

# Hydrology of Marlborough

## Summary June 2023

Report prepared by Charlotte Tomlinson, 4<sup>th</sup> July 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.

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### Executive Summary

June has been a reasonably dry and settled start to the winter season, with rainfall generally below average throughout the region. Blenheim rainfall for June was just 22 mm, which is a third of average rainfall for June. The Clarence and Awatere were the only areas with above average rainfall, with 150% of average June rainfall recorded at Awatere at Awapiri.

River flows in June were also lower than average for the time of year – rivers in the north of the region such as the Rai and Pelorus had mean flow just above 50% of their average June flow. Rivers in the south-east (Awatere, Flaxbourne, Omaka and Waihopai) had higher mean flows than average, following on from rain events in the second half of June.

As at the end of June, soils are holding slightly more moisture than average this year. Soils are at or near field capacity in the north of Marlborough and slightly below that in the south of the region.

Oceanic indicators have exceeded the El Niño threshold in June, but atmospheric indicators remain neutral. El Niño is forecast to continue developing throughout winter and into spring. This is expected to bring more frequent and stronger south-westerly winds to the country, which may shelter Marlborough, leading to rainfall and river flows near or below average.

### Rainfall

Rainfall in June was generally below average across the region. Blenheim recorded 22 mm of rain for the month, which is just 33% of the long-term June average (66 mm).

From mid-June the south-east of the region experienced a few rain events, making this the only area with above average rainfall for the month. The Upper Clarence recorded 85 mm of rain in June (compared to an average of 52 mm), and Awatere at Awapiri recorded 124 mm, which is 150% of average June rainfall.

At the Research Centre in Blenheim, total rainfall for the 12 months July 2022 – June 2023 (a hydrological year) was 806.2 mm. This is the 8<sup>th</sup> highest total over a 93 year period of data collection.

The Awatere at Awapiri site recorded 1,217 mm of rain in the last 12 months, which makes it the 2<sup>nd</sup> wettest hydrological year on record since 1995. The wettest year was 2021/22 with 1,283 mm.

Tunakino has had over 4 metres of rain in the past 12 months, with 4,055 mm recorded. This is the 2<sup>nd</sup> wettest hydrological year, with 4,097 mm recorded in 1998/99.

Figure 1. Monthly rainfall totals for 2022/23 from 6 key sites around Marlborough, compared to average monthly rainfall totals. Note the adjusted rainfall axis for the Tunakino and Kenepuru Head NRFA sites.

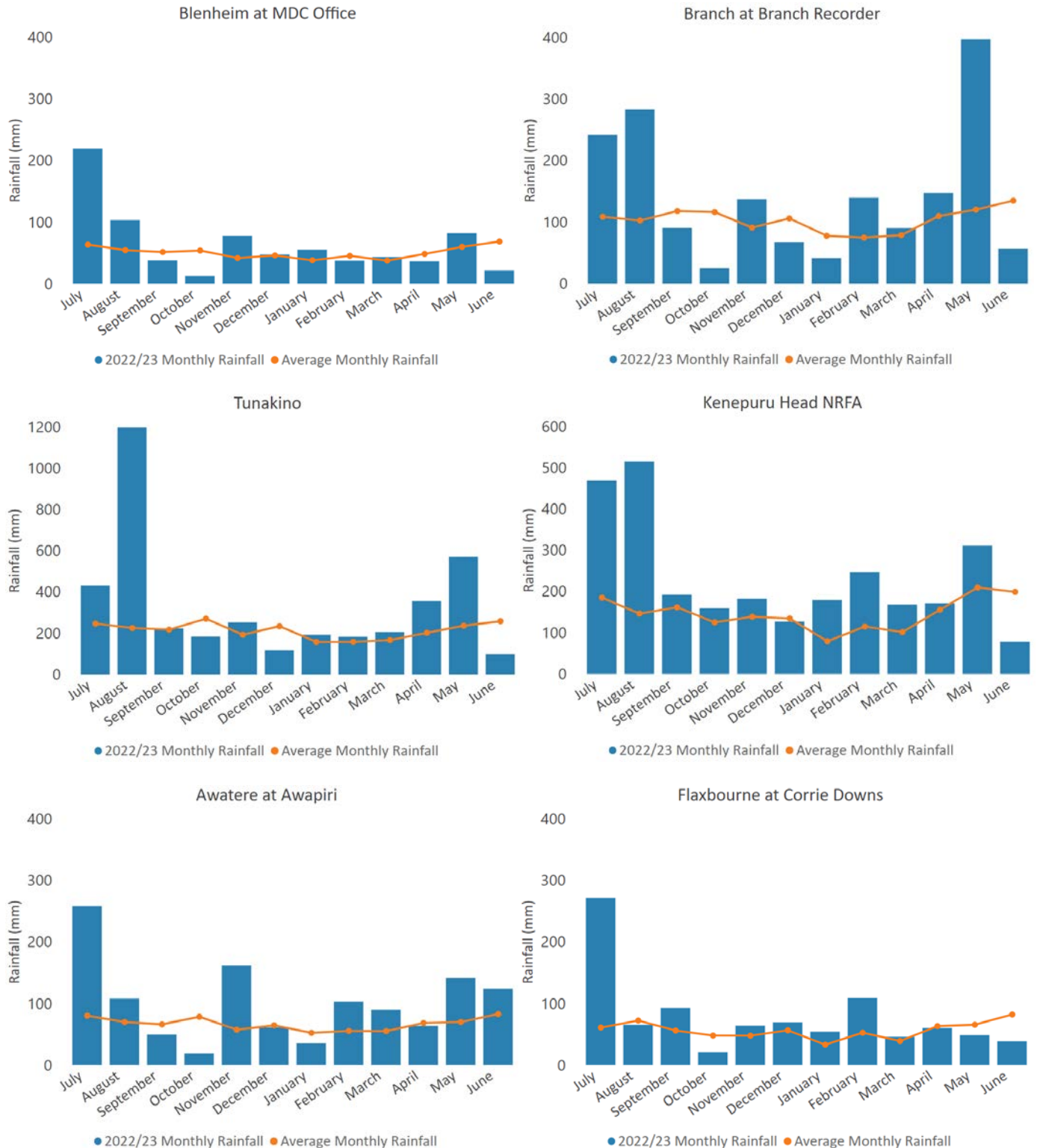


Table 1. 2022/23 monthly rainfall totals (mm) at rainfall monitoring sites in Marlborough.

Site	July	August	September	October	November	December	January	February	March	April	May	June	Total
Awatere at Awapiri	258	108	50	19	162	61	36	103	90	64	142	124	<b>1217</b>
Awatere Glenbrae NRFA	169	57	39	11	37	42	50	46	38	29	60	26	<b>605</b>
Beneagle at Farm Stream	261	94	78	21	95	62	78	57	47	46	83	36	<b>957</b>
Blenheim at MDC Office	220	104	38	13	78	48	56	38	44	37	82	22	<b>776</b>
Branch at Branch Recorder	242	283	90	25	137	67	41	140	90	148	398	57	<b>1717</b>
Branch at Mt Morris	216	399	163	59	200	126	44	202	155	190	444	72	<b>2271</b>
Flaxbourne at Corrie Downs	272	66	93	21	64	70	54	109	46	60	49	39	<b>942</b>
Kaituna Rainfall at Higgins Bridge	287	363	87	104	192	58	101	111	103	122	254	45	<b>1824</b>
Kenepuru Head NRFA	469	516	192	159	182	127	179	247	168	172	311	78	<b>2802</b>
Koromiko NRFA	337	287	186	130	126	148	233	111	139	122	171	76	<b>2067</b>
Lake Elterwater Climate	289	67	106	23	53	72	67	113	48	51	38	37	<b>962</b>
Lansdowne NRFA	298	239	88	25	130	50	42	87	74	113	234	40	<b>1419</b>
Malings	201	276	91	95	151	54	14	90	186	99	206	58	<b>1518</b>
Mid Awatere Valley NRFA	181	78	29	7	98	71	25	90	97	42	137	92	<b>946</b>
Molesworth NRFA	152	99	39	12	75	77	18	89	62	51	119	52	<b>847</b>
Omaka at Ramshead Saddle	210	141	72	20	112	65	73	73	93	65	185	57	<b>1167</b>
Onamalutu at Bartletts Creek Saddle	459	451	142	135	160	106	88	111	111	176	402	90	<b>2431</b>
Onamalutu at Hilltop Road NRFA	462	448	135	169	167	88	110	98	107	199	287	106	<b>2375</b>
Picton Climate at Waitohi Domain	262	332	132	95	128	100	194	147			173	45	
Pudding Hill NRFA	98	124	49	23	90	62	60	51	12	43	69	49	<b>729</b>
Rai at Rai Falls	394	913	177	193	254	65	145	151	142	299	484	94	<b>3309</b>
Rai Valley NRFA	419	735	209	158	263	110	188	173	181	250	453	115	<b>3253</b>
Rarangi at Driving Range	324	186	68	58	121	79	76	77	90	53	122	34	<b>1286</b>
Red Hills	236	251	114	28	167	113	46	140	112	174	463	139	<b>1980</b>
St Arnaud NRFA	208	199	138	67	177	84	42	84	129	112	240	44	<b>1525</b>
Taylor at Taylor Pass Landfill	165	87	55	15	85	48	53	46	37	56	78	26	<b>748</b>
Taylor at Tinpot	310	138	105	47	118	78	104	81	66	82	125	80	<b>1332</b>
Te Rapa	378	86	133	31	71	90	52	165	93	85	40	61	<b>1284</b>

Site	July	August	September	October	November	December	January	February	March	April	May	June	Total
Top Valley at Staircase Ridge	388	410	114	57	161	68	67	137	134	185	446	151	<b>2318</b>
Tor Darroch NRFA	248	164	79	20	139	91	36	91	131	106	219	71	<b>1394</b>
Tunakino	431	1241	224	184	253	117	192	183	206	356	572	99	<b>4055</b>
Upper Clarence NRFA	93	34	28	14	68	47	20	22	32	26	46	85	<b>514</b>
Waihopai at Craiglochart	212	114	54	20	90	51	21	88	67	61	142	18	<b>936</b>
Waihopai at Spray Confluence	235	163	69	10	109	90	21	77	85	90	220	56	<b>1225</b>
Waikakaho	358	6	94	54	117	87	95	57	69	74	194	46	<b>1250</b>
Waikawa at Boons Valley							243		122	202	174	49	
Wairau Valley at Southwold	310	273	77	39	102	48	41	108	56	95	227	58	<b>1431</b>
Wakamarina at Twin Falls	318	590	183	186	228	67	100	139	128	228	376	83	<b>2626</b>
Ward NRFA	294	65	87	24	80	67	36	115	54	57	59	55	<b>993</b>
Wye at Charlies Rest	215	208	95	22	114	75	43	119	89	94	225	52	<b>1350</b>

## River Flows

Following on from low rainfall this month, mean river flows were generally lower than average. The Te Hoiere rivers (Rai, Pelorus and Kaituna) had mean flows around 50% of their long-term means (see Table 2).

The exception to the lower than average flows were in the rivers to the south-east. The Awatere, Flaxbourne, and Omaka rivers all had a small fresh on the 18/19<sup>th</sup> of June, followed by another fresh in the Awatere, Flaxbourne, Omaka and Waihopai on the 24<sup>th</sup> of June. Peak flows were moderate (i.e. well below mean annual flood). These events led to above average mean flows in these four rivers for June.

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

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

Site Name	Mean Flow 2023 (m3/s)	Long-Term Mean Flow (m3/s)	% of long-term mean	Flow Record Begins	Catchment Area (km2)
▲					
Rai River at Rai Falls	8.18	15.17	54	1979	211
Pelorus River at Bryants	14.01	26.38	53	1977	375
Kaituna River at Higgins Bridge	3.26	6.32	52	1989	135
Branch River at Weir Intake	23.16	24.38	95	1958	551
Goulter River at Horseshoe Bend	9.70	11.38	85	2010	154
Waihopai River at Craiglochart	22.01	17.42	126	1960	745
Ohinemahuta River at Domain	1.32	1.75	76	2013	33
Are Are Creek at Kaituna Tuamarina Track	0.60	0.75	79	2007	32
Tuamarina River at Para Road	0.98	3.18	31	2004	100
Wairau River at Tuamarina	114.89	114.33	100	1960	3430
Omaka River at Gorge	2.90	1.63	178	1993	91
Taylor River at Borough Weir	0.83	0.93	89	1961	65
Flaxbourne River at Corrie Downs	1.63	0.89	184	2003	71
Awatere River at Awapiri	25.84	16.77	154	1977	983

## Soil Moisture

At the end of June, soils in northern Marlborough look to be at field capacity, while soils in the south of the region are slightly below field capacity (see Figure 2). Compared to the historical average deficit, soils are holding slightly more moisture than average this year. The soil moisture anomaly map (Figure 3) confirms this, showing soils throughout the region slightly wetter than normal for this time of year.

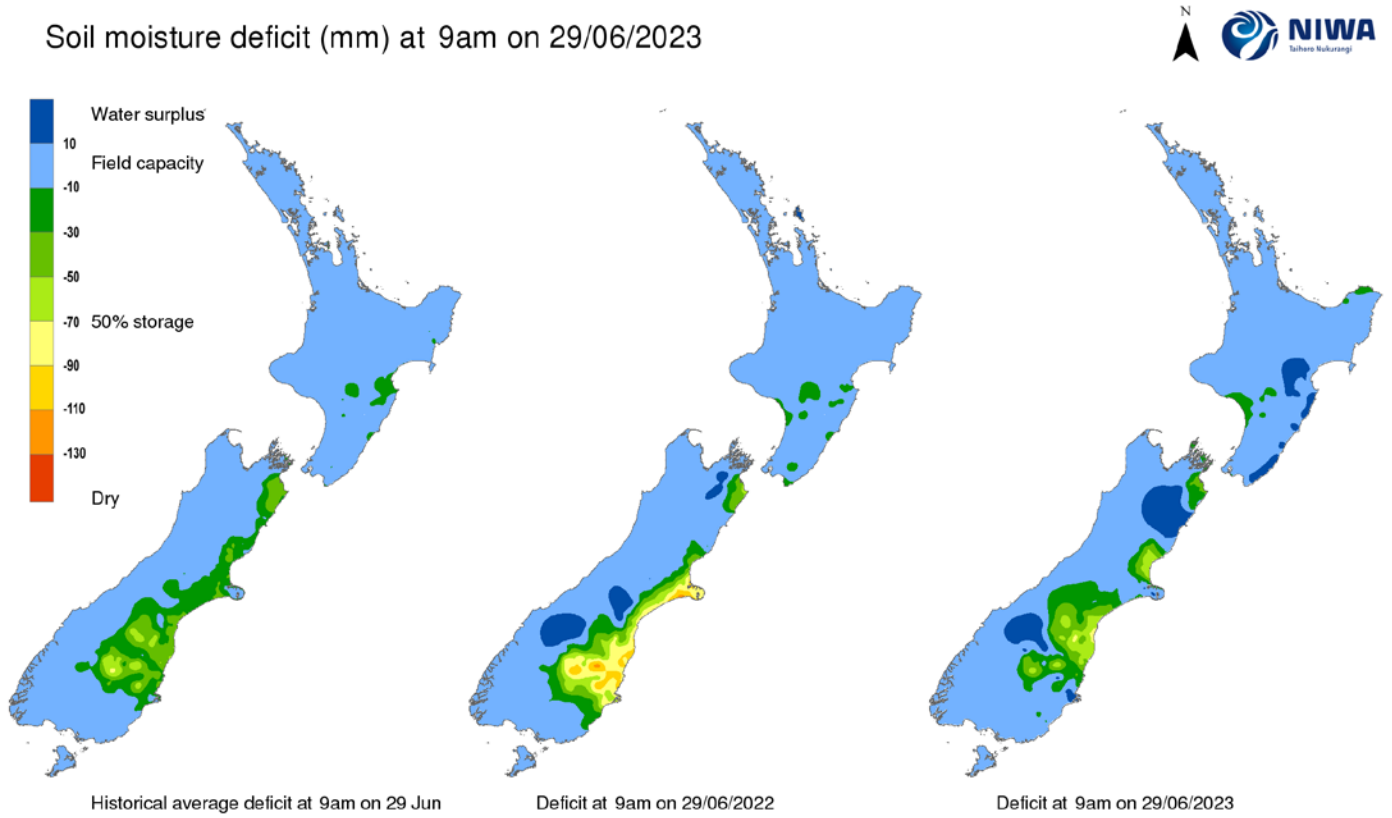


Figure 2. Soil moisture deficit maps of New Zealand, retrieved from NIWA on 29/06/2023.

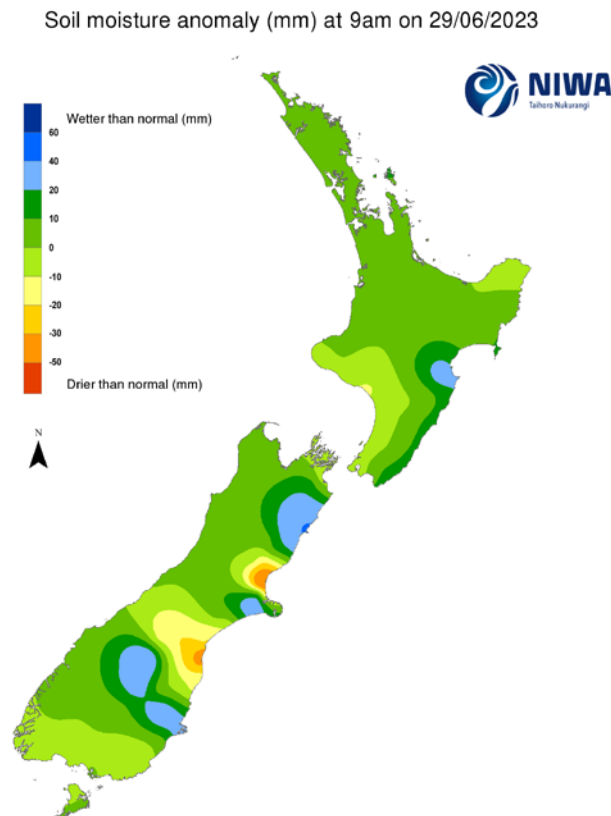


Figure 3. Soil moisture anomaly map of New Zealand, retrieved from NIWA 29/06/2023.

## NIWA Seasonal Climate Outlook July – September 2023

Sea temperatures in the central equatorial Pacific exceeded El Niño thresholds in June, but the Southern Oscillation Index, the atmospheric indicator of ENSO conditions, remained neutral. In late winter and moving into spring, the ocean-atmosphere system is expected to continue progress towards El Niño conditions.

As El Niño develops, air pressure is forecast to be above normal over the Tasman Sea, leading to more south-westerly winds across the country. Tropical moisture plumes are less likely under developing El Niño conditions. Frequent and stronger than normal south-westerly winds may shelter Marlborough, leading to dry spells.

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

 Temperature –near or above average

 Rainfall – below or near average

 Soil Moisture – near average

 River Flows – below or near average