Whaitua Catchments Climate Change parameters

All parameters were extrapolated based on the recent NIWA regional climate change report for the Wellington Region (2017) available from <u>www.gw.govt.nz/climate-change</u>

Wellington Region whaitua

As pictured in the map below, the Wellington Region has been split into five whaitua (catchments) with a committee in each making decisions on the future of land and water management in that whaitua.

For more info visit: <u>http://www.gw.govt.nz/whaitua-committees/</u>



Te Awarua o Porirua whaitua

Variable/period	2040	2090	Commentary
Average annual	+0.5C to	+1C to	Maximum warming in autumn
Temperature	1C above	+2.7C	and winter, least in spring
	present	above	
		present	Note reference to above present
	(+1.2C to		versus pre-industrial: About 0.7C
	+1.7 C	(+1.7C to	of warming has already
	above pre-	+3.4C	happened from pre-industrial to
	industrial)	above pre-	present (1880-1909 compared to
		industrial)	1986-2005 reference periods).
			Uncertainty range: lower range
			for RCP4.5 and upper range for
			RCP8.5
Average annual	0% to 5%	0% to	There is a large uncertainty in the
rainfall	increase	10%	range of changes due to model
		increase	differences and emission
			scenarios. Changes against RCP
			are not necessarily linear. Greater
			likelihood of positive changes in
			autumn, winter and spring.
Amount of rain	0% to	5% to	Although the uncertainty in
falling during	15%	25%	average rainfall range is high,
heavy rainfall days	increase	increase	extreme rainfall increases are
(> 99 th percentile			more certain due to the increased
of daily rainfall)			amount of water vapour that the
			atmosphere can hold as it gets
			warmer (about 8% increase in
			saturation vapour per degree of
	0.12.4-	0.26 to	warming)
Sea level rise	0.12 to	0.36 to	The projected sea level rise
	0.24	0.98	(based on IPCC AR5) may get
	metres	metres	significantly worse depending on
	above	above	chelwes, so the upper limit is not a
	present	present	fixed physical limit There is york
	(0.38 ± 0.00)	(0.62 to	high confidence in see level rise
	0.5000	1.24	projections, probably more so
	above pre-	netres	than any other variable Note the
	industrial)	ahove pre-	difference between present and
	maastriarj	industrial	nre-industrial as we have
		maastriarj	already had about 26cm of sea
			level rise so far.
			See the link below for inundation
			maps plotting for anywhere in

Number of hot days (above 25C) per yearBetween 0 and 10 daysBetween 0 and 30 days increaseNumber of frost nights (below 0C) per yearBetween 0 Between 0 and 5 days reductionBetween 0 days and 15 reduction
Number of hot days (above 25C) per yearBetween 0 and 10 days increaseBetween 0 and 30 days increaseNumber of frost nights (below 0C) per yearBetween 0 and 5 days and 15 reductionBetween 0 days and 15 reduction
days (above 25C) per yearand 10and 30daysdaysdaysincreaseincreaseNumber of frost nights (below 0C) per yearBetween 0and 5 days reductionand 15and 5 days reductionand 15
per yeardaysdaysincreaseincreaseNumber of frostBetween 0nights (below 0C)and 5 daysper yearreductionreductiondays
increaseincreaseNumber of frostBetween 0nights (below 0C)and 5 daysper yearreductiondays
Number of frostBetween 0Between 0nights (below 0C)and 5 daysand 15per yearreductiondays
nights (below 0C) and 5 days and 15 per year reduction days
per year reduction days
raduction
Change in the 1% to 2% 1% to 3%
Intensity of wind Increase Increase
auring windy days
(>99 ^{an} percentile of daily mean)
Change in annual 2 to 4 2 to 10
number of windy days days
days increase increase
Change in annual Increase Increase Measures potential for crop and
growing degree between between pasture growth
days base 10 200 and 300 and
300 GDD 900 GDD
units units
Change in annual Increase Increase Measures drought intensity
potential between between
evapotranspiration 60 and 60 and
deficit (mm) 100 mm 120 mm
Change in rivers Decrease Decrease Measures water shortage in the
flow discharge
(MAI)
Change in rivers Increase Increase Measures flood potential in the
mean annual flood up to 40% up to 80% catchments
discharge (MAF)
Changes in number 50% to 100% to These figures are given by IPCC
of days of very 100% 150% model averages. Individual
high and extreme increase increase models can show much higher
forest fire danger increases of up to 700%
Key environmental Increased flood intensity
impacts Increased coastal inundation (some areas to become
permanently inundated)
Increased erosion Deduced apil fortility
Reduced Soll Tertility
Croundwater quality and availability processors
Salt water intrusion
Increased pressure on water storage
Biodiversity losses

Increased pests such as wasps and rodents
Ocean acidification
Decline in fish population
Increased wildfire
Increased allergies (e.g. pollen)

Wellington Harbor & Hutt Valley whaitua

Variable/period	2040	2090	Commentary
Average annual	+0.5C to	+1C to	Maximum warming in summer
Temperature	1C above	+2.5C	and autumn, least in spring and
	present	above	winter
		present	
	(+1.2C to		Note reference to above present
	+1.7 C	(+1.7C to	versus pre-industrial: About 0.7C
	above pre-	+3.2C	of warming has already
	industrial)	above pre-	happened from pre-industrial to
		industrial)	present (1880-1909 compared to
			1986-2005 reference periods).
			Uncertainty range: lower range
			for RCP4.5 and upper range for
			RCP8.5
Average annual	5%	5%	There is a large uncertainty in the
rainfall	decrease	decrease	range of changes due to model
	to 10%	to 10%	differences and emission
	increase	increase	scenarios. Changes against RCP
			are not necessarily linear. Greater
			likelihood of positive changes in
			autumn and winter.
Amount of rain	5% to	5% to	Although the uncertainty in
falling during	15%	30%	average rainfall range is high,
heavy rainfall days	increase	increase	extreme rainfall increases are
(> 99 th percentile			more certain due to the increased
of daily rainfall)			amount of water vapour that the
			atmosphere can hold as it gets
			warmer (about 8% increase in
			saturation vapour per degree of
	0.40.	0.04	warming)
Sea level rise	0.12 to	0.36 to	The projected sea level rise
	0.24	0.98	(based on IPCC AR5) may get
	metres	metres	significantly worse depending on
	above	above	the behavior of the Antarctic ice
	present	present	fixed physical limit. There is very
	(0.38 to	(0.62 to	high confidence in sea level rise
	0.5 metres	1.24	projections, probably more so
	above pre-	metres	than any other variable. Note the
	industrial)	above pre-	difference between present and
	_	industrial)	pre-industrial, as we have
			already had about 26cm of sea
			level rise so far.
			See the link below for inundation

			maps plotting for anywhere in
			the world:
			http://sealevel.climatecentral.org
Number of hot	Between 0	Between 0	
days (above 25C)	and 10	and 40	
per year	days	days	
	increase	increase	
Number of frost	Between 0	Between 0	
nights (below 0C)	and 5 days	and 10	
per year	reduction	days	
		reduction	
Change in the	1% to 2%	1% to 4%	
intensity of wind	increase	increase	
during windy days			
(>99 th percentile of			
daily mean)			
Change in annual	2 to 6	2 to 12	
number of windy	days	days	
days	increase	increase	
Change in annual	Increase	Increase	Measures potential for crop and
growing degree	between 0	between	pasture growth
days base 10	and 300	200 and	
	GDD units	800 GDD	
		units	
Change in annual	Increase	Increase	Measures drought intensity
potential	between	between	
evapotranspiration	40 and	40 and	
deficit (mm)	100 mm	140 mm	
Change in rivers	Decrease	Decrease	Measures water shortage in the
mean annual low	up to 40%	up to 40%	catchments
flow discharge			
(MAL)			
Change in rivers	Increase	Increase	Measures flood potential in the
mean annual flood	up to 40%	up to	catchments
discharge (MAF)		100%	
Changes in number	50% to	100% to	These figures are given by IPCC
of days of very	100%	150%	model averages. Individual
high and extreme	increase	increase	models can show much higher
forest fire danger			increases of up to 700%
Key environmental	Increased fl	ood intensity	
impacts	Increased co	bastal inunda	tion (some areas to become
	permanentl	y inundated)	
	Increased e	rosion	
	Reduced so	li fertility	
	Decreased v	vater quality	1 1111.
	Groundwate	er quality and	availability pressures
	Saltwater in	trusion	
	Increased pressure on water storage		

Biodiversity losses	
Increased pests such as wasps and rodents	
Ocean acidification	
Decline in fish population	
Increased wildfire	
Increased allergies (e.g. pollen)	

Kapiti coast whaitua

Variable/period	2040	2090	Commentary
Average annual	+0.5C to	+1C to	Maximum warming in autumn
Temperature	1C above	+2.7C	and winter, least in spring
	present	above	
		present	Note reference to above present
	(+1.2C to		versus pre-industrial: About 0.7C
	+1.7 C	(+1.7C to	of warming has already
	above pre-	+3.4C	happened from pre-industrial to
	industrial)	above pre-	present (1880-1909 compared to
		industrial)	1986-2005 reference periods).
			Uncertainty range: lower range
			for RCP4.5 and upper range for
			RCP8.5
Average annual	0% to 5%	0% to	There is a large uncertainty in the
rainfall	increase	10%	range of changes due to model
		increase	differences and emission
			scenarios. Changes against RCP
			are not necessarily linear. Greater
			likelihood of positive changes in
			autumn, winter and spring.
Amount of rain	0% to	0% to	Although the uncertainty in
falling during	10%	15%	average rainfall range is high,
heavy rainfall days	increase	increase	extreme rainfall increases are
(> 99 th percentile			more certain due to the increased
of daily rainfall)			amount of water vapour that the
			atmosphere can hold as it gets
			warmer (about 8% increase in
			saturation vapour per degree of
			warming)
Sea level rise	0.12 to	0.36 to	The projected sea level rise
	0.24	0.98	(based on IPCC AR5) may get
	metres	metres	significantly worse depending on
	above	above	the behavior of the Antarctic ice
	present	present	shelves, so the upper limit is not a
			fixed physical limit. There is very
	(0.38 to	(0.62 to	high confidence in sea level rise
	0.5 metres	1.24	projections, probably more so
	above pre-	metres	than any other variable. Note the
	industrial)	above pre-	difference between present and
		industrial)	pre-industrial, as we have
			already had about 26cm of sea
			level rise so far.
			See the link below for inundation
			maps plotting for anywhere in

			the world:
			http://sealevel.climatecentral.org
Number of hot	Between 5	Between 5	
days (above 25C)	and 10	and 50	
per year	days	days	
	increase	increase	
Number of frost	Between 0	Between 0	
nights (below 0C)	and 5 days	and 15	
per year	reduction	days	
		reduction	
Change in the	0% to 2%	0% to 3%	
intensity of wind	increase	increase	
during windy days			
(>99 th percentile of			
daily mean)			
Change in annual	0 to 4	0 to 6	
number of windy	days	days	
days	increase	increase	
Change in annual	Increase	Increase	Measures potential for crop and
growing degree	between 0	between	pasture growth
days base 10	and 300	200 and	
	GDD units	900 GDD	
		units	
Change in annual	Increase	Increase	Measures drought intensity
potential	between	between	
evapotranspiration	40 and 80	40 and	
deficit (mm)	mm	100 mm	
Change in rivers	Decrease	Decrease	Measures water shortage in the
mean annual low	up to 40%	up to 40%	catchments
flow discharge			
(MAL)	D. i	*	
Change in rivers	Between	Increase	Measures flood potential in the
mean annual flood	20%	up to 60%	catchments
discharge (MAF)	decrease		
	and 60%		
	increase		
	depending		
	on		
	catchment	1000/	
Changes in number	50% to	100% to	These figures are given by IPCC
of days of very	100%	150%	model averages. Individual
high and extreme	increase	increase	models can show much higher
forest fire danger	1 10	1	increases of up to 700%
Key environmental	Increased fl	ood intensity	tion (anno anno ta barrar
impacts	increased co	Jastai inunda	tuon (some areas to become
	Increased	y munuated)	
	nicreased el	USIUII	
	Reduced SO	interunity	

Decreased water quality
Groundwater quality and availability pressures
Saltwater intrusion
Increased pressure on water storage
Biodiversity losses
Increased pests such as wasps and rodents
Ocean acidification
Decline in fish population
Increased wildfire
Increased allergies (e.g. pollen)

Ruamahanga whaitua

Variable/period	2040	2090	Commentary
Average annual	+0.7C to	+1.2C to	Maximum warming in autumn
Temperature	1C above	+3C above	and summer, least in winter
	present	present	
			Note reference to above present
	(+1.4C to	(+1.9C to	versus pre-industrial: About 0.7C
	+1.7 C	+3.7C	of warming has already
	above pre-	above pre-	happened from pre-industrial to
	industrial)	industrial)	present (1880-1909 compared to
			1986-2005 reference periods).
			Uncertainty range: lower range
			for RCP4.5 and upper range for
			RCP8.5
Average annual	5%	0% to	There is a large uncertainty in the
rainfall	decrease	10%	range of changes due to model
	to 5%	decrease	differences and emission
	increase		scenarios. Changes against RCP
			are not necessarily linear.
			Variable seasonal pattern
Amount of rain	0% to	0% to	Although the uncertainty in
falling during	10%	20%	average rainfall range is high,
heavy rainfall days	increase	increase	extreme rainfall increases are
(> 99 th percentile			more certain due to the increased
of daily rainfall)			amount of water vapour that the
			atmosphere can hold as it gets
			warmer (about 8% increase in
			saturation vapour per degree of
	0.10	0.04	warming)
Sea level rise	0.12 to	0.36 to	The projected sea level rise
	0.24	0.98	(based on IPCC AR5) may get
	metres	metres	significantly worse depending on
	above	above	the behavior of the Antarctic ice
	present	present	shelves, so the upper limit is not a fixed physical limit. There is very
	(0.38 to	(0.62 to	high confidence in sea level rise
	0.50 to 0.5 metres	1 24	projections probably more so
	above pre-	metres	than any other variable. Note the
	industrial)	above pre-	difference between present and
	incustriary	industrial	pre-industrial as we have
		maasariarj	already had about 26cm of sea
			level rise so far.
			See the link below for inundation
			maps plotting for anywhere in
			the world:

			http://sealevel.climatecentral.org
Number of hot	Between 0	Between 0	
days (above 25C)	and 30	and 80	
per year	days	days	
	increase	increase	
Number of frost	Between 0	Between 0	
nights (below UC)	and 15	and 40	
per year	uays	uays	
Change in the	1000 to 300	1% to 4%	
intensity of wind	increase	increase	
during windy days	merease	mercase	
(>99 th percentile of			
daily mean)			
Change in annual	0 to 4	0 to 12	
number of windy	days	days	
days	increase	increase	
Change in annual	Increase	Increase	Measures potential for crop and
growing degree	between 0	between	pasture growth
days base 10	and 300	200 and	
	GDD units	1000 GDD	
		units	
Change in annual	Increase	Increase	Measures drought intensity
potential	between	between 0	
evapotranspiration	20 and	and 180	
deficit (mm)	120 mm	mm	
Change in rivers	Decrease	Decrease	measures water shortage in the
flow discharge	up to 60%	up to 80%	catchinents
(MAL)			
Change in rivers	Between	Retween	Measures flood notential in the
mean annual flood	20%	20%	catchments
discharge (MAF)	decrease	decrease	
	and 40%	and 60%	
	increase	increase	
	depending	depending	
	on	on	
	catchment	catchment	
Changes in number	100% to	100% to	These figures are given by IPCC
of days of very	150%	150%	model averages. Individual
high and extreme	increase	increase	models can show much higher
forest fire danger			increases of up to 700%
Key environmental	Increased fl	ood intensity	
impacts	Increased co	bastal inunda	tion (some areas to become
	permanentl	y inundated)	
	Increased e	rosion	
	Reduced sol		
	Decreased water quality		

Groundwater quality and availability pressures
Saltwater intrusion
Increased in drought frequency and intensity
Increased pressure on water storage
Biodiversity losses
Increased pests such as wasps and rodents
High potential for fruit fly establishment
Ocean acidification
Decline in fish population
Increased wildfire
Increased allergies (e.g. pollen)

Wairarapa coast whaitua

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Number of hot	Between 5	Between		
days (above 25C)	and 30	15 and 60		
per year	days	days		
	increase	increase		
Number of frost	Between 0	Between 0		
nights (below 0C)	and 5 days	and 15		
per year	reduction	days		
		reduction		
Change in the	0% to 3%	1% to 4%		
intensity of wind	increase	increase		
during windy days				
(>99 th percentile of				
daily mean)	0	a 1 a		
Change in annual	0 to 6	0 to 10		
number of windy	days	days		
days	increase	increase		
Change in annual	Increase	Increase	Measures potential for crop and	
growing degree	between 0	between	pasture growth	
days base 10	and 300	200 and		
	GDD units	900 GDD		
Change in annual	Increase	Increase	Maggunga draught intensity	
change in annual	hotwoon	hotwoon	Measures drought intensity	
ovapotranspiration	40 and	40 and		
deficit (mm)	40 allu 120 mm	40 allu 160 mm		
Change in rivers	Decrease	Decrease	Measures water shortage in the	
mean annual low	un to 60%	un to 80%	catchments	
flow discharge	up to 0070	up to 0070		
(MAL)				
Change in rivers	Between	Between	Measures flood potential in the	
mean annual flood	20%	20%	catchments	
discharge (MAF)	decrease	decrease		
0 ()	and 20%	and 60%		
	increase	increase		
	depending	depending		
	on	on		
	catchment	catchment		
Changes in number	100% to	100% to	These figures are given by IPCC	
of days of very	150%	150%	model averages. Individual	
high and extreme	increase	increase	models can show much higher	
forest fire danger			increases of up to 700%	
Key environmental	Increased fl	ood intensity		
impacts	Increased co	pastal inunda	tion (some areas to become	
	permanentl	y inundated)		
	Increased erosion			
	Reduced Soll fertility			
	Decreased water quality			
	eround wat	er quality and	u avallability pressures	

Increase in drought frequency and intensity	
Increased pressure on water storage	
Biodiversity losses	
Increased pests such as wasps and rodents	
High potential for fruit fly establishment	
Ocean acidification	
Decline in fish population	
Increased wildfire	
Increased allergies (e.g. pollen)	