

Groundwater Quantity

Monitoring Summary Spring 2012

Key Points

- * The levels of most of Marlborough's aquifers are normal to high heading into the 2012/13 summer
- * Southern Valleys Aquifer levels are rebounding strongly with most having recovered to their pre-1997 drought state
- * Unconfined Wairau Aquifer levels have been low for much of the past 12 months
- * MDC are researching the causes including floodway management and whether rates of recharge vary with Wairau River flow
- * Measurements of water conductivity and temperature are being used in the study at an array of wells north-west of Renwick

How have aquifer levels changed over the past year?

- * Spring is a key time of the water year because it marks the start of drier conditions when demand on groundwater increases, and rates of recharge fall.
- * It is the ideal juncture to report on the impact of groundwater abstraction last summer, and the state of aquifers heading into the 2012/13 summer.
- * The series of plots to the right show the variation in groundwater levels at 5 key monitoring wells representing Marlborough's main aquifer systems.
- * Groundwater elevation is in millimetres above mean sea-level on the vertical axis with the water year along the bottom from October to October.
- * The black line is the mean groundwater elevation with the level over the past year in red. 60% of readings fall within the yellow band, with the remainder in the high or low bands shaded green.
- * Most Marlborough aquifer systems are full going into summer and levels have generally been above average for most of the past year. This reflects above average rainfall for most of Marlborough except for March to May 2012, reducing demand and increasing recharge.
- * The exception is the recharge area of the Wairau Aquifer where levels have been below the long-term mean for much of the past 12 months as the top plot shows. The variation in aquifer recharge as represented by Wairau River or Omaka River flow as a proportion of the mean monthly flow is shown in Figure 2.

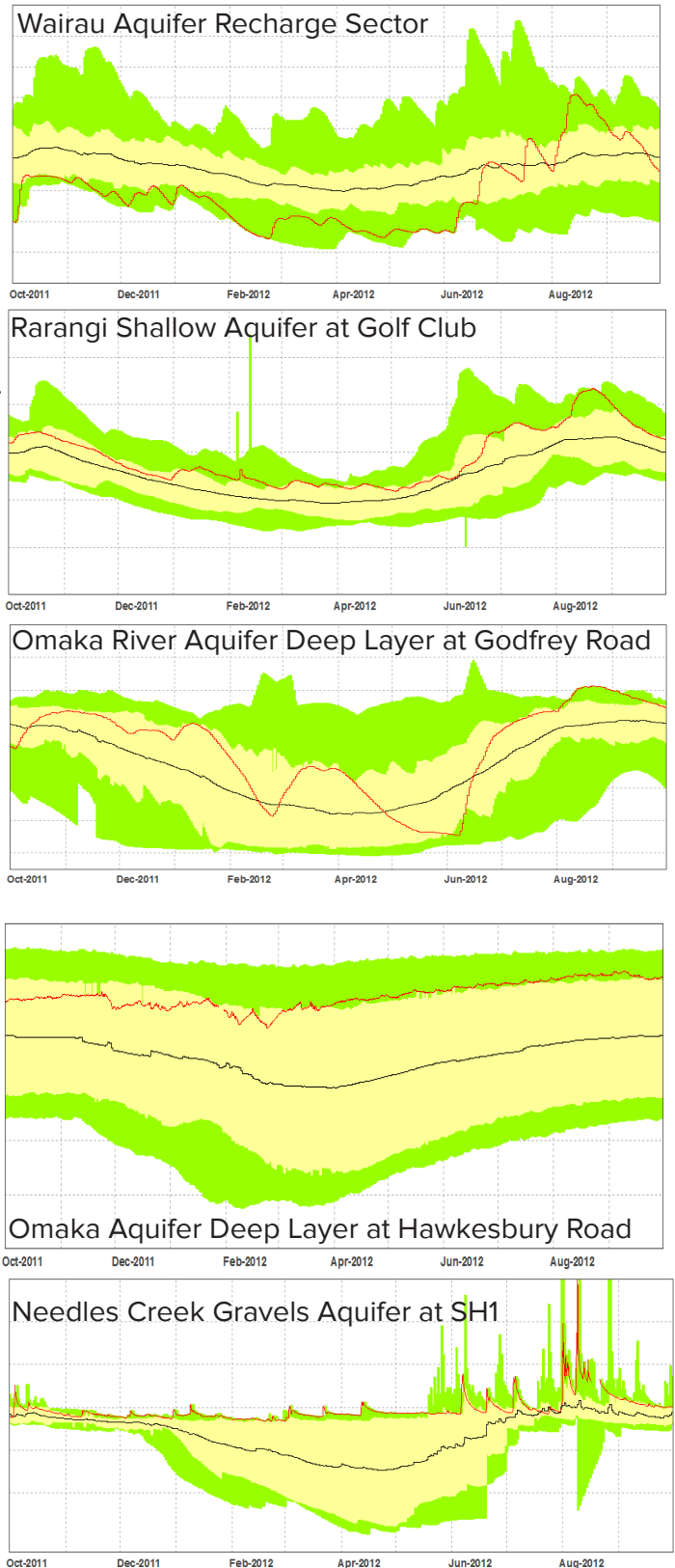


Figure 1:

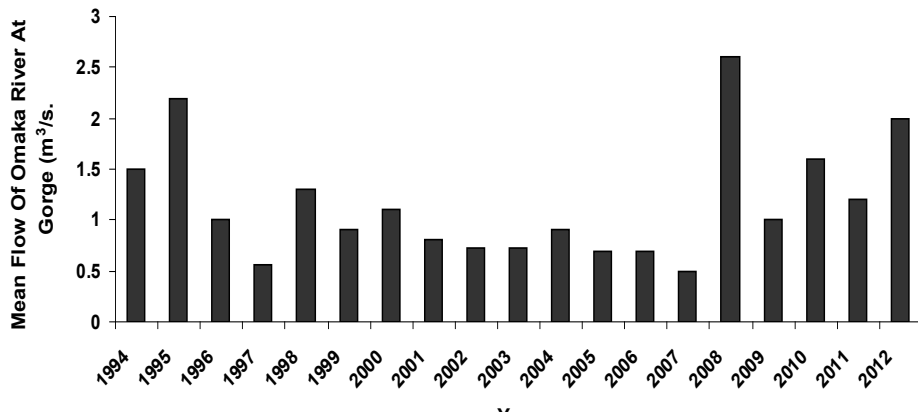


Figure 4

What effect has climate had on aquifer levels?

Recently, shallow aquifer levels have tended to mirror natural changes in rainfall or river recharge rather than being demand driven due to the wetter climate. Since 2008 there has been a dramatic increase in the mean flow of the Omaka River as Figure 4 shows. This has tended to keep shallow to medium depth wells at Woodbourne and underlying the southern Wairau Plain higher than they would otherwise be. The dynamic Wairau Aquifer responds quickly to fluctuations in Wairau River flow. Despite its large size, it appears to only have several months of storage to offset drier conditions and levels can fall quickly as happened between October 2011 and June 2012. Record low well levels at Conders coincided with 3 consecutive months of below average Wairau River flows shown in blue below (Figure 2).

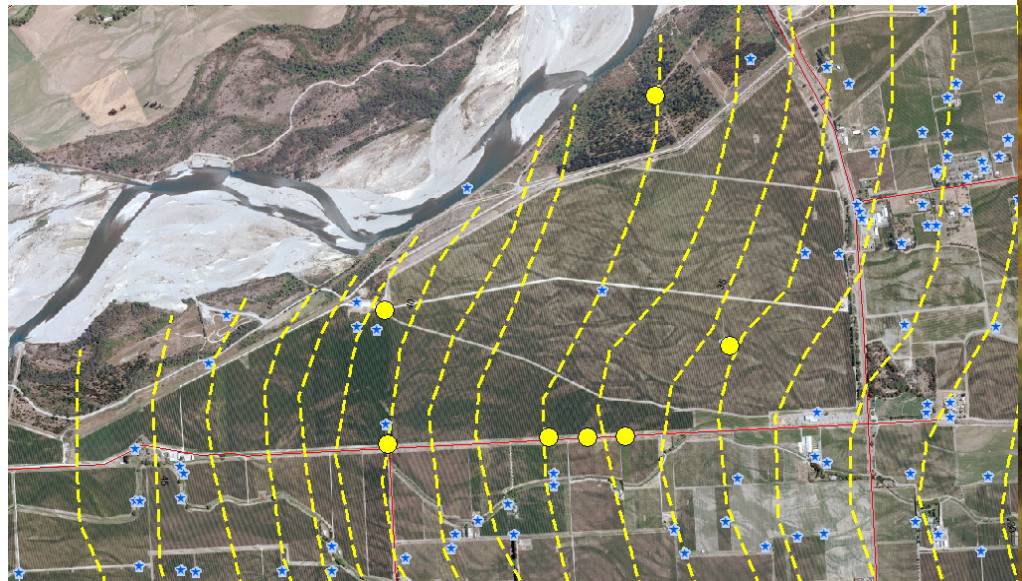


Figure 3 : Recharge Study Well Array

Unravelling the recharge mechanism

A key question facing managers of the Wairau Aquifer, the most important groundwater resource to Marlburians, is whether the rate at which the Wairau River loses flow to the Wairau Aquifer is constant or varies. Gaugings show the loss is 7 m³/second at low Wairau River flows. Research is underway to see if rates increase during flood flows using conductivity and temperature readings in an array of wells at Conders near the SH6 bridge. The yellow dots in Figure 3 show test well locations and the dashed lines are contours of groundwater elevation. Groundwater flows at right angles to these lines. This work has implications for the safe yield of the aquifer. If recharge rates are higher for short periods of time, then more water may be able to be allocated in the future.

