



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

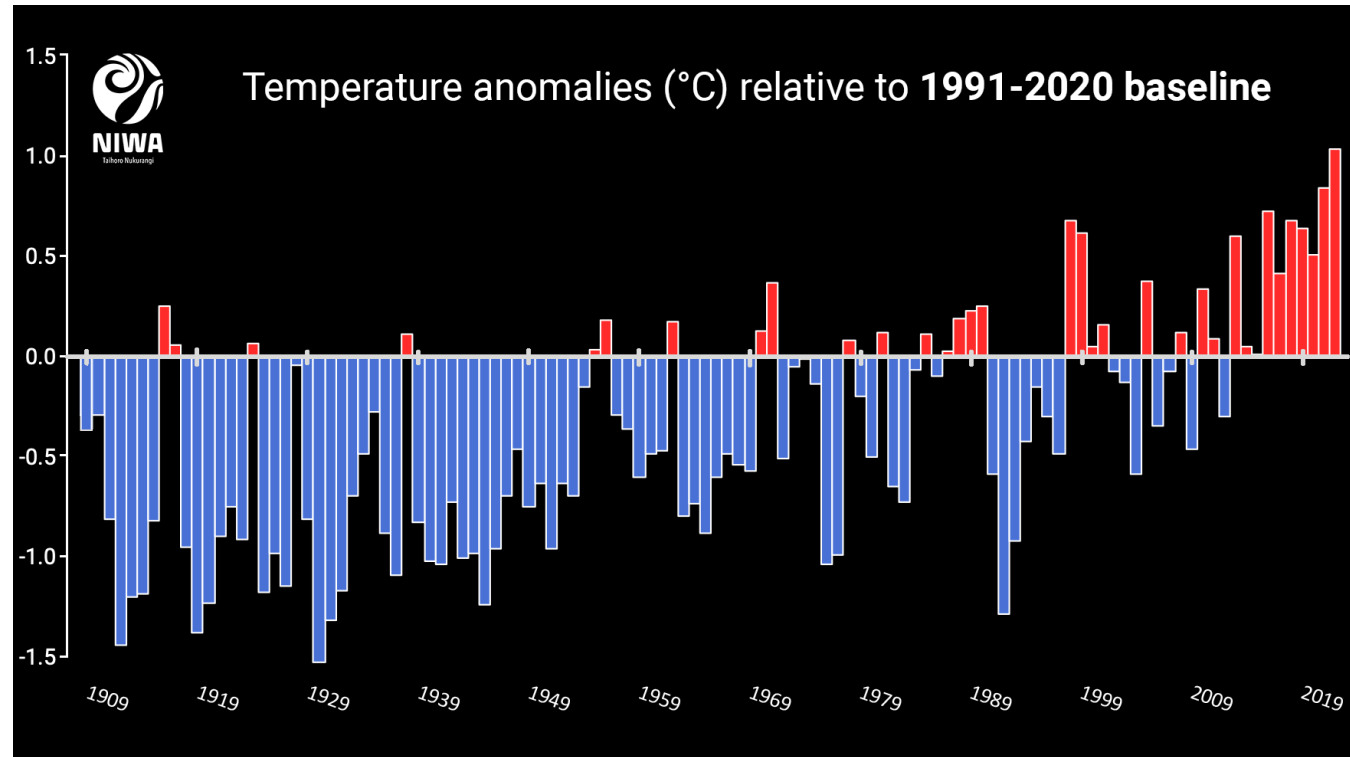
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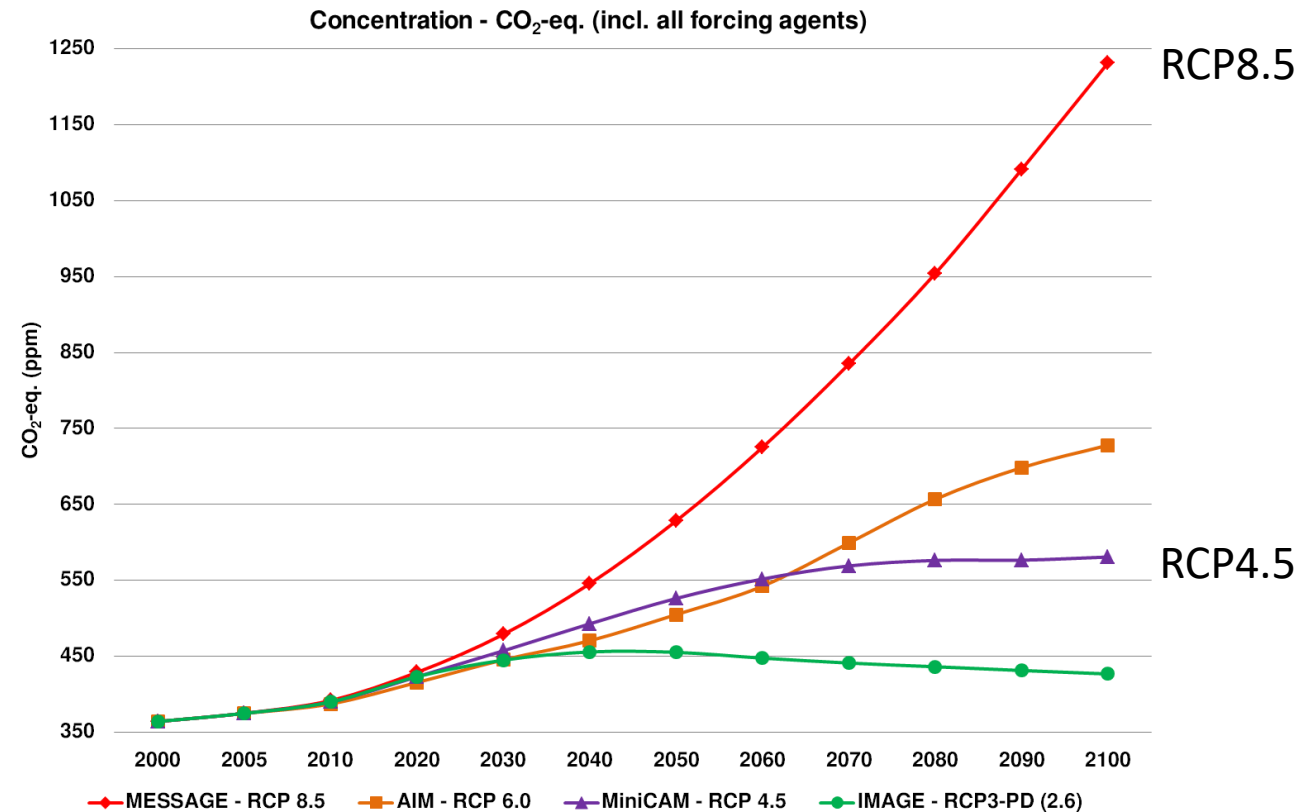
# Evidence of climate change in NZ

- NZ average temperature +1°C since 1909
- Record or near-record high temperatures set almost every month
- NZ glaciers have lost 35% of ice volume since 1978
- ~20 cm sea level rise since 1900
- Marine heatwaves more common
- More acidic oceans around NZ



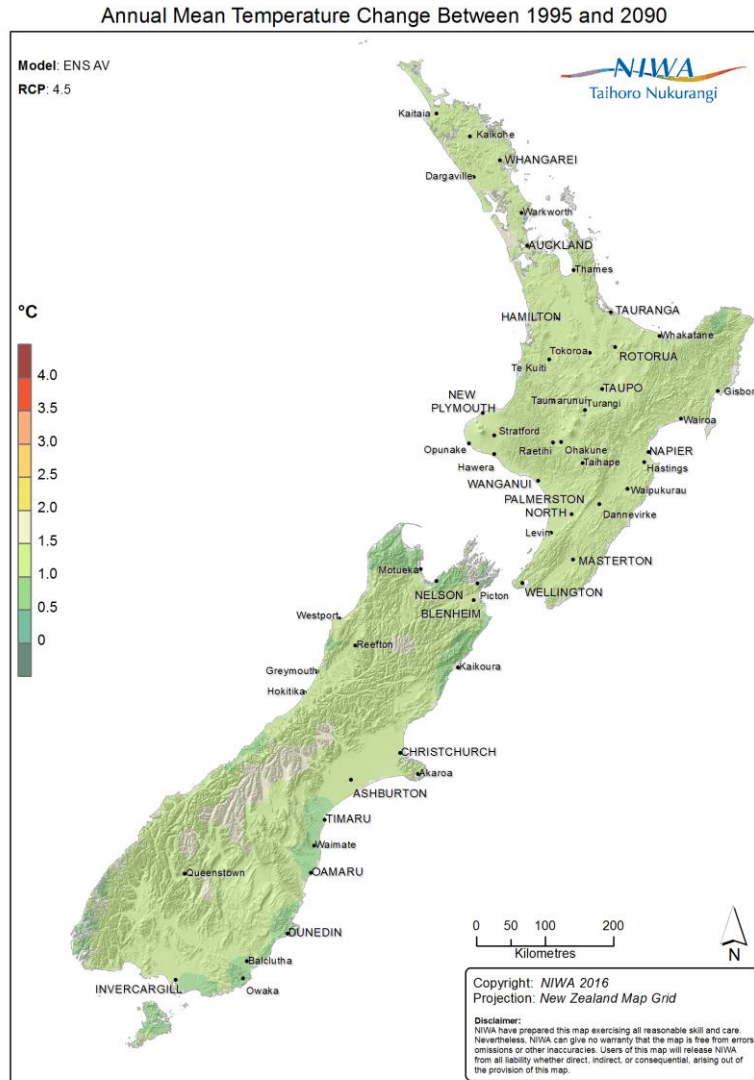
# What may the future hold?

- Simulations of future climate changes based on scenarios of greenhouse gas concentrations
- Multiple scenarios to understand uncertainty in future climate system
- NIWA downscales IPCC global climate models to a finer resolution over NZ
- Used by central and local govt, businesses for risk assessment
- IPCC AR5 modelling presented here, downscaling is underway for AR6 models

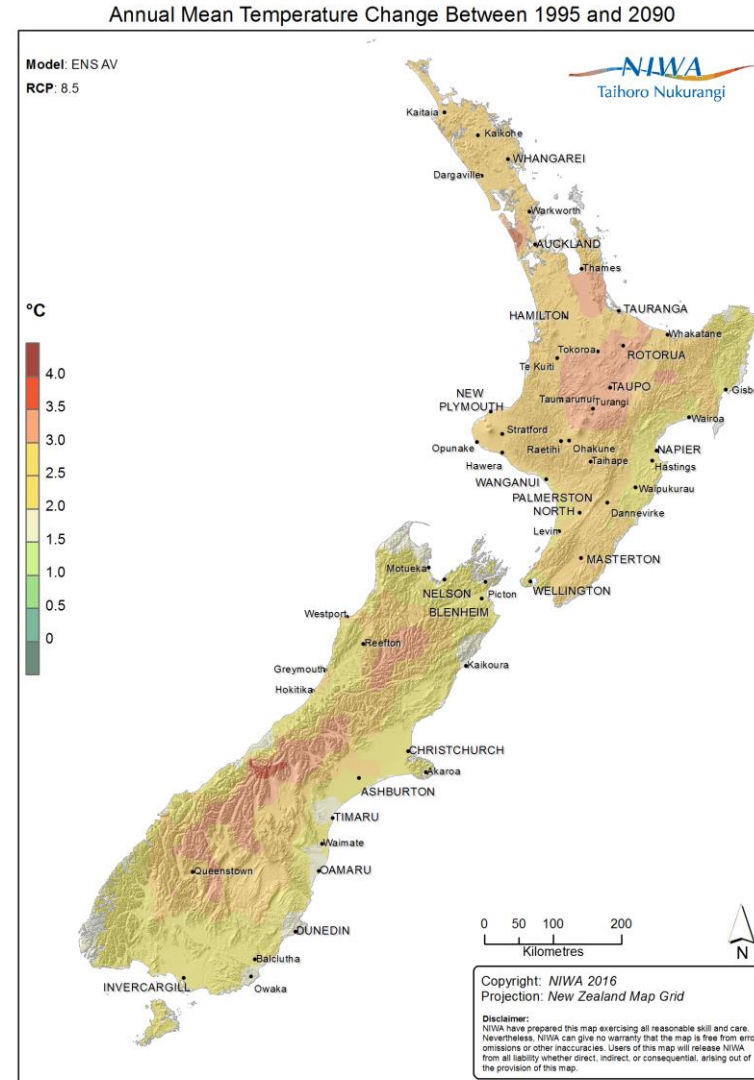


# NZ will be warmer everywhere

## 2090: RCP4.5 'mid range'

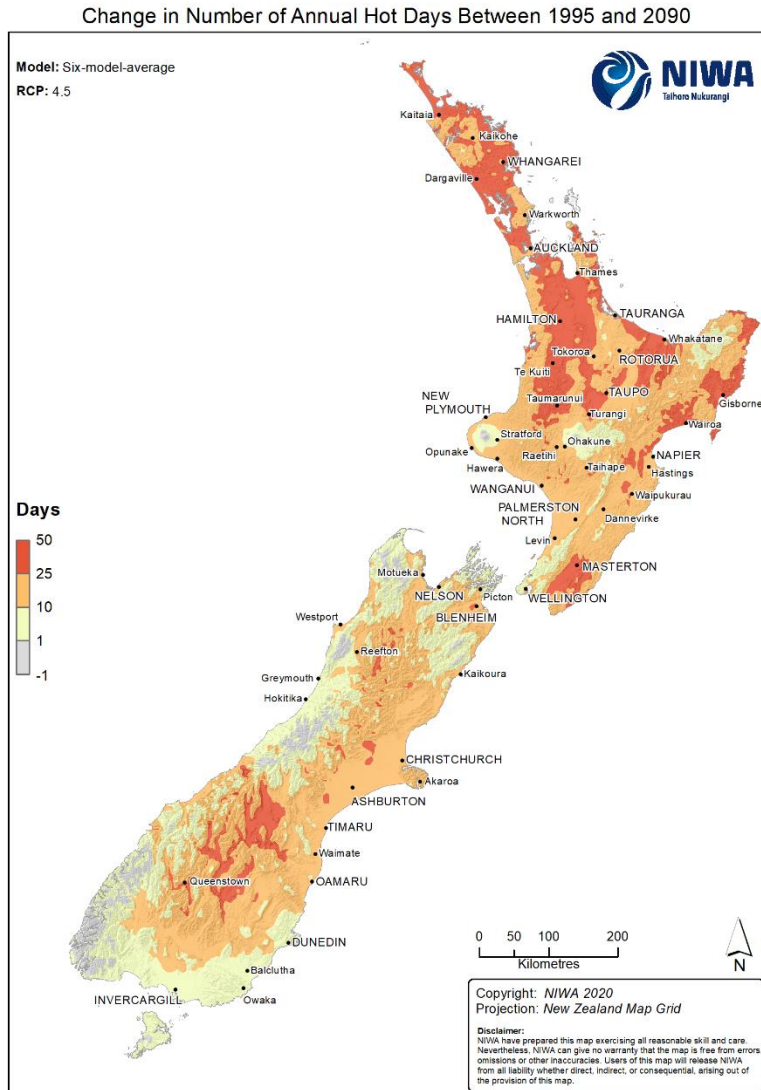


## 2090: RCP8.5 'high'

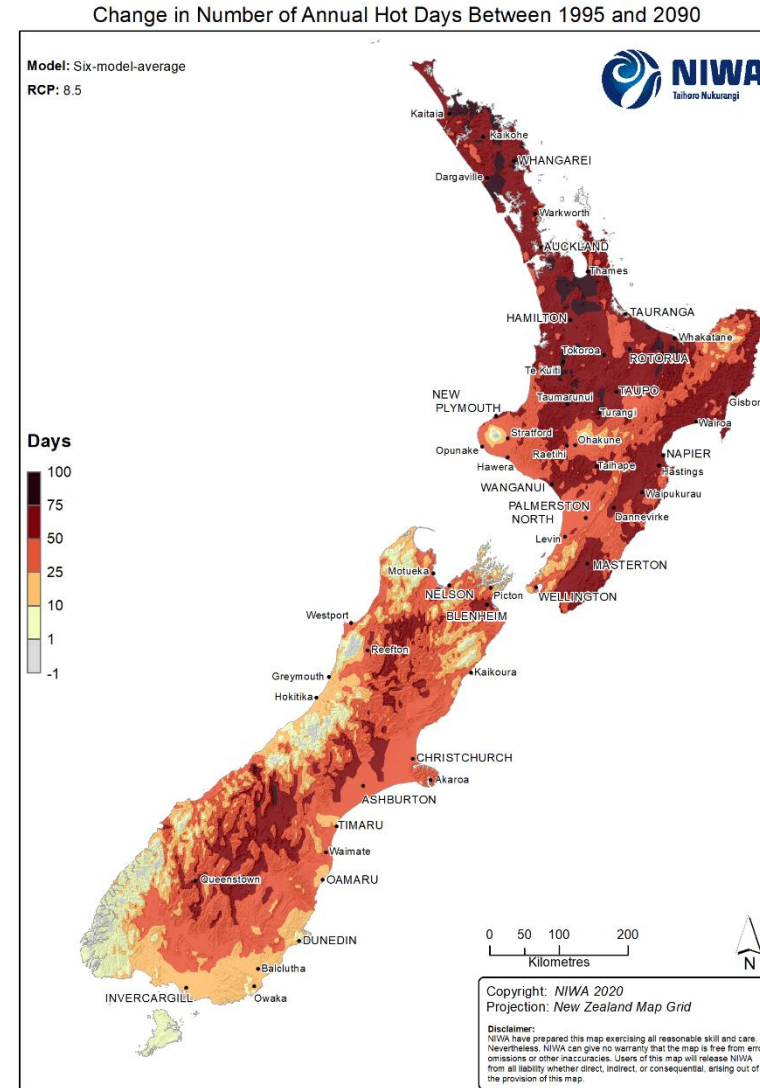


# More hot days (max temp. >25°C)

2090 RCP4.5 (mid): change



2090 RCP8.5 (high): change



# Pests, disease & biosecurity risks

- Establishment of new exotic pest animals, weeds and diseases which are currently prevented by New Zealand's cooler climate.
- Some evidence of expanded ranges of species already having an impact include myrtle rust, fruit flies and wasps.
- An issue for freshwater and marine environments, as well as terrestrial
- There will be a rising cost of managing these species as well as loss of revenue for primary production due to their impact.



# Changes to rainfall patterns

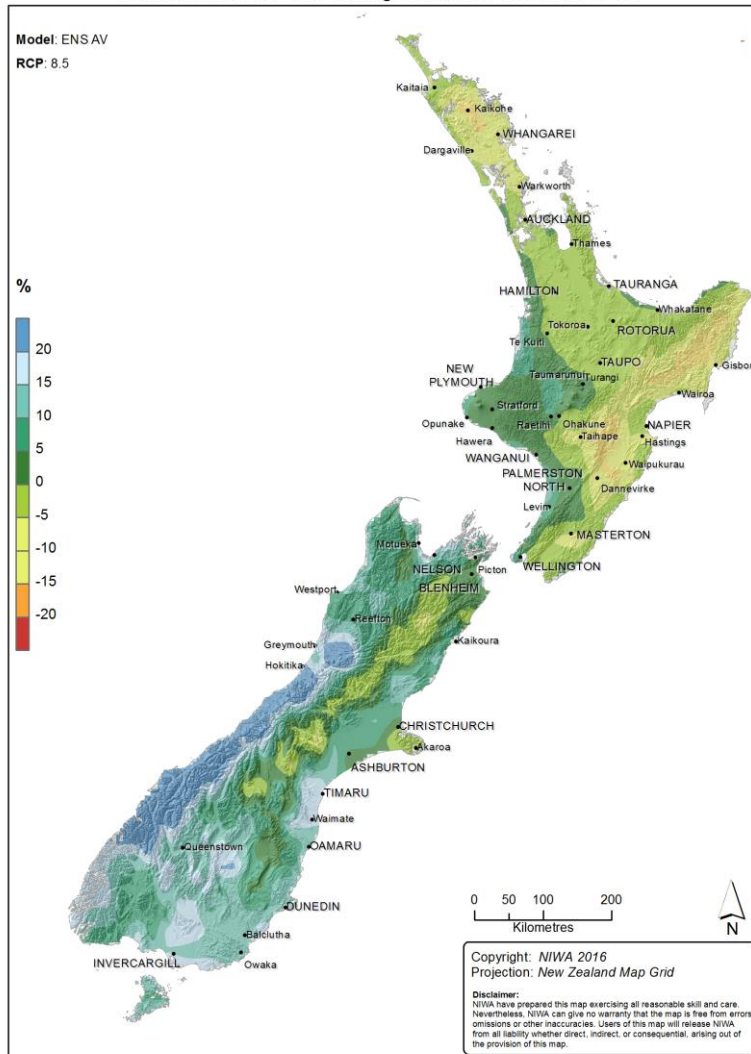
RCP8.5 'high' 2090

## Wetter west, drier east

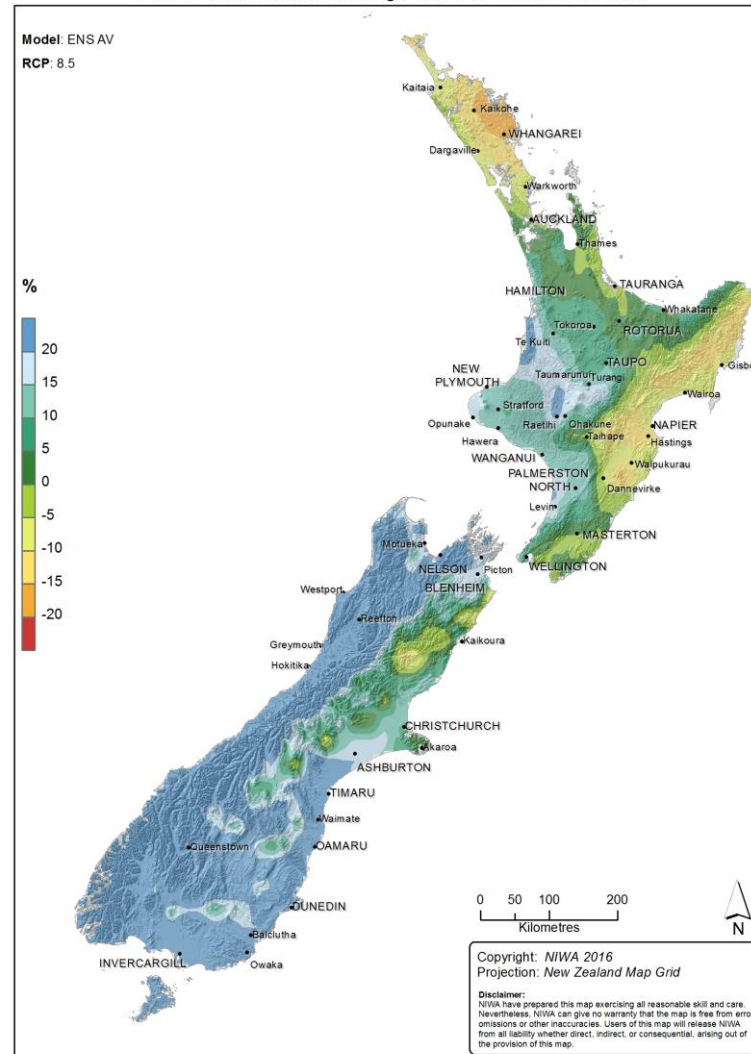
## Particularly in winter

## Fewer days with rain

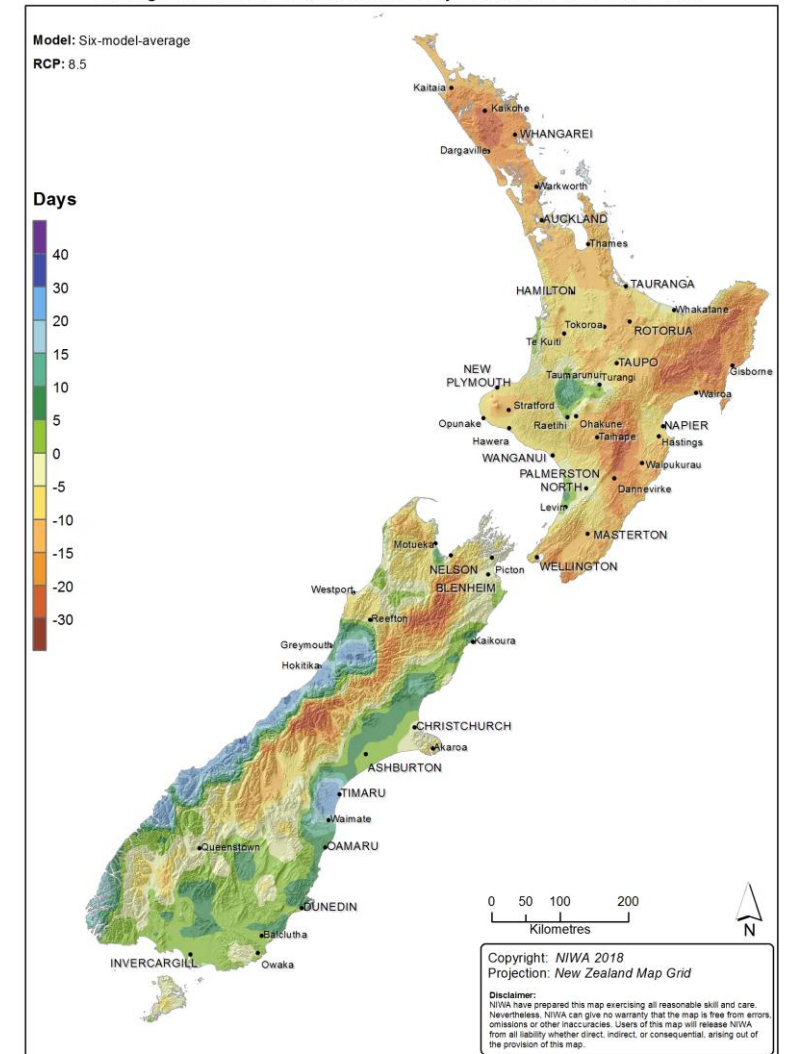
Annual Mean Rainfall Change Between 1995 and 2090



Winter Mean Rainfall Change Between 1995 and 2090



Change in Number of Annual Wet Days Between 1995 and 2090



# Drought risks

- Drought may increase even for areas where rain doesn't change much
- Increased pressure on water resources (e.g. irrigation)
- Increased wildfire risk and season length
- Elevated stress on plants, animals and trees





# Changes to extreme rainfall

NZ-wide estimates:

- 1-hr duration events  
~12-14% increase per °C
- 5-day duration events  
~5-6% increase per °C



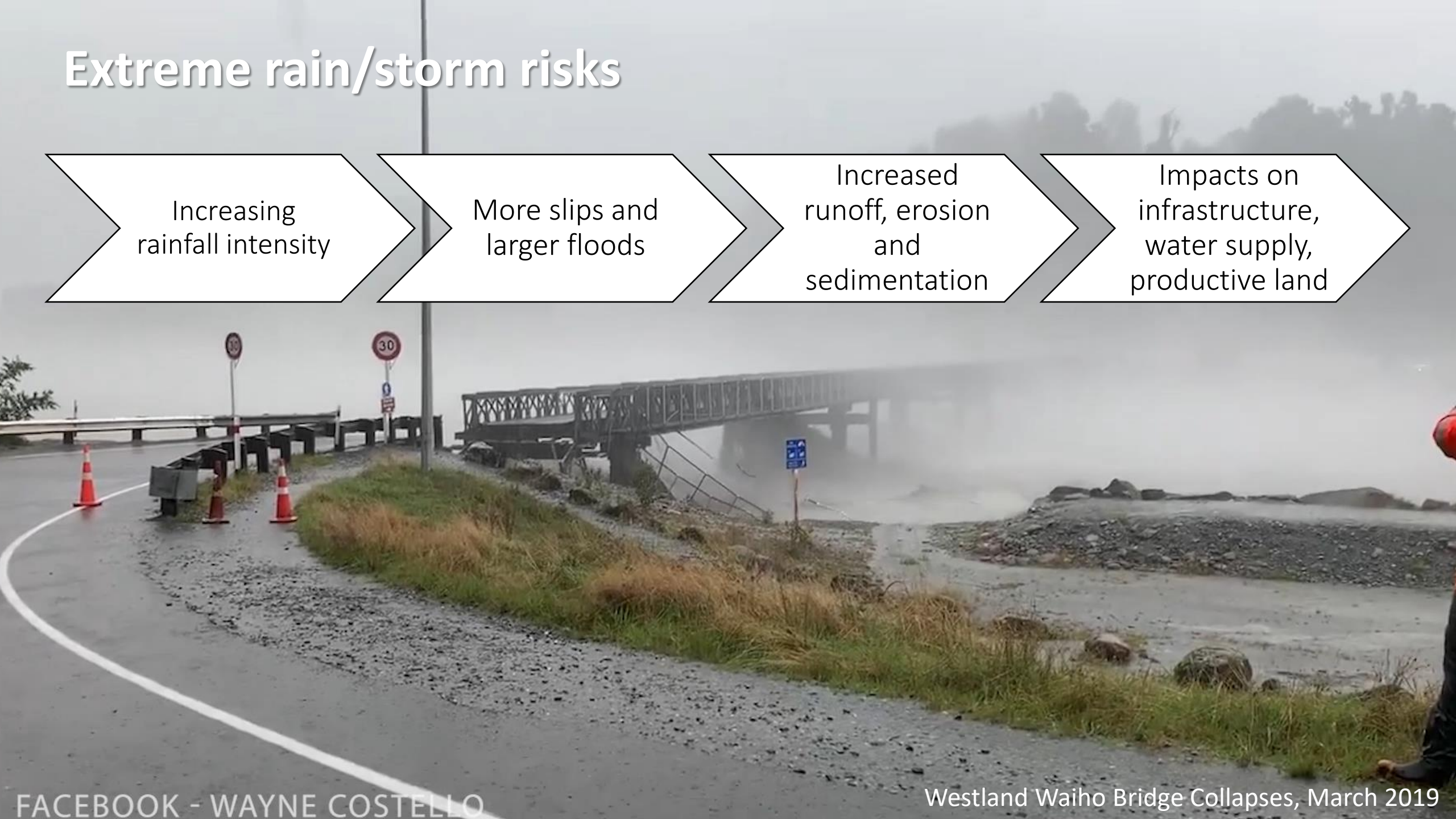
# Extreme rain/storm risks

Increasing  
rainfall intensity

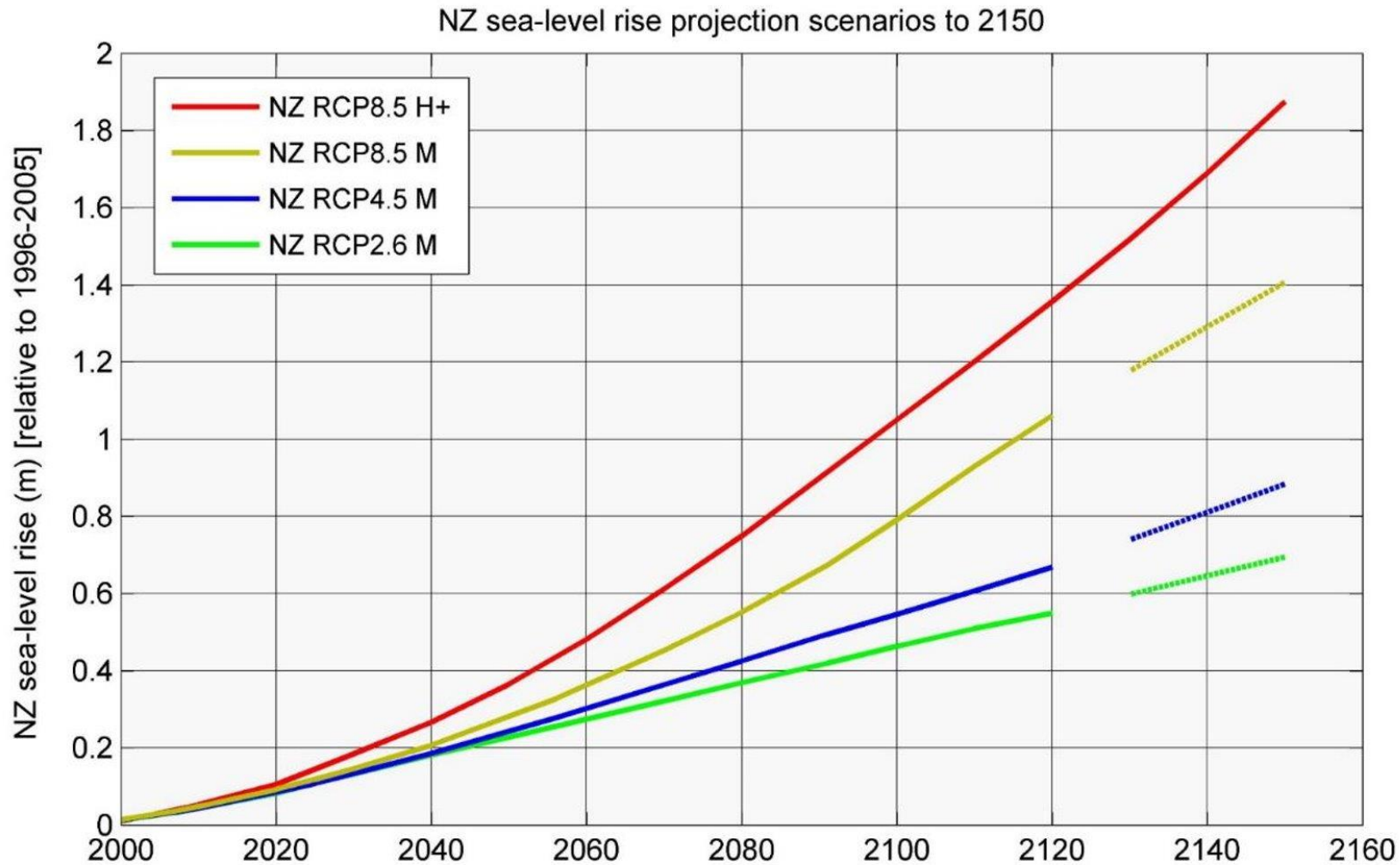
More slips and  
larger floods

Increased  
runoff, erosion  
and  
sedimentation

Impacts on  
infrastructure,  
water supply,  
productive land



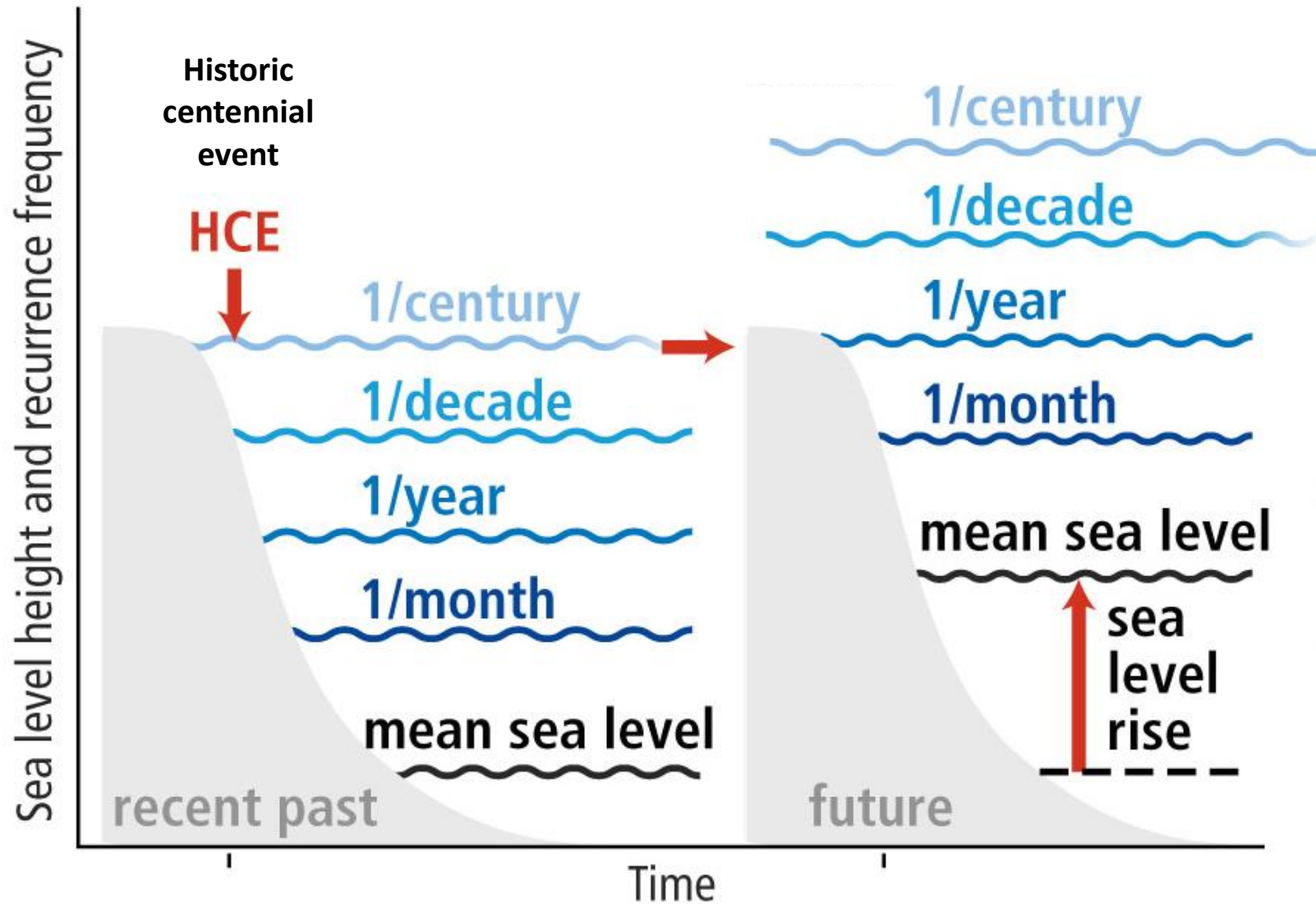
# Sea-level rise



Two ways of looking at this plot:

- 2050: +0.25m to +0.4m
- 2100: +0.45m to +1.1m
- +0.5m by 2060 at earliest
- +1m by 2100 at earliest

# Changing frequency of extreme coastal flooding



For NZ, change in frequency from 1/century to 1/year:

- after modest sea rises of 30-45 cm
- occurs from 2045 onwards

*Source: IPCC Special Report on Oceans & Cryosphere (2019)*

# Impacts of sea-level rise on coastal lowlands

Rising sea level

More coastal inundation events

Increased salinization of groundwater

Impacts on soils, crops, pasture, natural habitats

# Adaptation – how do we become more resilient to these risks?

- Incorporating climate change information into all long-term planning and decisions
- Enhancing natural environment improves adaptive capacity for humans and biodiversity
- Increasing community resilience through education and empowerment
- Assessing climate change as you would with any other risk



# Thank you

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# NIWA

Taihoru Nukurangi