

INTRODUCTION

Purpose

This report is intended to provide the ACT Community with information on the water quality in ACT lakes and rivers for the year 1 April 2000 to 31 March 2001. To establish a statistically significant analysis of water quality trends, the analysis includes data for the period 1992 to 2001.

The report is divided into three main sections. The first introduces the report and provides background information for interpreting the water quality data. The second section discusses water quality condition. The indicators used are introduced and results discussed for the lakes and rivers in light of the methods set up for the Sustainable River Audit commissioned by the Murray Darling Basin Commission (MDBC), The Territory Plan and Water Quality Standards. Monitoring information is provided on action under the *Water Resources Act*, which came into full effect on 11 December 1999. 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 waterways of the ACT with the exception of the Cotter catchment and Lake Burley Griffin. In view of the generally undisturbed nature of the catchment, water quality monitoring assessing the protection of conservation values has only been undertaken periodically. However, as part of its licence to take water, ActewAGL is undertaking a major monitoring program in the Cotter and Queanbeyan water supply catchments. It encompasses physical, chemical, biological, and fish components and is supporting a major investigation into environmental flows being undertaken by the Cooperative Research Centre for Freshwater Ecology. Progress will be reported in 2002. Drinking water quality, which is the responsibility of ActewAGL and the Chief Health Officer, is not part of this report.

Lake Burley Griffin is a Commonwealth responsibility and is the subject of an annual report produced by the National Capital Authority.

Landuse

There are four major land uses in the ACT (Figure 1). Conservation land use tends to have a minimal impact on water quality. Plantation forestry and agricultural 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.

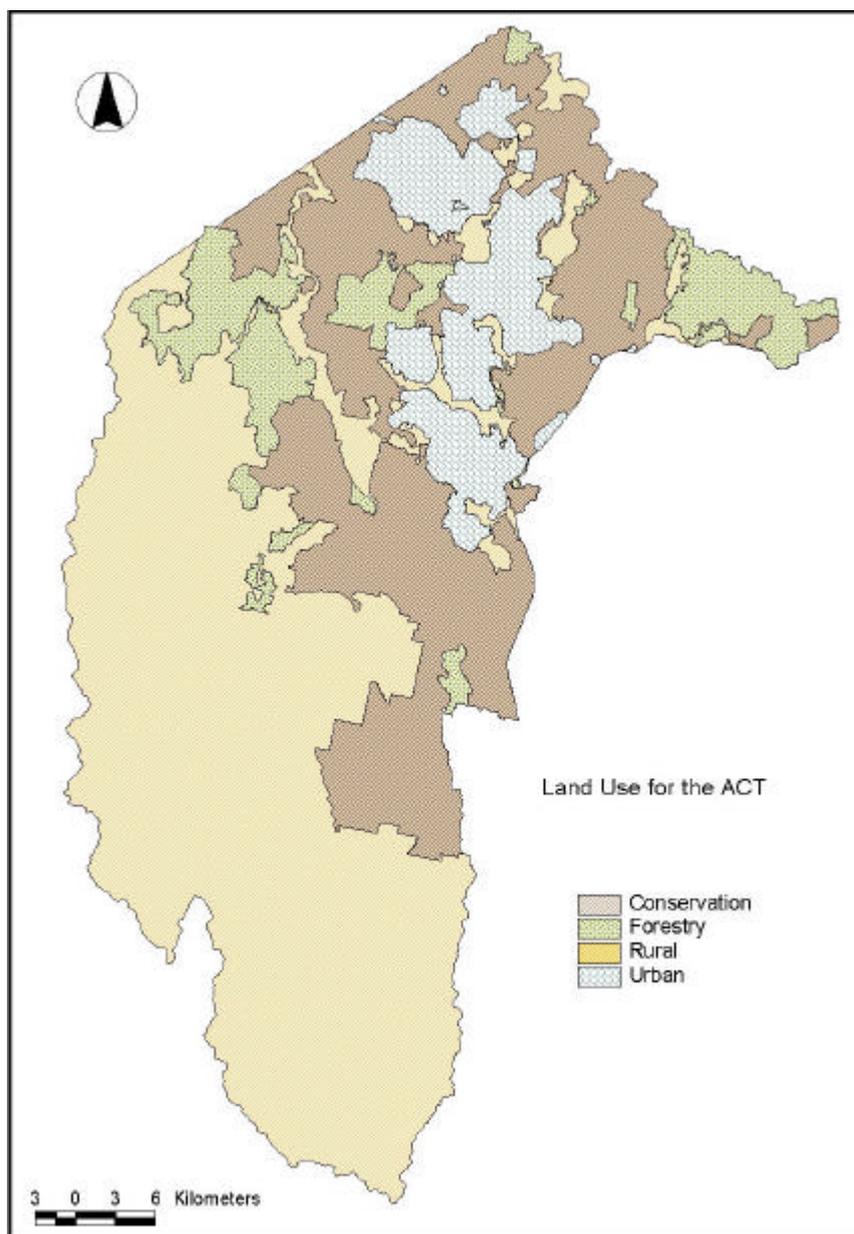


Figure 1: Land Use Map

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.

The ACT Government measures rainfall at a number of sites in the ACT. Rainfall for a site in Belconnen near the Barton Highway (Figure 2) shows both the monthly average rainfall for the 2000-2001 reporting period as well as the long term monthly average.

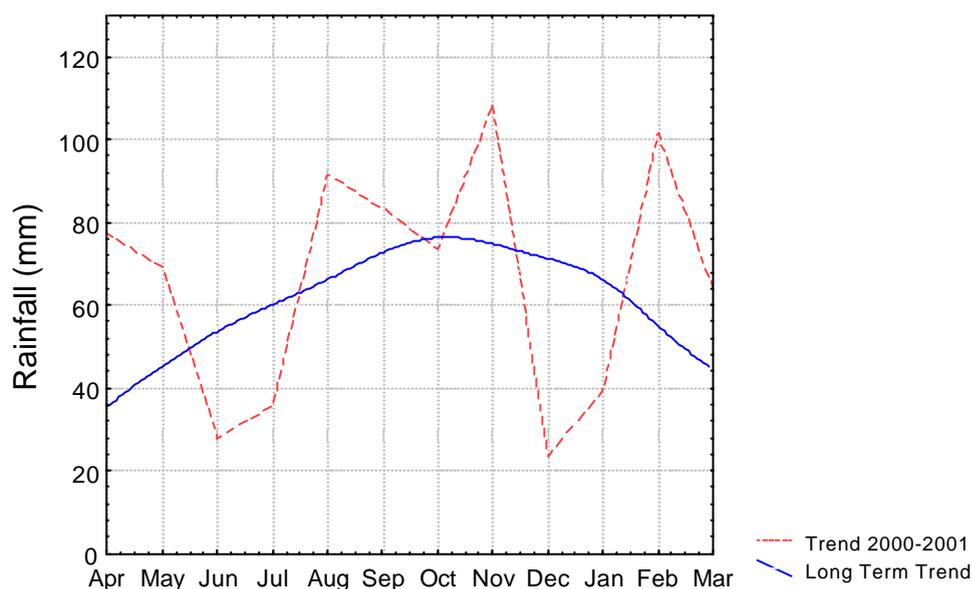


Figure 2: Monthly Average Rainfall in Belconnen near Barton Highway

The long term average annual rainfall, since 1992, in Belconnen at the Barton Highway site is 729 mm. The annual rainfall for this reporting period was above the long term average at 795 mm and greater than the 741 mm recorded during the last reporting period of 1 April 1999 to 31 March 2000. The rainfall data show a regular rainfall pattern, with no extreme high or low rainfall monthly averages in the reporting period.

Streamflow

Streamflow during the period was generally below the long term average. Flow in the Murrumbidgee River near Angle Crossing (Figure 3), shows that the mean monthly flow into the ACT only exceeded the long term average in November. It also shows the extended low flow period that occurred during most of the year except the spring season.

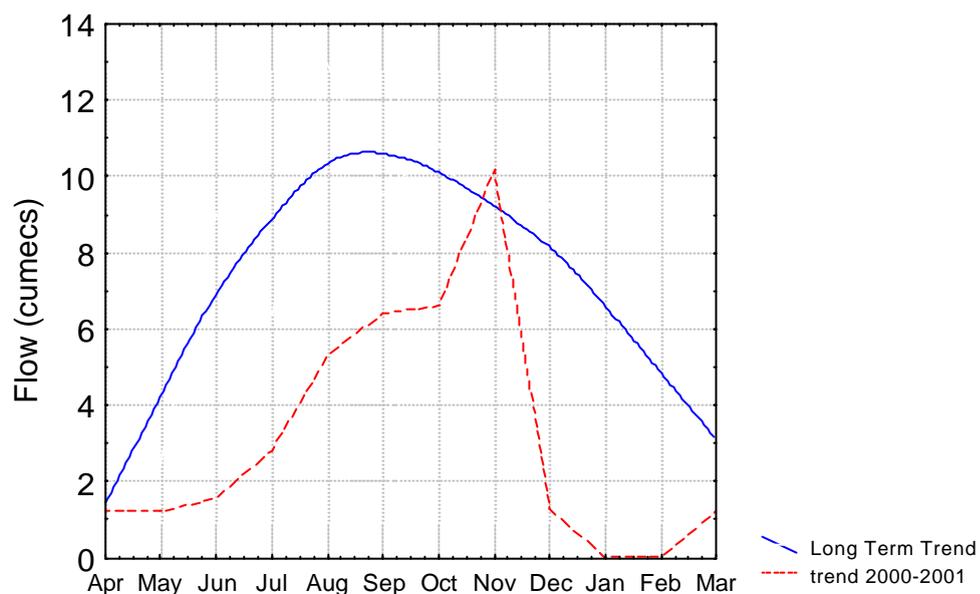


Figure 3: Average Monthly Flow in the Murrumbidgee River Near Angle Crossing

Urban areas react more quickly to rainfall with a greater proportion of rainwater being converted to run off due to the large impervious surface areas. Flows in Ginninderra Creek illustrate the elevated levels of run off from the urban area (Figure 4). It more closely matches the rainfall than the flow at Angle Crossing that drains a less developed catchment, responds more slowly to rainfall events and is effected by conditions upstream. For more information about flow in different regions see (Appendix 1).

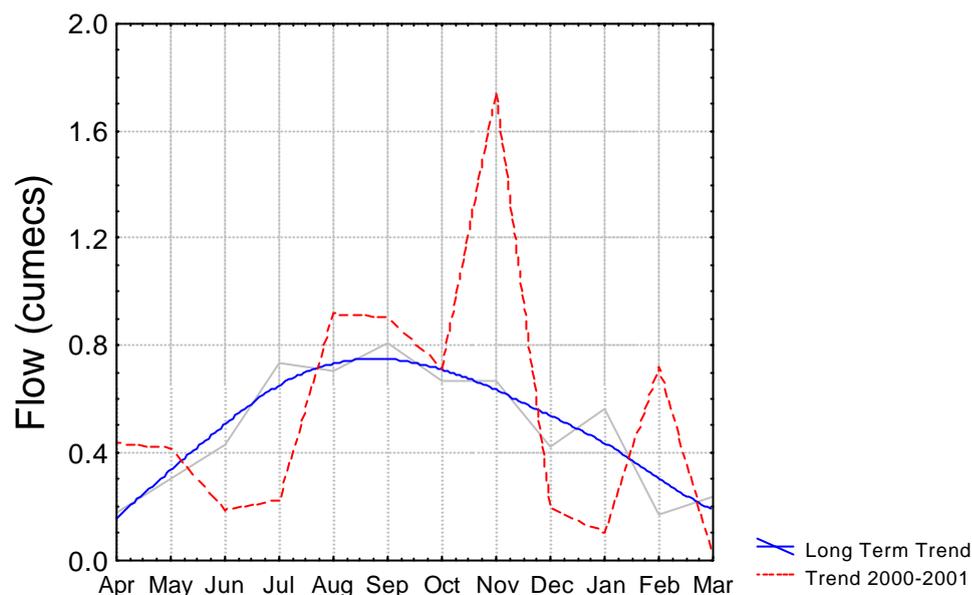


Figure 4: Average Monthly Flow in Ginninderra Creek Near Charnwood Road

Rivers of the ACT and 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 well 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 rise to the south-east of the ACT with both draining to Lake Burley Griffin.

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

ACT Government Responsibilities in Relation to Water Quality

The Territory Plan and Water Quality Standards

The Territory Plan sets the designated uses for the waterways in the ACT. The Plan identifies three categories of water use and catchment policies. These are drainage and open space, water supply, and conservation. For each category a range of other uses are allowed which are generally compatible with, but secondary to, the primary value. Water quality standards are identified in the *Environment Protection Regulations 1997*. These regulations contain a set of 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.

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)				So as not to block irrigation systems	12.5–25
Chlorophyll 'a' (µg/L)	10	10	10		2–10
Algal Cells Counts (cells/mL)	5,000	5,000	up to 10,000 depending on species		5,000
Bacteria (faecal coliforms/100 mL)	150	1,000	1,000	1,000	
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	

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

Protection of Water Quality

The ACT Government has broad responsibilities in relation to water quality. This includes meeting ACT standards which are set out in Schedule 4 of the *Environment Protection Regulations 1997*. Water uses or activities, which are not included in the Water Quality Standards, are managed taking account of the appropriate part of the *National Water Quality Management Strategy*.

Environment ACT manages a water monitoring program for the ACT that includes the collection of water quality, streamflow and biological information. Such information is used to determine whether waters in the ACT are of adequate 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 provide information about changes to water quality over time.

The 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 licensing 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.

Monitoring Program

The data for this report is sourced from the ACT Government's water quality monitoring program and from authorised dischargers, including Lower Molonglo Water Quality Control Centre and Queanbeyan Sewage Treatment Plant. The ACT Government program is based on regular sampling of lakes and rivers.

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 other similar areas. The site locations can be seen on the water quality indicator maps Figure 7 through Figure 11 for water quality sampling and Figure 5 and Figure 6 for biological sampling.

Lakes

The major urban lakes (with the exception of Lake Burley Griffin – a Commonwealth responsibility) are sampled eight months of the year (see Table 2). The sampling program for lakes is not flow related.

<i>Month</i>
August
October
November
December
January
February
March
May

Table 2: Lake Sampling Occasions

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 entering it.

A separate program to monitor blue-green algae in Canberra's lakes is undertaken during the summer months by Environment ACT. In the reporting period, the observed levels of blue green algae were not high enough to issue any public alerts, which are triggered when algae levels are recorded above 5000 cells per millilitre.

Rivers

A flow based sampling program has been adopted in the case of stream water quality. 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 (Table 3). The 5th percentile flow is the flow exceeded only 5% of the time and represents very high flow; conversely the 90th percentile flow indicates very low flow.

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

Table 3: Flow Percentiles for River Sampling

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 streets and fields do so during rainfall events. In conjunction with water quality monitoring, streamflow allows for the calculation of pollutant loads in our lakes and rivers.

Rivers were sampled ten times during this reporting period. In addition to the requirement to sample within flow percentile groups (Table 3), 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.

Macroinvertebrate test sites were selected to represent river health in the region. Their selection 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 previous rounds of the ACT component of the Monitoring River Health Initiative (MRHI). The 10 test sites and three reference sites were sampled in October 2000 and April 2001 (Figure 5 and 6).

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	Paddys River at Murray's Corner	Reference
15	Tidbinbilla River at Paddys 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

Table 4: Macroinvertebrate Sites