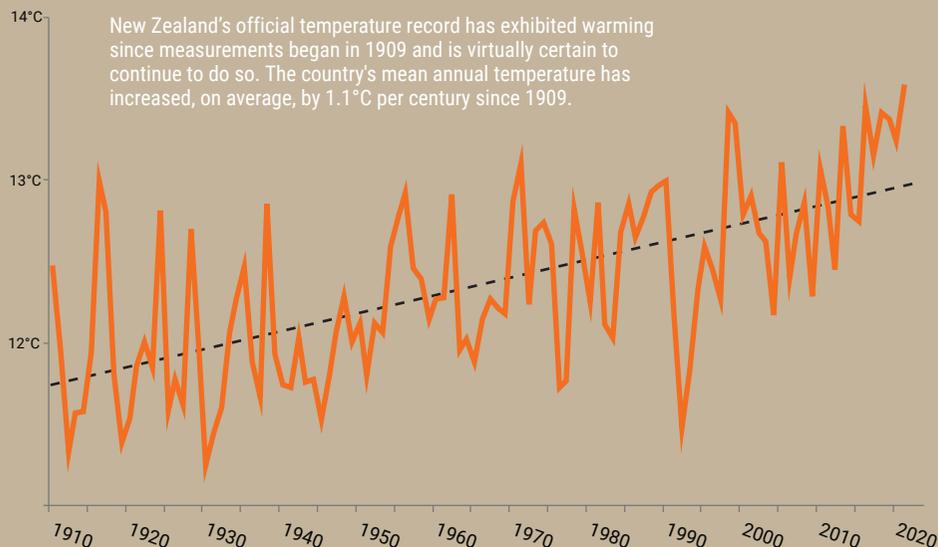


# WAIMAKARIRI CLIMATE CHANGE SCENARIOS

From large forestry blocks, through productive farmlands, to extensive horticulture and viticulture sectors, Waimakariri District is dependent on the use of the natural environment.

As temperatures rise due to global warming, our wind, rainfall, and seasonal patterns will shift, and we will see more extreme events and unpredictability in our weather.

Climate change is already happening, and the current average temperature is about one degree higher than 100 years ago. As we head into the future it is critical to understand how our environment might change so we can prepare, find opportunities, adapt, and continue to prosper.



Assessing possible changes to the climate system is challenging because climate projections depend strongly on future greenhouse gas concentrations. Representation concentration pathways (RCPs) are scenarios that describe how greenhouse gas concentrations might change during the 21st Century. These two RCPs represent a plausible range for future global climate change.

## MODERATE INTENSITY SCENARIO (RCP 4.5)

RCP4.5 is an intermediate concentration scenario that could be a realistic outcome if moderate global action is taken towards mitigating greenhouse gas emissions.

## HIGH INTENSITY SCENARIO (RCP 8.5)

RCP8.5 is a high-risk scenario, with greenhouse gas concentrations increasing at the current or an elevated future rate.

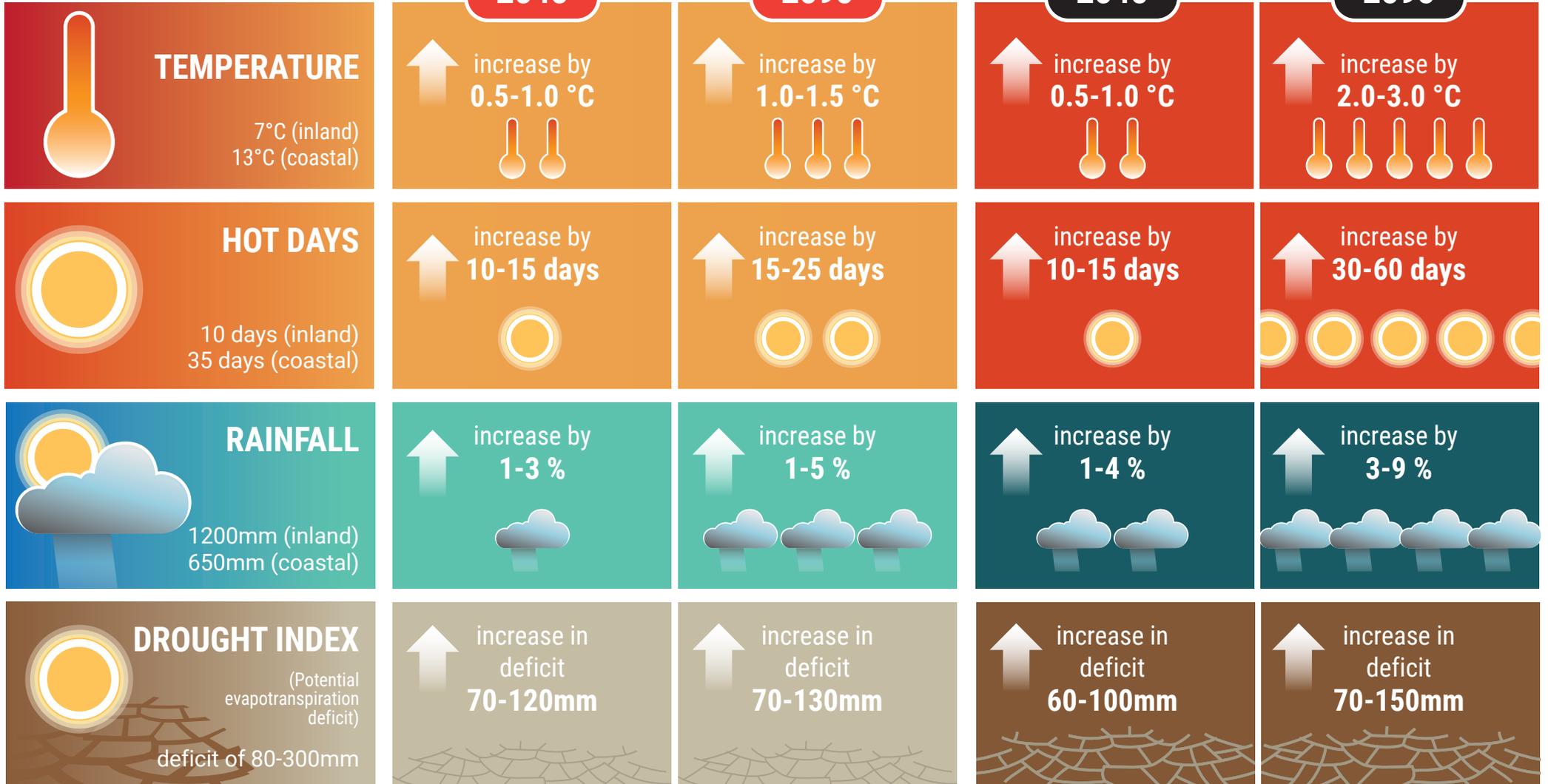
# OVERVIEW

## Waimakariri Climate Change Scenarios

### CURRENT AVERAGE

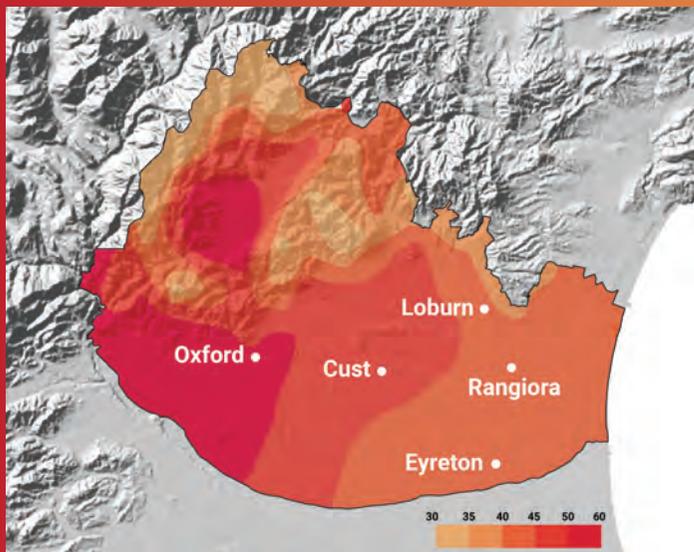
### MODERATE INTENSITY SCENARIO

### HIGH INTENSITY SCENARIO



# TEMPERATURE

Increasing average temperatures means that extreme warm temperatures will be more common. By 2040, the difference in hot days (days with temperature > 25°C) between moderate and high intensity scenarios is small. However, by the end of the century, the difference between high and moderate scenarios is substantial with more than double the number of hot days under the high intensity scenario. The Lees Valley and western plains could see the largest surge in hot days by the end of century with upwards of 50 additional hot days projected per year.



Map showing the increase (compared to a recent average) in annual number of hot days expected by the end of the century under the high intensity scenario. At present inland areas experience around 10 hot days a year while coastal areas see around 35 hot days.

## HOW DOES CHANGING TEMPERATURE AFFECT OUR DISTRICT?



Increase in heatwaves could bring more heat-related illness to residents of the district, especially vulnerable groups and outdoor workers. This could also cause increased heat stress and mortality for livestock animals

Warmer temperatures could also enhance the risk of pests and diseases that impact primary industries. Some pests and diseases normally wiped out by cooler winter temperatures may be able to persist and spread. Animals and plants living in higher elevation areas may be affected by new pests as temperatures warm and snowlines rise.



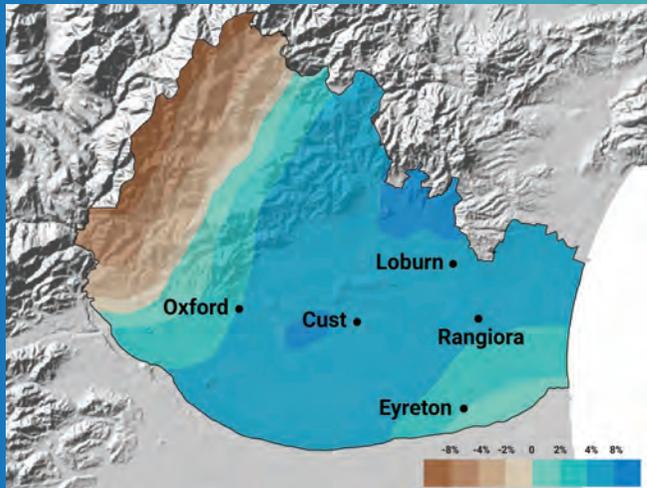
Projections suggest warming could be enhanced in the district's ecologically sensitive alpine areas and snow days will be reduced. Changes to the seasonal timing of snowmelt will likely affect water supply to downstream communities and use by the primary sector. Warmer temperatures could also adversely affect the district's sensitive waterways, such as Ashley/Rakahuri estuarine ecological area. These areas hold significant cultural and recreation value to local residents.

# RAINFALL



Changes to yearly rainfall totals are expected to follow an east-to-west gradient, with increasing rainfall across the plains and coastal areas, and no change (or a slight decrease) in the high-altitude regions and Lees Valley. The southern edge of the district may experience 12% more rainfall annually under the high intensity scenario. Despite increased annual rainfall, drought intensity may increase throughout the district as a warmer atmosphere dries the land. Droughts are expected to become more severe and last for longer periods.

A warmer atmosphere can hold more moisture and therefore more frequent and intense rainfall events are expected in the future. It's likely that shorter duration extreme rainfall events (e.g., thunderstorms) will experience a greater intensity increase than longer-lived rainfall events. Historically, a 1-in-100 year rainfall event of 1 hour duration brings 33mm of rain in Rangiora. By the end of the century, under the high intensity scenario, this could increase to 44mm.



Map showing the change in annual number of dry days (days with less than 1mm of rain) expected by the end of the century under the high intensity scenario. Similar to the projected change to annual rainfall, changes in dry days will follow an east west gradient with slight increases in dry days in the upper high elevation areas and decreases in dry days in the lowland and coastal areas.

## HOW DOES CHANGING RAINFALL AFFECT OUR DISTRICT?



Flooding will continue to be an issue in the district particularly for primary sector activities located near the district's larger rivers, such as the Ashley/Rakahuri and Waimakariri or in areas experiencing considerable amounts of rainfall.

More frequent and intense storms could result in loss of life, crops, livestock, extended power outages and property damage. Insurance may increasingly become an issue for owners of affected properties.

Evaporation and transpiration are expected to increase throughout the Waimakariri District in the future, suggesting the district will likely become more drought prone. This will have an impact on water sensitive activities and industries. It could mean that there is more pressure on all freshwater uses, including irrigation.



Increased drought frequency, and associated increases in vegetation drying, more thunderstorms and lightning combined with warmer temperatures are expected to contribute to an increased fire risk in the future. Damaging wildfires that could negatively impact forestry, biodiversity, agriculture, and private property could become more prevalent across the district in future.



## NATURAL ENVIRONMENT IMPACTS

Many of Aotearoa New Zealand's indigenous plants and wildlife exist nowhere else on earth. Our ecosystems and species therefore make a significant contribution to global biodiversity. All aspects of life rely on a thriving natural environment including physical and mental health, food and water security, culture and economy. The natural environment also contributes to climate resilience by absorbing carbon.

The current biodiversity crisis and climate crisis have been acknowledged to be closely linked. Wetlands, native forest and rare species such as the Tawera mud fish and Canterbury Pink Broom are particularly at risk in the district.

## CULTURAL IMPACTS

Changes to the natural environment affect Māori cultural, economic and spiritual wellbeing. Culture and customs relating to mahinga kai (food gathering) and urupā (burial grounds) could be impacted. The loss of vulnerable ecosystems and species will also disturb the relationships Māori have with these living taonga (treasure).



The information presented here is a summary of the "Climate Change Scenarios Technical Report". The report was prepared by NIWA for the Waimakariri District Council. A video summarising the findings and the full technical report can be found at: [www.waimakariri.govt.nz/climate](http://www.waimakariri.govt.nz/climate)

## Waimakariri Climate Change Scenarios

# SEA-LEVEL RISE

Sea-level rise is triggered by melting of the polar ice caps, and the thermal expansion of ocean as water warms. In New Zealand, the sea may rise by up to a metre by the end of the century. There are several growing settlements located in the Waimakariri District that are located along the coastline, so sea-level rise could directly impact those living in the coastal zone.

Slow incremental changes will occur alongside and increased frequency and magnitude of extreme sea-level events. Coastal erosion and flooding can damage homes, roads and other infrastructure and affect access to coastal areas. Rising sea levels also threaten important coastal ecosystems such as the Ashley/Rakahuri estuarine system which is an important feed, roosting and breeding ground for a large number of native birds, including threatened and critically endangered species.

