

Hydrology of Marlborough Summary September 2023

Report prepared by Charlotte Tomlinson, 3rd October 2023.

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

Executive Summary

After a dry winter, rainfall was closer to average in the first month of spring. Blenheim recorded 48 mm of rain in September, slightly below the September average of 52.5 mm. Rainfall in the upper Wairau Valley was above average, while in the rest of the region rainfall was near or slightly below average.

Average monthly river flows varied throughout the region in September. Broadly speaking, rivers to the west of the region had higher mean flows than average, while rivers in the east had lower mean flows than usual for September. The Wairau at Tuamarina had mean flow of 119 m³/s, which is just below average for September.

Shallow soil moisture at Grovetown Park rose to just below 38% by the end of September.

NIWA have announced the official onset of El Niño conditions, which are virtually certain to continue from now to December, and 95% likely to persist through the summer months. Strong westerly winds will be present across the country and could lead to dry spells around Marlborough. Large temperature variations will continue through spring, as air masses from Australia bringing unseasonal warm periods followed by cold southerly systems.

Rainfall

After a dry winter, rainfall was closer to average in September. Rainfall in Blenheim for the month was 48 mm, compared to the long-term average of 52.5 mm.

In the upper Wairau Valley rainfall was higher than average, with 161 mm recorded at Red Hills, which is 150% of average September rainfall. Similarly, Top Valley recorded 130% of average September rainfall, with 184 mm in total.

Monthly rainfall totals from July 2023 onwards for sites in Marlborough can be seen in Figure 1 and Table 1 below.



Figure 1. Monthly rainfall totals for the 2023-24 hydrological year from 6 key sites around Marlborough, compared to average monthly rainfall totals. Note the adjusted scale for the Tunakino site.

Site	July	August	September
Awatere at Awapiri	85	51	64
Awatere Glenbrae NRFA	44	18	53
Beneagle at Farm Stream	49	29	55
Blenheim at MDC Office	23	22	44
Branch at Branch Recorder	40	63	128
Branch at Mt Morris	34	70	193
Flaxbourne at Corrie Downs	99	12	52
Kaituna Rainfall at Higgins Bridge	41	76	116
Kenepuru Head NRFA	62	130	135
Koromiko NRFA	46	79	117
Lake Elterwater Climate	97	12	59
Lansdowne NRFA	46	64	80
Malings	56	101	227
Mid Awatere Valley NRFA	39	38	50
Molesworth NRFA	41	38	72
Omaka at Ramshead Saddle	44	55	68
Onamalutu at Bartletts Creek Saddle	64	147	165
Onamalutu at Hilltop Road NRFA	48	96	175
Picton Climate at Waitohi Domain	46	65	86
Pudding Hill NRFA	54	39	77
Rai at Rai Falls	46	114	223
Rai Valley NRFA	50	128	180
Rarangi at Driving Range	31	49	59
Red Hills	36	49	161
St Arnaud NRFA	57	70	120
Taylor at Taylor Pass Landfill	40	47	43
Taylor at Tinpot	85	48	99
Te Rapa	160	18	77
Top Valley at Staircase Ridge	43	77	184
Tor Darroch NRFA	47	61	114
Tunakino	74	160	170
Upper Clarence NRFA	106	31	50
Waihopai at Craiglochart	28	52	56
Waihopai at Spray Confluence	38	65	86
Waikakaho	49	59	73
Waikawa at Boons Valley	61	69	124
Wairau Valley at Southwold	51	73	73
Wakamarina at Twin Falls	45	100	169
Ward NRFA	136	18	55
Wye at Charlies Rest	35	68	103

Table 1. Monthly rainfall totals (mm) for the 2023-24 hydrological year at monitoring sites in Marlborough.

River Flows

Mean monthly flows varied throughout the region. Broadly speaking, rivers in the west of the region (Pelorus, Branch, Goulter, Wairau at Dip Flat) had higher mean flows than average, while the Wairau at Tuamarina had mean flow of 119 m³/s, which is just below average for September. Rivers in the east of the region generally had lower flows than usual for September, such as the Tuamarina River with a mean flow of 0.78 m³/s, which is 43% of the long-term September average.

In the last week of September sustained rainfall led to some moderately high flows in rivers throughout the region. Maximum flow in the Wairau at Dip Flat was approximately 240 m³/s on the 23rd, while at State Highway 1 maximum flow was 730 m³/s.

From this same event, maximum flow in the Pelorus river reached 500 m³/s. Mean annual flood in the Pelorus is approximately 950 m³/s.

A summary of river flows for September 2023 can be seen below in Table 2.

Table 2. A summary of river flows in Marlborough for September 2023.

River	Site	September mean flow 2023 (m ³ /s)	September mean flow all records (m ³ /s)	% of monthly average	Records begin	Catchment area (km ²)
Rai	Rai Falls	9.24	13.27	70	1979	211
Pelorus	Bryants	28.56	24.71	116	1977	375
Kaituna	Higgins Bridge	3.03	5.58	54	2006	133
Wairau	Dip Flat	40.75	28.80	141	1951	505
Branch	Weir Intake	34.96	27.64	126	1958	550
Goulter	Horseshoe Bend	11.92	8.70	137	2010	154
Waihopai	Craiglochart	21.83	20.03	109	1960	764
Onhinemahuta	Domain	1.10	1.20	92	1998	33
Are Are	Kaituna-Tuamarina Track	0.30	0.69	43	2007	32
Tuamarina	Para Road	0.78	1.80	43	2004	100
Wairau	Tuamarina	119.36	130.18	92	1960	3,430
Omaka	Gorge	0.79	1.37	58	1994	90
Taylor	Borough Weir	0.26	0.92	28	1961	64
Flaxbourne	Corrie Downs	0.13	0.61	21	2003	70
Awatere	Awapiri	13.97	18.19	77	1977	987

Soil Moisture

At the start of September, shallow soil moisture (5-35 cm) was 33.6% at Grovetown Park. This declined through the month to 30.6% on the 21st, before rainfall in the last week of September raised soil moisture to 37.7% by the end of the month.

The soil moisture deficit map below (Figure 2) show that at the 1st of October (right-hand map) soils in the cropping areas of Marlborough have a similar soil moisture deficit to the historical average (left map). This time last year most soils in the region were at or near field capacity (central map).

Figure 3 shows that soils are slightly drier than normal in the north-east of the region, and around average for the rest of the region.

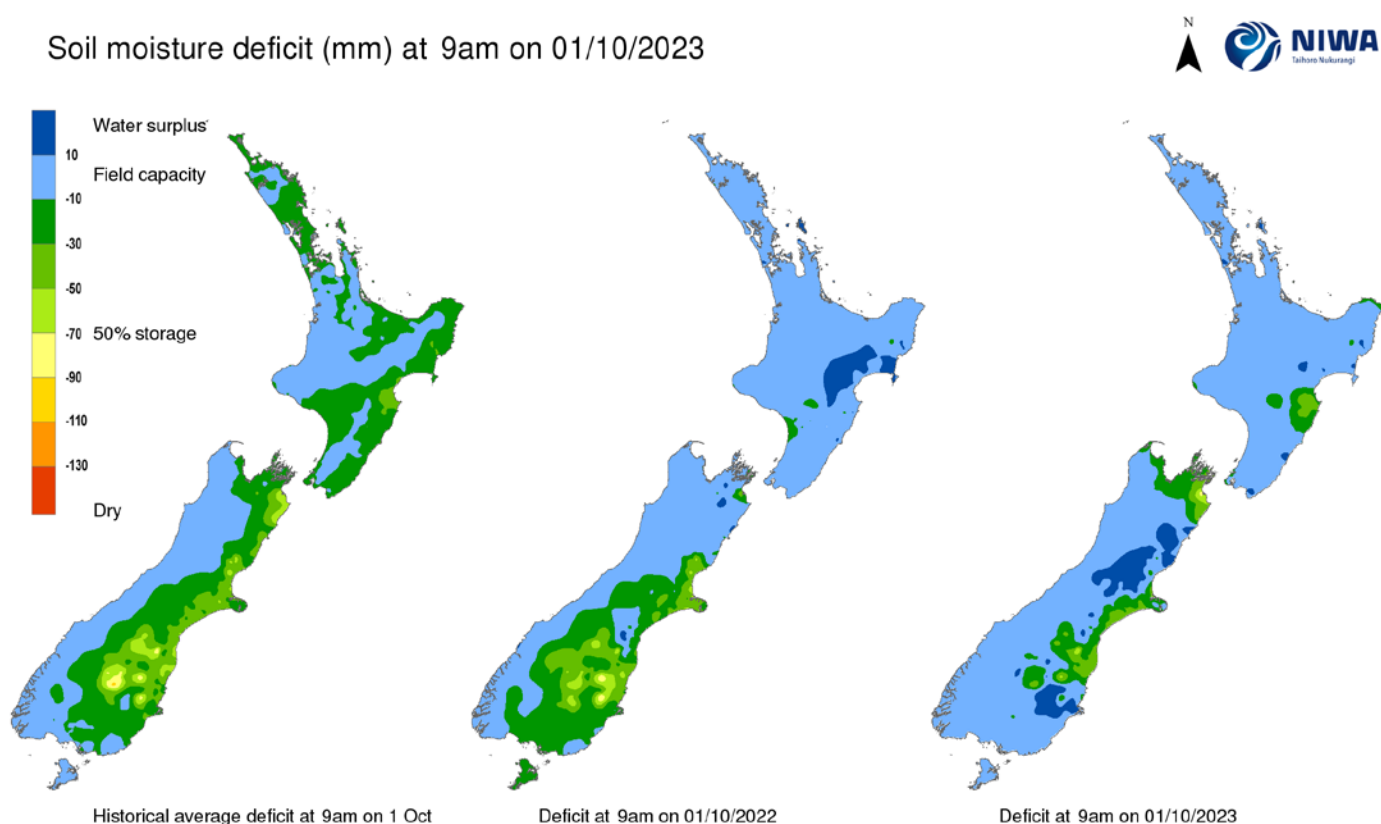


Figure 2. Soil moisture deficit maps of New Zealand, retrieved from NIWA on 1/10/2023.

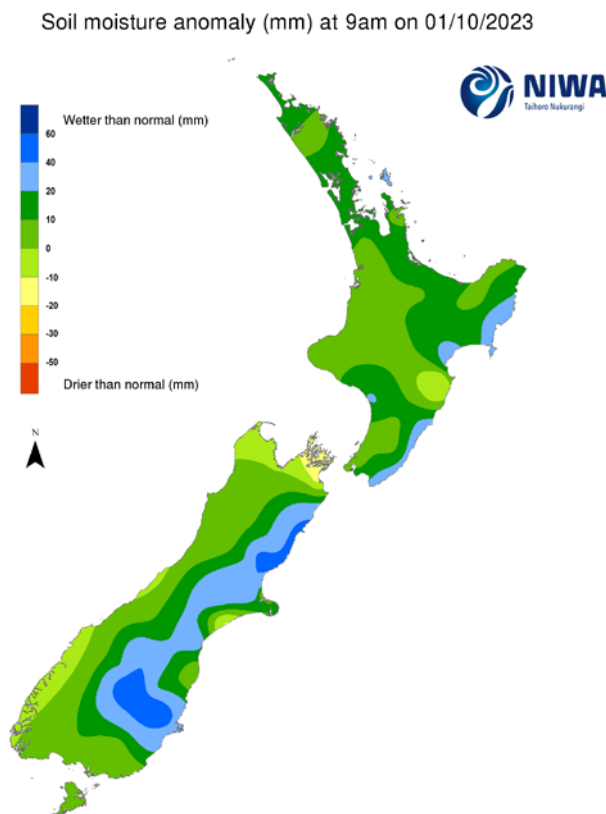


Figure 3. Soil moisture anomaly map of New Zealand, retrieved from NIWA 1/10/2023.

Spring Climate Outlook September – November 2023

El Niño has arrived, with the Southern Oscillation index meeting the El Niño threshold during September. It is virtually certain that El Niño conditions will continue from October to December, with a 95% chance that El Niño will persist through the summer months. Higher air pressure to the north of New Zealand and lower air pressure to the south will lead to more westerly winds than normal. Wind strength is forecast to be stronger than usual, due to a larger pressure gradient than usual. We are in for a temperature rollercoaster through spring with air masses from Australia bringing unseasonal warm periods, followed by cold southerly systems.

Large temperature swings are likely especially in October. Westerly winds increasing in frequency will likely lead to dry spells around Marlborough. Seasonal wind speeds are likely to be much stronger than usual.

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

- 🌡️ Temperature – near or above average
- ☁️ Rainfall – near or below average
- 🌿 Soil Moisture – near or below average
- 🌊 River Flows – near or below average