

Hydrology of Marlborough Summary for October 2022

Report prepared by Charlotte Tomlinson, 1st November 2022.

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

October has been characterised by low rainfall and subsequent declining river flows throughout Marlborough. Many of the major rivers in Marlborough (Branch, Waihopai, Awatere at Awapiri, and Wairau at Bernetts Bank) had an average monthly flow of only half the long-term average flow for October.

The pattern of soil moisture deficit throughout Marlborough at the end of October is similar to the historic average for this time of year. Soils in northern Marlborough are slightly drier than normal, and soils on the East Coast are slightly wetter than normal.

Moderate La Niña conditions continued in October, while higher air pressure over the South Island is forecast to bring more easterly air flows to Marlborough in the coming months. Rainfall, soil moisture, and river flows are all predicted to be average or slightly below average through to January 2023.

Rainfall

In October, rainfall throughout the region was low, as can be seen in the graphs below (*Figure 1*). All 6 of the key sites shown below had lower than average rainfall compared to average October rainfall. The most significant rainfall for October fell in northern Marlborough and at higher elevation points on October 29th.

The Awatere at Awapiri and Branch rain gauges both recorded less than a quarter of average October rainfall. Blenheim recorded just 28% of average October rainfall this month, with Marlborough Research Centre data showing this is the 10th lowest October rain total since 1986.

Looking at year-to-date rainfall totals (Table 1), the majority of rainfall monitoring sites in Marlborough have already recorded more total rainfall than in an average calendar year. However, the rain has not been distributed evenly throughout the year. Using Blenheim as an example: there have been 4 months this year (January, March, April, and October) which recorded less than a third of average monthly rainfall (very dry). Conversely, there have also been 3 months this year (February, July, and August) which recorded more than twice the average monthly rainfall (very wet). This pattern of very dry and very wet months has been seen throughout the region in 2022.

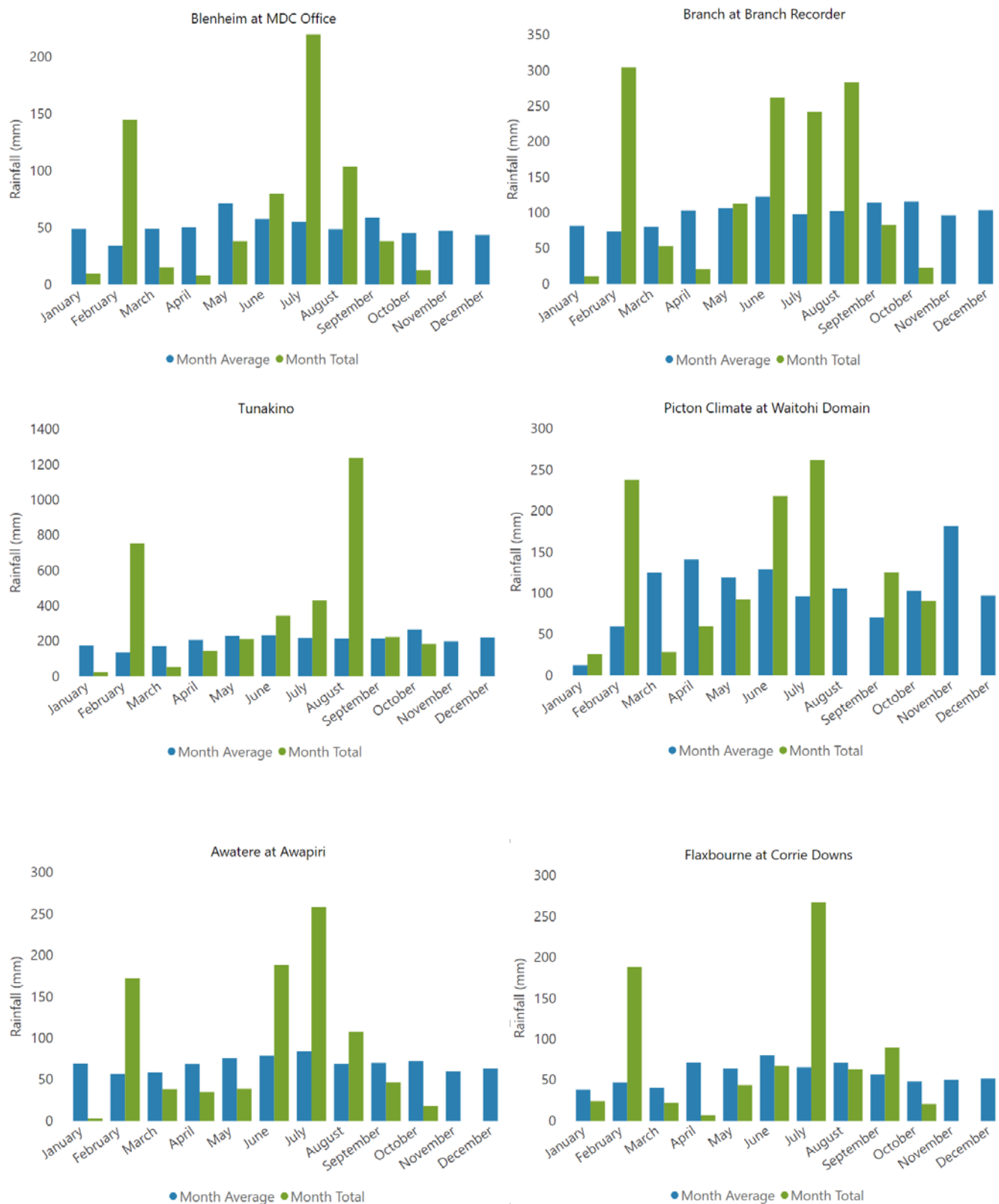


Figure 1. Year-to-date monthly rainfall totals from key sites around Marlborough, compared to average monthly rainfall totals.

Table 1. Monthly rainfall totals (mm) in Marlborough for Aug/Sept/Oct 2022, and Year-to-date rainfall Totals (mm)

Site	Aug	Sept	Oct		Year-to-date total
Tunakino	1238.8	223.5	183.5		3609.7
Rai at Rai Falls	912.5	170	185		2956.7
Rai Valley NRFA	735.2	208.6	158.4		2880.8
Wakamarina at Twin Falls	590.3	175	178		2392.9
Kaituna Rainfall at Higgins Bridge	365	87	103.5		1617
Kenepuru Head NRFA	516.2	192.2	159.4		2330.4
Koromiko NRFA	286.8	185.8	129.6		1701.4
Picton Climate at Waitohi Domain	315.8	125.2	90.8		1455.3
Waikawa at Boons Valley	143	119	84		967
Waikakaho	212.3	88	48		1287.7
Wairau at Narrows	246	79	50.5		1193
Rarangi at Driving Range	185.6	63.6	53		1162.6
Lansdowne NRFA	239	88	24.6		1242.6
Wairau Valley at Southwold	272.5	77	35.1		1287.7
Onamalutu at Hilltop Road NRFA	447.6	134.6	168.6		1825.8
Onamalutu at Bartletts Creek Saddle	450	130	123.5		2084
Top Valley at Staircase Ridge	430.1	120	60		1982.1
Red Hills	250.5	113.5	28		1374
St Arnaud NRFA	199.4	138.2	66.8		1507.2
Malings	275.5	90.5	94.5		1620.5
Branch at Branch Recorder	283.4	82.5	23		1393.7
Branch at Mount Morris	376.9	152.5	55.5		1858.3
Wye at Charlies Rest	197	89.5	21		1144.3
Waihopai at Spray Confluence	163.4	65.3	9		1008.6
Tor Darroch NRFA	163.8	78.6	20		1074
Waihopai at Craiglochart	128.4	60.8	18.9		869.1
Omaka at Ramshead Saddle	148.7	75.5	21.5		932.4
Taylor at Tinpot	137.9	104.9	46.8		1101.2
Taylor at Taylor Pass Landfill	109	55	15		727.3
Wither Hills NRFA	87.2	51.2	15		153.4
Blenheim at MDC Office	103.5	38	12.5		651
Beneagle at Farm Stream	87	71.5	19.5		792.5
Flaxbourne at Corrie Downs	63	89.5	20.5		792.6
Awatere at Awapiri	107.9	46.5	18		906.3
Awatere Glenbrae NRFA	57.4	38.6	11.2		582
Mid Awatere Valley NRFA	77.6	28.6	7		685.6
Molesworth NRFA	99.2	39	12.4		765.2
Lake Elterwater	66.7	106.4	22.8		826.9
Ward NRFA	65	87	23.6		896.6
Te Rapa	86	132.8	32.2		1153.2
Pudding Hill NRFA	124	48.8	22.6		768.4
Upper Clarence NRFA	34.2	28	13.6		518.2

River Flows

River flows gradually declined throughout the month, with very little rain input. A fresh was seen in many rivers after moderate rainfall on October 29th, centred around the Te Hoiere catchment area. However, mean flow in most Marlborough rivers was lower than average for October.

The Wairau River at Barnettts Bank, Branch, Waihopai, and Awatere at Awapiri all had mean flow of around 50% of their historic average October flow. At the other end of the spectrum, the Flaxbourne River at Corrie Downs had an average flow of 1.09 m³/s, which is double the average October flow.

Table 2. A summary of river flows in Marlborough for October 2022.

River	Site	October mean flow 2022 (m ³ /s)	October mean flow all records (m ³ /s)	% of monthly average	Records begin	Catchment area (km ²)
Pelorus	Bryants	22.96	27.99	82	1977	375
Rai	Rai Falls	12.55	15.65	80	1979	211
Kaituna	Higgins Bridge	6.51	4.56	143	2006	133
Branch	Intake Weir	15.60	32.58	48	1958	550
Wairau	Barnettts Bank	84.21	149.38	56	1960	3,430
Wairau	Dip Flat	35.78	41.17	87	1951	505
Onhinemahuta	Domain	1.24	1.40	89	1998	33
Waihopai	Craiglochart	9.96	21.40	47	1960	764
Awatere	Awapiri	8.68	19.81	44	1977	987
Omaka	Gorge	0.98	1.34	73	1994	90
Taylor	Borough Weir	0.87	0.73	118	1961	64
Flaxbourne	Corrie Downs	1.09	0.51	211	2003	70

Soil Moisture

Data from the Marlborough Research Centre shows that topsoil moisture declined rapidly throughout October, from 39.8% (slightly above field capacity) on October 1st, to 22.4% on October 31st, a loss of 17.4% moisture. Average topsoil moisture loss for October is 6.1%.

As can be seen in the soil moisture deficit maps below (*Figure 2*), soils around Marlborough have a similar moisture deficit to the historical average for the end of October, and soils are generally slightly drier than this time last year (middle image below).

The soil moisture anomaly map (*Figure 3*) shows a north-west to south-east gradient in Marlborough, with drier than normal soils in the Northern Marlborough and the Marlborough Sounds, while soils on the East Coast are normal or slightly wetter than normal.

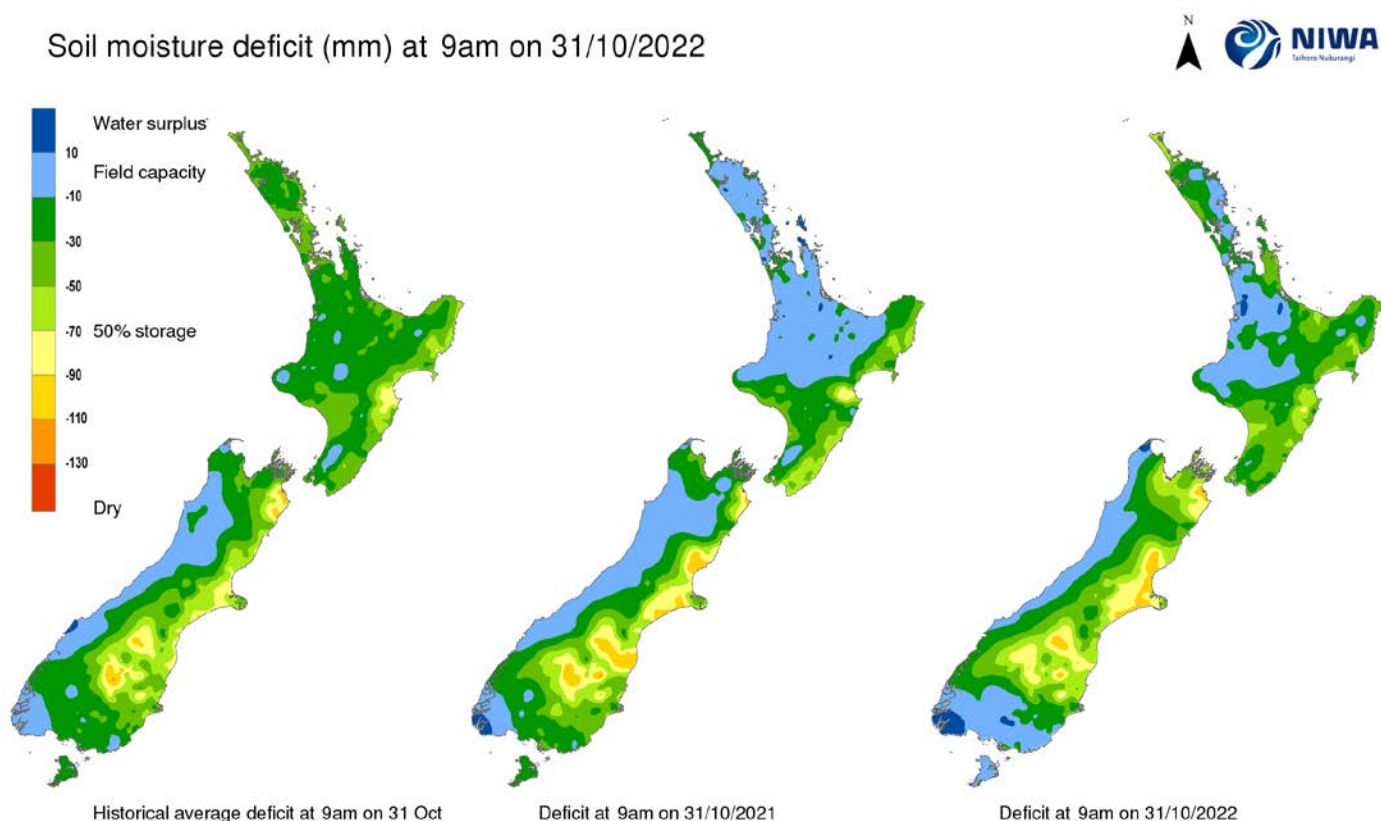


Figure 2. Soil moisture deficit maps of New Zealand, retrieved from NIWA on 31/10/2022.

Soil moisture anomaly (mm) at 9am on 31/10/2022

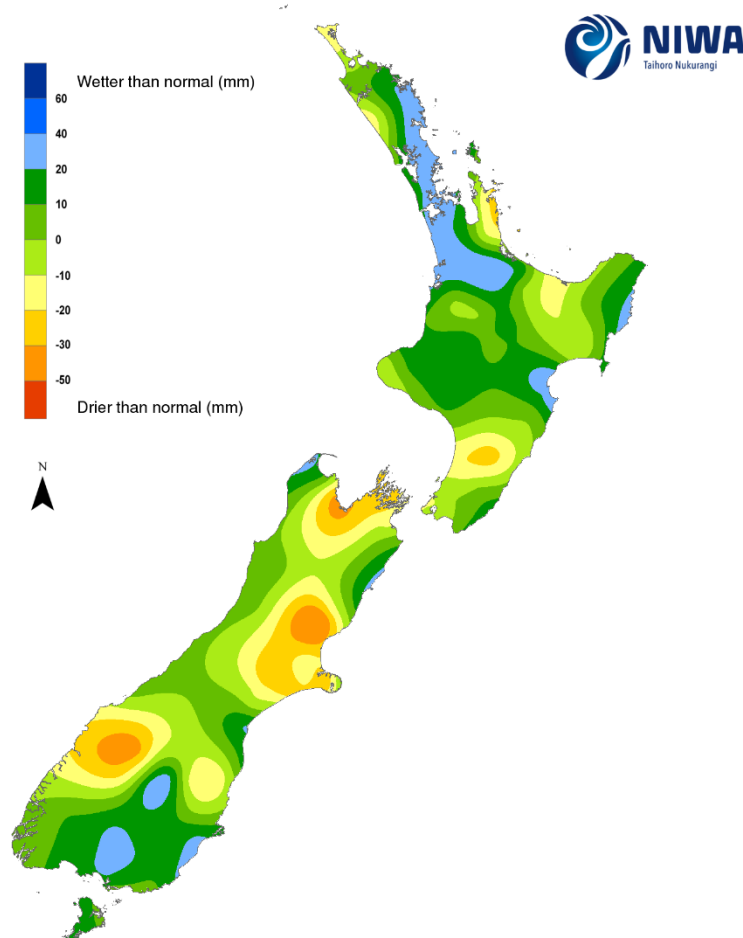


Figure 3. Soil moisture anomaly map of New Zealand, retrieved from NIWA 31/10/2022.

NIWA Seasonal Climate Outlook November 2022 – January 2023

Throughout October, moderate La Niña conditions continued. Air pressure over the South Island is forecast to be higher than normal in the coming months, leading to an easterly air flow anomaly and fewer westerly winds. North-easterly winds coupled with warmer than average sea temperatures will result in high humidity and heat at times. There continues to be an increased risk for early tropical cyclone activity in the Southwest Pacific.

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

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