

# INTRODUCTION

## Purpose

This report is intended to provide the ACT community with information on the state of the ACT's water resources for the year 1 April 2003 to 30 June 2004. The 15-month reporting period in this report differs from previous 12-month reporting periods, but is necessary so that in the future, the report can be presented on a financial year, which will both assist understanding as well as satisfy the reporting requirements of the Water Strategy, *Think Water, act water*. To establish a statistically significant analysis of trends, the analysis includes data for the period 1992 to 2004.

The report is divided into five main sections. Section 1 introduces the report and provides background information for interpreting the water quality data. Section 2 discusses water quality condition. The indicators used for assessing water quality and biological condition, are introduced and results discussed for the lakes and rivers in light of the Territory Plan and Water Quality Standards. Section 3 provides monitoring information collected in administering the *Water Resources Act 1998*, which came into full effect on 11 December 1999. Section 4 looks at the implementation of *Think water, act water*, Strategy for Sustainable Water Resource Management in the ACT, which commenced during the reporting year. Finally, a brief discussion on projects undertaken by community groups in the ACT during the reporting period is also presented.

## Scope

The report focuses on the major waterbodies of the ACT with the exception of Lake Burley Griffin.

Lake Burley Griffin is a Commonwealth responsibility and is the subject of an annual report produced by the National Capital Authority. For information relating to Lake Burley Griffin, contact the National Capital Authority on 6271 2888.

Water use from the Cotter catchment is included in this report in the third section relating to management of water resources. Information relating to drinking water quality of urban water supply is the responsibility of ACTEW and the Chief Health Officer, and is not included in this report.

## Land Use

There are four major land uses in the ACT (see Figure 1). In normal circumstances, conservation land use tends to have a minimal impact on water quality. As a result of the January 2003 bushfires, soil erosion and sediment movement now present a potential impact on the water quality of previously unimpacted water bodies. Plantation forestry and rural use can have significant impacts on water bodies where these activities result in soil erosion or the release of agricultural chemicals and animal waste. Urban use has the greatest potential for impact on water quality per unit area. Materials entering urban waterways, which are likely to impact on the health of our waterways, include fertilisers and other chemicals, organic matter, soil, oil, and sewage effluent. Urban areas are also susceptible to drought as the pollutants entering waterways are concentrated, impacting on local ecosystems.

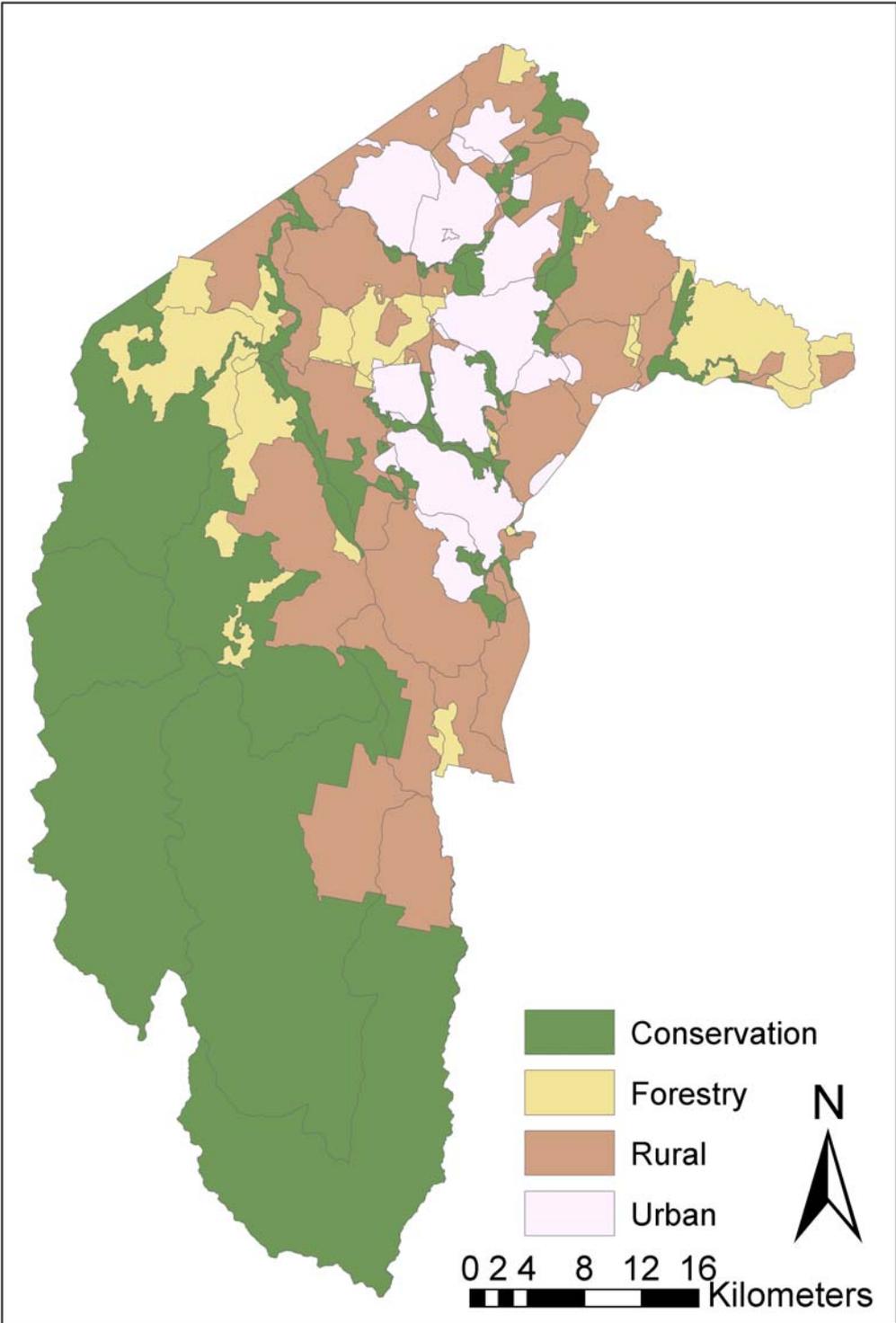
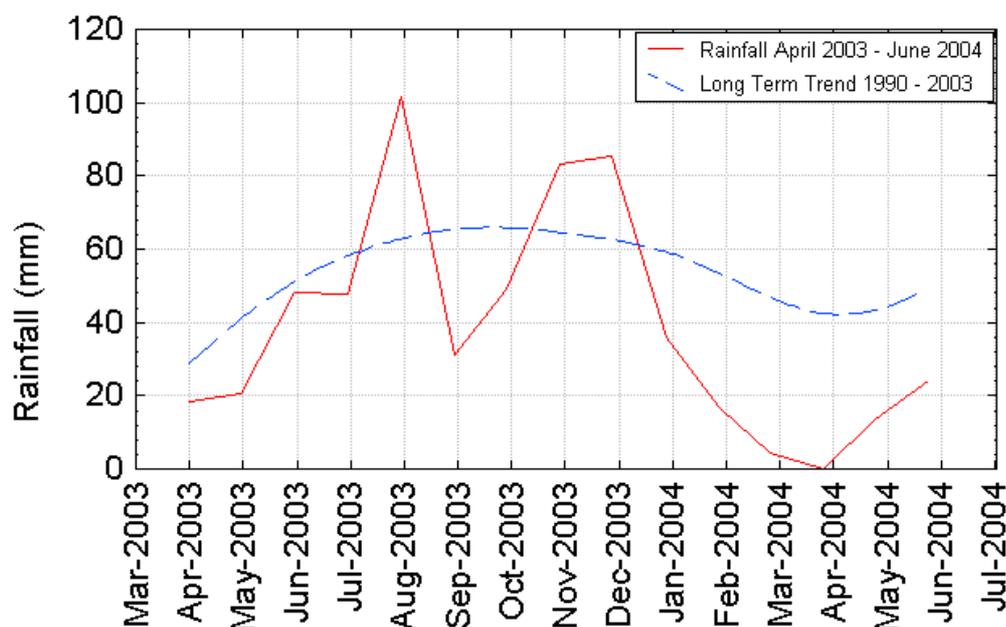


Figure 1: Designated Land Use in the ACT

## Climate

Rainfall in the ACT is strongly affected by the landform. In the mountainous region to the west of the Murrumbidgee River, annual average rainfall ranges from 800-1000 mm. The flatter tablelands on which Canberra is built are in a rain shadow area and the annual rainfall reaches 600-700 mm. In this 15-month reporting period the annual average rainfall was 518 mm, which is down on the average, but has increased from the last 12-month reporting period where the annual average was approximately 350 mm.

Rainfall is measured at numerous sites in the ACT. Rainfall in urban areas in the ACT is depicted in Figure 2, for a site near the Barton Highway. Both the long-term average monthly rainfall on data collected since 1992, and the monthly rainfall for the 2003-2004 reporting period are presented.



**Figure 2: Monthly Average Rainfall in Belconnen Upstream of the Barton Highway**

The long-term average annual rainfall, since 1992, in Belconnen at the Barton Highway site is 664 mm. The annual rainfall for this reporting period, 1 April 2003 to 31 July 2004, was significantly lower at 518 mm. This follows previous years of lower than average rainfall, and higher than average temperatures combining to produce continuing drought conditions. The monthly average rainfall is consistently lower than the long-term average, with the exception of the average monthly rainfall for the end of 2003 and August 2003, which had higher than average rainfall. Rainfall was however, exceptionally low for the first half of 2004.

## Streamflow

The monthly average streamflow showed further evidence that the drought conditions have dominated recent years with flow consistently below the long-term average and in some cases, no flow was recorded for significant periods. This includes the flow into the ACT via the Murrumbidgee River, which was extremely low in 2004 and consistently below average, as shown in Figure 3.

Figure 4 shows flow entering the ACT via the Molonglo River as measured at Burbong Bridge. There has been no flow for large proportions of the reporting year. At these times flow out of the ACT comes almost exclusively from the Lower Molonglo Water Quality Control Centre.

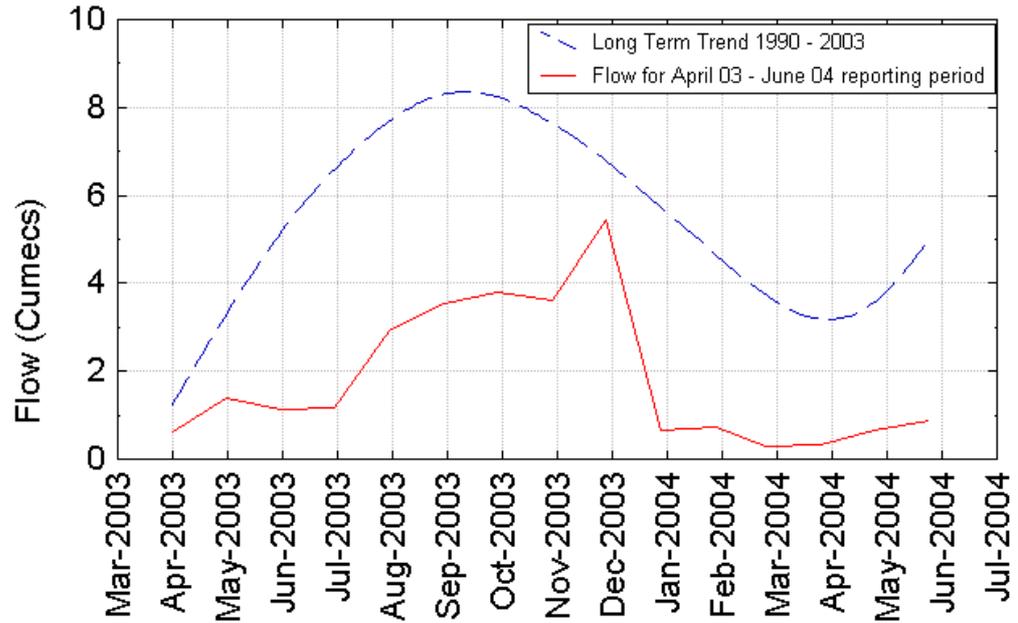


Figure 3: Average Monthly Flow in the Murrumbidgee River Entering the ACT

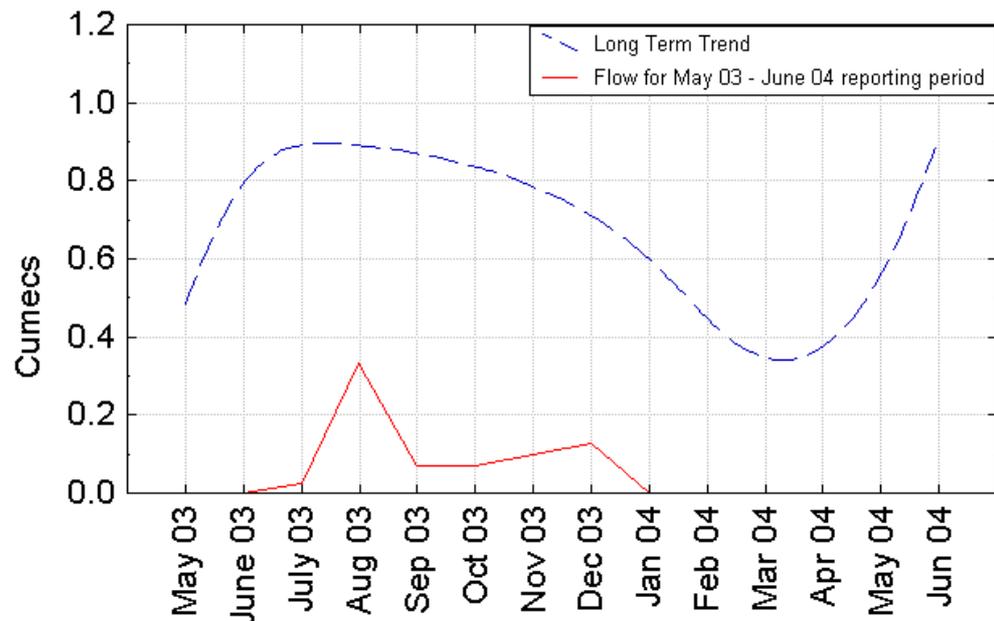


Figure 4: Average Monthly Flow in the Molonglo at Burbong Bridge

Urban areas react more quickly to rainfall with a greater proportion of rainwater being converted to run-off because of the large areas of impervious surfaces. Figure 5 shows runoff in Ginninderra Creek downstream of Belconnen. Runoff closely follows the rainfall shown in Figure 2. Rural subcatchments with less impervious area respond more slowly to rainfall events. However the dominant feature in this urban catchment were the low flows over the reporting period, especially the first 6 months of 2004.

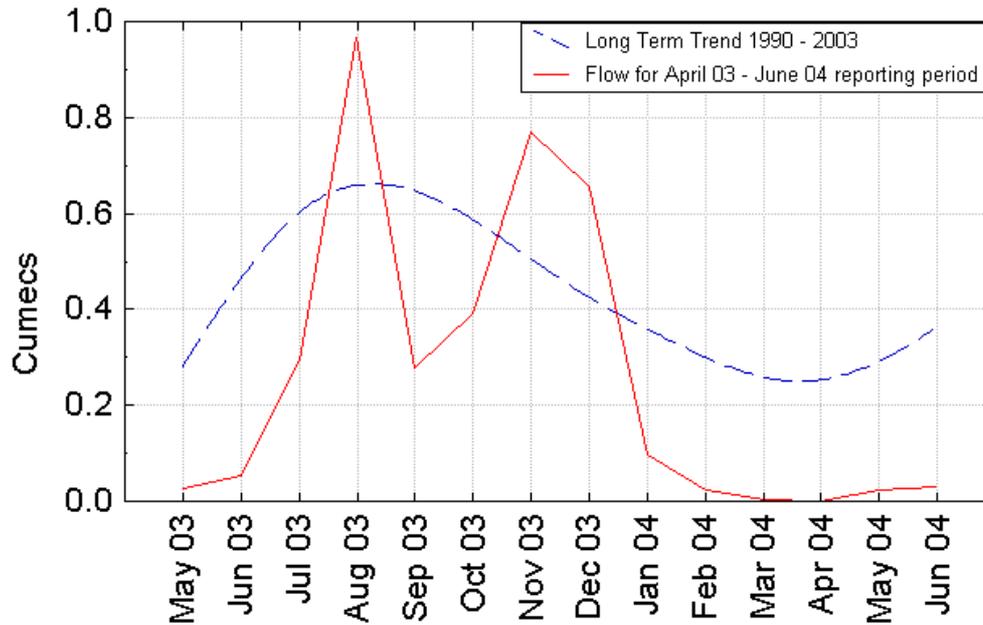


Figure 5: Average Monthly Flow in Ginninderra Creek

## Rivers in the ACT Region

A number of the rivers and streams that flow through the ACT originate in NSW. The catchment boundaries of other major rivers in the ACT form part of the ACT/NSW border.

The Murrumbidgee River originates to the south of the ACT. Tantangara Reservoir diverts its headwaters to the Tumut River and the river is further regulated downstream of the ACT at Burrinjuck Reservoir. The Molonglo River and Queanbeyan River originate to the south-east of the ACT, with both draining through Lake Burley Griffin to the Murrumbidgee River.

The Cotter catchment forms the western boundary of the ACT and the Naas and Gudgenby catchments form the southern and south-eastern boundaries.

## Bushfires

The fires of January 2003 continue to be a major influencing factor on the condition of the ACT's waterways. The fires had a significant effect on a large proportion of the water catchments in the ACT, including the areas around our reservoirs. The Environment ACT Bushfire Recovery Plan, which was published in March 2003, identified key issues and potential threats relating to fire-affected vegetation, landforms and wildlife populations, including those within the water supply catchments. Strategies and actions relevant to these issues were developed and undertaken based on priority. Ongoing monitoring is still occurring. Figure 6 shows the extent of the Bushfire within catchments throughout the ACT region.

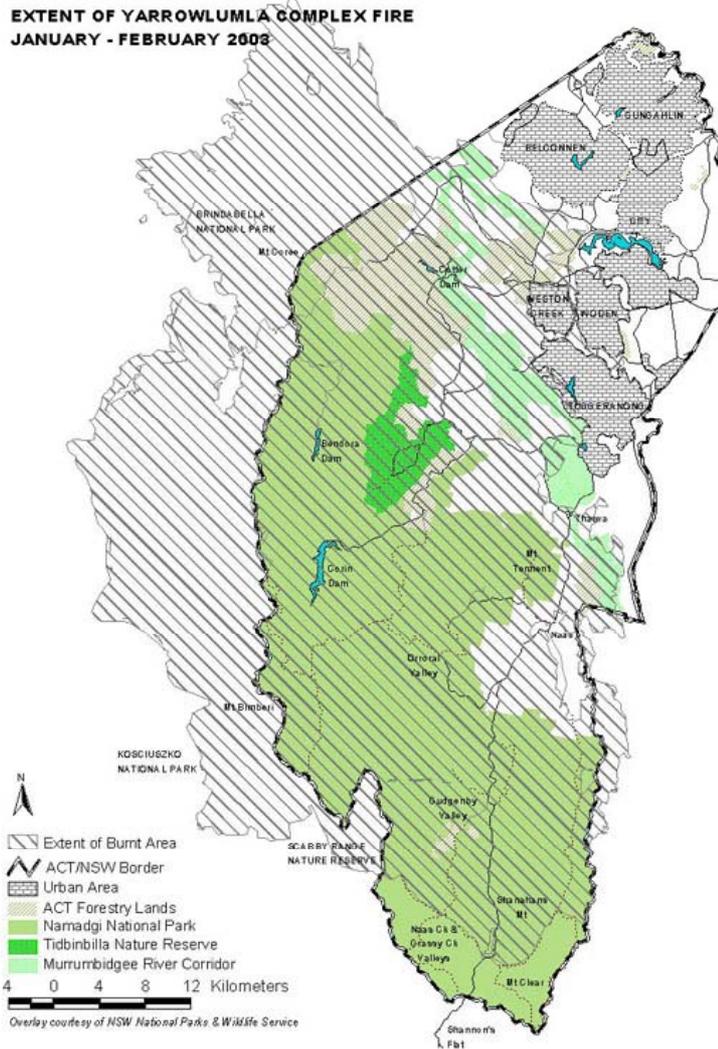


Figure 6: Extent of Bushfire\*

## Protection of Water Resources

The ACT Government seeks to manage waterways so that sustainable and appropriate water conditions are attained. This includes an integrated catchment approach to planning, development controls, the licensing of end of pipe discharges and regulation of non-point source discharges through the requirements of erosion and sediment control plans. Urban stormwater management infrastructure such as gross pollutant traps, water quality control ponds, wetlands and vegetated floodways are designed and managed to reduce urban impacts on water quality, as is an increasing emphasis on improved urban design. These measures are designed to ensure that water quality is suitable for designated uses.

### The Territory Plan Environmental and Use Values

Appendix 1, Water Use and Catchment Policies of the Territory Plan, sets the permitted uses and protected environmental values for the waterways in the ACT. The plan identifies three types of catchments: drainage and open space; water supply; and conservation. Uses such as maintenance of ecosystems, recreation and water supply are designated for streams, lakes and rivers within each of these types of catchments. Within each catchment type there will be a designated primary value, and a range of other uses are permitted which are generally compatible with, but secondary to, the primary value.

\* Environment ACT Bushfire Recovery Plan 2003, 27 March 2003.

## Water Quality Standards

Water quality standards are identified in Schedule 4 of the *Environment Protection Regulations 1997*. These regulations contain tables that list the necessary water quality to support each of the water uses referred to in the Territory Plan. Table 1 provides examples of some of the water quality standards for certain water uses.

**Table 1: Water Quality Standards (Ref: *Environment Protection Regulations 1997*)**

Indicator	Water Use				
	Water based recreation—swimming (REC/1)	Water based recreation—boating (REC/2)	Water supply—stock (STOCK)	Water supply—irrigation (IRRIG)	Aquatic habitat—wetland (AQUA/1 to AQUA/6)
Total Phosphorus (mg/L)	< 0.1	< 0.1			< 0.1
Turbidity (NTU)	Not objectionable	Not objectionable			<10 – <30
Suspended Solids (mg/L)					<12.5 – <25
Chlorophyll 'a' (µg/L)	< 10	< 10	< 10		<2 – <10
faecal coliforms (cfu/100mL)	≤ 150	≤ 1000	≤ 1000	≤ 1000	
Dissolved Oxygen (mg/L)					>4
Acidity (pH)	6.5–8.5	6.5–8.5	6.5–9.2	4.5–9.0	6–9
Total Dissolved Solids (mg/L)			< 3000	< 500	

## Water Resource Use

The *Water Resources Act 1998* came into full effect in December 1999, providing the Territory with the tools to effectively and sustainably manage its water resources. The Act provides for the preparation of Environmental Flow Guidelines that establish the methods used to identify flows necessary to protect all ACT waterbodies. These guidelines are currently under review.

The Act also requires the preparation of a Water Resources Management Plan, which was recently updated and now forms Volume 3 of *Think water, act water*. The Water Resources Management Plan describes the water resources of the Territory, quantifies environmental flows on the basis of the Environmental Flow Guidelines, identifies water available for use, and allocations which can be made over the next 10 years.

Water allocations are only issued in accordance with this plan and thus ensure that the total quantity of water that could be used from ACT water resources is sustainable. Licence conditions are used to ensure that water allocations are only taken from ACT water resources when and where the water is available. These measures ensure the Territory's water resources are managed appropriately.

Water catchments boundaries used for this purpose are set out in Figure 7.

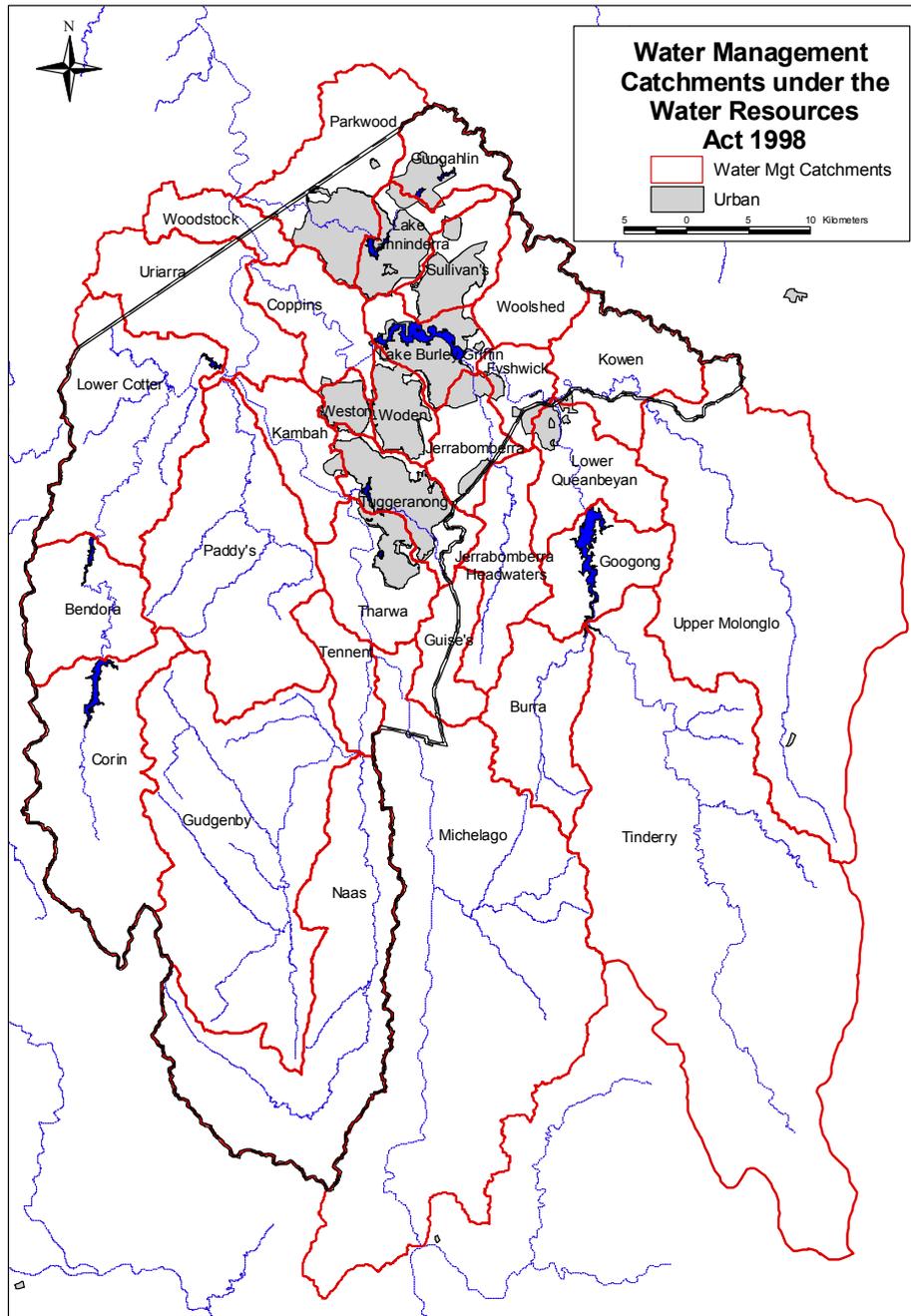


Figure 7: Water Catchments' Map

## Water Quality Monitoring Program

Environment ACT manages a water monitoring program for the ACT that includes the collection of water quality, streamflow and biological data. The monitoring program is based on regular sampling of lakes and rivers. Such information is used to determine whether waters in the ACT are of appropriate quality and if the management strategies used to achieve or maintain such water quality are adequate. The information is not intended to identify specific pollution incidents but rather provide information about changes to water quality over time.

The data for this report is sourced from Environment ACT's water monitoring program, other government agencies and from authorised dischargers, including Lower Molonglo Water Quality Control Centre and Queanbeyan Sewage Treatment Plant.

### Sampling Sites

Sites are located so as to be representative of stream and lake conditions in the ACT. It is not possible to monitor all sites and all parameters of interest, consequently those considered most representative of environmental conditions are selected with the intention of generalising to similar areas. The site locations can be seen on the water quality indicator maps Figure 8 and Figure 9, for biological sampling and Figure 9 to Figure 14 for water quality sampling.

The major urban lakes (with the exception of Lake Burley Griffin — a Commonwealth responsibility) are sampled eight months of the year during August, October to March and May. The sampling program for lakes is not flow related.

The ACT Government also monitors Burrinjuck Reservoir. The ACT's impact on the Murrumbidgee River is not identifiable downstream of Burrinjuck Reservoir as a result of the Reservoir's size and the residence time of water in it.

A separate program to monitor blue-green algae in Canberra's lakes is undertaken during the summer months by Environment ACT.

A flow based sampling process has been adopted for the stream water quality monitoring program. This method is a more cost effective characterisation of water quality than time based monitoring, because streamflow is the major determinant of quality. Samples are collected within four flow percentile groupings (see Table 2). The 5<sup>th</sup> percentile flow is the flow exceeded only 5% of the time and represents very high flow; conversely the 90<sup>th</sup> percentile flow indicates very low flow.

Streamflow is measured at a number of sites throughout the ACT. This information is valuable for interpreting water quality data. Most of the pollutants that wash off the land do so during rainfall events. In conjunction with water quality monitoring, streamflow allows for the calculation of pollutant loads in our lakes and rivers.

**Table 2: Flow Percentiles for River Sampling**

Flow Percentile Group	Number of Samples
5–29	2
30–49	2
50–69	2
70–89	2

Rivers were sampled five times during this reporting period. In addition to the requirement to sample within flow percentile groups, there is a requirement to ensure there is a reasonable time period between each sample. The aim of this strategy is to provide a fully representative assessment of river health over time by taking account of the impact of flow on water quality. As in the previous reporting year, the full range of samples, as scheduled in Table 2, were not taken as the flow was not adequate for high flow percentile samples.

The biological health of rivers was assessed using stream animals (macro invertebrates) as indicators. Thirteen sites are sampled and are selected as either reference sites or test sites (see Table 3). The selection of test sites was based on potential and known impacts from rural degradation, urban runoff, discharge of treated sewage effluent, trace metal contamination, habitat degradation, sedimentation and river regulation. The three reference sites were selected from those sampled during development of the ACT component of the National River Health Program (NRHP). The ten test sites and three reference sites were sampled in October 2002 and April 2003 (see Figure 8 and Figure 9).

**Table 3: Macroinvertebrate Sites**

Site No	Location	Site Type
40	Murrumbidgee River at Angle Crossing	Reference
53	Murrumbidgee River at Halls Crossing	Test
20	Gudgenby River at Smiths Road Crossing	Test
58	Tuggeranong Creek downstream of Lake Tuggeranong	Test
10	Paddy's River at Murray's Corner	Reference
15	Tidbinbilla River at Paddy's River Road	Reference
242	Molonglo River at Sutton Road Bridge	Test
70	Molonglo River at Coppins Crossing	Test
235	Queanbeyan River below Queanbeyan Cemetery	Test
246	Jerrabomberra Creek at Hindmarsh Drive	Test
189	Yarralumla Creek at Cotter Road Bridge	Test
195	Ginninderra Creek	Test
64	Ginninderra Creek	Test