greater WELLINGTON
REGIONAL COUNCIL
Te Pane Matua Taiao

Climate and Water Resources Summary for the Wellington Region

Warm Season (November to April) 2017/2018

Release date: 25 May 2018

Contents

Damage to SH1 seawall north of Pukerua Bay
Photo: NZTA

Logs, rocks and debris washed into Makara Beach community

Photo: Makara Beach Cafe

Ex-tropical cyclone Gita crossed the region on 20 February. While we were spared the extreme rainfall and severe flooding/slips that affected other parts of the country, the severe weather certainly made its presence felt.

State Highway 1 was damaged and closed for a time after waves destroyed part of the seawall and crashed across the road dumping debris.

Storm surge also caused damage to the Kāpiti coastline, contributing to flooding in Paraparaumu Beach and Raumati South.

Further south, boat sheds at Titahi Bay and a number of houses and properties at Makara Beach were damaged by the destructive storm surge.

Winds of 140kmh were recorded on the Rimutaka Range and in areas of the Wairarapa. At Kelburn winds peaked around 120kmh.

Titahi Bay boatsheds damaged by waves
Photo: Porirua City Council

In this report you will find:

More information

For more information on monitoring sites and up-to-date data please visit http://www.gw.govt.nz/environmental-science/. Several climate sites are operated by NIWA and/or MetService, and GWRC is grateful for permission to present the data in this report.

Disclaimer

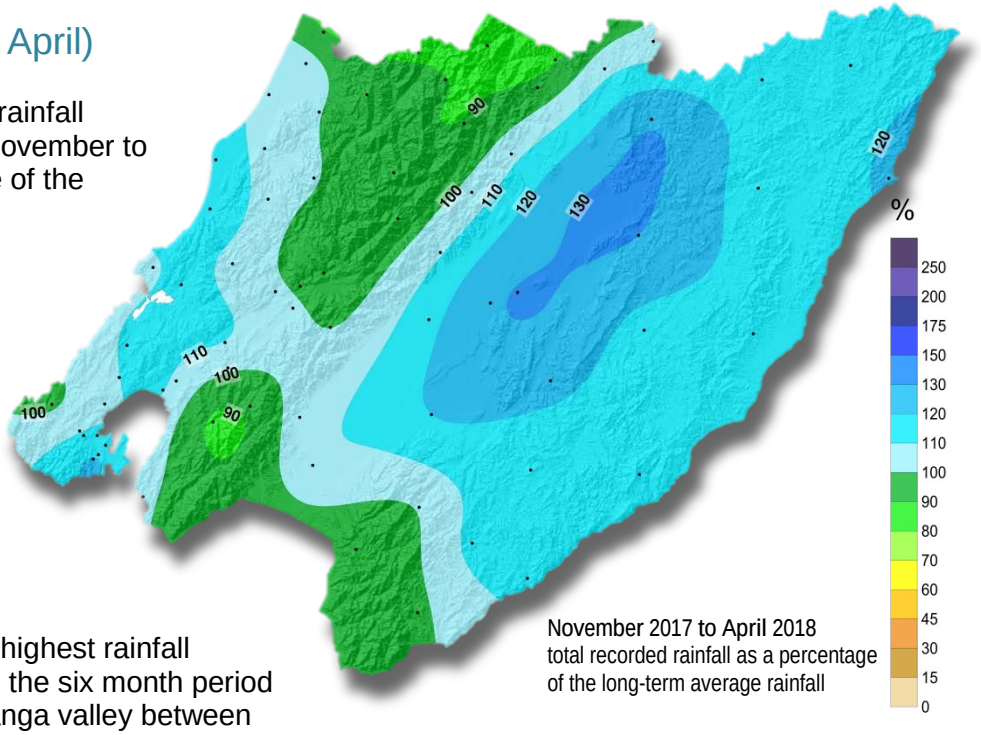
Report release date: May 2018

The warm season from November 2017 to April 2018 saw mostly about average rainfall across the region with greatest departures from the average occurring around the mid to upper part of the Ruamāhanga valley.

Rainfall (November to April)

The map to the right shows rainfall recorded during the entire November to April period as a percentage of the long term average.

While the pattern of the six month period is that of around average to slightly above average rainfall over much of the region, the individual monthly totals show a highly varied picture (see the following page for monthly rainfall percentage maps).



The recorded rainfall shows there was a relatively even spread of average (to slightly above average) rainfall when compared to normal. (The dots on the map indicate rainfall recording sites)

The areas that received the highest rainfall percentages (120-130%) for the six month period were the northern Ruamāhanga valley between the Whangaehu River and Carterton, the southern part of Wellington city, and extending up to Paekakariki and Paraparaumu.

Separate rainfall maps for each month, shown on the following page, highlight the variability in rainfall during each month. Two extremes occurred with record breaking low rainfall and dry conditions in November and then the record breaking wet during February.

Another way to consider the weather is to look at the number of days that it rained. If more than 1mm of rain is recorded in a day this is called a 'Rain Day' and if there is more than 25mm this is termed a 'Heavy Rain Day'.

The table below shows that all areas had more Rain and Heavy Rain days than normal. Most areas had around twice the average number of Heavy Rain days.

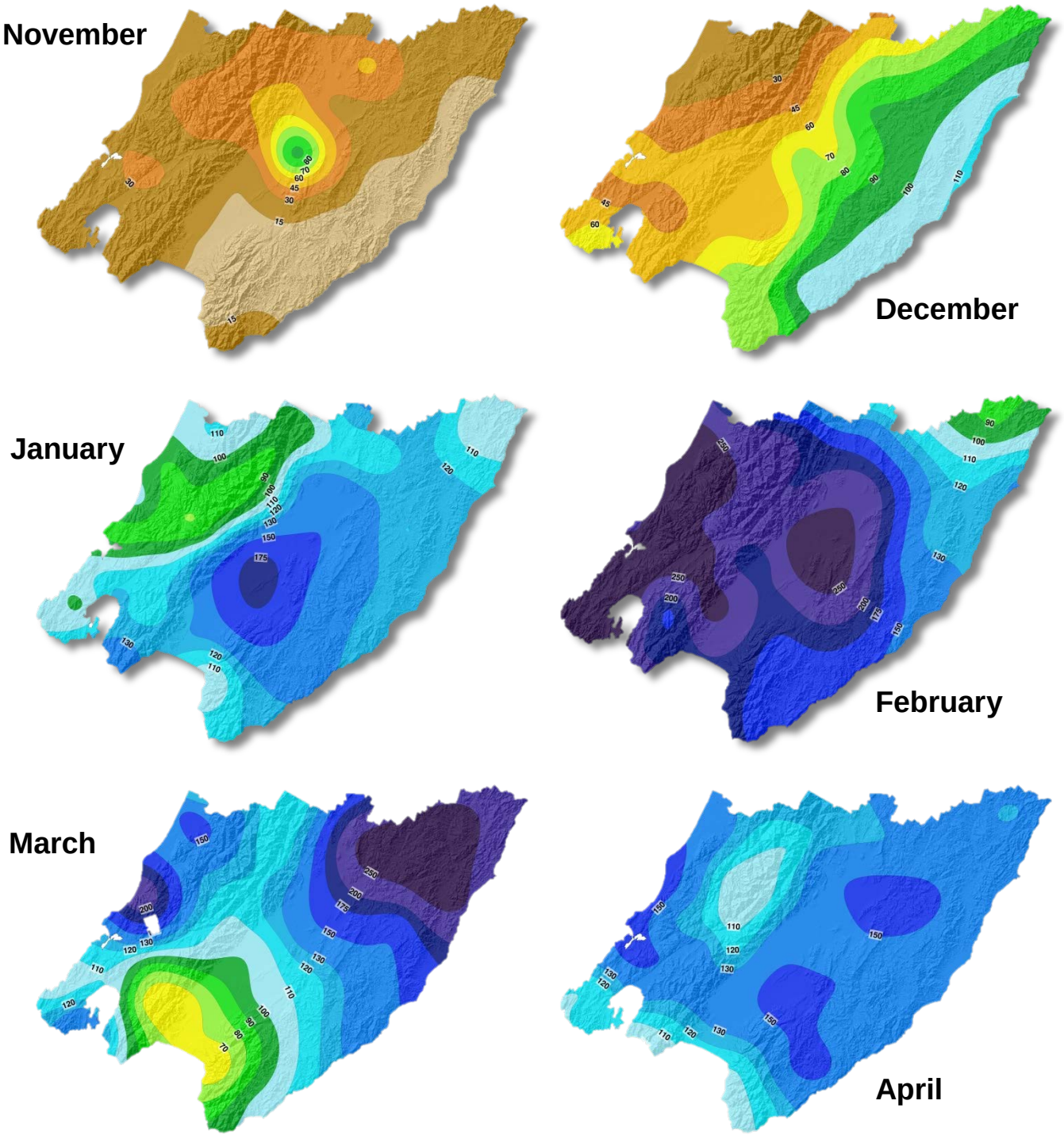
Number of Rain Days and Heavy Rain Days during May to October across the region (long-term average in brackets.)

	Kāpiti Coast		Porirua	Hutt Valley & Wellington		Ruamāhanga		Eastern Wairarapa
	Lowland	Hills	Lowland	Lowland	Hills	Lowland	Hills	
Rain Days (>1mm)	72 [53]	104 [78]	60 [45]	59 [47]	86 [68]	60 [44]	99 [84]	51 [50]
Heavy Rain Days(>25mm)	8 [3]	37 [21]	10 [4]	9 [4]	20 [10]	6 [3]	39 [25]	5 [3]

Rainfall by the month

The maps below show the percentage of average rainfall for each month of the warm season (November 2017 to April 2018). November and December had below average rainfall. November was very exceptionally dry everywhere with figures below 10% in the east. A localised thunderstorm created the high anomaly near Carterton.

The dry pattern changed during January and into February which became a very wet month with above 200% of the normal rainfall in Wellington, Kāpiti Coast and mid Ruamāhanga valley.



Monthly rainfall as a percentage of the long-term average

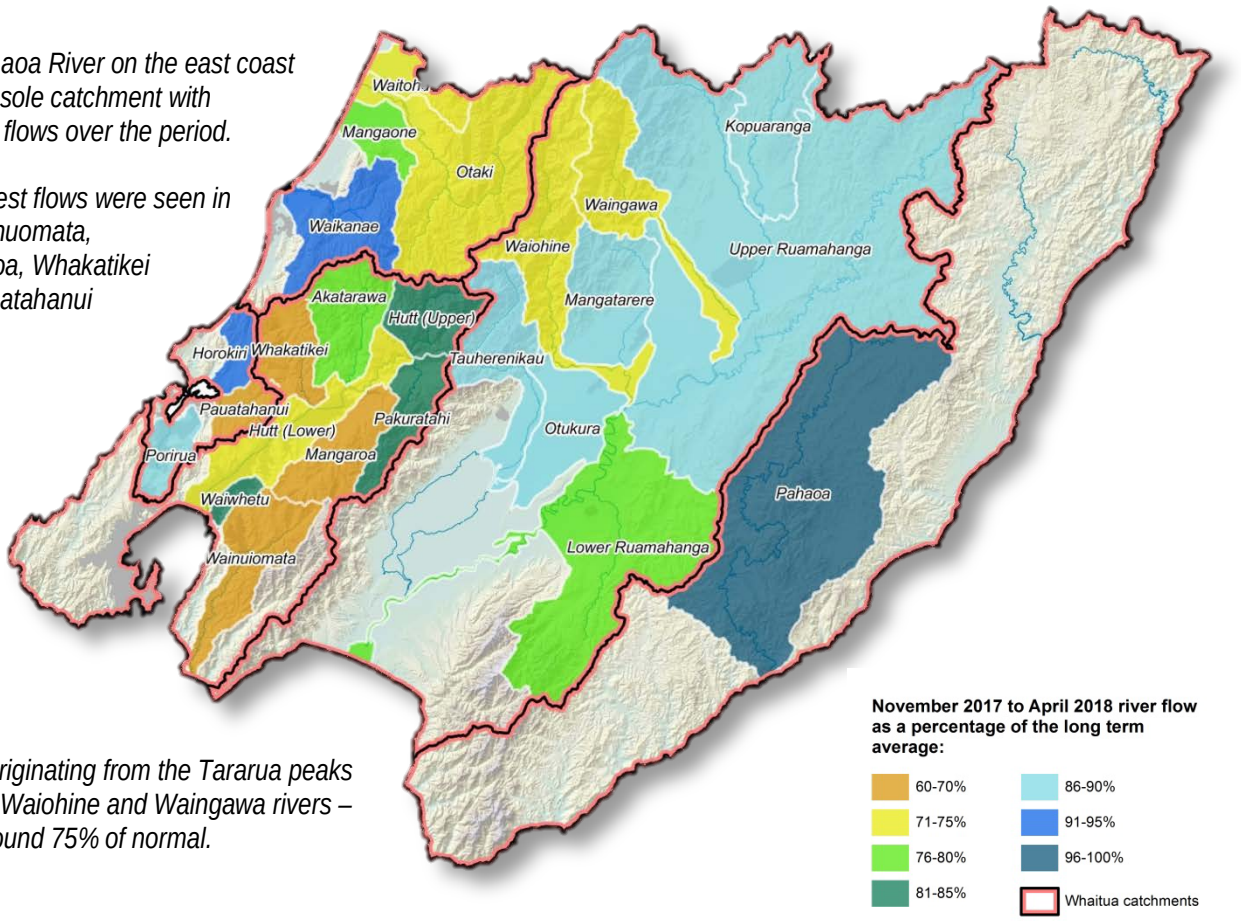
River flow

The map below shows the average river and stream flow conditions between November and April, for various monitored catchments, as a percentage of the long-term average flow over this period.

The entire region experienced largely below average flows during November to April with only one monitored river site, in the Pahaoa catchment, registering 100% of normal.

The Pahaoa River on the east coast was the sole catchment with average flows over the period.

The lowest flows were seen in the Wainuomata, Mangaroa, Whakatikei and Pauatahanui rivers.



Rivers originating from the Tararua peaks – Otaki, Waiohine and Waingawa rivers – were around 75% of normal.

A cracking start to summer

After a pretty wet three months from July to September 2017 the tap just appeared to turn off on the rainfall and October, November and December turned into very dry and warmer than average months.

Rainfall records tumbled in November and December.

November:

- Karori 2nd lowest since 1879
- Wainuiomata LOWEST since 1890
- Tauherenikau LOWEST since 1963
- Longbush LOWEST since 1947
- Otaki 3rd lowest since 1893

December:

- Paraparaumu LOWEST since 1945
- Waikanae 2nd lowest since 1969
- Tararua Range LOWEST since 1974

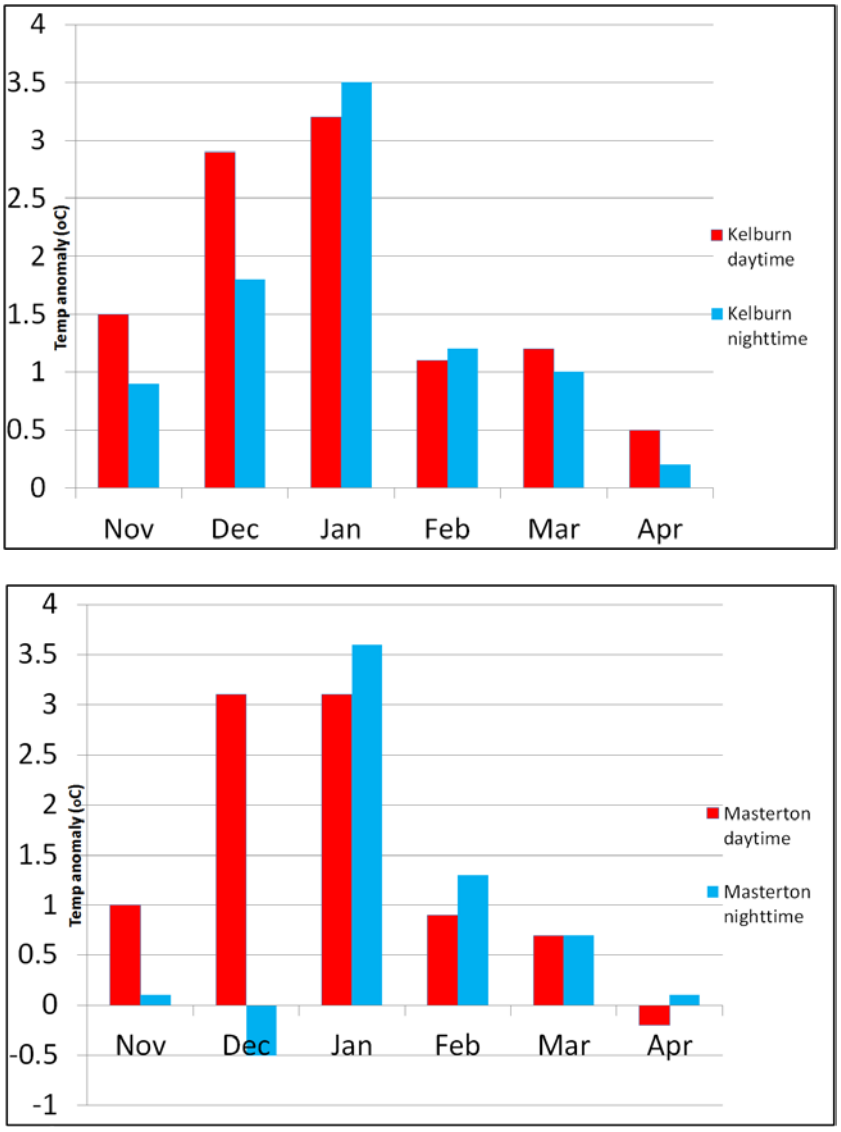
And hot! - the number of days with temperature over 25°C (Nov-Apr); Kelburn - 18, Wgtn Airport - 28, Upper Hutt - 30, Porirua - 21, Paraparaumu - 27, Martinborough - 59, Masterton - 64.

The early conditions prompted the Government to officially declare a drought ('medium range adverse event') across Wellington, Porirua, Lower Hutt, Upper Hutt and Kāpiti Coast on 23rd December.

Air temperatures

Air temperature is measured at a number of meteorological monitoring sites across the region. It is useful to look at the anomalies (i.e., departures from normal) in average temperatures month by month, in order to understand the climate anomalies.

The graphs below show the monthly average daytime maximum and average nighttime minimum temperature anomalies (i.e., based on every day of the month) for Kelburn (upper panel) and Masterton (lower panel). We can see that the warm season was much hotter than normal. For Wellington, this was the hottest six month period since 1935. This means that anyone younger than 82 years old has never experienced a warm season comparable or hotter than the 2017-2018 season!



Average daytime and nighttime temperature anomalies for Kelburn (top) and Masterton (bottom) for the warm season period. Very large positive (warm) anomalies were observed over the period, especially in Dec and Jan.

SOURCE: Data from MetService meteorological stations.

Global climate drivers

Climate variability and climate change

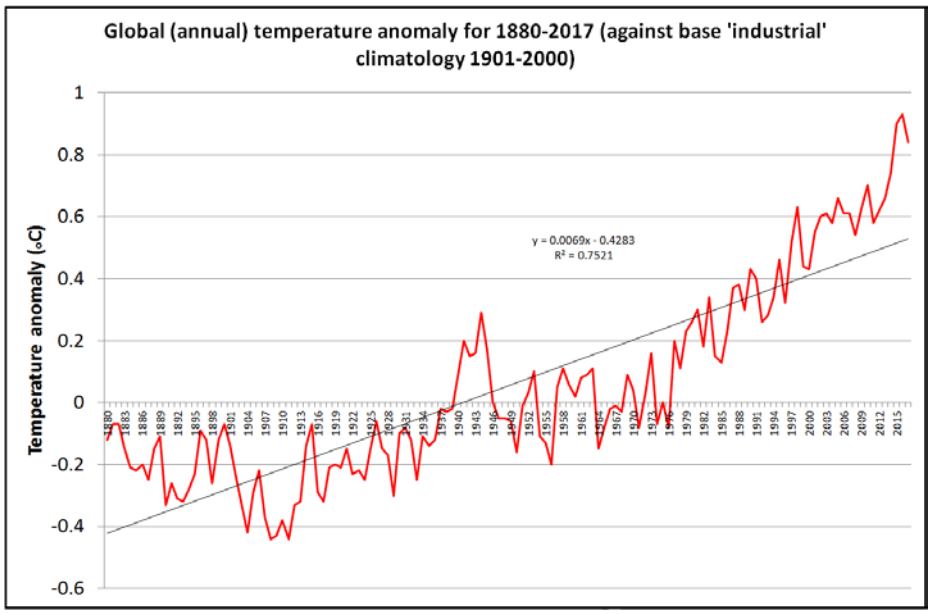
People often ask if the variable weather patterns in our region are a result of climate change. While natural climate variability has always been quite pronounced in our region, weather extremes are expected to get worse as a result of human-induced climate change and "global warming" caused by greenhouse gas emissions (http://www.royalsociety.org.nz/expert-advice/papers/yr2016/climate-change-implications-for-new-zealand/).

Some key observations about climate variability and change in our region during the period November 2017 to April 2018:

- The six-month period was the hottest on record for Wellington since 1935. In January, temperature anomalies of almost four degrees were observed in both Wellington and the Wairarapa. January 2018 was the hottest month ever measured in New Zealand by a significant margin, considering all long-term records available for over 100 years.
- Globally, the calendar year 2017 was the third hottest on record. The rate of global warming has more than doubled after the mid-1970s and continues to increase faster than the linear fit (see figure below)
- The sea surface temperatures (following page) have been much warmer than normal around New Zealand, with a marine heat wave present during most of summer and a weak La Niña in the Equatorial Pacific
- A series of high pressure anomalies propagated over New Zealand and remained stationary east of the country, blocking the westerlies and preventing the normal progression of fronts (positive Southern Annual Mode)
- A couple of ex-Tropical cyclones had a major influence with only a short break in between them in February, with record rainfall totals in some areas and significant damage on the Kāpiti coast due to coastal inundation.

Global Land and Ocean annual temperature anomalies 1880-2017.

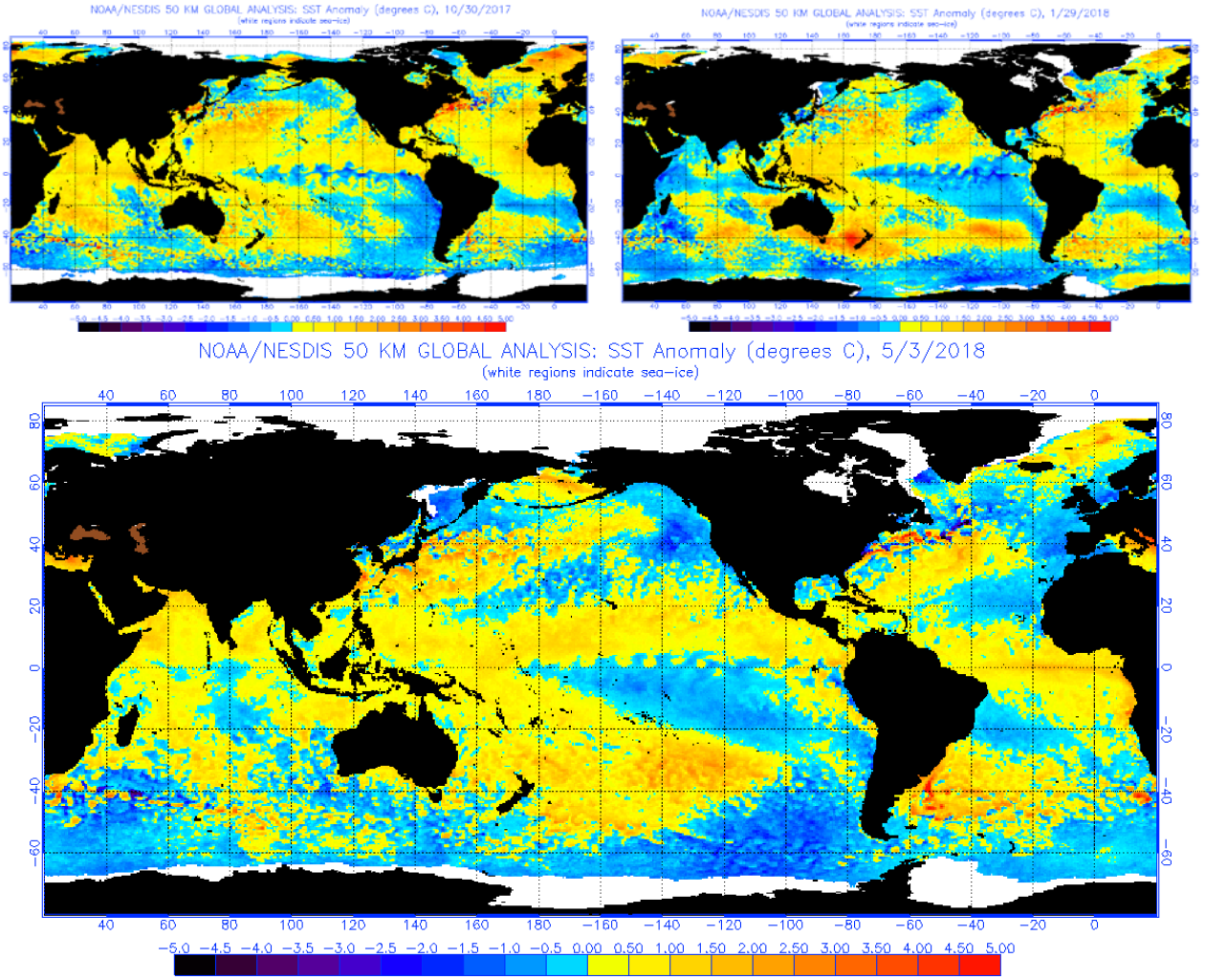
Source: NOAA (USA).



2016 was the hottest year on record, followed by 2015 and 2017. The temperature anomalies are calculated in respect to the 20th century 'industrial' average, showing a global anomaly of about 0.82°C in 2017. The trendline shows a linear warming of about 0.7°C per century, explaining about 75% of the total variance of the time series. Since the late 70s the rate of warming has more than doubled, sitting at almost 2°C per century

Global climate drivers and extreme weather events

Climate drivers are global mechanisms that can influence the weather in our region. The El Niño/Southern Oscillation[1] (ENSO) phenomenon remains neutral despite a weak La Niña signature during January (right hand side panel below). The sea ice extent (in white) has been below average during summer, being barely discernible in January (right). A marine heat wave around New Zealand (darker red) is also seen in January (top right).

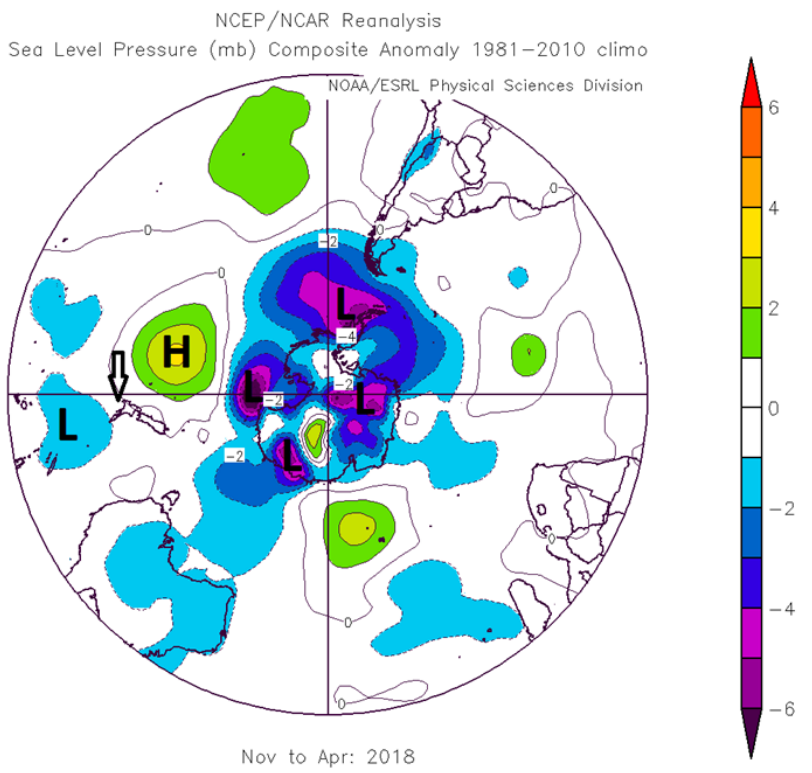


Sea surface temperature anomalies on 30th Oct 2017 (left), 29th Jan 2018 (right) and 3rd May 2018 (bottom). Warm waters around NZ are seen during the whole period, with a marine heatwave visible in January as one of the hottest anomalies on the planet. A weak La Niña is also seen in the Equatorial Pacific, while the sea ice around Antarctica (white) appears much depleted in January. Source: NOAA/USA.

The pressure anomalies over the six month period show two fundamental climate systems affecting New Zealand (see figure on next page). Firstly, a high pressure anomaly to the east (H) and a low to the north (L) of New Zealand helped produce warm and humid north-easterly winds (shown by the arrow), blocking the westerlies and reducing the influence of cold fronts. This pair of low and high pressure anomalies was boosted by La Niña, while enhancing the local marine heatwave by

[1] https://www.niwa.co.nz/education-+-and-training/schools/students/enln

promoting heat transport from the north. Secondly, anomalous lows around Antarctica (representing the positive phase of the Southern Annual Mode) also helped produce warm and stable weather patterns around New Zealand, via confining the westerlies to the south. The combination of northerly winds and warm water also meant that the atmospheric humidity was much higher than normal, with increased occurrence of thunderstorms and ex-tropical cyclone influences, as discussed below.



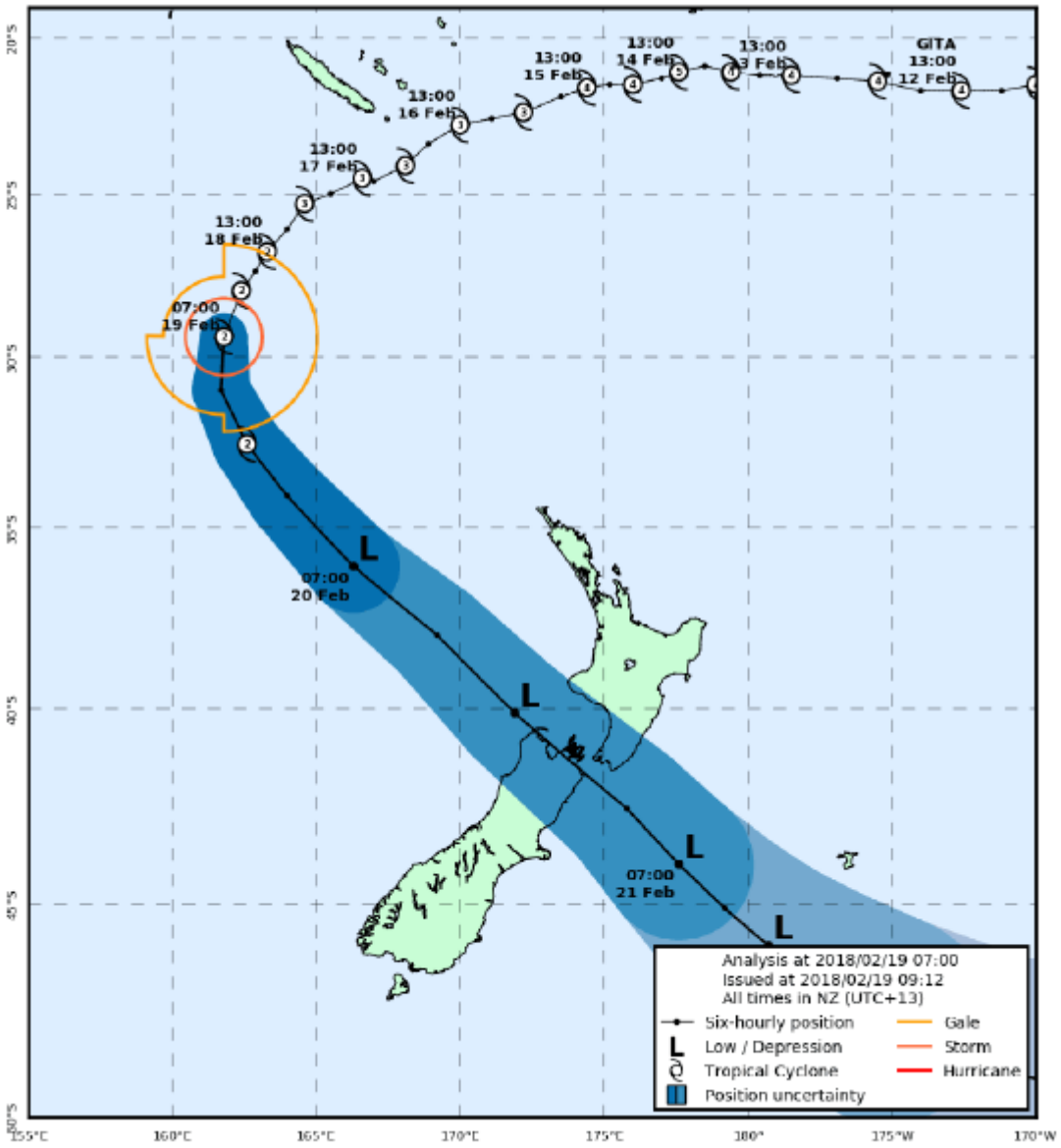
Mean sea level pressure anomaly between November 2017 and April 2018.

Low pressure anomalies to the south (as shown by the L) largely corresponded to a persistent positive phase of the Southern Annular Mode (SAM), which tends to bring warm stable weather to New Zealand during the warm season.

The pair of anomalous high and low pressure areas around New Zealand was strengthened by La Niña, and strengthened the marine heatwave around the country. The arrow shows the prevailing wind anomalies, as a result of the two pressure systems, that helped block the normal westerly flow, reducing the influence of cold fronts from the south.

Tropical influences

The warm season (November to April) also corresponds to the formal tropical cyclone season in the South Pacific. On average, New Zealand is expected to be directly affected by at least one ex-tropical cyclone each season (within a distance less than 550 km), so a minimum of two cyclones affecting the country means an 'above average' season. Two ex-tropical cyclones affected New Zealand during the 2017-2018 season, with both making direct landfall on the South Island in February, and causing significant damage. Ex-TC Fehi crossed the southern part of the South Island early in the month, causing over $39M in insurance costs. Ex-TC Gita (see figure on the next page) made landfall near Nelson around the 20th, with a serious threat to our region and also causing significant damage on the west coast of both islands. Final insurance costs for Gita are yet to be released (refer to contents cover for photos and description of damage due to coastal inundation on the west coast)



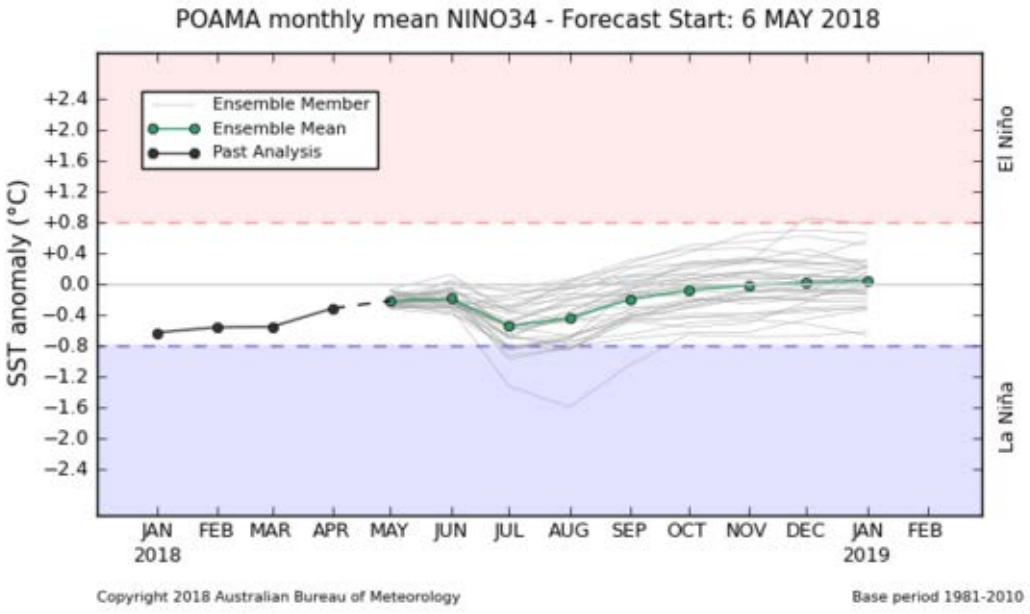
Predicted trajectory of ex-TC Gita during the final approach towards New Zealand, leaving Wellington within the position uncertainty area of risk. The actual observed path was very close to this prediction. Source: MetService.

Seasonal climate outlook update

The ENSO phenomenon is expected to remain neutral for the remainder of the year, with only a couple of models suggesting the possibility of an El Niño forming (see below). Thanks to the influence of ex-tropical cyclones and a very wet summer and autumn, most of the soil moisture across the region remains above average at the time of publication.

The sea surface temperature anomalies around New Zealand remain warmer than average for the most part, although not as strong as they were previously. In the absence of any strong signal coming from the climate drivers, the odds favour normal conditions during winter, with average atmospheric temperatures still tending to remain on the warm side.

The full climate outlook for winter will be released with our regular seasonal briefing by mid-June.



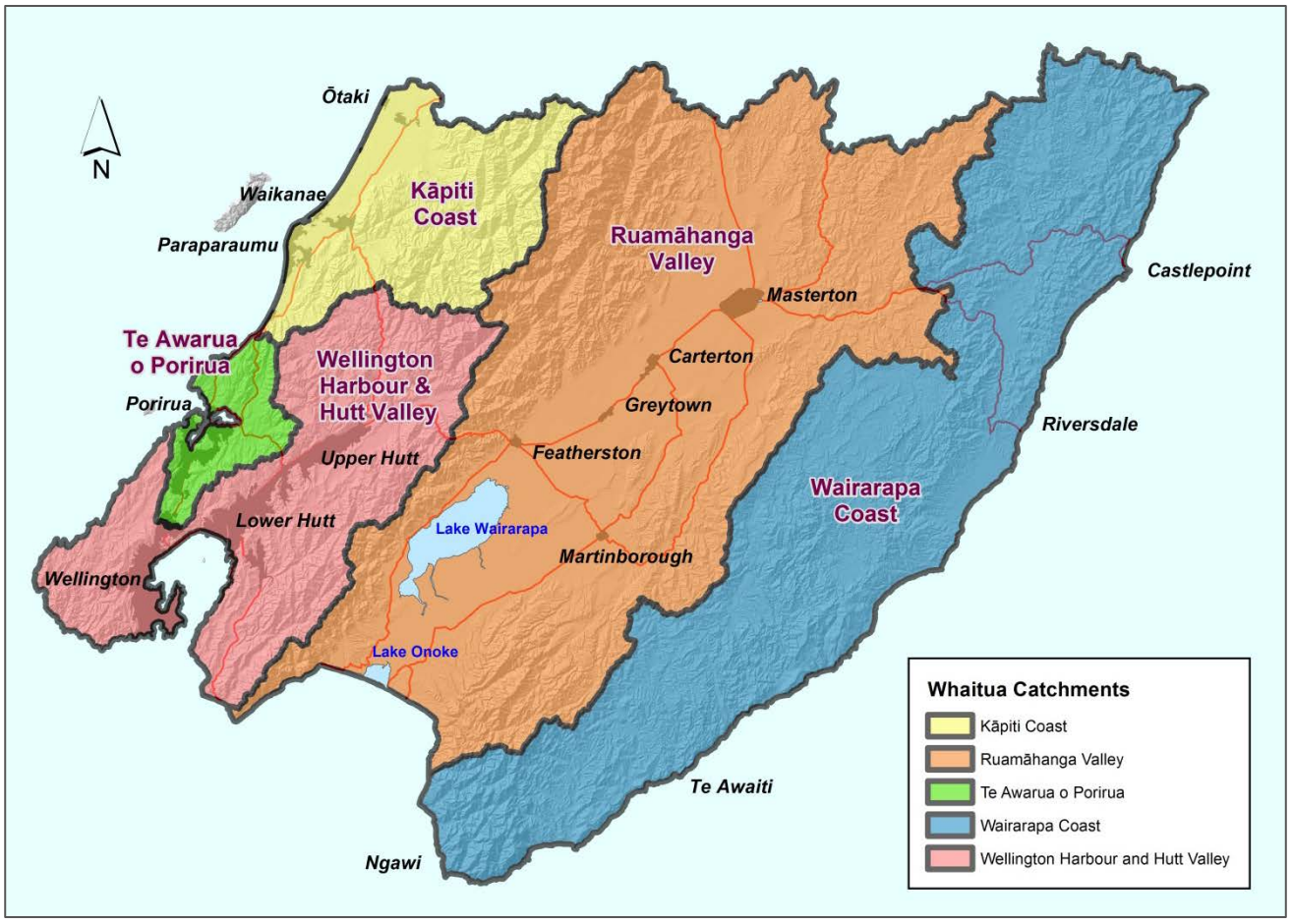
ENSO predictions as of 6 May 2018, showing a continuation of neutral conditions predicted for the remaining of the year. *Source: BOM (Australia)*

What happened in each whaitua catchment?

Climate and water resource summaries are provided in the following sections for each of the five Wellington region whaitua catchment areas (as shown below). The whaitua catchments provide an important sub-regional basis for environmental management in the Wellington region[2], and roughly coincide with the different climate and water resource zones.

Click the following links for November 2017 to April 2018 summaries for:

- Wellington Harbour and Hutt Valley
- Te Awarua-o-Porirua
- Kāpiti Coast
- Ruamāhanga Valley
- Wairarapa Coast



Map of the five whaitua catchment areas in the Wellington region. Each whaitua roughly coincides with a climatic zone, expressing the marked east-to-west contrast that we experience in our region.

[2] http://www.gw.govt.nz/whaitua-committees/

Wellington Harbour and Hutt Valley climate summary

- **Total rainfall tended slightly below average in Wainuiomata, about average across the Hutt valley, and slightly above average over Wellington**
- **Record breaking monthly mean and maximum temperatures**
- **Very dry November and dry December coincided with water treatment upgrades to set the scene for water restrictions from late November to 9 February**
- **Number of days over 25°C; Kelburn – 18, Wgtn Airport – 28, Upper Hutt - 30**

November very dry!

During November rainfall totals across the area were well below average:

- Karori 19% - 2nd lowest since 1879
- Wainuiomata 21% - LOWEST since 1890
- Kaitoke 31% - 4th lowest since 1951
- Lower Hutt 23%

Extra wet February

Karori 187mm (250%) 6th highest since 1879
Lower Hutt 172mm (240%)
Kaitoke 280mm (222%) 3rd highest since 1952

Ex-Tropical cyclone Gita

Storm surge smashed into Makara Beach, with waves flooding houses, damaging properties and leaving a trail of logs, rocks and sand

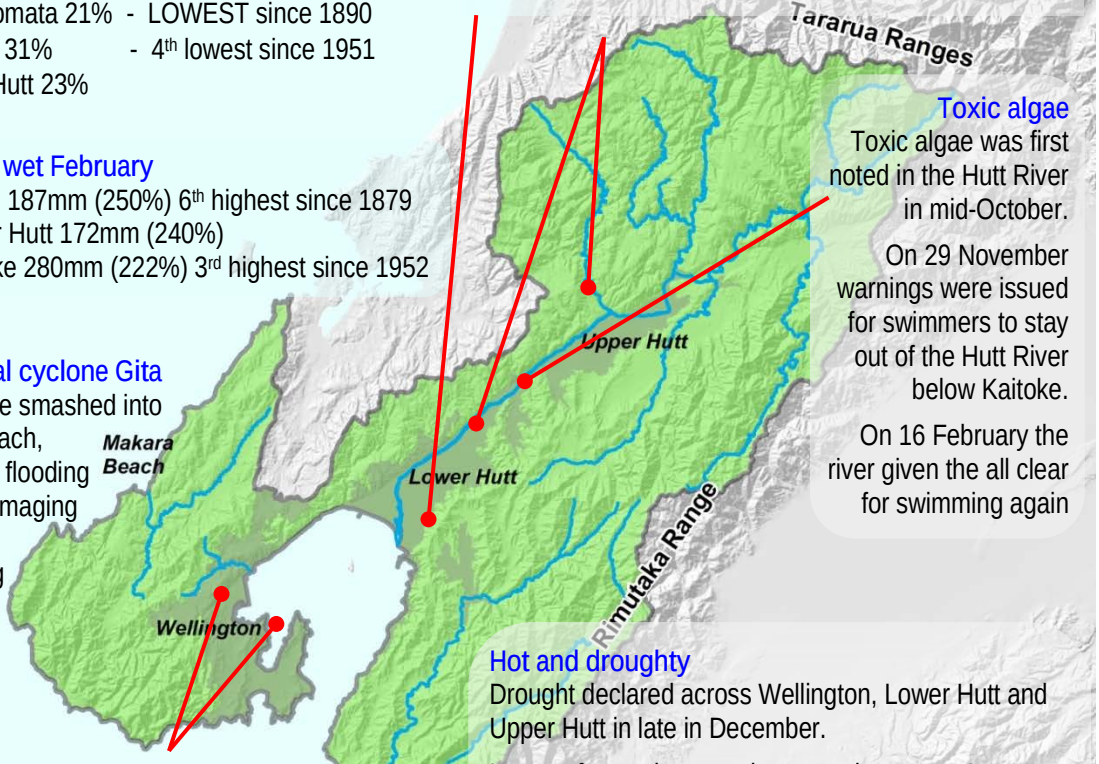
Record MEAN and MEAN MAXIMUM temperatures:

December:	Kelburn 2nd highest Wgtn Airport HIGHEST
January:	Kelburn HIGHEST Wgtn Airport HIGHEST

Kelburn since 1927 Wgtn Airport since 1962

River flows

- Flows 60-80% of average for the six month period.
- Hutt River had its lowest average Nov to Dec flow since records started in 1979 (29% of normal)



Toxic algae

Toxic algae was first noted in the Hutt River in mid-October.

On 29 November warnings were issued for swimmers to stay out of the Hutt River below Kaitoke.

On 16 February the river given the all clear for swimming again

Hot and droughty

Drought declared across Wellington, Lower Hutt and Upper Hutt in late in December.

Largest fans sales growth across the country!

The Zoo used blood iceblocks and snow parties to keep animals cool. Red pandas had sprinklers and fans in their cages.

A true reflection the summer heat was the successful harvest of a pineapple in Miramar!

Want to look at the summary tables and graphs?

- Rainfall
- River flows

Te Awarua-o-Porirua climate summary

- **Much drier than average until early January**
- **Very wet February, March and April**
- **Garden watering restrictions in place almost the whole summer**

Early summer stream flow well below average

November:

- Porirua 46% - 5th lowest since 1965
- Pauatahanui 34% - 2nd lowest since 1976

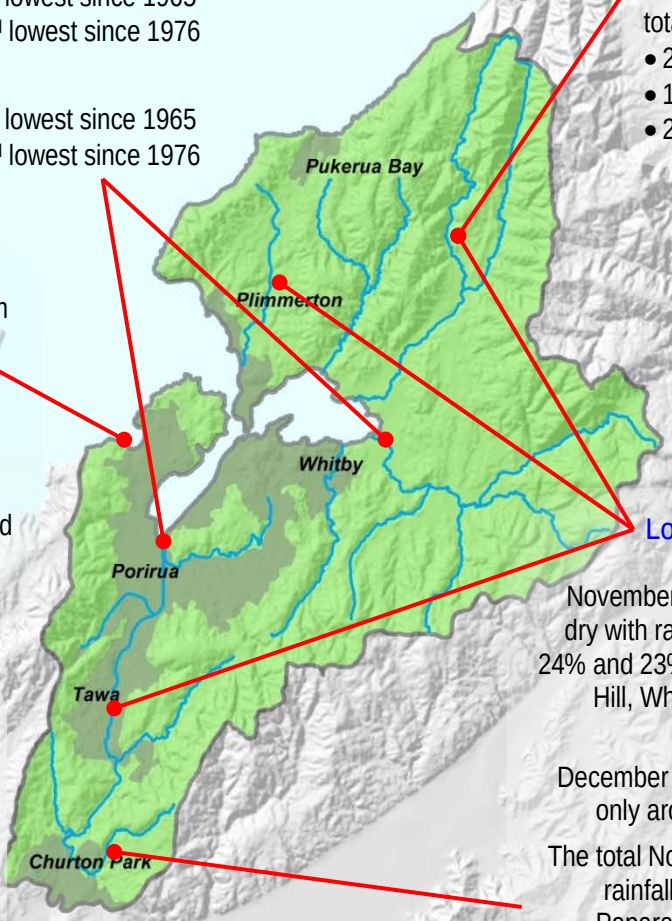
December:

- Porirua 45% - 4th lowest since 1965
- Pauatahanui 30% - 2nd lowest since 1976

Battle Hill heavy rain

Three days with rainfall totals over 50mm;

- 22 March (65mm)
- 10 April (64mm)
- 20 February (60mm)



Ex-tropical cyclone Gita

On 22 February, a large storm surge and high tide smashed into the coast flooding and damaging a number of boat sheds at Titahi Bay.

One day rainfall totals of 78mm and 74mm at Tawa and Paparangi

Low rainfall November and December

November conditions were very dry with rainfall being only 32%, 24% and 23% of average at Battle Hill, Whenua Tapu and Tawa respectively.

December rainfall was also low - only around 50% of average.

The total November to December rainfall of 56mm recorded at Paparangi was the LOWEST since records started in 1981

Dry. So dry. For a bit anyway

Garden watering restrictions were imposed in late November and not lifted until 9 February. Very dry conditions and hot temperatures caused demand to outstrip supply.

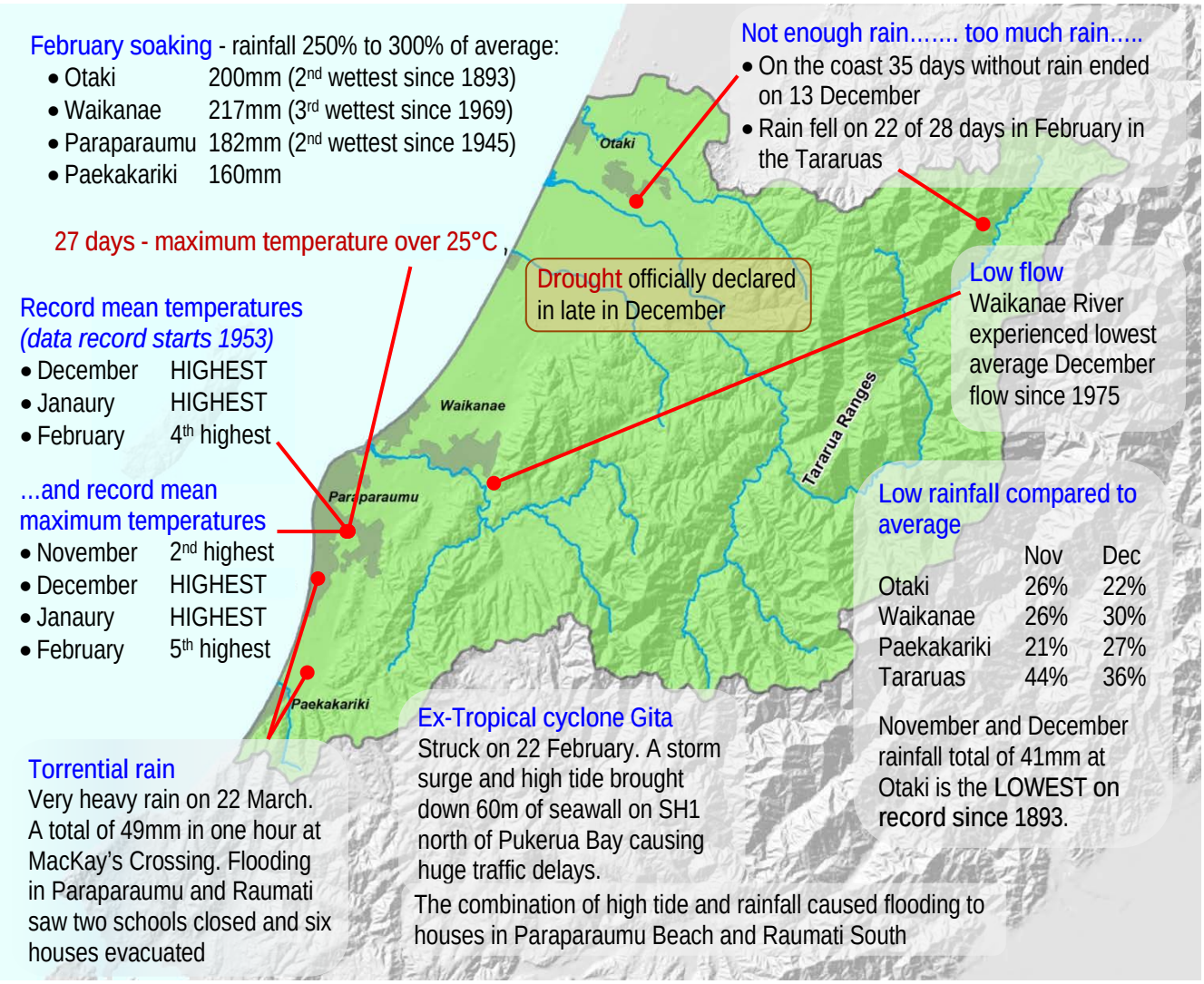
- Porirua had 21 days where maximum temperature was over 25°C.
- Drought declared across Porirua in late December.

Want to look at the summary tables and graphs?

- Rainfall
- River flows

Kāpiti Coast climate summary

- **Rainfall balanced out to be around average for the entire period**
- **But characterised by:**
  - **very dry conditions in November and December**
  - **very wet February and March**
- **Record high temperatures in December and January**



Want to look at the summary tables and graphs?

- Rainfall
- River flows

Ruamāhanga Valley climate summary

- **Very dry conditions in November and December**
- **Summer temperatures high and record breaking**
- **February was very wet – over 200% of normal rainfall everywhere**

Low Tararua rainfall leading into summer

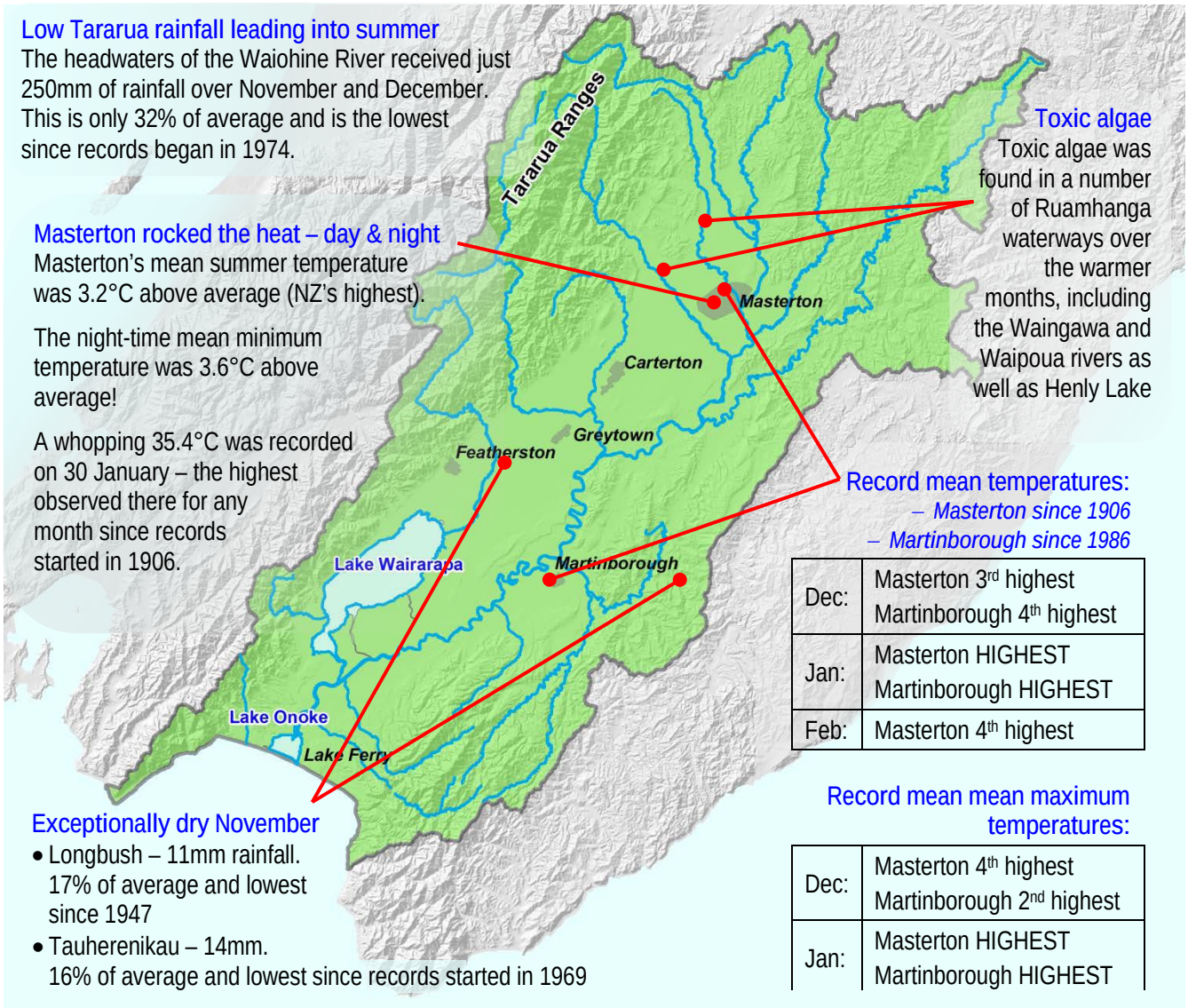
The headwaters of the Waiohine River received just 250mm of rainfall over November and December. This is only 32% of average and is the lowest since records began in 1974.

Masterton rocked the heat – day & night

Masterton's mean summer temperature was 3.2°C above average (NZ's highest).

The night-time mean minimum temperature was 3.6°C above average!

A whopping 35.4°C was recorded on 30 January – the highest observed there for any month since records started in 1906.



Toxic algae

Toxic algae was found in a number of Ruamhanga waterways over the warmer months, including the Waingawa and Waipoua rivers as well as Henly Lake

Record mean temperatures:

– Masterton since 1906
– Martinborough since 1986

Dec:	Masterton 3rd highest Martinborough 4th highest
Jan:	Masterton HIGHEST Martinborough HIGHEST
Feb:	Masterton 4th highest

Exceptionally dry November

- Longbush – 11mm rainfall. 17% of average and lowest since 1947
- Tauherenikau – 14mm. 16% of average and lowest since records started in 1969

Record mean mean maximum temperatures:

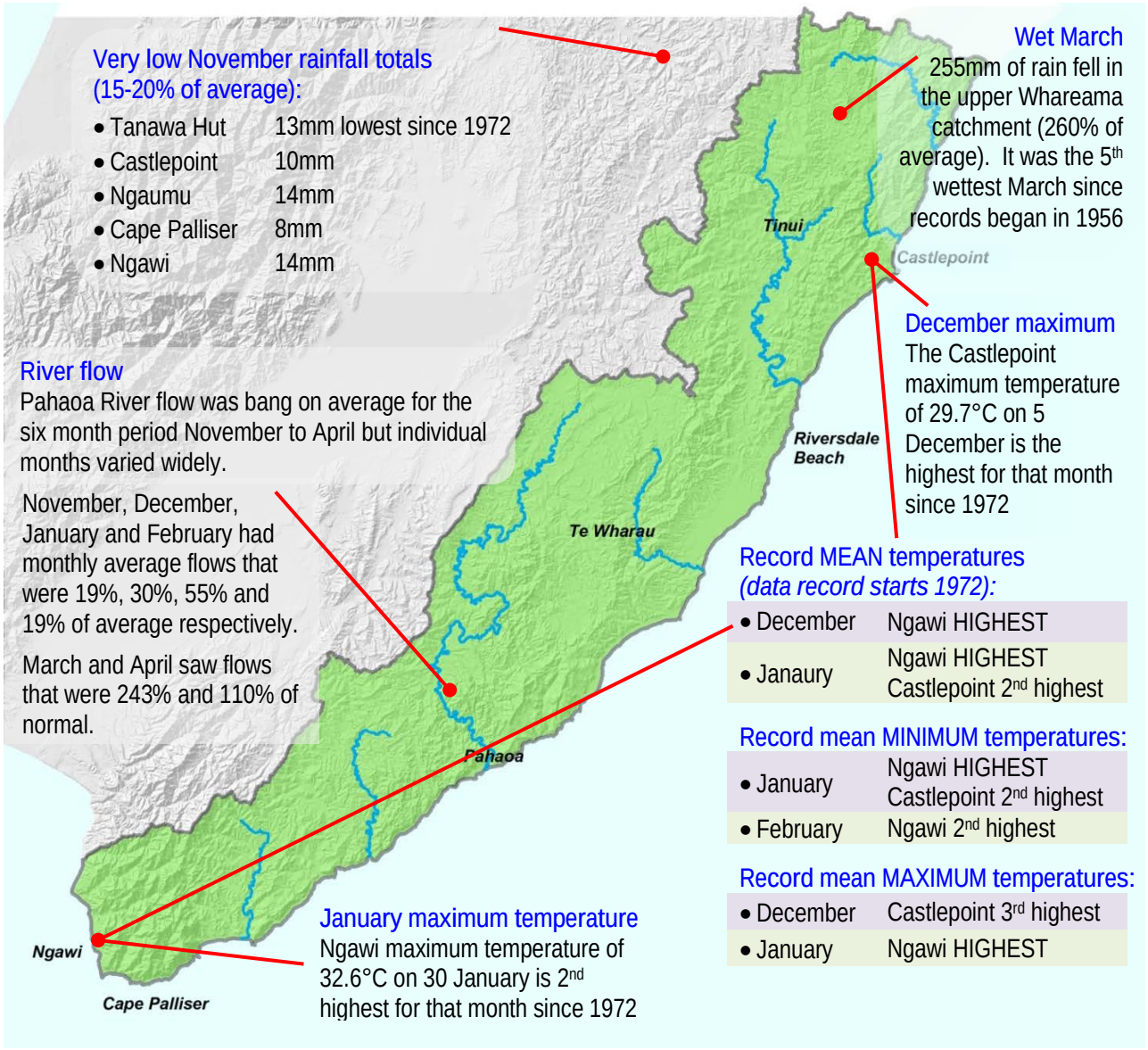
Dec:	Masterton 4th highest Martinborough 2nd highest
Jan:	Masterton HIGHEST Martinborough HIGHEST

Want to look at the summary tables and graphs?

- Rainfall
- River flows

Wairarapa Coast climate summary

- **Exceedingly low November rainfall**
- **Temperature records broken**
- **Very wet March**



Want to look at the summary tables and graphs?

- Rainfall
- Soil moisture

Rainfall statistics

Rainfall was highly variable over the six months November to April, but ended up around average to slightly above average overall

November and December had well below average rainfall across the region. In contrast, February and March were exceptionally wet with some areas getting over 300% of the normal February rainfall

Whaitua	Location	Nov %	Dec %	Jan %	Feb %	Mar %	Apr %	Nov-Apr (mm)	Nov-Apr (%)
Wellington Harbour & Hutt Valley Click to see cumulative rainfall plots	Kaitoke	31	54	67	222	113	103	879	90
	Lower Hutt	23	39	113	236	103	140	514	103
	Wainuiomata	21	37	104	131	56	117	564	76
	Karori	19	68	113	248	134	129	600	115
	Wellington	14	65	108	288	139	128	465	117
Te Awarua-o-Porirua Click to see cumulative rainfall plots	Battle Hill	32	44	88	323	157	137	620	117
	Whenua Tapu	24	52	82	197	132	157	467	104
	Tawa	23	45	107	393	117	162	507	114
Kāpiti Coast Click to see cumulative rainfall plots	Otaki	26	22	109	265	193	152	561	117
	Waikanae	26	30	78	239	136	152	604	104
	Paekakariki	21	27	96	268	254	149	599	117
	Tararua (Otaki headwaters)	44	36	80	206	127	104	2148	92
Ruamāhanga Click to see cumulative rainfall plots	Masterton	14	94	153	223	186	155	457	135
	Featherston	16	63	194	218	97	147	471	114
	Longbush	17	94	142	265	118	151	546	126
	Tararua (Waiohine headwaters)	36	27	105	219	110	120	2676	94
Wairarapa Coast Click to see cumulative rainfall plots	Tanawa Hut	18	89	98	85	258	125	598	118
	Ngaumu	17	98	113	119	139	117	432	101

Click the following links to return to climate summaries for:

- Wellington Harbour & Hutt Valley
- Te Awarua-o-Porirua
- Kāpiti Coast
- Ruamāhanga
- Wairarapa Coast

Cumulative rainfall plots

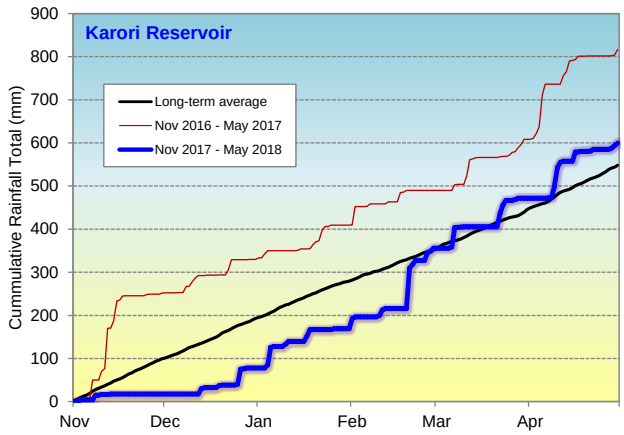
Cumulative rainfall totals for the November 2017 to April 2018 period are detailed for various rain gauges sites across the regional whaitua areas as denoted by the blue trace on the following plots. The November 2016 to April 2017 period is denoted by the red trace and the black trace represents the long-term average rainfall accumulation.

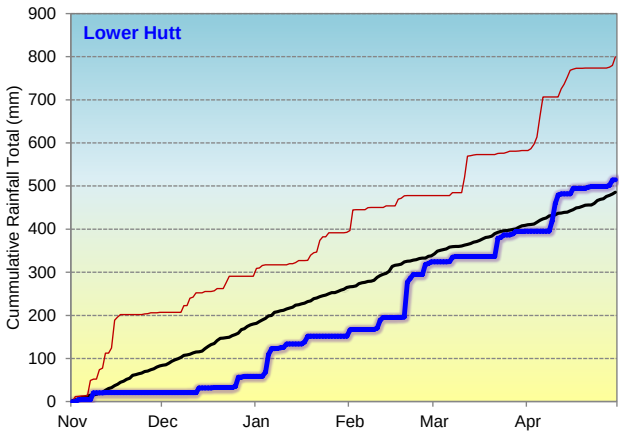
Wellington and Hutt Valley

The plots highlight that the rainfall accumulation during the November to April period was around average.

The exceptionally dry period of November and December is evident, causing the accumulation to track well below average until February when large rainfalls brought it back to near average.

Rainfall in Karori and Lower Hutt during November to April was over 200mm less than the previous year



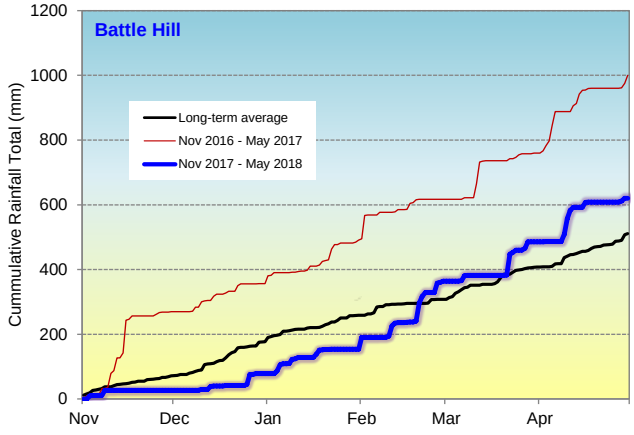


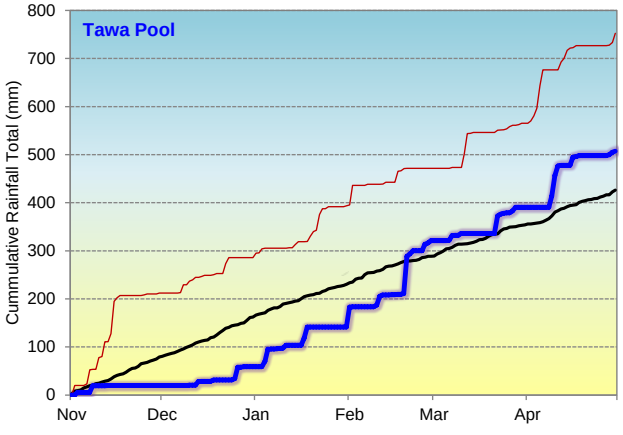
Porirua Harbour

The plots show that the rainfall accumulation trends in the November to April period at the two sites within the Te Awarua-o-Porirua whaitua area were quite similar, with rainfall totals ending up around 115% of average.

November and December rainfall was very low while February, March and April show sharp increases due to heavy rainfall events.

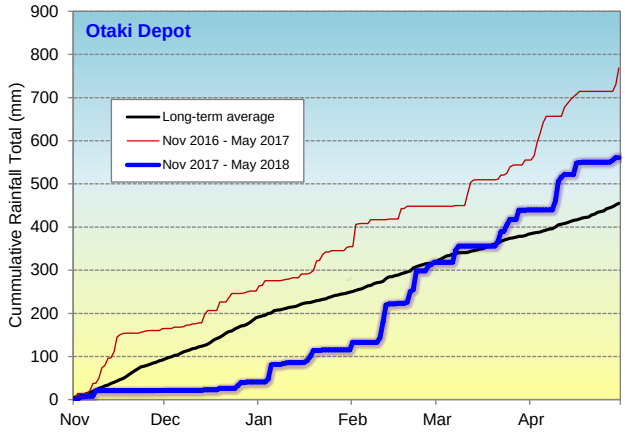
Rainfall for the period was 33% and 40% less than the previous year at the Tawa Pool and Battle Hill sites respectively.

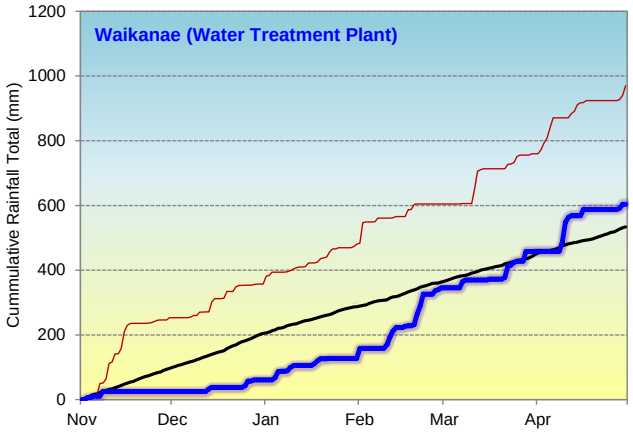




Kāpiti Coast

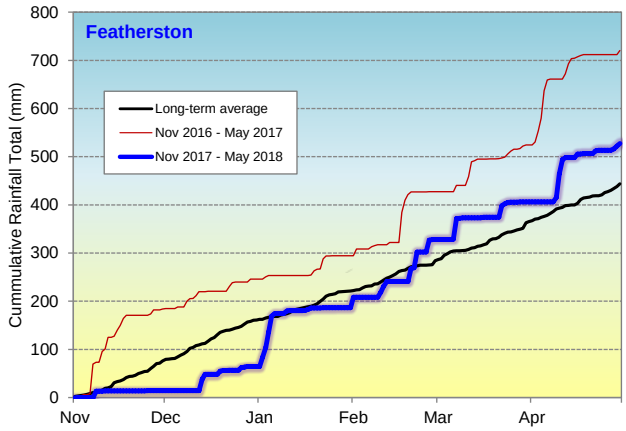
Rainfall recorded at Otaki and Waikanae over the November to April period was 121% and 113% of average respectively. Rainfall at Waikanae was 366mm lower than the same period in 2016/17.

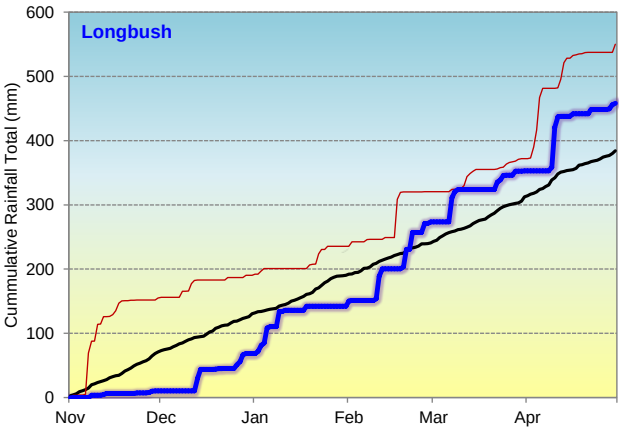




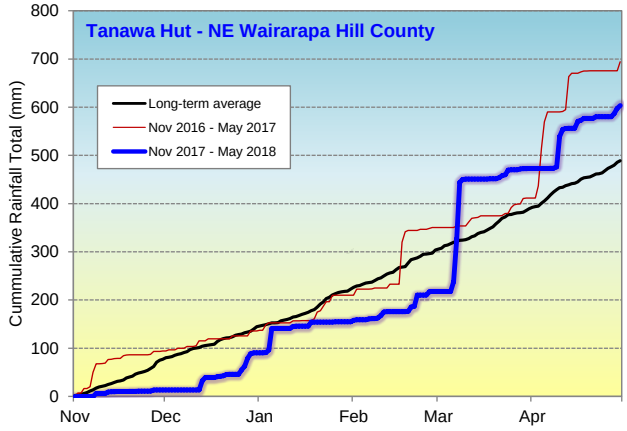
Ruamāhanga

The contrast between the start to this 2017/18 period and that of 2016/17 is evident in the two rainfall accumulation traces. November and December 2017 were exceptionally dry. The November to April totals were about 120% of average at both Featherston and Longbush.





Wairarapa Coast



The Tanawa Hut rain gauge in the Wairarapa Coast area showed a similar rainfall accumulation trend as most other areas, starting out with a very dry November and December.

There was also relatively dry spell through mid-January to early March before over 200mm of rain was recorded over three days causing a sharp rise in the accumulation trace.

River flows - averages

Percentage of average river flow for each month and whole of the November 2017 to April 2018 period.

Flows across the region were slightly below normal for the entire warm season. However, the table shows month to month variation was large with November and December very low and February and March very high

		Flow as a percentage of average						
Whaitua	River	Nov	Dec	Jan	Feb	Mar	Apr	Nov-Apr
Wellington Harbour & Hutt Valley	Hutt River - Kaitoke	33	19	52	188	122	138	81
	Hutt River - Taita Gorge	27	17	44	146	120	143	72
	Akatarawa River	43	20	33	152	143	145	80
	Mangaroa River	23	18	60	100	71	149	63
	Waiwhetu Stream	53	51	65	116	75	149	82
	Wainuiomata River	30	26	59	93	53	156	62
Te Awarua-o-Porirua	Porirua	43	43	92	164	102	133	89
	Pauatahanui	34	30	49	104	85	163	70
	Horokiri	31	36	48	75	174	277	92
Kāpiti Coast	Waitohu	27	15	57	190	109	149	72
	Otaki	35	13	47	187	108	133	73
	Mangaone	33	25	43	134	155	209	76
	Waikanae	36	20	36	194	185	222	94
Ruamāhanga	Kopuaranga	26	29	110	41	220	146	87
	Waingawa	28	13	67	132	113	131	73
	Waiohine	31	15	54	153	113	123	72
	Mangatarere	28	19	103	116	175	132	87
	Tauherenikau	31	21	86	176	133	129	87
	Otukura	46	33	71	117	155	146	87
	Ruamāhanga	31	15	74	121	143	136	79
Wairarapa Coast	Pahaoa	19	30	55	19	243	109	100

Click the following links to return to climate summaries for:

- Wellington Harbour & Hutt Valley
- Te Awarua-o-Porirua
- Kāpiti Coast
- Ruamāhanga
- Wairarapa Coast

River flows – lowest

Minimum river and stream flows recorded during the November 2017 to April 2018 period. The estimated return period is given for each event.

Whaitua	River	Minimum Flow		
		Flow (m^3/s)	**Date**	**Return Period (years)**
Wellington Harbour & Hutt Valley	Hutt (Kaitoke)	1.103	19 December	5
	Hutt (Taita Gorge)	3.015	25 January	3
	Akatarawa	0.841	25 January	5
	Mangaroa	0.331	19 December	3
	Wainuiomata	0.160	3 February	3
Te Awarua-o-Porirua	Porirua	0.161	18 December	2
	Pauatahanui	0.100	3 February	2
	Horokiri	0.091	4 February	1
Kāpiti Coast	Waitohu	0.123	29 December	4
	Otaki	3.601	18 December	5
	Mangaone	0.087	18 December	1
	Waikanae	0.888	28 December	3
Ruamāhanga	Kopuaranga	0.328	19 December	2
	Waingawa	0.939	19 December	10
	Waiohine	2.592	19 December	8
	Mangatarere	0.164	19 December	2
	Tauherenikau	1.168	19 December	2
	Otukura	0.072	24 January	1
	Ruamāhanga (Upper)	2.018	19 December	5
	Ruamāhanga (Lower)	6.973	19 December	5
Wairarapa Coast	Pahaoa	0.086	4 February	1

** Analyses have been completed on provisional data which may be subject to change once it is processed and archived.*

Click the following links to return to climate summaries for:

- Wellington Harbour & Hutt Valley
- Te Awarua-o-Porirua
- Kāpiti Coast
- Ruamāhanga
- Wairarapa Coast

River flows – highest

Maximum river and stream flows recorded during the November 2017 to April 2018 period. The estimated return period is given for each event.

Whaitua	River	Maximum Flow		
		Flow (m^3/s)	Date	Return Period (years)
Wellington Harbour & Hutt Valley	Hutt (Kaitoke)	174	22 February	1
	Hutt(Taita Gorge)	450	22 February	1
	Akatarawa	162	22 February	1
	Mangaroa	34	10 April	1
	Waiwhetu	6	20 February	1
	Wainuiomata	10	10 April	1
Te Awarua-o-Porirua	Porirua	20	1 February	1
	Pauatahanui	10	10 April	1
	Horokiri	6	10 April	1
Kāpiti Coast	Otaki	397	12 February	1
	Mangaone	5.5	12 February	1
	Waikanae	151	22 February	2
Ruamāhanga	Kopuaranga	33	8 March	1
	Waingawa	159	11 February	1
	Waiohine	288	1 February	1
	Mangatarere	24	8 March	1
	Tauherenikau	110	22 February	1
	Otukura	1.9	11 April	1
	Ruamāhanga (Upper)	199	8 March	1
	Ruamāhanga (Lower)	463	8 March	1
Wairarapa Coast	Pahaoa	223	8 March	1

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- Wellington Harbour & Hutt Valley
- Te Awarua-o-Porirua
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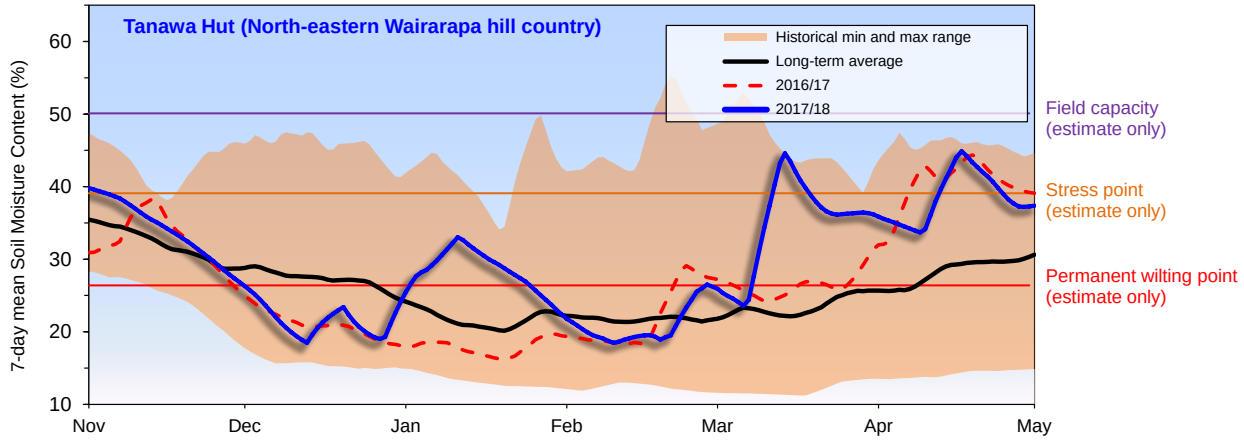
- Ruamāhanga
- Wairarapa Coast

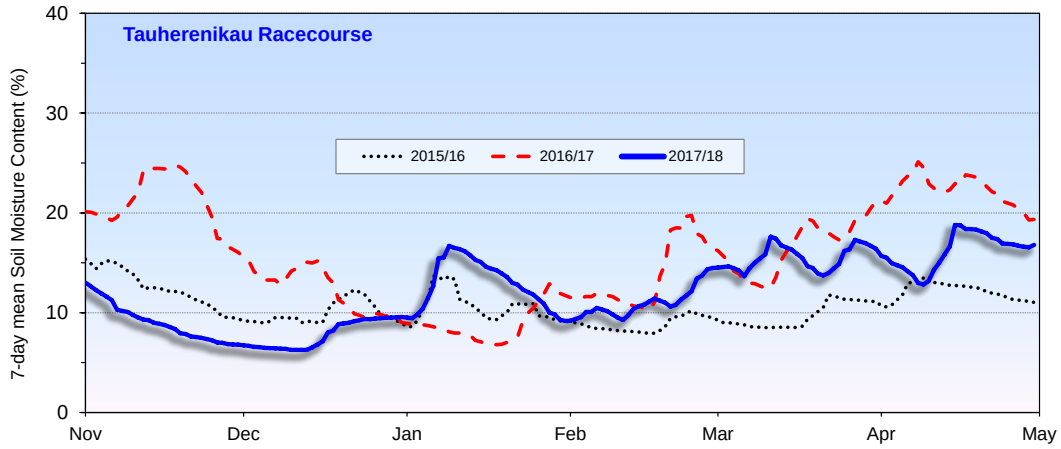
Soil moisture content

Wairarapa Coast

November 2017 to April 2018 soil moisture content at monitoring sites at Tanawa Hut in north-east Wairarapa (Wairarapa Coast whaitua) and Tauherenikau racecourse (Ruamāhanga whaitua) are plotted below.

Soil moisture at Tanawa Hutt started to get quite low during December before recovering and sitting around average until high rainfall in March and April brought the levels up. The levels at Tauherenikau started low in response to very dry conditions in November and December, before settling into an average range for the remainder of the warm season.





Drought monitoring

GWRC maintains a drought check webpage with regional anomaly maps and links to live data across the region:

http://www.gwrc.govt.nz/drought-check/

Climate Briefings

Additionally to the extended water resources reports, the Environmental Science department, GWRC, also produces seasonal updates specifically targeting the farming community. Those can be accessed from the main Climate and Water Resource webpage:

http://www.gw.govt.nz/seasonal-climate-and-water-resource-summaries-2/

The Greater Wellington Regional Council's purpose is to enrich life in the Wellington Region by building resilient, connected and prosperous communities, protecting and enhancing our natural assets, and inspiring pride in what makes us unique

For more information contact the Greater Wellington Regional Council:

Wellington office
PO Box 11646
Manners Street
Wellington 6142

04 384 5708

Upper Hutt office
PO Box 40847
Upper Hutt 5018

04 526 4133

Masterton office
PO Box 41
Masterton 5840

06 378 2484

Follow the Wellington Regional Council

info@gw.govt.nz
www.gw.govt.nz