greater WELLINGTON
REGIONAL COUNCIL
Te Pane Matua Taiao

Climate and Water Resource Summary for the Wellington Region

Winter 2015

Contents

Ruamahanga River at 'The Cliffs' near Masterton; A typical winter base flow on 18 June (left) and a 1 in 4 year flood flow two days later (right)

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

This report has been prepared by Environmental Science staff of Greater Wellington Regional Council (GWRC) and as such does not constitute Council policy.

In preparing this report, the authors have used the best currently available data and have exercised all reasonable skill and care in presenting and interpreting these data. Nevertheless, GWRC does not accept any liability, whether direct, indirect, or consequential, arising out of the provision of the data and associated information within this report. Furthermore, as GWRC endeavours to continuously improve data quality, amendments to data included in, or used in the preparation of, this report may occur without notice at any time. GWRC requests that if excerpts or inferences are drawn from this report for further use, due care should be taken to ensure the appropriate context is preserved and is accurately reflected and referenced in subsequent written or verbal communications.

Any use of the data and information enclosed in this report, for example, by inclusion in a subsequent report or media release, should be accompanied by an acknowledgement of the source.

Report release date: September 2015

Winter 2015 (June to August inclusive) was much wetter than average for the north western corner of the region, and generally a little drier than normal elsewhere with north-east Wairarapa being especially dry for this time of year.

Winter rainfall

Figure 1 shows the rainfall that occurred during Winter 2015 as a percentage of the long term average.

A general west to east rainfall gradient prevailed with parts of the Kapiti Coast receiving almost two times the normal rainfall while rainfall in north-east Wairarapa dipped to 50 percent of normal.

This is a continuation, albeit slightly less extreme, of the pattern observed in autumn 2015 and is consistent with the westerly air flow that predominates when an El Nino climate system is in force.

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 we call this a 'Rain Day'. Table 1 shows how many Rain Days occurred during winter in different parts of the region.

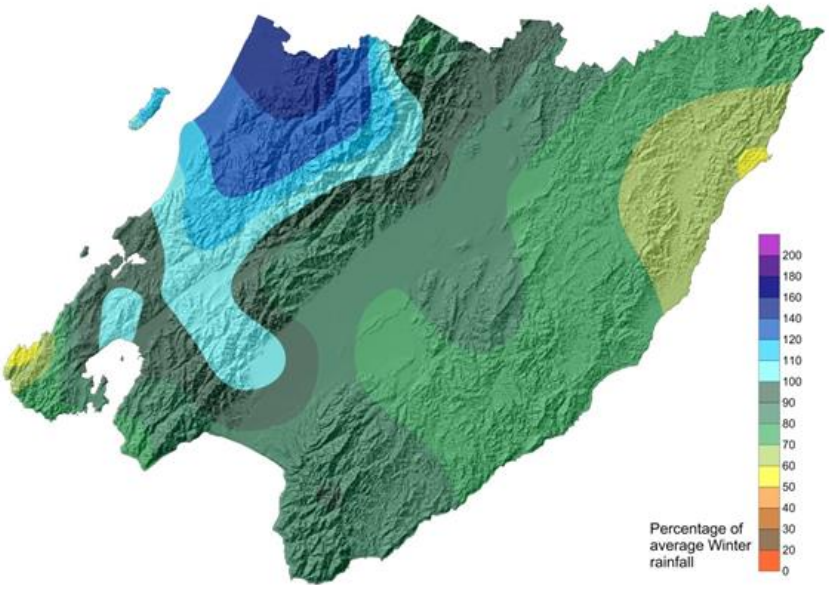


Figure 1: Winter 2015 rainfall as a percentage of the long-term average, showing an obvious contrast between the north west (above average rainfall) and the south and east (below average rainfall).

The number of Rain Days was a little higher than normal on the Kapiti Coast and below normal in the eastern Wairarapa. The frequency of Heavy Rain Days (more than 25mm of rain in a day) was fairly typical for winter throughout most the region, with the exception of the Kapiti Coast which experienced notably more than normal.

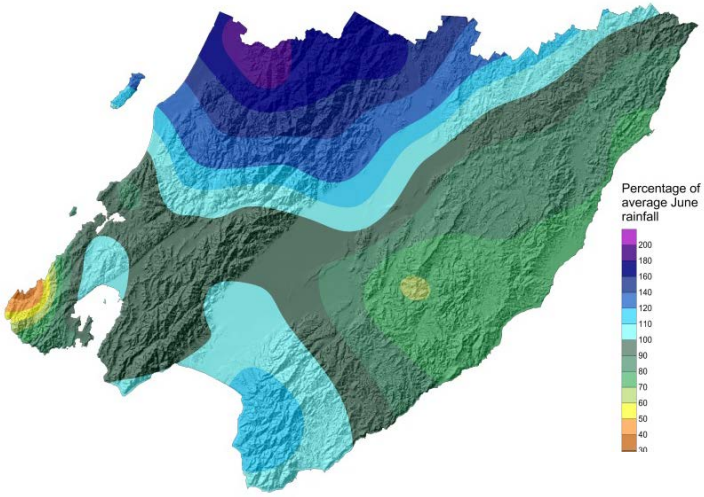
Table 1: Number of Rain Days and Heavy Rain Days across the region (with the average shown in square brackets). Most places experienced a typical number of rainy days but there were significantly more than normal in the Kapiti hill country and significantly less in the eastern Wairarapa.

	Kapiti Coast		**Porirua**	**Hutt Valley & Wellington**		**Ruamahanga**		**Eastern Wairarapa**
	Lowland	Hills	Lowland	Lowland	Hills	Lowland	Hills	
Rain Days (>1mm)	37 [33]	68 [58]	40 [36]	41 [39]	49 [50]	36 [35]	70 [69]	37 [48]
Heavy Rain Days(>25mm)	4 [2]	16 [17]	2 [4]	2 [3]	7 [6]	1 [2]	20 [22]	2 [2]

Rainfall by the month

The maps below show rainfall by the month. June was the wettest month, punctuated by the storm on 19 and 20 June. In July large parts of the Wairarapa were extremely dry, however late winter rain in August meant rainfall levels were largely normal in most parts of the region except for east Wairarapa.

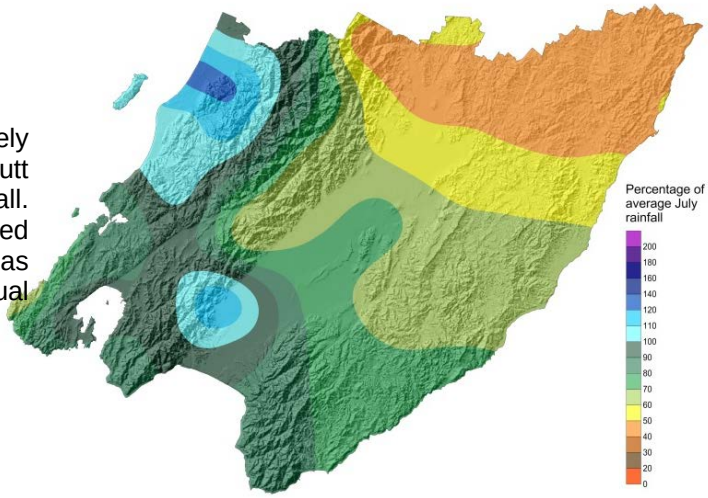
June 2015



Heavy rainfall and high river levels affected the northern half of the Kapiti Coast and the Tararua Ranges on 19 June. A total of 405mm fell in 24 hours at the rain gauge in the Tararua Ranges.

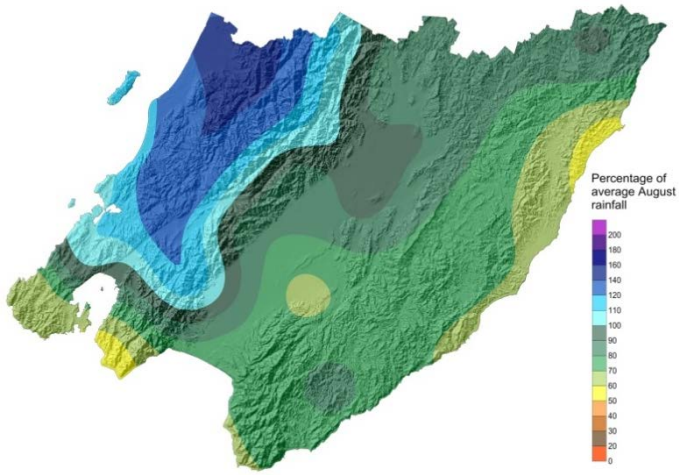
Monthly rainfall was lower than normal in southern and eastern parts of the region. A large part of the east Wairarapa Coast received only 60 to 90 percent of normal rainfall.

July 2015



During July, rainfall in the Kapiti Coast was largely above normal. Wellington, Porirua and the Hutt Valley experienced average amounts of rainfall. The north and east of the Wairarapa experienced lower than normal rainfall with some areas receiving as low as half the amount of the usual rainfall.

August 2015



The Kapiti Coast and western Tararua Ranges again received higher than normal rainfall, with Otaki receiving 160 percent of average. Above average rainfall was also received in Porirua, parts of Welling ton and much of the Hutt Valley.

Out east the Wairarapa Coast continued its trend of below average rainfall with only 50 to 60 percent of normal being recorded along the coast and around Martinborough.

River flows

Figure 2 shows average river and stream flows during winter 2015. The pattern reflects the distribution of winter rainfall (Figure 1) with average flows being up to two times greater than normal in north western catchments (eg, Otaki and Waikanae rivers, and Mangaone and Waitohu streams), and average to below average elsewhere.

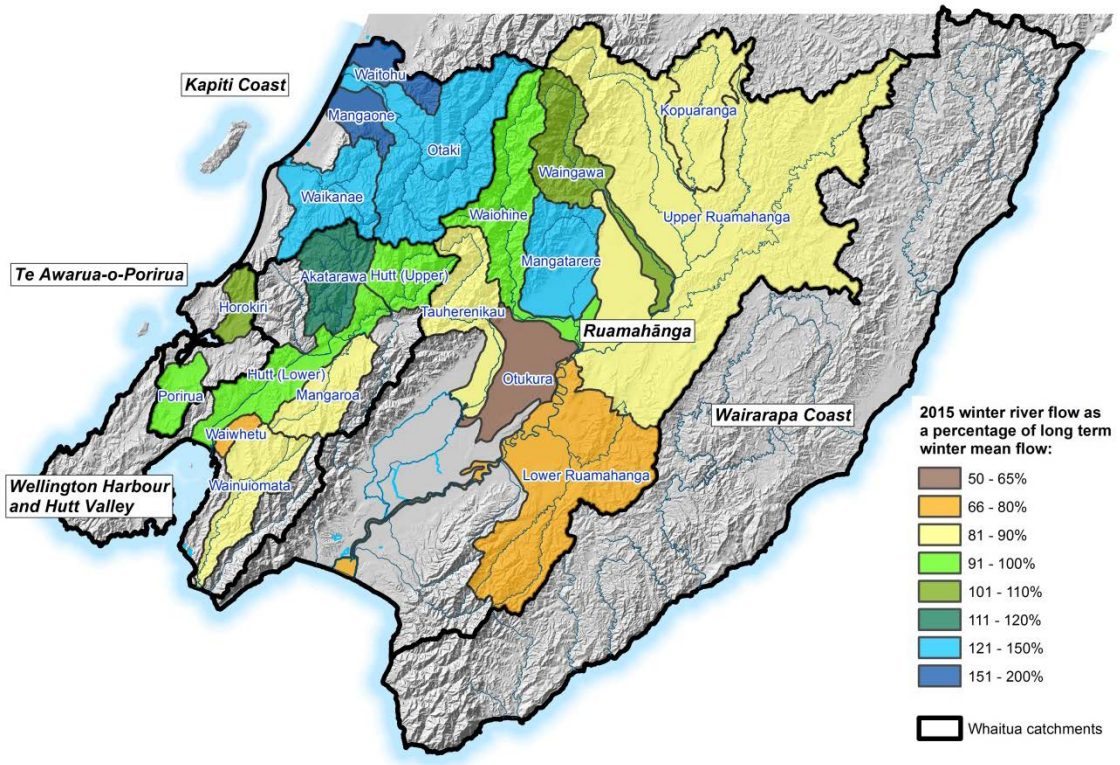


Figure 2. River and stream flows during winter 2015 as a percentage of the long-term average. Above average flows were recorded in the north west and rivers draining the Tararua Ranges but elsewhere flows were below average.

Impacts of the storm on 19 and 20 June

A heavy rainfall event hit the northern Tararua Ranges and Kapiti Coast on 19 June. High altitude rain gauges situated in the ranges recorded rainfall totals only expected once in every 3 to 10 years.

This heavy rainfall occurred in the headwaters of the Ruamahanga, Waingawa, Waiohine, Otaki and Waikanae rivers and the Waitohu Stream and caused high flows that peaked at return periods of 5, 4, 3, 8, 14 and 14 years respectively.

The worst rainfall during this storm event actually occurred further north in the Manawatu-Wanganui region, however the rain gauge at Otaki recorded a total of 63mm of rainfall in just 6 hours, which is estimated to occur only once every 25 years.

Winter air temperatures

Figure 3 shows how maximum and minimum recorded temperatures across the region varied from the historical average.

Both maximum and minimum temperatures were below average across the region, especially in the Wairarapa with Martinborough and Castlepoint being the coldest spots measured. Near normal temperatures were observed on the western side of the region, with the exception of Mana Island which recorded slightly colder than normal temperatures.

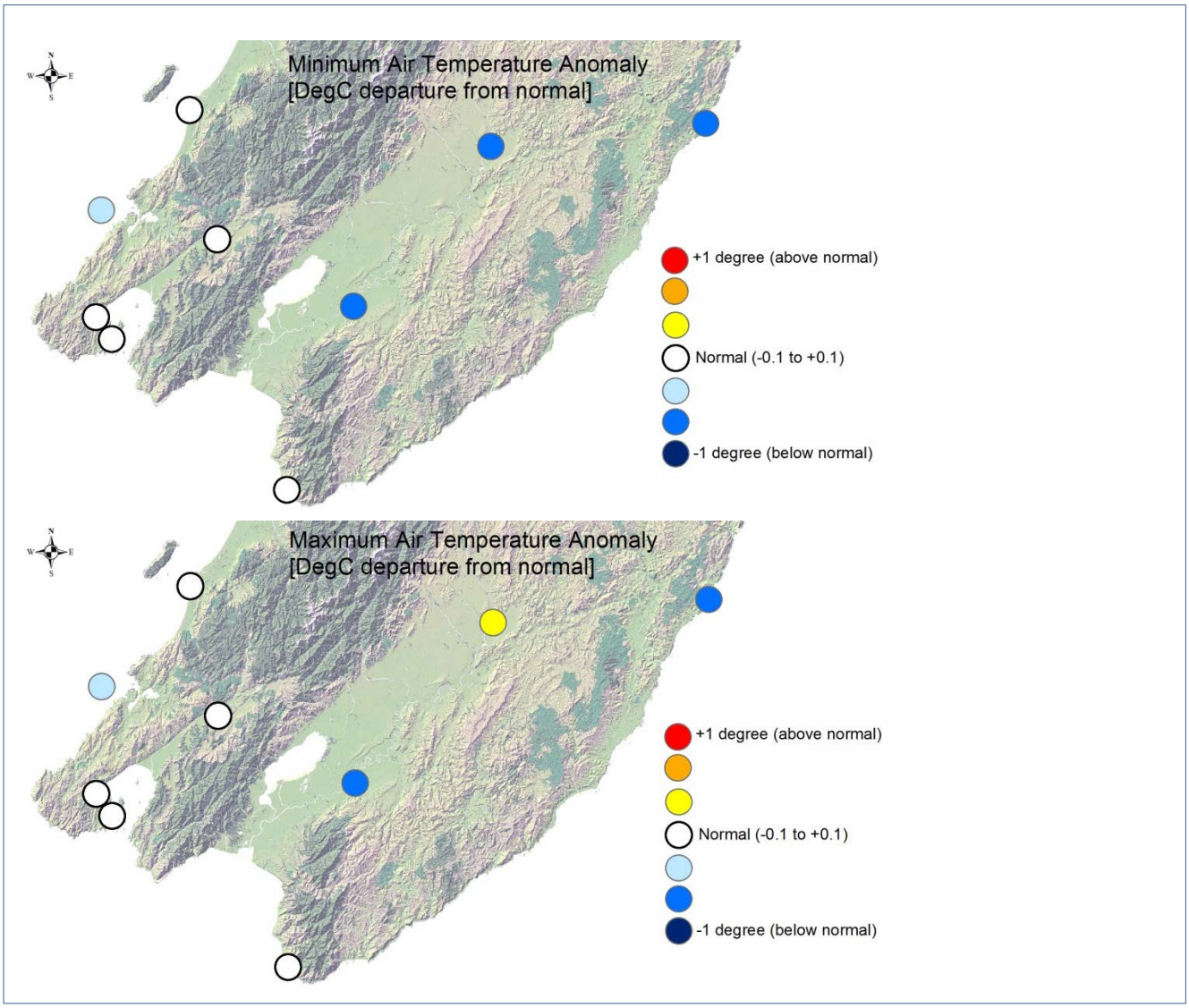


Figure 3: Winter 2015 maximum (top panel) and minimum (bottom panel) temperature anomalies, i.e. difference from the long-term average. A clear predominance of below average maximum and minimum temperatures is seen throughout the Wairarapa, especially in Martinborough and Castlepoint.

SOURCE: Data are from NIWA and 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 the emission of greenhouse gases (https://www.niwa.co.nz/natural-hazards/hazards/climate-change).

Some key observations about climate variability and change in our region during winter 2015 are:

- A few historical temperature records (both low and high temperatures) were broken. This is consistent with expected climatic changes as a result of increased anthropogenic (i.e., caused by humans) CO_2 in the atmosphere
- The effects of climate change are already being felt as superimposed onto natural climate fluctuations
- The current El Nino phenomenon is the strongest since 1997/98 and is still intensifying. This is causing below average rainfall in the eastern part of our region.

Global climate drivers and extreme weather events

Climate drivers are global mechanisms that can influence the weather in our region. The current major driver is the El Nino/Southern Oscillation[1], which has been in its positive (El Nino) phase since April 2015. The current El Nino phenomenon is the strongest since 1997/98, and is still intensifying.

Figure 4 shows the global anomalies (ie, departure from average) of the Sea Surface Temperature for the last week of winter. While the El Nino is clearly seen by the large warm water band around the Equatorial Pacific (red tones), the regional waters to the east of New Zealand have been colder than normal.

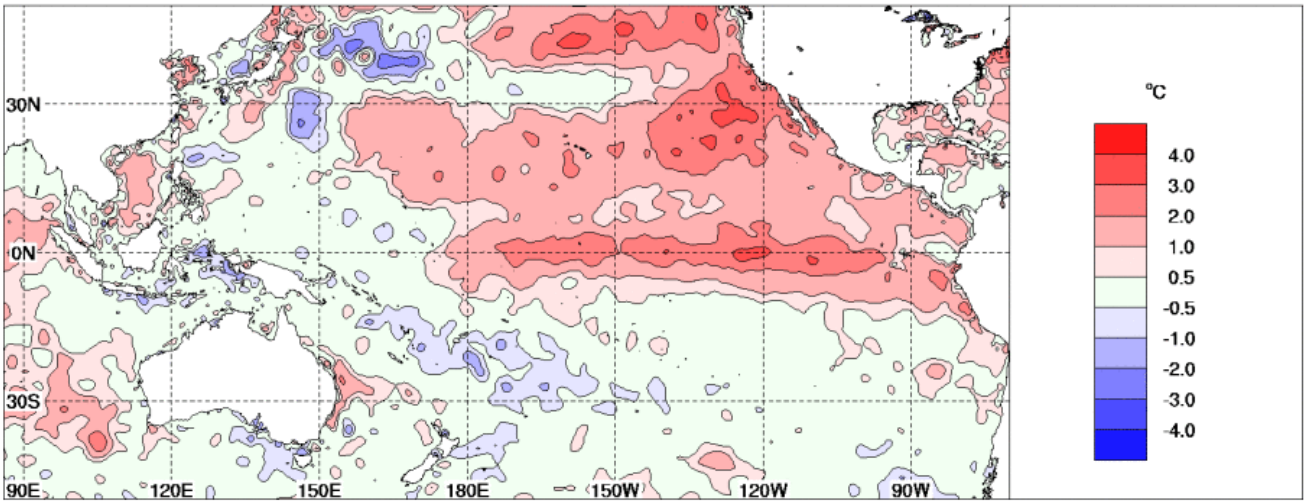


Figure 4: Global Sea Surface Temperature anomalies for the last week of winter. The El Nino is clearly seen by the warm waters around the Equatorial Pacific, while cooler than average waters are seen to the east of New Zealand. This pattern is causing increased westerly air flow and low rainfall in the eastern parts of New Zealand.

SOURCE: Australian Bureau of Meteorology

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

The combined El Nino and cooler waters around New Zealand are causing more westerly/south-westerly winds, and subsequently less rainfall for most of the eastern coast owing to the shadowing effect of the topography. Calculations by NIWA indicate that most of the Wairarapa has had lower than normal winter rainfall, and rainfall on the eastern coast has been near the lowest on record (eg, Castlepoint had the 4th lowest winter rainfall on record).

In addition to the low rainfall in the east, winter was also characterised by a large degree of variability, with record-breaking observations of maximum and minimum temperatures being measured across the region. Remarkably, all possible permutations of extremes were observed, including extreme high and extreme low maximum temperatures, and extreme high and extreme low minimum temperatures, which is highly unusual to be observed in the same season.

This climate variability was mainly caused by the clash between warm tropical air and extremely cold polar air masses coming from Antarctica. One such polar outbreak caused one of the lowest temperatures ever measured in New Zealand (-21°C at Tara Hills in Otago on 24 June) and several days of severe frost within the Wellington region. As depicted by Figure 5, the trajectory of the air mass that arrived at the southern tip of New Zealand originated very close to Antarctica, travelling on top of ice-covered ocean before reaching New Zealand about one and a half days later. This means that the air had very little time to be modified by the ocean, conserving very cold temperatures until arriving in New Zealand. Note that the edge of the sea ice is only about 2,400km from New Zealand, which is less than the distance between Wellington and Melbourne.

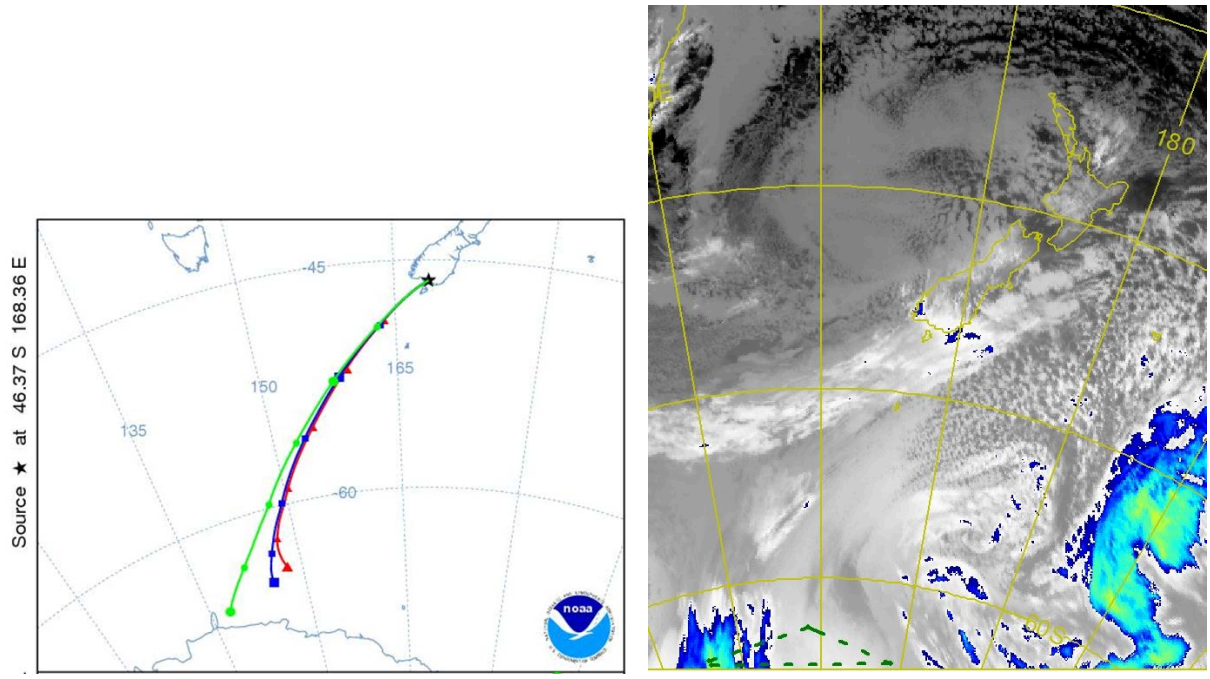


Figure 5: Air mass trajectory at different levels of the atmosphere (left panel) arriving at the southern tip of New Zealand on 15 June causing one of the lowest temperatures on record in New Zealand (-21°C at Tara Hills in the South Island), and satellite image showing the polar blast (right panel).

SOURCE: NOAA (USA) and MetService (NZ)

Seasonal outlook

Climate outlook for spring 2015

Based on the fact that the current El Nino is very strong, and will potentially intensify even further, there is relatively high confidence that most of the Wairarapa is to expect a dry spring. However, it is not possible to predict with confidence how dry it is going to be, as each El Nino behaves differently. Based on previous El Nino cases, it is possible that the seasonal rainfall on the eastern coast may be about only half of the historical average.

As the polar fronts are still quite active, their combined influence along with the El Nino is that higher than average variability is expected throughout most of the region, with occasional extremes of significant rainfall events and unseasonably cold periods alternated with mild temperatures. As the solar radiation sharply increases during spring, the combination of stronger westerly winds and reduced rainfall will provide a further drying element for the soil. The wind has the effect of dramatically increasing the evapotranspiration, “sucking” the moisture out of the exposed soil.

Climate Outlook for spring 2015. Mostly cool and dry conditions are expected, which are typical of El Nino springs. A greater likelihood of extreme weather events, in particular extremes of cold and mild, are in place for the season. The forecasts are qualitative only, as it is not possible to accurately estimate the actual amount of seasonal rainfall. Based on previous El Ninos, it is possible that rainfall on the eastern coast could be within the 10% lowest on record.

Whaitua	**Climate outlook for spring 2015**
Wellington Harbour & Hutt Valley	Temperature: Normal to below normal, higher variability of cold and mild, extremes of very cold days and frost likely Precipitation: Normal to below normal.
Te Awarua o Porirua	Temperature: : Normal to below normal, higher variability of cold and mild, extremes of very cold days and frost likely Precipitation: Normal to below normal
Kāpiti Coast	Temperature: : Normal to below normal, higher variability of cold and mild, extremes of very cold days and frost likely Precipitation: Normal
Ruamāhanga	Temperature: : Normal to below normal, higher variability of cold and mild, extremes of very cold days and frost likely Precipitation: Below normal
Wairarapa Coast	Temperature: : Normal to below normal, higher variability of cold and mild, extremes of very cold days and frost likely Precipitation: Below normal

This climate outlook was prepared by the Air and Climate Team of GWRC based on our own expertise, and information provided by NIWA, MetService and international centres such as the International Research Institute for Climate and Society of Columbia university (http://iri.columbia.edu/our-expertise/climate/forecasts/seasonal-climate-forecasts/). This guidance is qualitative only, and GWRC takes no responsibility for the use or accuracy of this information. For more details on long-term climate forecasts at a national level the reader should refer to NIWA in the first instance (https://www.niwa.co.nz/climate/sco)

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 (Figure 6). 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 winter 2015 summaries on:

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

A summary outlook for winter for each whaitua catchment is presented here.

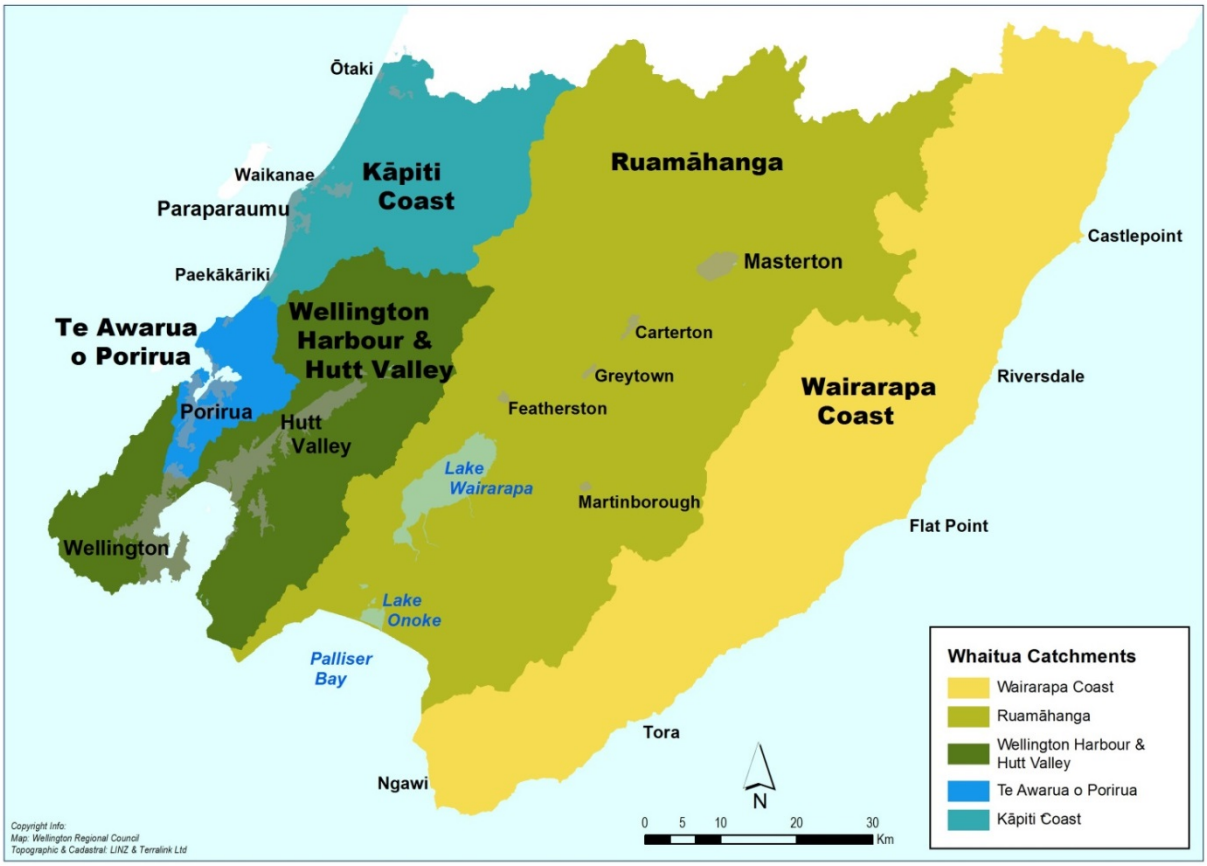
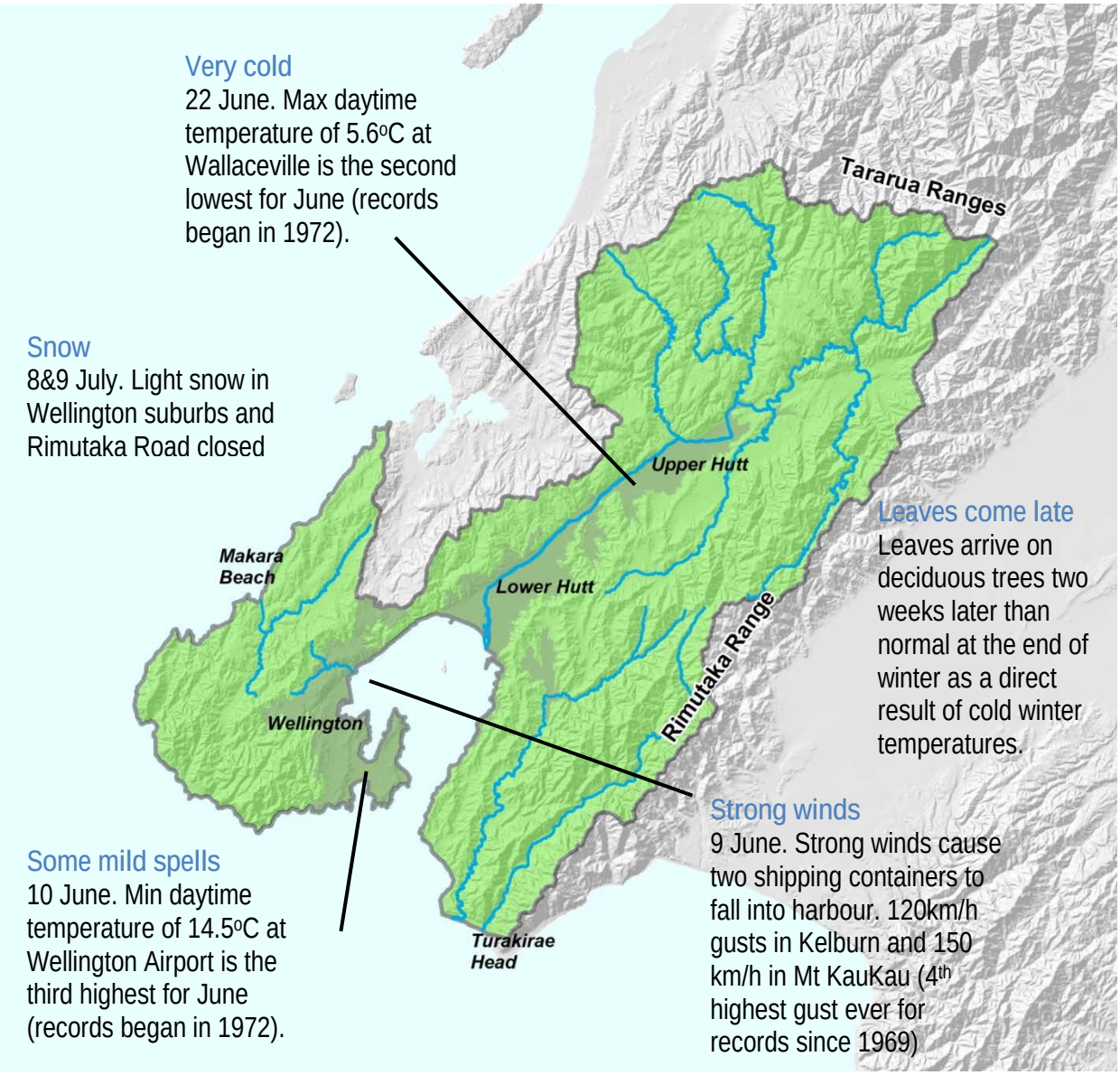


Figure 6: Map of the five whaitua catchment areas in the Wellington region. Each whaitua roughly coincides with a climatic zone, expressing the marked east-to-west contrast that we experience in our region.

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

Climate Summary

- About **average** temperatures
- About **average** rainfall
- Some notable winds gusts, coastal inundation, frost events and record mild nights



Want to look at the summary tables and graphs?

Climate

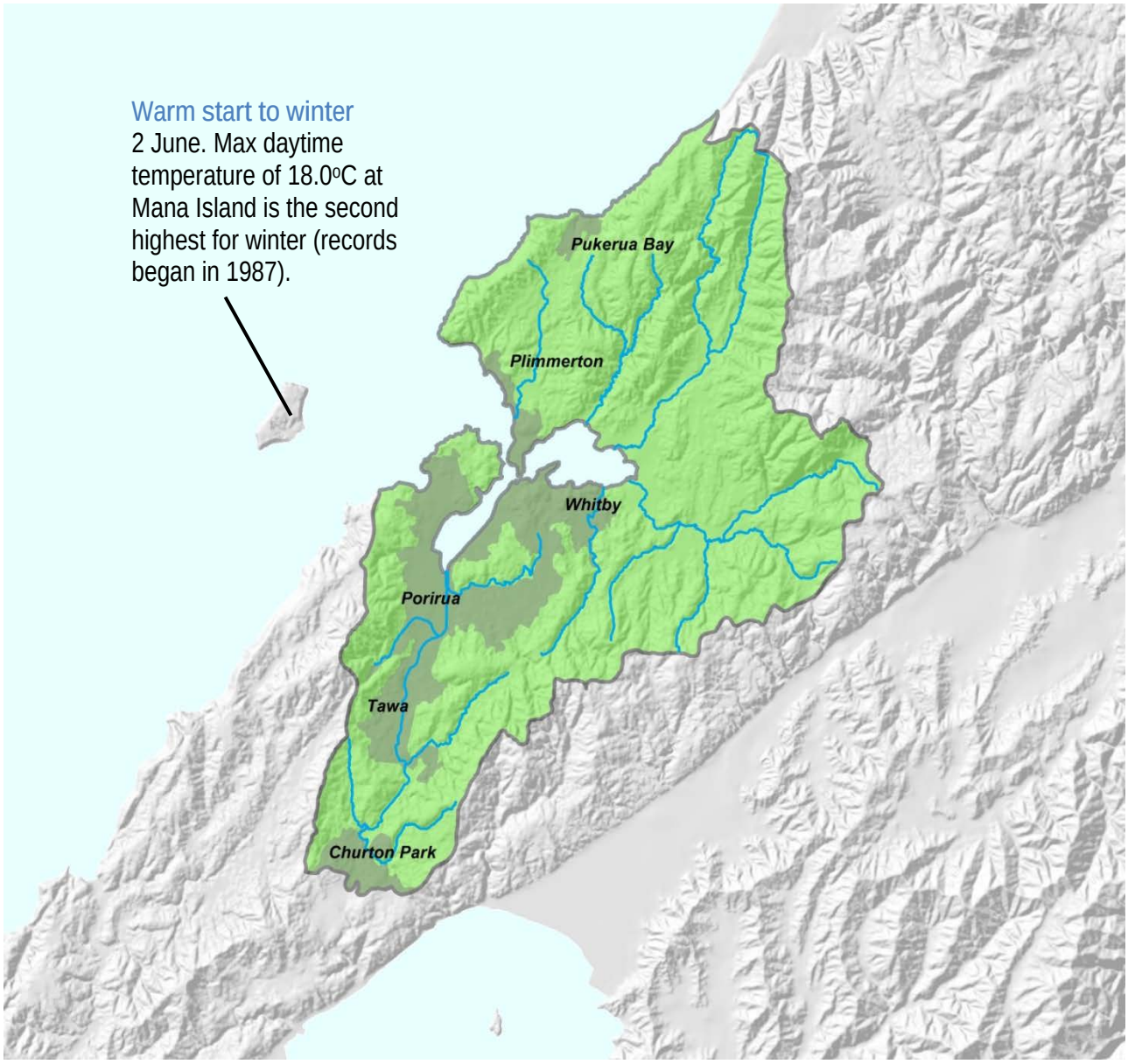
Rainfall

River flows

Groundwater levels

Climate Summary

- **Colder** than average
- About **average** seasonal rainfall
- Some notable wind gusts and record mild daytime temperatures



Want to look at the summary tables and graphs?

Climate

Rainfall

River flows

Climate Summary

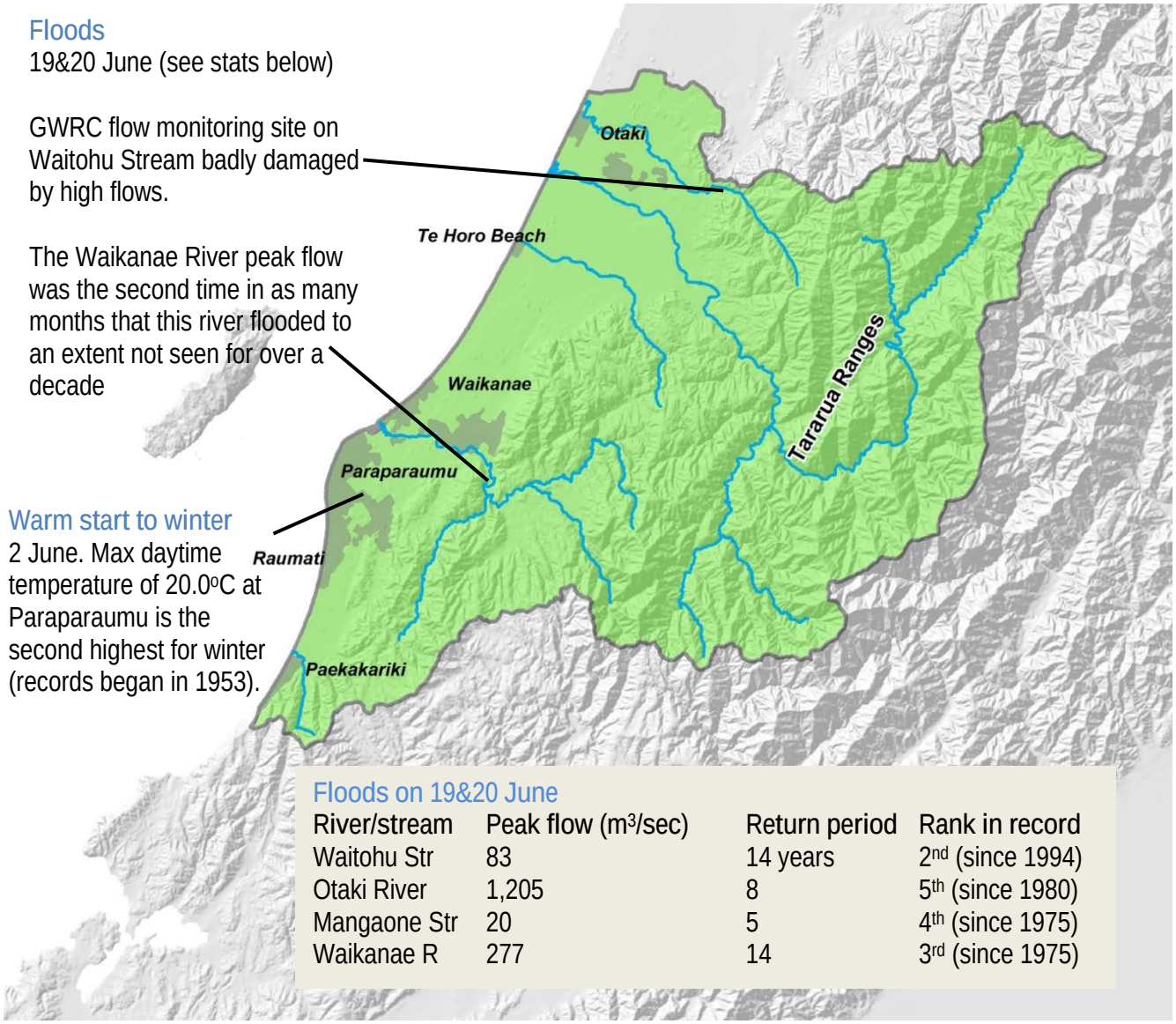
- About **average** temperatures
- **Wetter** than average
- Some notable rainfall and record mild daytime temperatures.

Floods
19&20 June (see stats below)

GWRC flow monitoring site on Waitohu Stream badly damaged by high flows.

The Waikanae River peak flow was the second time in as many months that this river flooded to an extent not seen for over a decade

Warm start to winter
2 June. Max daytime temperature of 20.0°C at Paraparaumu is the second highest for winter (records began in 1953).



Floods on 19&20 June

River/stream	Peak flow (m^3/sec)	Return period	Rank in record
Waitohu Str	83	14 years	2nd (since 1994)
Otaki River	1,205	8	5th (since 1980)
Mangaone Str	20	5	4th (since 1975)
Waikanae R	277	14	3rd (since 1975)

Want to look at the summary tables and graphs?

Climate
Rainfall
River flows
Groundwater levels

Climate Summary

- **Colder** than average
- **Drier** than average
- Some notable frosts as well as record mild nights and warm and cold daytime temperatures, wind gusts, and low rainfall caused by El Nino

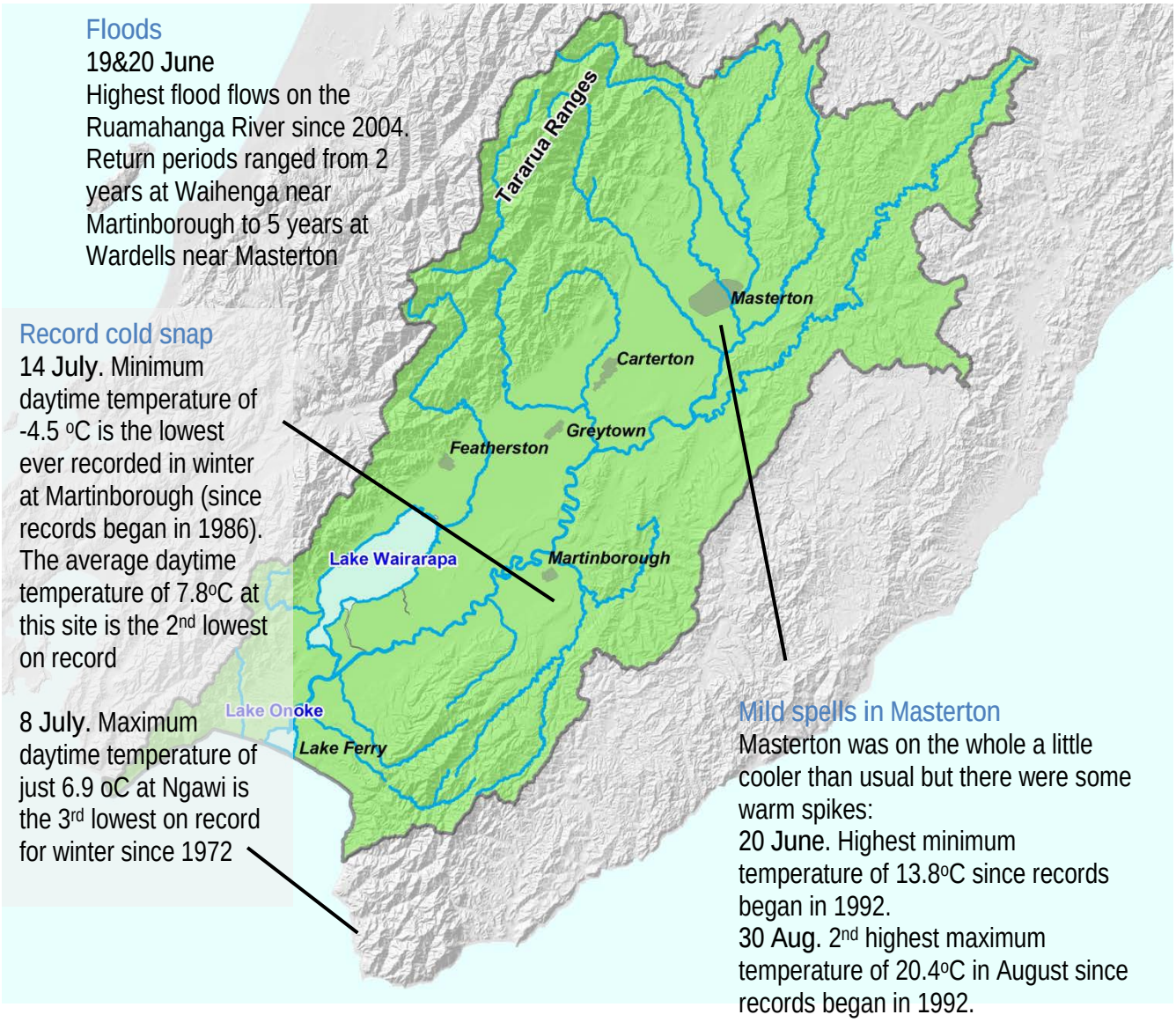
Floods

19&20 June
Highest flood flows on the Ruamahanga River since 2004. Return periods ranged from 2 years at Waihenga near Martinborough to 5 years at Wardells near Masterton

Record cold snap

14 July. Minimum daytime temperature of -4.5 ^{o}C is the lowest ever recorded in winter at Martinborough (since records began in 1986). The average daytime temperature of 7.8^{o}C at this site is the 2nd lowest on record

8 July. Maximum daytime temperature of just 6.9 oC at Ngawi is the 3rd lowest on record for winter since 1972



Mild spells in Masterton

Masterton was on the whole a little cooler than usual but there were some warm spikes:
20 June. Highest minimum temperature of 13.8^{o}C since records began in 1992.
30 Aug. 2nd highest maximum temperature of 20.4^{o}C in August since records began in 1992.

Want to look at the summary tables and graphs?

Climate
Rainfall
River flows
Groundwater levels

Climate Summary

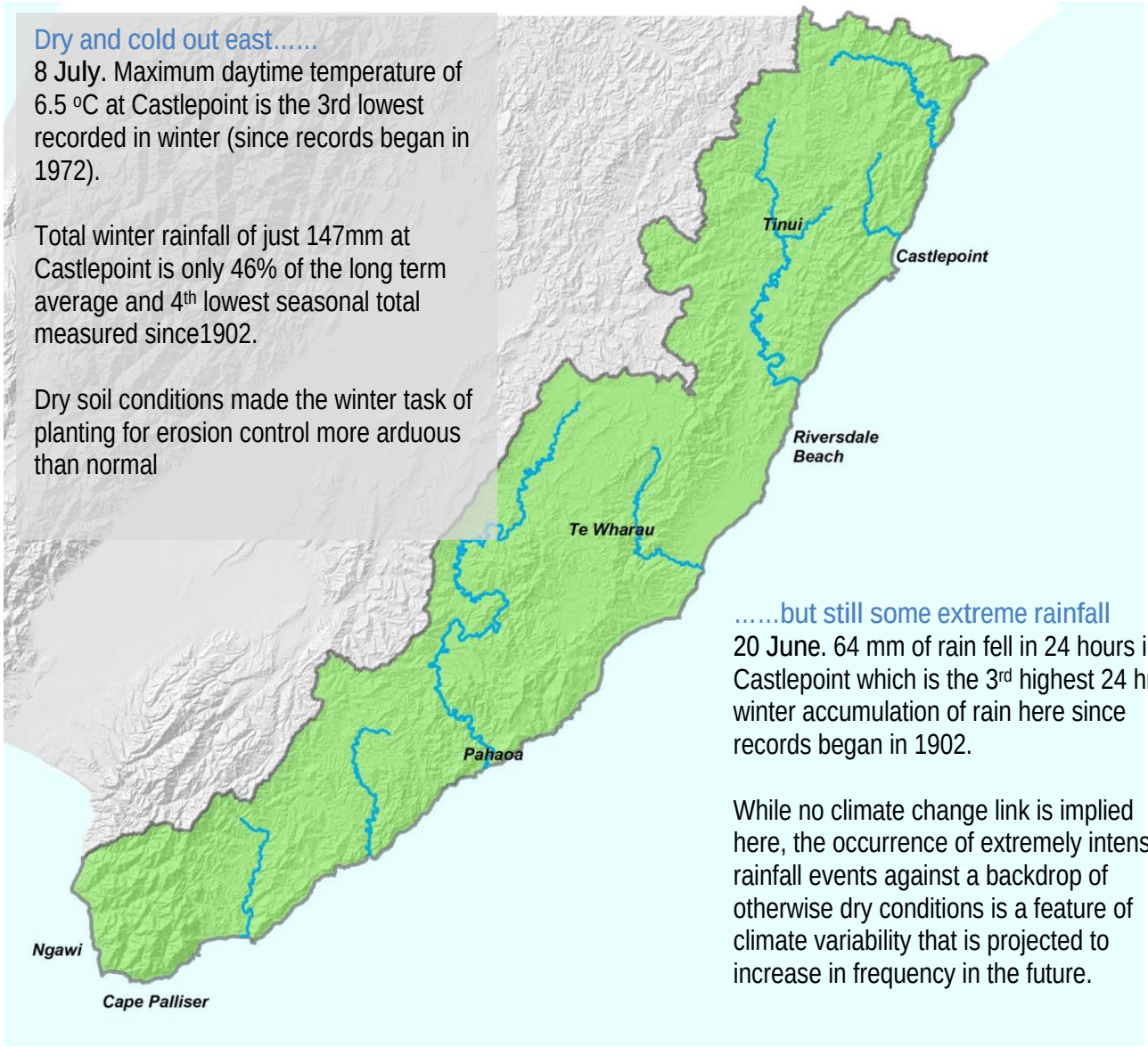
- **Colder** than average
- **Drier** than average
- Some notable frosts and record cold daytime temperatures, wind gusts, and low rainfall caused by El Nino

Dry and cold out east……

8 July. Maximum daytime temperature of 6.5 ^{o}C at Castlepoint is the 3rd lowest recorded in winter (since records began in 1972).

Total winter rainfall of just 147mm at Castlepoint is only 46% of the long term average and 4th lowest seasonal total measured since1902.

Dry soil conditions made the winter task of planting for erosion control more arduous than normal



……but still some extreme rainfall

20 June. 64 mm of rain fell in 24 hours in Castlepoint which is the 3rd highest 24 hr winter accumulation of rain here since records began in 1902.

While no climate change link is implied here, the occurrence of extremely intense rainfall events against a backdrop of otherwise dry conditions is a feature of climate variability that is projected to increase in frequency in the future.

Want to look at the summary tables and graphs?

Climate

Rainfall

Soil moisture

Climate statistics

Climate summary for selected monitoring sites for each Whaitua catchment area for winter 2015. Orange shading denotes record breaking extreme warm temperatures compared to the long-term historical records, and/or positive departures from the mean temperatures. Blue shading denotes the opposite (cold). The predominance of blue clearly shows colder than average conditions for most whaitua, except Wellington Harbour and Kapiti Coast. Higher incidence of severe gales is noted for Mt Kau Kau, Rimutaka hill and Castle point, with more frosts around Masterton and Upper Hutt.

Whaitua	Location[1]	Extreme Max Temp (°C)	Extreme Min Temp (°C)	Mean Max Temp Departure from average (°C)	Mean Min Temp Departure from average (°C)	Severe Gale days (>102 km/h wind gusts)	Severe Frost days (Minimum Temp < 0°C)
Wellington Harbour & Hutt Valley	Kelburn AWS (MS)	17.1	1.8	0.1	0.0	10	0
	Wellington Airport AWS (MS)	17.9	1.7	0.0	0.0	1	0
	Wallaceville EWS (N)	---	---	---	---	---	---
	Mt Kau Kau (MS)	---	---	---	---	14	---
	Shandon Golf Club	19.6	2.9	---	---		
	Lower Hutt (Waterloo)	18.4	0.5	---	---	0	0
	Wainuiomata	19.9	-2.7	---	---	0	0
	Upper Hutt (Central)	18.4	-2.0	---	---	---	
Te Awarua-o-Porirua	Mana Island AWS (MS)[2]	16.8	1.9	-0.2	-0.3	3	0
Kāpiti Coast	Paraparaumu Airport AWS (MS)	20.0	-3.2	0.1	0.1	0	7
Ruamāhanga	Masterton Airport AWS (MS)[2]	20.4	-4.3	0.0	-0.6	1	20
	Martinborough EWS (N)	17.9	-4.3	-0.7	-0.6	---	---
	Tauherenikau (Featherston)	19.5	-3.2	---	---	0	8
	Rimutaka Summit AWS (MS)	13.3	-1.3	---	---	14	9
Wairarapa Coast	Castlepoint AWS (MS)	19.3	1.6	-0.5	-0.6	19	0
	Ngawi (MS)	19.6	2.9	-0.2	-0.3	2	0

[1] Sites owned by MetService = MS,Sites owned by NIWA = N, all other sites are owned by GWRC

[2] The departures from average for Masterton Airport AWS and Mana Island AWS are only approximate, based on an inferred climatology obtained via interpolation from nearby sites.

Click the following links to return to climate summaries for:

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

Rainfall statistics

Rainfall total and percentage of average for each month and whole of winter 2015.

Whaitua	Location	June		July		August		Winter	
		(mm)	(%)	(mm)	(%)	(mm)	(%)	(mm)	(%)
Wellington Harbour & Hutt Valley Click to see cumulative rainfall plots	Kaitoke	224	97	175	72	227	103	626	89
	Lower Hutt	136	102	109	85	111	86	356	90
	Wainuiomata	186	89	203	88	187	90	576	88
	Karori	120	93	132	95	92	74	344	87
	Wellington City	121	118	120	116	77	83	318	108
Te Awarua-o-Porirua Click to see cumulative rainfall plots	Battle Hill	99	66	94	75	125	108	317	81
	Whenua Tapu	108	97	81	82	100	108	288	94
	Tawa	140	115	94	84	118	117	352	110
Kāpiti Coast Click to see cumulative rainfall plots	Otaki	200	194	82	95	137	162	418	160
	Waikanae	162	133	113	97	129	124	404	121
	Paekakariki	122	86	115	80	114	92	351	86
	Tararua (Otaki catchment)	664	148	388	81	521	123	1573	117
Ruamāhanga Click to see cumulative rainfall plots	Masterton	94	94	54	49	78	83	226	73
	Featherston	100	89	71	61	77	74	248	75
	Longbush	70	66	73	59	130	131	272	83
	Tararua (Waiohine catchment)	635	146	330	71	489	107	1454	106
Wairarapa Coast Click to see cumulative rainfall plots	Tanawa Hut	127	88	70	40	135	99	332	73
	Stoney Creek (Awhea)	160	100	143	72	143	87	445	85
	Ngaumu (Pahaoa)	98	79	N/A	N/A	N/A	N/A	N/A	N/A

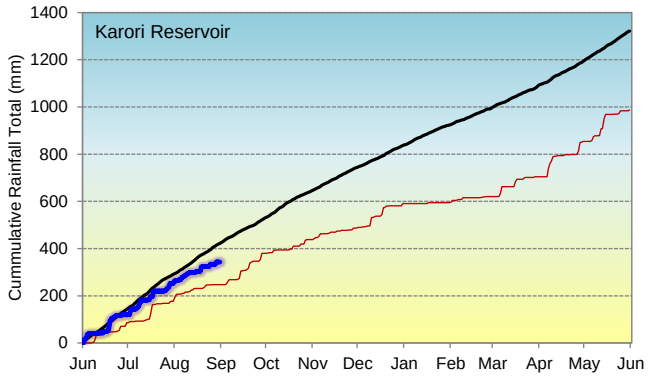
Click the following links to return to climate summaries for:

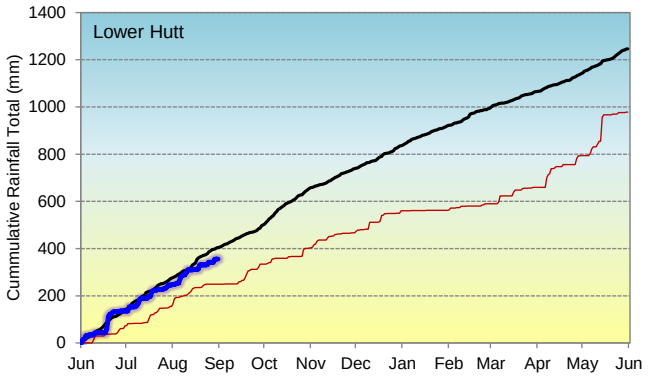
- Wellington Harbour & Hutt Valley
- Te Awarua-o-Porirua
- Kāpiti Coast
- Ruamāhanga
- Wairarapa Coast

Cumulative Rainfall Plots

Wellington & Hutt Valley

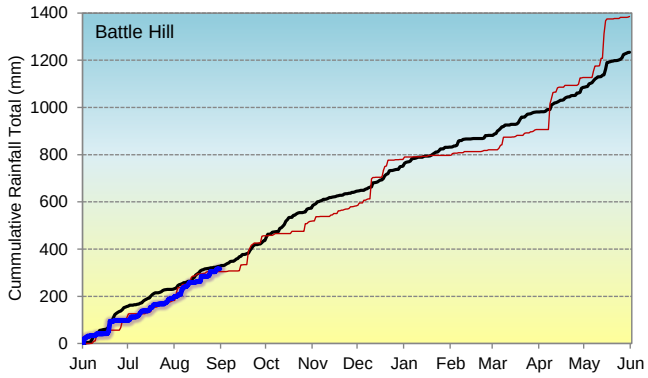
Cumulative rainfall total 2015/16 (blue line), 2014/15 (red line) and long-term average (black line). The plots highlight that winter rainfall has accumulated at about the expected normal rate for this season.

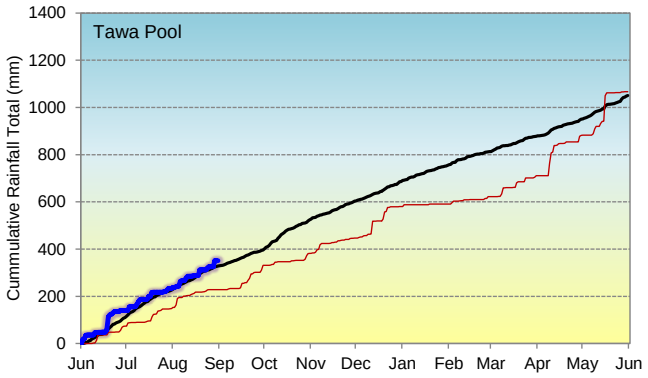




Porirua Harbour

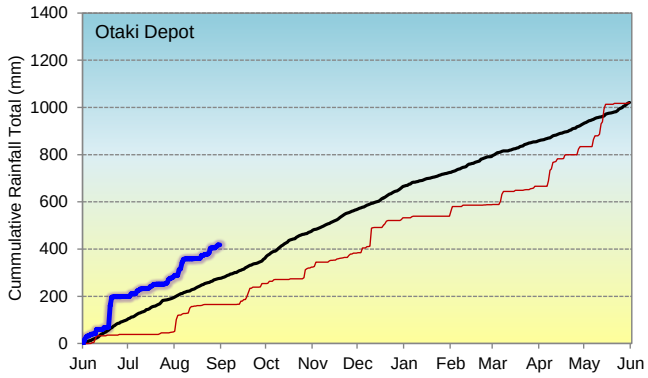
Cumulative rainfall total 2015/16 (blue line), 2014/15 (red line) and long-term average (black line). The plots highlight that winter rainfall has accumulated at about the expected normal rate for this season.

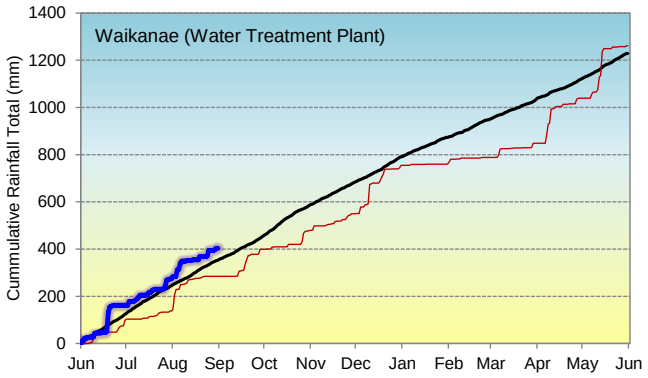




Kapiti Coast

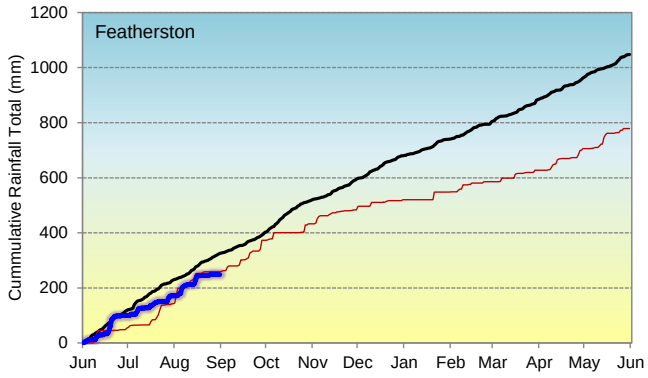
Cumulative rainfall total 2015/16 (blue line), 2014/15 (red line) and long-term average (black line). The plots highlight that winter rainfall has accumulated at a higher rate than normal for this season (and much higher than last year), mainly as a result of the very high rainfall that occurred during the 20 June event. Rainfall at Otaki at the end of August was 1.5 times greater than the average and 2.6 times greater than the same time last year.

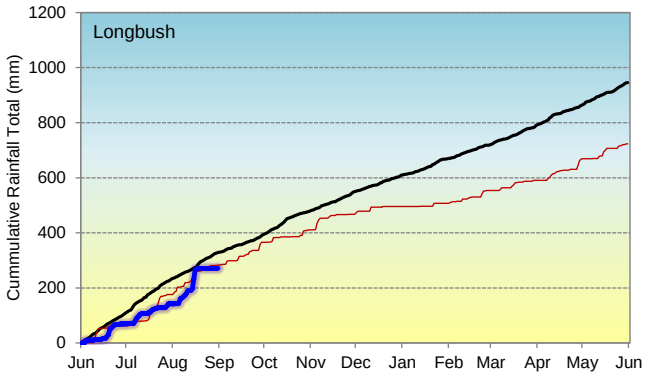




Ruamahanga

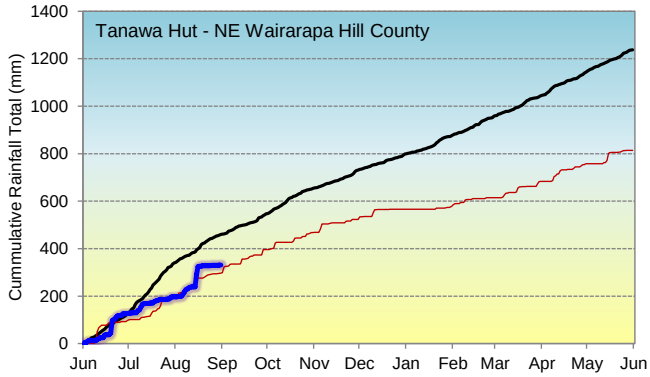
Cumulative rainfall total 2015/16 (blue line), 2014/15 (red line) and long-term average (black line). The plots highlight that winter rainfall has accumulated at a slightly lower than normal rate for this season, and by the end of August total winter rainfall was almost identical to that in the previous winter.





Wairarapa Coast

Cumulative rainfall total 2015/16 (blue line), 2014/15 (red line) and long-term average (black line). The plot highlights that winter rainfall has accumulated at a much lower rate than normal for this season, and by the end of August total winter rainfall was almost identical to that in the previous winter. This follows on from the end of the previous year when 2014/15 rainfall ended the year 34 percent (424mm) below average.



River flows

Percentage of average river flow for each month and whole of winter 2015, reflecting the abundance of rainfall on the Kapiti coast in particular during June and August.

Whaitua	River	June	July	August	Winter
Wellington Harbour & Hutt Valley	Hutt River - Kaitoke	134	63	100	97
	Hutt River - Taita Gorge	118	63	113	96
	Akatarawa River	138	76	136	116
	Mangaroa River	74	73	117	86
	Wainuiomata River	77	64	106	81
Te Awarua-o-Porirua	Porirua	120	77	94	94
	Pauatahanui	125	85	132	111
	Horokiri	125	81	114	106
Kāpiti Coast	Waitohu	257	81	180	166
	Otaki	164	103	129	132
	Mangaone	221	101	155	157
	Waikanae	204	67	163	140
Ruamāhanga	Kopuaranga	154	40	85	89
	Waingawa	153	60	104	103
	Waiohine	147	56	95	96
	Mangatarere	168	81	145	129
	Ruamahanga	125	45	80	79

Click the following links to return to climate summaries for:

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

Minimum and maximum flows recorded during winter. The significance of the 19/20 June flood event is indicated by the flood peak return periods, up to 15 years for the Waikanae River and Waitohu Stream.

Whaitua	River	7-day Minimum Flow			Maximum Flow		
		Flow (m3/s)	Date Begins	Return Period (years)	Flow (m^3/s)	Date	Return Period (years)
Wellington Harbour & Hutt Valley	Hutt River - Kaitoke	4.616	26-Jun	1	264	19-Jun	2
	Hutt River - Taita Gorge	12.998	12-Jun	1	622	20-Jun	1
	Akatarawa River	3.402	12-Jun	1	194	20-Jun	1
	Mangaroa River	2.252	1-Jul	1	18	10-Jul	1
	Wainuiomata River	0.387	11-Jun	1	8	19-Jun	1
Te Awarua-o-Porirua	Porirua	0.436	11-Jun	1	17	19-Jun	1
	Pauatahanui	0.388	11-Jun	1	12	19-Jun	1
	Horokiri	0.326	12-Jun	1	6	20-Jun	1
Kāpiti Coast	Waitohu	0.089	12-Jun	1	83	19-Jun	14
	Otaki	9.204	31-May	1	1205	19-Jun	8
	Mangaone	0.211	21-Jul	1	20	19-Jun	5
	Waikanae	2.439	21-Jul	1	278	20-Jun	14
Ruamāhanga	Kopuaranga	1.109	30-Jun	1	59	21-Jun	3
	Waingawa	4.343	19-Jul	1	320	19-Jun	4
	Waiohine	10.609	8-Jul	1	934	19-Jun	3
	Mangatarere	0.62	3-Jun	1	46	20-Jun	1
	Ruamahanga (Lower)	36.383	31-May	1	1150	20-Jun	2
	Ruamahanga (Upper)				599	20-Jun	5

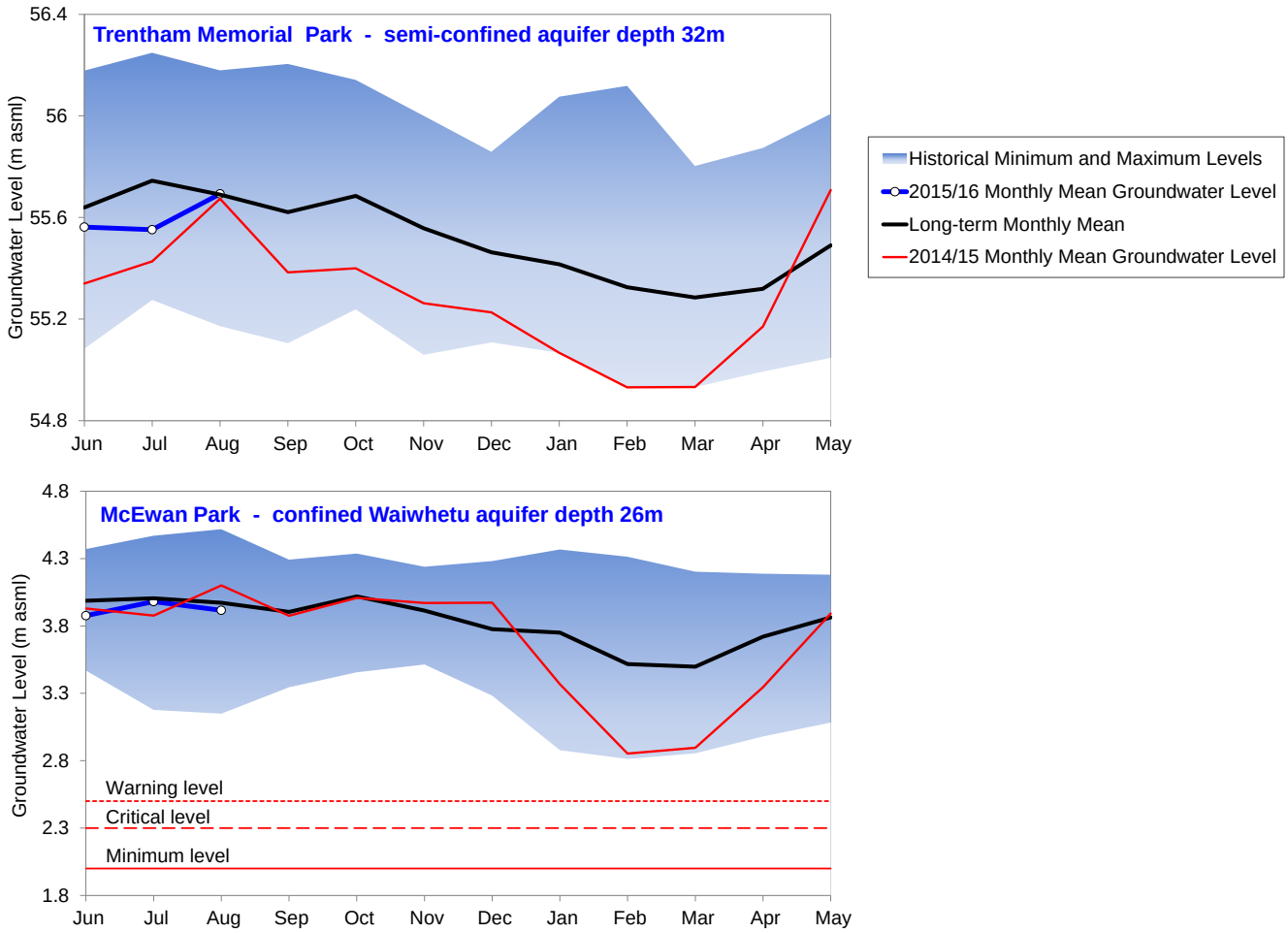
Click the following links to return to climate summaries for:

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

Groundwater levels

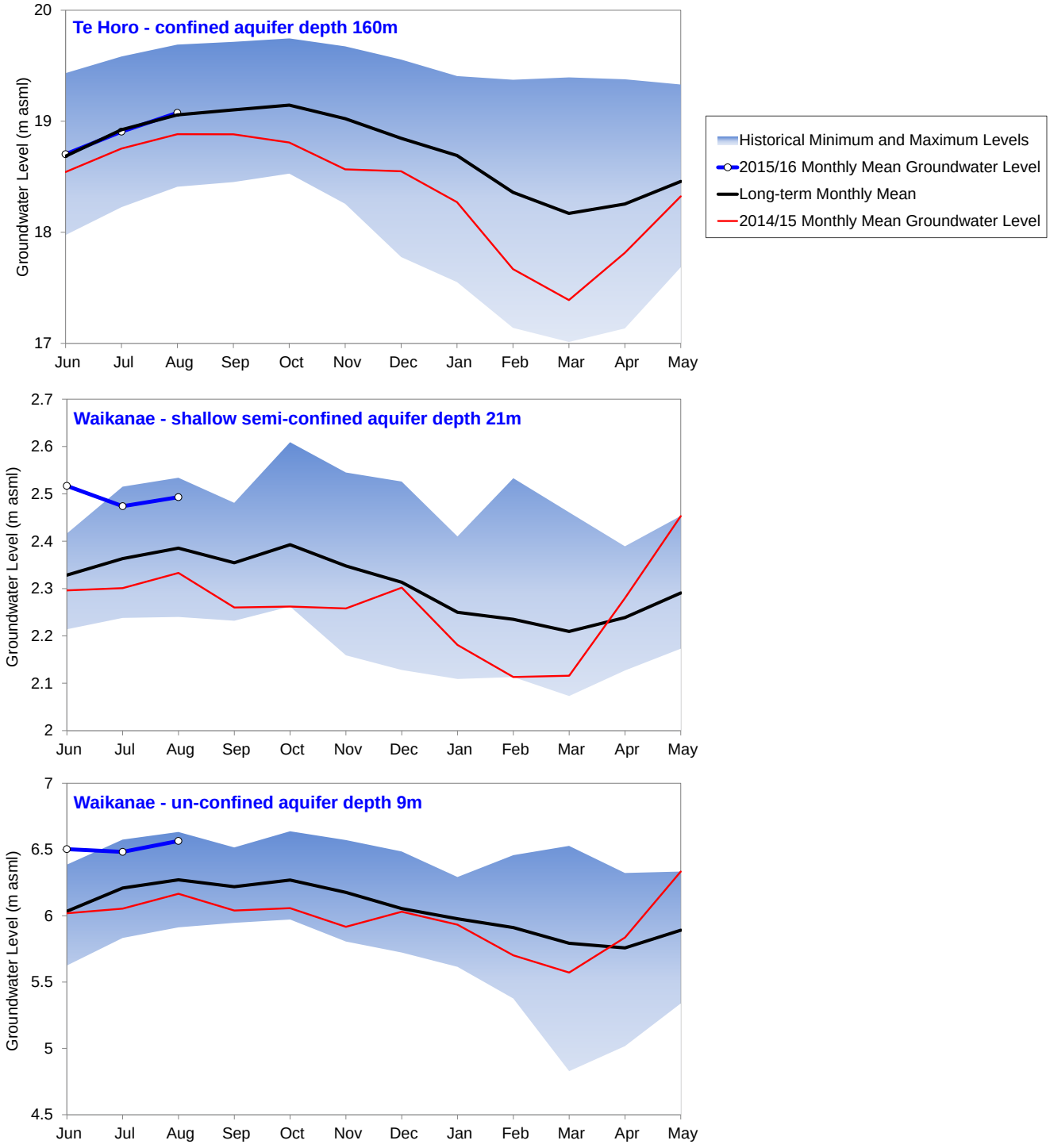
Wellington & Hutt Valley

Winter 2015 groundwater levels in two Hutt Valley bores compared to their long-term averages, the previous year's levels and historical extremes (blue envelope). The plots highlight groundwater levels are tracking close to their expected normal levels for this time of year.



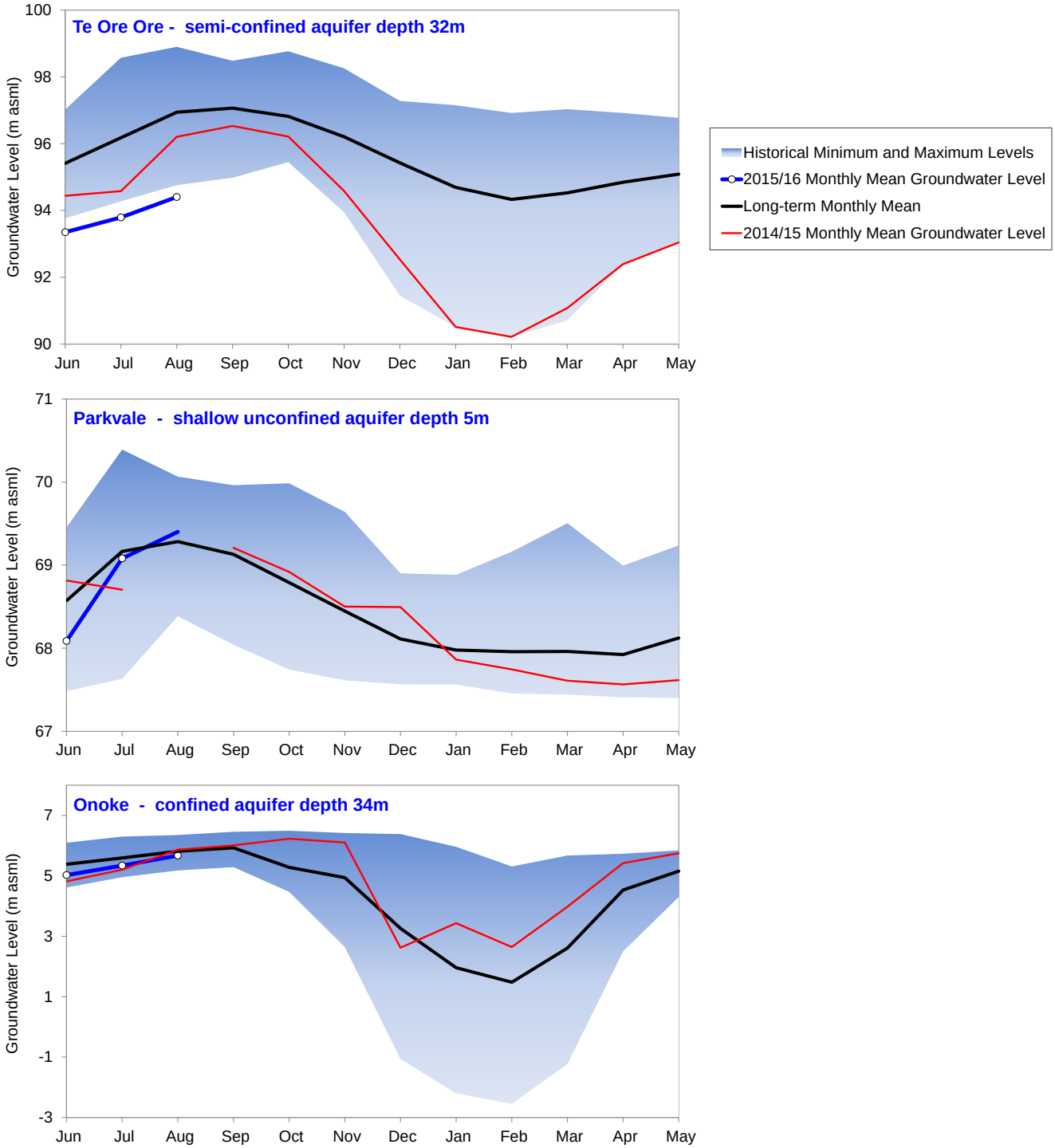
Kapiti Coast

Winter 2015 groundwater levels in three Kapiti Coast bores compared to long-term averages, the previous year and historical extremes (blue envelope). The plots highlight that groundwater levels are tracking either well above or close to their expected normal levels for this time of year. This is the result of higher than average winter rainfall.



Ruamahanga

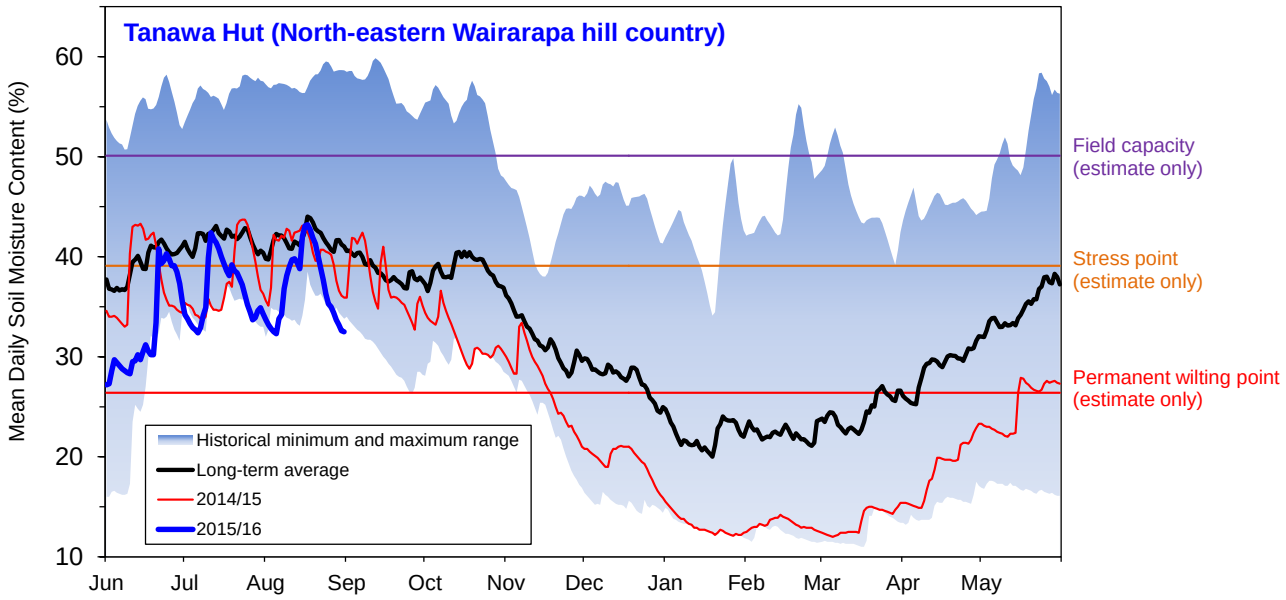
Winter 2015 groundwater levels in three Ruamahanga valley bores compared to their long-term averages, the previous year's levels and historical extremes (blue envelope). The plots highlight that while groundwater levels have recovered somewhat since earlier in the year, in some cases the effects of the summer low levels have carried through the winter (eg, Te Ore Ore) due to only modest rainfall.



Soil moisture content

Wairarapa Coast

Winter 2015 soil moisture content at Tanawa Hut in north-east Wairarapa plotted against the historical mean, historical minimum and maximum (7-day average), and the year 2014/2015. The plot shows that while there have been some good rainfall events over winter to periodically recharge soil moisture, the generally dry winter in the eastern Wairarapa has resulted in soil moisture levels being the lowest on record (at this site – record length is 12 years) at the start of spring.



Drought monitoring

NIWA maintains a 'drought monitor' website that provides much more information on soil moisture conditions (and other hydrological and climatic information relevant to drought assessment)

https://www.niwa.co.nz/climate/information-and-resources/drought

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

September 2015
GW/ESCI-G-15/123