



Groundwater Quality

State of Environment Summary

2007

Water quality standards

The Drinking Water Standards for New Zealand (Ministry of Health 2000) are used for management of groundwater quality. These standards provide both health-based maximum allowable values and aesthetic guideline values.

How is groundwater quality determined?

A trained technician visits all groundwater monitoring sites quarterly, 6-monthly or annually depending on the site. The bore is purged to make sure the water quality sampled is from the groundwater and not an artifact of the bore. Water samples are taken and bottled and sent off to a certified laboratory for analysis. Results of water samples are stored in a database at ORC.



Why we sample for groundwater

Groundwater is used throughout Otago for domestic and community supply, stock water, commercial uses and irrigation purposes. Groundwater is a receiving environment for contaminants from natural processes and man-made pollutants. Otago Regional Council has been monitoring groundwater quality throughout the region on a regular basis since 1995 to ensure safe drinking water and to gain a better understanding of variation in the region.

The council monitors 101 bores throughout the region. The water quality results vary depending on location, age and depth of the bore and connection with surface water.

Key indicator

The key indicator parameter monitored in Otago is nitrate. The other main parameters of concern are discussed below. The following maps present the average nitrate levels for Otago and information on the other water quality parameters are summarised beside each area.

Nitrate concentrations in groundwater can rise due to contamination from septic tanks, fertilisers, agricultural practices and discharge to land of high nitrate wastewaters. Most of the contamination is near surface, therefore shallow groundwater bores are at greatest risk.

High iron, manganese and arsenic are often found in areas with iron rich sediments and iron bacteria can become a problem in wells when levels are elevated. Iron has mostly aesthetic problems but manganese and arsenic can pose health problems.

Microbial contaminants for health concern are often found in poorly secured wells, areas of high human or animal effluent discharges. This is often associated with shallow wells especially those with no well head protection (sealed to prevent down bore flow from surface runoff). Key indicators for microbial contaminants are *E. coli* and faecal coliforms.

Boron concentrations are elevated in some areas due to the natural chemical interactions between water and rock. When groundwater passes through sediments, leaching occurs resulting in boron from clays in the sediments dissolving into water.



Wakatipu Basin 1

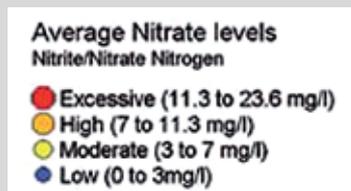
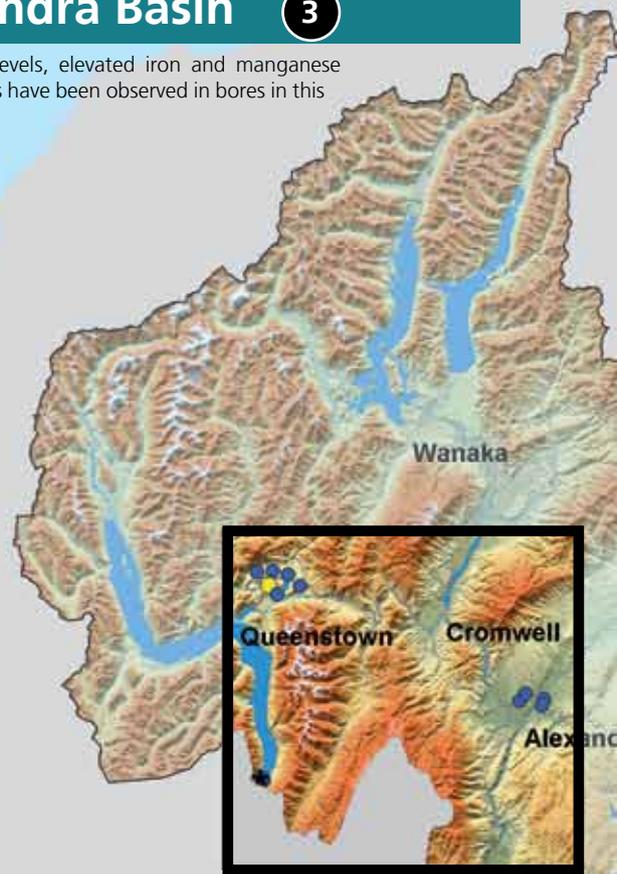
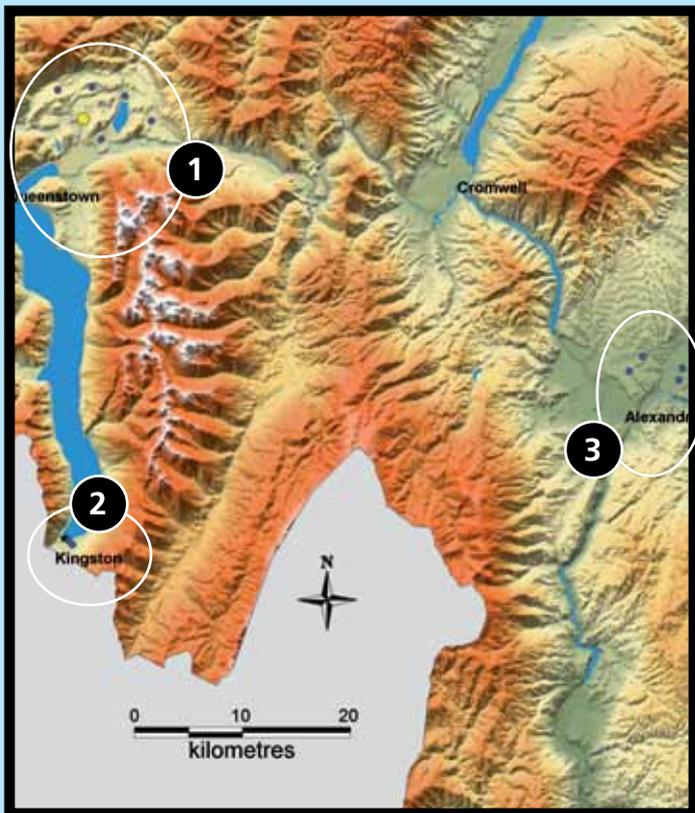
The water in the area can be characterised as high bicarbonate, slightly acidic water with low to moderate nitrates. Some bores have elevated faecal coliforms.

Kingston 2

The groundwater in this area is high in iron, slightly acidic and calcium-bicarbonate rich water.

Alexandra Basin 3

Low nitrates levels, elevated iron and manganese concentrations have been observed in bores in this basin.

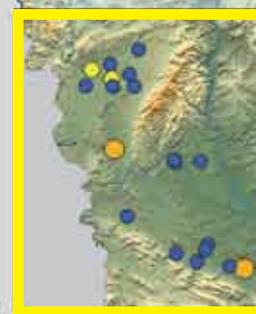
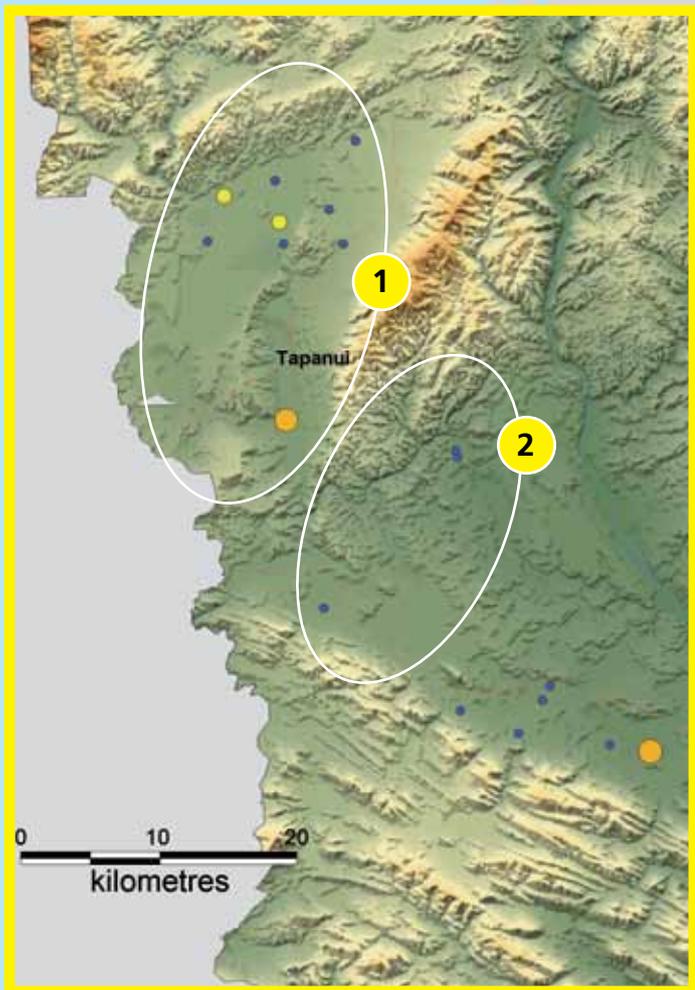


Pomahaka Basin 1

Groundwater quality is reasonable except for a few bores with elevated faecal coliforms and nitrates. The water is slightly acidic and bores draw their water mostly from shallow groundwater.

Clydevale/Wairuna Basin 2

20% of bores tested positive for faecal coliforms. Elevated levels of iron and boron were measured in some wells. Decreasing trend in pH, chloride and conductivity was seen over time.



Lower Waitaki 1

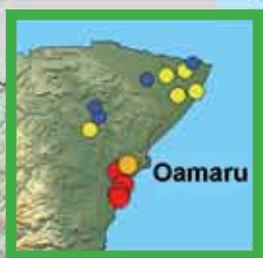
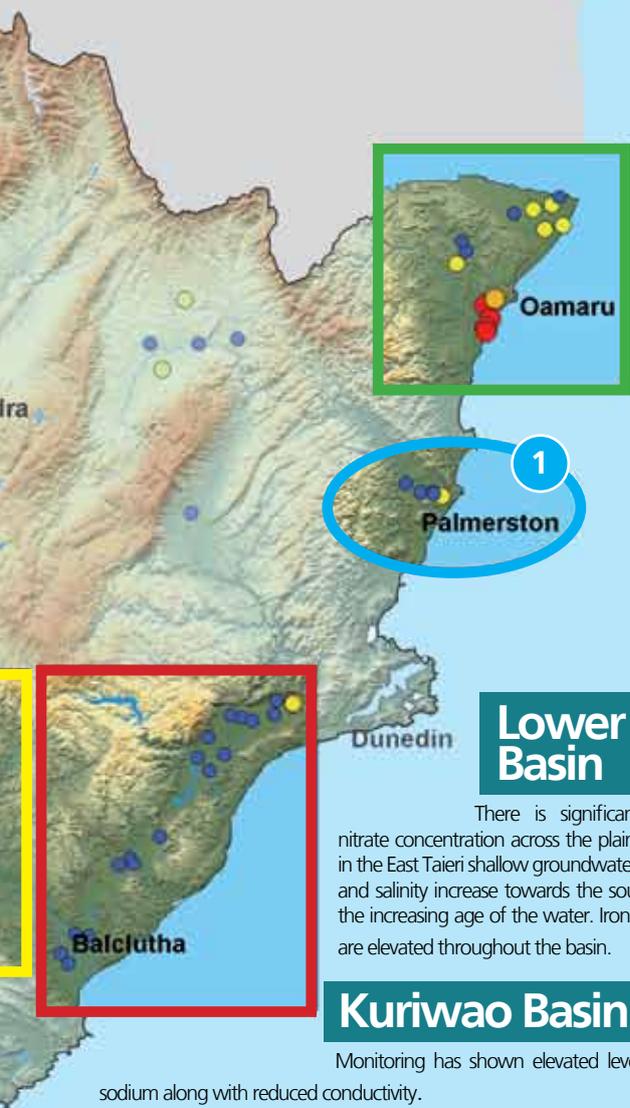
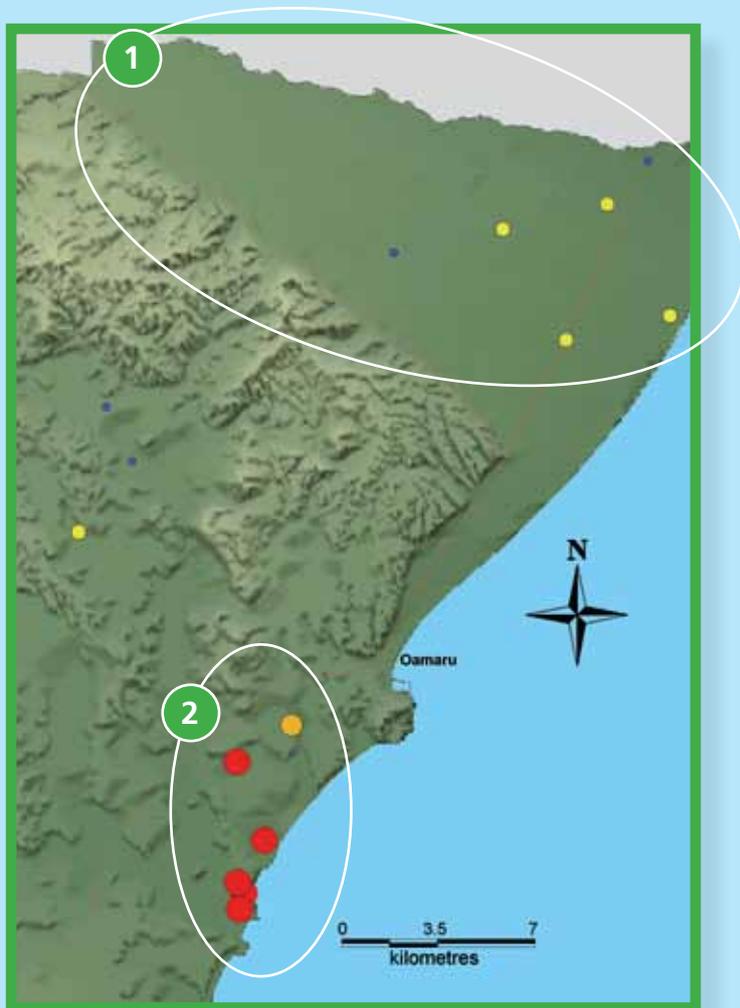
This area is dominated by shallow groundwater. Many of the bores have moderate levels of faecal coliforms.

Waireka/Deborah volcanic aquifers 2

Groundwater in this area has very high nitrate levels.

Shag Valley 1

Water quality monitoring has shown elevated levels of iron, manganese and sodium, combined with slightly acidic water.



Lower Taieri Basin 1

There is significant variation in nitrate concentration across the plains. It is elevated in the East Taieri shallow groundwaters. Conductivity and salinity increase towards the southwest due to the increasing age of the water. Iron concentrations are elevated throughout the basin.

Kuriwao Basin 2

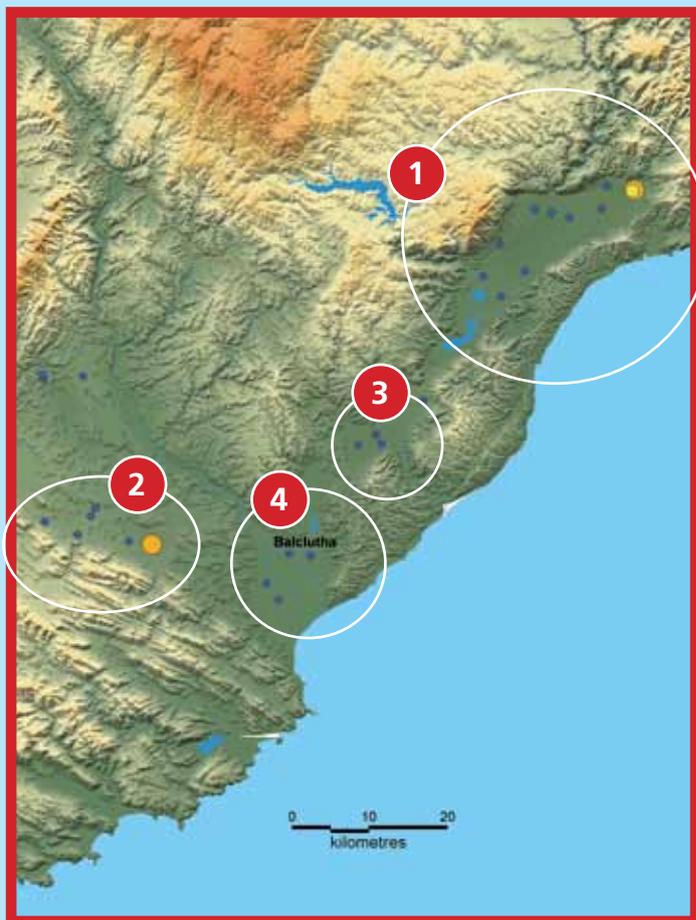
Monitoring has shown elevated levels of iron and sodium along with reduced conductivity.

Tokomairio Basin 3

Groundwater in the basin is slightly acidic, high in iron and manganese.

Lower Clutha Plain 4

Water quality monitoring indicates high faecal coliforms, slightly acidic water, high iron, high manganese, and low nitrates.



Results

Groundwater quality is generally good throughout Otago. Monitoring indicates most sites are within national water quality standards.

Results from groundwater quality monitoring show that most bores are of satisfactory quality. In some aquifer systems there are elevated levels of iron and manganese. There are variable results for bacterial levels, with most bores being below health guidelines, but there were some high values in bores. These exceedences may be attributed to lack of maintenance, location and age of the bore. This highlights the importance of good wellhead security.

Nitrate levels are low to moderate (relative to the DWSNZ) throughout most of Otago, as shown on the previous figures. Increasing nitrates generally reflect the increased agricultural development. In North Otago there were exceedences of the drinking water standard, mainly due to the land use being intensive market gardening.

More Information

Groundwater levels from the key monitoring bores are available under the Environmental Monitoring section of the ORC website: www.orc.govt.nz

Further information on specific Otago aquifers is available on our website under Plans & Publications or by contacting us on 0800 474 082.

The Regional Plan: Water is also available online.

SOE reports

- Taieri River Catchment Monitoring Report 1999
- North and Coastal Otago River Catchments Monitoring report 1999
- Clutha Catchment Monitoring report 1999

Recently published aquifer reports

- Groundwater Allocation of Ettrick Basin 2006
- Groundwater Quality in Kingston and Glenorchy 2006
- Groundwater Allocation of the Alexandra Basin 2005



In Progress

A review of groundwater monitoring throughout Otago is currently being completed to ascertain if there are areas that require new monitoring sites or if any current sites are not suitable to be used.

North Otago Volcanic Aquifers Groundwater Allocation Project is planned for 2007-2008 which will include a detailed assessment of current monitoring bores and the quality of sampling data.



Contact

Otago Regional Council

Ph: 0800 474 082

www.orc.govt.nz

