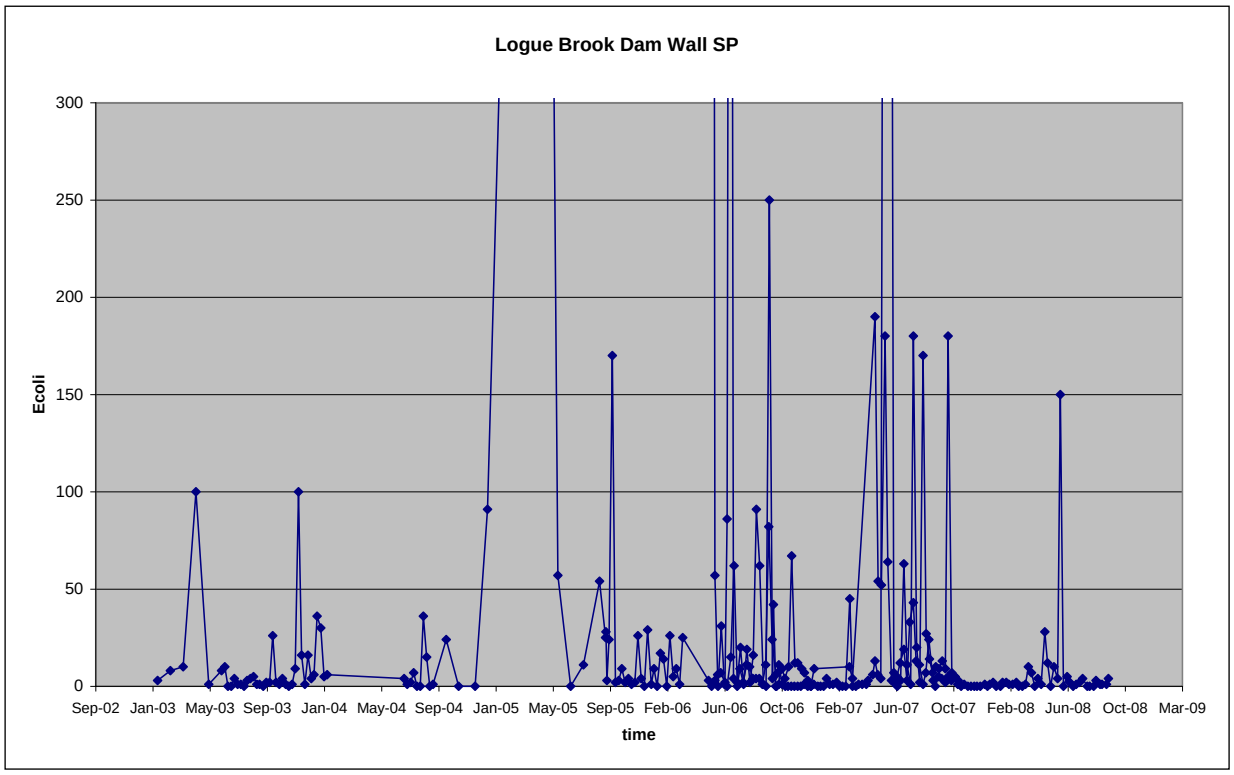
Government of **Western Australia**
Department of **Health**

Drinking Water Catchment Protection

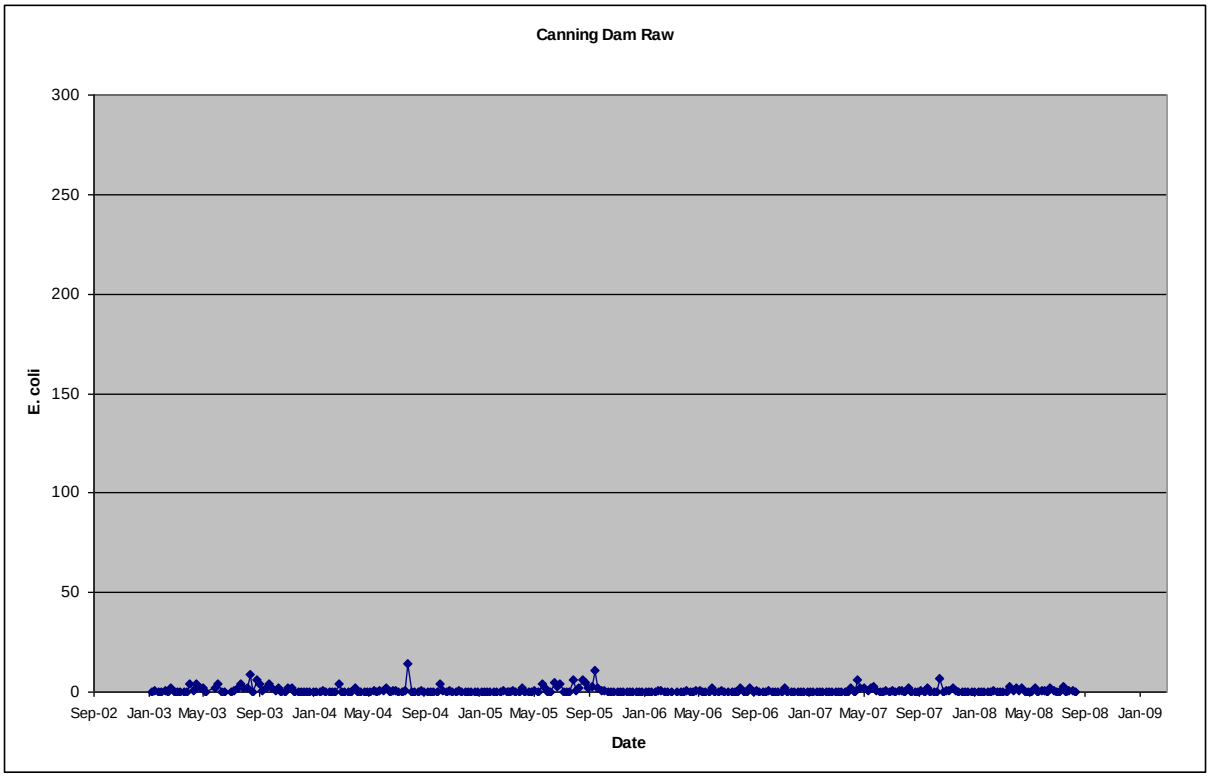
Water is essential to sustain life. It is easy for us to take the quality of our drinking water for granted – when we turn on the tap, we expect safe, pleasant tasting water to flow out. Our health depends on having an adequate supply of safe water for drinking, cooking, laundry, bathing even brushing our teeth – every day.

Does Drinking Water Catchment Protection Work?

- It is universally recognized that good public health engineering practice requires the separation of human activities from drinking water sources wherever possible. Where near-pristine conditions can be maintained, source waters typically require nothing more than disinfection (usually by chlorination) to render them safe for human consumption.
- Access to Perth's drinking water catchments has been restricted since the 1890's, following a major outbreak of typhoid fever, in which 367 residents died. At the time the Victoria Dam and upstream land use activities were identified as the source of the outbreak.
- The following two charts show the effect upon the microbiological quality of dam water as a result of allowing recreational activities to occur within the catchment area. Logue Brook Dam has recreation permitted while recreational activities are prohibited in Canning Dam. (E. coli is a specific indicator of faecal contamination and hence the safety of water for drinking).



(Water Corporation 2009)



(Water Corporation 2009)

- All drinking water dams serving the Metropolitan area that have restricted recreational access display similar microbiological results to those recorded at Canning Dam.

Why Should Drinking Water Catchments Continue to be Protected?

- For many older, more densely settled countries in other parts of the world the simple solution of catchment protection is often no longer an option. Compromised catchments and degraded dams mean that these societies start with sources of contaminated water. Engineers responsible for the provision of drinking water to such communities have developed elaborate and complex treatment processes to render the water as safe as possible, but such treatment comes at great cost to the societies concerned and is subject to malfunction.
- In WA the estimates provided to Government by the Water Corporation in 2008 to install and operate a multibarrier treatment system designed to permit multiple use activity and to provide safe drinking water in one small dam (Logue Brook) show similar increased costs. The opportunity cost of 5.3GL per year of water available in the Dam is estimated at between $47 million and $88 million, in net present value terms. However the Water Corporation estimate that the treatment required for Logue Brook would cost between an additional $120 million to $160 million in capital costs and approximately $1.6 million in annual operating costs. In net present value terms this is a total cost to the Government of $140 million to $180 million over 30 years.
- The protected nature of Perth's catchments has enabled the metropolitan supply to avoid costly treatment processes thus far. The Water Corporation currently carries out only coarse screening, followed by disinfection using chlorine (or chloramination on the Mundaring pipeline). This practice, supported by successive Governments, has provided safe low cost drinking water to Western Australians for the past one hundred years.

Are Drinking Water Catchments Protected in the Other States and Territories?

- In other State and Territories similar processes are practiced by a variety of agencies and multiple use activities within drinking water catchment areas supplying Canberra, Melbourne, Sydney, Darwin and Adelaide are prohibited.

City	Reservoir	Catchment type	Recreation on reservoir	Recreation in catchment
Canberra	Corin, Bendora	Native bush land	None permitted	None permitted
Melbourne	Thomson, Upper Yarra, Silvan, Cardinia	Native bush land	None permitted	None permitted
Sydney	Woronora, Cataract, Cordeaux	Native bush land	None permitted	None permitted
Sydney	Warragamba	Mixed land use	None permitted	None permitted within 3km
Wollongong	Avon	Native bush land	None permitted	None permitted
Darwin	Darwin River	Native bush land	None permitted	None permitted
Perth	All	Native bush land	None permitted	None permitted within 2km

- Where pre-existing land uses have already exposed the water to a high level of risk, multiple uses are permitted in the following reservoirs

City	Reservoir	Catchment type	Recreation on reservoir	Recreation in catchment
Brisbane	Wivenhoe, Somerset, Samsonvale	Mixed land use	Non-motorised, primary contact	Open
Goldcoast	Heinz	Mixed land use	Non–motorized, secondary contact	Open
Canberra	Googong	Mixed land use	Non-motorised, secondary contact	Open
Newcastle	Grahamstown	Mixed land use	Non-motorised, secondary contact	Open

- It should be noted that multiple uses permitted within these reservoirs has come at a cost. A case example is Googong Dam, a small dam supplementing the supply to Canberra, ACT. Canberra obtains most of its drinking water from three other dams, and Googong is used only during periods of high demand. It collects water from a degraded rural catchment, which includes farmlands, and small communities. Consequently, the water quality from this catchment can be variable and requires full treatment. Water from Googong costs ten times more to produce than water from the other dams, as treatment includes:
  - coagulation by liquid alum and a polymer coagulant aid flocculation
  - clarification and filtration
  - disinfection by chlorination
  - pH adjustment and stabilization with lime.

What Happens Overseas?

- Internationally in the United Kingdom, 27 water supply authorities provide drinking water. Where groundwater is available as a primary source, it is generally of good quality and requires very little additional treatment other than chlorination. However, surface waters (dams, and reservoirs) require comprehensive treatment to remove chemical and microbiological contaminants resulting from agricultural and human activities as most catchments have been compromised. As the water supplies in many catchments are subject to contamination events, water supply authorities rely on sophisticated treatment technologies to provide safe drinking water. However, the drinking water provided to the public does not always achieve 100% compliance even with basic microbiological criteria, as the following extract from a UK Drinking Water Inspectorate report suggests.

> In 1999, 32 (2.21%) of the 1,447 treatment works in England and Wales had contraventions of the standard in respect of faecal coliforms and 165 (11.40%) in respect of coliforms. In 2001 a total of 169 samples taken from 133 treatment works (9.60% of all works) were found to contain total coliforms, compared with 247 samples from 182 treatment works (13.11%) in 2000. In 2001, faecal coliforms were detected in 30 samples taken from 28 treatment works (2.02% of all works), compared to 43 samples from 41 treatment works (2.95%) in 2000.

- In the United States, there are approximately 170,000 public water supplies, of which about 80,000 (47%) come from surface water reserves. Control of recreational activities on surface catchments has historically been dependent upon local regulators and water providers. Between 1986 and 1992, the US Centers for Disease Control and Prevention reported 102 disease outbreaks affecting 34,155 people in 35 States, attributed directly or indirectly to bacteria, viruses or parasites from drinking water.
- In 1993 one of the largest water-borne disease outbreaks in history occurred in Milwaukee, Wisconsin, which draws its drinking water from Lake Michigan. Cryptosporidium protozoa in the supply affected over 400,000 people and caused approximately 100 deaths. This led in 1999 to the introduction by the US EPA of its Interim Enhanced Surface Water Treatment Rule.
- The effect of this Rule has been to force large water providers to reassess dam usage and catchment integrity. As a consequence, individual States and Territories are currently reviewing and developing legislation to limit recreational activities on surface catchments and storages.
- In Canada, a water-borne outbreak in 2000 at Walkerton, Ontario, affected over 2,000 people and killed 7. The enterohaemorrhagic Escherichia coli bacteria responsible came from a

contaminated groundwater source in this case, but the Royal Commission set up to inquire into the outbreak recommended a radical shake up of the water industry generally. It stressed in particular the need for a multiple barrier approach to drinking water quality, including the restriction of human activities (such as recreation) on or near drinking water reserves and storages.

What do the National and International Guidelines Say?

- The importance of catchment management as an essential part of the multi barrier approach has been clearly recognized both in Australia by the National Health and Medical Research Council 2004 Australian Drinking Water Guidelines (2004 ADWG) and overseas by the World Health Organizations 3rd Ed Guidelines for Drinking Water Quality (WHO).
- The WHO Guidelines state “resource protection and source protection provide the first barriers in protection of drinking water quality”.
- The 2004 ADWG states “the greatest risk to consumers of drinking water is pathogenic micro-organisms. Protection of water sources and treatment are of paramount importance and must never be compromised”. Furthermore the 2004 ADWG states” prevention of contamination provides greater surety than removal of contaminants by treatment, so the most effective parrier is protection of source water to the maximum degree practical”.
- All Australian States and Territories have adopted the 2004 Australian Drinking Water Guidelines.

Summary

- It is universally recognized that separating human activities from drinking water sources wherever possible protects public health.
- Drinking water source protection is recommended by National and International Guidelines.
- Recreational activities in and around dam and catchment areas impacts upon the water quality.
- Treatment processes are available to remove contaminants in water. However, they are expensive to run and can breakdown.
- Protected catchments have provided safe low cost drinking water to all Western Australians for the past one hundred years

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