The Molonglo Catchment Health indicator Program Report

July to December, 2009.

Looking down to the Molonglo River from Stockdill Drive.

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Executive Summary

The second half of 2009 presented weather that was generally unfavourable to the maintenance of flows in rivers and creeks in the Molonglo Catchment. Winter and spring rainfall was below average, and was accompanied by moderate to warm daytime temperatures, frequent winds and evaporation rates at least twice the rainfall. When the weather did break it was after the date for the December sampling for Waterwatchers. The depletion of the water table after so long a drought meant that many of the sampling sites where water levels were not artificially maintained ran dry by the spring of 2009. The consequence of this is that much of the calculation is based on few samples. Indicators are more reliable when based on large numbers of samples.

Drought and continuing low flows are the main forces that have combined to bring stress on our waterways. We need to continue to be watchful of our use of both groundwater and surface water throughout the catchment. We need to support the development of off-stream urban wetlands to return storm water to the watertable. We need to continue to promote the fencing of waterways and the revegetation of the in-stream and riparian habitat. We need to continue to promote the sensitive use of water storages and groundwater bores in all our sub-catchments.

Acknowledgements

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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 30 active sites looked after by sixteen 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 page. Also there is a link to the data base, 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 & Beth	SUL012; SUL015, SUL018	+	+	+			
Perraud/Stenekes	SUL455				+		
Su Wild River's ANU group	SUL735; SUL745; SUL765	+	+	+		+	+
Fyshwick , Woolshed, Kowen (Central Molonglo WMA)							
John Bruggeman	WOO090; MOL295; MOL270; REE095	+	+	+		+	+
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	MOL216	+	+	+	+		+
	CHI095;STO060;WHI090	+	+	+	+		
Captains Flat Landcare	MOL109		+	+	+	+	+
Burra (Googong WMA)							
Burra Creek Landcare	BUR055	+	+	+	+	+	+
Upper Queanbeyan (Googong WMA)							
Sandy Lloyd	QUE300; TIN080; URI040	+	+	+	+	+	+
Upper Queanbeyan/Bredbo Rivers 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 ACT 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 four sites in the Queanbeyan River below Googong Dam (Lower Queanbeyan WMA), and two sites in Jerrabomberra Creek (Jerrabomberra Headwaters WMA). These 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 2. Catchment Health Ratings .

Indicator rating	Excellent 1	Good 2	Moderate 3	Poor 4	Degraded 5
pH urban	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
pH rural	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 Urban µS.cm^{-1}	<80	<250	<400	<500	>500
Electrical Conductivity Rural µS.cm^{-1}	<60	<200	<350	<400	>400
Turbidity Urban NTU	<10	<15	<20	<30	>30
Turbidity Rural NTU	<10	<12.5	<15	<20	>20
Dissolved Oxygen Urban, mg.L^{-1}	>8.0	>7.0	>6.0	>4.6	<4.6
Dissolved Oxygen Rural, mg.L^{-1}	>10.5	>9.0	>8.0	>6.0	<6.0
Phosphate Urban, mg.L^{-1}	<0.01	<0.05	<0.09	<0.15	>0.15
Phosphate Rural, mg.L^{-1}	<0.01	<0.02	<0.05	<0.09	>0.09
Nitrate Urban, mg.L^{-1}	<1.0	>1.0	>10.0	>15.0	>20.0
Nitrate Rural, 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.

Each monthly reading for each parameter is assigned a score from Table 2 also. These scores are averaged for the reporting period. The parameter scores are summed and divide by the number of parameters reported to obtain a Site CHiP Water Score, and subsequently in the same manner a sub-Catchment CHiP Water Score. It is these values that are used to generate Table 3 and the Map (Figure 1).

Results

Table 3. Summary of results from the Catchments July- December 2009

Subcatchment	Current M-CHiP rating	January–June, 2009 rating	Comment
Coppins	2.40	Not scored	Good
Weston-Woden	2.9	2.8	Good condition tending to moderate
Sullivans Creek	3.3	2.8	Moderate
Fyshwick Woolshed-Kowen	2.9	3.4	Good, improving
Jerrabomberra Creek	3.0	3.2	Moderate at good end
Lower Queanbeyan	2.4	2.2	Good, slight decline
Upper Molonglo	2.5	2.7	Good and improving
Burra Creek	2.7	2.6	Good tending to moderate
Upper Queanbeyan	2.0	2.0	Good at excellent end

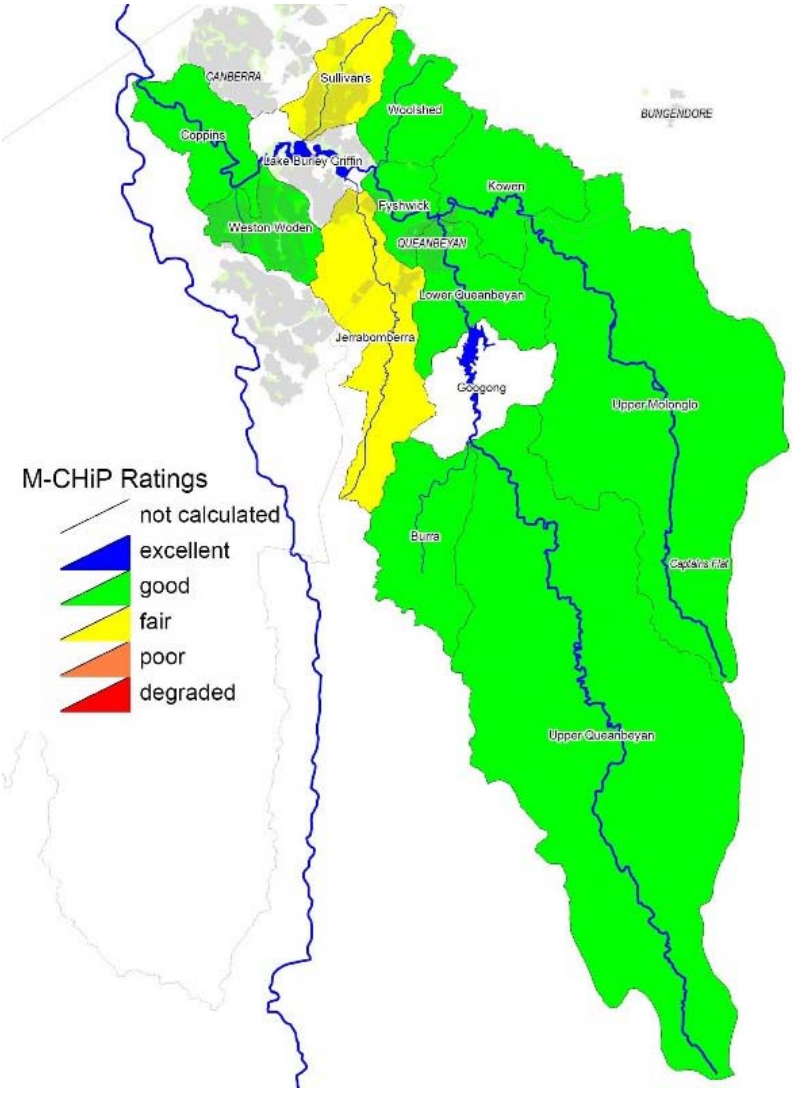

Figure 1. M-CHiP ratings for the Molonglo Catchment, July - December 2009

Coppins Sub-Catchment

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.

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 drought related elevation of electrical conductivity in the later months of the report period appears to have offset the excellent result for available phosphate. The score for the reporting period indicates a slight worsening of condition from the Long Term score for this reach but still well in **good** catchment health.

Table 4. Coppins Sub-Catchment

	Parameter	Standard	Long Term Median	Jul	Aug	Sep	Oct	Nov	Dec	M-CHiP score
M-CHiP			11.5=**2.2**							12/5=**2.4**
MOL350			11/5=2.2							12/5 = **2.4**
	Temp. °C			7.7	11.2	13.8		19.3	21.7	
	pH	6.5–9.0	7.4	7.8	7.9	7.8		7.3	7.8	10/5=2
	E C µS.cm^{-1}	30–350	360	317	295	348		488	493	19/5=3.8
	Turbidity, NTU	<30	2.8	40	16	<10		<10	<10	11/5=2.2
	Dissolved Oxygen, mg.L^{-1}	>4	7.15	9.8	9.0	10.0		4.2	4.4	13/5=2.6
	Phosphate, mg.L^{-1}	<0.10	0.02	0.0	0.01	0.0		0.0	0.01	7/5=1.4
	Nitrate, mg.L^{-1}	<150 µm.L^{-1}								

Weston–Woden Sub-Catchment

There are two active sites in this subcatchment. The Weston Creek site is in the creek below Cotter Rd, where it becomes a natural waterway after being an open drain through the Waramanga, Weston and Holder areas. 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.

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. There is no M-CHiP score for Weston Creek for the reporting period, as unfortunately the results were misplaced and had not come to light at the time of writing. The subcatchment score comes to 2.92 based only on the Yarralumla Creek data, which indicates that the catchment remains only just in **good condition** on this scale.

Table 5. Weston Woden Sub-Catchment

	Parameter	Standard	Long Term Median	Jul	Aug	Sep	Oct	Nov	Dec	M-CHiP score
MCHiP			6.0/2=**3.0**							**2.92**
WES410			[8/3=2.6]							
	Temp. °C			10	13					
	pH	6.5–9.0	7.3	7.3	7.1					
	E C µS.cm^{-1}	30–350	585	650	170					
	Turbidity, NTU	<30	10	50	15					
YAR400			[17/5=3.4]							14.6/5 = **2.92**
	Temp. °C				11.5	17.5	17	19	27	
	pH	6.5–9.0	8.0		7.5	8.0	8.4	8.0	7.4	13/5 = 2.6
	E C µS.cm^{-1}	30–350	520		1190	680	400	940	300	22/5 = 4.4
	Turbidity, NTU	<30	15		<10	<10	20	<10	30	10/5 = 2
	Dissolved Oxygen, mg.L^{-1}	>4	5.8		9.0	10.0	6.7	4.8	4.4	14/5 = 2.8
	Phosphate, mg.L^{-1}	<0.10	0.07		0.02	0.01	0.02	0.03	0.1	14/5= 2.8

Sullivans Sub-Catchment

Sullivans Creek rises on the south western face of Gooroo Hill at the ACT–NSW border. It crosses the limestone plains and enters the urban area through the industrial area 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. Waterwatch volunteers sample at three spots in the Mitchell area, at Wattle St in Lyneham and at three sites within the university campus.

Figure 2. SUL765 on Sullivans Creek, after weed removal, 2009.

A recent addition to Sullivans Creek has been a inline wetland upstream from Flemington Rd near the racecourse. There is a proposal to move SUL015 to above the gross pollution trap on the inlet side , and sample below as well. SUL010 and SUL 012 are ephemeral. Meaningful dissolved Oxygen determinations cannot be made in this sub-catchment until the ANU sites.

Although there are missing records and the upper sites were dry in most months, the M-CHiP rating is 3.3, indicating **moderate** condition, in line with the Long Term Score of 3.16. pH readings upstream

of the university pondages remain in the alkaline range, a combination of the catchment geology and the effects of urban run-off. The highly elevated phosphate levels, especially from Lyneham down to Lake Burley Griffin, are almost certainly related to maintenance of private and public parks and gardens.

Table 5. Sullivans Creek Sub-Catchment

	Parameter	Standard	Long Term Median	Jul	Aug	Sep	Oct	Nov	Dec	M-CHiP score
MCHiP			18.95/6 = **3.16**							19.78/6 =**3.3**
SUL012			10/4 = 2.5							10/4 =2.5
	Temp. °C				12	19				
	pH	6.5–9.0	9.3		8.7	9.3				9/2 = 4.5
	E C µS.cm^{-1}	30–350	120		120	80				4/2 = 2.0
	Turbidity, NTU	<30	<10		15	<10	Dry	Dry	Dry	3/2 = 1.5
	Dissolved Oxygen, mg.L^{-1}	>4								
	Phosphate, mg.L^{-1}	<0.10	0.05		0.03	0.05				4/2 = 2.0
SUL015			14/4 = 3.5							12/3= 4.0
	Temp. °C				13	19				
	pH	6.5–9.0	10.2		8.7	9.2				9/2 = 4.5
	E C µS.cm^{-1}	30–350	290			240				
	Turbidity, NTU	<30	<10		30	<10	Dry	Dry	Dry	5/2 = 2.5
	Dissolved Oxygen, mg.L^{-1}	>4								
	Phosphate, mg.L^{-1}	<0.10	0.33		0.5	1.0				10/2 =5.0
SUL018										
	Temp. °C					17				
	pH	6.5–9.0				9.0				
	E C µS.cm^{-1}	30–350				110				
	Turbidity, NTU	<30				90				
	Dissolved Oxygen, mg.L^{-1}	>4								
	Phosphate, mg.L^{-1}	<0.10	0.05			0.05				
SUL455			14/4 = 3.5							10.9/3= 3.63
	Temp. °C						31	24	29.5	
	pH	6.5–9.0	10				9.3	9.0	10.0	5/3 = 5
	E C µS.cm^{-1}	30–350	310				530	380	330	11/3 = 3.6
	Turbidity, NTU	<30	<10				80	<10	<10	7/3 = 2.3
	Dissolved Oxygen, mg.L^{-1}	>4								
	Phosphate, mg.L^{-1}	<0.10	0.25				0.25			
SUL735			16/5 = 3.25							12.6/4 = 3.2
	Temp. °C			13	11	17.5		24	24	
	pH	6.5–9.0	7.3	7.5	7.4	7.0		7.3	7.0	10/2 = 2.0
	E C µS.cm^{-1}	30–350	99	263	110	94		401	155	14/5 = 2.8
	Turbidity, NTU	<30	10	20	100	60		<10	15	16/5 = 3.2
	Dissolved Oxygen, mg.L^{-1}	>4								
	Phosphate, mg.L^{-1}	<0.10	0.15	0.16	0.06	0.17		1.92	0.8	23/5 = 4.6

	Parameter	Standard	Long Term Median	Jul	Aug	Sep	Oct	Nov	Dec	M-CHiP score
SUL745			15/5 = 3.0							13/4 = 3.25
	Temp. °C			11	13.5	18		24	27	
	pH	6.5–9.0	7.5	8.9	7.9	7.4		7.7	9.2	15/5 = 3.0
	E C µS.cm^{-1}	30–350	143	254	136	95		374	222	12/5 = 2.4
	Turbidity, NTU	<30	<10	<10	80	40		<10	<10	13/5 = 2.6
	Dissolved Oxygen, mg.L^{-1}	>4								
	Phosphate, mg.L^{-1}	<0.10	0.4	0.26	0.11	0.17		1.31	0.67	25/5 = 5.0
SUL765			16/5 = 3.2							12.8/4 = 3.2
	Temp. °C			10.5	13	17		25.5	24.5	
	pH	6.5–9.0	7.3	7.6	7.4	7.3		7.6	7.5	10/5 = 2.0
	E C µS.cm^{-1}	30–350	516	516	186	163		635	478	19/ 5 = 3.8
	Turbidity, NTU	<30	10	20	60	30		10	10	14/5 = 2.8
	Dissolved Oxygen, mg.L^{-1}	>4								
	Phosphate, mg.L^{-1}	<0.10	0.14	0.79	0.12	0.00		0.10	0.30	21/5 = 4.2

Fyshwick, Woolshed and Kowen Sub-Catchments

Reedy Creek is a minor tributary of the Molonglo River that runs through the valley at the base of the uplift of the Kowen Forrest, and enters the river not far downstream of the Molonglo Gorge. It is almost entirely in grazing country. Woolshed Creek rises near Ginns Gap and runs between Mt Majura and Greenwood Hill, past the airport and enters the river just above Dairy Flat bridge. It also crosses grazing country, but 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 realignment of Majura Rd. 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. One of our sites (MOL270) is near the river confluence, while another (MOL295) is at the water ski park, downstream of the Queanbeyan water treatment works. The third site (MOL260) is at the causeway under the Yass Rd bridge, a sampling site for both Waterwatch and the AUSRIVAS macroinvertebrate program from Canberra University and eWater.

The M-CHiP score for these four sites in the lower part of the Molonglo River between the Molonglo Gorge and the Lake in the second half of 2009 is close to the long term score, at 2.86. This is an improvement from the summer-autumn 2009 score of 3.4, although many of the same stresses are working in these three small catchments. It is to be expected that the area will remain in the poorer end of the good band at least until the roadworks in Pialligo are completed, and restoration work on the Molonglo immediately above Lake Burley Griffin takes effect.

Table 7. Fyshwick, Woolshed and Kowen sub-catchment

	Parameter	Standard	Long Term Median	Jul	Aug	Sep	Oct	Nov	Dec	M-CHiP Score
M-CHiP			11.2/4=**2.8**							11.46/4 = **2.86**
MOL295			12/5=2.4							14.2/5 = 2.85
	Temp. °C			10.4	12.2	18.2	16.9	22.2		
	pH	6.5–9.0	8.0	8.48	7.92	8.06	7.90	7.67		12/5 = 2.4
	E C µS.cm^{-1}	30–350	445	520	567	565	549	447		24/5 = 4.8
	Turbidity, NTU	<30	20	15	15	15	15	20		11/5 = 2.2
	Dissolved Oxygen, mg.L^{-1}	>4	7.3	8.5	7.3	6.2	4.6	5.8		14/5 = 2. 8
	Phosphate, mg.L^{-1}	<0.10	0.01	0.02	0.05	0.05	0.05	0.01		10/5 = 2
WOO090			18/5=3.6							14.4/5 = 2.88
	Temp. °C			9	11.1	18.9	16.1	17.1	19.7	
	pH	6.5–9.0	7.6	8.5	7.63	7.62	7.61	7.46	7.56	13/6=2.3
	E C µS.cm^{-1}	30–350	553	631	621	438	380	787	447	26/6=4.3
	Turbidity, NTU	<30	155	30	10	10	10	30	10	12/6=2.0
	Dissolved Oxygen, mg.L^{-1}	>4	6.5	7.8	5.0	8.4	5.6	3.7	2.8	21/6 = 3.5
	Phosphate, mg.L^{-1}	<0.10	0.01	0.0	0.01	0.02	0.01	0.1	0.07	14/6 = 2.3
MOL270			8/5=1.6							11.4/5 = 2.28
	Temp. °C			8.1	10.0	18.1	19.6	19.6	24.2	
	pH	6.5–9.0	7.6	8.86	7.50	7.74	7.60	7.34	7.43	14/6=2.3
	E C µS.cm^{-1}	30–350	313	315	309	336	333	492	245	20/6=3.3
	Turbidity, NTU	<30	10	10	20	10	10	10	15	9/6=1.5
	Dissolved Oxygen, mg.L^{-1}	>4	7.7	9.4	7.7	8.6	8.0	4.4	5.2	14/6 = 2.3
	Phosphate, mg.L^{-1}	<0.10	0.02	0.03	0.02	0.03	0.02	0.05	0.05	12/6 = 2.0
MOL260										
	Temp. °C								23.5	
	pH	6.5–9.0							8.0	
	E C µS.cm^{-1}	30–350							450	
	Turbidity, NTU	<30							12	
	Dissolved Oxygen, mg.L^{-1}	>4							3.1	
	Phosphate, mg.L^{-1}	<0.10							0.05	
REE095			18/5=3.6							17.25/5 = 3.45
	Temp. °C			8.4	11.1	19.3	17.0			
	pH	6.5–9.0	7.4	8.54	7.44	7.50	7,49			9/4= 2.25
	E C µS.cm^{-1}	30–350	580	500	603	625	625			20/4=5
	Turbidity, NTU	<30	58	80	10	20	20	Dry	Dry	14/4= 3.5
	Dissolved Oxygen, mg.L^{-1}	>4	5.8	6.8	6.0	5.2	5.4			18/4 = 4.5
	Phosphate, mg.L^{-1}	<0.10	0.01	0.00	0.02	0.03	0.01			8/4 = 2.0

Jerrabomberra Sub-Catchment

Jerrabomberra Creek rises between Lobb Hill and Gibraltar Hill and travels north across 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 a peri-urban development. The lower part of Jerrabomberra Creek passes through Jerrabomberra and enters the ACT. Here it picks up Stonyhurst Creek (that runs below the Mugga Lane Tip) and Woden Creek. The creek then goes past the Monaro Hwy and under both Hindmarsh Drive and Canberra Avenue to enter the Jerrabomberra Wetlands near the CIT in Fyshwick.

Waterwatch volunteers currently maintain sites at Royalla and Fernleigh Park as well as near Hindmarsh Drive. Waterwatch may work towards setting up sites on the creek at Hume and on Stonyhurst Creek (or Wild Dog Creek, the one that drains the tip) downstream of the tip. The flow in Jerrabomberra Creek, even at the headwaters, has been reduced to less than a trickle in the last six months, as a quick look at the Table 7 will show. The depletion of the water table is partly a consequence of the very real lack of rainfall, but bores and farm dams throughout the drainage lines do not help the situation. The 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, but the recent drought appears to have been hard on the sub-catchment. Once again the Waterwatchers at the peri-urban sites reported that there was no water to test on several occasions. The city site Waterwatcher was unable to sample on all occasions. The Queanbeyan City Council data reflects the lack of water; there were no samplings in October and the November samples were actually taken in the first week of December. Even though the drought had not yet broken, the Score is just inside the **good** range.

Table 8. Jerrabomberra Creek Sub-Catchment

	Parameter	Standard	Long Term Median	Jul	Aug	Sep	Oct	Nov	Dec	M-CHiP Score
MCHiP			15.9/6=**2.65**							17.91/6 = **2.98**
JER175			9/3=3.0							8/2=4
	Temp. °C					15	16			
	pH	6.5–9.0	7.7							
	E C µS.cm^{-1}	30–350	400			400	310			7/2 = 3.5
	Turbidity, NTU	<30	17.5			20	30			9/2 = 4.5
JER121			11/4=2.75							11.4/4= 2.85
	Temp. °C			8.34	9.17	15.19		22.07	24.99	
	pH	6.5–9.0	7.6	7.82	7,79	7.74		7.92	8.15	11/5 = 2.2
	E C µS.cm^{-1}	30–350	281	316	280	338		489	535	13/5 = 2.6
	Turbidity, NTU	<30	*							
	DO	>4.5	8.5	9.51	8.51	8.77		6.66	6.77	16/5 =3.2
	Phosphate	<0.01	0.14	0.10	0.08	0.02		0.01	0.18	17/5 =3.4
JER120			11/5=2.2							8.6/4 = 2.15
	Temp. °C			8.56	9.44	13.93		22.63	25.20	
	pH	6.5–9.0	7.8	8.03	7.77	8.70		8.43	7.72	12/5 = 2.4
	E C µS.cm^{-1}	30–350	181.5	143	132	150		213	239	10/5 =2
	Turbidity, NTU	<30	<10							
	DO	>4.5	8.2	11.43	10.65	12.49		9.7	4.55	9/5 = 1.8
	Phosphate	<0.01	0.12	0.02	0.07	0.06		0.00	0.06	12/5 = 2.4
JER095			11/5=2.75							9/4= 2.25
	Temp. °C			7.0	7.0	Dry	17	21	Dry	
	pH	6.5–9.0	8.0	8.0	7.6		7.8	7.2		8/4 = 2.0
	E C µS.cm^{-1}	30–350	715	750	830		360	580		19/4 = 3.75
	Turbidity, NTU	<30	5	<10	<10		<10	20		5/4 = 1.25
	DO	>4.5	*							
	Phosphate	<0.01	0.02	0.01	0.01		0.01	0.02		8/4 = 2
JER065			13/5=2.6							9.5/3 = 3. 16
	Temp. °C					8.3	25.1	19.8		
	pH	6.5–9.0	7.4			7.4	7.8	7.6		6/3 = 2
	E C µS.cm^{-1}	30–350	460			600	460	570		15/3 = 5
	Turbidity, NTU	<30	10			10	13	18		7/3 = 2.3
	DO	>4.5	6.6					6.0		
	Phosphate	<0.01	0.02					0.00		
JER020			13/5=2.6							10.5/3 = 3. 5
	Temp. °C			Dry	5.0	Dry	9.0	18.0	12.0	
	pH	6.5–9.0	7.8		7.5		7.2	7.8	9.1	11/4 =2.75
	E C µS.cm^{-1}	30–350	410		490		230	370	520	17/4 = 4. 25
	Turbidity, NTU	<30	10		20		80	15	15	14/4 = 3.5
	DO	>4.5	7.5							
	Phosphate	<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).

Figure 2:The Queanbeyan River at Dane St, looking down stream and across to Dodsworth (QUE460). This area is currently being rehabilitated.

The sub-catchment shows consistently close to standard water conditions and has a condition rating of 2.4 well into the **Good** range. This is remarkable for a built-up area.

Even the weir pool results (QUE470) are well within acceptable standards for urban and peri-urban waterways. Other indicators, including phytoplankton inspection and macroinvertebrate counts (usually done with school groups) indicate that the chemical analyses are pointing in the right direction.

Table 9. Lower Queanbeyan River Sub-Catchment

	Parameter	Standard	Long Term Median	Jul	Aug	Sep	Oct	Nov	Dec	M-CHiP Score
MCHiP			11.4/6= **1.9**							14.5/6= **2.4**
QUE496			11/4 = 2.75							10.6/4 = **2.65**
	Temp. °C			8.3	8.6	14.3		18.8	21.8	
	pH	6.5–9.0	6.8	7.5	7.0	7.1		6.7	7.4	9/5=1.8
	E C µS.cm^{-1}	30–350	272	202	169	228		316	259	12/5=2.4
	Turbidity, NTU	<30								
	Dissolved Oxygen, mg.L^{-1}	>4	5.6	9.2	5.7	9.1		5.1	2.2	15/5 = 3.0
	Phosphate, mg.L^{-1}	<0.10	0.08	0.07	0.18	0.04		0.02	0.11	17/5 = 3.4
QUE495			12/5 = **2.4**							11.5/5 =**2.3**
	Temp. °C			9.1	11.2	18.4	20.0	19.4	24.6	
	pH	6.5–9.0	7.7	8.5	7.4	7.9	7.7	7.4	7.0	13/6=2.1
	E C µS.cm^{-1}	30–350	210	279	296	271	239	326	200	18/6= 3.0
	Turbidity, NTU	<30	10	10	30	10	10	10	10	9/6= 1.5
	Dissolved Oxygen, mg.L^{-1}	>4	4.6	9.0	7.7	8.0	4.6	5.4	4.6	16/6 = 2.6
	Phosphate,	<0.10	0.02	0.02	0.02	0.02	0.0	0.07	0.07	14/6 = 2.3

	Parameter	Standard	Long Term Median	Jul	Aug	Sep	Oct	Nov	Dec	M-CHiP Score
	mg.L^{-1}						3			
QUE470			7/4 = 1.75							9.2/4 = 2.3
	Temp. °C			7.8	8.75	13.6		20.2	24.0	
	pH	6.5–9.0	6.5	7.4	7.1	7.2		7.4	8.0	11/5= 2.2
	E C µS.cm^{-1}	30–350	165	171	143	182		275	178	11/5=2.2
	Turbidity, NTU	<30								
	Dissolved Oxygen, mg.L^{-1}	>4	7.3	7.6	6.4	7.4		6.5	7.4	12/5 = 2.4
	Phosphate, mg.L^{-1}	<0.10	0.01	0.03	0.20	0.08		0.00	0.00	12/5 = 2.4
QUE460			6/4 = 1.5							9.6/4 = 2.4
	Temp. °C			6.1	7.7	13.5		18.4	23.7	
	pH	6.5–9.0	6.5	7.3	7.3	7.2		7.2	7.3	10/5= 2.0
	E C µS.cm^{-1}	30–350	138	150	131	182		203	188	11/5= 2.2
	Turbidity, NTU	<30								
	Dissolved Oxygen, mg.L^{-1}	>4	8.2	9.9	9.3	8.0		4.2	4.4	13/5= 2.6
	Phosphate, mg.L^{-1}	<0.10	0.01	0.14	0.16	0.02		0.05	0.06	14/5 = 2.8
QUE455			6/4 = 1.5							8.8/4 = 2.2
	Temp. °C			6.2	8.1	13.5		18.8	24.5	
	pH	6.5–9.0	6.5	7.4	7.4	6.9		7.6	7.6	9/5= 1.8
	E C µS.cm^{-1}	30–350	127	123	116	158		148	171	10/5= 2.0
	Turbidity, NTU	<30								
	Dissolved Oxygen, mg.L^{-1}	>4	9.2	10.6	10.8	8.3		6.9	5.8	10/5 = 2.0
	Phosphate, mg.L^{-1}	<0.10	0.01	0.11	0.14	0.05		0.00	0.02	15/5 = 3.0
QUE440			6/4 = 1.5							10.75/4 =2.64
	Temp. °C				8.04	12.8		18.5	22.8	
	pH	6.5–9.0	6.5		7.7	6.0		7.6	7.7	11/4 =2.75
	E C µS.cm^{-1}	30–350	117		104	159		124	157	8/4 = 2.0
	Turbidity, NTU	<30								
	Dissolved Oxygen, mg.L^{-1}	>4	9.0		10.3	8.15		7.10	5.87	14/4 = 3.5
	Phosphate, mg.L^{-1}	<0.01	0.01		0.09	0.01		0.08	0.05	10/4 = 2.5

Upper Molonglo Sub-Catchment

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 channel meanders across the plain and then re-enters hilly country at the back of the uplift that makes the upper Molonglo Gorge.

The Catchment Health Rating is on the middle of the **Good** range, but as with some other catchments patchy records because of no flow in the river or its tributaries have blurred the picture. The efforts of the Waterwatchers and other land care 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 contribute in the future to an improved score.

Table 10. Upper Molonglo Sub-Catchment

	Parameter	Standard	Long Term Median	Jul	Aug	Sep	Oct	Nov	Dec	M-CHiP Score
MCHiP			11.7/5 = **2.32**							12.7/5 = **2.54**
MOL216			7/3=2.3							8.3/3 = 2.8
	Temp. °C			5	6	13	14	Dry	30	
	pH	6.5–9.0	7.1	7.6	7.6	7.6	7.8		8.5	11/5 = 2.2
	E C µS.cm^{-1}	30–350	380	550	560	690	560		970	25/5 = 5.0
	Turbidity, NTU	<30	5		<10	<10	<10		<10	4/4 = 1.0
	DO, mg.L^{-1}	>4.0								
	Phosphate, mg.L^{-1}	<0.10								
CHI095			10/5 = 2							14.25/5 = 2.85
	Temp. °C			7.2	6.5	12	16			
	pH	6.5–9.0	7.1	8.2	6.9	8.9	7.8			9/4 = 2.25
	E C µS.cm^{-1}	30–350	260	260	350	610	710			15/4 = 3.75
	Turbidity, NTU	<30	<10	160	60	40	30			20/4 =5.0
	DO, mg.L^{-1}	>4.0	9.6	12.4	9.6	9.6	8.5			8/4 = 2.0
	Phosphate, mg.L^{-1}	<0.10	0.00	0.00	0.00	0.01	0.00			5/4 = 1.25
STO060			11/5 = 2.2							12.25/5 =2.45
	Temp. °C			5.5	4.0	9.0	15.0			
	pH	6.5–9.0	7.1	7.0	7.1	7.3	7.4			8/4 = 2.0
	E C µS.cm^{-1}	30–350	1070	1070	990	1020	1220			20/4 = 5.0
	Turbidity, NTU	<30	<10	<10	<10	<10	<10			4/4 = 1.0
	DO, mg.L^{-1}	>4.0	9.0	8.2	9.0	8.4	5.8			13/4 = 3.25
	Phosphate, mg.L^{-1}	<0.10	0.00	0.00	0.00	0.00	0.00			4/4 = 1.0
WHI090			14/5 = 2.8							13/5 =2.6
	Temp. °C			5.5	5.5	10.5	12.0			
	pH	6.5–9.0	7.0	7.6	7.5	7.6	8.0			9/4 = 2.25
	E C µS.cm^{-1}	30–350	610	810	750	670	610			20/4 = 5.0
	Turbidity, NTU	<30	<10	<10	<10	15	15			8/4 = 2.0
	DO, mg.L^{-1}	>4.0	9.3	8.8	9.9	9.2	8.4			10/4 = 2.5
	Phosphate, mg.L^{-1}	<0.10	0.00	0.00	0.00	0.00	0.01			5/4 = 1.25
MOL109			12/5 =2.4							10/5 =2.0
	Temp. °C			8	8	15	13	22		
	pH	6.5–9.0	7.0	7.6	7.6	6.9	7.4	7.4		9/2 = 1.8
	E C µS.cm^{-1}	30–350	370	940	930	880	660	430	Dry	25/5 = 5
	Turbidity, NTU	<30	10	<10	<10	<10	<10	<10		5/5 = 1
	DO, mg.L^{-1}	>4.0	7.4	8.2	9.6	6.2	8.0	7.0		6/5 = 1.2
	Phosphate, mg.L^{-1}	<0.10	0.00	0.00	0.00	0.00		0.00		4/4 = 1.0

Burra Sub-Catchment

Burra Creek rises in the western fall of the Tinderry Ranges, between Mt Burra and Mt Urialla, and collects a number of tributaries including Holden Creek before it reaches the intersection of Williamsdale and Burra Rds. It then follows Burra Rd and passes under it below the showground after which it goes down to the back of Googong reservoir below London Bridge arch. There is a gauging station at the Burra Rd bridge, and a Waterwatch site at the Williamsdale Rd intersection, which has

been going since November 2008. Like Jerrabomberra Creek, Burra Creek has had periods of nil flow in this reporting period.

The less than flattering condition indication for Burra Creek (2.7 at the poor end of **good**) is a result of drought effects on top of dense peri-urban development. Much of the catchment had been cleared well before subdivision into smaller holdings. The sum of the water requirement for each small holding significantly reduces the groundwater return to the creek. This sub-catchment could do with further monitoring sites.

Table 11. Burra Creek Sub-Catchment

	Parameter	Standard	Long Term Median	Jul	Aug	Sep	Oct	Nov	Dec	M-CHiP Score
MCHiP			12/5=**2.4**							10.85/4=**2.7**
BUR055			12/5= 2.4							10.85/4=2.7
	Temp. °C			5	*	12	13	21.5	Dry	
	pH	6.5–9.0	7	7	*	7.4	7	7		5/4=1.25
	E C µS.cm^{-1}	30–350	610	590	*	610	580	630		20/4=5
	Turbidity, NTU	<30	9	<10	*	<10	<10	<10		4/4=1
	Dissolved Oxygen, mg.L^{-1}	>4.5	7.0	10.0	*	3.75	7.0	*		11/3=3.6
	PO_4, mg.L^{-1}	<0.1	0.07	*	*	0.07	*	0.10		*
	NO_3, mg.L^{-1}	<1.0	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 to eventually reach the Googong reservoir at the confluence with Burra Creek. This sub-catchment is the least developed in the Molonglo Catchment system. Although Urialla Creek has been dry throughout the reporting period and Tinderry Creek showed no flow except in October, the sub-catchment has been the one system beside the Cotter to continue flowing until December!

The condition rating for the sub-catchment continued to improve, but is still only just in the **Excellent** range. Individual sites however are not so good. Upstream of "Sunnybrae" there continues to be a point source of phosphate, possibly the result of on-going soil disturbance or horticultural activity. The two Boolboolma sites are in excellent condition, despite the drought and the absence of flow in December.

Table 12. Upper Queanbeyan River Sub-Catchment

	Parameter	Standard	Long Term Median	Jul	Aug	Sep	Oct	Nov	Dec	M-CHiP Score
MCHiP			13.65/7=**1.95**							5.92/3=**1.97**
QUE300			10.5 = 2.0							12.1/5 =2.42
	Temp. °C			5.0	7.0	15.0	14.0	20.0	23.5	
	pH	6.5–9.0	7.9	9.3	7.9	8.1	7.9	7.9	7.9	16/6 = 2.6
	E C µS.cm^{-1}	30–350	100	90	110	100	110	130	160	12/6 = 2.0

	Parameter	Standard	Long Term Median	Jul	Aug	Sep	Oct	Nov	Dec	M-CHiP Score
	Turbidity, NTU	<30	<10	<10	<10	<10	<10	10	10	8/6 = 1.3
	Dissolved Oxygen, $mg.L^{-1}$	>4.5	8.6	8.2	10.75	9.25	8.60	7.0	8.6	16/6 = 2.7
	PO_4, $mg.L^{-1}$	<0.1	0.02	0.02	0.25	0.20	0.05	0.03	0.03	21/6 = 3.5
URI040			7/3=2.3							
	Temp. °C			Dry	Dry	Dry	Dry	Dry	Dry	
	pH	6.5–9.0	7.7							
	E C $\mu S.cm^{-1}$	30–350	330							
	Turbidity, NTU	<30	15							
	Dissolved Oxygen, $mg.L^{-1}$	>4.5								
	PO_4, $mg.L^{-1}$	<0.1								
TIN080			12/5 = 2.4							
	Temp. °C			Dry	Dry	Dry	14	Dry	Dry	
	pH	6.5–9.0	7.7				8.1			
	E C $\mu S.cm^{-1}$	30–350	290				280			
	Turbidity, NTU	<30	10				10			
	Dissolved Oxygen, $mg.L^{-1}$	>4.5	7.65				9.8			
	PO_4, $mg.L^{-1}$	<0.1	0.08				0.10			
ROB180			5/3=1.6							5.2/3=1.7
	Temp. °C			2.0	4.5	11.0	8.0	16.0	Dry	
	pH	6.5–9.0	7.6	6.7	7.4	7.3	7.6	7.3		9/5 = 1.8
	E C $\mu S.cm^{-1}$	30–350	110	140	120	120	80	100		10/5 = 2.0
	Turbidity, NTU	<30	<10	10	<10	<10	12	<10		7/5 = 1.4
	Dissolved Oxygen, $mg.L^{-1}$	>4.5								
	PO_4, $mg.L^{-1}$	<0.1								
QUE125			5/3 = 1.6							5.4/3 =1.8
	Temp. °C			4.0	6.0	13.0	11.0	19.0	Dry	
	pH	6.5–9.0	7.8	6.9	7.8	8.0	7.8	7.6		10/5 = 2.0
	E C $\mu S.cm^{-1}$	30–350	120	110	90	120	120	150		10/5 = 2.0
	Turbidity, NTU	<30	<10	10	<10	<10	10	<10		7/5 = 1.4
	Dissolved Oxygen, $mg.L^{-1}$	>4.5								
	PO_4, $mg.L^{-1}$	<0.1								
QUE110			7/4 = 1.75							
	Temp. °C				11					
	pH	6.5–9.0	8.5		8.3					
	E C $\mu S.cm^{-1}$	30–350	100		100					
	Turbidity, NTU	<30	<10		<10					
	Dissolved Oxygen, $mg.L^{-1}$	>4.5								
	PO_4, $mg.L^{-1}$	<0.1	0.00		0.00					
TOW130			8/4 = 2.0							
	Temp. °C				9.0					
	pH	6.5–9.0	8.5		8.3					
	E C $\mu S.cm^{-1}$	30–350	250		280					
	Turbidity, NTU	<30	<10		15					
	Dissolved Oxygen, $mg.L^{-1}$	>4.5								
	PO_4, $mg.L^{-1}$	<0.1			0.00					

Summary

This Report is based on data for three to five parameters. As such it shows that for acidity, the load of dissolved minerals and water clarity each sub-catchment has its own characteristics. It also emphasises the very real problem of low flows in these sub-catchments. Dissolved oxygen levels are also very closely associated with low flows and shallow water. Where they have been collected, phosphate levels provide some indication of continuing land disturbances or the casual use of fertilizers. Every effort needs to be made to re-establish and maintain flows in our waterways despite the ravages of drought. But there are more things to consider than drought. In rural and peri-urban areas the number and capacity of off-stream drainage line water storages (farm dams), the maintenance

and considered use of groundwater sources, and the suitable vegetation and fencing of water courses are matters that need on-going review. Urban waterways, often engineered to provide rapid clearance of stormwater, are also under constant pressure and need better management, with at least some designed returns to the watertable to maintain building fabrics and our leafy communities.

It is hoped that in the near future scores for the Riparian parameters in the CHiP scoring system may also be able to be included. These will be derived from the twice yearly Macroinvertebrate surveys that some Waterwatcher conduct, the community participation in the annual Frogwatch (in October), the annual photo-point and RARC scoring done by Waterwatchers and the addition of a Conspicuous Algal rating with all water data. These should provide a fuller picture of Catchment Health.

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