Hydrology of Marlborough Summary August 2023

Report prepared by Charlotte Tomlinson, 4th September 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

August was a cold, clear and dry end to winter. In Blenheim 597 hours of sunshine from June to August made it the sunniest winter recorded over 94 years (1930-2023).

Blenheim rainfall was 24.2 mm for the month, which is 38% of the long-term August average (63 mm). Total winter rainfall was just 70.2 mm, 35% of the long-term average of 198 mm. This is the 2nd driest winter in 94 years of rainfall data collection in Blenheim.

A lack of rain events over winter has led to river flows well below average for this time of year. The average flow in the Wairau River at Tuamarina was 39 m^3/s in August, which is 33% of the long-term average. For 18 days in August flows were below 30 m^3/s, the flow at which Class C water takes must cease.

Average shallow soil moisture at Grovetown Park was 35% in August, below field capacity of 38%. After a dry winter, spring rainfall will be needed to replenish soil moisture in the coming months.

Official El Niño conditions are likely to be met in New Zealand this spring, with the ocean temperature in the tropical Pacific warming to above the El Niño threshold, and the Southern Oscillation Index approaching the El Niño threshold. The onset of El Niño will lead to a more active and volatile westerly flow across New Zealand. Rainfall is likely to be below average in Marlborough with unusually long dry spells possible this spring.

Rainfall

August was a dry end to a generally dry winter season across the region. Blenheim rainfall was 24.2 mm for the month, which is 38% of the long-term August average (63 mm). Total winter rainfall was just 70.2 mm, 35% of the long-term average of 198 mm. This is the 2nd driest winter in 94 years of rainfall data collection, standing in stark contrast to the winter 2022 season, which was the wettest winter on record, with 413 mm of rainfall in Blenheim.

Rainfall for the winter season was in the 10th percentile at both the Branch at Branch Recorder and Tunakino sites, with 165 and 335 mm respectively. Awatere at Awapiri was one location where rainfall was slightly above average for winter, with 254 mm recorded compared to an average of 233 mm. However the Flaxbourne and Te Rapa (Waima catchment) both recorded below average rainfall for the winter.

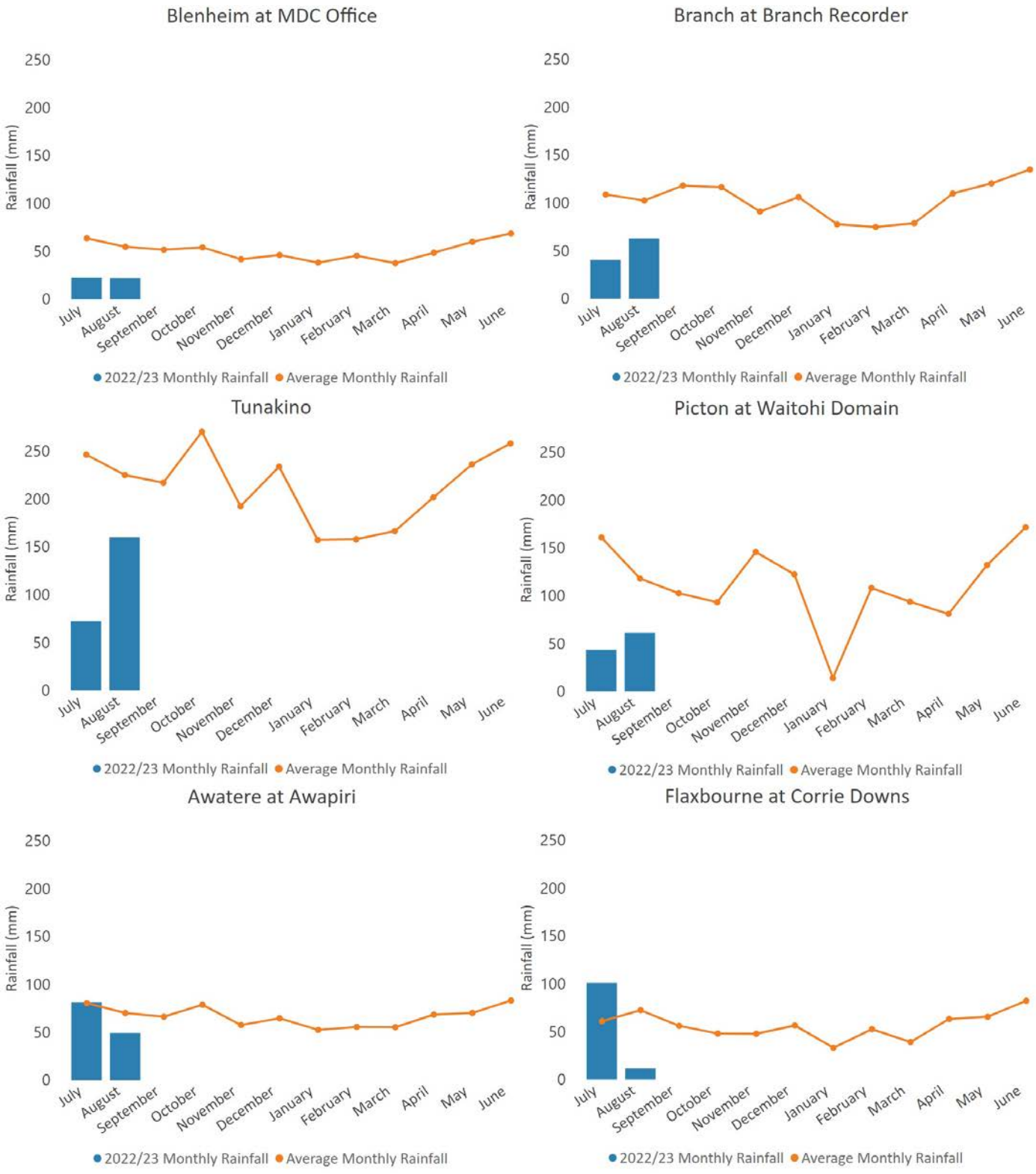

Figure 1. Monthly rainfall totals for the 2023-24 hydrological year from 6 key sites around Marlborough, compared to average monthly rainfall totals.

Table 1. Winter 2023 monthly rainfall totals (mm) at rainfall monitoring sites in Marlborough.

Site	June	July	August
Awatere at Awapiri	124	81	49
Awatere Glenbrae NRFA	26	44	18
Beneagle at Farm Stream	36	49	29
Blenheim at MDC Office	22	23	22
Branch at Branch Recorder	62	40	63
Branch at Mt Morris	72	29	59
Flaxbourne at Corrie Downs	39	101	12
Kaituna Rainfall at Higgins Bridge	45	41	76
Kenepuru Head NRFA	78	62	130
Koromiko NRFA	76	46	79
Lake Elterwater Climate	37	97	12
Lansdowne NRFA	40	46	64
Malings	58	56	101
Mid Awatere Valley NRFA	92	39	38
Molesworth NRFA	52	41	38
Omaka at Ramshead Saddle	62	44	55
Onamalutu at Bartletts Creek Saddle	90	64	147
Onamalutu at Hilltop Road NRFA	106	48	96
Picton Climate at Waitohi Domain	45	43	61
Pudding Hill NRFA	49	54	39
Rai at Rai Falls	99	44	114
Rai Valley NRFA	115	50	128
Rarangi at Driving Range		31	49
Red Hills	139	36	49
St Arnaud NRFA	44	57	70
Taylor at Taylor Pass Landfill	29	40	25
Taylor at Tinpot	80	74	42
Te Rapa	66	160	18
Top Valley at Staircase Ridge	143	43	77
Tor Darroch NRFA	71	47	61
Tunakino	103	72	160
Upper Clarence NRFA	85	106	31
Waihopai at Craiglochart	18	26	52
Waihopai at Spray Confluence	56	35	61
Waikakaho	46	46	56
Waikawa at Boons Valley	49	61	69
Wairau Valley at Southwold	64	51	70
Wakamarina at Twin Falls	87	43	100
Ward NRFA	55	136	18
Wye at Charlies Rest	58	35	68

River Flows

River flows throughout the region were below average in August.

A lack of rain events over winter has led to a quiet period in the Wairau River, with flows well below average for this time of year. The average flow in the Wairau River at Tuamarina was 39 m^3/s, which is 33% of the August long-term average. Following on from rain on the 19th of August, maximum flow was 200 m^3/s on the 20th. However for much of the month (18 days), flows were below 30 m^3/s, which is the flow at which Class C water takes must cease.

The same band of rain on the 19th of August resulted in a fresh in the Pelorus River, with maximum flow of 340 m^3/s at Pelorus River at Bryants. The average annual flood at this site is approximately 950 m^3/s.

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

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

Site Name	August Mean Flow (m3/s)	August Long-Term Mean Flow (m3/s)	% of long-term mean	Flow Record Begins	Catchment Area (km2)
Rai River at Rai Falls	6.29	15.55	40	1979	211
Pelorus River at Bryants	16.99	24.77	69	1977	375
Kaituna River at Higgins Bridge	1.55	7.69	20	1989	135
Branch River at Weir Intake	8.52	24.35	35	1958	551
Goulter River at Horseshoe Bend	3.36	10.34	32	2010	154
Waihopai River at Craiglochart	6.94	20.12	34	1960	745
Ohinemahuta River at Domain	0.59	1.76	33	2013	33
Are Are Creek at Kaituna Tuamarina Track	0.34	1.14	30	2007	32
Tuamarina River at Para Road	0.79	2.85	28	2004	100
Wairau River at Tuamarina	39.11	119.72	33	1960	3430
Omaka River at Gorge	0.96	2.17	44	1993	91
Taylor River at Borough Weir	0.19	1.40	13	1961	65
Flaxbourne River at Corrie Downs	0.40	1.31	30	2003	71
Awatere River at Awapiri	11.30	19.91	57	1977	983

Soil Moisture

Average shallow soil moisture at Grovetown Park was 35% in August, below field capacity of 38%. After a dry winter, spring rainfall will be needed to replenish soil moisture in the coming months.

The soil moisture deficit maps below (Figure 2) show that soils in the cropping areas of Marlborough are below field capacity as of the 31st of August. In comparison, soils in the region were generally at or above field capacity at the same time last year. Figure 3 shows that soils are drier than normal for the end of winter in Marlborough.

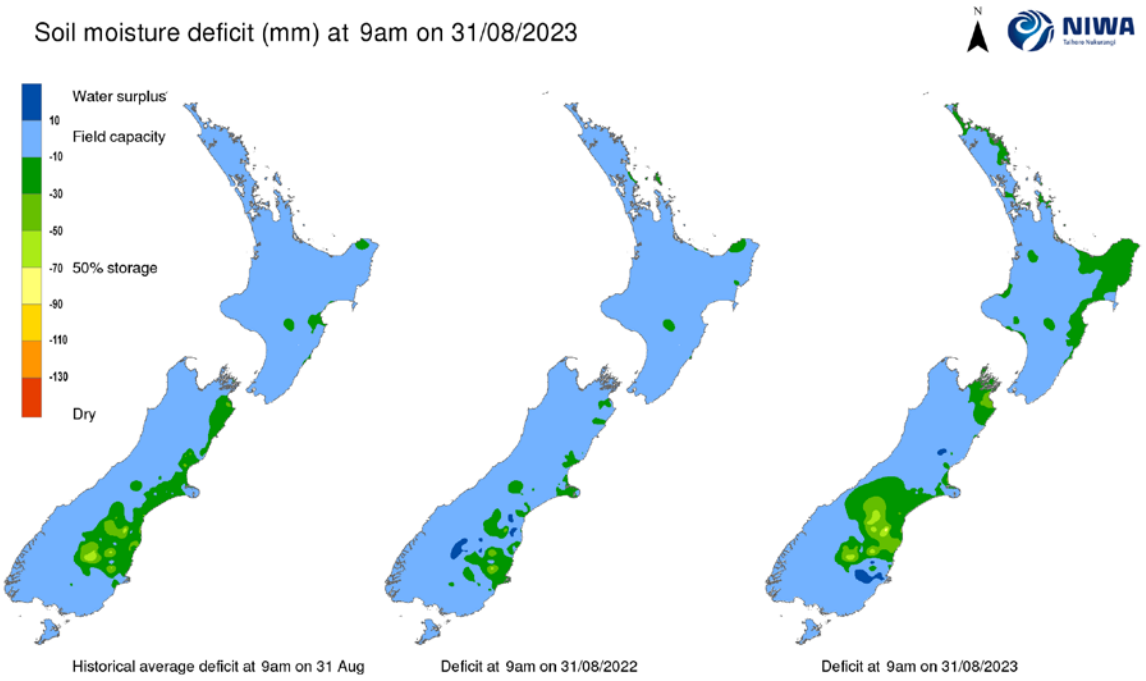

Figure 2. Soil moisture deficit maps of New Zealand, retrieved from NIWA on 31/08/2023.

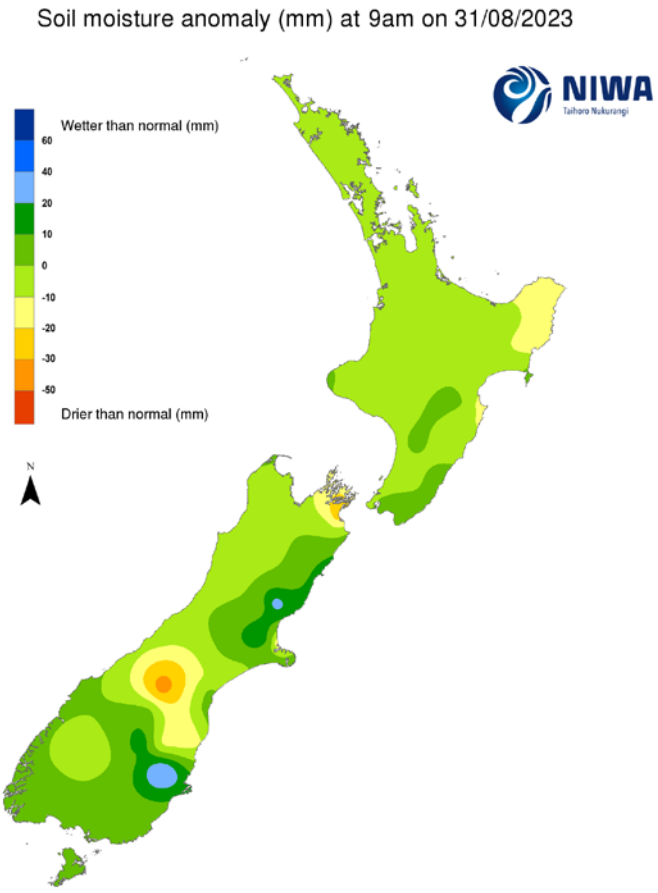

Figure 3. Soil moisture anomaly map of New Zealand, retrieved from NIWA 31/08/2023.

Spring Climate Outlook September – November 2023

The United States weather agency NOAA have declared the start of El Niño in North America, with a significant event possible by New Zealand summer. In a New Zealand context El Niño conditions are likely to be met this spring, with ocean temperatures in the central equatorial Pacific exceeding the El Niño threshold, and the Southern Oscillation Index approaching the El Niño threshold. The onset of El Niño will lead to a more active and volatile westerly flow across New Zealand.

Winds for the first half of September will be more easterly, then throughout spring as a whole air pressure is forecast to be higher to the north-west of New Zealand and lower to the south, leading to a south-westerly flow across the country. Wind speeds may be greater than normal once westerlies intensify in the second half of September.

Marlborough is well sheltered to the south-west, so rainfall is likely to be below average with unusually long dry spells possible this spring.

The predictions for Marlborough/Tasman from September to November are:

Temperature – near or above average

Rainfall – below average

Soil Moisture – near average

River Flows – near or below average