2023/24 Hydrology monitoring

Greater Wellington
Te Pane Matua Taiao

Contents

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For the latest available results go to the GW environmental data hub. Reports for previous years can be found in the GW document library.

Overview

Greater Wellington (GW) operates a hydrometric network for measuring rainfall, river levels and flow, lake and wetland levels, groundwater levels, tidal levels and soil moisture. There are approximately 270 monitoring stations on the hydrometric network, of which the majority are automated to operate continuously and to send the data to the office via a radio or cell phone telemetry system.

This report contains key results for each of the five main whaitua (main river) catchments with recorded data for the year summarised and compared to long term averages and any significant hydrological events that occurred.

Monitoring objectives

- Provide information on the state of the Region's water resources and the baseline quantity of water.
- Detect long and short-term trends in climate and water resources.
- Provide data on the state of the Region's freshwater resources to enable informed decisions on sustainable allocation and use.
- Inform whaitua committees to enable the creation of a unique vision and to prioritise objectives for land and water management.
- Provide a flood warning monitoring network and alerting system for the Region.
- Monitor drought conditions and enable drought warnings.
- Inform policy and Regional Plan development and review.
- Contribute to resource consent compliance monitoring.

Monitoring results

Summary results are presented in the following sections for a representative subset of the sites shown on the monitoring network map below. Use the links below to navigate to each.

- Rainfall – annual and sub-annual totals, maximum and minimum rainfalls for 47 sites.
- River levels/flows – averages, maximums, and minimums for 33 sites.
- Groundwater levels – daily averages for 16 sites in selected groundwater zones.
- Lake & wetland levels – daily and monthly summaries for 5 sites.
- Soil moisture – daily averages for 2 sites.

Monitoring network

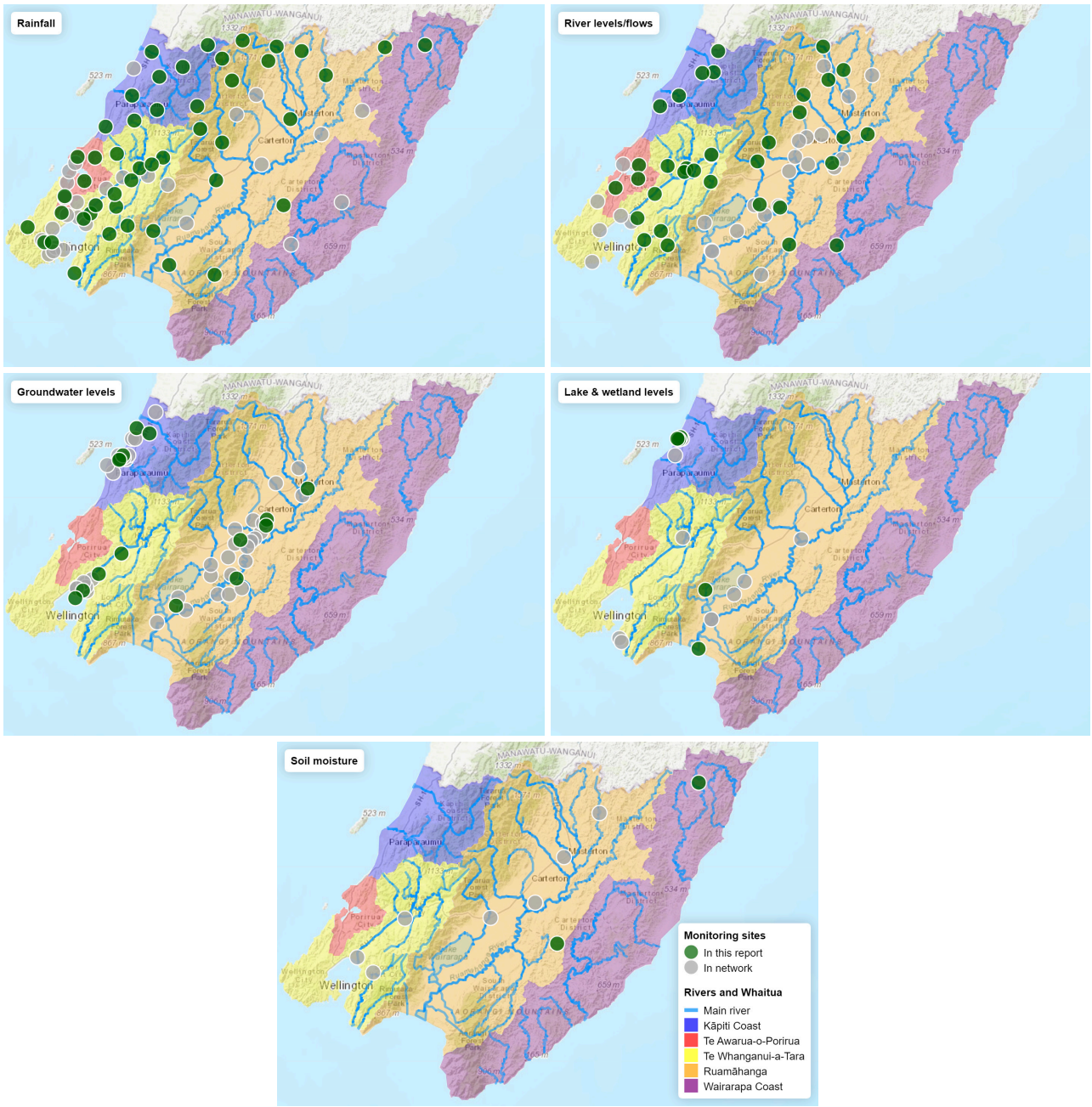

Figure 1: Hydrology monitoring site locations for each hydrometric network. Green circles indicate sites with data summarised in this report, while data for sites shown by grey circles are not reported. *Note: circles marked with a star (✶) indicate there are two bores in the same location at different depths.*

Methods

Monitoring objectives

The information collected is used for:

- Council to make informed decisions on the state of the region's freshwater resources and manage its sustainable allocation and use through the development of the Natural Resources Plan for the Wellington Region, including determining how much water can safely be taken from a water body
- Informing whaitua to enable the creation of a unique vision and to prioritise objectives for land and water management
- Providing for flood warning and flood response duties to protect vulnerable communities from flooding
- Maintaining groundwater aquifer levels to protect the resource against degradation and saltwater intrusion
- Providing information on the state of our water resources and the baseline quantity of water
- Detecting long and short term trends in water resources and whether these can be related to things such as climate change or other pressures on the resource
- Providing drought warnings and advice
- Resource consent monitoring.

Rainfall

All GW rainfall monitoring sites are automatic and typically record rainfall amounts at 5 minute intervals. The majority of sites are telemetered back to the GW database to allow real time monitoring. There are two measuring devices are at each site; an automatic tipping-bucket rain gauge that records rainfall as it occurs, and a check/storage gauge that collects and stores all rainfall between site visits by the monitoring team. A number of rainfall sites have alarm levels that are automatically triggered if a high intensity rainfall above a certain threshold occurs. Alarms are received by flood-warning staff and a flood event will be monitored at any time of the day or night with warnings issued to authorities and landowners if dangerous flood levels are predicted. Continuous rainfall data are collected at 76 sites across the region.

River levels/flows

River level sites were originally installed for a number of reasons including flood warning, public water supply and water resource monitoring. As such the network tends to concentrate on the larger rivers and the upper parts of catchments. This has been changing over time as GW undertakes more monitoring in agricultural and urban areas and in the lower reaches of the catchments to manage abstractions, maintain environmental flows and ensure regional plan rules are being met. All river sites are automatic and typically record river levels every 5 to 15 minutes. Data is stored on loggers at the site, as well as being sent back to the GW database via telemetry to allow for real time monitoring. GW staff also physically measure the amount of flow in rivers and streams by completing a 'flow gauging' using specialised equipment, and can measure from a trickle in a ditch to a major flood in the Ruamahanga River. The gauged flow and the water level at the time are used to build up a flow-rating relationship that is used to convert the continuously measured river water levels into flow values. The flow-rating relationships at each site change often due to events such as a flood which might alter the river bed level, therefore gaugings are undertaken regularly to ensure the correct flows are being calculated from the recorded water levels. Most river sites have flood alarm levels that are automatically triggered if a river level rises above a certain threshold. Alarms are received by flood-warning staff and a flood event will be monitored at any time of the day with warnings to authorities and landowners issued if dangerous flood levels are predicted. Continuous river level and flow data are collected at 64 sites across the region.

Groundwater Level

The groundwater monitoring network covers principal groundwater areas within three whaitua, Ruamāhanga, Te Whanganui-a-Tara and Kāpiti Coast. Continuous data on groundwater levels are collected at 86 sites. These are automatic sites where the groundwater level is recorded every 5 to 15 minutes and stored in a data logger at the site. The majority of sites are also linked to GW's database via telemetry.

Lake & wetland levels

GW monitor lake water level at various locations for a variety of reasons. A number of wetlands are monitored to gather information on wetland hydrology and to determine how they fluctuate over time due to environmental drivers. Lake level monitoring sites on Lake Wairarapa and Lake Onoke are key flood warning sites and allow the Lower Wairarapa valley flood scheme to operate during a flood event to minimize flooding and damage to surrounding areas.

Soil moisture

Knowing the water content of soil is important for managing groundwater recharge, assessing agricultural irrigation needs and soil chemistry. It is also used for analysis of long-term climate trends, measuring how often plant growth is restricted by soil moisture and providing an indication for early intervention and drought management decisions.

Rainfall results

Annual totals

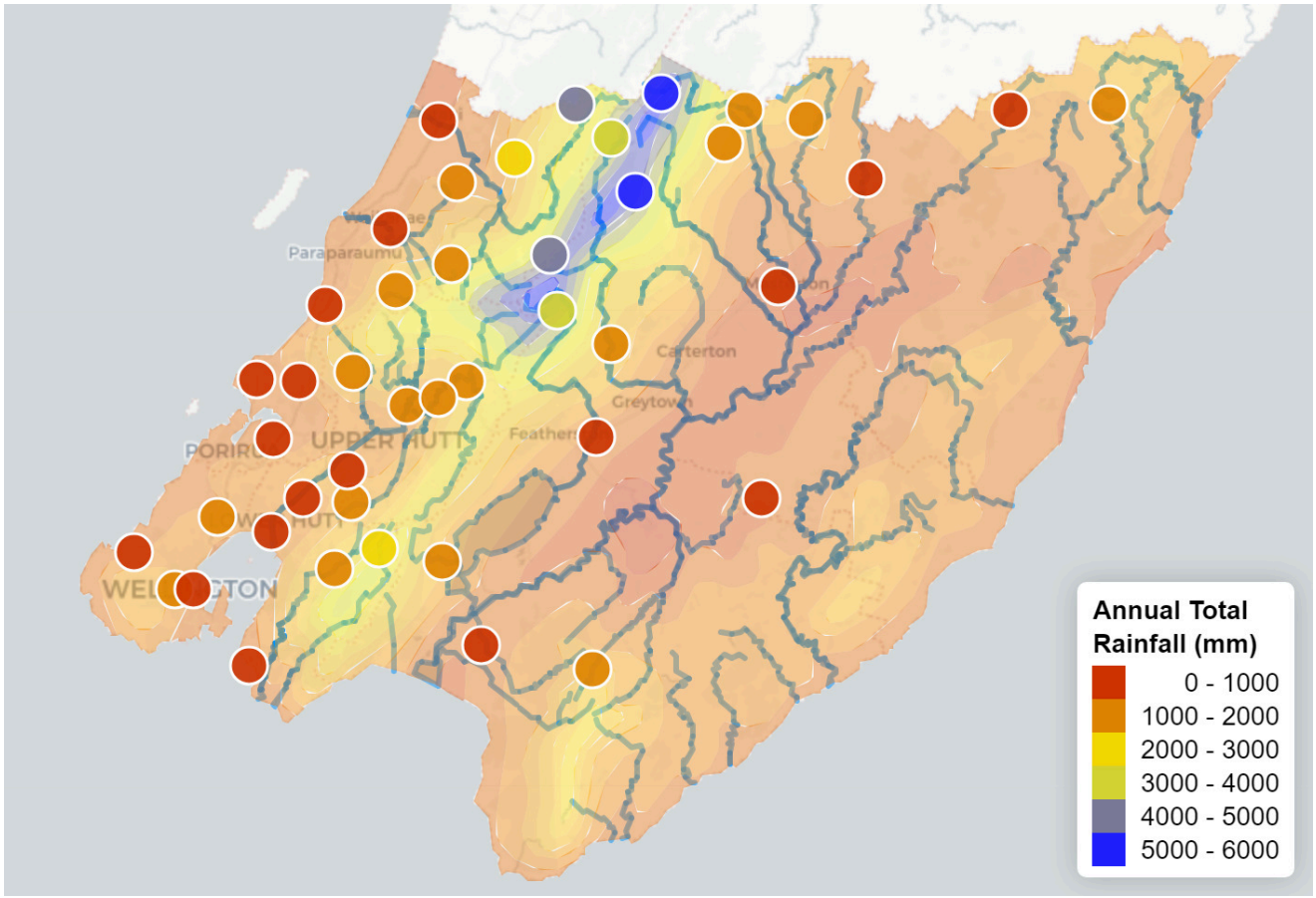

Figure 2: Annual total rainfall (mm) at a range of monitoring sites across the region. The shaded areas under the monitoring sites show the long term mean annual rainfall over the entire region.

Table 1: Annual total rainfall (mm) at a range of monitoring sites across the region. Sites with greater than 20 percent difference from their long-term average have table rows shaded orange (**below average**) or blue (**above average**). Abbreviations: **KC**: Kāpiti Coast, **TP**: Te Awarua-o-Porirua, **TW**: Te Whanganui-a-Tara, **RU**: Ruamāhanga, **WC**: Wairarapa Coast.

Whaitua	Site	Catchment	Annual total mm	Long-term average mm (years)	% of long-term average
KC	Kapakapanui (Tararua)	Ōtaki	1789	2441 (1993-2024)	73
KC	Mackays Crossing	Whareroa	908	1183 (2008-2024)	77
KC	Mangaone Stream (Transmission Lines)	Mangaone	1234	1714 (1995-2024)	72
KC	McIntosh (Tararua)	Ōtaki	4404	5226 (1995-2024)	84
KC	Ōtaki River (Depot)	Ōtaki	690	1024 (1972-2024)	67
KC	Oriwa (Tararua)	Ōtaki	4013	4867 (1995-2024)	82
KC	Taungata (Tararua)	Ōtaki	2398	2867 (1996-2024)	84
KC	Waikanae River (Water Treatment Plant)	Waikanae	896	1235 (1996-2024)	73
RU	Angle Knob (Tararua)	Waingawa	5542	7071 (1993-2024)	78
RU	Bannister Basin (Tararua)	Ruamāhanga	5507	6308 (1976-2024)	87

Whaitua	Site	Catchment	Annual total mm	Long-term average mm (years)	% of long-term average
RU	Carkeek (Tararua)	Waiohine	3543	4572 (1976-2024)	77
RU	Masterton (Wairarapa College)	Ruamāhanga	595	919 (2004-2024)	65
RU	Mauriceville	Kōpuaranga	1089	1469 (2010-2024)	74
RU	Ruakōkopatuna River (Iraia)	Iraia	1475	1755 (1973-2024)	84
RU	Ruamāhanga River (Mt Bruce)	Ruamāhanga	1801	2383 (1987-2024)	76
RU	Tauanui at Pirinoa		929	1125 (2020-2024)	83
RU	Taueru (Castlehill)	Tauweru	998	1185 (1995-2024)	84
RU	Tauherenikau (Racecourse)	Tauherenikau	884	1012 (1965-2024)	87
RU	Waikoukou (Longbush)	Waikoukou	763	980 (2008-2024)	78
RU	Waiohine River (Gorge)	Waiohine	1783	2184 (1975-2024)	82
RU	Waiorongomai (Matthews)	Waiorongomai	1079	1484 (2011-2024)	73
RU	Waipoua (Westons)	Waipoua	1826	2397 (2009-2024)	76
RU	Whangaehu River (Waihi)	Whangaehu	777	1102 (2003-2024)	71
TP	Horokiri Stream (Battle Hill)	Horokiri	961	1337 (2004-2024)	72
TP	James Cook Reservoir	Duck Creek	767	1162 (2018-2024)	66
TP	Seton Nossiter Park	Porirua	1027	1269 (1996-2024)	81
TP	Taupō Stream (Whenua Tapu)	Taupō	809	1094 (1993-2024)	74
TW	Akatarawa River (Cemetery)	Akatarawa	1386	1757 (1991-2024)	79
TW	Akatarawa River (Warwicks)	Akatarawa	1825	2285 (1984-2024)	80
TW	Hutt River (Kaitoke Headworks)	Hutt	1702	2287 (1954-2024)	74
TW	Hutt River at Mabey Road Depot	Hutt	985	1415 (2019-2024)	70
TW	Karori Reservoir	Kaiwharawhara	1134	1338 (1952-2024)	85
TW	Mangaroa River (Tasman Vaccine Ltd)	Mangaroa	1262	1570 (1970-2024)	80
TW	Orongo Swamp	Ōrongorongo	2032	2508 (1985-2024)	81
TW	Pencarrow Lakes	Pencarrow Lakes	634	901 (2009-2024)	70
TW	Quartz Hill	Mākara	742	1086 (2009-2024)	68
TW	Shandon Golf Club	Hutt	904	1049 (2001-2024)	86
TW	Te Mārua	Hutt	1350	1841 (1996-2024)	73
TW	Te Papa	Wellington City	846	1044 (2002-2024)	81
TW	Upper Hutt (Pinehaven)	Hutt	984	1082 (2000-2024)	91
TW	Wainuiomata Reservoir	Wainuiomata	1532	1879 (1951-2024)	82
TW	Whakatikei River (Blue Gum Spur)	Whakatikei	1547	2003 (1993-2024)	77
WC	Tanawa Hut	Whareama	1173	1305 (1957-2024)	90

Long-term

The charts below show annual total rainfall (mm) at a number of sites graphed against the site average total (black line). Years when recorded rainfall was above average are coloured **orange** while years with below average rainfall are **blue**.

Kāpiti Coast

Figure 3: Yearly total rainfall and long-term averages in the Kāpiti Coast whaitua.

Te Awarua-o-Porirua

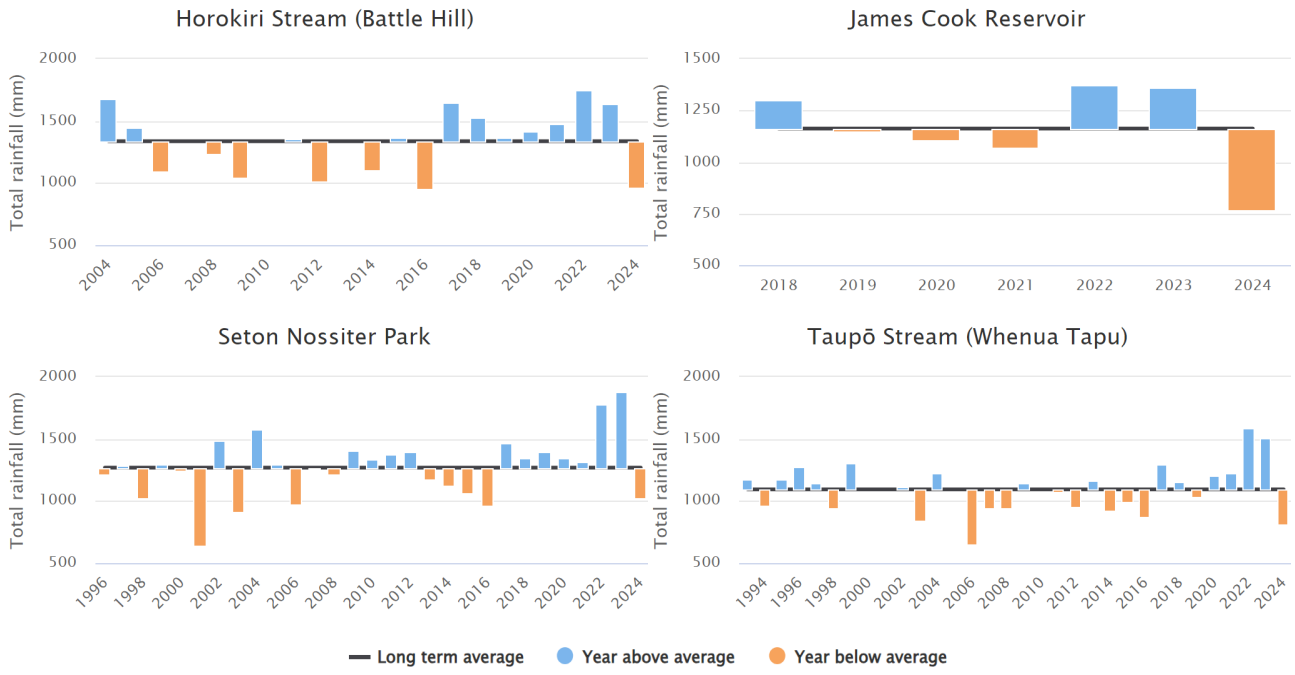

Figure 4: Yearly total rainfall and long-term averages in the Te Awarua-o-Porirua whaitua.

Te Whanganui-a-Tara

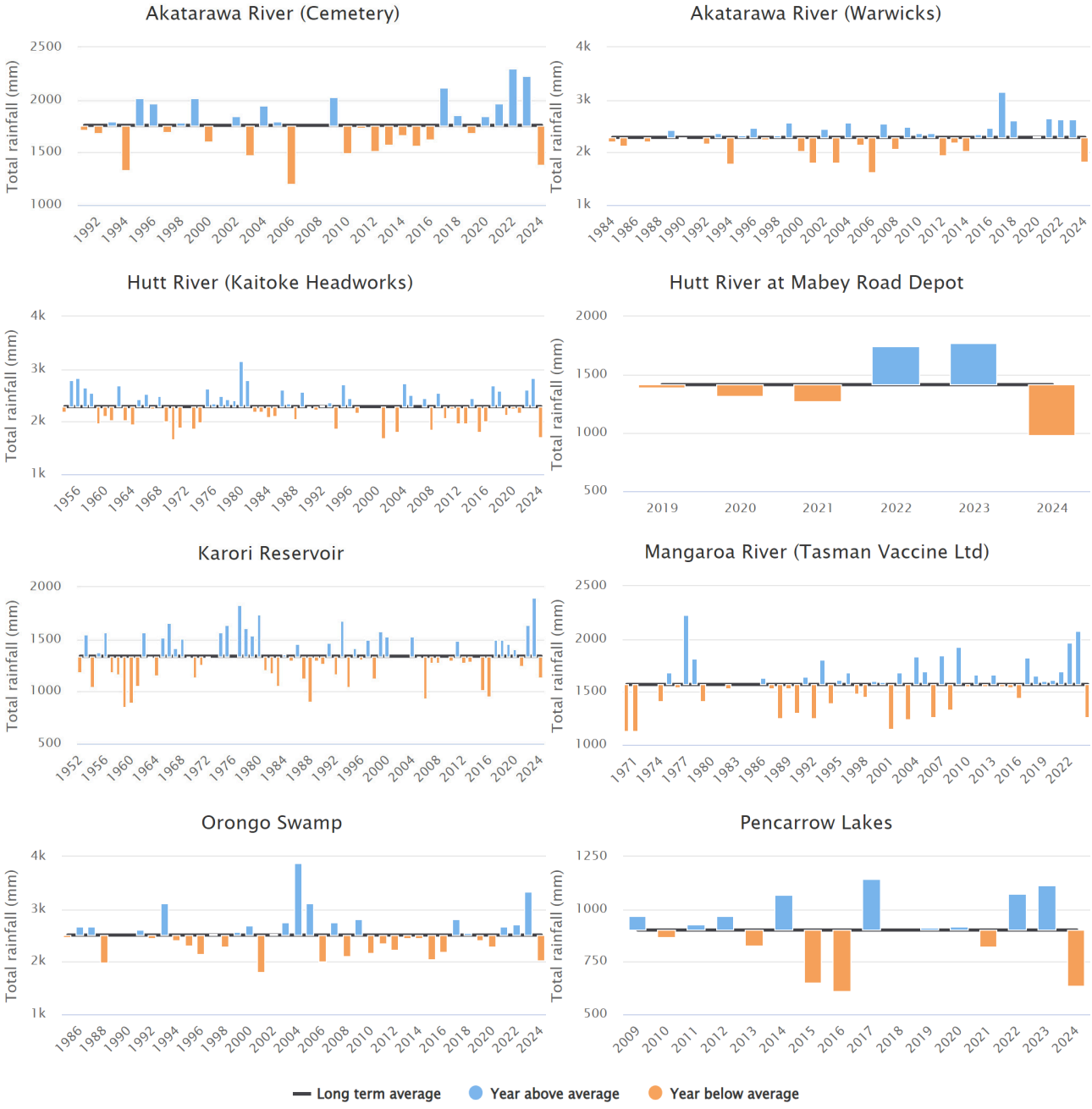

Figure 5: Yearly total rainfall and long-term averages in the Te Whanganui-a-Tara whaitua.

Figure 6: More yearly total rainfall and long-term averages in the Te Whanganui-a-Tara whaitua.

Ruamāhanga

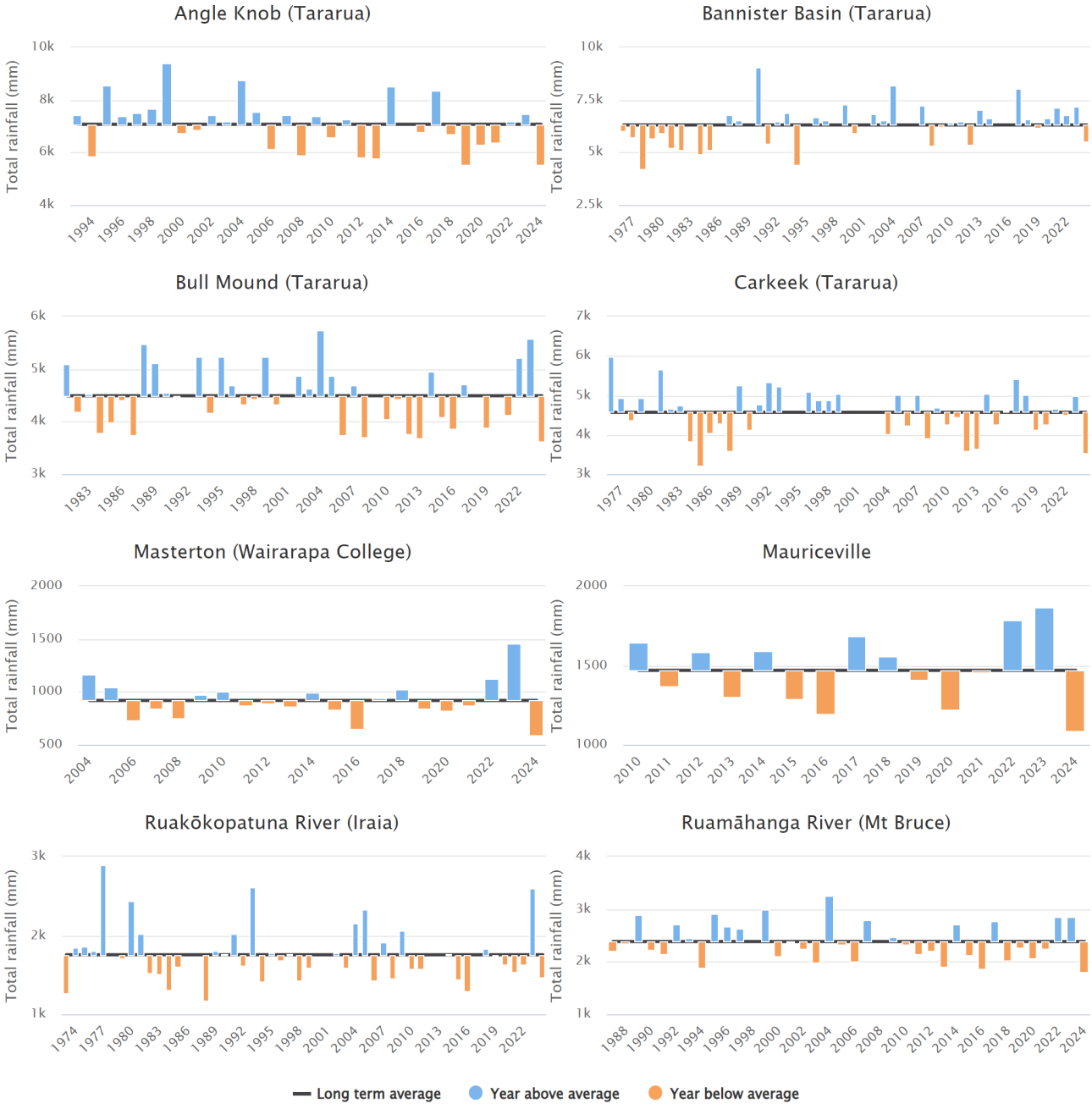

Figure 7: Yearly total rainfall and long-term averages in the Ruamāhanga whaitua.

Figure 8: More yearly total rainfall and long-term averages in the Ruamāhanga whaitua.

Wairarapa Coast

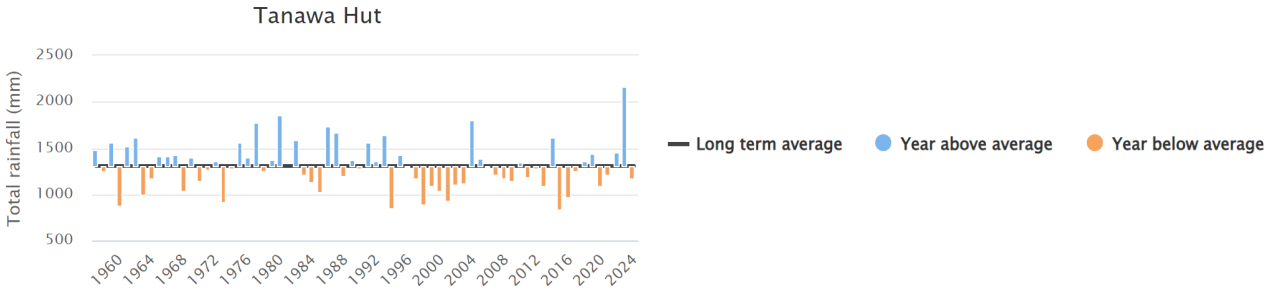

Figure 9: Yearly total rainfall and long-term averages in the Wairarapa Coast whaitua.

Subannual totals

The charts below show monthly total, and cumulative monthly, rainfall (mm) at several monitoring sites compared to the previous year and the long-term monthly average.

Kāpiti Coast

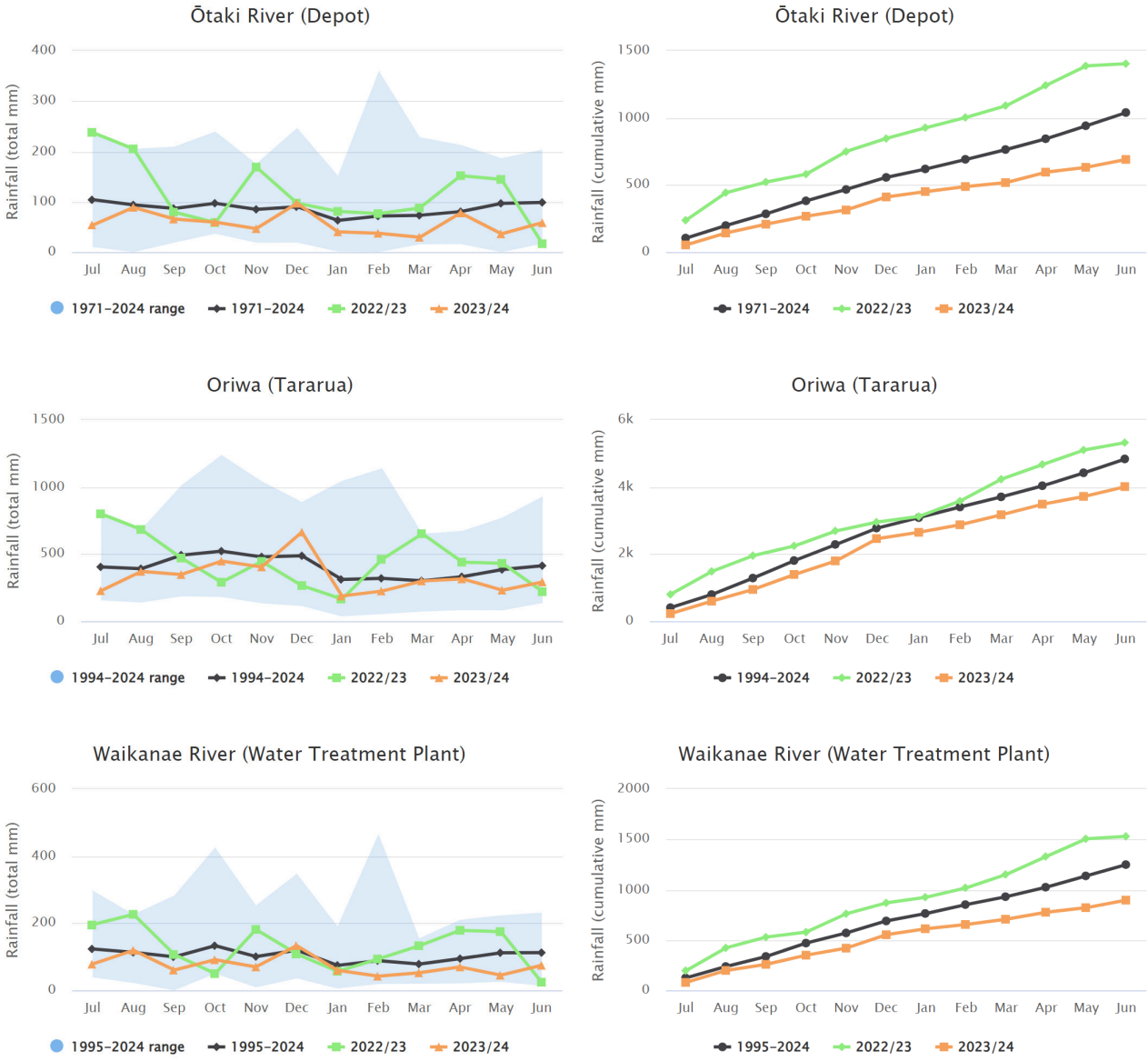

Figure 10: Monthly total and cumulative rainfall in the Kāpiti Coast whaitua.

Te Awarua-o-Porirua

Figure 11: Monthly total and cumulative rainfall in the Te Awarua-o-Porirua whaitua.

Te Whanganui-a-Tara

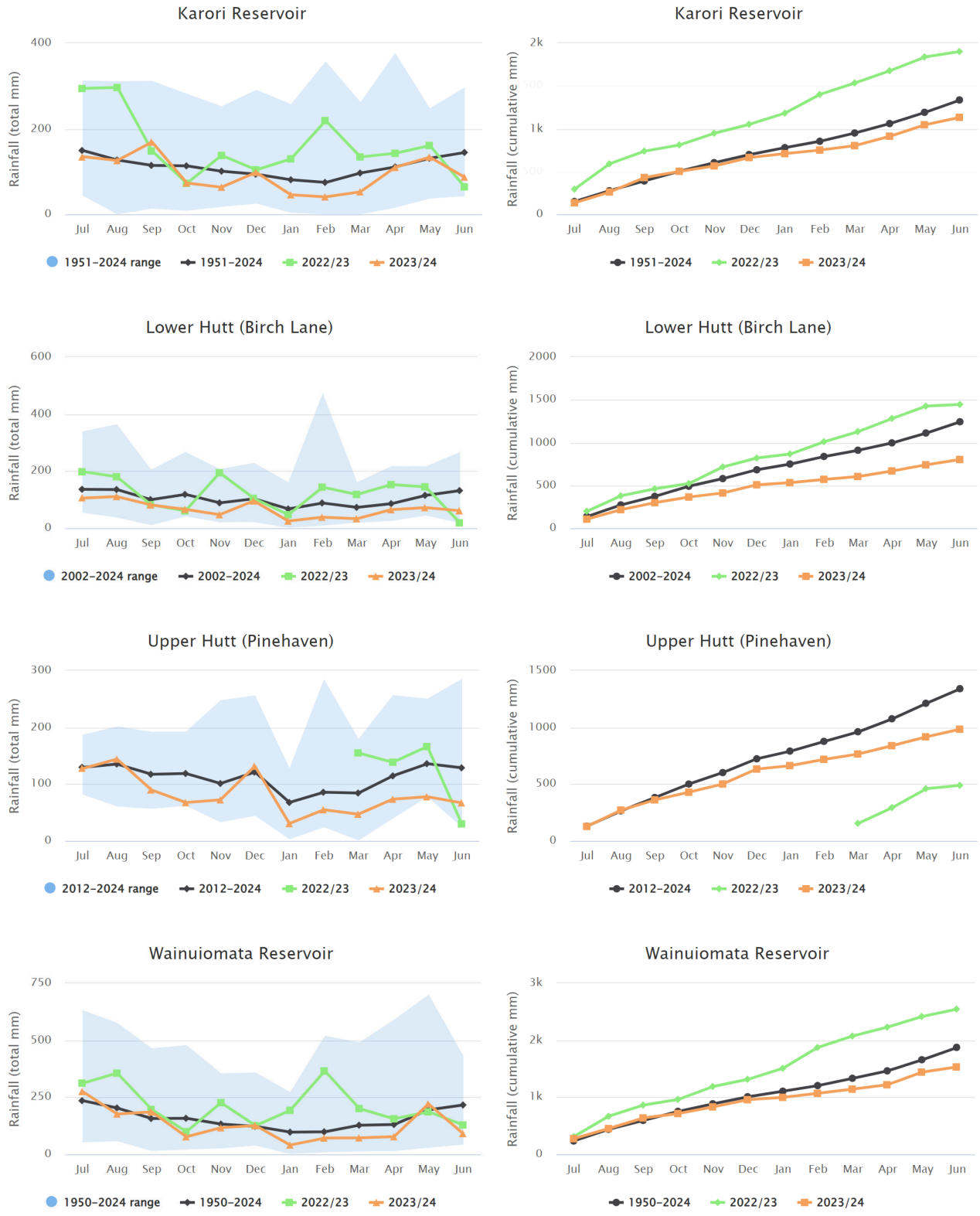

Figure 12: Monthly total and cumulative rainfall in the Te Whanganui-a-Tara whaitua.

Ruamāhanga

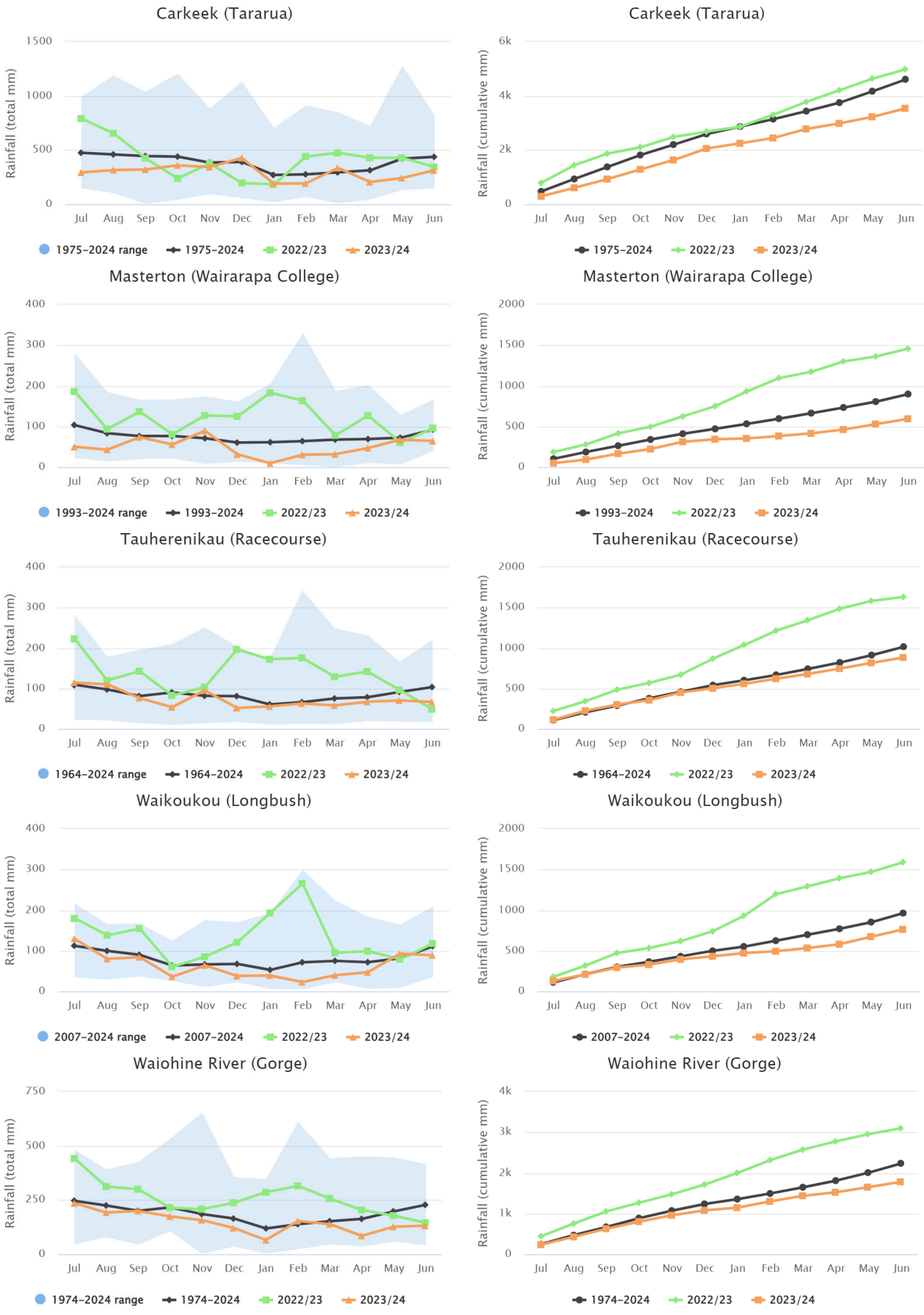

Figure 13: Monthly total and cumulative rainfall in the Ruamāhanga whaitua.

Wairarapa Coast

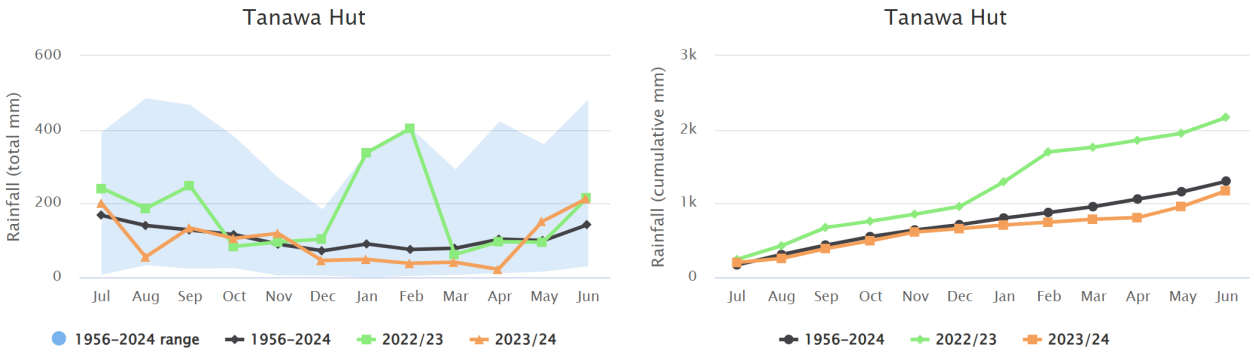

Figure 14: Monthly total and cumulative rainfall in the Wairarapa Coast whaitua.

Seasonal totals

Table 2: Seasonal rainfall totals for select monitoring sites. Those sites that have a greater than 20 percent difference from their long-term seasonal average are shaded orange (**below average**) or blue (**above average**).

Site	Winter	Spring	Summer	Autumn
Carkeek (Tararua)	68	80	86	75
Hutt River (Kaitoke Headworks)	75	75	74	71
Karori Reservoir	83	93	74	87
Lower Hutt (Birch Lane)	69	62	60	61
Mackays Crossing	91	77	75	57
Masterton (Wairarapa College)	54	100	36	69
Ōtaki River (Depot)	69	65	77	58
Oriwa (Tararua)	73	80	96	83
Quartz Hill	78	78	36	73
Ruamāhanga River (Mt Bruce)	72	86	72	68
Seton Nossiter Park	83	84	70	82
Tanawa Hut	105	108	55	76
Taueru (Castlehill)	95	119	47	66
Tauherenikau (Racecourse)	95	89	83	80
Waikanae River (Water Treatment Plant)	79	67	86	58
Waikoukou (Longbush)	96	87	51	78
Wainuiomata Reservoir	83	85	74	82
Whangaehu River (Waihi)	76	98	37	59

Maximum recorded rainfalls

The highest and lowest recorded rainfall totals throughout the year at various monitoring sites have been assigned estimated return periods based on frequency analysis of long term recorded data (see NIWA's HIRDS V4 for more information). **Blue** shaded values indicate a rainfall total with a 5-year return period or greater.

Note that for all frequency analysis results (rainfall and flows) a return period expressed as 100 years can be assigned a probability of occurring being 1/100, or 1% in any one year. Similarly, a 5-year return period event equates to 1/5 or a 20% chance of occurring in any one year.

Table 3: Maximum recorded rainfalls over short duration periods. Rainfall values are in mm, and return periods in years.

Site	1 hour			6 hours			12 hours		
	Rainfall	Start date	Return period	Rainfall	Start date	Return period	Rainfall	Start date	Return period
Bannister Basin (Tararua)	33.0	Feb 25, 2024	2	116.0	Feb 24, 2024	<2	121.5	Feb 24, 2024	<2
Karori Reservoir	30.4	Dec 12, 2023	5	43.8	May 01, 2024	<2	77.8	May 01, 2024	7
Mackays Crossing	22.0	Aug 16, 2023	2	29.8	Aug 16, 2023	<2	35.8	Aug 16, 2023	<2
Masterton (Wairarapa College)	13.0	Nov 19, 2023	<2	22.8	Nov 19, 2023	<2	27.8	May 21, 2024	<2
Ōtaki River (Depot)	13.0	Mar 04, 2024	<2	21.0	Aug 01, 2023	<2	33.0	Apr 12, 2024	<2
Oriwa (Tararua)	30.0	Feb 25, 2024	<2	88.5	Feb 24, 2024	<2	113.0	Mar 02, 2024	<2
Shandon Golf Club	21.6	Feb 02, 2024	3	34.6	May 01, 2024	<2	48.8	May 01, 2024	<2
Tanawa Hut	11.5	Jan 05, 2024	<2	30.5	Jun 25, 2024	<2	54.0	Jun 25, 2024	<2
Tauherenikau (Racecourse)	29.2	Jan 22, 2024	76	29.2	Jan 22, 2024	<2	32.2	May 21, 2024	<2
Wainuiomata Reservoir	16.2	May 01, 2024	<2	53.0	May 21, 2024	<2	79.4	May 21, 2024	<2
Waiohine River (Gorge)	21.0	Mar 04, 2024	<2	50.0	Feb 02, 2024	<2	62.5	Mar 04, 2024	<2

Table 4: Maximum recorded rainfalls over long duration periods. Rainfall values are in mm, and return periods in years.

Site	24 hours			48 hours			72 hours		
	Rainfall	Start date	Return period	Rainfall	Start date	Return period	Rainfall	Start date	Return period
Bannister Basin (Tararua)	168.0	Oct 26, 2023	<2	244.0	Oct 25, 2023	<2	300.0	Oct 24, 2023	<2
Karori Reservoir	79.6	May 01, 2024	<2	80.2	May 01, 2024	<2	80.2	Apr 30, 2024	<2
Mackays Crossing	44.0	Aug 16, 2023	<2	53.4	Aug 15, 2023	<2	62.8	Aug 14, 2023	<2
Masterton (Wairarapa College)	38.8	Nov 19, 2023	<2	50.0	Nov 18, 2023	<2	59.2	Nov 18, 2023	<2
Ōtaki River (Depot)	43.8	Apr 11, 2024	<2	48.0	Apr 11, 2024	<2	48.8	Apr 11, 2024	<2
Oriwa (Tararua)	128.0	Mar 02, 2024	<2	195.0	Mar 02, 2024	<2	224.5	Mar 02, 2024	<2
Shandon Golf Club	50.0	May 01, 2024	<2	62.2	Apr 11, 2024	<2	62.2	Apr 10, 2024	<2
Tanawa Hut	75.5	Jun 25, 2024	<2	114.0	Jun 25, 2024	<2	123.0	Jun 25, 2024	<2
Tauherenikau (Racecourse)	39.8	May 21, 2024	<2	47.6	Apr 11, 2024	<2	48.2	Apr 11, 2024	<2
Wainuiomata Reservoir	96.6	May 21, 2024	<2	109.4	May 21, 2024	<2	118.2	Jul 25, 2023	<2
Waiohine River (Gorge)	74.5	May 21, 2024	<2	98.5	Jul 08, 2023	<2	99.5	Jul 08, 2023	<2

Lowest recorded rainfalls

Table 5: Minimum total rainfalls (mm) over periods of 14, 28, and 90 days.

	14 days		28 days		3 months	
Site	Rainfall	Start date	Rainfall	Start date	Rainfall	Start date
Bannister Basin (Tararua)	5.0	Dec 31, 2023	158.5	Apr 17, 2024	848.0	Mar 10, 2024
Horokiri Stream (Battle Hill)	0.2	Nov 09, 2023	10.8	Mar 05, 2024	140.2	Dec 31, 2023
Karori Reservoir	0.8	May 25, 2024	23.2	Aug 25, 2023	130.2	Dec 29, 2023
Mackays Crossing	1.4	Aug 22, 2023	8.6	Mar 05, 2024	112.2	Jan 01, 2024
Masterton (Wairarapa College)	0.0	Jul 13, 2023	9.0	Jan 01, 2024	67.8	Nov 26, 2023
Ōtaki River (Depot)	0.6	Mar 16, 2024	2.4	Mar 05, 2024	106.6	Jan 04, 2024
Oriwa (Tararua)	13.5	Aug 22, 2023	75.0	Mar 05, 2024	617.5	Mar 08, 2024
Savage Park	2.0	Dec 31, 2023	15.0	Mar 05, 2024	154.4	Dec 31, 2023
	2.0	Apr 14, 2024	15.0	Mar 05, 2024	154.4	Dec 31, 2023
Shandon Golf Club	0.2	May 25, 2024	10.8	Dec 29, 2023	106.2	Dec 30, 2023
Tanawa Hut	2.0	Feb 09, 2024	16.0	Feb 03, 2024	90.5	Feb 03, 2024
Tauherenikau (Racecourse)	2.6	Aug 28, 2023	11.0	Aug 22, 2023	155.8	Feb 20, 2024
Waikanae River (Water Treatment Plant)	0.4	Aug 22, 2023	9.8	Mar 05, 2024	125.4	Mar 07, 2024
Waikoukou (Longbush)	1.2	May 30, 2024	13.8	Jan 01, 2024	89.4	Dec 29, 2023
Wainuiomata Reservoir	3.0	Apr 14, 2024	24.2	Dec 29, 2023	171.4	Dec 30, 2023
Waiohine River (Gorge)	10.5	Mar 28, 2024	46.5	Apr 22, 2024	263.0	Mar 06, 2024

River level and flow results

Average flows

Mean monthly river flows (m^3/s) for the year compared against the previous year and the long-term average/range.

Kāpiti Coast

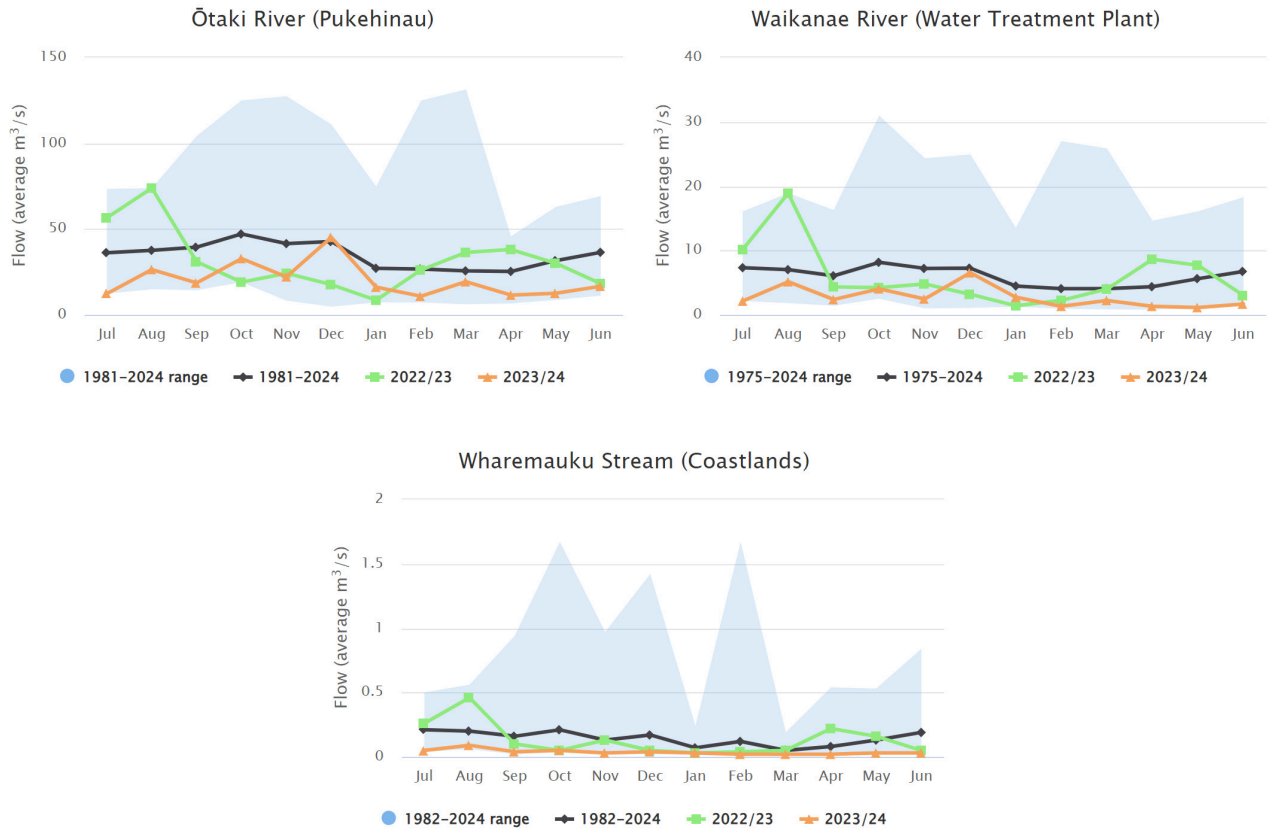

Figure 15: Monthly average river flow in the Kāpiti Coast whaitua.

Te Awarua-o-Porirua

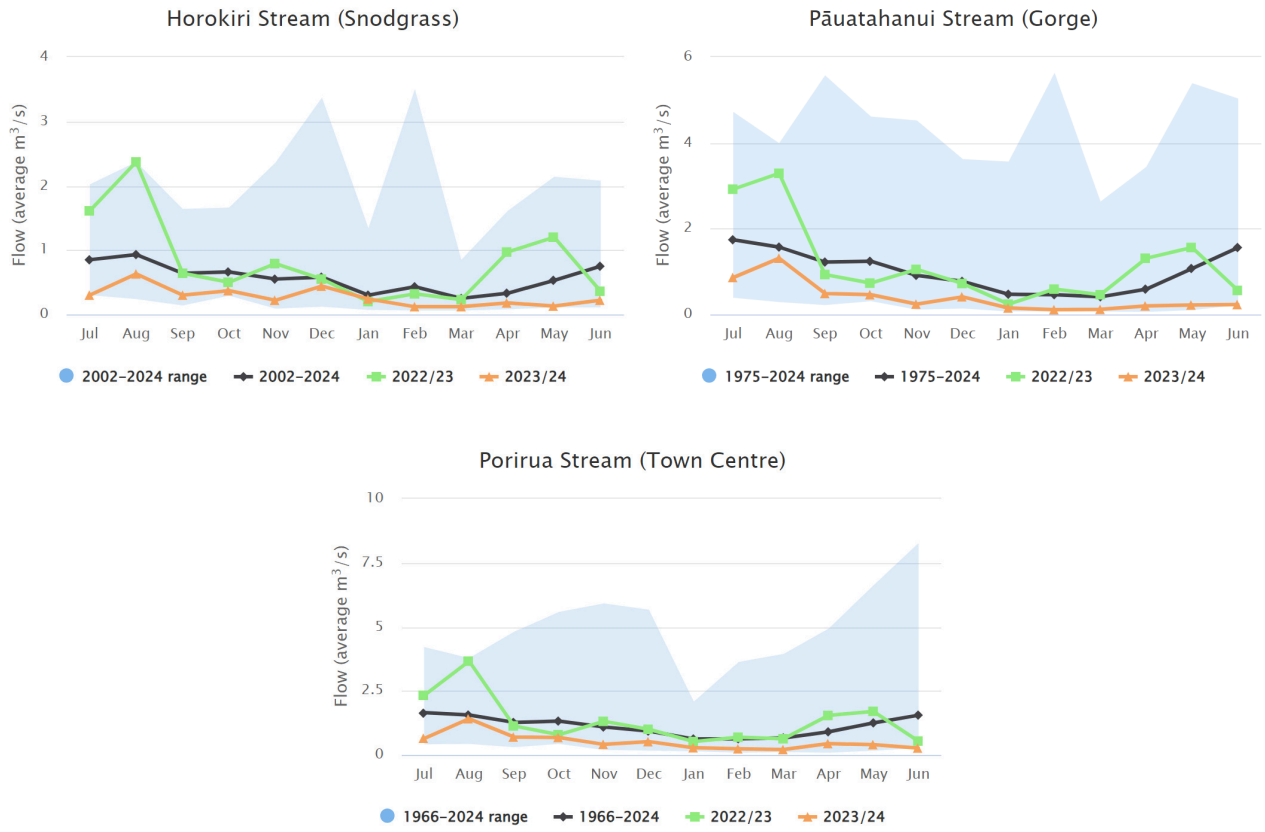

Figure 16: Monthly average river flow in the Te Awarua-o-Porirua whaitua.

Te Whanganui-a-Tara

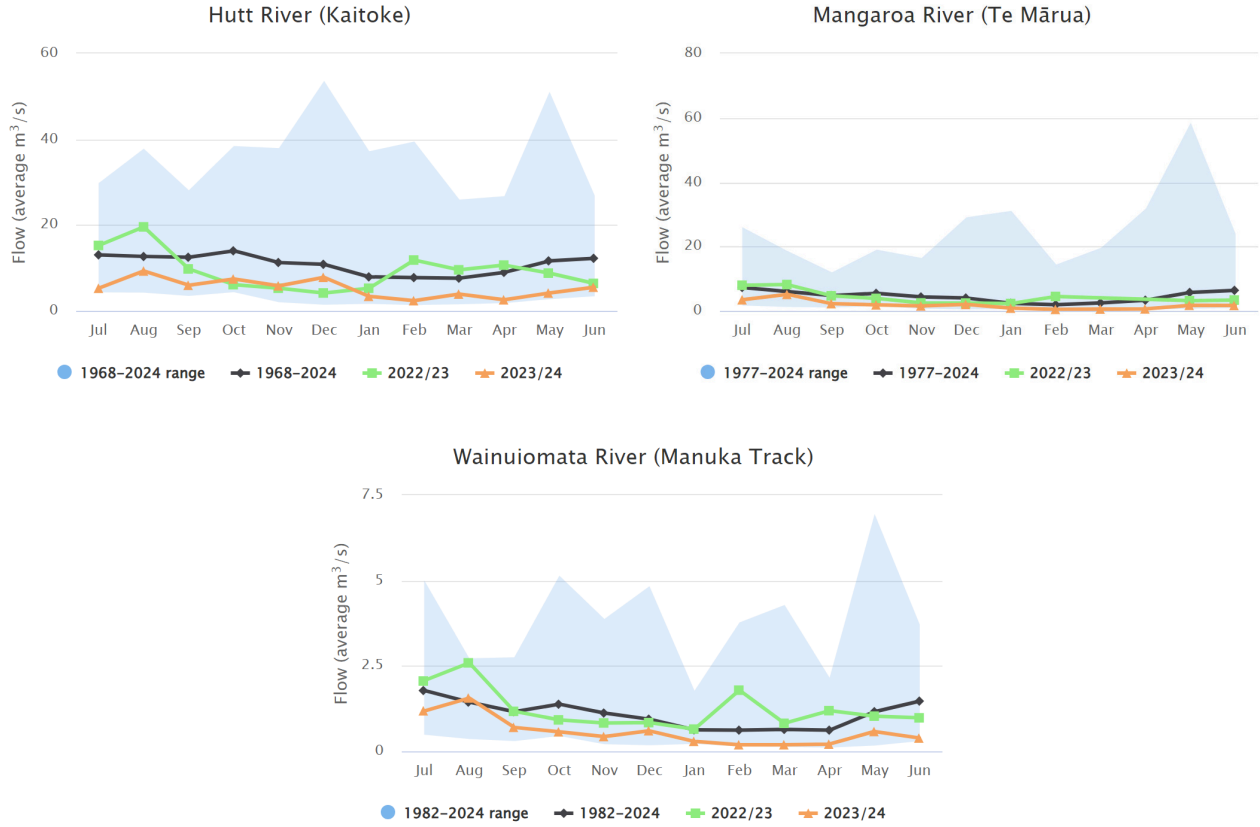

Figure 17: Monthly average river flow in the Te Whanganui-a-Tara whaitua.

Ruamāhanga

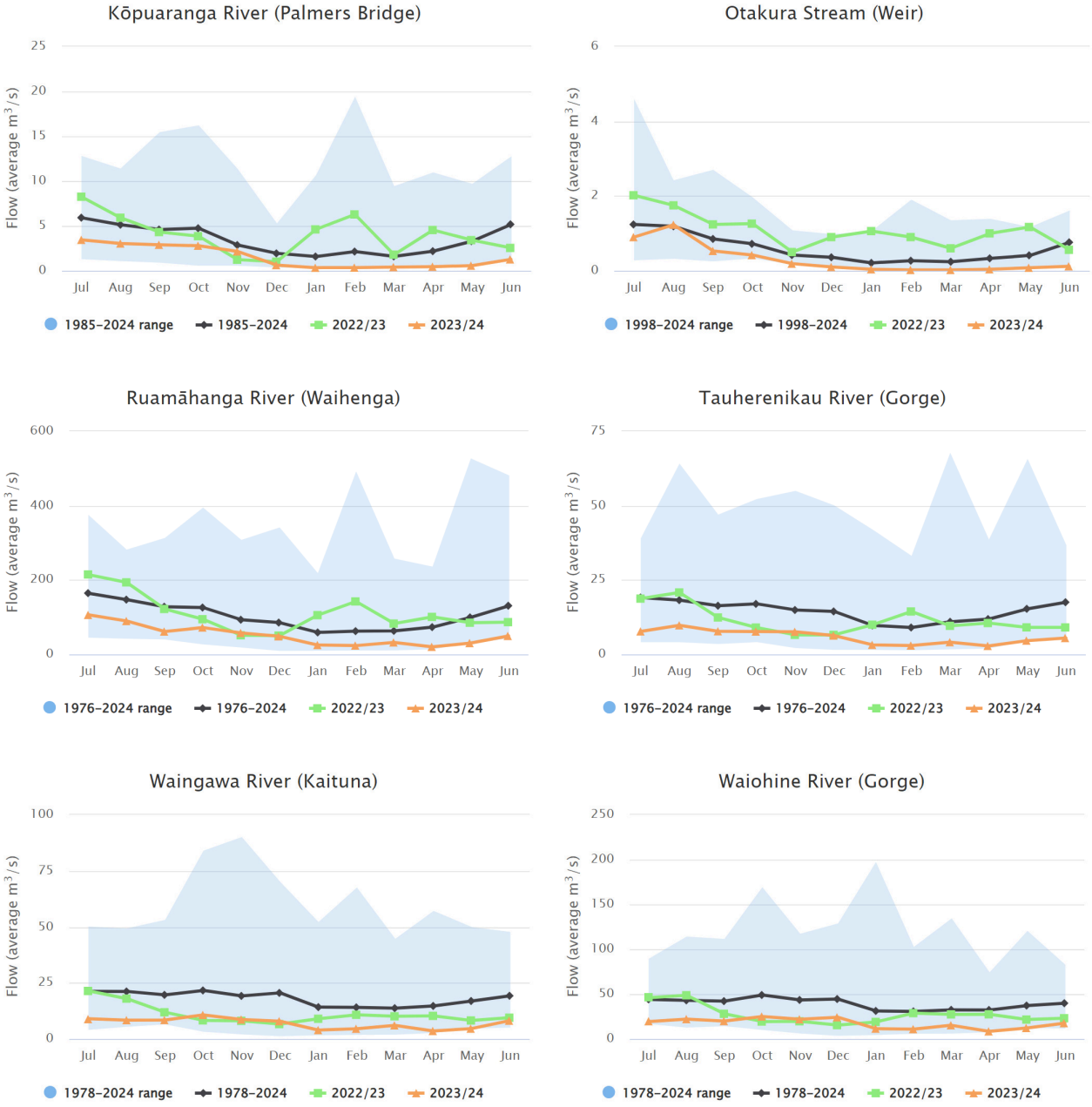

Figure 18: Monthly average river flow in the Ruamāhanga whaitua.

Wairarapa Coast

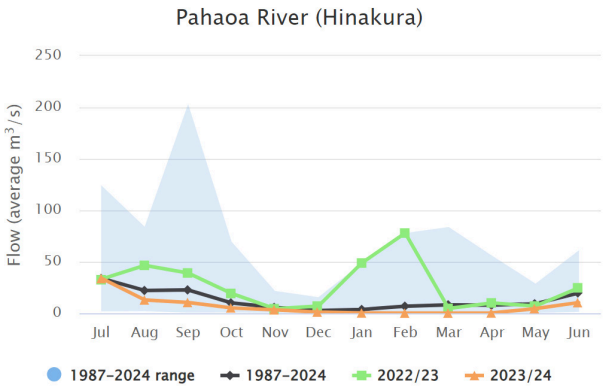

Figure 19: Monthly average river flow in the Wairarapa Coast whaitua.

Maximum flows

Table 6: Maximum recorded river flows with return periods derived by flood frequency analysis of annual peak flows recorded at each site. Sites highlighted in **blue** indicate a flood flow in excess of a 5-year return period. Note that for all frequency analysis results (high or low flows and rainfall) a return period expressed as 100 years can be assigned a probability of occurring being 1/100, or 1% in any one year. Similarly, a 5-year return period event equates to 1/5 or a 20% chance of occurring in any one year.

Site	Date of occurence	Max flow (m^3/s)	Estimated return period (yrs)
Ōtaki River (Pukehinau)	Mar 04, 2024	619	<2
Akatarawa River (Cemetery)	Mar 04, 2024	106	<2
Horokiri Stream (Snodgrass)	Dec 17, 2023	7	<2
Huangarua (Hautotara)	Jul 28, 2023	94	<2
Hutt River (Birchville)	Mar 04, 2024	327	<2
Hutt River (Kaitoke)	Mar 04, 2024	213	<2
Hutt River (Taita Gorge)	Mar 04, 2024	350	<2
Kōpuaranga River (Palmers Bridge)	Jul 10, 2023	19	<2
Mangaone Stream (Ratanui)	Mar 04, 2024	4	<2
Mangaroa River (Te Mārua)	Jul 28, 2023	32	<2
Mangatarere River (Gorge)	Oct 27, 2023	18	<2
Pāuatahanui Stream (Gorge)	Aug 16, 2023	18	<2
Pahaoa River (Hinakura)	Jul 10, 2023	217	<2
Pakuratahi River (Truss Bridge)	May 22, 2024	43	<2
Porirua Stream (Town Centre)	Aug 20, 2023	49	6
Ruamāhanga River (Gladstone Bridge)	Jul 30, 2023	1279	16
Ruamāhanga River (Mt Bruce)	Aug 02, 2023	171	<2
Ruamāhanga River (Waihenga)	Jul 10, 2023	560	<2
Ruamāhanga River (Wardells)	Aug 02, 2023	255	<2
Taueru River (Te Weraiti)	Jul 10, 2023	69	<2
Tauherenikau River (Gorge)	Mar 04, 2024	207	<2
Waikanae River (Water Treatment Plant)	Dec 17, 2023	61	<2
Waingawa River (Kaituna)	Mar 04, 2024	178	<2
Wainuiomata River (Leonard Wood Park)	May 22, 2024	28	<2
Wainuiomata River (Manuka Track)	May 22, 2024	10	<2
Waiohine River (Gorge)	Mar 04, 2024	650	<2
Waipoua River (Mikimiki Bridge)	Aug 02, 2023	97	<2
Waiwhetū Stream (Whites Line East)	May 02, 2024	8	<2
Whakatikei River (Dude Ranch)	Dec 17, 2023	38	<2

Low flow periods

Table 7: Minimum recorded river flows (m^3/s averaged over 7- and 28-day periods). Significant flow events (5-year return period or greater) are shaded **blue**. Note that for all frequency analysis results (high or low flows and rainfall) a return period expressed as 100 years can be assigned a probability of occurring being 1/100, or 1% in any one year. Similarly, a 5-year return period event equates to 1/5 or a 20% chance of occurring in any one year.

Site	7-day duration			28-day duration		
	Lowest mean flow	Start date	Return period	Lowest mean flow	Start date	Return period
Akatarawa River (Cemetery)	1.07	Mar 28, 2024	<2	1.20	Mar 15, 2024	<2
Horokiri Stream (Snodgrass)	0.08	Mar 26, 2024	<2	0.09	Mar 07, 2024	<2
Hutt River (Birchville)	2.82	Feb 17, 2024	<2	3.65	Mar 15, 2024	<2
Hutt River (Kaitoke)	1.28	Feb 17, 2024	<2	1.83	Mar 15, 2024	<2
Hutt River (Taita Gorge)	2.88	Feb 17, 2024	<2	4.31	Feb 04, 2024	<2
Kōpuaranga River (Palmers Bridge)	0.28	Feb 13, 2024	<2	0.32	Feb 06, 2024	<2
Mangaone Stream (Ratanui)	0.06	Jun 02, 2024	<2	0.07	May 12, 2024	<2
Mangaroa River (Te Mārua)	0.28	Mar 23, 2024	<2	0.35	Mar 07, 2024	<2
Mangatarere River (Gorge)	0.17	May 14, 2024	<2	0.21	Apr 23, 2024	<2
Ōtaki River (Pukehinau)	4.94	Feb 18, 2024	<2	7.91	Mar 15, 2024	<2
Pahaoa River (Hinakura)	0.06	Feb 19, 2024	<2	0.08	Feb 07, 2024	<2
Pakuratahi River (Truss Bridge)	0.18	Feb 17, 2024	<2	0.27	Mar 07, 2024	<2
Porirua Stream (Town Centre)	0.14	Mar 20, 2024	<2	0.17	Mar 05, 2024	<2
Ruamāhanga River (Mt Bruce)	1.39	May 08, 2024	<2	2.40	Apr 23, 2024	<2
Ruamāhanga River (Waihenga)	10.39	Feb 13, 2024	<2	15.17	Mar 15, 2024	<2
Ruamāhanga River (Wardells)	2.68	Feb 13, 2024	<2	3.64	Mar 15, 2024	<2
Tauherenikau River (Gorge)	1.40	Feb 13, 2024	<2	1.94	Apr 23, 2024	<2
Waikanae River (Water Treatment Plant)	0.93	Jun 02, 2024	<2	1.03	May 12, 2024	<2
Waingawa River (Kaituna)	1.53	Mar 18, 2024	<2	2.50	Apr 18, 2024	<2

Site	7-day duration			28-day duration		
	Lowest mean flow	Start date	Return period	Lowest mean flow	Start date	Return period
Wainuiomata River (Manuka Track)	0.12	Apr 24, 2024	<2	0.15	Mar 07, 2024	<2
Waiohine River (Gorge)	4.10	Mar 18, 2024	<2	6.55	Apr 18, 2024	<2
Waipoua River (Mikimiki Bridge)	0.31	Apr 05, 2024	<2	0.40	Apr 23, 2024	<2
Whakatikei River (Dude Ranch)	0.36	Jun 02, 2024	<2	0.42	May 12, 2024	<2

Low flow exceedances

Table 8: GW has defined low flow thresholds on several rivers and streams across the Region to signify when restrictions on abstractions should begin (restriction thresholds) and when all abstractions shall stop (minimum flows). These are defined in the GW Freshwater Plan). This table summarises the number of instances that the first restriction threshold was reached for rivers and streams as specified in the Regional Freshwater Plan. Values for the current year are in **bold** and results from the previous three years are included for comparison.

Site	First restriction threshold (m^3/s)	Number of days below threshold			
		2020/21	2021/22	2022/23	2023/24
Hutt River (Birchville)	1.45	0	0	0	**0**
Kōpuaranga River (Palmers Bridge)	0.27	10	0	0	**0**
Mangaone Stream (Ratanui)	0.05	0	0	0	**0**
Mangatarere River (Gorge)	0.33	106	42	11	**73**
Ōtaki River (Pukehinau)	4.38	3	21	0	**0**
Orongorongo River (Truss Bridge)	0.10	0	0	0	**26**
Ruamāhanga River (Waihenga)	9.80	33	10	0	**4**
Ruamāhanga River (Wardells)	2.70	35	6	0	**13**
Tauherenikau River (Gorge)	1.35	28	14	0	**12**
Waikanae River (Water Treatment Plant)	0.90	0	10	0	**0**
Waingawa River (Kaituna)	1.90	65	48	0	**54**
Wainuiomata River (Leonard Wood Park)	0.36	38	5	0	**42**
Waiohine River (Gorge)	3.04	8	6	0	**0**
Waipoua River (Mikimiki Bridge)	0.30	37	7	0	**12**
Waitohu Stream (Water Supply Intake)	0.18	18	78	29	**82**

High river level alarms

As part of its flood warning and response service, GW sets high river level alarms on many of its monitoring sites to provide early warning of rising river levels and possible flooding.

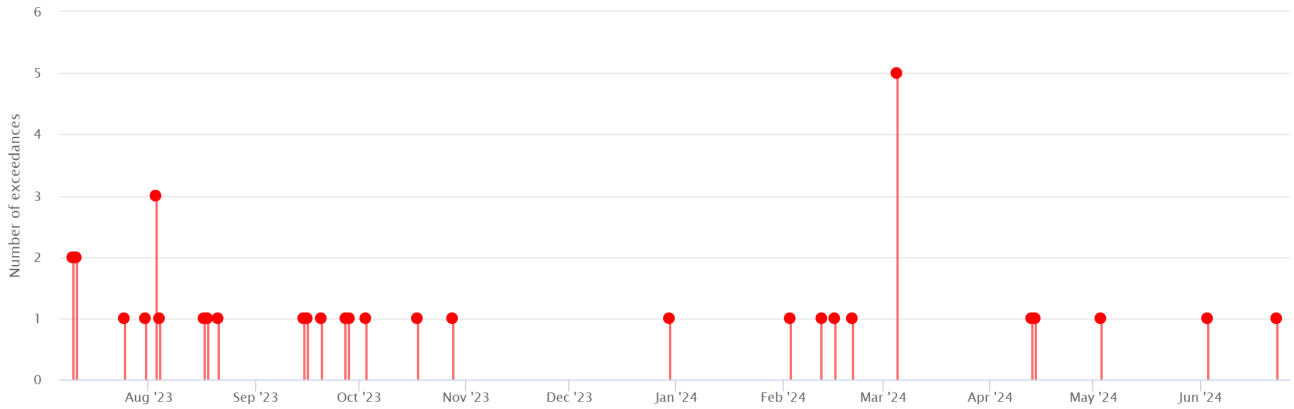

Figure 20: Number of flood warning alarms triggered by date.

Table 9: River levels that triggered alarms at each site with thresholds included.

Site	Event date	River level (m)	Threshold (m)
Ōtaki River (Pukehinau)	Mar 05, 2024	2.16	2.15
Porirua Stream (Town Centre)	Aug 17, 2023	1.02	0.90
Porirua Stream (Town Centre)	Aug 18, 2023	0.94	0.90
Porirua Stream (Town Centre)	Aug 21, 2023	1.54	0.90
Porirua Stream (Town Centre)	Feb 03, 2024	0.98	0.90
Porirua Stream (Town Centre)	Apr 13, 2024	0.99	0.90
Porirua Stream (Town Centre)	May 03, 2024	1.04	0.90
Ruamāhanga River (Gladstone Bridge)	Jul 10, 2023	3.64	3.35
Ruamāhanga River (Gladstone Bridge)	Jul 11, 2023	4.02	3.35
Ruamāhanga River (Gladstone Bridge)	Jul 25, 2023	3.52	2.00
Ruamāhanga River (Gladstone Bridge)	Jul 31, 2023	3.91	2.00
Ruamāhanga River (Gladstone Bridge)	Aug 03, 2023	3.09	3.00
Ruamāhanga River (Gladstone Bridge)	Aug 04, 2023	3.65	2.00
Ruamāhanga River (Gladstone Bridge)	Sep 15, 2023	3.61	2.00
Ruamāhanga River (Gladstone Bridge)	Sep 16, 2023	3.70	2.00
Ruamāhanga River (Gladstone Bridge)	Sep 20, 2023	2.71	2.00
Ruamāhanga River (Gladstone Bridge)	Sep 27, 2023	3.58	2.00
Ruamāhanga River (Gladstone Bridge)	Sep 28, 2023	2.59	2.00
Ruamāhanga River (Gladstone Bridge)	Oct 03, 2023	3.75	2.00
Ruamāhanga River (Gladstone Bridge)	Oct 18, 2023	3.66	2.00
Ruamāhanga River (Gladstone Bridge)	Dec 30, 2023	2.93	2.00
Ruamāhanga River (Gladstone Bridge)	Feb 12, 2024	3.52	2.00
Ruamāhanga River (Gladstone Bridge)	Feb 16, 2024	2.81	2.00
Ruamāhanga River (Gladstone Bridge)	Feb 21, 2024	2.79	2.00
Ruamāhanga River (Gladstone Bridge)	Apr 14, 2024	2.17	2.00
Ruamāhanga River (Gladstone Bridge)	Jun 03, 2024	3.48	2.00
Ruamāhanga River (Gladstone Bridge)	Jun 23, 2024	3.73	2.00

Site	Event date	River level (m)	Threshold (m)
Ruamāhanga River (Waihenga)	Oct 28, 2023	3.50	3.35

Groundwater level results

The figures below show mean daily groundwater levels for this and last year compared to historical mean daily levels. All units are metres above average sea level.

Rumahāhanga

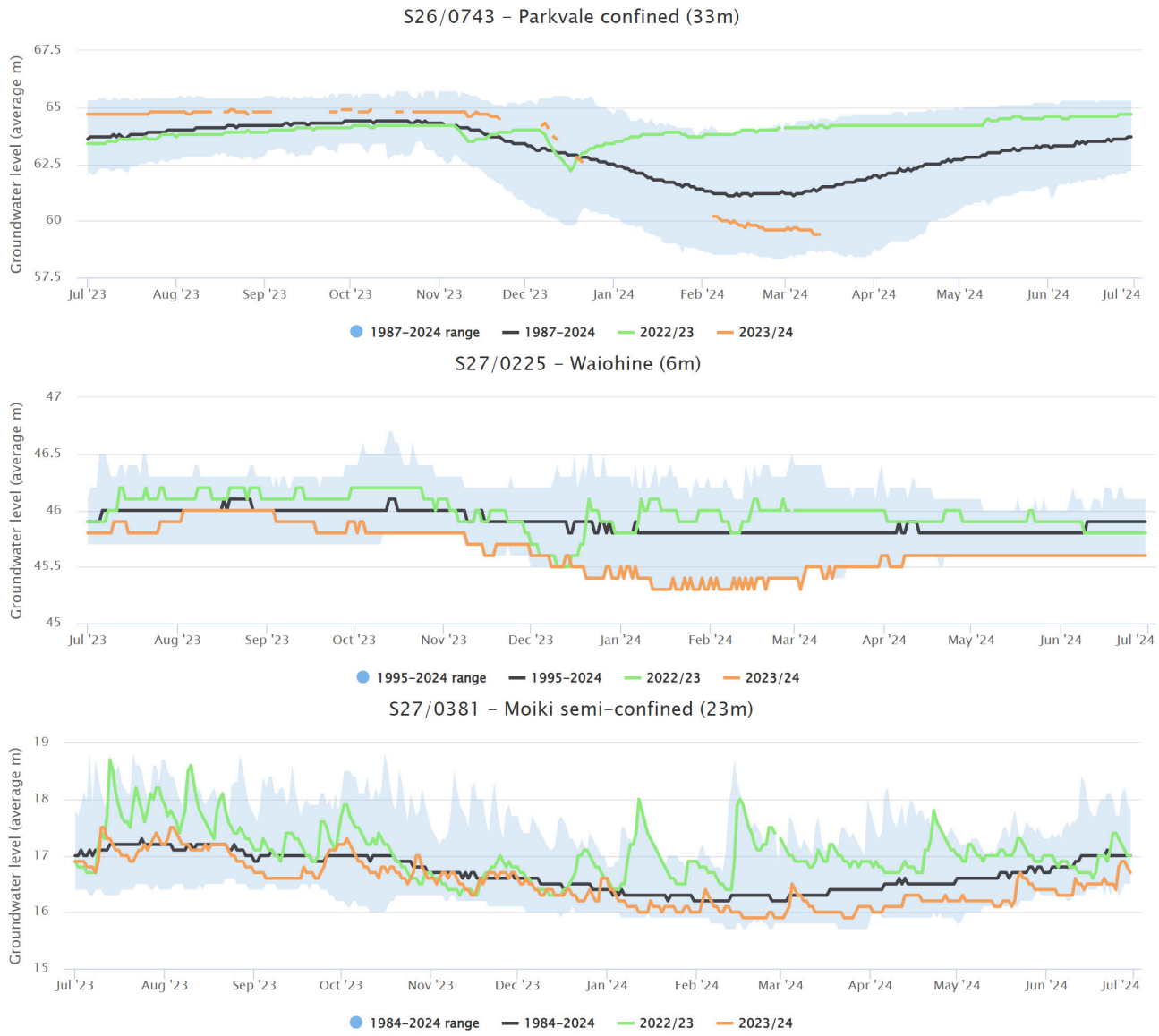

Figure 21: Daily groundwater levels in the Rumahāhanga whaitua.

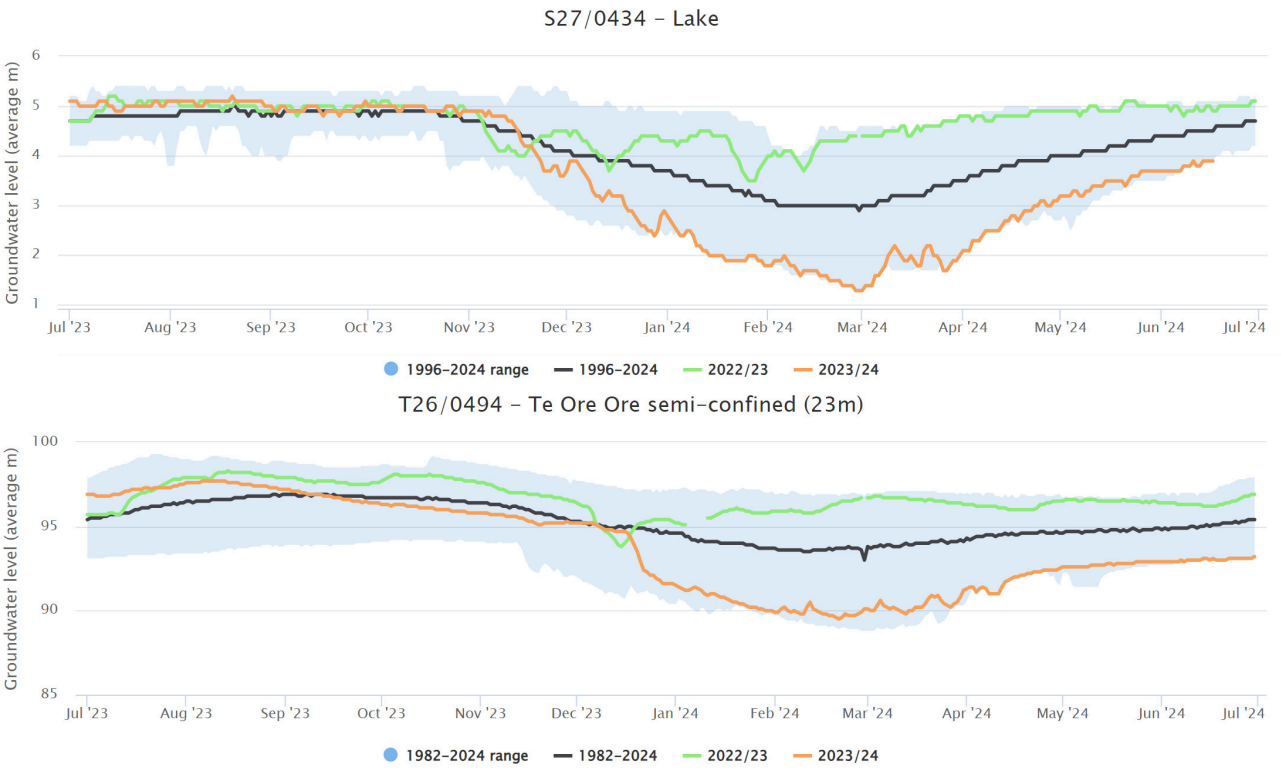

Figure 22: More daily groundwater levels in the Rumahāhanga whaitua.

Te Whanganui-a-Tara

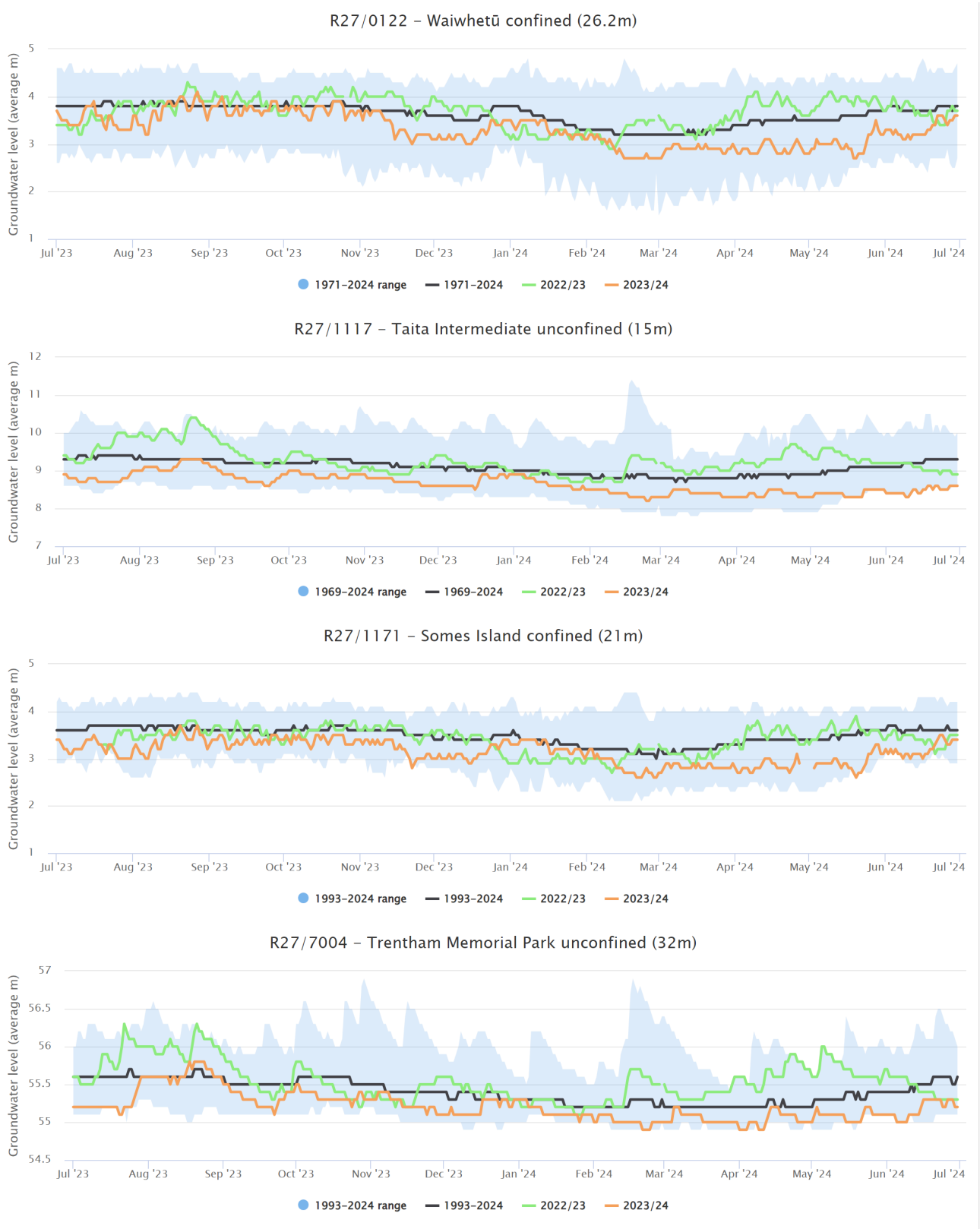

Figure 23: Daily groundwater levels in the Te Whanganui-a-Tara whaitua.

Kāpiti Coast

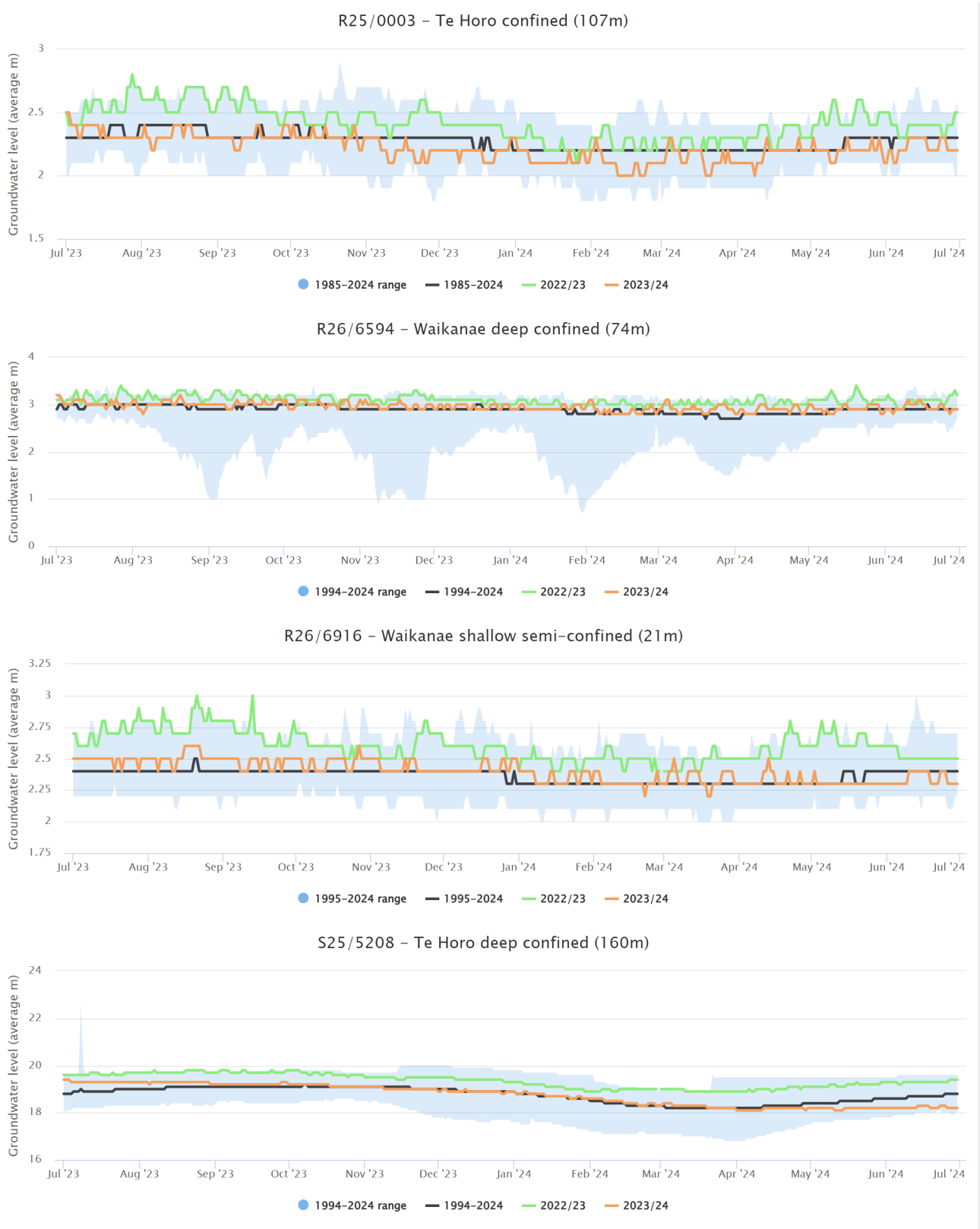

Figure 24: Daily groundwater levels in the Kāpiti Coast whaitua.

Lake & wetland level results

Lakes

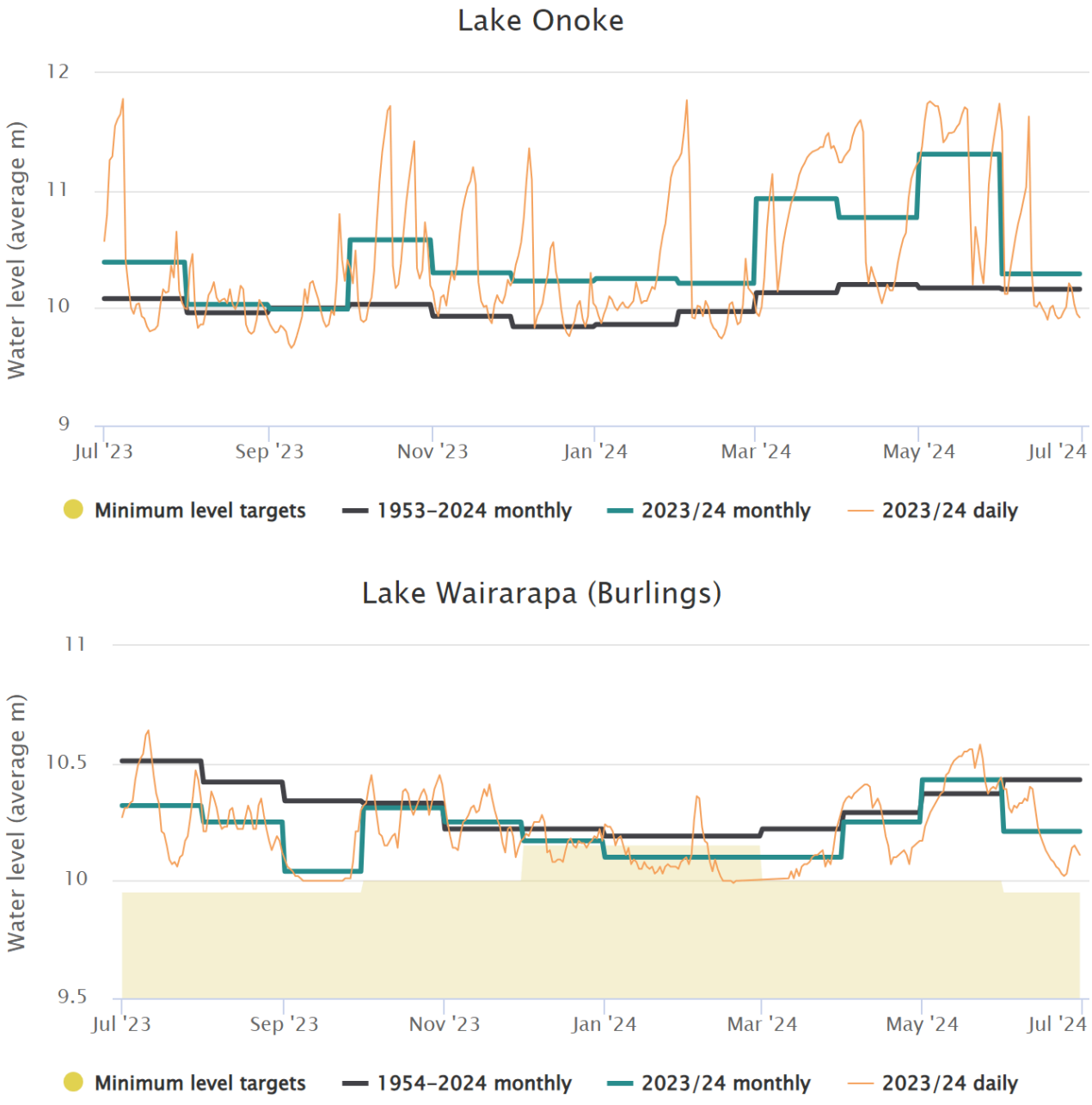

Figure 25: Recorded lake levels (metres above average sea level) at Lake Wairarapa and Lake Onoke. This year's data are presented as a daily mean level and a monthly mean level with the long-term monthly mean for comparison. The minimum lake water level for Lake Wairarapa (as specified in the GW Regional Freshwater Plan) is shown by the shaded yellow area. There is no minimum level set for Lake Onoke.

Wetlands

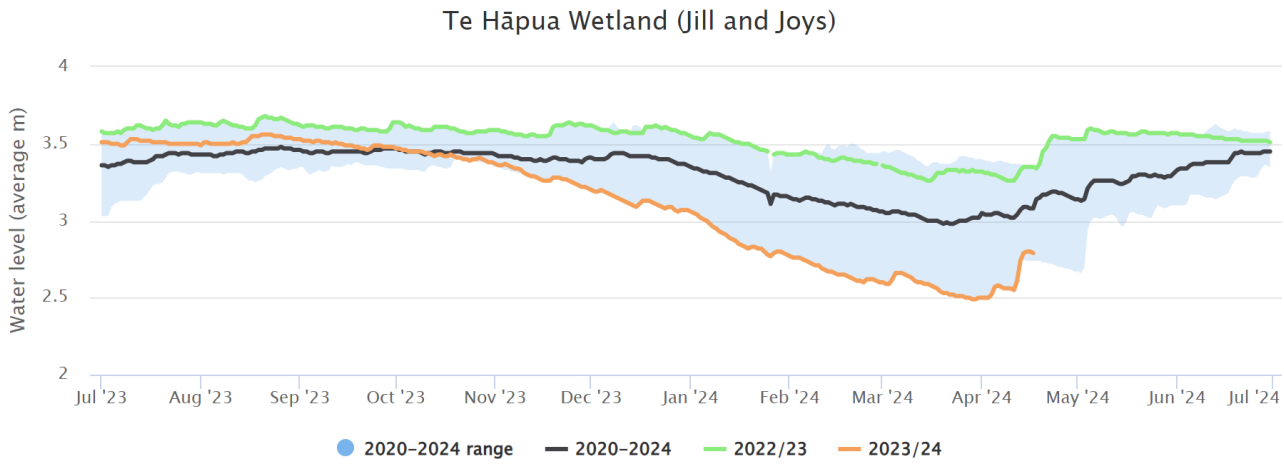

Figure 26: Water levels have been recorded within the Te Hāpua wetland complex on the Kāpiti Coast since 2008. Below shows this years recorded daily mean water levels (metres above average sea level) in comparison to last year and historical averages/ranges.

Soil moisture results

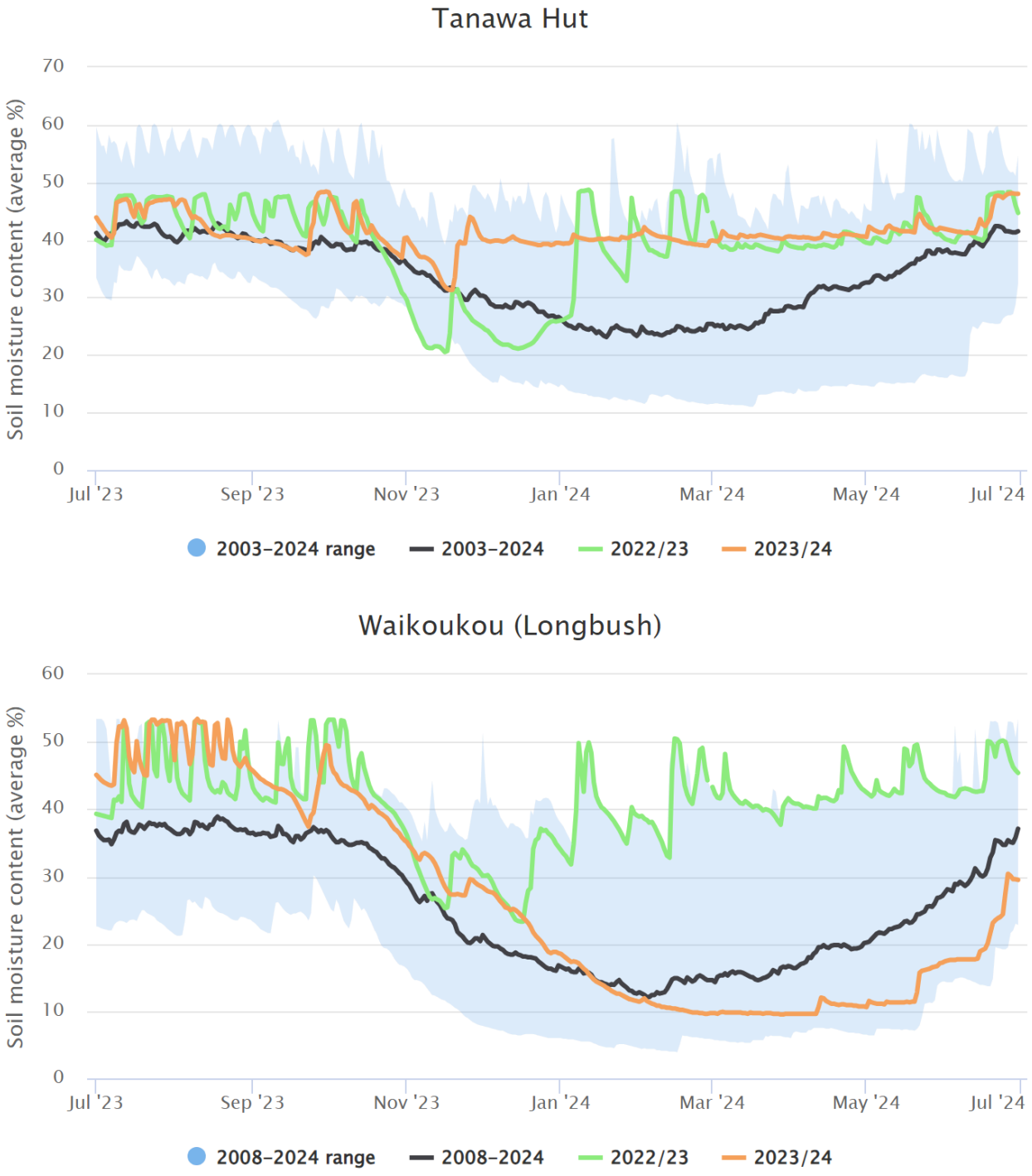

Figure 27: Daily average soil moisture content (%) is shown below for the Tanawa Hut (near Tinui) and Waikoukou (Longbush) monitoring sites. The previous year and long-term average/range are also shown for comparison.