

# Summer 2014/15 - Hydrological summary

## Environmental Science Department

Greater Wellington Regional Council (GWRC) presents this summary of hydrological data that have been collected at monitoring locations in the Greater Wellington region. GWRC monitors and collects environmental data such as rainfall, river level and flow, groundwater level and quality, freshwater quality, coastal water quality, aquatic ecosystems and recreational water quality at many more locations than have been presented in this document. This report is a brief data summary with limited interpretation of the results. Readers are referred to the GWRC website where maps of all monitoring locations and up to date data can be found at: <http://www.gw.govt.nz/environmental-science/>.

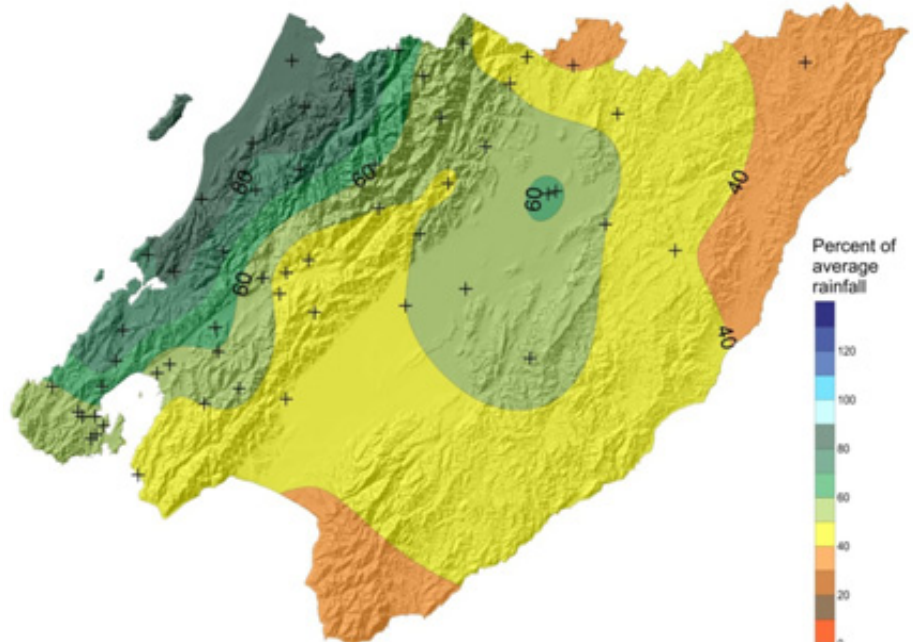
### Summer rainfall

The figure to the right details the rainfall that occurred during the 2014/15 summer season as a percentage of the long term average. Rainfall was below average over the entire area. An east to west trend existed with the eastern areas relatively drier. Parts of the eastern hill country received less than 40 percent of their average rainfall.

The Kapiti Coast experienced 80 to 90 percent of normal summer rainfall.

Rainfall maps for the individual months of December, January and February months are presented on the next the page.

**Summer 2014/15 rainfall as a percentage of long term average (crosses are monitoring stations used to build map)**



### Rainfall statistics for summer (Dec 2014–Feb 2015) for selected monitoring sites in the Wellington region

| Location                  | Summer Rainfall |             | Days with >1mm rain |             |
|---------------------------|-----------------|-------------|---------------------|-------------|
|                           | Total (mm)      | % of normal | No. of days         | % of normal |
| Otaki                     | 205             | 84%         | 17                  | 66%         |
| Waikanae                  | 239             | 77%         | 18                  | 63%         |
| Kaitoke                   | 163             | 36%         | 19                  | 49%         |
| Karori Reservoir          | 134             | 53%         | 19                  | 69%         |
| Paparangi                 | 167             | 68%         | 18                  | 80%         |
| Wainuiomata               | 171             | 50%         | 22                  | 69%         |
| Tararua Range             | 744             | 53%         | 39                  | 82%         |
| Masterton                 | 110             | 63%         | 12                  | 61%         |
| Featherston               | 102             | 51%         | 11                  | 51%         |
| NE Wairarapa (Tanawa Hut) | 91              | 39%         | 14                  | 64%         |
| SE Wairarapa (Longbush)   | 86              | 51%         | 12                  | 49%         |

The table to the left details the summer rainfall total (in millimetres depth) and the total as a percentage of average at a number of locations. All sites had below average rainfall.

Four sites in the Wairarapa (Masterton, Featherston, Tanawa Hut and Longbush) had only between 11 and 14 days over the entire summer where more than 1mm of rain fell in a day.

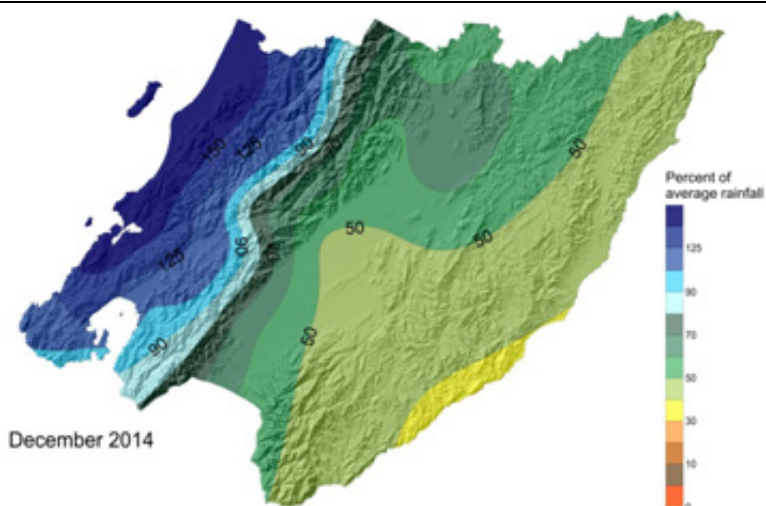
The Kaitoke rain gauge in the headwaters of the Hutt River received only 36 percent of average summer rainfall and had half the normal days where rain was greater than 1mm.

## December 2014

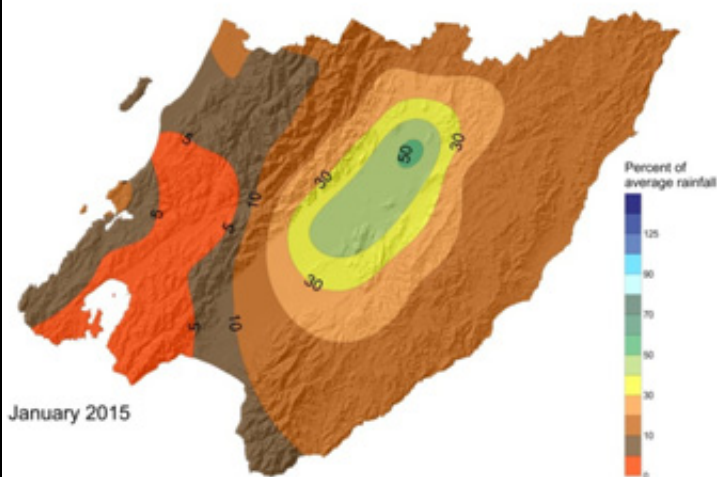
December was a month of stark contrast for rainfall over the region with a distinct west (wetter) to east (drier) trend prevailing.

All rain gauges in the Wairarapa received below average December rainfall, ranging from just below 50% in the eastern hills to 70% in the Tararua Ranges.

To the west, the Kapiti Coast experienced up to 180% of average December rainfall at McKay's Crossing, Waikanae and Otaki.



## January 2015



January was characterised by higher than normal air pressures which resulted in an abundance of dry, warm and sunny weather over the entire region. The Wellington, Hutt and Kapiti areas experienced the lowest January rainfall totals compared to long-term averages. Very low totals between 1 and 4mm were recorded across the Hutt Valley and Wainuiomata.

The 1.5mm total at Wainuiomata Reservoir was the lowest since records began in 1890. A total of 3.8mm was recorded at Karori Reservoir which was the lowest January total since records started there in 1880.

A small group of rain gauges in the central Wairarapa valley were hit by a sudden isolated downpour on the 21<sup>st</sup> January that lifted the monthly average at those locations to 60% of normal.

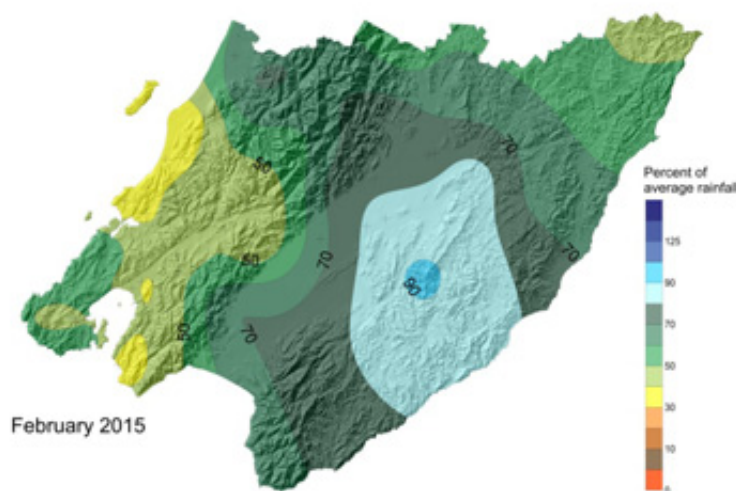
## February 2015

The predominance of anticyclones was reflected in low rainfalls for the month.

The eastern Wairarapa hill country received the highest percentages of normal February rainfall. The Waikoukou gauge at Longbush collected 95 % of the normal monthly rain total.

All rain gauge sites across the region recorded below average rainfall during February - although not to the extreme low levels that occurred during January.

A trend of decreasing rainfall from east to west is evident (in contrast to December which had an opposite pattern). An area stretching from Paekakariki, through the Hutt Valley, and out to the Wainuiomata coast received less than 40% of average rain.

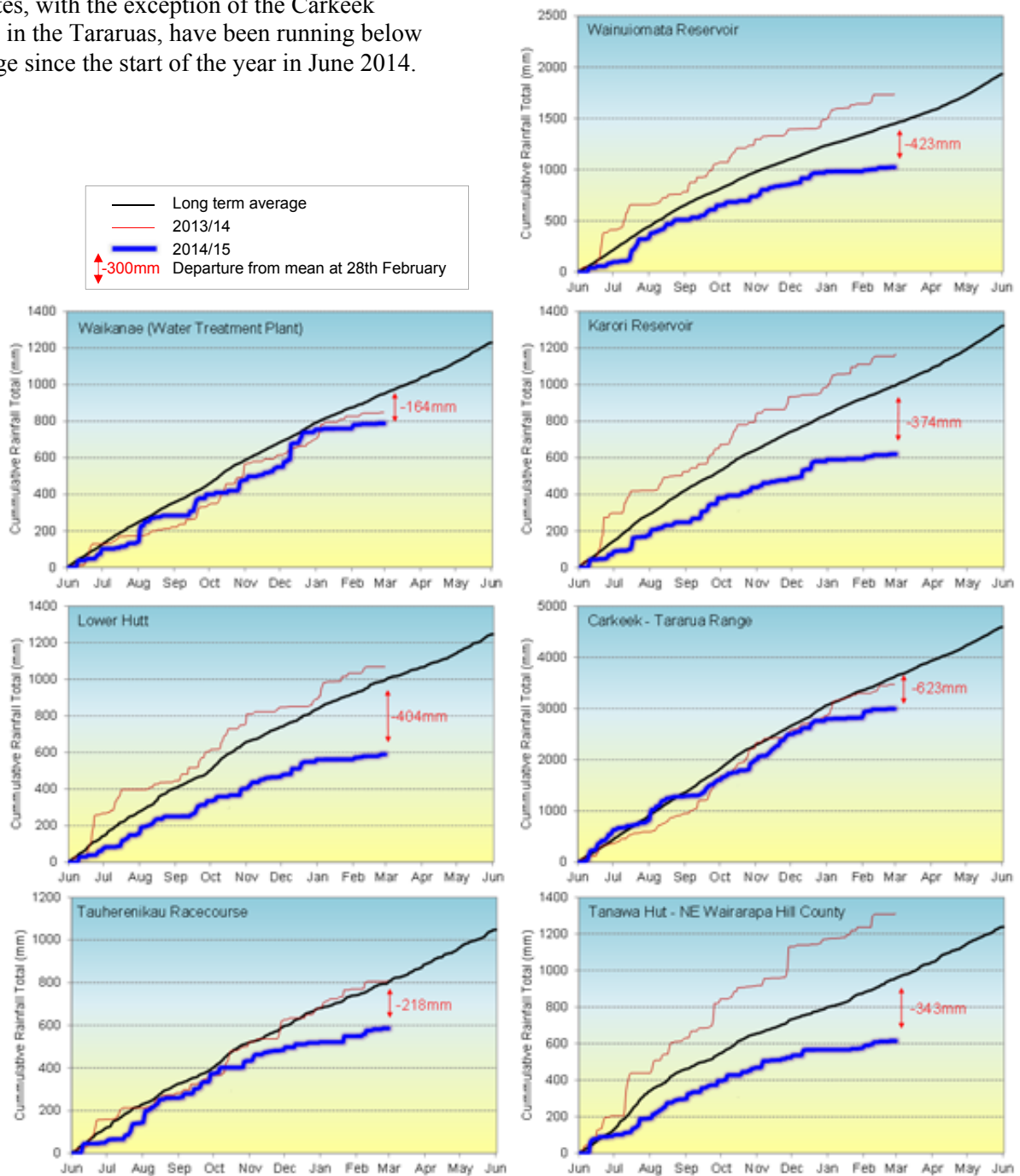


## Rainfall for the year to date: June 2014 – February 2015

Cumulative rainfall graphs for the year beginning in June 2014 are shown in the plots below for a range of rainfall monitoring sites across the region. The current year up to the end of summer 2014/15 is compared to the long-term average and the same period in 2013/14.

The summer months have seen a flattening of the 2014/15 cumulative rainfall trace (thick blue line) at the sites shown. All sites are currently below their respective average accumulation. The Lower Hutt gauge was 404mm below the average at the end of February, which equates to 40% less rainfall for the year to date.

All sites, with the exception of the Carkeek gauge in the Tararuas, have been running below average since the start of the year in June 2014.



**Cumulative rainfall for the year to date (June 2014–February 2015) compared to the same period last year (June 2013–February 2014) and the long term average for the full year (June–May).**

## River flows during summer

The table below shows that with the exception of the Waikanae River the highest river flows recorded over summer were insignificant. The peak flow in the Waikanae River on the 10<sup>th</sup> December was the result of a very intense rainfall event that occurred on the Kapiti Coast plains and up into the catchment of the Waikanae River.

The mean annual flood (average of highest flow recorded each year) is shown for comparison.

### Peak flows (cubic metres per second) during summer 2014/15 compared with mean annual flood peak

| River gauge location                    | Peak recorded flow during Summer (raw data) | Mean annual flood      |
|---|---|------------------------|
| Waikanae River at Water Treatment Plant | 204 m <sup>3</sup> /s on 10 December        | 157 m <sup>3</sup> /s  |
| Otaki River at Pukehinau                | 345 m <sup>3</sup> /s on 18 December        | 950 m <sup>3</sup> /s  |
| Hutt River at Taita Gorge               | 207 m <sup>3</sup> /s on 10 December        | 835 m <sup>3</sup> /s  |
| Wainuiomata River at Manuka Track       | 5 m <sup>3</sup> /s on 10 December          | 30 m <sup>3</sup> /s   |
| Porirua Stream at Town Centre           | 14 m <sup>3</sup> /s on 10 December         | 35 m <sup>3</sup> /s   |
| Waingawa River at Kaituna               | 63 m <sup>3</sup> /s on 18 December         | 289 m <sup>3</sup> /s  |
| Waiohine River at Gorge                 | 190 m <sup>3</sup> /s on 18 December        | 885 m <sup>3</sup> /s  |
| Ruamahanga River at Wardells (mid)      | 107 m <sup>3</sup> /s on 18 December        | 487 m <sup>3</sup> /s  |
| Ruamahanga River at Waihenga (lower)    | 222 m <sup>3</sup> /s on 18 December        | 1062 m <sup>3</sup> /s |

The lowest recorded river and stream flows for the summer are tabled below for a number of monitoring sites across the region's waterways. The mean annual low flow (average of the lowest flow recorded every year) is shown in the far column for comparison.

### Minimum recorded flows (7-day average) during summer 2014/15 compared with mean annual low flows.

| River gauge location                    | Minimum 7-day duration flow during summer (raw data) | Estimated Return Period | 7-day mean annual low flow |
|---|--|-------------------------|----------------------------|
| Waitohu at Water Supply Intake          | 0.131 m <sup>3</sup> /s beginning 21 Feb             | 3-year                  | 0.151 m <sup>3</sup> /s    |
| Otaki River at Pukehinau                | 3.482 m <sup>3</sup> /s beginning 21 Feb             | 5-year                  | 5.183 m <sup>3</sup> /s    |
| Waikanae River at Water Treatment Plant | 0.882 m <sup>3</sup> /s beginning 21 Feb             | 3-year                  | 1.048 m <sup>3</sup> /s    |
| Akatarawa River at Cemetery             | 0.872 m <sup>3</sup> /s beginning 21 Feb             | 4-year                  | 1.069 m <sup>3</sup> /s    |
| Mangaroa at Te Marua                    | 0.216 m <sup>3</sup> /s beginning 21 Feb             | 6-year                  | 0.398 m <sup>3</sup> /s    |
| Hutt River at Taita Gorge               | 3.235 m <sup>3</sup> /s beginning 21 Feb             | 2-year                  | 3.788 m <sup>3</sup> /s    |
| Wainuiomata River at Manuka Track       | 0.143 m <sup>3</sup> /s beginning 21 Feb             | 4-year                  | 0.291 m <sup>3</sup> /s    |
| Porirua at Town Centre                  | 0.162 m <sup>3</sup> /s beginning 16 Feb             | Annual                  | 0.163 m <sup>3</sup> /s    |
| Waingawa River at Kaituna               | 1.200 m <sup>3</sup> /s beginning 24 Jan             | 3-year                  | 1.427 m <sup>3</sup> /s    |
| Waiohine River at Gorge                 | 2.729 m <sup>3</sup> /s beginning 25 Jan             | 8-year                  | 3.612 m <sup>3</sup> /s    |
| Mangatarere at Gorge                    | 0.133 m <sup>3</sup> /s beginning 16 Feb             | 3-year                  | 0.176 m <sup>3</sup> /s    |
| Tauherenikau River at Gorge             | 0.928 m <sup>3</sup> /s beginning 21 Feb             | 9-year                  | 1.321 m <sup>3</sup> /s    |
| Otukura Stream at Weir                  | 0.033 m <sup>3</sup> /s beginning 15 Jan             | 4-year                  | 0.080 m <sup>3</sup> /s    |
| Kopuaranga River at Palmers             | 0.241 m <sup>3</sup> /s beginning 21 Feb             | 3-year                  | 0.314 m <sup>3</sup> /s    |
| Ruamahanga River at Wardells (mid)      | 2.280 m <sup>3</sup> /s beginning 24 Jan             | 4-year                  | 3.111 m <sup>3</sup> /s    |
| Ruamahanga River at Waihenga            | 6.082 m <sup>3</sup> /s beginning 25 Jan             | 10-year                 | 10.161 m <sup>3</sup> /s   |

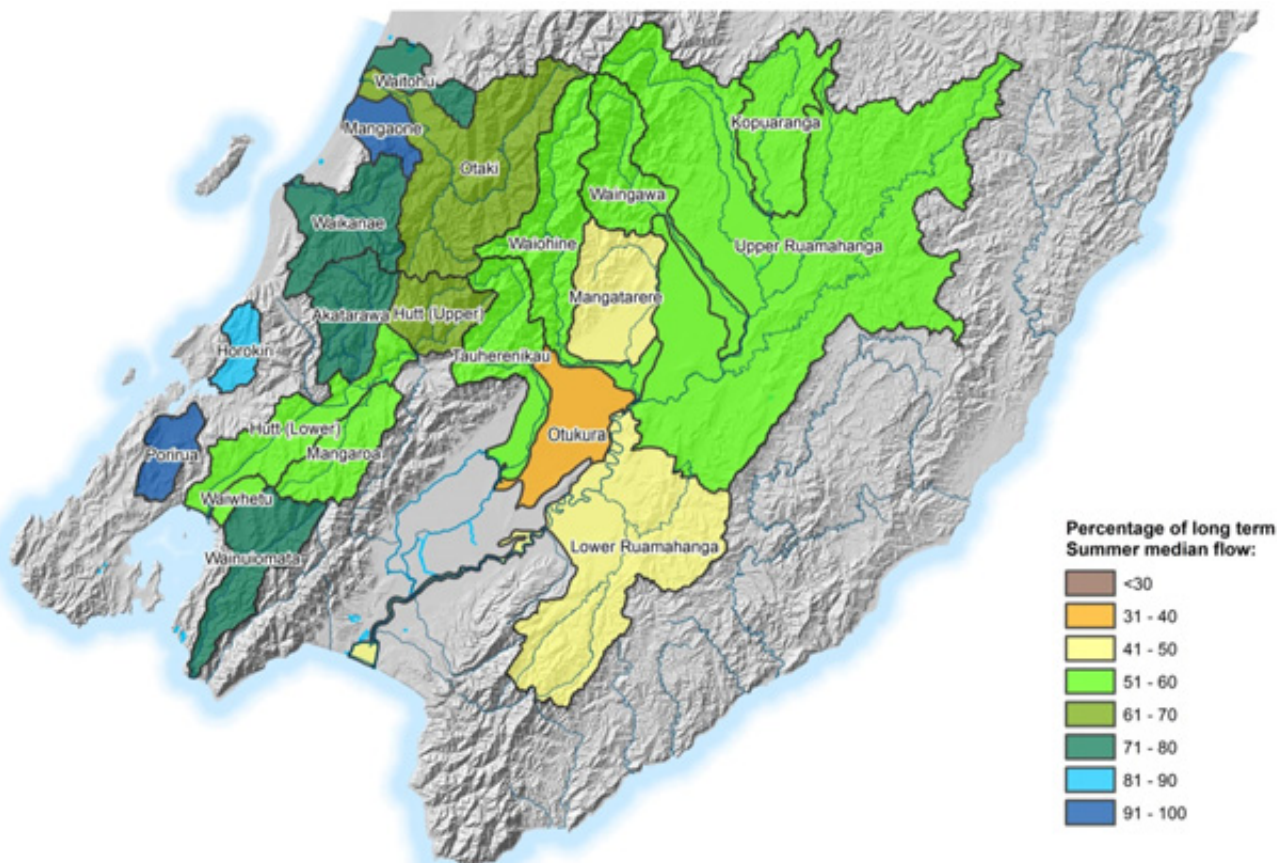
The river flows were generally quite low with all sites experiencing a minimum flow less than their mean annual low flow. A number of monitored rivers and streams have recorded very low flows towards the end of summer.

In the Wairarapa, the Waiohine and Tauherenikau rivers reached minimum flows with 8 and 9-year return periods respectively. The Ruamahanga rivers at Waihenga (Martinborough) fell to a low flow expected once every 10 years.

On the Kapiti Coast and in Wellington, the important water supply catchments of the Waikanae and Wainuiomata rivers fell to 3 and 4-year return period low flows respectively.

The low flows experienced during late summer have continued into the start of the autumn season and the extent of the dry conditions will be reported on in the *Autumn 2015 Hydrological Summary* that will be prepared in June 2015.

The median recorded summer river flow at some of our monitored catchments is compared to long-term median flows in the map below. All monitored river catchments had median summer flows below what is normally expected. Only the Mangaone and Porirua streams recorded above 90 % of normal. The entire Wairarapa river flow network registered median flows that were less than 60% of normal

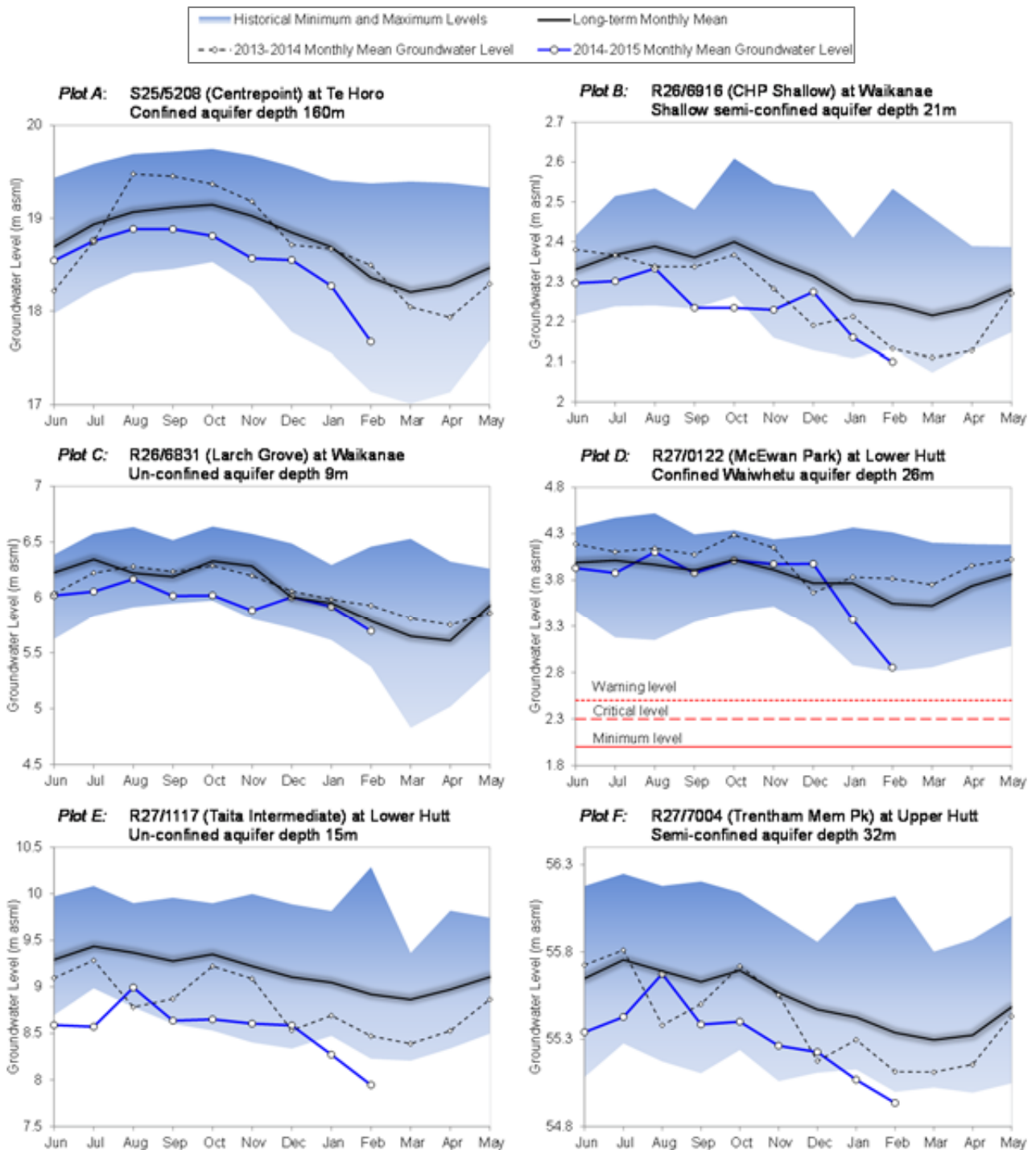


**Median river flows during summer 2014/15 (Dec–Feb inclusive) for primary catchments in the Wellington region as a percentage of the long term seasonal median**

## Groundwater levels in summer

Recorded groundwater levels at twelve bores across the region are shown below. The level for the current 2014/15 year to the end of summer is compared to the previous year (2013/14), the long-term average and the range of recorded levels.

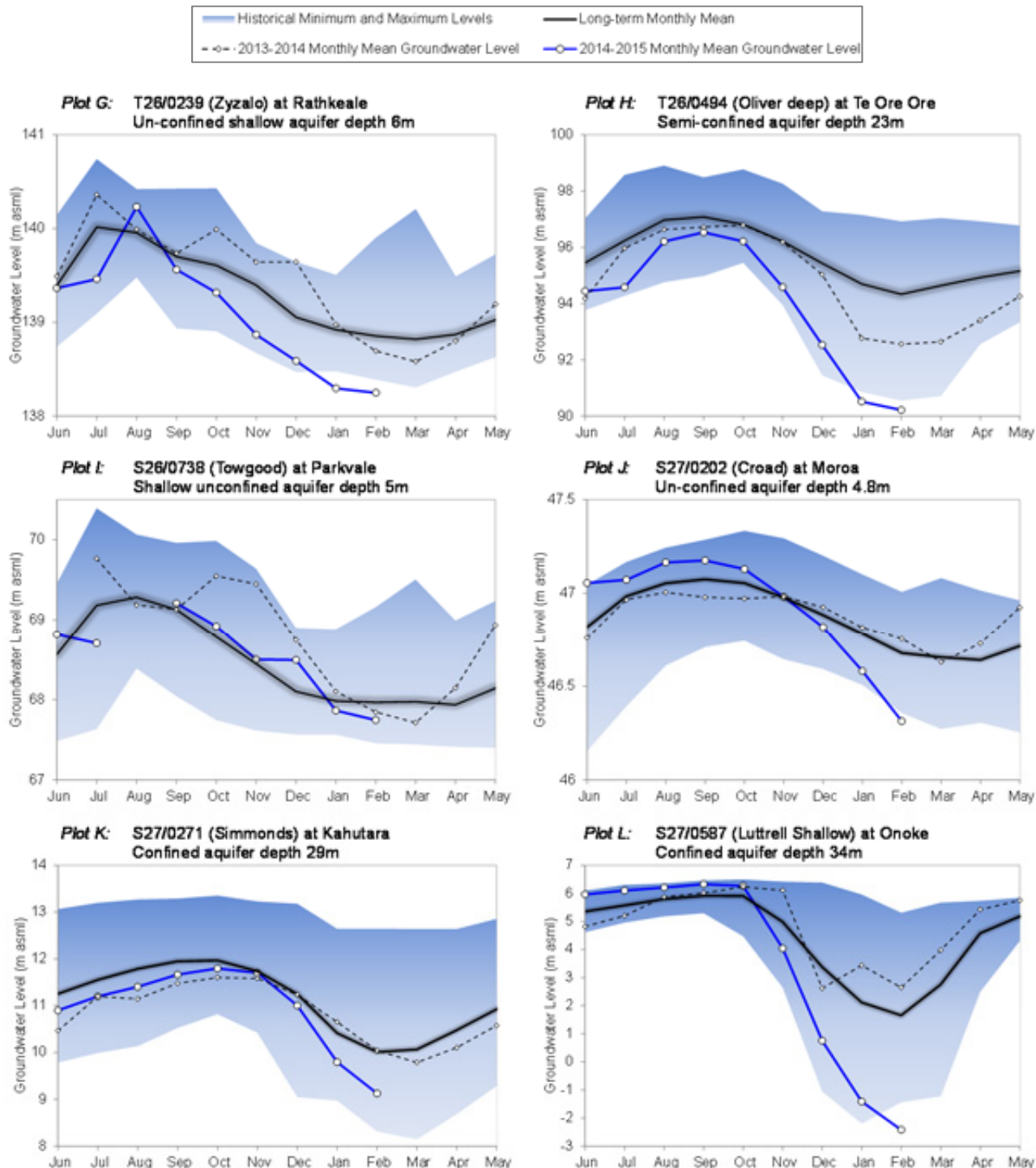
Groundwater levels over the summer dropped away sharply as dry weather and low rainfall conditions prevailed. The Waiwhetu aquifer at McEwan Park (Plot D) was near average all year until summer. Restrictions on abstraction for public water supply from the Hutt, Wainuiomata and Orongorongo rivers lead to increased reliance on groundwater supply from the Waiwhetu aquifer which contributed to the below normal levels from December to February.



**Mean monthly groundwater levels at selected sites in the Wellington region for the year to date (1 June 2014 to 28 February 2015) compared with the previous full year and the historical average and range**

The Taita Intermediate and Trentham Memorial Park sites (Plot E and F) showed low levels throughout the year and both registered record low levels in January and February 2015. Both these sites have long records with measurements beginning in 1968 and 1973 respectively.

Groundwater monitoring sites in the Wairarapa (Plots G to L) also showed sharp decreases during summer. The Rathekeale (Plot G), Te Ore Ore (Plot H), Moroa (Plot J) and Onoke (Plot L) aquifers dropped to record lows in January 2015.

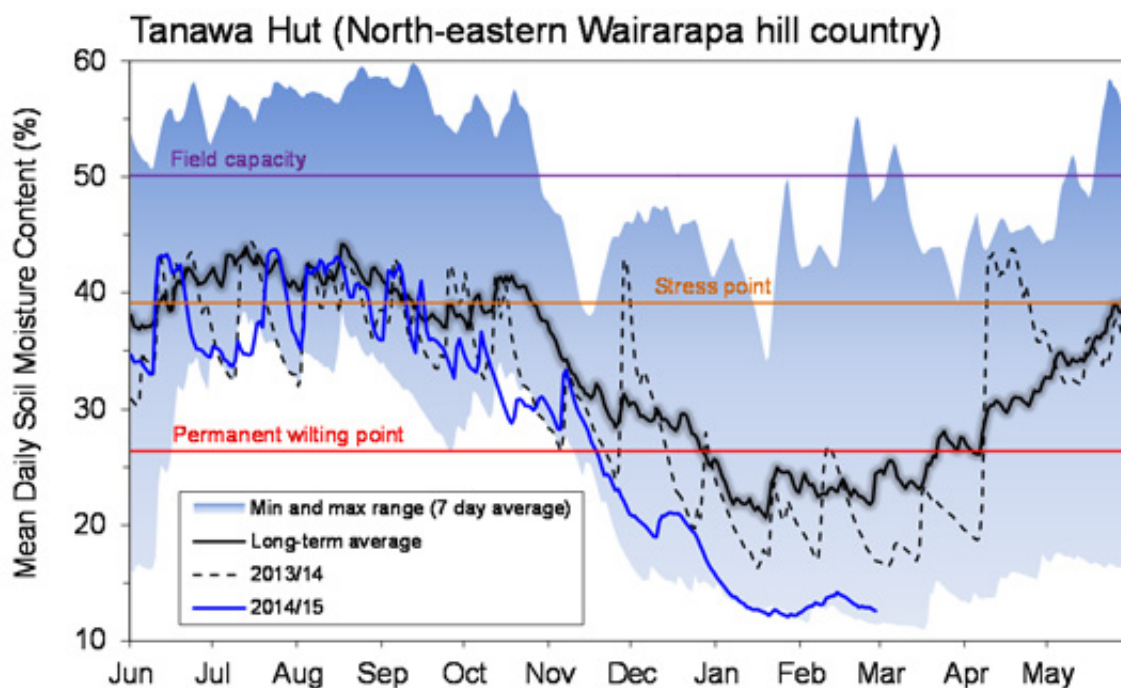


**Mean monthly groundwater levels at selected sites in the Wellington region for the year to date (1 June 2014 to 28 February 2015) compared with the previous full year and the historical average and range**

## Soil moisture in summer

Soil moisture content, as measured at the Tanawa Hut monitoring site in the north-east Wairarapa, is detailed below for the 2014/15 year up to the end of summer. The long-term average and data for the same period in the previous year (2013/14) are also plotted.

The prevailing dry conditions with very low rainfall caused the soil moisture to fall away to relatively low levels through summer 2014/15. Soil moisture was very low at the end of January.



**Mean monthly soil moisture levels in the north-eastern Wairarapa hill country for the past year (up to 1 March 2015) compared with the previous year and the historical average and range**

## More information

This summary is based on data from selected monitoring locations in the Wellington region. Greater Wellington monitors rainfall, river flows, groundwater levels and soil moisture at many locations that may not be mentioned in this summary report. Maps of site locations and up-to-date data can be found at <http://www.gw.govt.nz/environmental-science/>.

**Disclaimer:** This report is based on data that have not yet been quality checked. In particular, flow data may be subject to change following adjustment of rating curves. The data presented is the best currently available but due to quality assurance procedures this data may be amended, without notice, at any time.

Greater Wellington accepts no responsibility for any interpretation or use of the provisional data in this report.