MARLBOROUGH DISTRICT COUNCIL

Groundwater Quality - Monitoring Summary 2012

Key Points

* Groundwater is sampled each season at a representative network of wells
* The monitoring network has been enlarged with a new site at Rai Valley which provides full coverage of the spectrum of Marlborough groundwater types and issues
* Groundwater samples are laboratory tested for a range of common constituents
* The quality of Marlborough's groundwater remains high and has not changed significantly from the 2010 baseline report
* There are a mixture of short term trends in water quality probably related to local land use practice or climate
* Fluctuations in the quality of insecure aquifers is commonly driven by natural leaching processes associated with spring rains

Why do we monitor?

Ongoing monitoring of Marlborough groundwater quality is an essential role of MDC because of the value of the resource to residents for drinking, economically and ecologically.

The potential exists for groundwater quality to quickly become degraded because of the insecure type aquifers in many parts of Marlborough.

The latest year of sample results show there has not been a significant change in Marlborough's groundwater quality since the initial baseline review was done in 2010. Interestingly, groundwater often remains clear when surfacewaters are turbid due to floods or rain because aquifers are isolated as the photo of Murphys Creek at the confluence with the Taylor River in 2011 illustrates.

Seasonality of groundwater quality in unconfined aquifers

Recent analyses have confirmed the seasonal nature of fluctuations in groundwater quality related to surface contaminants.

For example nitrate levels commonly peak in winter or spring as the cluster of high values in Figure 2 show for 2010.

However there are always exceptions and in some cases summer irrigation may cause spikes, or pumping may induce surfacewater into the aquifer and carry with it its chemical signature.

There is a good correlation between seasonal spikes in concentration and rainfall. Figure 3 shows the 4 monthly moving average of rainfall in black, matching changes in nitrate at an unconfined Wairau Aquifer well in red.

Figure 1. Confluence of Murphys Creek and the Taylor River

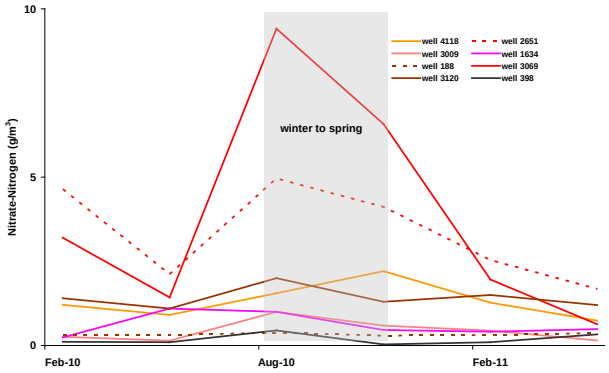

Figure 2. Nitrate-Nitrogen levels.

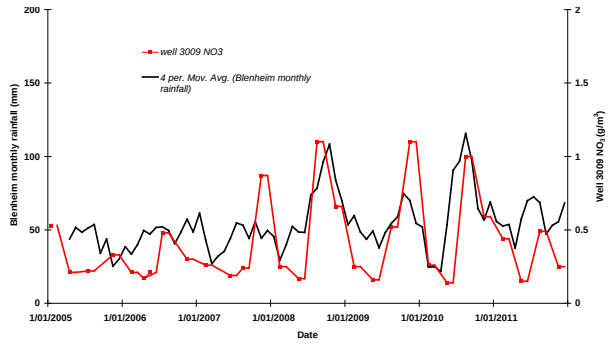

Figure 3. Rainfall versus nitrate level in well 3009

Expansion of monitoring network

MDC completed the district wide coverage of the regional groundwater quality monitoring network with the drilling of a dedicated well at Rai Valley in February 2012.

Until now there has been no systematic monitoring of groundwater chemistry or the influence of landuses for the Rai Valley area. Future growth of the township and intensification of catchment landuses may affect groundwater quality.

Information on the state and trends of groundwater quality will be used for catchment planning, to inform local residents of the quality of their well water and to learn more about the properties of the local groundwater resources.

The new well (10323) is located south of the school on the upper terrace (Figure 4).

Water samples will be taken each season for laboratory analysis of the standard set of parameters which will allow the chemical composition of groundwater to be compared with other Marlborough aquifers.

Measurements were also made of the age of groundwater and its likely origin, although most will obviously originate as rainfall or runoff. The results will form part of a separate report on the construction of the wells due to be released later in 2012.

Figure 4. Well 10323 looking towards the Rai River in the trees in the distance.

Improving knowledge of coastal aquifer salinity processes

It is a decade since MDC established the sentinel well network to provide early warning of seawater intrusion of aquifers located along the Cloudy Bay coastline.

Over that time no wells have been affected by seawater intrusion, although demand is yet to peak and no significant droughts have been experienced recently. A considerable amount of knowledge of aquifer behaviour has been gained through observing aquifer conductivity values over this time.

For example it is now known that peak conductivity values in the Rarangi Shallow Aquifer are caused by natural leaching of wind blown sea-salts transported by spring rains. The shape of the curve in Figure 5 shows this where the black line is the median conductivity since 2000 with a maximum in September to November. The yellow bands are the upper and lower percentiles with the middle 50% of observations in green.

This is not to say that localised seawater intrusion won't occur in the future, however the background seasonal variation in salinity in the unconfined aquifer is driven in most seasons by natural processes independent of pumping.

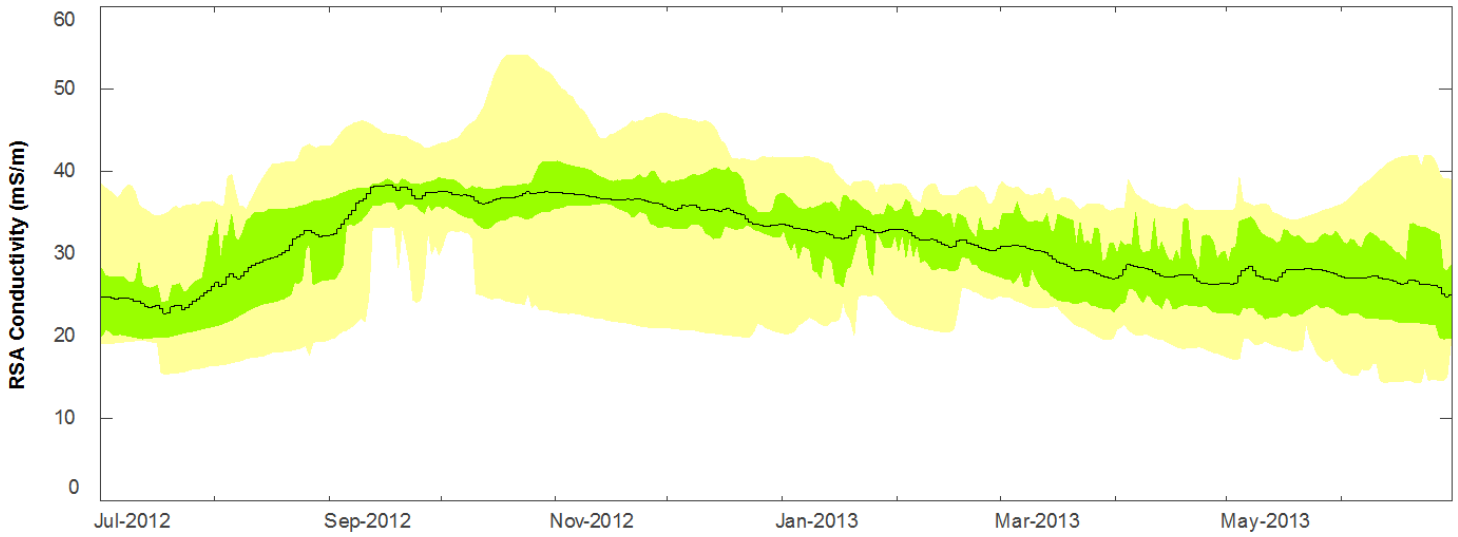

Figure 5. Rarangi Shallow Aquifer conductivity

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For more information on groundwater quality go to

www.marlborough.govt.nz

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