



# Groundwater Quantity

State of Environment Summary

April 2009

## What do we monitor?

Otago Regional Council technicians manually monitor the groundwater levels in over 130 bores four times per year.

There are four groundwater sites in Otago which are telemetered with groundwater levels recorded every 15 minutes and transmitted back to our main office. There are 11 other bores which are continuously monitored and the data are downloaded every month. Seven of these key groundwater monitoring sites are now available on-line from the ORC website.

## Why we monitor groundwater levels

Groundwater levels (groundwater hydrographs) give a good indication of the state of groundwater quantity. For example, is the aquifer recovering from abstraction during the irrigation season? Are the long-term trends in groundwater levels stable, or is there a long-term decline?

During wet periods, rainfall saturates the soil and excess water drains below the soil profile into the groundwater system, refilling or replenishing the aquifer. In many cases in Otago water bodies such as rivers, lakes and streams also contribute significant amounts of recharge.

The balance between abstraction and recharge may vary from year to year with climatic variations. Generally, groundwater levels will naturally decline in the summer periods when use is high and recharge is low. However, aquifers act as a storage system so that dry years can be compensated by wet years. Looking for long-term trends in the groundwater levels indicates if a system is reaching its sustainable abstraction limit.

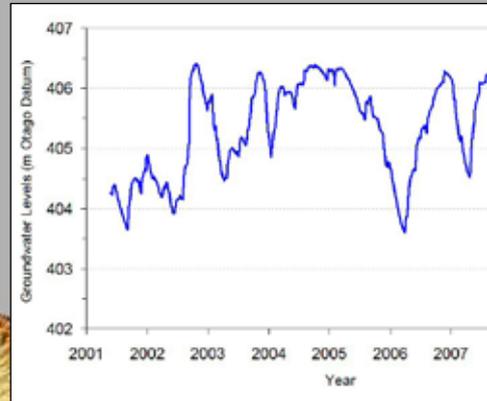
## What are restriction levels?

The restriction levels shown on the following groundwater hydrographs are from Schedule 4 of the Regional Plan: Water. These restriction levels are in place to manage consented groundwater abstractions within defined aquifer limits. When the aquifer reaches the 25% restriction level there shall be either a 25% restriction or a water allocation committee will implement a protocol to take all practical steps to curb the decline in the aquifer level so as to avoid a 50% restriction.



## Wanaka Basin

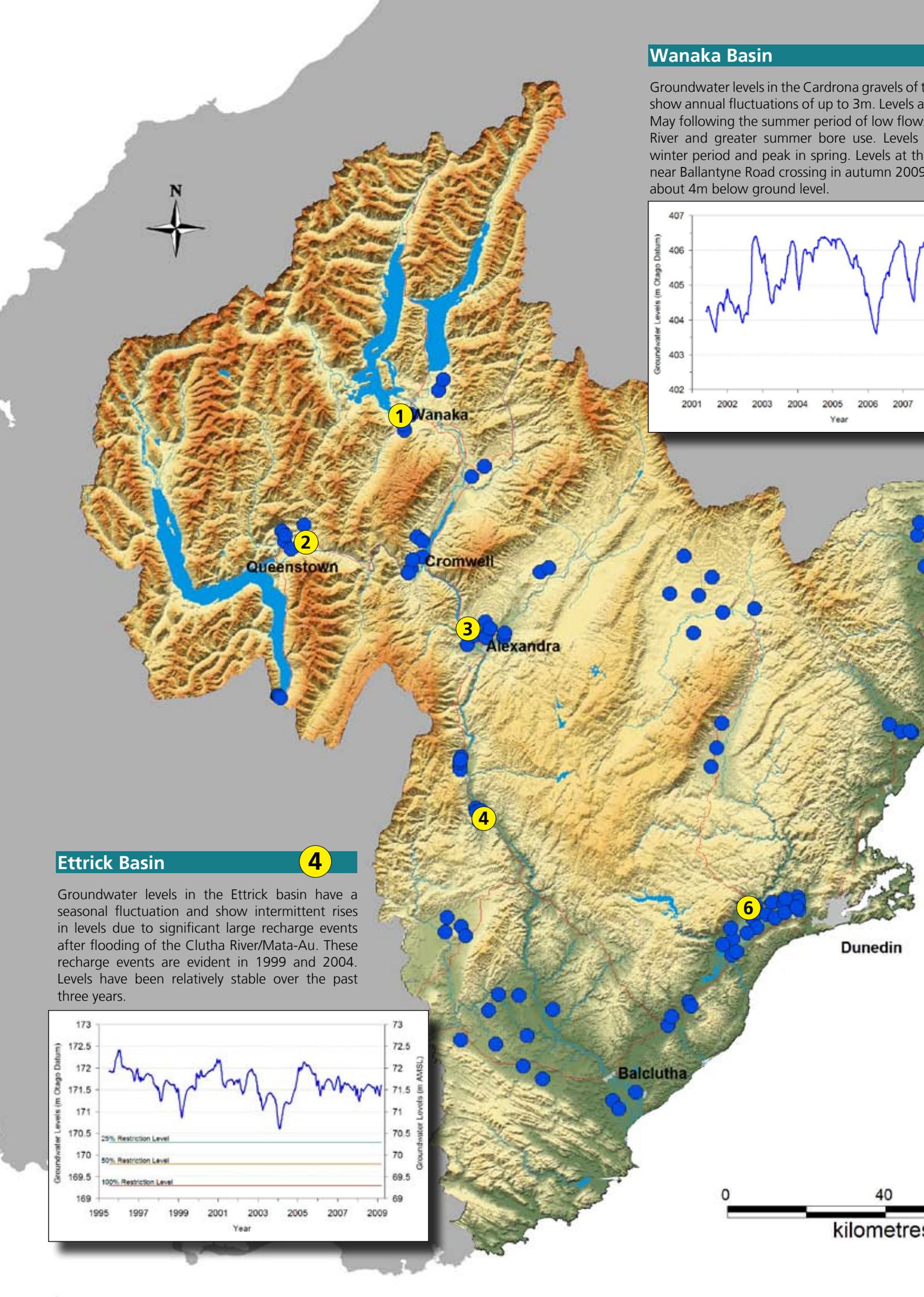
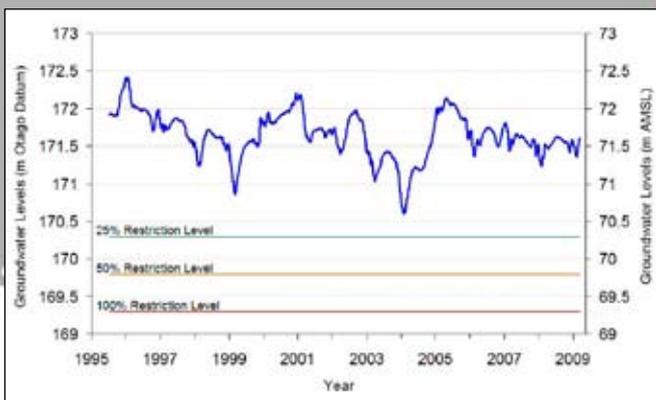
Groundwater levels in the Cardrona gravels of the Wanaka Basin show annual fluctuations of up to 3m. Levels are generally low in May following the summer period of low flow in the Clutha River and greater summer bore use. Levels are generally high in the winter period and peak in spring. Levels at the site near Ballantyne Road crossing in autumn 2009 were about 4m below ground level.



## Ettrick Basin

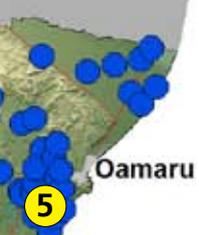
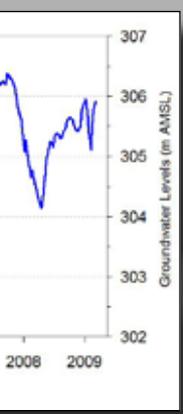
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Groundwater levels in the Ettrick basin have a seasonal fluctuation and show intermittent rises in levels due to significant large recharge events after flooding of the Clutha River/Mata-Au. These recharge events are evident in 1999 and 2004. Levels have been relatively stable over the past three years.



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The Wanaka basin are typically low in the Cardrona rise through the monitoring site are averaging at

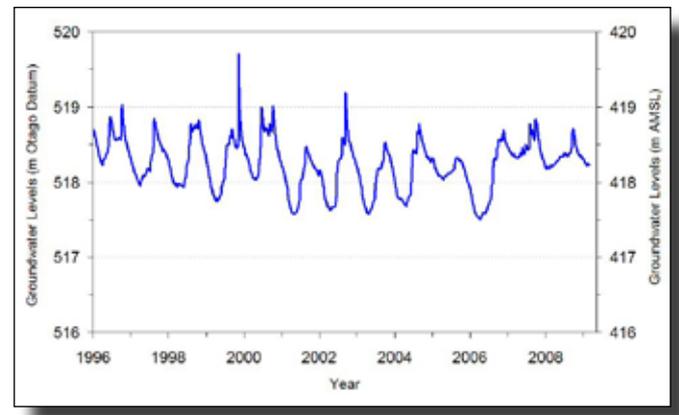


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## Wakatipu Basin

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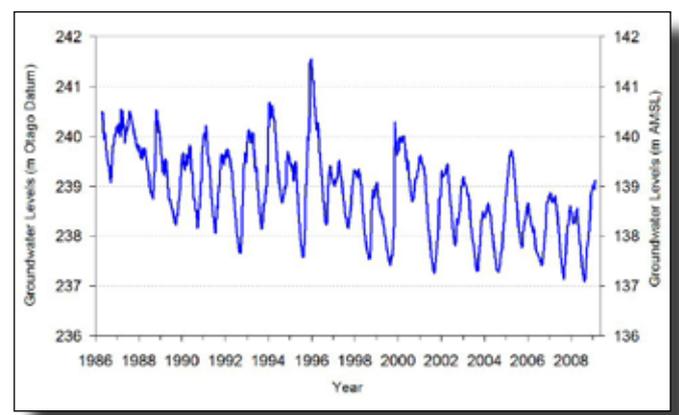
Groundwater levels in the Wakatipu basin rise during autumn and winter as a result of reduced groundwater use and increased autumn rainfall. Then there is a static period during the winter freeze followed by spring rain and thaw before a summer decline with increased bore use, slightly lower rainfall and high evaporation. Levels fluctuate every year by 1 to 1.5m. Groundwater levels have been relatively stable over the past two years.



## Alexandra Basin

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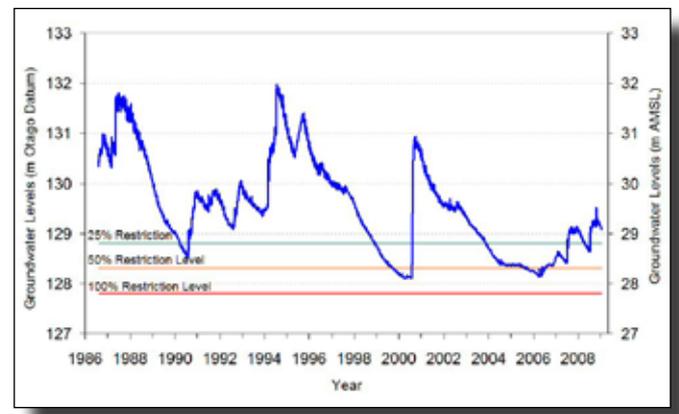
Groundwater levels in Dunstan Flats in the Alexandra basin show a strong seasonal fluctuation with levels peaking around January. The fluctuations are a response to recharge from the Clutha River/Mata-Au and excess irrigation water recharging down through the soil profile. Overall the hydrograph shows a 1 to 1.5m decline. Levels are reasonably high for the time of year at the start of 2009.



## Deborah Aquifer

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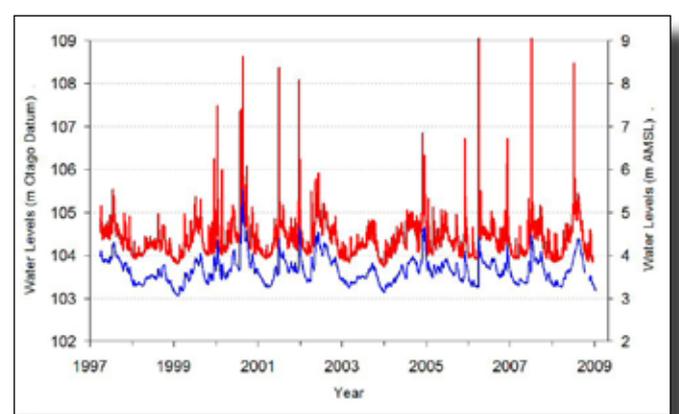
Groundwater levels in the North Otago Volcanic Aquifers (Deborah and Waiareka Aquifers) have been very low over the past six years and were below the 25% restriction level from December 2003 until July 2007. Over the past year levels dropped from February 2008 until July 2008 when a large rainfall/flood event caused levels to rise. Another rainfall event occurred in February 2009 causing levels to rise again. There has been a general recovery (rise) in groundwater levels over the last 3 years.



## Taieri Basin

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Groundwater levels in some areas are highly influenced by river recharge. The levels in the Outram monitoring bore show a rapid response to the Taieri River flows. The red line in the graph shows Taieri River levels at Outram and the blue line is groundwater levels from a 6m deep bore in Outram. The recharge in this area is predominantly from river recharge rather than rainfall percolating down through the soil profile as is seen in the Mosgiel area.



## More Information

Groundwater levels from the key monitoring bores are available under the Environmental Monitoring section of the ORC website: [www.orc.govt.nz](http://www.orc.govt.nz)

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

The Regional Plan: Water for Otago is also available online.

## Recently published aquifer reports:

North Otago Volcanic Aquifer Report 2008.



## In Progress

The Lower Taieri Groundwater Basin Investigation is currently underway. This study is being completed to determine an overall allocation limit for groundwater abstraction in the basin. It will also review the current restriction levels on the two reference bores in the basin.

To investigate the impacts of increased rates of pumping, a groundwater numerical model has been built. The affect on streams, rivers, groundwater levels and lakes are identified through the modelling. The allocation limit will take into account these potential affects of increased groundwater use.

The report is scheduled for publication in 2009.



## Contact

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[www.orc.govt.nz](http://www.orc.govt.nz)

