

**GINNINDERRA CREEK CATCHMENT  
WATERWATCH WATER QUALITY REPORT**

**Report for the Year 1997**

**Ginninderra Catchment Group Inc.**

## **INTRODUCTION**

### **Purpose**

This report is intended to provide Waterwatch and Landcare groups, Ginninderra Catchment Group and relevant stakeholders with information about the water quality results obtained from several Waterwatch monitoring groups in the catchment over 1997.

The information provided in this report is to be used as baseline data to assist the catchment group in making recommendations for future works and modifications to the water quality monitoring program.

The integrity and accuracy of the data presented in this report is unknown. A quality assurance and quality control program is being implemented in 1998. The program will provide the catchment group with information regarding the integrity of data collected by groups.

### **Scope**

The Ginninderra Creek Catchment Monitoring Program covers a wide area of the catchment. Sites extend from Ginninderra Creek upstream of Gungahlin to Ginninderra Creek at Umbagog District Park and Halls Creek.

Sites including Murrumbateman and Yass are being integrated into the 1998 program.

### **Landuse**

A major percentage of Ginninderra Creek catchment is urban with large areas of industrial/commercial/retail around the Belconnen centre. New urban developments are being undertaken in suburbs of Gungahlin and Dunlop.

## **WATER QUALITY GUIDELINES**

The guidelines adopted for the assessment of Ginninderra Creek catchment water quality is for the '**Protection of Aquatic Ecosystems**'. Other guidelines exist for various water uses such as recreational and water supply.

The guidelines shown in the Table 1 are developed from the following sources: ANZECC Guidelines, ACT Water Quality Report (1996-97) and Waterwatch Manual.

Table 1: Water Quality Guideline Values.

<b>Variable</b>	<b>Water Quality Guidelines for the Protection of Aquatic Ecosystems</b>
pH	6.5 - 9.0
Dissolved Oxygen (mg/L)	>4
Phosphorus (mg/L)	<0.02
Total Phosphorus (mg/L)	0.01 - 0.1
Nitrate (mg/L)	0.05 - 0.1
Conductivity (mg/L)	<1,000
Turbidity (NTU)	<10
Temperature (C)	< 2 degrees Celsius change in seasonal mean

## **MONITORING PROGRAM**

The Ginninderra Creek Catchment Water Quality Monitoring Program is based on monitoring undertaken by Waterwatch groups in the catchment. The frequency and duration of monitoring varies depending on the type of group. School groups can only sample during school terms, Landcare groups when time is available and when university students are undertaking random sampling programs. These constraints are inevitable and therefore the monitoring program must adapt to these factors.

### **Waterwatch Groups**

There are approximately 20 groups registered on the Waterwatch Database (Table 2). Not all groups are currently sampling. Groups come in and out of the program depending on the availability of time and resources, school curriculum and enthusiasm of group leaders.

Table 2: Waterwatch Groups Contact Database

<b>Waterwatch Group</b>	<b>Contact</b>
<b>Scout Groups</b>	
Scouts/Venturers	Tracey Hogan
<b>Landcare Groups</b>	
Hall District Landcare Group	Nelson Quinn
Murrumbateman Landcare Group	Sandra Harding
Ginninderra Wetlands Group	Maurice Griffin-Warwick
North Belconnen Landcare Group	Mary Ormay
North Canberra Community Council	Jan Kellet
<b>Tertiary Groups</b>	
CIT, Bruce	Bill Martin
<b>Secondary Groups</b>	
Copland College	Michael Bateman
Lake Ginninderra College	Pat Tracey
Ginninderra High School	Sue Hall
Melba High Technology School	Penny George
Belconnen High School	Vicki Larkman
<b>Primary School</b>	
Hall Primary School	Cliff Daly
Florey Primary School	Sandra Martin
Flynn Primary School	Irene Forenstenko
Kaleen Primary School	Claire Maslin
Giralang Primary School	Susan Leech
Miles Franklin Primary School	Elisabeth Truthuie
Evatt Primary School	Jeff Mansfield
Latham Primary School	Robina Jeffs

### **Sampling Sites**

There are 16 sampling sites located in the Ginninderra Creek Catchment (Figure 1). The Ginninderra Creek Catchment Water Quality Monitoring Program has been developed with a number of factors determining site selection.

There are 9 sites on Ginninderra Creek which were chosen due to the site having easy access and being within walking distance from the groups school or home.

A further 7 sites form part of a project undertaken by Canberra Institute of Technology, Bruce. This project will be continued later in 1998.

A final factor affecting the selection of sites is areas prone to potential pollution sources. These sites will be expanded and intensive sampling undertaken in the 1998 program to further identify sources of pollution and 'hot spots' in the catchment.

The following is a list of the 16 monitoring sites which formed the 1997 Ginninderra Creek Catchment Water Quality Monitoring Program. Sites that were sampled weekly or monthly are described as regular sampling sites. Canberra Institute of Technology (CIT) sampled weekly between 4-9-97 and 30-10-97. Melba High Technology School sampled monthly from June 1997 - October 1997.

Sites that were sampled on one off events as part of Waterwatch excursion and short sampling programs during 1997 are described as snapshot sampling sites. Groups such as Evatt, Latham, Florey and Hall Primary Schools fall into this description.

Table 2: Sites, Groups and Frequency of Monitoring over a Sampling Period

<b>Site</b>	<b>Group(s)</b>	<b>Frequency</b>
Yerrabi Pond North	(CIT)	Regular
Yerrabi Pond South	CIT	Regular
Gungahlin Pond South	CIT	Regular
Ginninderra Creek @ Barton Hwy	CIT	Regular
Kaleen Pond North	Evatt Primary School	Snapshot
Kaleen Pond East	Evatt Primary School	Snapshot
Kaleen Pond South	Evatt Primary School	Snapshot
Lake Ginninderra East	CIT	Regular
Lake Ginninderra @ Pizza Hut	CIT	Regular
Lake Ginninderra West	CIT	Regular
Ginninderra Creek @ Evatt	CIT	Regular
Ginninderra Creek @ Melba	CIT & Melba Tech. School	Regular
Ginninderra Creek @ Umbagog	Latham Primary School	Snapshot
Ginninderra Creek @ BMX, Melba	Florey Primary School	Snapshot
Halls Creek @ Showground	Hall Primary School	Snapshot
Halls Creek @ Victoria Street	Hall Primary School	Snapshot

### **Water Quality Database**

Water quality data collected by Waterwatch groups is sent to the Waterwatch coordinator and stored on a Microsoft Word database. Mini monthly reports are produced and distributed to the group. The data is also intended to be transferred to the National Waterwatch Database. Reports such as this one will be produced yearly to give Waterwatch groups a chance to compare water quality results in a catchment wide context.

The Waterwatch coordinator also provides the data to Environment ACT's water data coordinator Greg Keen who enters the data into the ACT's water database which can be seen on the Environment ACT's internet site.

At present the data is only used by the catchment group for providing baseline data on water quality in the Ginninderra Catchment for monitoring, management and evaluation purposes.

### **Water Quality Monitoring Project Plan**

The Water Quality Monitoring Project Plan is a document being stringently implemented in 1998 that aims to assist Waterwatch groups in developing, implementing and maintaining a water quality monitoring program.

The plan aims to assist groups in producing water quality data that is of a high standard. At present the integrity of data collected from Waterwatch groups is unknown and the use of the data is limited. The plan aims to assist groups in producing good quality data by getting groups to consider the why, what, when and where of their sampling program. The plan also details appropriate sampling methodologies and easy to follow instructions on quality control requirements which all assist in collecting accurate data.

Groups involved in the project plan program (all Waterwatch groups) will be able to provide data which they can be confident in. This will lead to the data being able to be utilised more effectively, such as for State of the Environment Reports, Environmental Assessments and annual Government Water Quality Reports.

### **WATER QUALITY RESULTS**

The water quality results have been analysed depending on the frequency of sampling.

Those sites which were **regularly** sampled (Table 2) have been graphically presented by parameter for each site. For the individual parameters, the median value for the year is used. The median value is the middle value in a list of the results ordered from lowest to highest. The median value is a better indicator than the average because it does not introduce factors such as rainfall or extremely high results affecting the final representation of that site. Parameters used to assess the condition of the regular sampling sites are pH, temperature, conductivity, turbidity, dissolved oxygen, phosphorus and nitrates.

Those sites which were **snapshot** sampled (Table 2) have been given ratings of excellent, good, fair and poor depending on their compliance at time of sampling with the guidelines (Table 1). Parameters used to assess the condition of the snapshot sampling sites are pH, temperature, conductivity, turbidity and macroinvertebrates (bugs).

Table 3 lists the site codes used in this report.

Table 3: Site Codes

<b>Site</b>	<b>Location</b>
1	Yerrabli Pond North
2	Yerrabi Pond South
3	Gungahlin Pond North
4	Ginninderra Creek @ Barton Highway
5	Lake Ginninderra East
6	Lake Ginninderra @ Pizza Hut, Belconnen
7	Lake Ginninderra West
8	Ginninderra Creek @ Carlile St. Evatt
9	Ginninderra Creek @ Melba Playing Fields

## pH

### Description of Parameter

The pH level of a waterbody measures the acidity of a water body. Most natural fresh waters have a pH close to 7.0 which is neutral, levels above 7.0 are alkaline and levels below 7.0 are acidic.

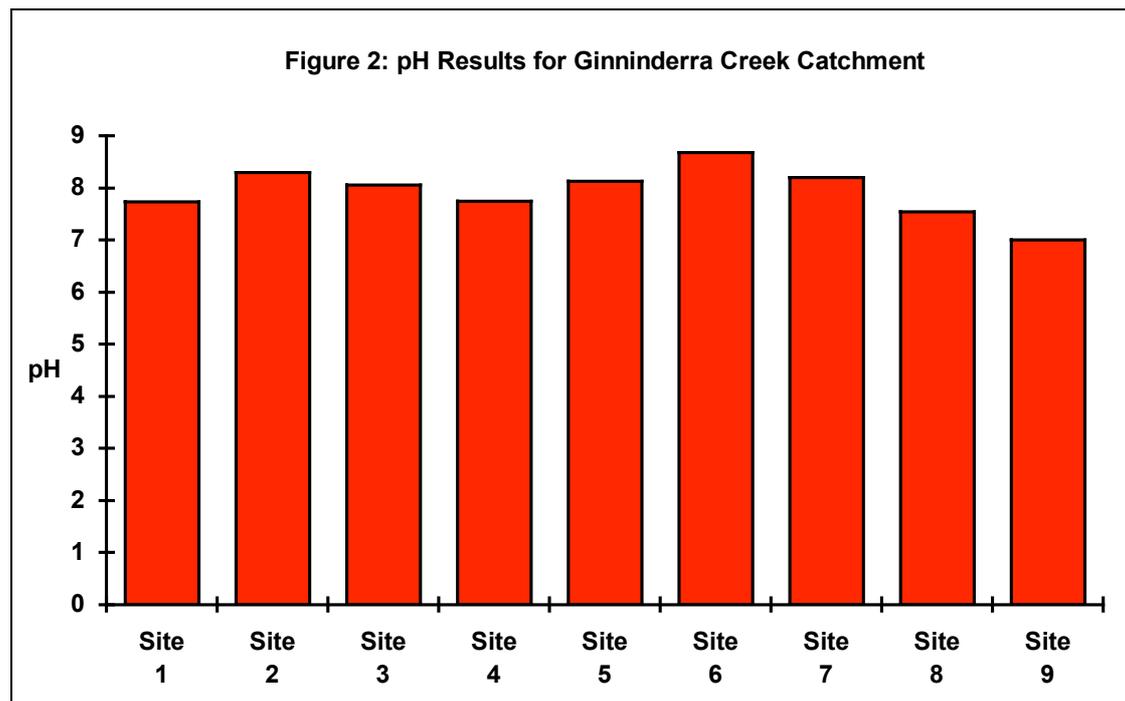
Changes to pH are influenced by the addition of salts, acids, basis and by photosynthesis. Changes to the pH of a water-body can influence the numbers and types of aquatic plants and animals which can live there (Pollutant Information).

### Criteria

The commonly accepted range for pH in Freshwater's is 6.5 - 9.0.

### Results

All sites fell within the recommended range for pH.



### Discussion

The highest pH level was observed at site 6 and the lowest observed at site 9. The level of acidity in Ginninderra Catchment is acceptable and therefore is not a major pollutant concern for Ginninderra Creek and Lake Ginninderra.

## TEMPERATURE

### Description of Parameter

The temperature of a water body effects rates of chemical and biological reactions and effects Dissolved Oxygen levels. This has an important influence on aquatic life, and hence on water quality. The slightest change in temperature can be detrimental to organisms.

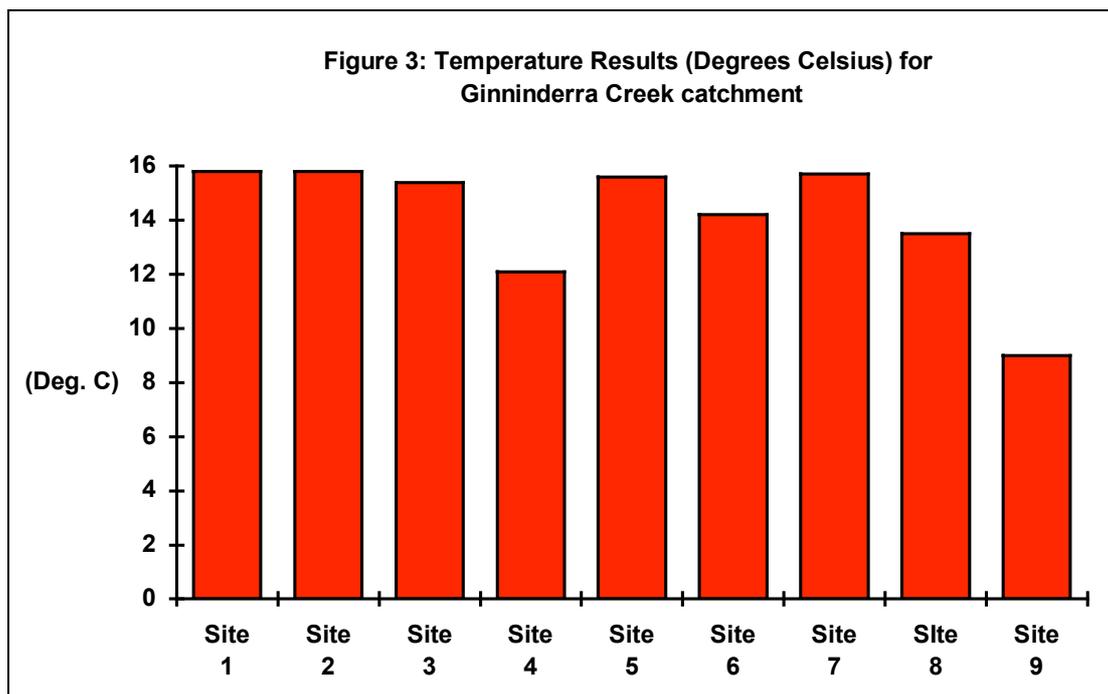
Water temperature is affected by tree cover, or when sediment clouds the water, or thermal discharges from industry.

### Criteria

It is recommended that temperature should not increase by 2 degree Celsius from the natural temperature for the time of sampling.

### Results

Due to this being the first year of regular sampling by Waterwatch it is difficult to say whether temperature increased from the seasonal mean.



### Discussion

The temperature at all sites sampled was not extreme at time of sampling and no thermal pollution was observed.

## **CONDUCTIVITY**

### **Description of Parameter**

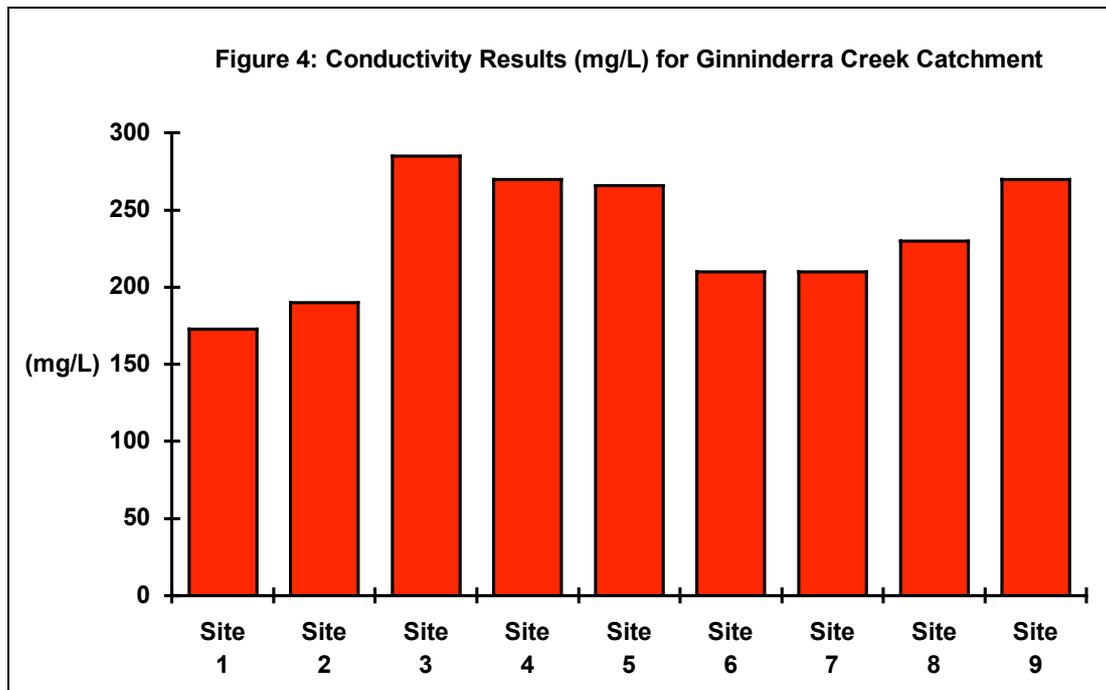
Conductivity is a measure of the water's salinity level. Salts such as calcium carbonate are picked up by the water as it runs over and through the rocks and soil of the catchment. Low levels of salt are vital for the growth of aquatic plants and animals but high levels can cause problems for aquatic life (Waterwatch Manual).

### **Criteria**

In freshwater salinity should not increase above 1,000 mg/L.

### **Results**

All sites were observed to be under the recommended level for the protection of aquatic ecosystems.



### **Discussion**

Salinity levels in Ginninderra Creek Catchment are typical of urban catchments. Conductivity remains below the recommended guideline of 1,000 mg/L for all sites sampled in the catchment.

Conductivity was observed to be lower in Lake Ginninderra and Yerrabi Pond compared to other Ginninderra Creek sites in the catchment. Site 3 Gungahlin Pond was observed to have the highest salinity level. This is most probably caused by the development of Gungahlin.

## **TURBIDITY**

### **Description of Parameter**

Turbidity is a measure of the clarity of the water which affects light penetration required by aquatic organisms for photosynthesis. Turbidity is measured in Nephelometric Turbidity Units (NTU).

Turbidity is also an aesthetic measurement because a highly turbid waterway will often be described as being 'dirty'.

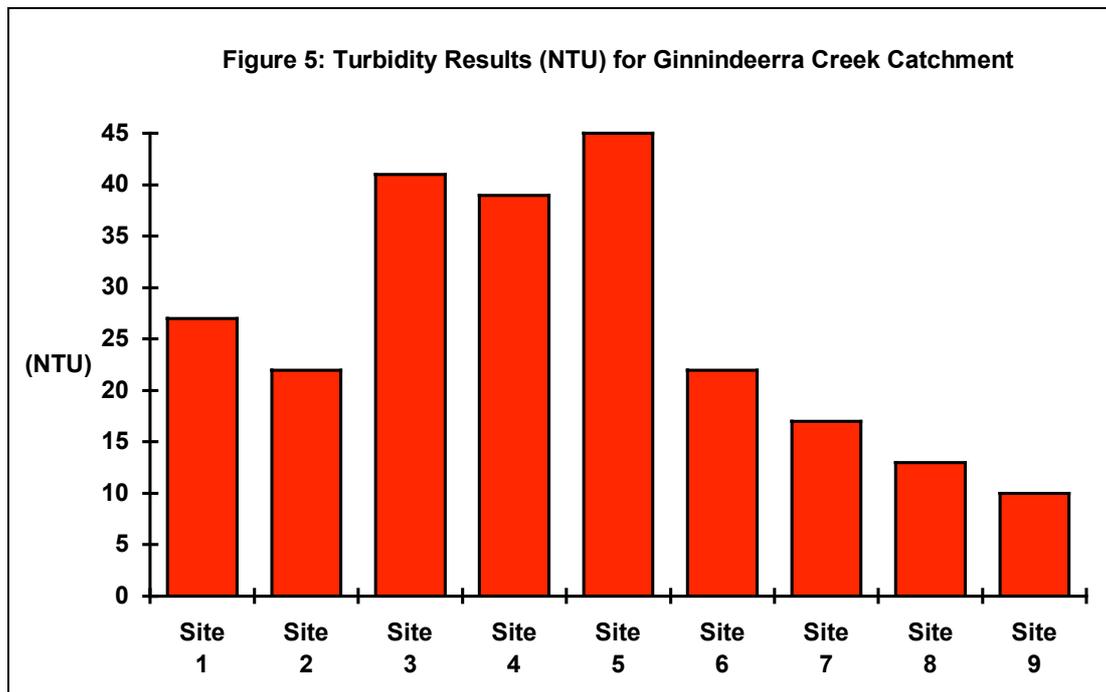
Sediment loads being discharged into a waterway, flood events and runoff from land can all increase turbidity levels.

### **Criteria**

Less than 10 NTU.

### **Results**

All sites sampled were observed to have turbidity levels higher than the recommended 10 NTU. The most affected area by turbidity was between the Barton Highway (Site 3) and Lake Ginninderra (Site 6).



## **Discussion**

Turbidity is one of the major pollution parameters of concern for the Ginninderra Creek Catchment.

The area of Ginninderra Creek Catchment most effected by turbidity is directly downstream of Gungahlin. Increased sediment loads from construction sites after rainfall and intense urban development elevate turbidity levels.

Turbidity levels drop off downstream of Lake Ginninderra where sediment loads have been settled out before entering Ginninderra Creek downstream of the weir. Although levels drop off turbidity still remains above the recommended guideline for the protection of aquatic ecosystems. This is caused by shallow waters being easily disturbed and unvegetated banks eroding during rainfall events.

## DISSOLVED OXYGEN

### Description of Parameter

Dissolved Oxygen (DO) is essential in maintaining an aquatic ecosystem and is a natural characteristic of clear water. Many factors may change DO levels such as:

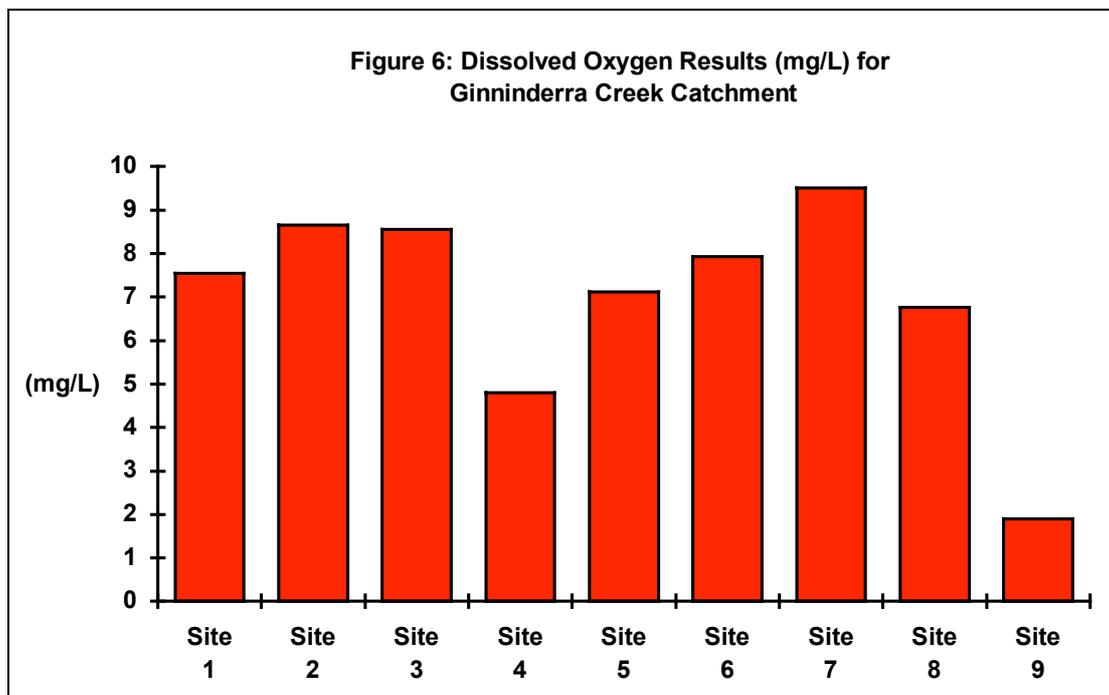
- 1) Discharge to waters of chemicals that produce or consume oxygen (oils and solvents).
- 2) nutrients that increase the photosynthesis and/or respiratory activity of organisms.
- 3) the capacity of water to dissolve oxygen with increasing temperature, altitude & salinity.
- 4) Diurnal changes during the night reduce levels of DO as there is less photosynthesis activity and DO progressively increases with photosynthesis throughout the course of the day.

### Criteria

It is recommended that the level of DO be 80% or >4mg/L. Studies have found that levels below 4mg/L are to stressful for many aquatic species.

### Results

All sites except one were observed to have the recommended DO levels for the protection of aquatic ecosystems. Melba Playing fields (Site 9) was found to have a DO level below the requirement.



## **Discussion**

Dissolved Oxygen in the Ginninderra Creek Catchment is lower in areas downstream of Lake Ginninderra. Monitoring undertaken by University of Canberra also indicate that DO levels are found to be low downstream of Lake Ginninderra (ACT Water Quality Report).

Site 9 was observed to have a DO level below the required 4 mg/L. This is caused by a combination of shadowing of the creek caused by willows invading the creek bank and long periods of low flow during summer (ACT Water Quality Report).

## **PHOSPHORUS**

### **Description of Parameter**

Phosphorus is an essential component of all living cells and a natural part of all living systems. Phosphorus is introduced to waterways in runoff and discharges from point sources.

High levels of phosphorus are likely to cause excessive growth of plants such as phytoplankton, macrophytes and periphyton.

Of all the chemical elements present in waterways phosphorus is the element most commonly found to control growth of algae.

Waters affected by high phosphorus levels exhibit excessive plant growth, they diminish enjoyment for body contact recreation and have greater potential for fish kills.

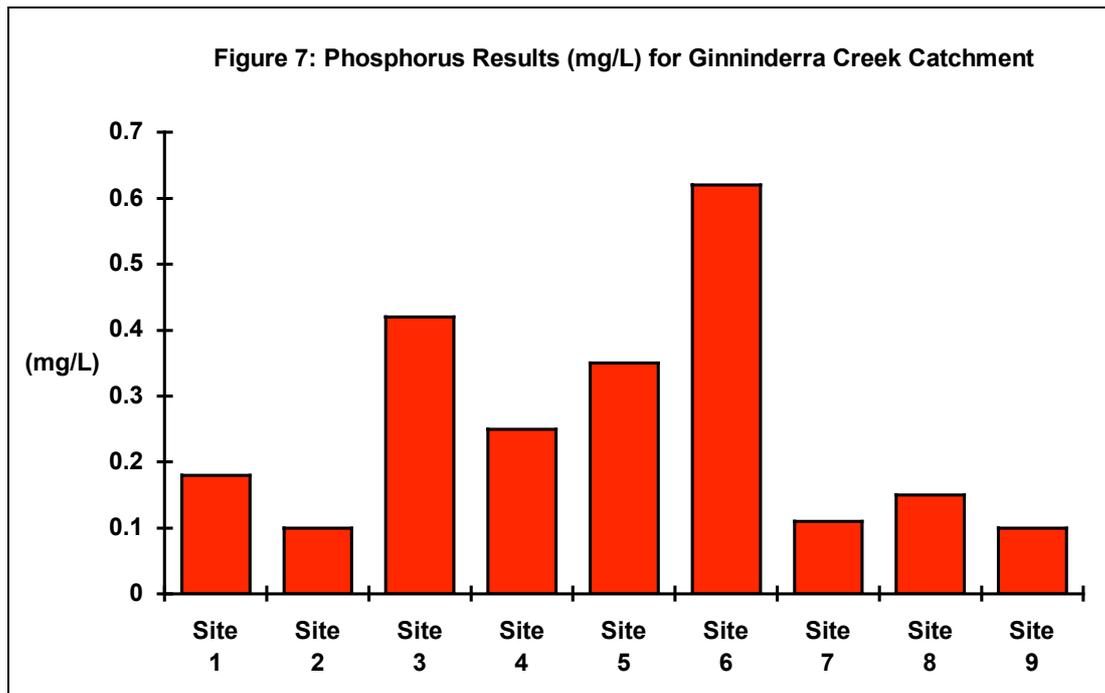
Phosphorus measures only soluble forms of phosphate and total phosphorus measures all forms of phosphorus including particulate forms in unfiltered samples.

### **Criteria**

It is recommended that phosphorus as PO<sub>4</sub> (phosphate) be <0.02 mg/L for Freshwater's and total phosphate be within the range of 0.01 - 0.1 mg/L for Freshwater's.

### **Results**

All sites failed to meet the recommended guideline for Reactive Phosphorus. Phosphorus appears to be concentrated at high levels between the Barton Highway and Lake Ginninderra.



## Discussion

Phosphorus is a major pollutant concern for the Ginninderra Creek Catchment. Phosphorous levels were found to be exceeding the recommended requirements for the protection of aquatic ecosystems.

Levels were higher upstream of the Lake and within Lake Ginninderra with levels decreasing below the weir but still above the guidelines. This observation shows that the Ponds and Lake Ginninderra are reducing nutrient levels before they enter downstream but there is definitely room for improvement.

## **NITROGEN**

### **Description of Parameter**

Nitrogen like phosphorus is an essential component of all living cells, but unlike phosphorus moves freely between the atmosphere and aquatic ecosystems in the molecular state as N<sub>2</sub> gas.

High levels of nitrogen, in the presence of phosphorus, are likely to have impacts similar to those of high levels of phosphorus.

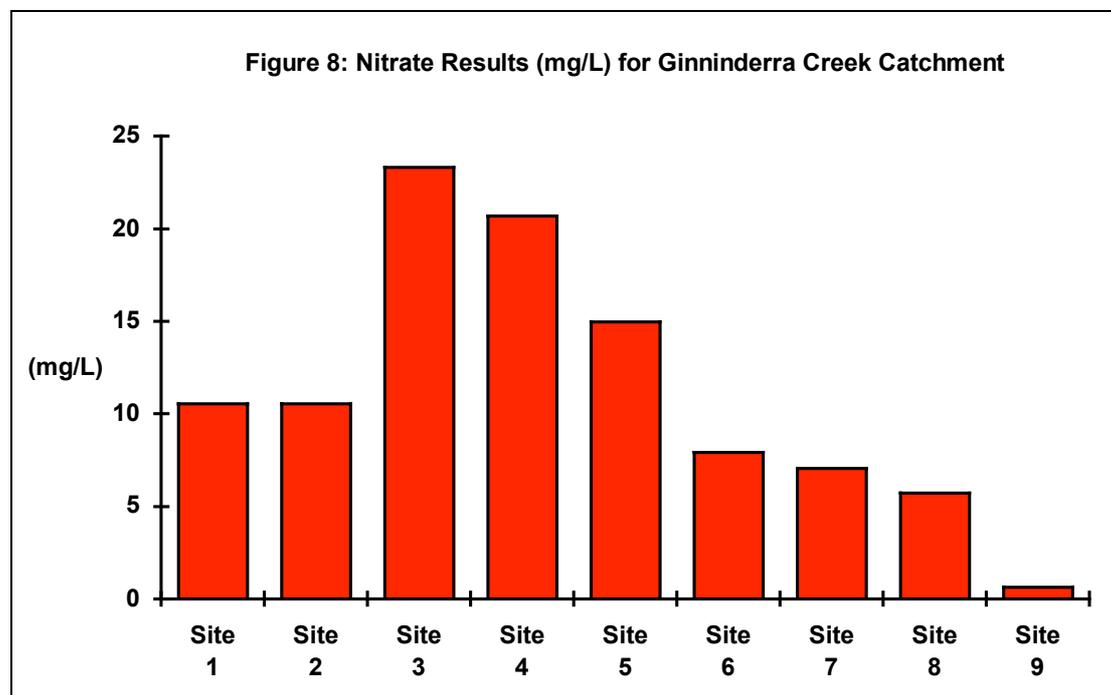
### **Criteria**

The recommended level for nitrogen for freshwater is 0.05 - 0.1 mg/L.

### **Results**

The results indicate that all nitrate levels exceeded the recommended guidelines for the protection of aquatic ecosystems.

Ginninderra Creek at the Barton Highway (Site 3) was observed to have the highest nitrate levels. Levels decreased further downstream but remained considerably above the requirements.



## **Discussion**

All sites sampled in the Ginninderra Catchment exceeded recommended levels for nitrates for the protection of aquatic ecosystems.

Gungahlin Pond was observed to have the highest nitrate level at 23 mg/L with levels decreasing further downstream at Melba to 0.64 mg/L. This shows the high loads of nitrates entering the system at Gungahlin and being filtered out by Giralang Ponds and Lake Ginninderra.

Levels of nitrate downstream of Lake Ginninderra are less than at Gungahlin Pond but remain higher than the recommended level of 0.05 - 0.1 mg/L. Like phosphorus nitrate is a major pollutant concern for the Ginninderra Creek Catchment.

## **Waterwatch Snapshot Data**

The snapshot data for the Ginninderra Creek Catchment is made up of those sites which were sampled on one off occasions. Sites have been given a rating of excellent, good, fair or poor based on the water quality guidelines presented in Table 1.

Figure 9: Waterwatch Snapshot Sites for Ginninderra Creek Catchment  
(Source: Environment ACT, Water Section)

## **CONCLUSION**

The recent and continuing developments occurring in Gungahlin are increasing loads of sediment and nutrients entering into Ginninderra Creek. From the data obtained it was observed that turbidity, phosphorus and nitrates through out the catchment and dissolved oxygen in the lower part of the catchment are major pollutants of concern in the Ginninderra Creek Catchment. The recent and continuing developments occurring in Gungahlin are increasing loads of sediment and nutrients entering into Ginninderra Creek.

## **RECOMMENDATIONS**

- The effectiveness of the Ponds in Gungahlin need to be upgraded with further work being put towards policing appropriate sedimentation controls around construction sites.
- Intensive studies on identifying major sources of pollution.
- Discuss innovative stormwater methods to better reduce pollutants from entering into the Creek.
- Undertake a stormwater audit on industrial premises to assess the potential for their site to pollute stormwater.
- Intensive event sampling to estimate pollutant loads entering into Ginninderra Creek Catchment.
- Extend sampling program to Yass, picking up sites at Parkwood, Hall, Murrumbateman and Yass.
- Education programs with regard to stormwater.
- Future water quality reports comparing results obtained in the previous year(s).

## **CONTACT**

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## **REFERENCES**

- ANZECC (1992). ***Australian Water Quality Guidelines for Fresh and Marine Waters.*** Australian and New Zealand Environment and Conservation Council.
- Environment ACT (1996-97) ***ACT Water Quality Report.*** ACT Department of Urban Services, Water Unit.
- Author Unknown (????) ***Pollutant Information.*** Waterwatch Resource Kit.
- Waterwatch Victoria (1996) ***A Community Water Quality Monitoring Manual for Victoria.*** Waterwatch Victoria.