

Zone 7: Regional snapshot of projected climate changes and hazards

Chatham Islands (Wharekauri – Rēkohu) and Pitt Island (Rangiauria –Rangiaotea) at longitude 183–184°E.

Hazard	RCP 4.5	RCP8.5	Extra information
Higher mean temperatures: air and water	2040: Annual average air temp to increase 0.7-0.9°C; Coastal sea-surface temps to increase ~0.3°C (5.2% change).	2040: Annual average air temp to increase 0.8-1.1°C; Coastal sea-surface temps to increase ~0.65°C (9.1% change).	<ul style="list-style-type: none"> - Summer air temperature to warm the most; Spring air temperature the least. - Daily maximum air temperature is expected to increase faster than overnight daily minimum temperature.
	2090: Annual average air temp to increase 1.3-1.4°C; Coastal sea-surface temps to increase ~1.1°C (8% change).	2090: Annual average air temp to increase 2.8-3.1°C; Coastal sea-surface temps to increase ~1.5°C (20% change).	
Heatwaves: increasing frequency and magnitude	2040: N/A	2040: N/A	<ul style="list-style-type: none"> - No data available yet for <i>Heatwaves >25°C (3 consecutive days)</i> or <i>Extreme Heatwaves >30°C (3 consecutive days)</i>. - 40-100% increase in hot days (>25°C) across New Zealand (RCP4.5, ~2050). - 40-300% increase in hot days (>25°C) across New Zealand (RCP4.5, ~2100).
	2090: More hot days/year (>25°C).	2090: More hot days/year (>25°C).	
More and longer dry spells and droughts	2040: N/A	2040: N/A	<ul style="list-style-type: none"> - The Chatham Is. are expected to become wetter not dryer, under climate change projections
	2090: N/A	2090: N/A	
Changes in climate seasonality with longer summers and short winters	2040: Warming greatest in summer and autumn. Warming least in winter and spring.	2040: Warming greatest in summer and autumn. Warming least in winter and spring.	<ul style="list-style-type: none"> - Spring and autumn frost-free land to at least triple by 2080 (RCP8.5, ~2100).
	2090: Warming greatest in summer and autumn. Warming least in winter and spring.	2090: Warming greatest in summer and autumn. Warming least in winter and spring.	
Increasing fire-weather conditions: harsher, prolonged season	2040: N/A	2040: N/A	
	2090: N/A	2090: N/A	
Increased storminess and extreme winds and rainfall	2040: Extreme wind speeds increase up to 10%. Intensity of (ex)tropical cyclones projected to increase. Rainfall events see righthand column.	2040: Extreme wind speeds increase up to 10%. Frequency of extreme winds is likely to increase in winter and decrease in summer. Mean westerly flow of wind to increase ~20% in spring and ~70% in winter; decrease by ~20% in summer and autumn. Intensity of (ex)tropical cyclones projected to increase. Rainfall events see righthand.	<ul style="list-style-type: none"> - Increases in extreme wind (esp. for southern North Island). - Increases in rainfall intensity projected everywhere. - Moderately extreme daily precipitation (99th percentile of wet days) increases. Very extreme daily precipitation increases in frequency. - Short duration (1-in-100-year, 1hour duration) extreme rainfalls increase +13.6% for every 1°C increase. Long duration rainfall events (1-in-2-year, 120hour duration) increase +4.8% for every 1°C increase.
	2090: Poleward shift of mid-latitude and possible small reduction in frequency. The most severe ex-tropical cyclones are expected to be stronger. Intensity of (ex)tropical cyclones projected to increase. Rainfall events see righthand column.	2090: Poleward shift of mid-latitude and possible small reduction in frequency. The most severe ex-tropical cyclones are expected to be stronger. Frequency of extreme winds is likely to increase in winter and decrease in summer. Intensity of (ex)tropical cyclones projected to increase. Occurrence conditions conducive to storm development is projected to increase by 3-6%, relative to the period 1970-2000. Rainfall events see righthand column.	

Change in mean annual rainfall	2040: Minimal changes in annual rainfall, most seen at seasonal scale (winter and spring become wetter).	2040: Minimal changes in annual rainfall, most seen at seasonal scale (winter and spring become wetter).	<ul style="list-style-type: none"> - The largest rainfall changes by ~2100 will be seasonal rather than annually. Minimal changes in annual rainfall, most seen at seasonal scale (winter and spring become wetter).
	2090: Increase in annual rainfall (+4%). Largest increase in winter (5-11%) and spring (6-8%).	2090: Increase in annual rainfall (+4%). Largest increase in winter (5-11%) and spring (6-8%).	
Reducing frost, snow and ice cover	2040: N/A	2040: Fewer frosts.	<ul style="list-style-type: none"> - Much of NZ (outside of alpine areas) to become frost-free under RCP8.5, ~2100 scenario. - Number of frost days decrease is greatest in the coldest regions.
	2090: Fewer frosts.	2090: Fewer frosts.	
Increasing hail severity or frequency	<ul style="list-style-type: none"> - No information available on hail. MfE suggest a potential increase in storm intensity, local wind extremes and thunderstorms. - See also information above for <i>Increased storminess and extreme winds and rainfall</i>. 		
River and flow changes in frequency and magnitude in rural and urban areas	2040: N/A	2040: N/A.	<ul style="list-style-type: none"> - No research yet on changes to large flood flows and return periods – highly uncertain at this point (all RCPs and time frames). - Increases in Mean Annual Flood occurrence affect most agricultural areas, with only slight reductions in other areas. Percentage increases tend to be greater for the more extreme RCPs (i.e. RCP8.5) and late century (i.e. ~2100).
	2090: Increased risk of flooding due to increases in predicted heavy rainfall (i.e. Whanga lagoon).	2090: Increased risk of flooding due to increases in predicted heavy rainfall (i.e. Whanga lagoon).	
Coastal and estuarine flooding: increasing persistence, frequency and magnitude	2040: 0.24m SLR	2040: 0.28m SLR; 0.37m under RCP8.5+ (allows for ice sheet instability).	<ul style="list-style-type: none"> - Rising sea levels are expected to cause salinization of groundwater and coastal wetlands. - Exposure to extreme storm tides will increase with further sea-level rise. - Extreme sea levels that are expected to be reached once every 100 years (on average) at present-day MSL, will occur at least once per year or more (on average) by 2050-2070 and will occur earlier in areas with smaller tidal ranges.
	2090: 0.55m SLR	2090: 0.79m SLR; 1.05m under RCP8.5+ (allows for ice sheet instability).	
Sea-level rise and salinity stresses on brackish and aquifer systems and coastal lowland rivers	2040: SLR trends as per above.	2040: SLR trends as per above.	<ul style="list-style-type: none"> - No information about projections for salinization of aquifers, except that this will increase under higher levels of SLR. - Changes to salinity will also depend on rainfall and runoff patterns.
	2090: SLR trends as per above.	2090: SLR trends as per above.	
Increasing coastal erosion: cliffs and beaches	<ul style="list-style-type: none"> - Land subsidence will exacerbate the effects of SLR. - Highly variable erosion, depends on geology, tidal range, geomorphology and exposure. - Areas with small tidal range more sensitive to erosion than large tidal range. 		
Increasing landslides and coastal erosion	<ul style="list-style-type: none"> - Increase in landslides and erosion with increasing rainfall intensity. Increased fire risk will exacerbate soil erosion. - Increased risk of sheet erosion (exacerbated by increased rainfall and runoff) - Bank erosion may increase with increasing river flows. - Wind erosion may increase in susceptible areas, particularly in areas which will become drier and windier. 		
Marine heatwaves: more persistent high summer sea temperatures	2040: Southwest Pacific summer sea temperature (SST) increases by ~0.8°C.	2040: Southwest Pacific SST increases by ~1.0°C.	<ul style="list-style-type: none"> - Marine heatwaves projected to increase in frequency and intensity with ongoing atmospheric and ocean warming (i.e. RCP4.5 & RCP8.5 for ~2050 & ~2100). - Proportional SST warming of 16-20% for most New Zealand marine areas. - Warming lowest in southern waters.
	2090: Southwest Pacific Sea SST increases by ~1.1°C. Tasman Sea SST exceeds ~3.0°C.	2090: Southwest Pacific Sea SST increases by ~2.5°C. Tasman Sea SST exceeds ~3.1°C.	
Ocean chemistry changes: nutrient cycling and pH change	<p>2040: pH: 7.98 for SW Pacific (decrease of 0.12).</p> <p>No significant decrease in surface macronutrient concentrations and net primary production.</p> <p>Particle flux change: 0.5%</p>	<p>2040: pH: 7.98 for SW Pacific (decrease of 0.12).</p> <p>Mixed layer depth to decrease by a mean of 6m. Significant decrease of surface macronutrient concentrations.</p> <p>Net primary production to decrease ~1.2%.</p>	<ul style="list-style-type: none"> - Reduction in surface mixed layer depth, macronutrients, net primary production, chlorophyll-a. Reductions increase with time and RCP. - Largest macronutrient declines in the eastern Chatham Rise and sub-Antarctic waters.

	<p>2090: pH: 7.98 for SW Pacific (decrease of 0.12). Mixed layer depth to decrease by a mean of 6m. Significant decrease of surface macronutrient concentrations. Net primary production to decrease ~1.2%. Particle flux change: -7.8%.</p>	<p>Particle flux change: 0.4% 2090: pH: 7.77 for SW Pacific (decrease of 0.33). Decreases in surface mixed layer depth (15%), macronutrients (7.5-20%), net primary production (4.5%), and particle flux (12%). Particle flux change: -4.7%</p>	<p>- Largest increase in dissolved iron in subtropical waters.</p>
<p>International influences</p>	<p>Findings from Royal Society report on Climate Change Implications for NZ (non-specific timeframes, region or RCP)</p> <ul style="list-style-type: none"> - All aspects of food security are potentially affected by climate change, including food access, utilisation, and price stability. - Climate change over the 21st Century is projected to increase the displacement of people. - Climate change can indirectly increase risks of violent conflicts in the form of civil war and intergroup violence by amplifying well-documented drivers of these conflicts such as poverty and economic shocks. - The impacts of climate change on critical infrastructure and the territorial integrity of many states are expected to influence national security policies. - While NZ agriculture could benefit from increasing global commodity prices in the long term, there are many negatives. - We gain significant revenue from long-haul tourism which could be reduced if the acceptability of long-haul travel, and costs of fossil fuels, are affected by climate change. 		
<p>Useful resources: More information can be found on the MfE website for the Chatham Islands.</p>			