Molonglo Catchment Health indications Report,

January to June 2013

Yandyguinula Creek, above Rossi — one of the beginnings of the Molonglo

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Introduction

A catchment is a geographic unit in which all the drainage lines fill into one significant waterway. The components of the catchment include the country rock, the soils, the groundwater, the surface water the ecosystems the geographic unit supports and the rural and urban developments we have imposed on it. The health of a catchment depends on the interaction of all these components.

The CHiP is a whole of catchment indication scheme — not just a water quality summary. That is why the state of the land ecosystems, developed or otherwise, is just as important to the calculation as the water quality summary. That is why noting the conspicuous algal growth in waterways has value. That is why the scatter of Frogwatch Census sites is so useful. That is why spring and autumn macroinvertebrate surveys help with the whole picture. That is why photo-points and rapid appraisal of riparian condition contribute. Just one or a small number of these assessments alone do not give a rich enough picture to really indicate catchment health. It is up to the whole Landcare community, not just the Waterwatchers, to embrace this process.

Where did the water quality data come from

Table 1. Contributions from MCG Waterwatch Volunteers, January to June 2013

Group Name	Site Codes	J	F	M	A	M	J
Coppins (Lower Molonglo WMA)							
Eric	MOL350	+	+				
Woden-Weston(Lower Molonglo WMA)							
Harriden, K, J Thompson & Mina	YAR400	+	+	+	+		
J Thompson & Mina	EDD010	+	+	+	+	+	+
Sullivans Creek (Central Molonglo WMA)							
Andy Kaye	SUL010	+		+	+		
	SUL012	+					
	SUL015	+		+	+		
	SUL018	+		+	+		
Richard Larson	WAT010	+	+		+		+
	WAT020	+	+		+		+
	WAT030		+				
	WAT040	+	+		+		+
Jennie Tonna	DIC010	+	+	+	+	+	+
Beatrice Kelly-Loane	FMC200						+
	FMC210						+
	FMC220						+
Claudia Benham, Penny Godwin and friends	SUL445			+	+		+
	SUW020			+	+		+
The Dyer family	SUW010					+	+
Su Wild River's ANU group	SUL735	+	+	+	+	+	+
	SUL745	+	+	+	+	+	+
	SUL765	+	+	+	+	+	+
Lake Burley Griffin (National Capital Authority)							
Edward Calady	NUR090			+	+		
	YMC050			+	+		
The Tadpoles	LBG060	+		+	+	+	

Group Name	Site Codes	J	F	M	A	M	J
	LBG040	+		+	+	+	
	NER090	+		+	+	+	
Kate DeSmeth, Saiful	TEL010	+		+	+	+	+
	LBG015	+		+	+	+	+
	NOR010	+		+	+	+	+
Inner South SEE-Change	KEL010	+	+	+	+	+	+
Fyshwick, Woolshed (Central Molonglo WMA)							
John Bruggeman	MOL295	+	+	+	+	+	+
	WOO090	+	+	+	+	+	+
	MOL280	+	+	+	+	+	+
	MOL270	+	+	+	+	+	+
	MOL260	+	+	+	+	+	+
Katarina Badek	WOO060	+			+	+	+
	WOO010		+		+	+	+
Jerrabomberra (Central Molonglo WMA)							
Mat Banister	JER175	+	+	+		+	+
Saiful Marbun	WOD090			+	+	+	
Inner South SEE-Change	JER240	+	+	+	+	+	+
Jerrabomberra (Jerrabomberra Headwaters WMA)							
Queanbeyan City Council	JER120			+	+	+	+
	JER121			+	+	+	+
Fernleigh Park Landcare (Davies)	JER095		+	+		+	
Robertson/Shaw	JER065	+		+	+	+	+
Royalla Landcare (Owen)	JER020	+	+	+	+	+	+
Lower Queanbeyan (Lower Queanbeyan WMA)							
John Bruggeman	QUE495	+	+	+	+	+	+
Queanbeyan City Council	QUE496			+	+	+	+
MCG	QUE472					+	
Queanbeyan City Council	QUE470			+	+	+	+
	QUE460			+	+	+	+
Queanbeyan City Council	QUE455			+	+	+	+
Sue Gibson	QUE440		+	+	+	+	+
	GOO050		+	+	+	+	+
	GOO080			+	+		+
	GOO090		+	+	+	+	+
	GOR0?0		+		+		
Kowen (Kowen WMA and Carwoola)							
John Bruggeman	REE095	+	+	+	+	+	+
John Bissett	MOL230	+	+	+	+	+	+
Carwoola Landcare (Bernard K)	MOL216	+	+	+	+	+	
	MOL210	+	+	+	+	+	
Carwoola Landcare (Hilary & Christine)	STO060		+	+	+	+	+
	WHI090		+	+	+	+	+
Upper Molonglo (Upper Molonglo WMA)							
Carwoola Landcare (Hilary & Christine)	CHI095		+	+	+	+	+
	PRI090			+	+		
	PRI060			+	+		
John Bissett	YAN020	+	+	+	+	+	+
	YAN080	+	+	+	+	+	+
Captains Flat Landcare (Hodgman family)	MOL109	+	+	+	+	+	+
Burra (Googong WMA)							
Burra Landcare (Duffy)	BUR055	+	+	+	+	+	+

Group Name	Site Codes	J	F	M	A	M	J
Upper Queanbeyan (Googong WMA)							
Queanbeyan City Council	QUE430	+	+	+	+		+
Sandy Lloyd	QUE300	+	+	+	+	+	+
	URI040	+	+	+	+	+	+
	TIN080	+	+	+	+	+	+
Boolboolma Landcare (John Moore)	QUE125	+	+	+	+	+	+
	ROB180	+	+	+	+	+	+

Methods

WATER COMPONENT

Water Physics and Chemistry

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 by 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 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 (QUE455, 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 for Water Quality, 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	105–115	95–104; 116–120	80–94; 121–130	60–79; 131–140	<60; >140
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 for Water Quality, 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	105–115	95–104; 116–120	80–94; 121–130	60–79; 131–140	<60; >140
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.

Each reading for each parameter (except Water Temperature and Dissolved Oxygen) at each site is given a rating from Table 2a or 2b as appropriate. These are added and divided by the number of readings for the period, to get a parameter score for the site. The site score is the average of the site parameter scores. The sub-catchment score is the average of the site scores. 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. This gives a **Site CHiP Water Score**.

CONSPICUOUS ALGAL COMPONENT

Timing: This is entered, with the Water data, *each time* a site is visited by a volunteer.

The use of the conspicuous algal data in the CHiP is presently rather problematic. We have yet to collect enough information from as wide an area to be able to put things on scales. In all the CHiP scores the proponents have attempted to assess things on what is actually there, not make judgements as to whether something is missing and so the system fails. Or we have some standards, which appear often in the middle of the scale, and so a site may be above standard or below standard.

There may be more than one algal form present. Rate the most conspicuous one. The alga present may be aesthetically undesirable, and may also score low on the scale, but may be appropriate for the site and the season. Score that anyway.

What is measured: Using the method outlined in the Waterwatcher's Manual, each **volunteer** assesses one or more sites each month for algal abundance and algal form, the abundance score is divided by the form score to give the site rating.

The **Coordinator** uses the monthly data for each site to provide a Riparian CHiP rating for sites, subcatchments and Catchment every six months in the same manner as the water data.

Table 3: Catchment Health Ratings, for Conspicuous Algae

Excellent [1]	Good [2]	Moderate [3]	Poor [4]	Degraded [5]
<0.45	0.46–0.59	0.6–0.99	1.00–1.99	>1.99

Reporting in REACHES

The recommendation from the University of Canberra review (Harrison et al 2013) was that rather than continuing to report on whole of subcatchment, reports should be made for each reach within a subcatchment. This would provide

- Greater resolution of good and poor condition
- Discrimination of those areas not sampled in the period and
- More precise direction of actions following monitoring.

This may be rather a lot of work the first time, but should provide much better feedback for readers and data users.

The recommendation strongly suggested that reaches:

- should be ecologically discrete sections of waterway as far as possible, and
- that they contain no less than three sampling points.

Harrison et al. (2013) recommend: Reaches should be defined based on similar physical habitat characteristics (e.g. changes in land use, channel character). They can be delineated in different ways. Of those five methods we have chosen to use the Expert Opinion method, as it best reflects the citizen science and indication not index approach of CHiP as we use it.

Expert opinion: using local experts to define reaches with similar physical characteristics or water quality behaviour. This could also allow reaches to be defined on the basis of activities in the catchment such as reaches where catchment remediation works are taking place.

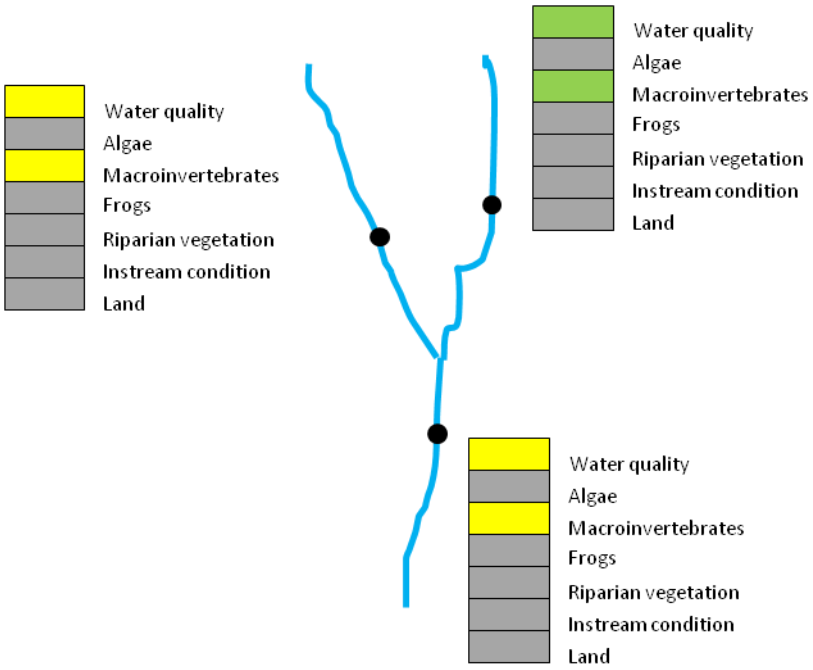

Figure 1. An example of a reach based CHIP assessment for an assessment upstream and downstream of a tributary confluence. Green = "good" assessment; Yellow = "moderate assessment" Grey = "not assessed". Black dots are sample sites representative of the reach.

On the former condition, where possible internally complete sections of waterways will be described as reaches, but to strictly follow a hierarchy of stream structure may be counter-productive in urban situations. We prefer to see our reaches as the result of 'expert opinion' as expressed above.

On the '3 sampling points' condition, while we agree with Harrison et al 2013 in theory, this will be used as a 'gold standard' rather than a minimum, as we have to realise that coverage is often less than adequate.

Results

Catchment Weather

With storms in January and March and sustained rain in June, summer and autumn in Canberra and Queanbeyan in 2013 has been challenging. Soil moisture would have steadily declined from February to May. There will have been little more than basal groundwater flow until June, so that flow in tributaries may have been erratic. Martin Butterfield, who lives on Whiskers Creek in Carwoola, sends in rainfall and flow observations each month. He reported no flow in the creek until the storm on 26th January deposited 64mm of rain in the area. The creek then flooded and continued with heavy flow to 30th, after which light flows continued for a short while. March flows were not much to write about until 22nd, when light flows followed 8.5mm rain, but this barely persisted beyond the 24th. April had no flow in the creek, although there was 20.5 mm rain across the month. Light flows started on the 13th May and more or less persisted to the end of the month. These anecdotal records reinforce the observation that either sustained periods of moderate rain or storms with follow-up falls are needed before our creeks have persistent base flow.

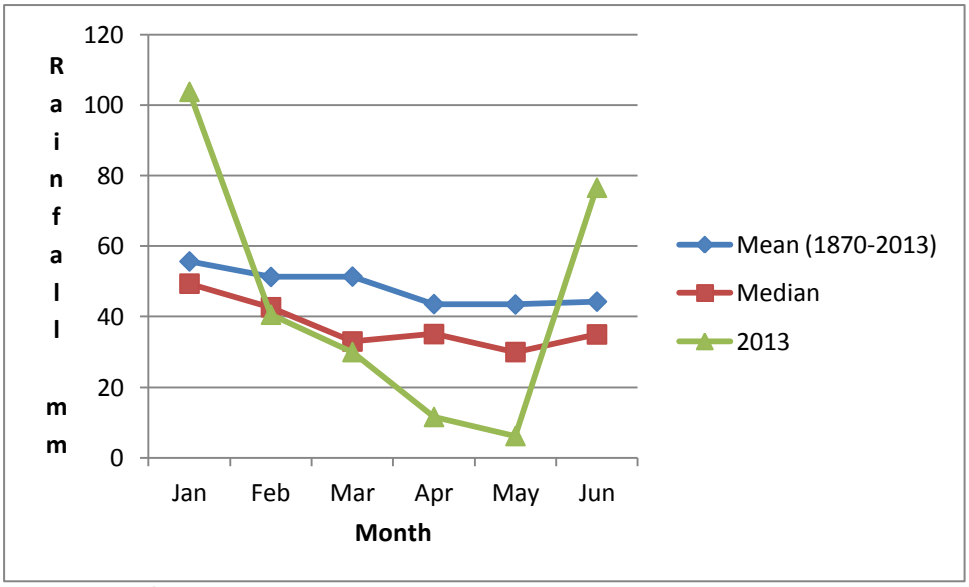

Figure 2. Rainfall Records at Queanbeyan Bowling Club (BOM).

Figure 2 shows the rainfall for Queanbeyan, at the Bowling Club, for the first six months of 2013. The mean for the last 143 years gives some perspective. The median for those figures provides an indication of expected rainfall. The general impression is that the last six months have had dramatic highs and lows when the expectation may have been for a moderate amount of rain each month.

Rainfall data for Canberra, January to June 2013

MONTH, 2013	Rain days, over 1mm	Monthly rain gauging (mm)	Long term average monthly gauging (mm)	% LTA
JANUARY	4	72.6	58.5	124.1
FEBRUARY	8	30.0	56.4	53.2
MARCH	3	26.9	50.7	53.1
APRIL	4	9.8	46.0	21.3
MAY	2	6.6	44.4	14.9
JUNE	10	85.2	40.4	210.9
TOTALS	**31**	**231.1**	**296.4**	**78**

Table 4: Rainfall data for Canberra, January to June 2013 (BOM)

Table 4 shows the same pattern for Canberra, with, if anything less wet weather. In theory, a more even distribution of rain days should provide a flow regime with more mid percentile flows.

In the Tinderry Mountains and at Captains Flat and Rossi it may have been milder, as there was snow on the tops of the Tinderry Mountains by the time of the June ERG meeting. Flow in Urila Creek stopped before the torrential rain in January, and was gone again in February and April. This suggests that similar flow conditions prevailed in the mountains as on the tableland.

Sub-Catchment Results, January to June 2013

Water Quality results from the Catchments January - June 2013

Subcatchment	Current M-CHiP rating	January – June, 2012 rating	Comment
Coppins		2.8	
Weston-Woden	**3.1**	2.6	moderate
Sullivans Creek	**2.7**	2.8	Good, but under pressure
Lake Burley Griffin	**2.4**	2.7	Good, with improvement
Fyshwick Woolshed	**2.9**	2.8	Good, just
Jerrabomberra Creek	**2.6**	2.6	
Lower Queanbeyan	**2.5**	2.2	Good, with some pressure
Kowen Carwoola	**2.2**	2.6	Good, with some pressure
Upper Molonglo	**2.2**	2.0	
Burra Creek	**2.5**	2.4	
Upper Queanbeyan	**2.2**	2.2	

The change over to the reach approach to reporting allows each subcatchment to be examined in a more careful manner. Each subcatchment presented here has at least two reaches, and while some are very extensive, they describe separate parts of a whole.

The Weston-Woden subcatchment may, on further examination, deserve to be split. For the moment, only the Yarralumla Ck drain lines are being monitored. The present data indicates that the urbanised upper catchment is in less favourable condition than the 'parkland' reach from Woden to the Molonglo River.

Sullivans Creek is a very important subcatchment for Lake Burley Griffin. There was little surface water present in the subcatchment above Flemington Pond in this half of 2013. The ponds in North Watson and Justice Robert Hope Park deliver clean water to Sullivans Creek, and the drain-line through Dickson, Hackett and North Ainslie is similarly effective. The drain-lines from O'Connor Ridge also provide satisfactory water to Sullivans Ck, but the old pondages in the Australian National University have to cope with much of the city grey-water and do not cope well.

Clearly a better coverage of the lake margins is needed before much can be constructively reported. In the Kingston area, where much of the present reporting is done the Water Sensitive Urban Design mechanisms are providing some better water quality.

Jerrabomberra Ck again presents numerous reaches. Most of the catchment is rural or parkland. Flow is poor, and the country rock metamorphic, producing plenty of dissolved minerals and suspensible clays keeping the water quality at the moderate end of good.

Fyshwick-Woolshed is, like the Weston part of Weston-Woden, a catchment with active development taking place. The Kowen-Carwoola part of the Molonglo is in good health with stable water quality records for the period. The Upper Molonglo is stable, but the water quality is impacted by the presence of the sulphide load in the water. It is interesting to see such a dramatic score for the conspicuous algae as an indicator of catchment health, but it does highlight the impact of poor riparian condition.

Both sections of the Queanbeyan and the Burra Creek sub-catchment are in good health. It would be great to see more activity in the small but important Burra sub-catchment. The ACTEW reports indicate good to moderate catchment health, but to have this supported by interested locals would be great.

Coppins Sub-Catchment

The main waterway in this catchment is the Molonglo River, as it travels from the low level Bridge at Coppins Crossing to the confluence with the Murrumbidgee opposite Woodstock Reserve. There are several reaches (the confluence; Tongs Hole; Lower Molonglo Gorge; Coppins Crossing), and we only have data for one, the Coppins Crossing reach, above the Lower Molonglo Gorge. As we only have a January and February report for this reach, there is little to report. The rain in January brought down the Electrical Conductivity, while the turbidity was moderate (the runoff from the new suburbs probably contributed to this) and there was low available oxygen. As February was dry, the EC again became elevated above ACT standards.

Weston-Woden Sub-Catchment

Reach	Water Quality Score	Conspicuous Algal Score
Long Gully Creek, Yamba Drive	**3.8**	
Yarralumla Creek,	**2.3**	**1.0**

Two main creek systems drain into the Molonglo River below Scrivener Dam, Weston Creek and Yarralumla Creek. Weston Creek has no Waterwatchers at the present time

Yarralumla Creek is an interesting and complex watershed…there are three drain lines, one along the west side of Mt Mugga Mugga, one from Farrer to Phillip [along Athllon Dr], and the other from Long Gully to Garran [Yamba Dr], Then the creek/drain runs parallel with Curtin , round Curtin (YAR400) and down to the river immediately below Scrivener Dam. There are few opportunities to sample permanent, flowing water along the system; while there are a couple of wetlands, East O'Malley Ponds in the Mt Mugga Mugga area and the off-stream wetland (supplied from the Yamba drain) at Eddison Park (EDD010).

Athllon Drive reach: although the drain line starts behind the Serbian Orthodox Church and the Primary School in Farrer there is not likely to be much water in the drain line until the underpass that links Melrose High and Mawson. Perhaps a sampling spot could be put in here.

East O'Malley reach: This begins in the old quarry well above the small pond. Opportunities for sampling are at the small pond, and the large pondage between Hindmarsh Dr and Wallangara St, O'Malley. The drain line is 'flood and dry' and is enclosed below Hindmarsh Dr.

Yamba Dr reach: there is a drain grate at the top of Shephardson Pl, Isaacs, and most of Long Gully drain is gutter or swale. Eddison Pond (EDD010), which is fed from the drain (and/or O'Malley Pond), may be the most 'permanent water' site.

Based on EDD010, Yamba Drive Reach scores 3.8 or 'Moderate tending to Poor'. The pond regularly has very warm, shallow water with high turbidity and electrical conductivity, elevated Phosphorus and nitrates, and poor Dissolved Oxygen. The Conspicuous Algal Score was 1.0, but the records were patchy.

Yarra Glen reach: there is a bike track along the drain on the east side of Curtin, that passes under Caruthers St, again a walk to find a sump would probably get a permanent sampling point.

Yarralumla Creek reach: the present site is on the south side of the road above the bridge on Cotter Rd Curtin (YAR400); and there was a site at the mouth of the creek just below the dam wall (YAR500). The gauging station is near the Cotter Rd bridge, and the site is also used by Canberra University as a Macroinvertebrate sampling site (see the ACT Water reports).

This reach, again based on a single site (YAR400), scored 2.3 for Water Quality and 1.0 for Conspicuous Algae. This indicates good catchment health, although there is always elevated electrical conductivity here.

Sullivans Creek sub-catchment:

Reach	Water Quality	Conspicuous Algae
Kenny		
Mitchell		
Flemington Pond	**3.5**	**3**
Watson	**1.8**	**1.0**
Southwell Park		
Dickson	**2.3**	
Lyneham, O'Connor Turner	**2.92**	**1.0**
Australian National University	**3.0**	
Sub-catchment	**2.7**	**1.5**

Kenny reach: above Horsepark Drive to the highway

No Waterwatch sites.

Mitchell reach: SUL010, SUL012

As there was no flow in either arm of Sullivans Creek in this reach on the occasions that they were to be sampled, there are no data on which to judge the reach health.

Flemington Pond reach: SUL015, SUL018

The phosphorus readings at SUL015 above the large pond were in the range of 0.5 mg/L for much of the time, while those below the road, in the lower pond (SUL018) were 0.05 mg/L or less, and similar improvements in EC and turbidity were reported. This indicates that the system is functioning as a stormwater cleaning mechanism. There is always blanket weed in the drain at the top of Flemington Pond.

North Watson reach: WAT010, WAT020; WAT030: WAT040.

The small retention dam at the north-east end of Roma Mitchell Crt was dry for most of the reporting period. The three other water bodies were in Excellent Condition.

Southwell Park reach:

Stretching from the Barton Hwy to Lyneham, this reach has the gauging station and one of the groundwater bores (ACT Government) as well as a golf links. No Waterwatch sites are presently in this reach.

Dickson reach: DIC010 and the Frogwatch sites on the western side of Mt Majura.

The elevated pH in the wetland, normal for such a structure, has taken the CHiP score into the Good rather than Excellent band. When we have readings from the inlet and outlet the picture may change. The Frogwatch sites data was for only one month, and may be more revealing in the next report.

Lyneham O'Connor Turner reach: SUL455, SUW010; SUW 020

This reach is almost in Moderate Condition with a score of 2.92, as the oxygen saturation in both Banksia St and Lyneham Wetlands was recorded as very low throughout the recording period.

Australian National University reach: SUL735, SUL 745, SUL765.

A Moderate Condition score of 3.0 for the ANU reach is better than expected. Total phosphorus readings were still elevated, but better than some occasions in the past, and, even with poor flow, the median level of Electrical Conductivity was under 250 $\mu S.cm^{-1}$, the reference standard.

Lake Burley Griffin sub-Catchment:

Reach	Water Quality	Conspicuous Algae
Yarramundi Reach, east		
Yarralumla Bay reach		
West Basin	**2.2**	
Central Basin, North	**2.3**	
East Basin, South	**2.6**	**2.3**

Scrivener Dam basin:

No Waterwatchers at present

Yarramundi reach, west:

No Waterwatchers at present

Yarramundi Reach, east:

There were only two reports in the six months for Nursery Bay, but both of those once again gave Total Phosphorous readings of 0.2 mg/L or higher, indicating a hot spot for Lake pollution .NUR090

Yarralumla Bay:

There is a drain in here that is watched, but is usually dry.

West Lake North (incl. Black Mountain Peninsula):

No Waterwatchers at present.

West Lake South (Lotus Bay, Attunga Point):

No Waterwatchers at present.

West Basin:

A Good health CHiP score for water quality for the one monitoring point near the National Museum in West Basin. LBG060

Central Basin North:

A CHiP score of 2.3 for water quality, despite occasional interestingly high levels of Oxygen saturation. NER090; LBG040

Central Basin, South:

No Waterwatchers at present.

East Basin, North:

No Waterwatchers at present.

East basin, South:

The Kingston area is in Good Health with Water Quality scoring 2.6 and Conspicuous Algae scoring 2.3. Even so there are elevated levels of EC suggesting high mineral content in the stormwater in both the Telopea Park drain and the Norgrove Park aquatic system, and Telopea Park drain usually has a high level of blanket weed. [NOR005] NOR010; LBG015; TEL010 [and there is much else to be done here]

Jerrabomberra Creek sub-catchment

Reach	Water Quality	Conspicuous Algae
Jerrabomberra Wetlands	**2.3**	
Symonston-Narrabundah	**2.6**	
Woden Creek	**dry**	
Jerrabomberra to heliport	**2.8**	
Stockyard Creek		
Little Burra-Fernleigh Park	**3.1**	
Royalla reach	**2.0**	**1.0**

Royalla to the Old Cooma Rd:

The headwaters of Jerrabomberra Creek were in Good Health for water quality and Excellent Health for Conspicuous Algal growth in this half of 2013. JER020

Little Burra, Fernleigh Park to the falls:

This reach has persistently high but natural Electrical Conductivity, with in this dry autumn poor Oxygen saturation and high phosphate loads. The CHiP score was 3.1, or Moderate Catchment Health. JER065; JER095, JER121

Stockyard Creek reach: It may be possible to sample the retention pond at Teatree Close, and the two pondages (Pipeline Ck Reserve, and John Palmer Park) at the bottom of the parallel gully (Pipeline Ck) north of Edwin Land Drive. These all link to the drain that comes out at Bayside Crescent.

No Waterwatch sites in this reach.

Jerrabomberra to the Heliport: JER120.

The poor Oxygen saturation and high levels of Phosphorus indicate that the water quality leaving Jerrabomberra is less than could be desired.

Wild Dog Creek and Woden Creek:

Wild Dog Creek cuts under Long Gulley Rd, and then goes through the tip [this is monitored by the operators, and reported to the EPA]; Woden Creek proper comes off the Callum Brae side of Mt Mugga Mugga, and runs down to Jerrabomberra Ave after rain WOD058.

This reach was dry most of the reporting period. We are not going to keep checking here.

Symonston-Narrabundah reach: The creek may be sampled under the Hindmarsh Dr overpass and just above Canberra Ave (JER175). There is a gauging station somewhere here, it may be back near the Lanyon Rd bridge.

The Good Catchment Health of 2.6 was moderated by very high Electrical Conductivity, moderate turbidity but good Oxygen Saturation.

Jerrabomberra Wetlands: There is a gauging station at or just above the triangular storm water retention dam behind CIT; it is possible to sample in the Jerrabomberra Wetlands at the walking bridge (JER240) or above it at or near the retention dam; you can also sample at Kelly's Swamp (KEL010) and the billabong above it.

Although Kelly's Swamp was dry from the end of January, the creek reported a CHiP score of 2.3, indicating Good Catchment Health.

Kelly's Swamp, from the Ardea hide, January 2013.

Fyshwick–Woolshed Sub-Catchment

Reach	Water Quality	Conspicuous Algae
Molonglo R., Oaks Estate to LBG	**2.6**	**2.3**
Upper Woolshed Ck	**2.7**	
Lower Woolshed Ck	**3.0**	**3.0**
Molonglo R., above the Queanbeyan R.,	**2.7**	**3.0**
Reedy Ck	**3.5**	**3.0**

Molonglo R., Oaks Estate to Dairy Road: MOL270; MOL280; MOL295

Much of the water in this part of the Molonglo River is backed up and slowed down by the presence of Scrivener Dam at the head of Lake Burley Griffin. The water holds a background level of particulate clays and, like much lake water rarely has turbidity less than 15 NTU. Poor flow and circulation results in unfavourable percentages of dissolved oxygen, but other parameters are just outside or within standards.

Woolshed Ck, Ginns Gap to Doughboys Creek: WOO010,

While the single point is a farm dam, the health rating of 2.7 reflects poor levels of oxygen saturation and some presence of nitrate in the water. Other parameters are within standards.

Lower Woolshed Creek: WOO060; WOO090

While the new Majura Parkway is built, including the redirection of the creek channel at one point the turbidity is unlikely to fall below 10 NTU. The disturbed soil will add to the already elevated EC readings in this spring fed reach. Flow is down and so is the level of oxygen in the water. Both nitrate and phosphorus are above expected levels, for the moment.

Molonglo R., above the confluence with the Queanbeyan: MOL260

The Molonglo River is sampled at Yass Rd. Turbidity is often elevated, and the principle source may be Reedy Creek, as water in the Gorge is usually clear and there is little soil disturbance in the reserve or the pine plantation. Oxygen levels are again influenced by poor flow rates much of the time. It is not uncommon to drive across the Yass Rd bridge and see that four or fewer of the eight pipes at the weir are running water, and that the flow is seepage rather than streaming.

Reedy Creek: REE095

This waterway rarely has readings that would indicate good catchment health. The water is often turbid, largely because stock have easy access to the banks. The local geology provides the conditions for constantly elevated EC as long as flow is stormwater dependent. Oxygen

may often be down in low flow water, and higher phosphorous will encourage blanket weed growth when there is little bank shading.

Molonglo River, looking back towards the Molonglo Gorge, April 2013.

Kowen-Carwoola sub-catchment:

Reach	Water Quality	Conspicuous Algae
Molonglo River: Burbong Bridge to Molonglo Gorge Park	**2.2**	
Molonglo River: river and tributaries in Carwoola	**2.25**	**1.0**

Burbong Bridge to Molonglo Gorge Park: MOL230;

The water entering the gorge at Burbong Bridge is in good condition, and while it has consistently elevated Electrical Conductivity this comes from the country rocks, trachyte, phyllite and limestone.

The two inactive sites in Scabbing Flat Creek (SCA080 in the quarry near the Kings Highway and SCA200 in Weetalabah village) and at Blue Tiles in the gorge, MOL240 may become active in the future.

Briars-Sharrow Rd to Stony Creek NR: MOL210; WHI095; MOL216; STO090

The water coming off the Hoskinstown Plain is good quality, even though the tributaries have very high (for this region) Electrical Conductivity. There are many occasions when there are no visible algae in these waters, and when there are algae they are seasonal and sensitive species like *Stigeoclonium helveticum*.

Upper Molonglo sub-catchment:

Reach	Water Quality	Conspicuous Algae
Molonglo R: to western edge of Hoskinstown Plain	**2.1**	**5.0**
Molonglo R: Captains Flat to the TSR	**2.2**	
Molonglo R: above Captains Flat dam wall		

Molonglo R., to western edge of Hoskinstown Plain: CHI095; PRI060; PRI090; YAN020; YAN080

The Water Quality is really very good, but the score is skewed by the weighting on acid water coming from the Yandyguinula site in the State Forest, where the stream conditions tend towards those of a bog or fen.

As the Conspicuous algal reports are from Chimney Creek and Yandyguinula Ck at *Reschs Ck* gate, both exposed sites where blanket weed does well, the degraded reading is apt but disappointing.

Molonglo R., Captains Flat to the TSR: MOL109,

Percentage saturation of dissolved Oxygen was poor across the whole half year, which may account for the good but not excellent water quality score.

Molonglo R. above Captains Flat Dam: access is limited

Molonglo River, Captains Flat, looking downstream from the bridge in town, January 2013.

Lower Queanbeyan River sub-catchment:

Reach	Water Quality	Conspicuous Algae
Queanbeyan R., Morisset St to confluence with Molonglo R	**2.25**	**3.0**
Queanbeyan R., Queanbeyan Weir	**2.8**	
Queanbeyan R., Barracks Flat	**2.4**	
Queanbeyan R., Googong Dam wall to Wickerslack Lane	**2.48**	

Morisset St to the viaduct: QUE472; QUE495; QUE496

The only parameter consistently outside expectations was Oxygen Saturation. As this is largely dependent on persistent flow, and the sites are in the river below the weir, flow is unlikely to be improved in dry seasons.

Queanbeyan Weir: QUE470

The weir collects runoff from Karabar, Queanbeyan, and Queanbeyan East including the parklands along its banks. The water is rarely flowing. This accounts for the elevated phosphorus levels and the poor oxygen saturation.

Barracks Flat: QUE455; QUE460

The river in the Barracks Flat area is in good condition. It would be good to have some future reporting on Barracks Ck and Valley Ck.

Googong dam wall to the White Rock: QUE430; QUE437; GOO080; GOO090; GOR090; QUE440;QUE445

Although the level of Phosphorus is negligible, the reference standards for P levels in rural reaches penalise even small P loadings. There are no other elevated parameters in this section of the river.

Burra Creek sub-catchment:

Reach	Water Quality	Conspicuous algae
Tin Hut Creek		
Burra Ck, from Burra Rd to Googong reservoir		
Burra Ck, M2G outfall to Burra Rd bridge	**2.5**	**1.0**
Burra Ck headwaters		

Tin Hut Creek:

We have no Waterwatchers along London Bridge Rd

Below Burra Rd bridge:

BUR075 is presently vacant

Williamsdale Rd to Burra Rd bridge: BUR055

The pH and EC are well above rural reference levels, but as they are consistent, and are maintained by ACTEW at that level when water is pumped from the Murrumbidgee R, the Good Catchment Health rating may be a little severe. The algal score is pleasing, and indicates that the spring silkweed (*Spirogyra chenii*) flush is gone by the end of summer.

Burra Creek upstream of the M2G pipehead:

ACTEW has sites up here, but no locals are sampling at present.

Burra Creek, looking downstream from the Burra Rd Bridge, January 2013.

Upper Queanbeyan River sub-catchment:

Reach	Water Quality	Conspicuous algae
Queanbeyan R, above Googong Reservoir	**1.86**	**1.0**
Queanbeyan R, Boolboolma Crossing to headwaters	**2.45**	

This is a very diffuse area, and our coverage is sparse to say the least!

Above Googong Reservoir: QUE300; URI040; TIN080

The very slightly elevated Phosphorus and the country rock driven alkaline pH are the only elevated readings for this part of the Queanbeyan R and its upper catchment. The absence of conspicuous algal growths across the sampling period attests to the fine condition of the riparian zone.

Boolboolma Crossing: QUE125; ROB180

With a pH on the acid side (it is granite country) the upper catchment Water Quality Catchment Health score comes in as Good but not excellent, unlike a little further down stream.

Recommendations:

Work has already begun on some rehabilitation in the Mt Mugga Mugga area. Dr Fleming and the others in the Friends of Mt Mugga Mugga / Isaacs Ridge have been working quietly. Now we need to have a push to clean up the East O'Malley Ponds system and make it the showcase it should have been. There is also much to be done in the Curtin area. When residents begin moving into the new Molonglo suburbs, it is hoped we will also be able to encourage some catchment care in these new areas that have taken quite a battering while the suburbs are under construction.

Some gentle persuasion about the GPT above Barry Drive and some replanning of the wetlands in the ANU would be a very worthwhile project in the Sullivans Creek Subcatchment.

The activities of the various Landcare and ParkCare groups in the Jerrabomberra Ck subcatchment need continued support. The revival of interest in the Wetlands, with its now very active group is wonderful to see. Some projects in the creek from the Falls down would be good to see, especially as some areas, including Tralee begin to be developed. These could include weeding and replanting with riparian shrubs between Hindmarsh and Canberra Avenues, and similar activities around the pool below the falls and as the creek approaches the NSW/ACT border below Jerrabomberra.

Work with the Majura Valley Landcare Group and the developers of the Majura Parkway will continue. There will be a need to look at revegetation of all those parts of the riparian zone of Woolshed Creek, section by section as the Parkway is completed. This will link into the establishment of corridors between Mt Majura and the Greater Goorooyarroo.

Weeds of various kinds present on-going threats to catchment health in the upper Molonglo Valley. Work on the brooms in the headwaters continues. Perhaps some of the willow patches need revisiting.

In and around the city of Queanbeyan there are continuing opportunities for catchment improvement. With a council that has been actively engaged on many recent occasions, the opportunities are there. The good work along Buttles Creek can be extended right into the river. Work on once again having a go at the bank below Dane St would be timely. And there is much more. Doyles Reserve is looking a little sad…and it may not be alone.