

Hydrology of Marlborough Summary for January 2023

Report prepared by Charlotte Tomlinson, 3rd February 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

Marlborough was lucky to miss the worst of the weather this month, with ex-tropical Cyclone Hale travelling down over the North Island before moving off to the east. As Hale moved east on January 11th, the heaviest rainfall in Marlborough was seen around the Picton and Koromiko area, where 99 mm of rain was recorded in 6 hours. This led to surface flooding on roads in the area, including State Highway One.

Picton has had a wet January, with 183 mm of rain in total. Blenheim also had higher than average rainfall for January, with 60.4 mm recorded.

Despite rain early in January there was a dry period in the middle of the month, and the Waihopai and Wairau rivers both approached their average annual low flows towards the end of the month. Rainfall from the 29th onwards provided a welcome top-up to rivers around the region.

The potential water deficit for January was -60.9 mm, which is only 57% of the long-term average. At the Grovetown Park weather station, average shallow soil moisture was 25.3%, about 5% above the long-term average.

La Niña weakened in January, with ENSO forecast to be moving into neutral territory in February. However, the lingering effects of La Niña will still be felt into the autumn months. The marine heatwave around the country continues and may lead to higher humidity levels and warmer temperatures, especially overnight. In Marlborough, more easterly onshore winds could result in increased cloud cover and cooler daytime temperatures.

Rainfall

There were widespread showers spread over three days in the first week of 2023, covering northern Marlborough, the inner sounds including Havelock and Picton, Blenheim and the lower Wairau Plains.

Ex-tropical Cyclone Hale made landfall over the North Island on the 10th of January. Luckily the local impact was minimal, as it moved down the North Island and out to the east of the country before reaching Marlborough.

As Hale moved to the east on the 11th of January, the heaviest rain in Marlborough was seen in those areas exposed to the east, such as the Kenepuru Head/Mt Stokes area and Mt Robertson/Tokomaru which can be both be seen in Figure 1.

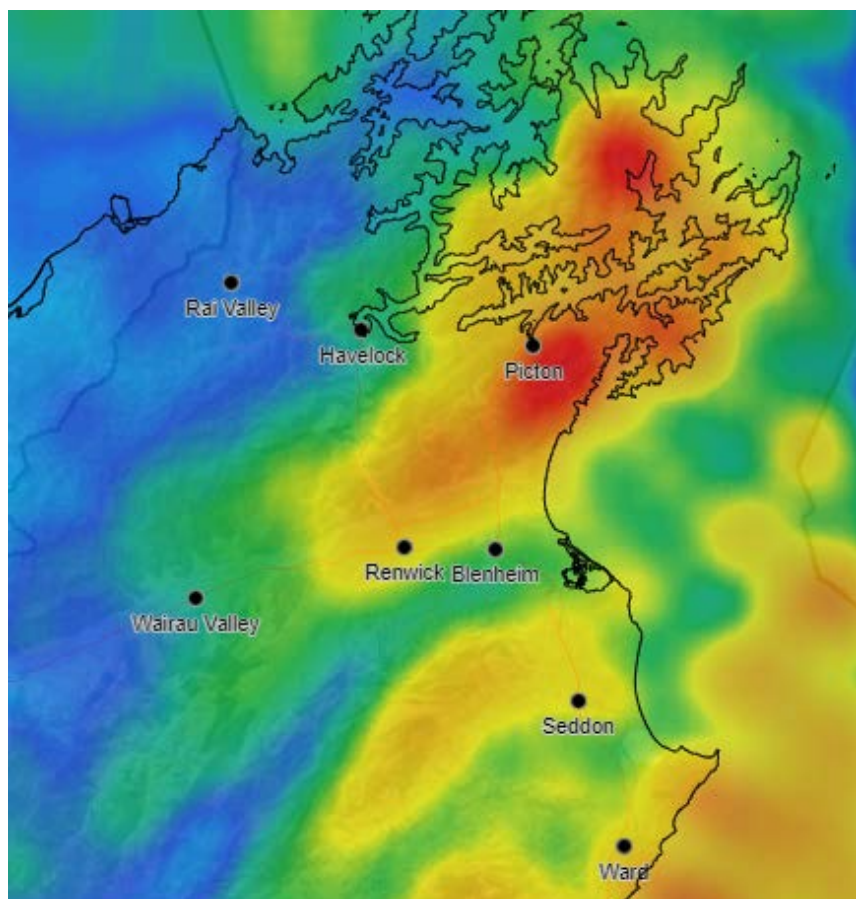


Figure 1. MetService gauge-corrected rainfall radar estimates for 11th January 2023. Areas shaded in red show the heaviest rainfall.

The most rain recorded was in Koromiko, where 99 mm of rain fell over 6 hours with an average intensity of 16 mm/hr over that time. This led to surface flooding of roads in the area, including State Highway One which was under one-way traffic management for much of the day. Rainfall totals for the surrounding area can be seen in Table 1 below. MetService gauge-corrected rain radar estimates over 170 mm of rain fell on the 11th at higher elevation around Mt Robertson/Tokomaru.

Table 1. Rainfall totals (6, 12, and 24-hour) for sites around the Picton area, January 11th 2023.

Rainfall site	6 hour rain total (mm)	12 hour rain total (mm)	24 hour rain total (mm)	Peak intensity (mm/hr)
Kenepuru Head FENZ	-	-	85	11
Picton at Waitohi Domain	-	-	82	12.5
Waikawa at Boons Valley	91	121	-	20
Koromiko FENZ	99	138	-	17

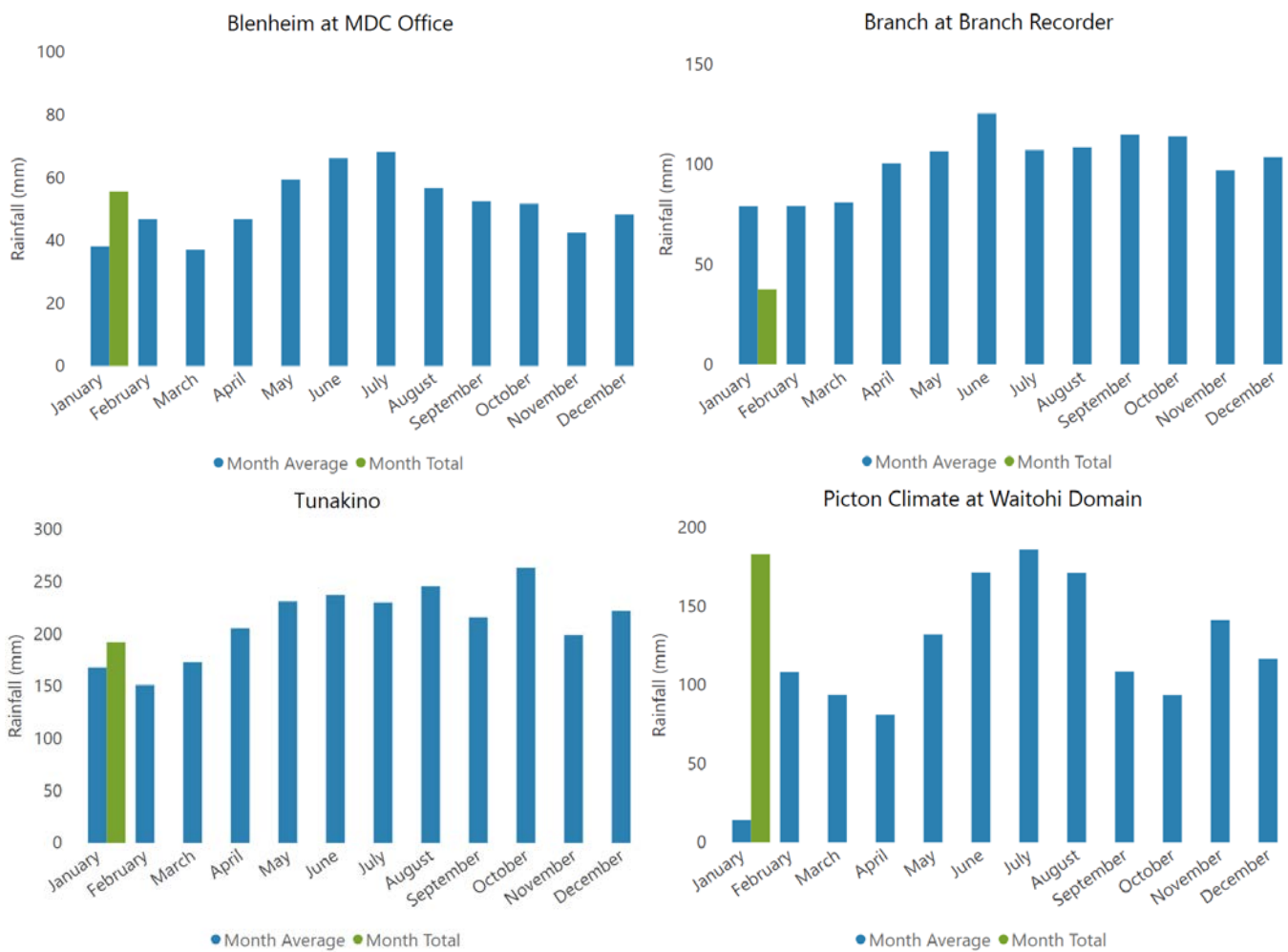
Following on from the ex-tropical cyclone were two weeks of little to no rain for the region, until the last few days of the month when again there were widespread showers with some localised heavier rainfall.

Blenheim’s rainfall total for January was 60.4 mm (data from the Marlborough Research Centre), which is 146% of the long-term-average. This is in contrast to the last 4 years which all had a fairly dry January, with less than 10 mm of rain recorded in January 2019, 2020, 2021, and 2022.

Picton had high rainfall this month, with 183 mm of rain, while Waikawa recorded 243 mm, which is 3 times the January average at this site of 83 mm.

January rainfall totals for 6 representative sites – Blenheim, Branch, Tunakino, Picton at Waitohi Domain, Awatere at Awapiri, and Flaxbourne can be seen in Figure 2. A full list of rainfall totals for all sites in Marlborough can be seen in Table 2.

Figure 2. 2023 monthly rainfall totals from 6 key sites around Marlborough, compared to average monthly rainfall totals.



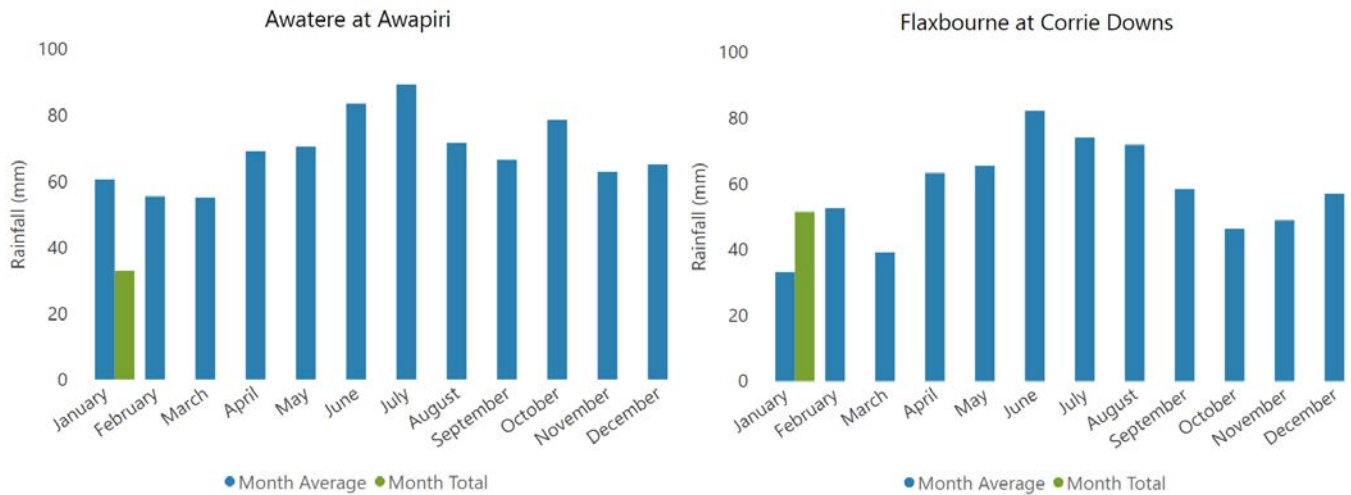


Table 2. January 2023 rainfall totals (mm) at rainfall monitoring sites in Marlborough

Site	January	Site	January
Awatere at Awapiri	33	Rai Valley NRFA	188
Awatere Glenbrae NRFA	50	Rarangi at Driving Range	71
Beneagle at Farm Stream	75	Red Hills	46
Blenheim at MDC Office	56	St Arnaud NRFA	42
Branch at Branch Recorder	38	Taylor at Taylor Pass Landfill	53
Flaxbourne at Corrie Downs	52	Taylor at Tinpot	93
Kaituna Rainfall at Higgins Bridge	101	Te Rapa	52
Kenepuru Head NRFA	179	Top Valley at Staircase Ridge	71
Koromiko NRFA	233	Tor Darroch NRFA	36
Lake Elterwater Climate	67	Tunakino	192
Lansdowne NRFA	42	Upper Clarence NRFA	20
Malings	14	Waihopai at Craiglochart	21
Mid Awatere Valley NRFA	25	Waihopai at Spray Confluence	19
Molesworth NRFA	18	Waikakaho	86
Omaka at Ramshead Saddle	65	Waikawa at Boons Valley	243
Onamalutu at Bartletts Creek Saddle	81	Wairau at Narrows	43
Onamalutu at Hilltop Road NRFA	110	Wairau Valley at Southwold	41
Picton Climate at Waitohi Domain	183	Wakamarina at Twin Falls	96
Pudding Hill NRFA	60	Ward NRFA	36
Rai at Rai Falls	145		

River Flows

The Wairau River at Barnetts Bank began the year at around 35 m³/s, steadily declining until two rain events on the 7th and 12th of January, which both brought flow up above median flow (60 m³/s) for a short time. River levels continued to decline to the end of the month, approaching the MALF (mean annual low flow) of 12 m³/s on the 29th of January, before beginning to rise again with the rainfall at the end of the month.

The Waihopai and Awatere rivers both had several small spikes in flow throughout the month, caused by thunderstorms bringing heavy localised rain to upper parts of the catchments. The Waihopai River was approaching the MALF towards the end of the month before flows increased with rainfall from the 29th onwards.

The Pelorus and Rai rivers both had a small fresh early in January, with declining flows through the rest of the month until flows began to rise again on the 30th.

A summary of river flows for January 2023 can be seen below in Table 3.

Table 3. A summary of river flows in Marlborough for January 2023.

River	Site	January mean flow 2023 (m ³ /s)	January mean flow all records (m ³ /s)	% of monthly average	Records begin	Catchment area (km ²)
Pelorus	Bryants	9.95	13.60	73	1977	375
Rai	Rai Falls	8.66	7.26	119	1979	211
Kaituna	Higgins Bridge	2.01	1.51	133	2006	133
Branch	Intake Weir	6.71	18.33	37	1958	550
Wairau	Barnetts Bank	27.43	69.56	39	1960	3,430
Ohinemahuta	Domain	0.41	0.51	81	1998	33
Waihopai	Craiglochart	4.49	8.92	50	1960	764
Awatere	Awapiri	7.44	9.48	79	1977	987
Omaka	Gorge	0.42	0.53	79	1994	90
Taylor	Borough Weir	0.29	0.22	136	1961	64
Flaxbourne	Corrie Downs	0.04	0.07	67	2003	70

Soil Moisture

The potential water deficit in January was -60.9 mm (60.4 mm of rainfall minus 121.3 mm potential evapotranspiration). This water deficit is only 57% of the long-term average (LTA), which is -106.6 mm (MRC Data).

At the Grovetown Park weather station, average shallow soil moisture was 25.3%, well above the LTA of 20.6%. Shallow soil moisture oscillated throughout the month, increasing with rainfall in early January to a maximum of 30.6% on January 7th. Minimum shallow soil moisture was 20.7% following on from a dry spell between the 12th – 27th (MRC data). The soil moisture deficit at the end of January can be seen below in Figure 3, while the soil moisture anomaly in Figure 4 shows Marlborough soils have about normal soil moisture for this time of year.

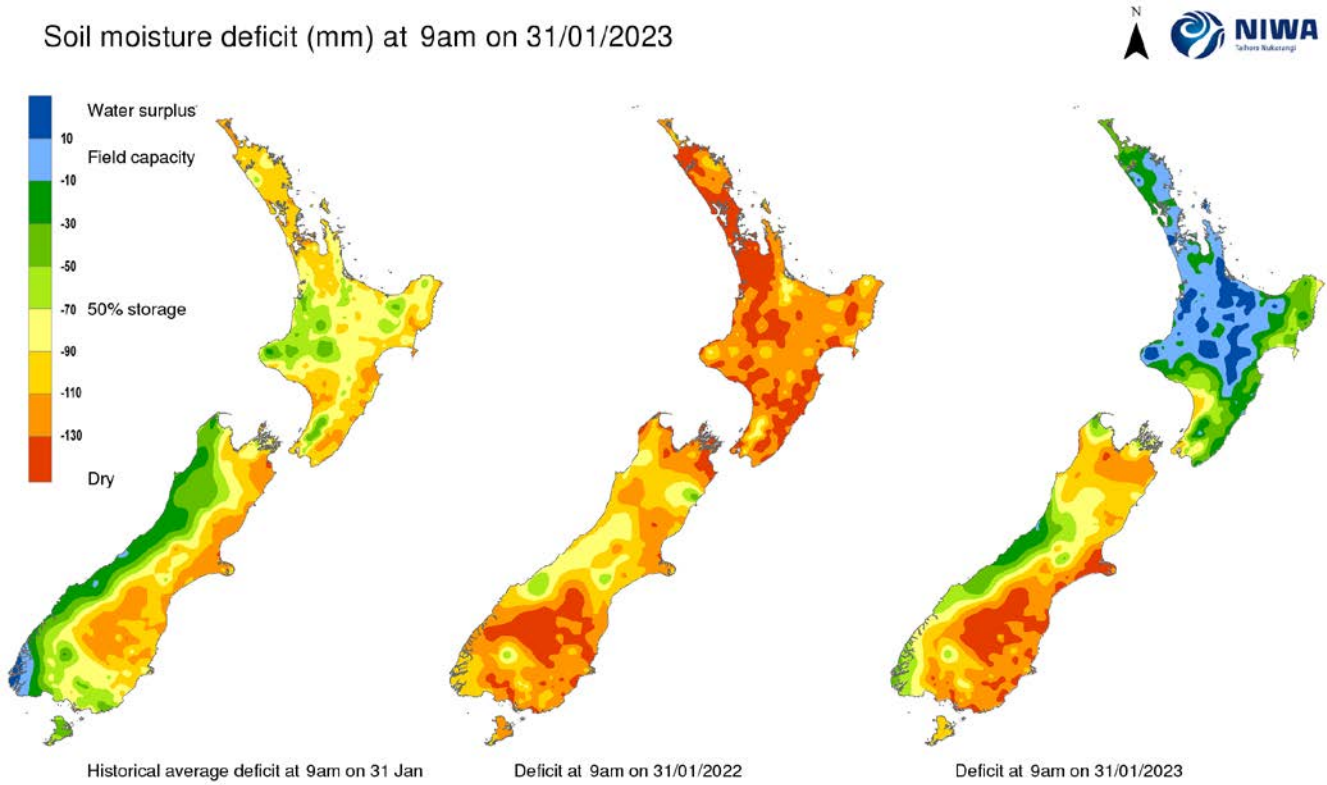


Figure 3. Soil moisture deficit maps of New Zealand, retrieved from NIWA on 31/01/2023.

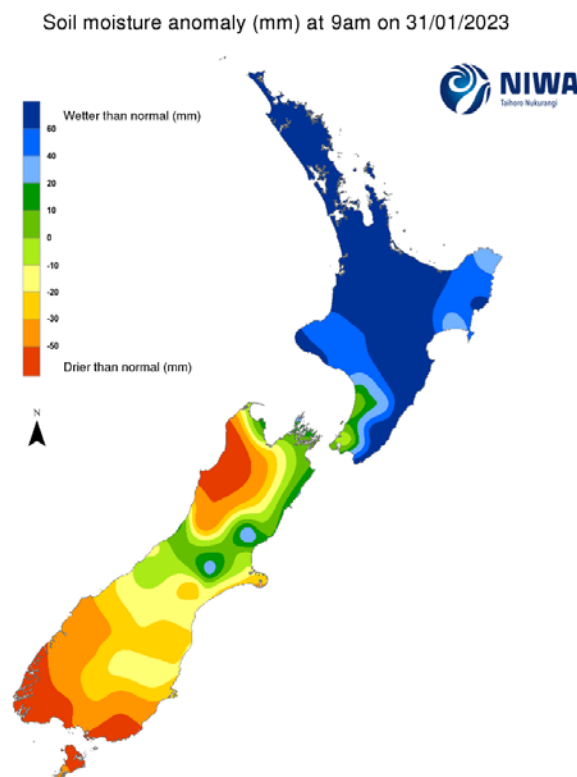


Figure 4. Soil moisture anomaly map of New Zealand, retrieved from NIWA 31/01/2023.

NIWA Seasonal Climate Outlook February – April 2023

The El Niño Southern Oscillation (ENSO) looks to be moving into neutral territory this month as La Niña weakened throughout January. However, the lingering effects will still be felt going into the autumn months.

Sea surface temperatures around the coast were between 0.7°C - 3.2°C above average last month, with the marine heatwave reaching record levels along the west of the South Island.

Air pressure is forecast to be higher than normal over the South Island, expected to be associated with an east to north-east air flow anomaly for the season as a whole.

The marine heatwave may lead to higher humidity levels and warmer temperatures (mostly overnight), however especially in Marlborough, more easterly onshore winds could result in increased cloud cover and cooler daytime temperatures as well.

Occasional tropical plumes of moisture will increase the risk of heavy rainfall, reducing the chances for a dry summer season.

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

 Temperature – near or above average

 Rainfall – near or above average

 Soil Moisture – near average

 River Flows – near average