

SUMMARY for January - December 2004

Prepared by Rachelle McConville, Ginninderra Waterwatch Coordinator, May 2005

Phone: 6278 3309 Email: waterwatch@ginninderralandcare.org.au Mail: PO Box 446, Holt, ACT, 2615 Fax: 6278 3309

Environmental Conditions during 2004

The Canberra region has seen a continuation of drought conditions throughout 2004. Daily rainfall was extremely low for most of the year, with some limited relief brought by rains in August to December. In the first half of the year, many areas of Ginninderra Creek were reduced to a series of small pools, with very small amounts of water flow.

This 'chain-of-ponds' state is quite natural for Ginninderra Creek and its tributaries. However urbanisation and the community's use of water e.g. watering gardens and washing cars have a significant impact. What was a natural base flow of relatively undiluted groundwater discharge has now been impacted by a concentration of urban storm water runoff, which is higher in nutrients and other pollutants. These conditions have had a number of interrelated impacts on the health of the creek system.

- Rare or sporadic rainfall events can bring increased concentrations of pollutants that have been accumulating on hard surfaces during prolonged dry weather.
- The occurrence of rainfall events that wash large amount of pollutants into the creek can be reduced compared to wetter years.
- Pollutants that are introduced to the creek remain concentrated, and are not diluted by any incoming fresh flows;
- Low water levels can increase the temperature of the water. This can encourage the growth of algae and aquatic weeds in some cases.
- Areas of aquatic habitat are decreased as small pools become disconnected from the main flow of water. This may be an advantage to some aquatic species. This can also reduce the area of submerged surfaces, and therefore hinder growth of algae and aquatic weeds.

Landscape Features of the Ginninderra Catchment

* Area of the Ginninderra Catchment = 23.88 km²

Indicator	Result	Ranking	Rating
% Urban Area	27%	Degraded	5
% Bare Soil	1%	Very Good	1
% Tree Cover	7.55%	Degraded	5
Area of forests with stands > 50 ha	0	Degraded	5
Area of slope > 5 degrees on agricultural land	29%	Poor	4
Length of riparian vegetation vs the total length of the creek	1.7%	Poor	4
Length of roads vs total catchment area	Average 4.93 km/km ² (0.202)	Degraded	5
Total Value =			29
Total Ranking / Rating =			POOR 4.1

SUMMARY OF RESULTS

The summarised water quality results for each site and sub-catchment, ranged from 'Fair' to 'Good'. This is shown on the Summary Table (overleaf) and the subcatchment map (page 5).

When compared to a similar analysis for 2003, degradation is apparent in sub-catchments 3, 6, 10 and 11. Sub-catchments 5 and 7 have remained the same, with a "Good" rating, while sub-catchment 4 has improved to get a "Fair" rating.

pH

pH is a measure of the acidity or alkalinity of the water. Aquatic animals and plants are adapted to certain ranges of pH, which in the Ginninderra region usually lies in the range 6.5 to 8.2. In 2004, median pH ranged from 6.6 to 8.5, indicating a generally healthy stream environment.

Dunlop Stormwater Pond 2 (STW007) had the highest median pH of 8.5 in 2004. pH here has been high for most of 2004, ranging from 8.3 to 8.9. This is consistent with pH results at this site since about November 2002. As highlighted in the 2003 water quality report, this result is likely to be related to the large influx of sediment and associated nutrients as a result of land clearing in the vicinity of Kerrigan St (North Dunlop).

In unhealthy waterbodies, pH levels can fluctuate dramatically over the 24-hour daily cycle. Such fluctuations will reduce the number of species normally present in the water. The Waterwatch Australia Technical Manual (2002) suggests that "changes of more than 0.5 pH units from the natural seasonal maximum or minimum in fresh water should be investigated".

Sites that showed a significant change in 2004 include GIN009 and KIP001. The highly variable pH at these sites may be a result of photosynthetic activities of plants and algae. In environments where there are large nutrient inputs, excessive growth of aquatic plants can occur, causing pH levels to fluctuate significantly over the course of a day. Excessive growth of aquatic weeds and algae has been noted at both site

In previous reports, McKellar Wetland (MCW001) was also noted as having a highly unstable environment. Development and residential construction at this site is still underway, and has been for much of 2004. The pH range here has slightly decreased from 6.9 - 9.4 in 2003 to 6.9 to 8.1, indicating a slightly more stable environment.

Key to Colour Coding:

1. Very Good
2. Good
3. Fair
4. Poor
5. Very Poor

Summary of Water Quality Indicator Ratings

Sub Catchment	Site Code	pH	EC	Turbidity	DO	Phosphates	Site Average	Site Ranking	Sub-catchment Ranking
-	CMM100	1	3	1	3	3	2.2	GOOD	-
-	CMM150	1	2	5	1.5	3	2.5	FAIR	-
3									FAIR (2.6)
	GIN002	2	3	4	not measured	not measured	3.0	FAIR	
	GUN001	2	2	4	1	2	2.2	GOOD	
4									FAIR (2.7)
	GIN005	2	3	5	not measured	not measured	3.3	FAIR	
	GIN007	2	2	1	3.5	not measured	2.1	GOOD	
5									GOOD (2.3)
	STW001	1	3	3	not measured	not measured	2.3	GOOD	
6									GOOD (2.0)
	MCW001	2	3	1	1	4	2.2	GOOD	
	GIN010	1	2	2	not measured	not measured	1.7	GOOD	
7									GOOD (2.4)
	GIN009	1	2	2	3.5	3.0	2.3	GOOD	
	STW003	2	3	2	3.5	4.0	2.9	FAIR	
	GIN020	2	2	1	4.5	3	2.5	FAIR	
	GIN024	2	2	1	not measured	not measured	1.7	GOOD	
	KIP001	1	3	1	3.5	4.0	2.5	FAIR	
	GIN011	2	2	3	not measured	not measured	2.3	GOOD	
	STW005	2	2	3	not measured	not measured	2.3	GOOD	
	STW007	4	2	1	not measured	not measured	2.3	GOOD	
10									FAIR (3.1)
	GOO007	2	5	1	4.5	not measured	3.1	FAIR	
11									FAIR (2.7)
	GOO009	2	5	1	not measured	not measured	2.7	FAIR	

ELECTRICAL CONDUCTIVITY (EC)

Most sites had median EC levels that were below 625 $\mu\text{S}/\text{cm}$ in 2004, and were therefore rated as either 'Fair' or 'Good'. None of the sites had EC levels less than 125 $\mu\text{S}/\text{cm}$.

The two sites along Gooromon Ponds Creek, GOO007 (at Wallaroo Rd) and GOO009 (at Dunlop) both had very high EC results, and also showed an increase in EC in 2004 when compared to the overall median. The extremely high results for the Wallaroo Rd site have been noted since 1999 when Waterwatch testing first began here. Investigation is required to determine the cause of this.

STORM EVENT MONITORING

Only one storm event was monitored during 2004. Turbidity was recorded at the Osborne Rd bridge in Macgregor during and after a rain event from 30 August to 1st September 2004. These results showed a high turbidity of 80 NTU at 5:30pm on the afternoon of 30 August, which was then back down to 20 NTU at the same time the next day (31st August). The turbidity was recorded on the following morning as being less than 10 NTU.

TURBIDITY

Although most sites had median turbidity values of <10 NTU, almost all sites showed turbidity spikes ranging from 15-300 NTU. These spikes were not necessarily associated with significant rainfall events, but many were.

Sites with consistently elevated turbidity levels included Gungahlin Golf Course (GIN002), Gungahlin Gauging Station (GIN005), Gungahlin Pond (GUN001) and Uriarra Crossing (CMM150). At GIN002 and GIN005, the turbidity was ≥ 30 NTU on 5 out of 8 sampling occasions.

Sampling notes at GIN002 suggest that the action of water birds and their faeces in the sampling pond may be contributing to the high turbidity here. The likely cause of elevated turbidity at GIN005 is unknown. At Gungahlin Pond, turbidity varied from 10 - 30 NTU. Wind action on the large urban pond here, may help to stir sediments up regularly. Residential development in Gungahlin is also likely to be contributing to sediment levels at all three of these sites.

At Uriarra Crossing turbidity varied from 10 - 30, except in February when a large spike of 60 NTU was observed. Sediments released because of the 2003 bushfires in the Murrumbidgee Catchment are likely to be contributing to turbidity here.

DISSOLVED OXYGEN (DO)

The Waterwatch Australia Technical Manual states that, "A DO concentration of 2 mg/L will not support fish, and DO concentrations below 3 mg/L are stressful to most aquatic animals. At least 5 - 6 mg/L are required for fish growth and activity. Daytime concentrations of 6 mg/L are cause for concern as dissolved oxygen levels will decrease overnight."

Our DO results are analysed below according to the average of 2 ratings. Rating 1 refers to the median DO result, and Rating 2 refers to the minimum DO result for each site in 2004. It is important to note that the concentration of DO fluctuates daily, and the lowest levels occur overnight and early in the morning, so our sampling may not have detected decreases in DO at these times.

Ginninderra Creek at Ginninderra Drive, Umbagog (GIN020) had a "Very Poor" overall result, with a median result of 4.1 mg/L, which is below the threshold required for fish growth and activity. This site also had a minimum result of 1.5 mg/L, which is alarmingly low in that it is likely to be stressful for most aquatic animals, and will not support fish.

Extremely low minimum DO results (<2 mg/L) were also found at sites downstream of the Barton Highway (GIN007), downstream of the dam wall (GIN009), Florey Stormwater Drain (STW003), and at Coppins Crossing (CMM150).

There may be a number of causes of these lowered DO levels. Nutrient pollution and subsequent excessive growth of aquatic plants can use up oxygen as plants decompose overnight. This can cause dramatic fluctuations in daily DO levels, resulting in higher maximum and lower minimum values. A review of the field notes and Phosphorus results suggest that this may be the case for GIN007, GIN009 and STW003, where excessive aquatic plant growth is apparent.

PHOSPHORUS

Phosphorus is an indicator of the nutrients present in the waterway that are available for uptake by aquatic organisms and plants. While nutrients are an important natural component of a healthy ecosystem, excess amounts can result in the growth of nuisance plant species such as algae. This can smother aquatic life and deplete overnight dissolved oxygen levels.

Phosphorus results were generally rated as Fair or Poor for all sites monitored, except for Gungahlin Pond (GUN001) where the result was rated as "Good" at <0.02 mgP/L.

Sites where median Phosphorus results were greater than 0.04 mgP/L included McKellar Wetland constructed 2000 (MCW001), Florey Stormwater Drain (STW003) and Kippax Creek (KIP001).

These results indicate a high level of nutrient pollution at all sites monitored. Possible reasons for this are discussed in the conclusions section.

PRESENCE OF RUBBISH

Rubbish was observed at all sites that were monitored, with the exception of GIN007 (downstream of the Barton Highway) and Uriarra Crossing (CMM150).

The largest amounts of rubbish were observed at the Giralang GPT (STW001) and Florey stormwater drain (STW003). At both of these sites over 100 items of rubbish were observed over the reporting period. At most sites, over 20 items of rubbish were observed, except for Gungahlin Gauging Station (GIN005), downstream of the Barton Highway (GIN007), Umbagog stepping stones (GIN024), Dunlop Ponds 1 and 2 (STW005 and STW007) and Uriarra Crossing (CMM150).

Most sites had some rubbish present on at least 50% of monitoring occasions.

The breakdown of the type of rubbish present shows that the largest component (37%) was plastic, followed by 20% cigarette butts and 19% paper. Aluminium cans, glass and dumped rubbish also made up significant components of the rubbish found.

PRESENCE OF ALGAE

The presence of excessive amounts of algae can indicate nutrient enrichment of a waterway. Waterwatchers observe the percent cover of algae on submerged surfaces. Standardised observations about the amount of algae present are also recorded using a rating system from A1 to A5. A percent cover of >50% combined with ratings of A4 or A5 are considered to indicate excessive growth of algae.

The most frequent occurrences of excessive algal growth were reported at the site downstream of the dam wall (GIN009), where there were 6 occurrences, and Kippax Creek (KIP001), where there were 5.

FROGWATCH

Frogwatch results show that there were 8 frog species present in the Ginninderra catchment in Spring 2004. These species are listed here in order of greatest distribution.

Scientific Name	Common Name	Number of Sites Where Detected
<i>Limnodynastes tasmaniensis</i>	Spotted Grass Frog	52
<i>Crinia parinsignifera</i>	Plains Froglet	45
<i>Crinia signifera</i>	Common Eastern Froglet	39
<i>Uperoleia laevigata</i>	Smooth Toadlet	26
<i>Litoria peronii</i>	Peron's Tree Frog	22
<i>Litoria verreauxii</i>	Whistling Tree Frog	20
<i>Limnodynastes dumerillii</i>	Eastern Banjo Frog	10
<i>Limnodynastes peronii</i>	Brown-striped Frog	5

The greatest number of species observed at any one site was 7. This number of species was found at 2 sites in the Ginninderra catchment, Mulligans Flat Site 2 (MFL002) and Mulligans Flat Site 3 (MFL003). Ten other sites in Mulligans Flat had 6 species present.

MACRO-INVERTEBRATE SNAPSHOTS

Seven macro-invertebrate snapshots were undertaken in Ginninderra during Autumn 2004 and three were undertaken in Spring 2004. All of the seven sites surveyed in Autumn were interpreted as suggesting “high salinity or nutrient levels (may be natural)”, except for the site at Umbagog stepping stones (GIN024), which suggested “pollution”. Three sites were surveyed in spring, with McKellar Wetland (MCW001) and Dunlop Pond 1 (STW005) suggesting “high salinity or nutrient levels (may be natural)”, and Ginninderra Creek at Amaroo suggesting “pollution”.

CONCLUSIONS

- Nutrient levels are consistently very high and dissolved oxygen levels are regularly below acceptable standards at a number of monitoring sites. This is indicated by high Phosphorus levels, observations of excess algae and aquatic plant growth and fluctuations in pH. The analyses of aquatic macro-invertebrate populations also indicate a nutrient-rich environment.
- Water quality sites situated downstream of new residential developments are all showing symptoms of disturbance, such as elevated Electrical Conductivity levels, extreme fluctuations in pH, high turbidity, or high Phosphorus concentrations. In particular, elevated turbidity at sites in Gungahlin, and very high pH levels at the Dunlop stormwater pond 2 (STW007) are apparent. The development of new suburbs involves large-scale land disturbance, vegetation clearance and the exposure of large areas of bare soil. Such development is currently occurring in north Gungahlin, north Dunlop and in the North McKellar.
- The erosion of stream banks is a significant issue along the Gooromon Ponds Creek tributary. This is possibly related to saline inflows and/or erosion from stock access.
- Bank erosion related to high water velocity is an issue along Kippax Creek.
- Rubbish is a problem throughout the catchment. Amounts of rubbish are especially high at Giralang GPT (STW001) and Florey stormwater drain. Dumping is also a regular problem in the Dunlop area and at Coppins Crossing.
- Results of the Frogwatch surveys show that Mulligans Flat is an extremely valuable frog habitat.

RECOMMENDATIONS

Community Engagement and Advocacy

- Initiate relationship with land managers in the Gooromon Ponds Creek catchment, with a view to investigate possibility of saline inflows and to limit stock access to the creek corridor.
- Take action to prevent escape of sediments from areas undergoing clearing and construction work. This may include establishing a relationship with builders associations and pressuring government agencies to enforce improved management of building sites.
- Continue involvement in consultation process for rehabilitation of Kippax Creek.
- Continue engagement with representatives of ACTPLA (ACT Planning and Land Authority) to ensure GCG input into urban planning processes.
- Continue to advocate for the protection and enhancement of Mulligan’s Flat as a regionally significant frog habitat.
- Initiate a public campaign aimed at changing community behaviour in relation to stormwater, focusing on reducing nutrient and sediment pollution and littering.
- Advocate for greater enforcement of illegal dumping regulations.
- Continue restoration of Ginninderra Creek and its riparian zone as a significant urban habitat corridor.

Further Monitoring

- Continuation of the Water Quality and Catchment Health Indicator Program is necessary to allow recognition of long-term trends and identify on-going impacts of stormwater pollution and erosion. It is also important as a tool for evaluating restoration efforts undertaken by the Group.
- Investigate potential for photopoint monitoring at Waterwatch sites and Landcare habitat development areas.
- Storm Event Sampling - Greater coordination of sampling between sites is needed, to be able to compare turbidity levels at different places. This will help to identify areas where erosion abatement is most needed. It is also recommended that extra SAS sites be established in areas likely to be contributing the highest sediment loads, that is, in North Gungahlin, West Belconnen and North McKellar, where land clearing, construction and residential development are currently occurring.
- Inclusion of wildlife monitoring (for example of bird, vegetation and fish species) is desirable, in order to broaden the scope of our monitoring program into the wider catchment.