



# Climate change – what does it mean for New Zealand?

Petra Pearce

Manager – Climate, Atmosphere & Hazards

5<sup>th</sup> One Health Aotearoa Symposium – 10 December 2019



# Evidence of climate change in NZ

- NZ average temperature +1°C over last 100 years
- NZ glaciers lost 38% ice volume 1962-2018
- ~20 cm sea level rise since 1900
- Marine heatwaves more common
- Record or near-record high temperatures set almost every month
- The pH of New Zealand waters has decreased.



**coldest to warmest**

110 years of measuring  
temperature in New Zealand

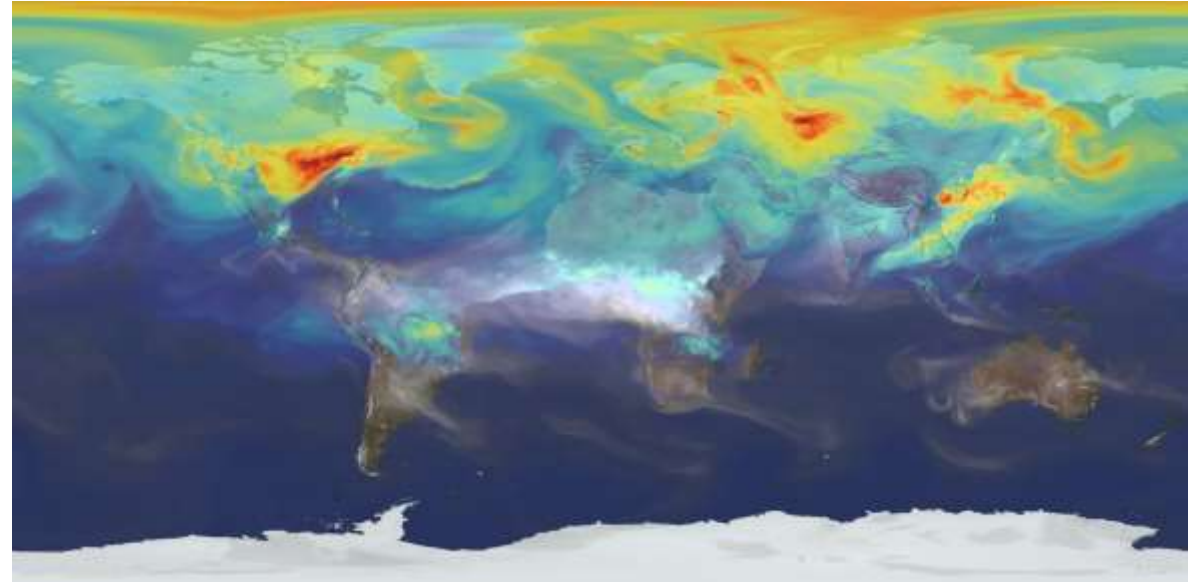
Dot size and colour based on temperature anomalies from NIWA's 7 station series and are relative to the 1981-2010 average





# What may the future hold?

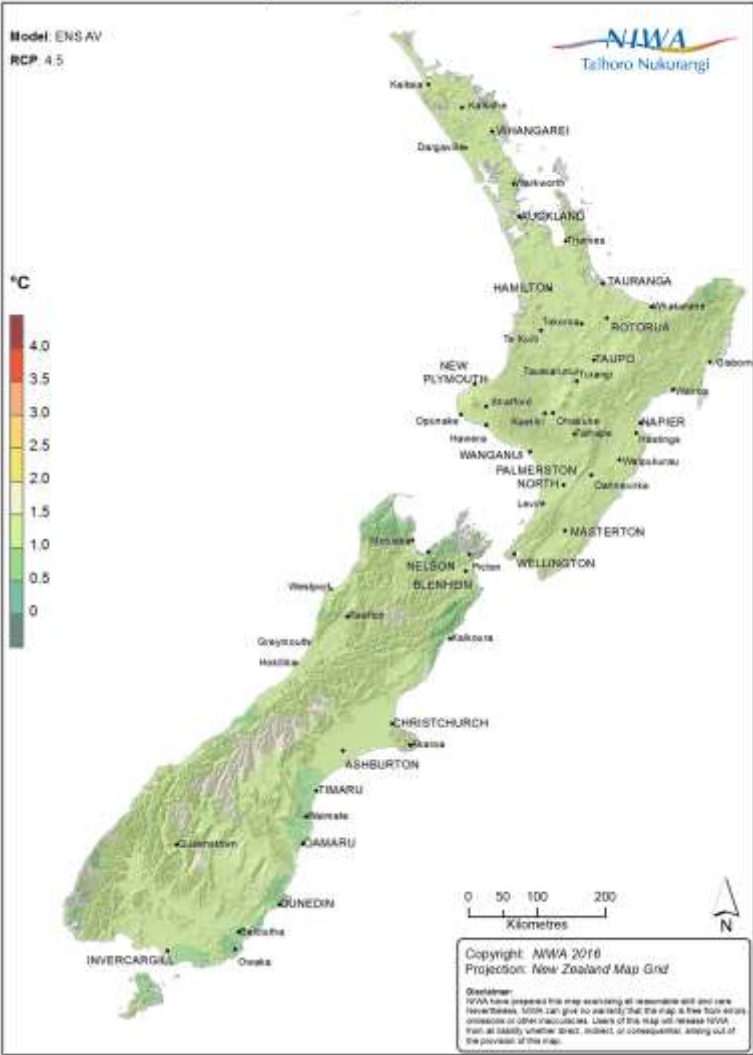
- Depends on global GHG emissions (and hence global agreements)
- We can project future climate changes based on scenarios of GHG concentrations
- RCP8.5 = high concentration pathway ('business as usual' emissions)
- RCP4.5 = mid-range pathway (requires reduction of emissions/carbon sequestration).



# NZ will be warmer everywhere

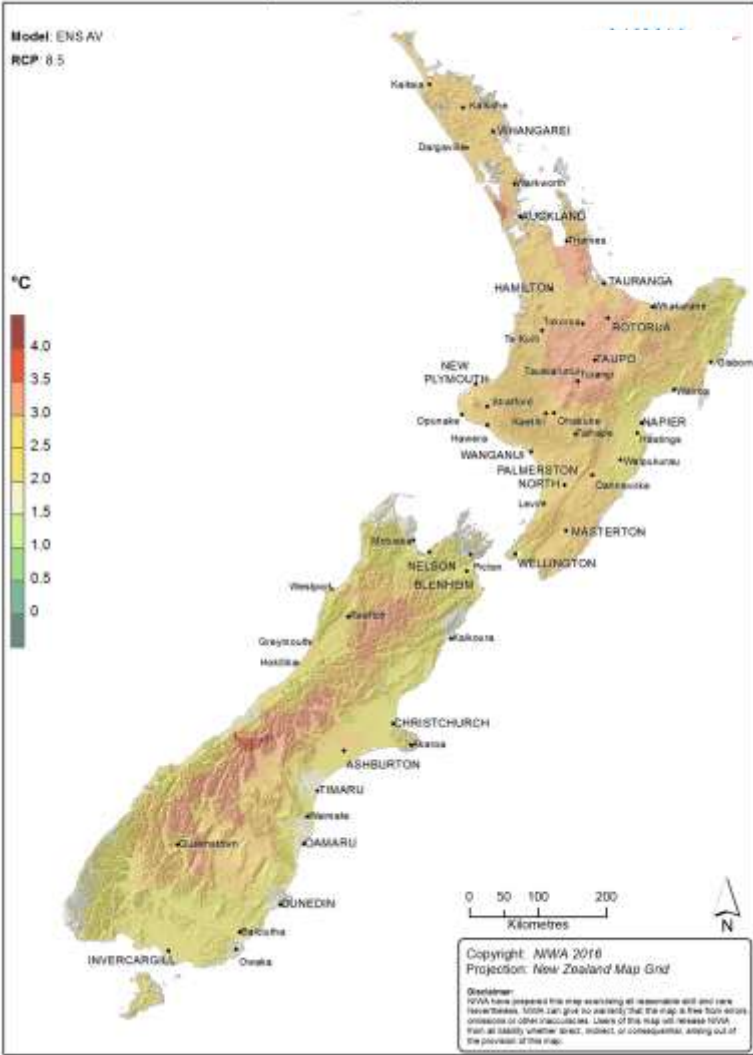
RCP4.5 'mid range' 2090

Annual Mean Temperature Change Between 1995 and 2090



RCP8.5 'Business as usual' 2090

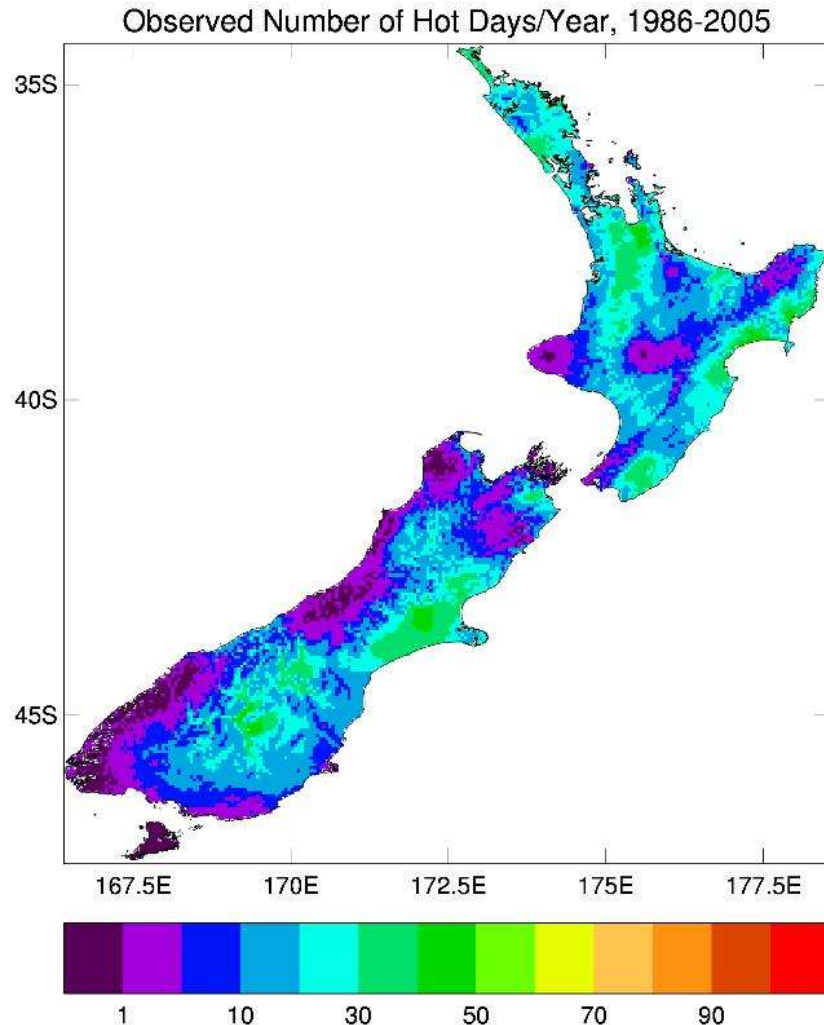
Annual Mean Temperature Change Between 1995 and 2090



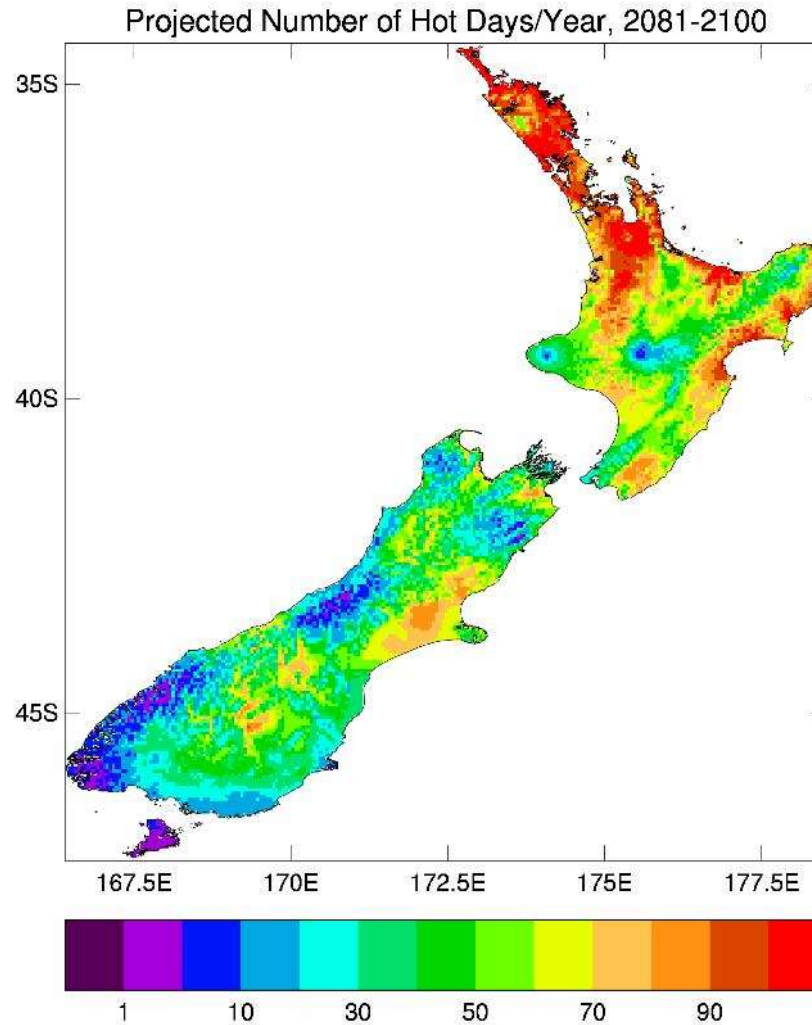
# More hot days

'Hot day' defined as  $T_{\max} \geq 25^{\circ}\text{C}$

Historic baseline



RCP8.5 (business as usual) 2090



- Further glacial retreat
- Increase in numbers of predators on native species
- Increase risk of pests and diseases
- Changing crop suitability
- Marine impacts

# Changes to rainfall patterns

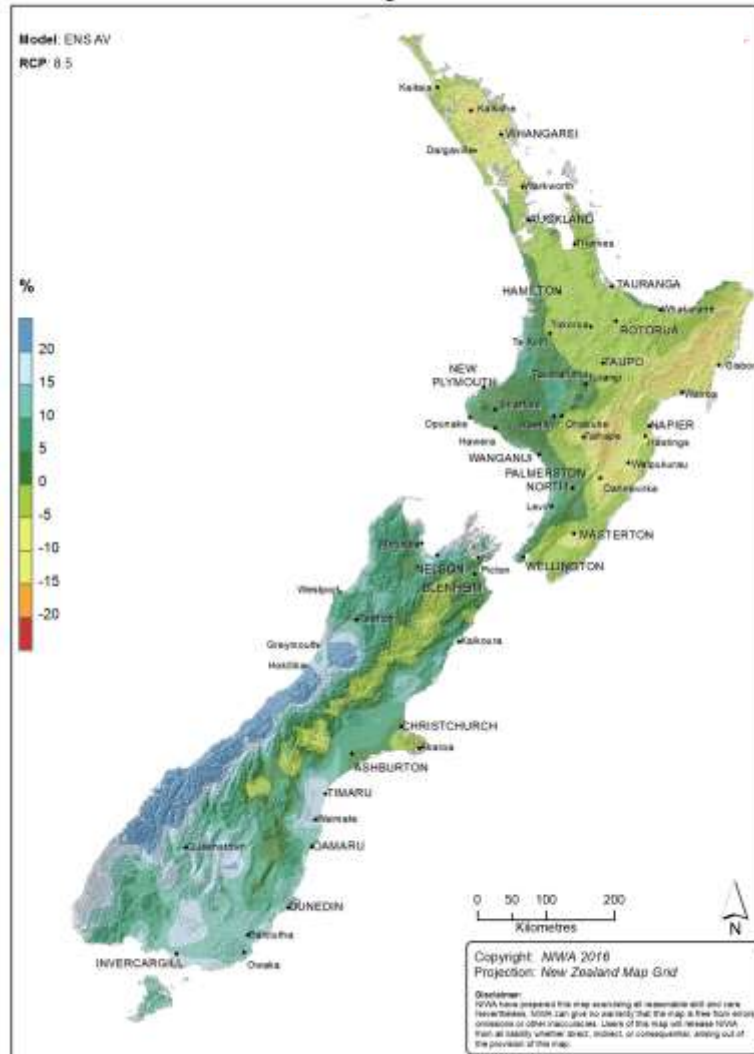
RCP8.5 'Business as usual' 2090

## Wetter west, drier east

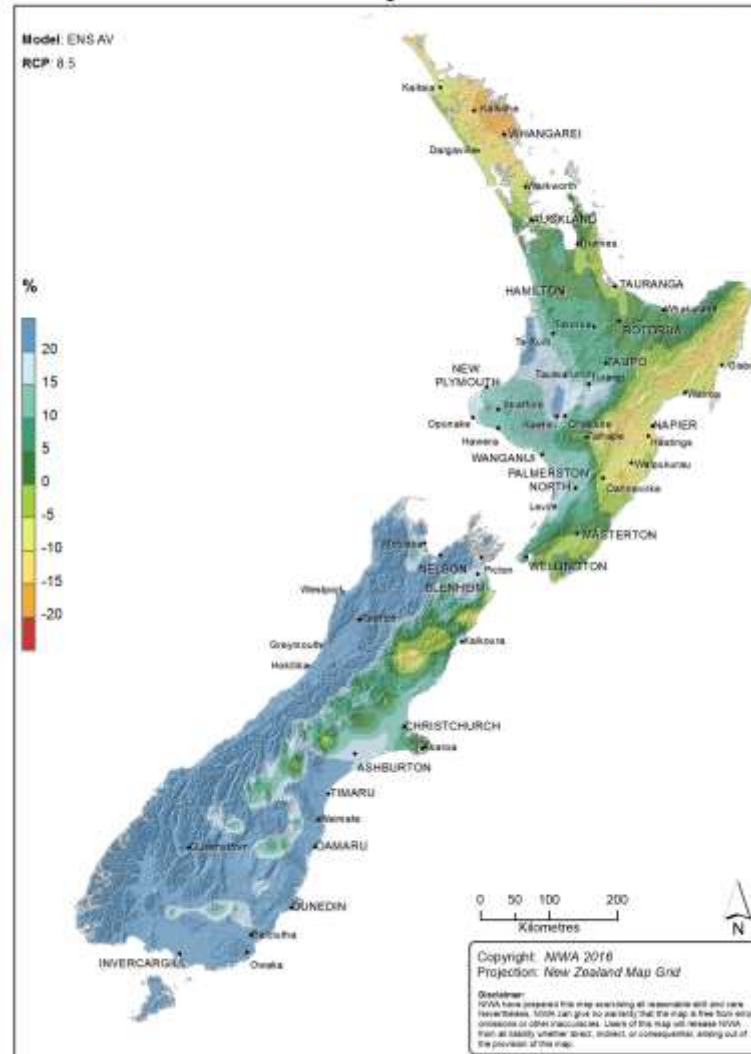
## Particularly in winter

## Fewer days with rain

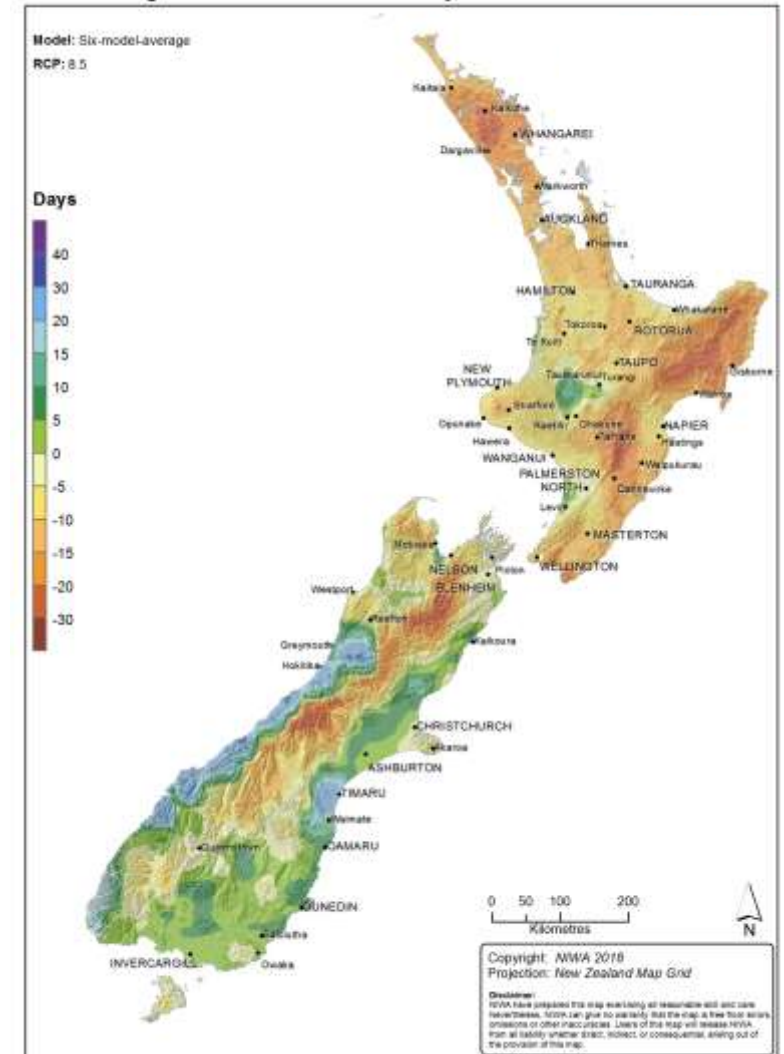
Annual Mean Rainfall Change Between 1995 and 2090



Winter Mean Rainfall Change Between 1995 and 2090



Change in Number of Annual Wet Days Between 1995 and 2090





# Drought impacts

- Increasing drought potential with drier spring/summers and warmer temperatures
- Low river flow thresholds getting earlier and lasting longer
- Increasing wildfire risk, longer fire seasons
- Impacts on primary sector
- Impacts on native biodiversity – terrestrial and instream
- Increased pressure on water resources





# Extreme rainfall and storm intensity increasing

- Largest heavy rainfall increases for short duration events
- Increasing intensity of ex-tropical cyclones and large storms (wind + rain)
- Potentially larger floods
- Increased slips, sedimentation
- Implications for floodplain communities, infrastructure (flood protection and civil)



# Sea-level rise and coastal erosion

- 0.5-1 m by 2100 depending on emissions scenario
- More coastal erosion and 'nuisance flooding'
- 100-year storm tide event becomes every year by ~2050
- Saltwater incursion into groundwater
- Coastal squeeze of habitats
- Damage to waahi tapu, homes, infrastructure



# Climate change impacts on health?

Climate, Freshwater & Ocean Science

## Human Health Impacts of Climate Change for New Zealand

Evidence Summary

EXPLORE | DISCOVER | SHARE

ROYAL  
SOCIETY  
TE APĀRANGI



# Damage to homes, services, places of importance

- Extreme events and sea-level rise causing damage to homes and infrastructure, forcing relocation
- Water shortages and contamination, more frequent toxic algal blooms
- Repeated stresses from extreme events has impact on mental health
- Maori communities particularly vulnerable – marae and waahi tapu



# Food production

- Droughts, floods and changes to weather patterns increase risk of crop disease, food spoilage, shortages and food contamination
- Marine heatwaves – kaimoana mortality and toxic blooms
- International impacts may be worse, affecting local food availability and cost



# Illness and disease

- Heat stress-related illnesses may increase
- Tropical diseases may establish in NZ
- Wetter conditions in some areas may increase damp and mould in homes
- Particulate air pollution from fires, pollen, or wind blown dust (during drought) may cause further respiratory issues





# Health benefits from mitigating climate change

- Reductions in the use of fossil fuels will reduce some particulate pollution
- Increasing active transport beneficial for health
- Retrofitting insulation in houses increases energy efficiency, reducing carbon emissions and improving health outcomes



## In summary

- New Zealand's climate is changing and will continue to do so for decades to come
- We can project future climate changes and sea level rise, but there is uncertainty on how much change by when
- We can predict the likely impacts of these changes, some of which we are already seeing
- Climate change will exacerbate existing health and wellbeing issues
- There will be health benefits from climate change mitigation

**Thank you**

**[petra.pearce@niwa.co.nz](mailto:petra.pearce@niwa.co.nz)**



**NIWA**

Taihoru Nukurangi

Climate, Freshwater & Ocean Science