Hydrology Update Spring 2024

Report prepared by Charlotte Tomlinson, 6th of December 2024.

Data from the Marlborough District Council's Environmental Monitoring network was primarily used in preparing this report and supplemented with data from the Marlborough Research Centre, MetService, NIWA, and FENZ.

Executive Summary

This marks the 9th consecutive year of warmer than average spring temperatures, with a mean air temperature of 13.9°C in Blenheim (0.9°C above the long-term average). Average daily windrun in September was just above the long-term average, while October and November were less windy than usual.

In Blenheim, spring rainfall totalled 136 mm, which is 87% of the long-term average. September was a relatively dry start to spring, and most of October recorded very little rainfall. The rainfall event over Labour weekend provided a much needed moisture boost to the region, with most monitoring locations recording slightly above average total spring rainfall as a result. This storm event will be covered in more detail in a separate report. November was particularly dry, with Blenheim recording just 9 mm of rainfall over the month. A northerly rain event mid-month meant November rainfall totals were closer to average in Northern Marlborough.

The late October rain event meant all of the major streams and rivers in the MDC monitoring network had median monthly flows above the long-term median for November. As of early December, river flows are beginning to decline due to a lack of rainfall inputs throughout November. This can be seen through the steady decline in river baseflow levels. In the Wairau River at Tuamarina, median flow for November was 93 m^3/s, which is 115% of the long-term median November flow.

Soil moisture in Blenheim reached field capacity following the Labour weekend rain event, then declined steadily throughout November, reaching 19% by November 30th. This is slightly below average for the time of year. Soil moisture is also sitting below average at sites across the region, including Ward, Molesworth, lower Awatere, Wairau Valley, Rai Valley, and Kenepuru Head.

Wairau Aquifer levels were below average throughout spring until the late October Wairau River flood, which raised aquifer levels by just under 0.5 m at Wratts Road. Throughout November groundwater level has steadily declined and is currently sitting around the long-term average for this time of year. With irrigation beginning in October, the Riverlands Aquifer level has rapidly declined due to the increased pumping demand.

Through to the middle of December, there will be a period of stronger than usual westerlies. From mid-December onwards more frequent northeasterly winds are expected, as is typical with La Niña-like atmospheric conditions. It is very likely air temperatures will be warmer than average over summer, while our eastern coastal areas may experience stronger onshore winds and cloudy skies. Rainfall is forecast to be near or above average for the season.

Climate

Spring 2024 was warm and sunny. This marks the 9th consecutive year of above-average spring temperatures, with a mean air temperature of 13.9°C in Blenheim (0.9°C above the long-term average). A maximum air temperature of 30°C was recorded in Blenheim on the 28th of November.

September recorded an average daily wind run of 286 km, which is 105% of the long-term average. October and November were less windy overall, recording 83% and 86% of the long-term average respectively. The 8th of October recorded the maximum spring daily windrun of 508 km, while the 9th of November was the gustiest day with a maximum recorded wind speed of 69 km/hour in Blenheim.

There were 2 ground frosts and 1 air frost recorded in September, with no frosts recorded in October or November. 729.8 sunshine hours were recorded over spring, which is slightly above the long-term average.

Rainfall

Blenheim at the Marlborough Research Centre has recorded 256 mm of rainfall in the hydrological year to date (1 July to 30 November). The 2024/25 rainfall to date is equivalent to 95% of the long-term average rainfall accumulation (see Figure 1 below).

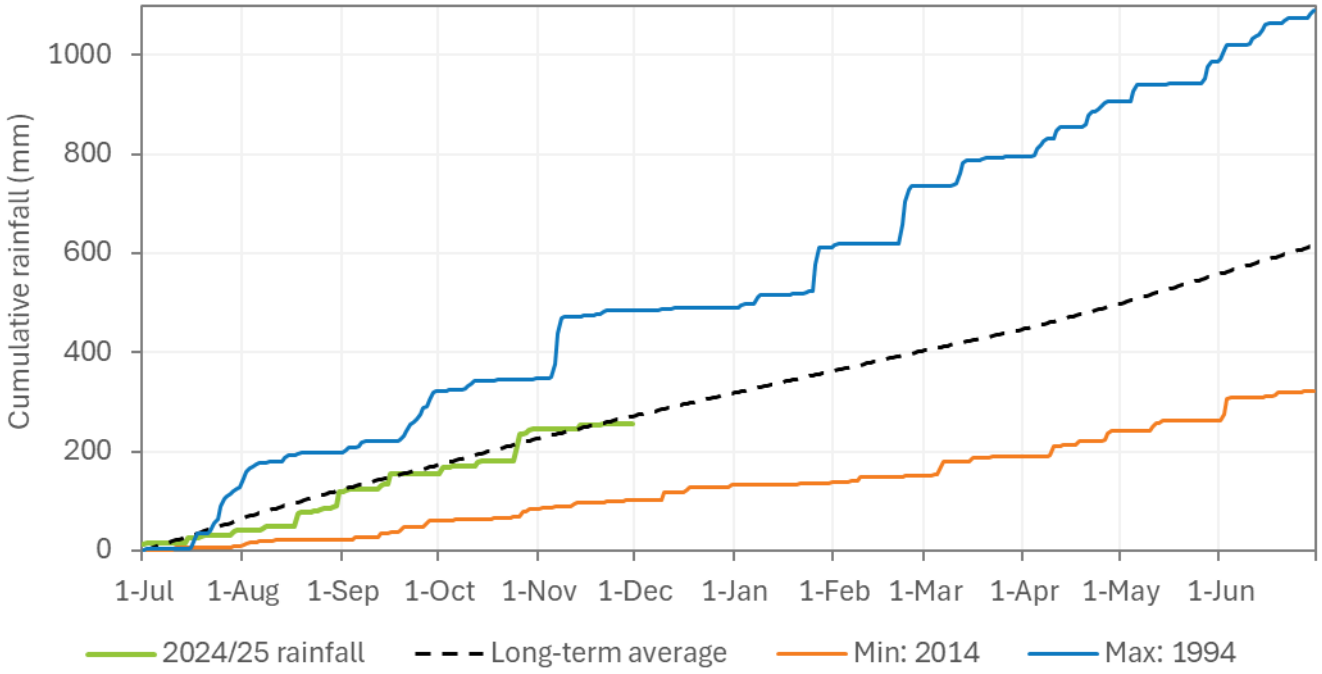

Figure 1. Cumulative rainfall (mm) for the 2024/25 hydrological year in Blenheim (Marlborough Research Centre), compared to the long-term average rainfall accumulation. Also shown are the minimum and maximum rainfall years.

Spring rainfall totalled 136 mm in Blenheim, which is 87% of the long-term average. Rainfall in September and November was low, while above average rainfall in October helped to increase the total rainfall for the season. In November just 9 mm of rainfall was recorded, putting this in the 10th percentile of November rainfall totals at the Blenheim site.

Monthly rainfall totals along with monthly evapotranspiration from July onwards can be seen in Figure 2 below. Due to low rainfall, the November water deficit was -115 mm, compared to the long-term average of -77.4 mm.

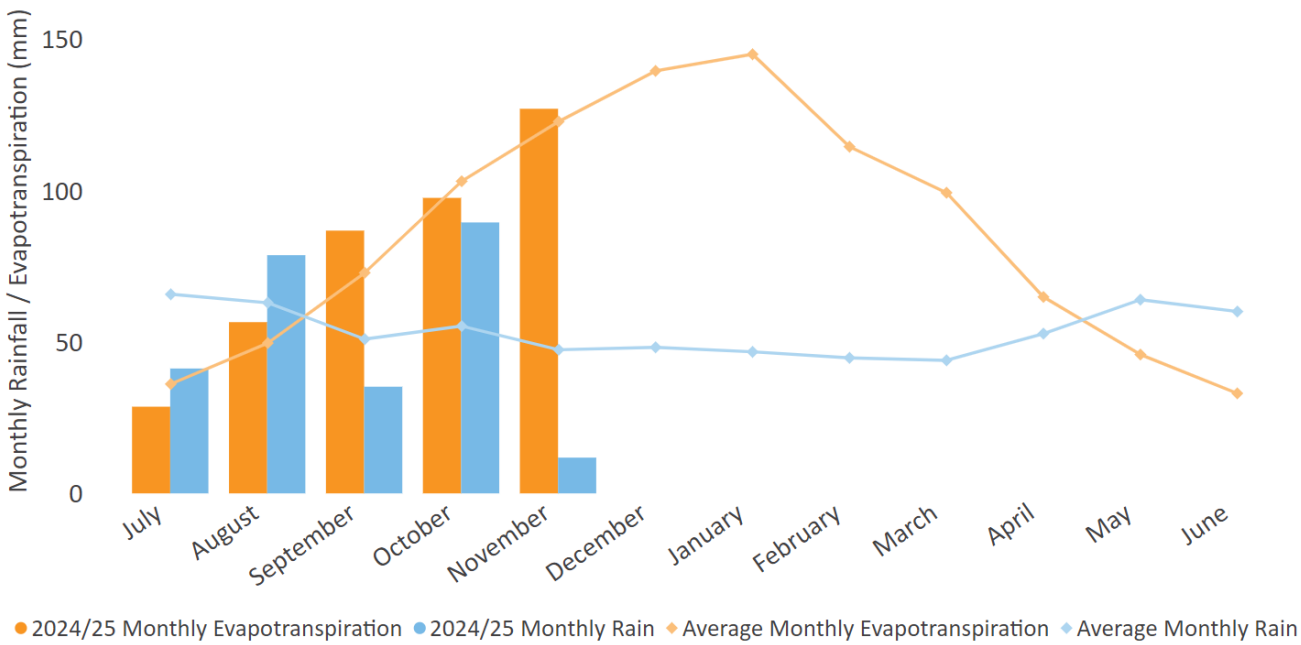

Figure 2. Monthly rainfall and evapotranspiration in Blenheim (Marlborough Research Centre) for the 2024-25 hydrological year, compared to average monthly totals.

In contrast to Blenheim, spring rainfall around the region has generally been slightly above average. September was reasonably dry across the region, however October rainfall totals were about twice the monthly average across the region due to the widespread rain event over Labour weekend. Figure 3 shows total spring 2024 rainfall for sites around Marlborough as a percentage of average spring rainfall.

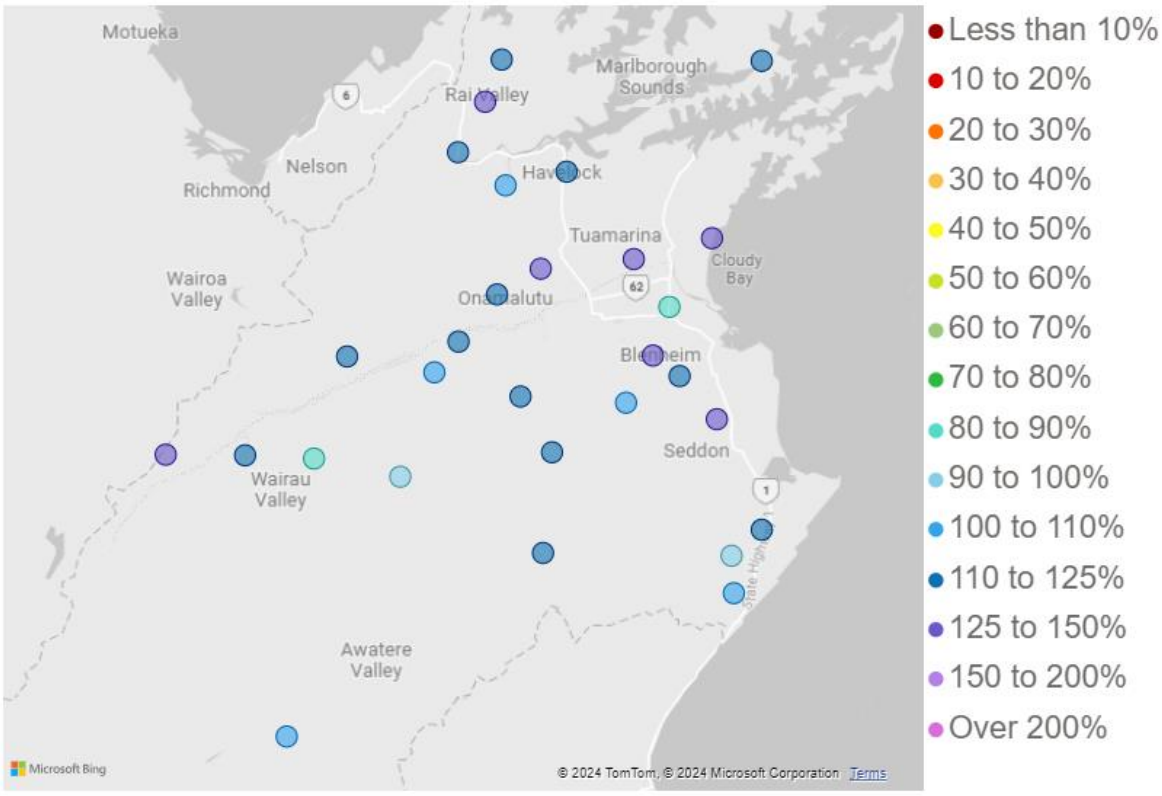

Figure 3. Spring 2024 rainfall at MDC monitoring sites, as a percentage of average spring rainfall.

Figure 4 shows monthly rainfall from July 2024 onwards at four key sites in South Marlborough compared to monthly averages.

September was average to slightly dry. October was also fairly dry, until the Labour weekend rain event at the end of the month. Due to this event, the Branch, Awatere at Awapiri and Flaxbourne sites all recorded more than twice their average October rainfall.

185 mm of rainfall was recorded at Awatere at Awapiri in October. Of this, 128 mm fell over a 36-hour period on Labour weekend. The average monthly rainfall at this site is 76 mm, meaning that during this single rain event, 1.7 times the average monthly rainfall was recorded. At the Branch site, 284 mm of rain was recorded in October, which is 250% of the average October rainfall.

November was very dry in South Marlborough. Awatere at Awapiri recorded 19 mm of rain in November, which is in the 10th percentile for November rainfall totals. Similarly, at the Flaxbourne just 12 mm of rain was recorded, which is just 25% of average November rainfall.

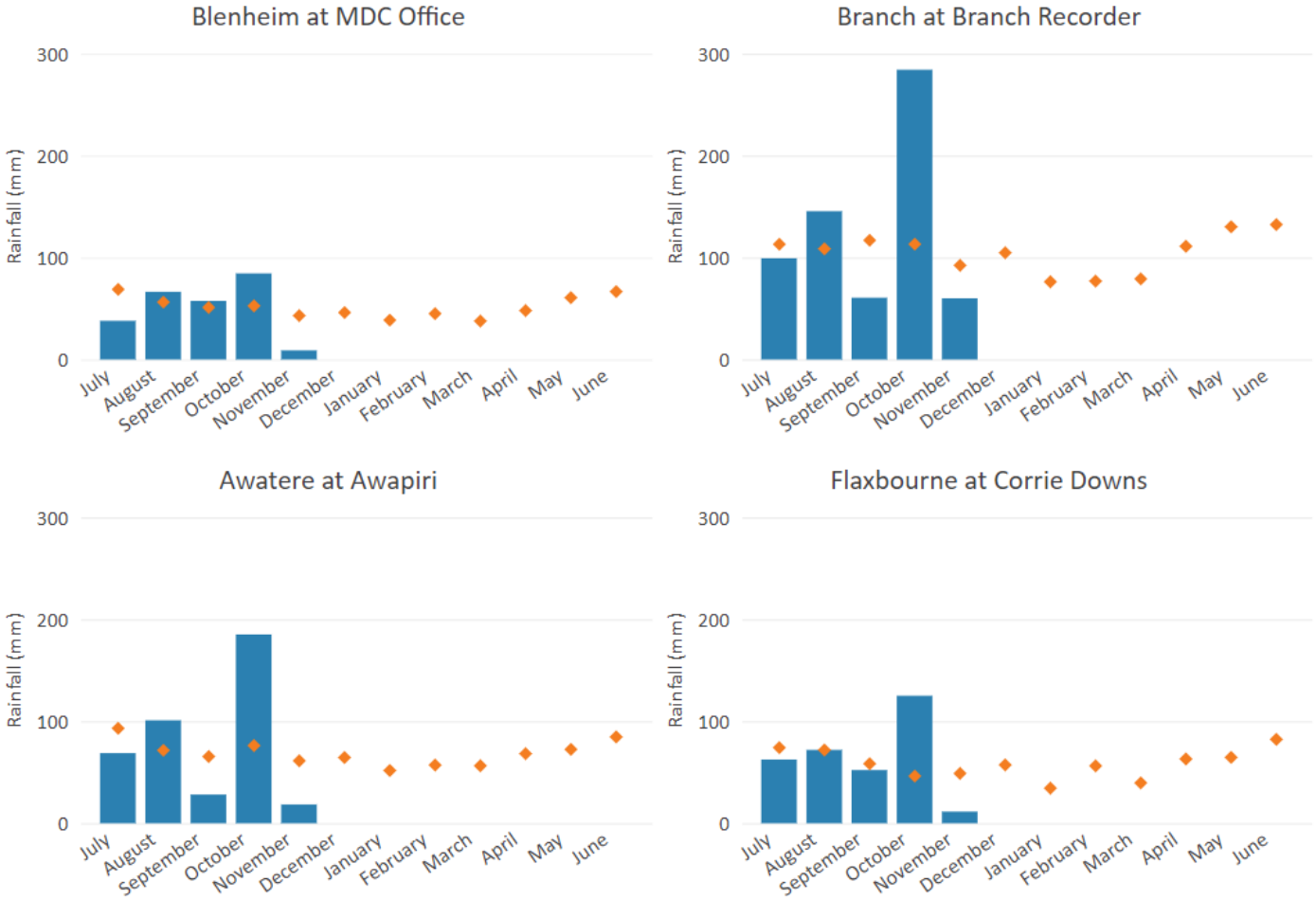

Figure 4. Monthly rainfall totals (mm) for the 2024-25 hydrological year from four key sites in South Marlborough, compared to average monthly rainfall totals.

Compared to the south of the region, November was wetter in North Marlborough due to a northerly rain event mid-month. Monthly rainfall was average at Tunakino (200 mm) and slightly below average at the other monitoring sites.

Total October rainfall was elevated due to the weather event over Labour Weekend. 176 mm of rain fell at Top Valley in a 24-hour period during this event, which is the equivalent of the average rainfall for the whole month of October at the site.

Figure 5 shows monthly rainfall from July 2024 onwards at four key sites in North Marlborough, compared to monthly averages.

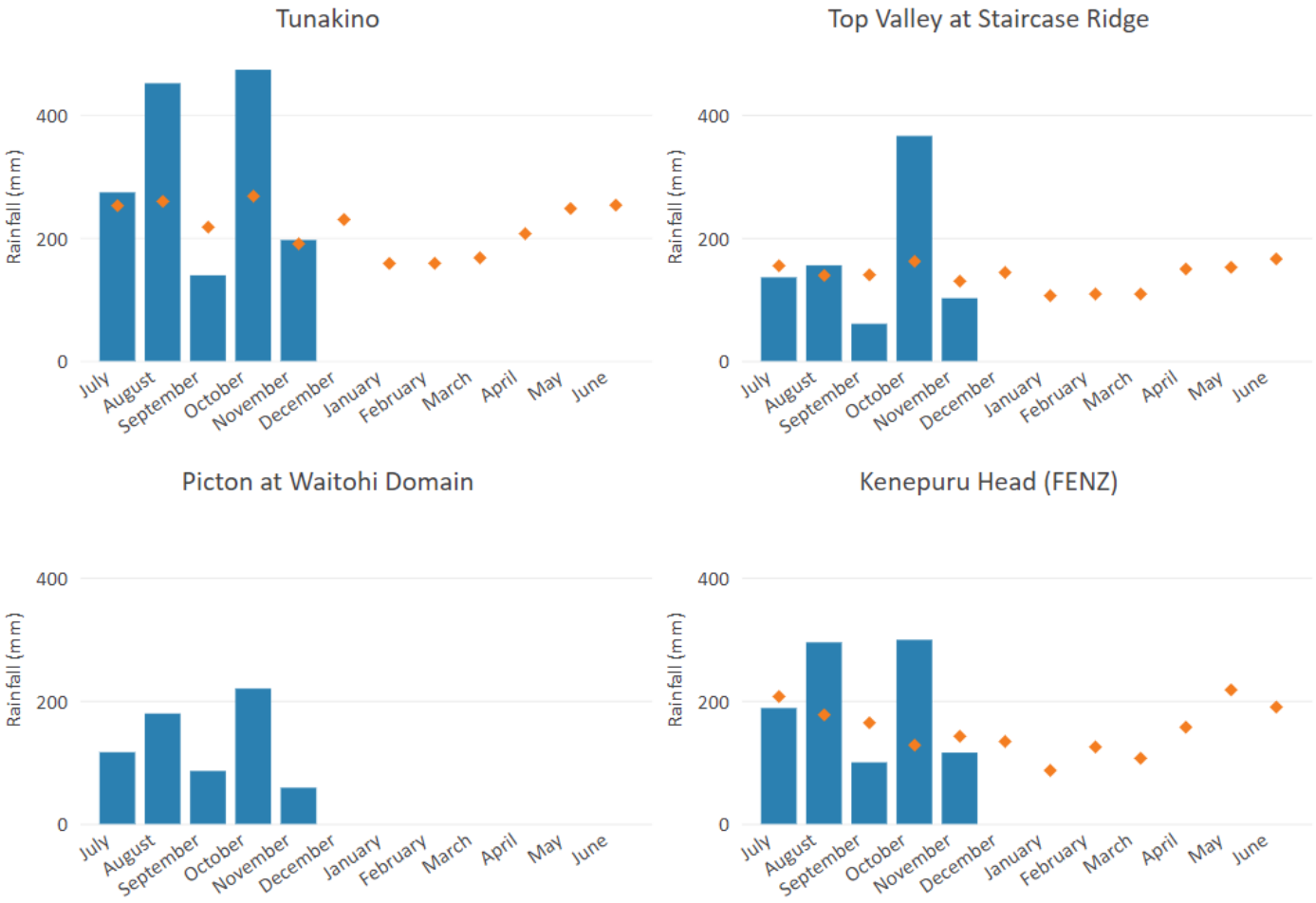

Figure 5. Monthly rainfall totals for the 2024-25 hydrological year from four key sites in North Marlborough, compared to average monthly rainfall totals. Note the adjusted scale when compared with the graphs for South Marlborough rainfall sites.

A full list of monthly rainfall totals for the 2024/25 hydrological year at all rainfall monitoring sites can be found in the appendix, Table 1.

River Flows

At the Awatere at Awapiri flow site, baseflow was below average through September and October (see Figure 6 below). The flood event in late October pushed baseflow into the upper quartile. With minimal rainfall input baseflow declined throughout November, dipping below average in the last week of the month.

Median flow at Awapiri was 12.4 m^3/s over spring, which is 88% of the long-term median spring flow of 14 m^3/s. In November, median flow was 13.2 m^3/s, 118% of the long-term median November flow.

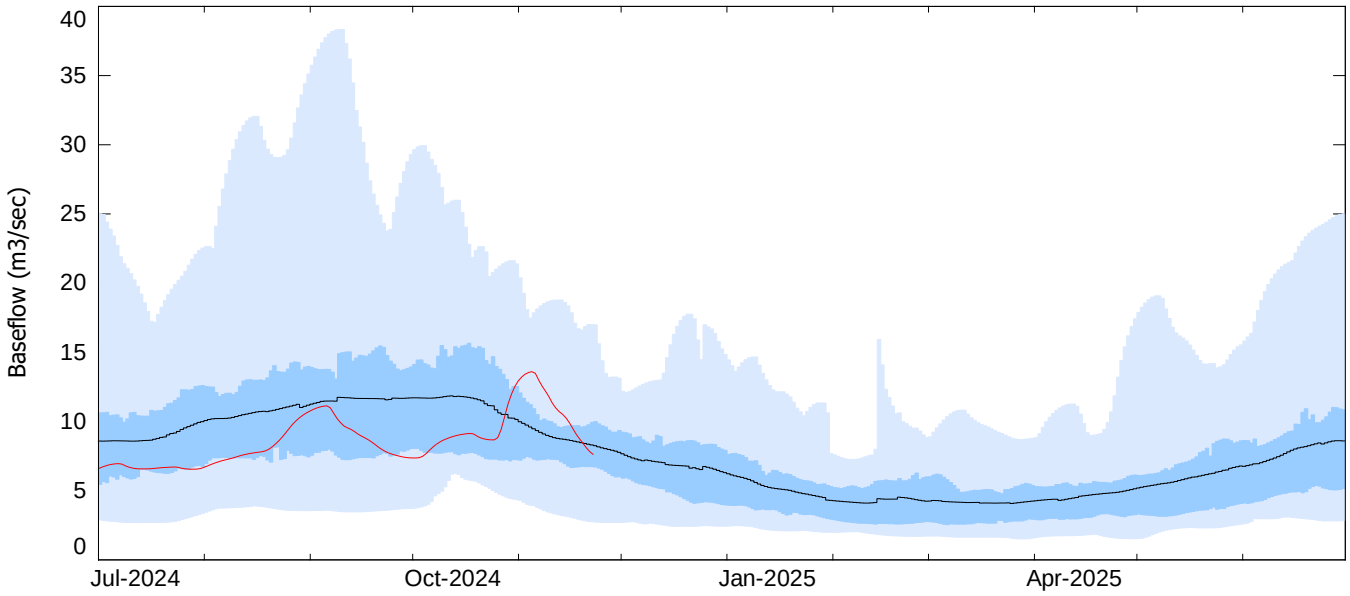

Figure 6. Awatere River at Awapiri baseflow, from 1 July 2024 to 30 June 2025. The black line is average baseflow and the red line is the 2024/25 baseflow. The dark blue section is the middle 50% of data and the light blue sections show the upper and lower quartiles.

Waihopai at Craiglochart baseflow was in the upper quartile at the start of spring due to a series of small freshes in August, but soon declined to below average over September. A small fresh at the start of October and the larger flood in the last week of October raised baseflow into the upper quartile by early November. Low rainfall in November saw baseflow decline to below average in the second half of the month. Baseflow from the 1st of July onwards can be seen in Figure 7 below.

The median flow at Craiglochart for spring was 10.5 m^3/s, which is just above the long-term median flow of 10 m^3/s.

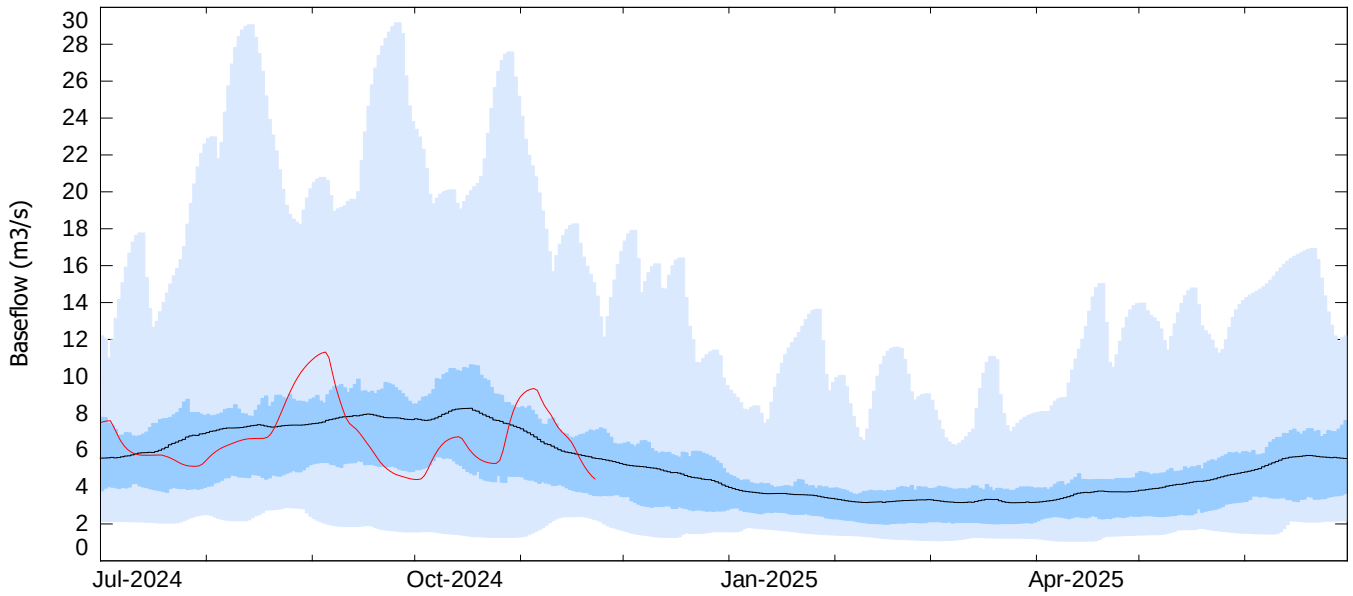

Figure 7. Waihopai River at Craiglochart baseflow, from 1 July 2024 to 30 June 2025. The black line is average baseflow and the red line is the 2024/25 baseflow. The dark blue section is the middle 50% of data and the light blue sections show the upper and lower quartiles.

Baseflow in the Wairau River at Tuamarina remained near or above average over spring, with a fresh in early October and the Labour weekend flood elevating baseflow levels into the upper quartile by early November. Baseflow levels steadily declined through November, approaching the lower quartile by the end of spring (see Figure 8 below).

Median flow for the Wairau at Tuamarina was 98 m^3/s over spring, which is 110% of the long-term median spring flow of 89 m^3/s. November median flow was 93 m^3/s, which is 115% of the long-term median November flow.

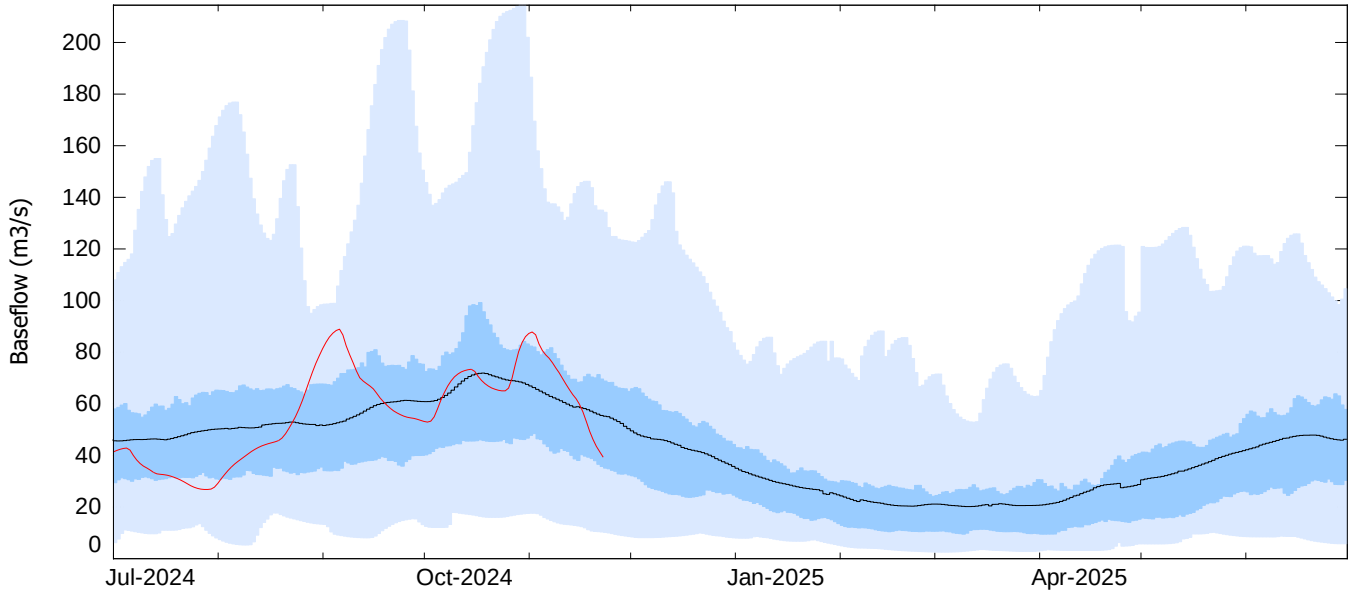

Figure 8. Wairau River at Tuamarina baseflow, from 1 July 2024 to 30 June 2025. The black line is average baseflow and the red line is the 2024/25 baseflow. The dark blue section is the middle 50% of data and the light blue sections show the upper and lower quartiles.

Baseflow in the Rai River at Rai Falls reached a new maximum for the time of year in early September, after two moderate flood events took place in late August/early September. Baseflow then declined to slightly below average by the end of September. Baseflow rose into the upper quartile by late October following a small fresh in early October and the larger flood in the last week of October. A moderate flood in mid-November kept baseflow levels elevated in the upper quartile for much of the month, although in the last week of November baseflow began to decline rapidly once more, approaching average baseflow by the end of the month.

Median flow for Rai at Rai Falls was 9.1 m^3/s for spring, which is almost 1.4 times the long-term median spring flow of 6.6 m^3/s.

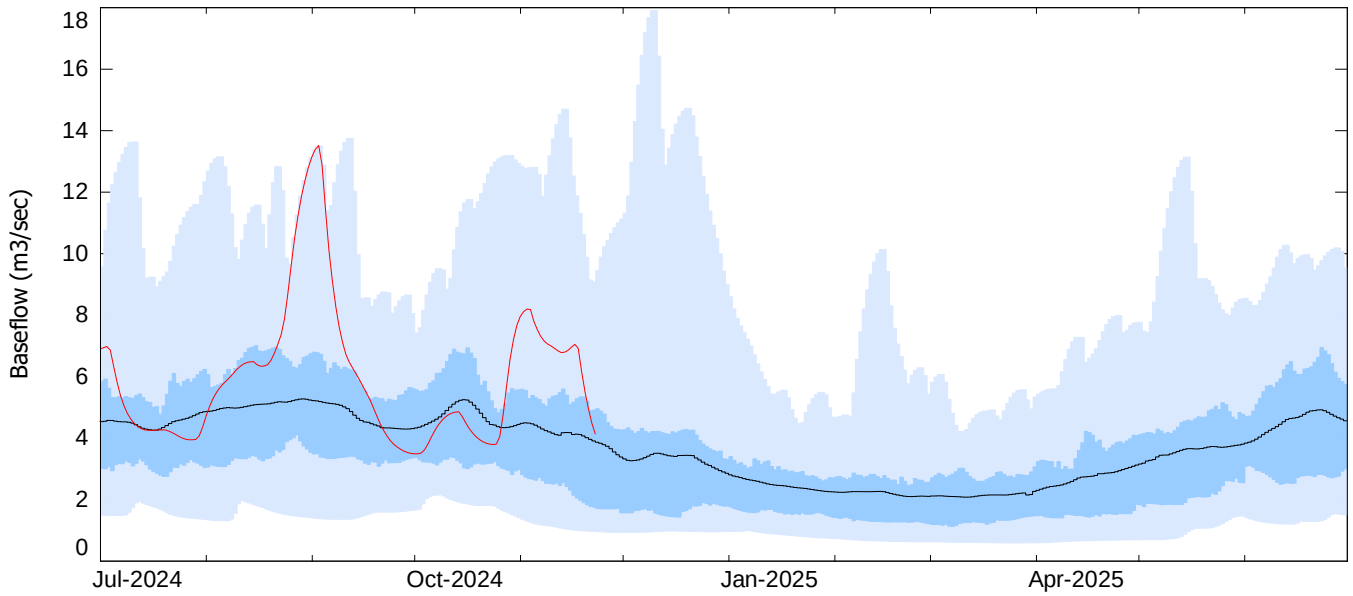

Figure 9. Rai River at Rai Falls baseflow, from 1 July 2024 to 30 June 2025. The black line is average baseflow and the red line is the 2024/25 baseflow. The dark blue section is the middle 50% of data and the light blue sections show the upper and lower quartiles.

A full summary of river flows for September, October and November 2024 can be found in the appendix.

Soil Moisture

Soil moisture at the Marlborough Research Centre in Blenheim sat near field capacity (approximately 38%) at the beginning of spring. With below average rainfall throughout September, by the end of the month soil moisture had declined to 31%. Soil moisture continued to decline through October, until over 50mm of rainfall in the last week of the month saw soil moisture rise from 25% to near field capacity. With just 12 mm of rain in November, soil moisture declined steadily throughout the month, reaching 19% by November 30th. This means little moisture is available in topsoil. 14.5% soil moisture is considered 'bone dry' or wilting point.

A graph of soil moisture for Blenheim over the 2024/25 hydrological year can be seen below in Figure 10.

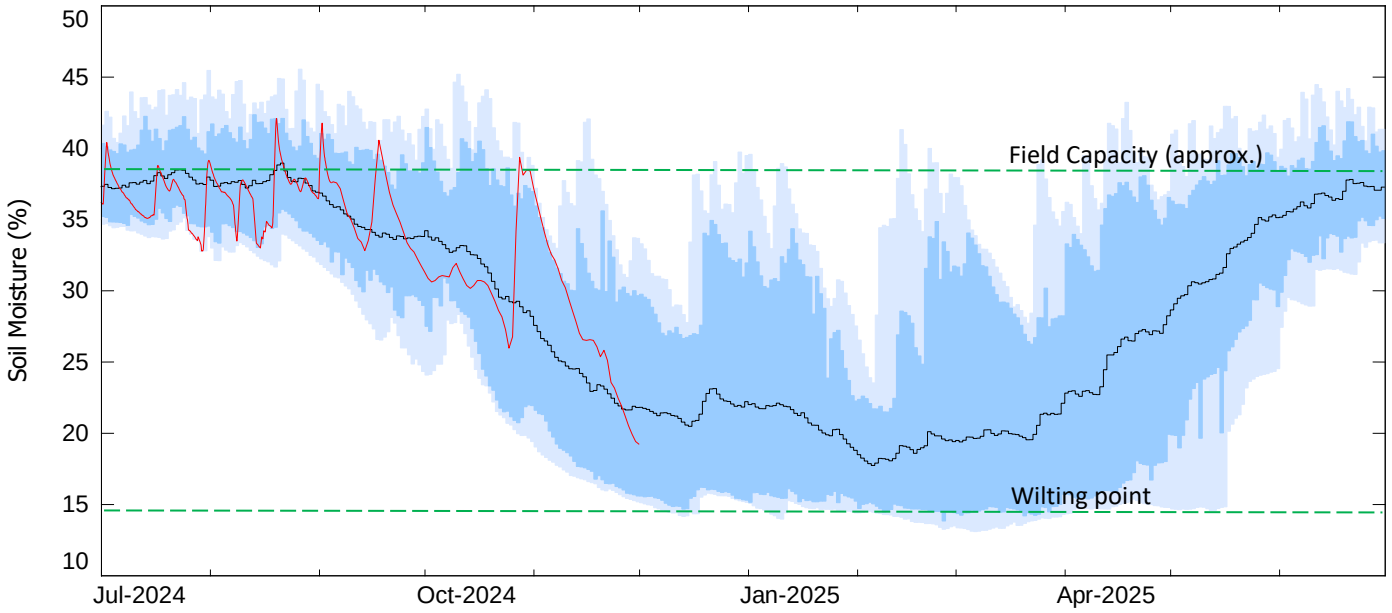

Figure 10. Shallow soil moisture at the Marlborough Research Centre (Blenheim) from the 1st of July 2024 to the 30th of June 2025. The red line shows this year's soil moisture, while the black line shows average soil moisture based on 19 years of data. The light blue shows the upper and lower 10% of the data and the dark blue shows the middle 80% of data.

Additional soil moisture monitoring sites around Marlborough (FENZ operated) generally have between 2 and 8 years of data, making analysis of soil moisture conditions difficult due to the short length of record. With low rainfall in November, soil moisture is sitting well below average at sites across the region, including Ward, Molesworth, lower Awatere, Wairau Valley, Rai Valley, and Kenepuru Head.

The current soil moisture deficit map from NIWA (the map on the right in Figure 11 below) shows that at the start of December soils in Marlborough are drying off, with soil moisture at or below 50% in the Wairau Valley, Wairau Plains, Awatere Valley, and the area moving south-east to the coast.

The soil moisture anomaly map (Figure 12) shows how current soil moisture compares to the historic average. The map shows soil moisture is average to slightly above average in the north of the region, and slightly below average in South Marlborough.

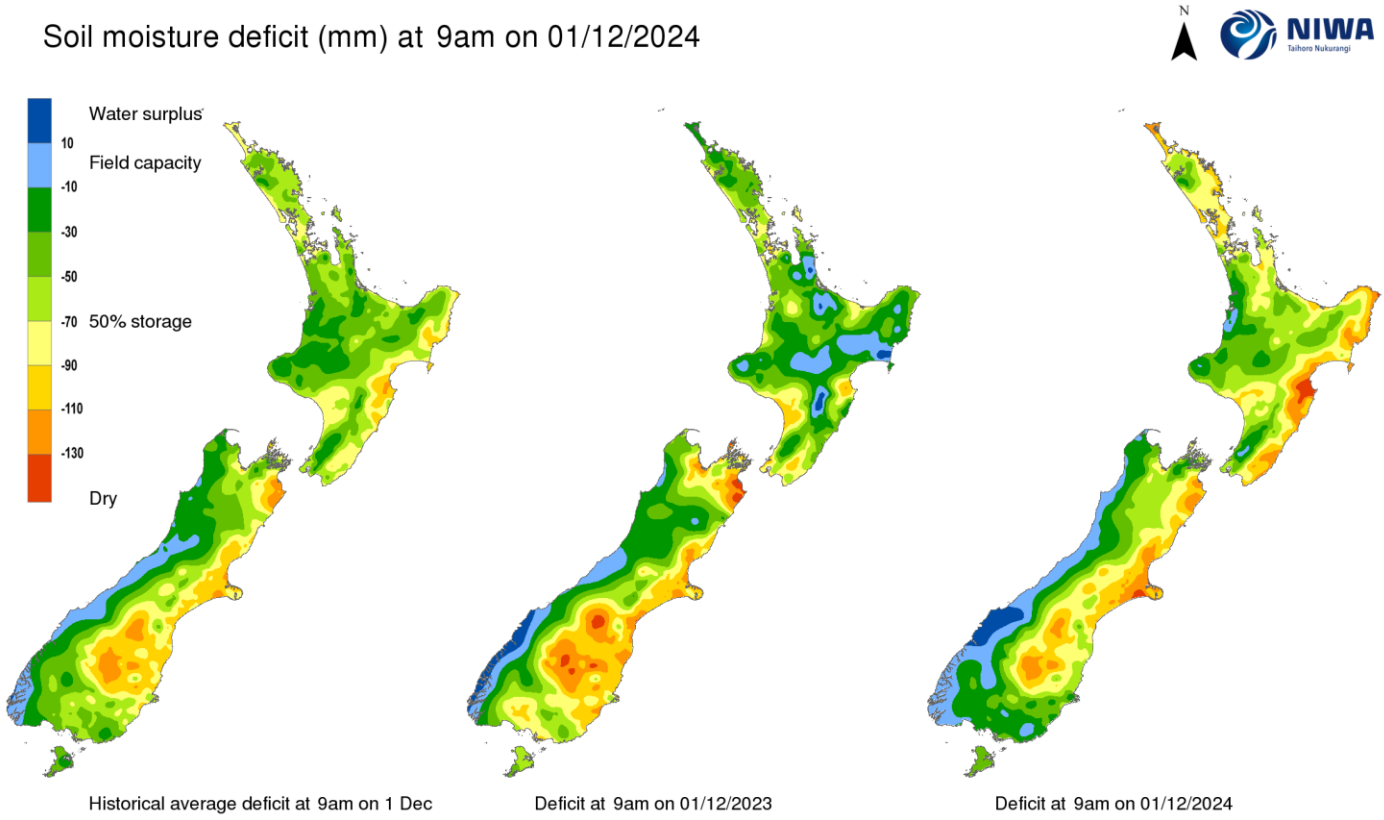

Figure 11. Soil moisture deficit map of New Zealand, retrieved from NIWA on the 2nd of December 2024.

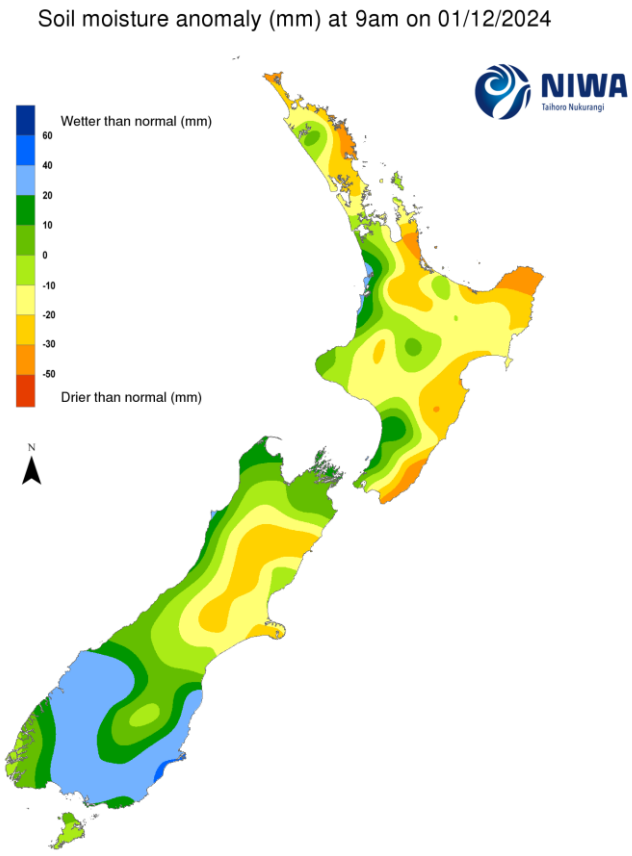

Figure 12. Soil moisture anomaly map of New Zealand, retrieved from NIWA on the 2nd of December 2024.

Groundwater

The Wairau Aquifer water level remained slightly below average for September and much of October. Groundwater level increased by just under 0.5 metres at Wratts Road following the late October Wairau River flood. Throughout November groundwater level steadily declined and in early December is sitting just below the long-term average for this time of year.

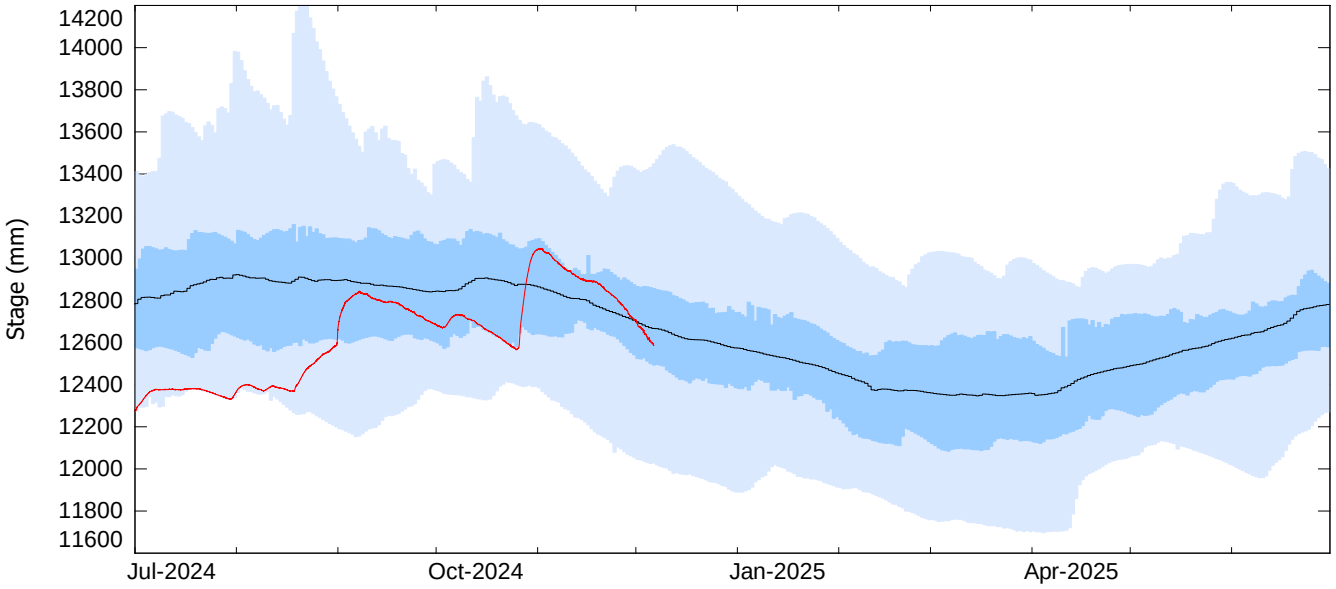

Figure 13. Wairau Aquifer at Wratts Road (well 3009) water level, from 1 July 2024 to 30 June 2025. The black line is the long-term average groundwater level, and the red line is the 2024/25 groundwater level. The dark blue section is the middle 50% of data and the light blue sections show the upper and lower quartiles.

Water level in the Riverlands Aquifer was near average for much of spring, with water level briefly raised due to the effects of the late October flooding. As irrigation began in October, the aquifer level has declined into the lower quartile due to increased pumping demand, as shown in Figure 14 below.

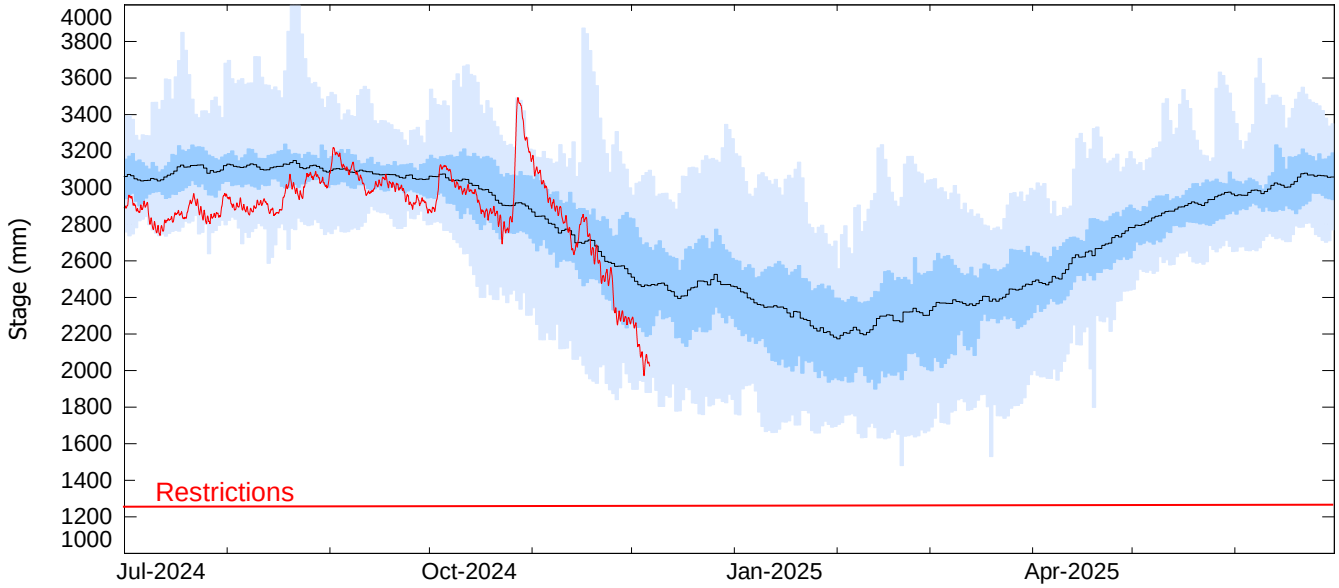

Figure 14. Riverlands Lagoon Well water level, from 1 July 2024 to 30 June 2025. The black line is the long-term average groundwater level, and the red line is the 2024/25 groundwater level. The dark blue section is the middle 50% of data and the light blue sections show the upper and lower quartiles.

Climate Outlook December to February 2024/25

There remains a 50% chance La Niña criteria will be met over the summer months. Whether or not an official La Niña event is declared, weather patterns will still be La Niña-like in the coming months.

In early to mid-December there will be a period of stronger than usual westerlies, bringing possible heavy rainfall to western regions of the country. From mid-December onwards more frequent northeasterly winds are expected, as is typical with La Niña. During La Niña there is generally high pressure sitting to the east of New Zealand, leading to more frequent north-easterly winds. Summer is generally wetter than average in northern and eastern areas and drier in western and southern areas. For Marlborough, this means the northern part of the region tends to have slightly more rainfall than average, while the southern half of the region may be slightly drier than average.

It is very likely air temperatures will be warmer than average over summer, while our eastern coastal areas may experience stronger onshore winds and cloudy skies.

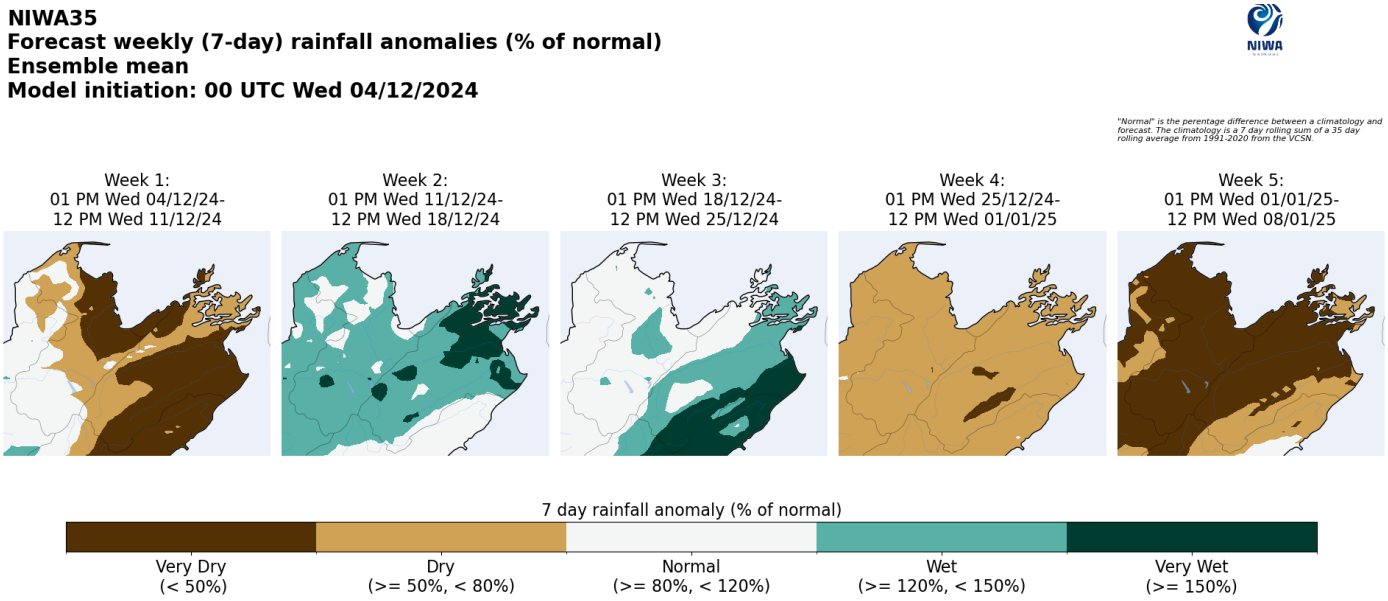

Figure 15. Weekly forecasted rainfall anomalies for Marlborough/Nelson/Tasman, from the 4th of December to the 8th of January. Retrieved from NIWA on the 4th of December 2024.

The predictions for Marlborough/Tasman from December to February are:

Temperature:	above average
Rainfall:	near average (40% chance) or above average (35% chance)
Soil Moisture:	near average or below average
River Flows:	near average or below average

Appendix

Table 1. Monthly rainfall totals (mm) for the 2024-25 hydrological year at monitoring sites in Marlborough.

Site	July	August	September	October	November
Awatere at Awapiri	69	101	28	185	19
Awatere Glenbrae NRFA	41	70	40	122	17
Beneagle at Farm Stream	54	80	44	129	20
Blenheim at MDC Office	38	67	58	85	9
Branch at Branch Recorder	99	146	61	284	60
Branch at Mt Morris	100	181	83	345	97
Flaxbourne at Corrie Downs	63	72	52	125	12
Kaituna Rainfall at Higgins Bridge	116	196	67	257	63
Kenepuru Head NRFA	188	295	100	299	116
Koromiko NRFA	132	214	74	292	68
Lake Elterwater Climate	71	69	49	124	32
Lansdowne NRFA	67	89	35	137	34
Malings	100	209	156	291	73
Mid Awatere Valley NRFA	55	64	29	147	18
Molesworth NRFA	34	86	27	150	20
Omaka at Ramshead Saddle	68	110	56	154	40
Onamalutu at Bartletts Creek Saddle	177	260	82	339	86
Onamalutu at Hilltop Road NRFA	154	273	101	320	100
Picton Climate at Waitohi Domain	117	179	86	220	59
Pudding Hill NRFA	36	85	32	141	13
Rai at Rai Falls	222	463	92	420	149
Rai Valley NRFA	253	410	101	447	155
Rarangi at Driving Range	61	149	115	153	19
Red Hills	83	125	101	309	76
St Arnaud NRFA	62	184	137	245	66
Taylor at Taylor Pass Landfill	48	85	51	108	17
Taylor at Tinpot	82	126	57	164	44
Te Rapa	66	78	64	129	25
Top Valley at Staircase Ridge	136	155	60	366	102
Tor Darroch NRFA	82	91	45	197	45
Tunakino	274	451	139	473	197
Upper Clarence NRFA	41	58	20	141	7

Table 2. (continued).

Site	July	August	September	October	November
Waihopai at Craiglochart	53	97	28	150	23
Waihopai at Spray Confluence	80	94	30	173	22
Waikakaho	80	154	63	211	29
Waikawa at Boons Valley	102	179	108	291	76
Wairau Valley at Southwold	97	126	44	204	43
Wakamarina at Twin Falls	170	381	98	372	131
Ward NRFA	64	66	49	109	24
Wye at Charlies Rest	68	112	50	130	50

Table 3. A summary of river flows in Marlborough for September 2024.

Site Name	Median Flow (m3/s)	% of long-term median	Flow Record Begins	Catchment Area (km2)
Rai River at Rai Falls	8.77	127	1979	211
Kaituna River at Higgins Bridge	3.62	130	1989	135
Branch River at Weir Intake	16.32	85	1958	551
Goulter River at Horseshoe Bend	4.60	105	2010	154
Waihopai River at Craiglochart	10.12	94	1960	745
Ohinemahuta River at Domain	0.77	140	2013	33
Are Are Creek at Kaituna Tuamarina Track	0.57	155	2007	32
Tuamarina River at Para Road	1.73	178	2004	100
Wairau River at Tuamarina	86.92	101	1960	3430
Omaka River at Gorge	0.93	124	1993	91
Taylor River at Borough Weir	0.54	132	1961	65
Flaxbourne River at Corrie Downs	0.35	130	2003	71
Awatere River at Awapiri	11.05	72	1977	983

Table 4. A summary of river flows in Marlborough for October 2024.

Site Name	Median Flow (m3/s)	% of long-term median	Flow Record Begins	Catchment Area (km2)
Rai River at Rai Falls	9.01	118	1979	211
Kaituna River at Higgins Bridge	3.91	149	1989	135
Branch River at Weir Intake	27.22	121	1958	551
Goulter River at Horseshoe Bend	7.63	171	2010	154
Waihopai River at Craiglochart	11.87	102	1960	745
Ohinemahuta River at Domain	0.50	109	2013	33
Are Are Creek at Kaituna Tuamarina Track	0.44	125	2007	32
Tuamarina River at Para Road	1.43	142	2004	100
Wairau River at Tuamarina	113.62	113	1960	3430
Omaka River at Gorge	0.89	117	1993	91
Taylor River at Borough Weir	0.46	143	1961	65
Flaxbourne River at Corrie Downs	0.28	111	2003	71
Awatere River at Awapiri	12.94	83	1977	983

Table 5. A summary of river flows in Marlborough for November 2024.

Site Name	Median Flow (m3/s)	% of long-term median	Flow Record Begins	Catchment Area (km2)
Rai River at Rai Falls	9.49	180	1979	211
Kaituna River at Higgins Bridge	3.67	234	1989	135
Branch River at Weir Intake	21.32	122	1958	551
Goulter River at Horseshoe Bend	4.82	157	2010	154
Waihopai River at Craiglochart	9.57	123	1960	745
Ohinemahuta River at Domain	0.43	125	2013	33
Are Are Creek at Kaituna Tuamarina Track	0.40	155	2007	32
Tuamarina River at Para Road	1.48	277	2004	100
Wairau River at Tuamarina	93.03	115	1960	3430
Omaka River at Gorge	0.67	139	1993	91
Taylor River at Borough Weir	0.24	124	1961	65
Flaxbourne River at Corrie Downs	0.19	213	2003	71
Awatere River at Awapiri	13.19	118	1977	983