	260	200	
	Turbidity, NTU	<30		30	20	50	40	<10	20	
	Phosphate, mg.L^{-1}	<0.10					0.1	0.1	0.01	
	Nitrate, mg.L^{-1}	<15.0					0.0	0.0	0.0	

	Parameter	Standard	Long Term Median	Jul	Aug	Sep	Oct	Nov	Dec	M-CHiP Score
WHI090	Whiskers Ck		10/5 = 2							11/6 = 1.8
	Temp. °C			9.0	11.5	10.5	11.5	17.0	15.0	
	pH	6.5–9.0	7.1	7.6	7.9	7.8	7.9	7.5	7.5	
	E C µS.cm^{-1}	30–350	260	340	340	450	250	370	460	
	Turbidity, NTU	<30	<10	13	<10	<10	20	13	10	
	Dissolved Oxygen, mg.L^{-1}	>4.0	9.6	9.2	8.8	8.0	8.0	4.8	4.4	
	% Dissolved Oxygen	80–120		98	100	90	95	50	68	
	Phosphate, mg.L^{-1}	<0.10	0.00	0.0	0.0	0.0	0.0	0.01	0.03	
	Nitrate, mg.L^{-1}	<15.0		0.0	0.0	0.0	0.0	0.0	0.0	
CHI095	Chimney Ck		14/5 = 2.8							12/6 = 2.0
	Temp. °C			10.0	12.0	13.0	11.5	20.0	17.0	
	pH	6.5–9.0	7.0	7.9	8.2	8.0	8.1	7.9	7.8	
	E C µS.cm^{-1}	30–350	610	320	340	430	250	480	440	
	Turbidity, NTU	<30	<10	28	18	13	18	<10	<10	
	Dissolved Oxygen, mg.L^{-1}	>4.0	9.3	10.9	10.0	9.0	8.6	7.3	7.4	
	% Dissolved Oxygen	80–120		114	115	110	102	80	75	
	Phosphate, mg.L^{-1}	<0.10	0.00	0.0	0.0	0.0	0.02	0.01	0.02	
	Nitrate, mg.L^{-1}	<15.0		0.0	0.0	0.0	0.0	0.0	0.0	
YAN080	Yandyguinula Ck, causeway, Hoskinstown Rd									14/6 = 2.3
	Temp. °C				9.2			22.3		
	pH	6.5–9.0			7.8			7.4		
	E C µS.cm^{-1}	30–350			200			210		
	Turbidity, NTU	<30			20			10		
	Dissolved Oxygen, mg.L^{-1}	>4.0			8.4			7.6		
	% Dissolved Oxygen	80–120			70			90		
	Phosphate, mg.L^{-1}	<0.10			0.0			0.03		
	Nitrate, mg.L^{-1}	<15.0			0.0			0.0		
YAN020	Yandyguinula Ck, Tallaganda St. For., Rossi									9/6 = 1.5
	Temp. °C				7.2			13.9		
	pH	6.5–9.0			8.3			7.8		
	E C µS.cm^{-1}	30–350			30			40		
	Turbidity, NTU	<30			<10			<10		
	Dissolved Oxygen, mg.L^{-1}	>4.0			10.2			8.0		
	% Dissolved Oxygen	80–120			80			80		
	Phosphate, mg.L^{-1}	<0.10			0.0			0.0		
	Nitrate, mg.L^{-1}	<15.0			0.0			0.0		
MOL109	Molonglo R., TSR on Captains Flat Rd		12/5 =2.4							9/6 = 1.5
	Temp. °C			5.0	7.0	11.0	15.0	20.0	18.0	
	pH	6.5–9.0		6.6	7.0	7.1	7.4	7.6	7.6	
	E C µS.cm^{-1}	30–350		250	170	190	110	150	150	
	Turbidity, NTU	<30		10	<10	<10	25	10	15	
	Dissolved Oxygen, mg.L^{-1}	>4		13.2	16.5	9.8	6.9	9.0	8.0	
	% Dissolved Oxygen	80–120		120	125	85	65	100	83	
	Phosphate, mg.L^{-1}	<0.10		0.0	0.0	0.0	0.0	0.01	0.0	
	Nitrate, mg.L^{-1}	<15.0		0.0	0.0	0.0	0.0	0.0	0.0	

Burra Sub-Catchment

Burra Creek rises in the western fall of the Tinderry Ranges, between Mount Burra and Mount Urialla, and collects a number of tributaries including Holden Creek before it reaches the intersection of Williamsdale and Burra Roads. It then follows Burra Road and passes under it below the showground after which it goes down to the back of Googong reservoir below London Bridge arch. Tin Hut Creek runs from the north west of London Bridge Hill to Tin Hut Dam and then into the Googong Reservoir a short distance below Burra Creek. There is a gauging station and Waterwatch site at the Burra Road bridge, and a Waterwatch site at the Williamsdale Road intersection, which has been going since November 2008. The Tin Hut Dam site lapsed when the dam water disappeared in 2004, and now needs a Waterwatcher.

Burra Ck, from London Bridge Arch, going into Googong reservoir. (Peter Duffy)

The indicator rating is **2.65** for **Good** Catchment Water Health tending a little to moderate health. Electrical conductivity is still high in this system, and pH is showing a tendency to become alkaline, despite recent good flows. For this creek system the CHiP score supports the instigation of creek-line revegetation and fencing. As work begins on the Angle Crossing to Googong pipeline, the creek may well be subject to considerable disturbance in the very near future. This sub-catchment could do with further monitoring sites.

Table 14: Burra Creek Sub-Catchment

	Parameter	Standard	Long Term Median	Jul	Aug	Sep	Oct	Nov	Dec	M-CHiP Score
M-CHiP			15/6=**2.5**							5.3 = **2.65**
QUE400	Tin Hut Ck, at the bird hide									
	Temp. °C			11.6						
	pH	6.5–9.0		8.0						
	E C µS.cm^{-1}	30–350		200						
	Turbidity, NTU	<30		40						
	Dissolved Oxygen, mg.L^{-1}	>4		8.4						
	% Dissolved Oxygen	80–120		75						
	Phosphate, mg.L^{-1}	<0.10		0.0						
	Nitrate, mg.L^{-1}	<15.0		0.0						
BUR075	Burra Ck at Burra Rd bridge									17/6 = 2.8
	Temp. °C				9.0			24.0	24.0	
	pH	6.5–9.0			7.0			7.8	8.0	
	E C µS.cm^{-1}	30–350			220			380	430	
	Turbidity, NTU	<30			10			<10	<10	
	Dissolved Oxygen, mg.L^{-1}	>4			9.4			5.5	6.0	
	% Dissolved Oxygen	80–120			80			60	70	
	Phosphate, mg.L^{-1}	<0.10			0.01			0.01	0.01	
	Nitrate, mg.L^{-1}	<15.0						10.0	10.0	
BUR055	Burra Ck, Williamsdale Rd causeway		15/6= 2.5							15/6 = 2.5
	Temp. °C			8.0	9.5	15.0	11.0	21.5	18.0	
	pH	6.5–9.0	7.0	7.1	7.1	8.6	8.4	8.3	8.0	
	E C µS.cm^{-1}	30–350	530	340	160	320	90	250	330	
	Turbidity, NTU	<30	<10	20	30	15	100	20	15	
	Dissolved Oxygen, mg.L^{-1}	>4	7.0	10.0	10.0	9.0	10.0	9.0	8.0	
	% Dissolved Oxygen	80–120		104	108	118	112	140	120	
	Phosphate, mg.L^{-1}	<0.10	0.025			0.025			0.025	
	Nitrate, mg.L^{-1}	<15.0	0.00	10.0	0.0	0.0	0.0	0.0	0.0	

The symbol * indicates equipment failure or reading not taken.

Upper Queanbeyan Sub-Catchment

The headwaters of the Queanbeyan and its upper tributaries (Towneys Creek, Roberts Creek, Sherlock Creek and Tinderry Creek) rise in the Tinderry Ranges. The system leaves the tussock sedgeland and grassland and crosses lightly timbered country with some grazing then a series of gorges and waterfalls to eventually reach the Googong reservoir at the confluence with Burra Creek. This sub-catchment is the least developed in the Molonglo Catchment system.

Queanbeyan R., Boolboolma Crossing in December. (John Moore)

The whole sub-catchment rating (**2.06** or **Good** Catchment Water Health) is very close to the long term expectation. The regular high flows and, later in the year, floods have supported low values for Electrical Conductivity and pH readings close to neutral, except in the high country. The variations in phosphate levels are a good reflection of run-off in the area. The scores indicate that if land disturbance can be kept to a minimum and reliable flows are maintained, then this subcatchment will have little difficulty showing Excellent Catchment Health once again.

Table 15: Upper Queanbeyan River Sub-Catchment

	Parameter	Standard	Long Term Median	Jul	Aug	Sep	Oct	Nov	Dec	M-CHiP Score
M-CHiP			10.7/5=**2.14**							12.4/6 = **2.06**
QUE430	Googong Dam, below the wall									11/5 = 2.2
	Temp. °C			7.5	7.7	10.9	17.3			
	pH	6.5–9.0		6.4	6.7	7.5	7.0			1
	E C µS.cm^{-1}	30–350		258	211	92	121			2
	Dissolved Oxygen, mg.L^{-1}	>4.5		8.9	10.4	10.2	9.2			2
	% Dissolved Oxygen	80–120		75	85	90	100			
	Phosphate, mg.L^{-1}	<0.1		0.13	0.06	0.09	0.03			4
	Nitrate, mg.L^{-1}	<15.0		1.7	1.1	1.0	1.1			2
QUE300	Queanbeyan R., "Sunnybrae"		11/6= 1.8							13/6 = 2.2
	Temp. °C			4.0	7.0	9.0	13.0	18.0		
	pH	6.5–9.0	7.9	8.0	8.0	7.8	7.5	7.7	7.7	
	E C µS.cm^{-1}	30–350	100	90	100	90	80	100	90	
	Turbidity, NTU	<30	<10	30	15	<10	30	15	<10	
	Dissolved Oxygen, mg.L^{-1}	>4.5	10.0	11.8	10.0	10.0	8.1	6.6	7.4	
	% Dissolved Oxygen	80–120		100	100	105	100	100		
	Phosphate, mg.L^{-1}	<0.1	0.03	0.05	0.05	0.05	0.05	0.03	0.02	
	Nitrate, mg.L^{-1}	<15.0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	
URI040	Urialla Ck, Urila Rd		18/6=3.0							16/6 = 2.7
	Temp. °C			9.0	11.0	12.0	10.0	19.0		
	pH	6.5–9.0	7.5	7.9	7.8	7.9	7.4	7.4	7.4	
	E C µS.cm^{-1}	30–350	270	70	70	70	70	70	80	
	Turbidity, NTU	<30	15	30	20	20	20	15	10	
	Dissolved Oxygen, mg.L^{-1}	>4	6.7	9.2	9.6	7.4	9.0	6.8	7.8	
	% Dissolved Oxygen	80–120		100	110	90	100	105		
	Phosphate, mg.L^{-1}	<0.10	0.05	0.07	0.10	0.07	0.07	0.05	0.05	
	Nitrate, mg.L^{-1}	<15.0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	
TIN080	Tinderry Ck, Urila Rd		16/6 = 2.6							14/6 = 2.3
	Temp. °C			8.0	7.0	8.0	11.0	14.5		
	pH	6.5–9.0	7.7	7.5	7.7	7.7	7.6	7.7	7.5	
	E C µS.cm^{-1}	30–350	220	80	70	70	60	60	70	
	Turbidity, NTU	<30	10	10	13	10	30	15	15	
	Dissolved Oxygen, mg.L^{-1}	>4	6.4	11.0	11.0	7.6	8.8	8.1	7.2	
	% Dissolved Oxygen	80–120		110	110	80	100	105		
	Phosphate, mg.L^{-1}	<0.10	0.07	0.07	0.07	0.05	0.05	0.02	0.01	
	Nitrate, mg.L^{-1}	<15.0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	
ROB180	Roberts Ck, off Tinderry Rd		6/3=2.0							4/3 = 1.3
	Temp. °C			5.0	4.0	7.0	8.0		17.0	
	pH	6.5–9.0	7.6	7.8	7.3	6.9	7.0		6.8	
	E C µS.cm^{-1}	30–350	100	60	100	50			70	
	Turbidity, NTU	<30	10	10	10	<10	20		<10	

	Parameter	Standard	Long Term Median	Jul	Aug	Sep	Oct	Nov	Dec	M-CHiP Score
QUE125	Queanbeyan R., Boolboolma Crossing		5/3=1.6							5/3 = 1.7
	Temp. °C			4.0	5.0	10.0	10.0		18.0	
	pH	6.5–9.0	7.8	7.6	7.5	7.4	7.2		6.7	
	E C µS.cm^{-1}	30–350	120	90	50	120			100	
	Turbidity, NTU	<30	<10	12	10	<10	20		10	
QUE110	Queanbeyan R., bridge on Jerangle Rd									
	Temp. °C				8.0					
	pH	6.5–9.0			8.3					
	E C µS.cm^{-1}	30–350			90					
	Turbidity, NTU	<30			<10					
	Phosphate, mg.L^{-1}	<0.1			0.01					
	Nitrate, mg.L^{-1}	<15.0			0.0					
TOW130	Towneys Ck.									
	Temp. °C				9.0					
	pH	6.5–9.0			8.7					
	E C µS.cm^{-1}	30–350			230					
	Turbidity, NTU	<30			<10					
	Phosphate, mg.L^{-1}	<0.1			0.0					
	Nitrate, mg.L^{-1}	<15.0			0.0					

Summary

***Lasioglossum peraustrale* native bee scrum.**

The weather has favoured the water quality throughout the second half of 2010. All parameters have shown direct effects of persistent flow, high soil moisture content and both erosion and stabilisation. While in quite a number of places the pH fell with increased flow, in others the pH rose perhaps reflecting the fresh mix of chemicals suspended in the waterway. Electrical Conductivity generally fell until November, and rose again in December. Turbidity varied from sub-Catchment to sub-Catchment, frequently reflecting the proximity of sampling to the last rain shower. Often sand and silt movements were seen with the earliest downpours and much of the later runoff was 'clean'. Dissolved Oxygen showed a trend towards maintaining levels close to saturation, even as the water temperatures rose. In Sullivans Creek, and through Queanbeyan and Fyshwick phosphate levels generally showed higher levels than for similar periods, perhaps reflecting the urban nature of the catchments. Apart from the spike at Scabbing Flat Creek phosphate levels were steady or down in other sub-Catchments. Nitrates tended to be elevated in urban areas and lower in rural areas, again probably reflecting the flushing of urban parkland and stormwater systems for domestic animal refuse. While groundwater levels remain high, and flow persist in even the quickest drying soaks, the catchment as a whole will continue to enjoy Good Health.

Recommendations

An important overall recommendation is that, following flood disturbance, all sites in the catchment probably need assessment for fence repair, bank assessment and riparian weed control and revegetation.

Coppins sub-Catchment: sampling sites within the sub-catchment, perhaps even at Tongs Hole just above the outfall for the return of Canberra's used water.

Weston-Woden sub-Catchment: we have the support of a student volunteer until mid 2011: to have local volunteers to pick up when the student is finished would mean coverage of Holdens Ck, Weston Ck and the confluence of Yarralumla Ck and the river.

Sullivans Creek sub-Catchment: we will soon need a group for the Dickson Wetland.

Lake Burley Griffin sub-Catchment: any more volunteers!

Fyshwick-Woolshed sub-Catchments: a group to monitor Beard Ck at Beard, and there are plenty of sites in the Madura Valley and round Pialligo.

Jerrabomberra sub-Catchment: it would be very good to get sites on the Dog Trap - Woden Creeks side and at Jerrabomberra Wetland. Now that Jerrabomberra Wetland is once again to be rejuvenated it is hoped that sampling will begin again.

Lower Queanbeyan sub-Catchment: Barracks Creek and Valley Ck are both important tributaries, and could well do with sample sites.

Upper Molonglo sub-Catchment: a site or two in Captains Flat.

Burra sub-Catchment: Tin Hut Dam sampled regularly.

Upper Queanbeyan sub-Catchment: a sampler at the base of the spillway (QUE430).

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