Climate Change Implications

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Climate change is a real and happening thing …

- The evidence for global warming is unequivocal (IPCC)
- It is very likely to be human-induced (IPCC)
- Represents a “real and present danger”

  Sir David King, Chief Advisor to UK Government

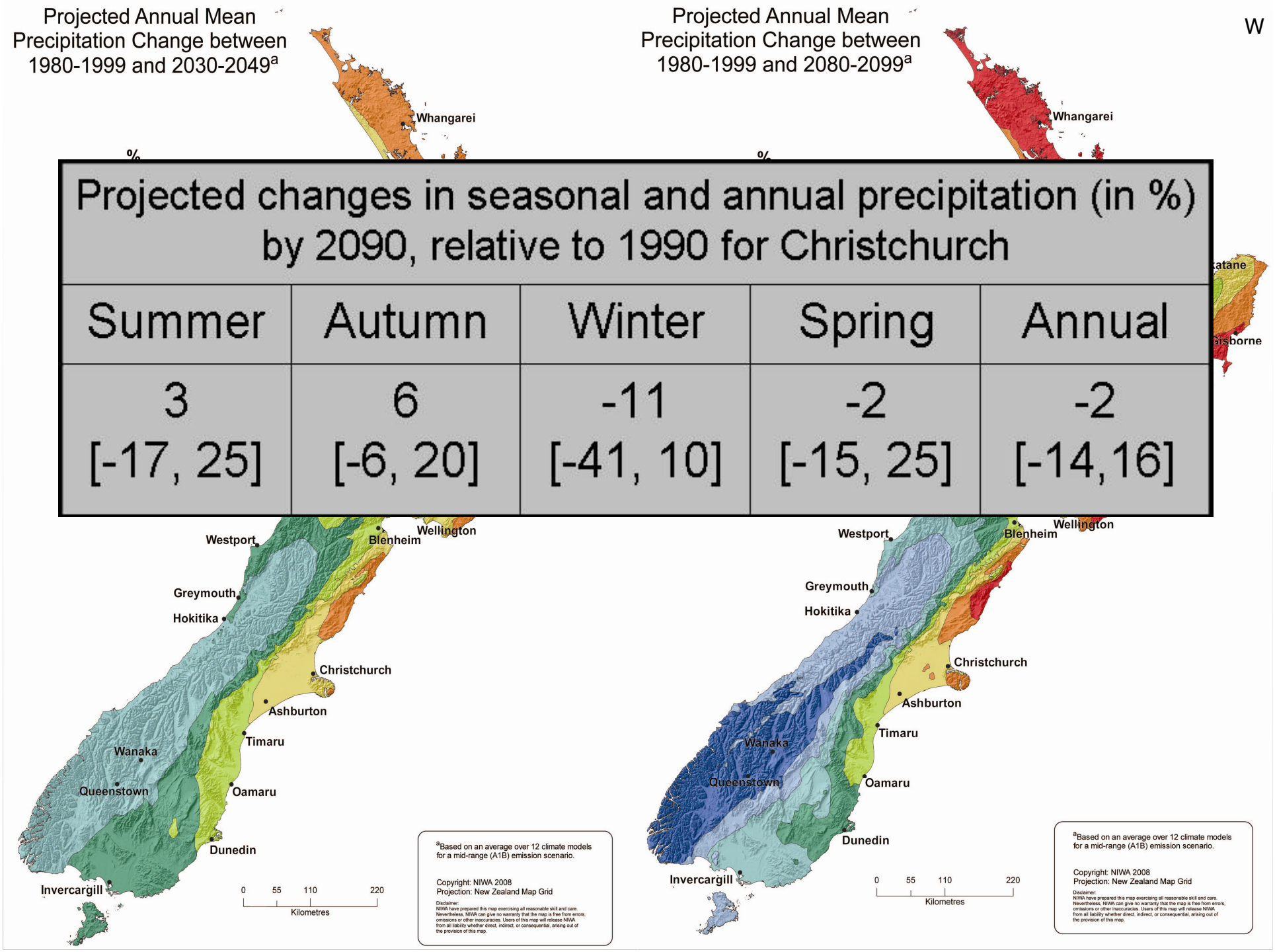
The climate is changing and it is our fault … this will have implications for all of us

Mitigation and Adaptation

- Mitigation
  - Reduce our emissions
  - e.g., ETS, Bio fuels, Energy efficiency …
- Adaptation
  - Minimize risk
  - Maximize opportunity
  - e.g. Stormwater design, crop choice …
- Adaptation needed even if emissions reduced

Climate Change

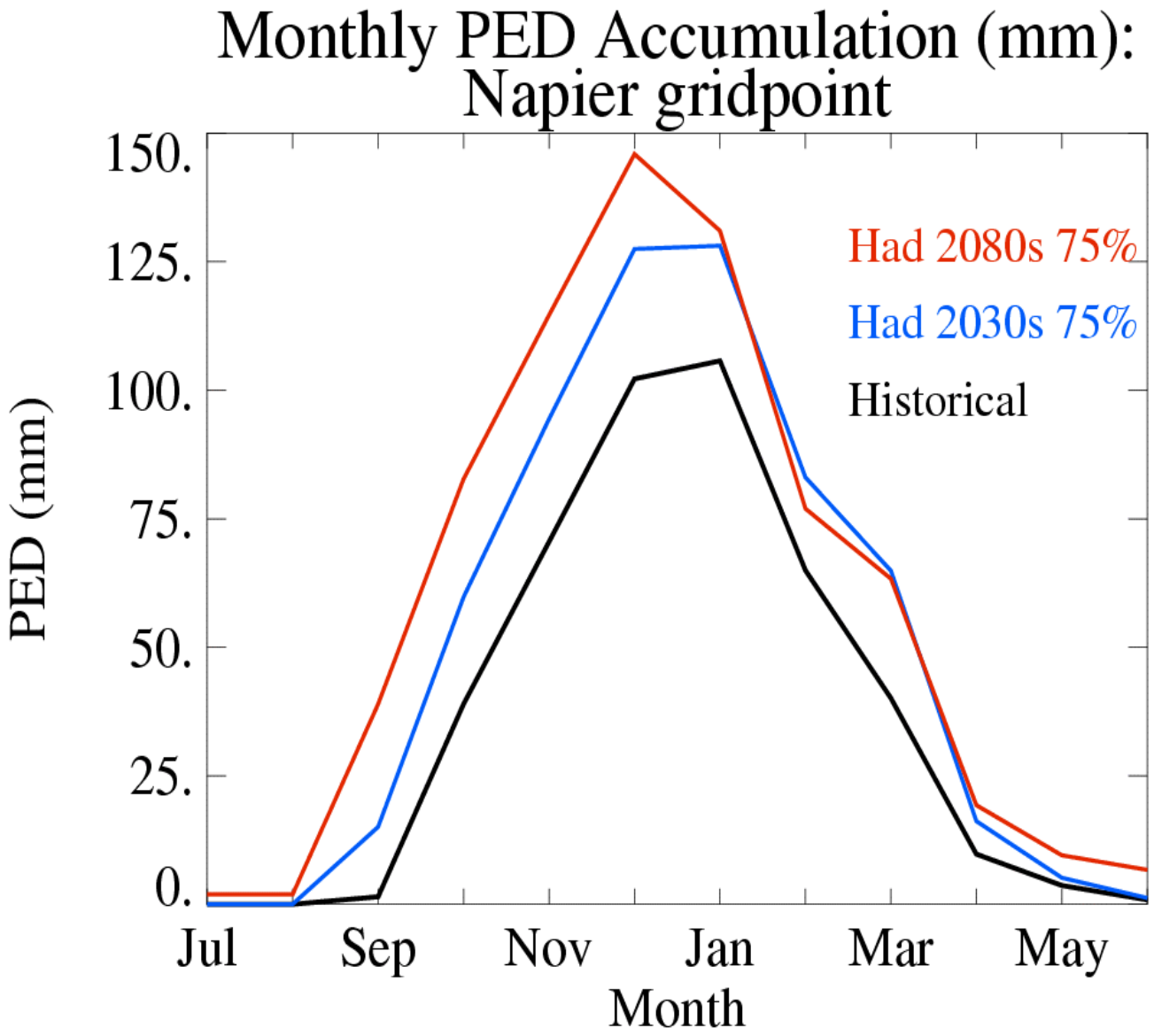
Implications



Projected changes in seasonal and annual precipitation (in %) by 2090, relative to 1990 for Christchurch

Summer	Autumn	Winter	Spring	Annual
3 [-17, 25]	6 [-6, 20]	-11 [-41, 10]	-2 [-15, 25]	-2 [-14,16]

Change in drought timing



Drought

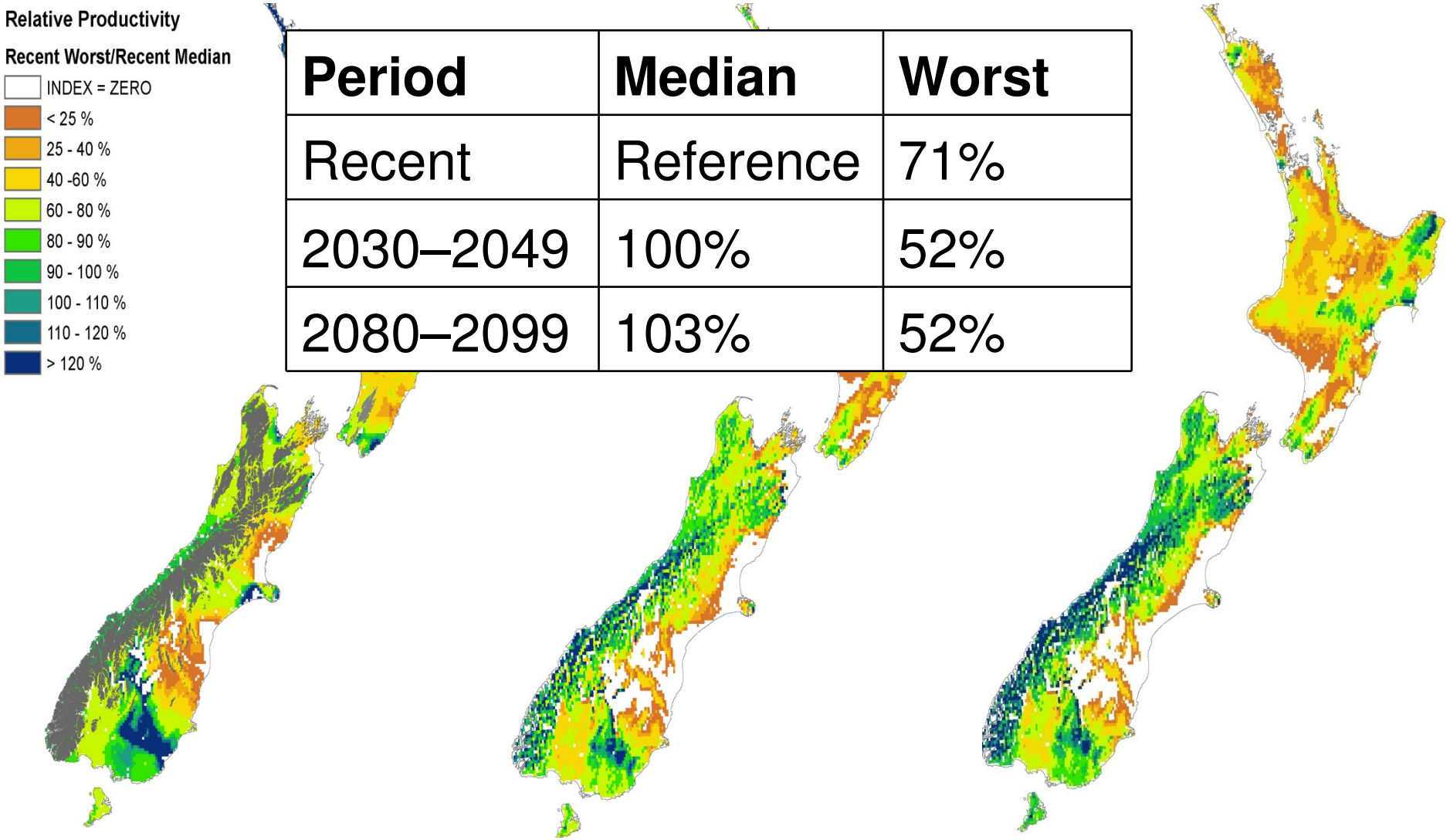
- Canterbury: significant increase in time spent in water deficit (+ 2 to 6 weeks)
  - Lengthens an irrigation season that is currently at least 21 weeks long
- Severe droughts likely to occur more often:
  - current 1 in 20 year droughts → 1 in every 5 yrs
  - northern Canterbury → 1 in every 2.5 yrs

Agriculture

- EcoClimate report for MAF
- Looks at
  - Soil moisture deficit
  - National pasture productivity

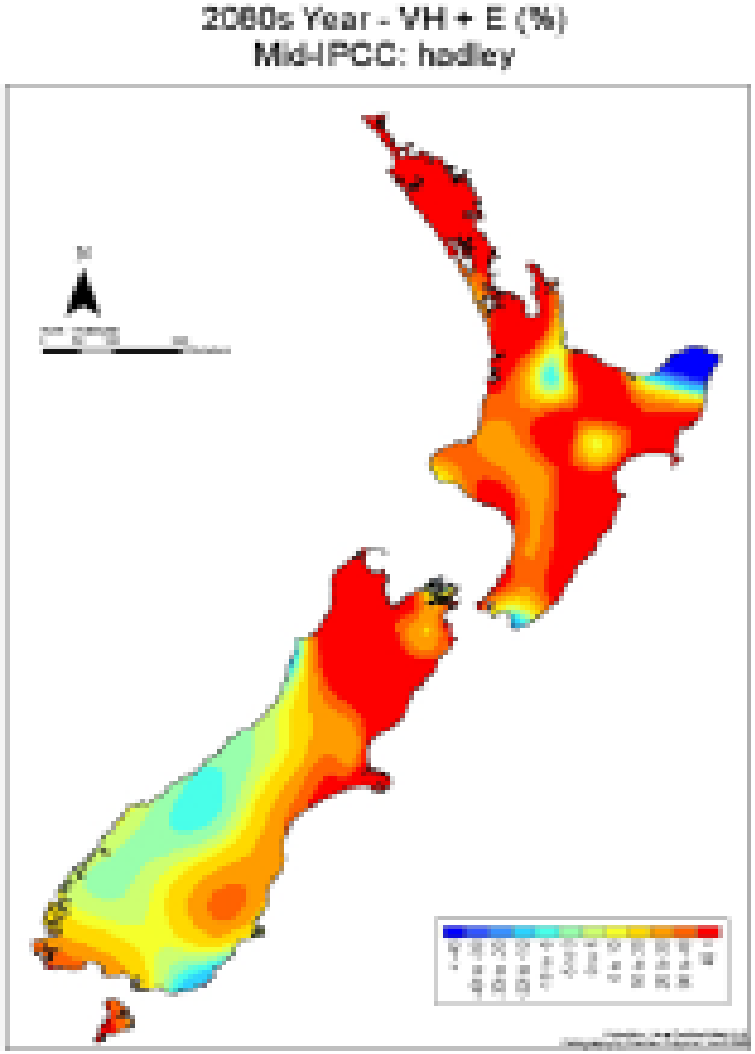
Production projections – Worst year

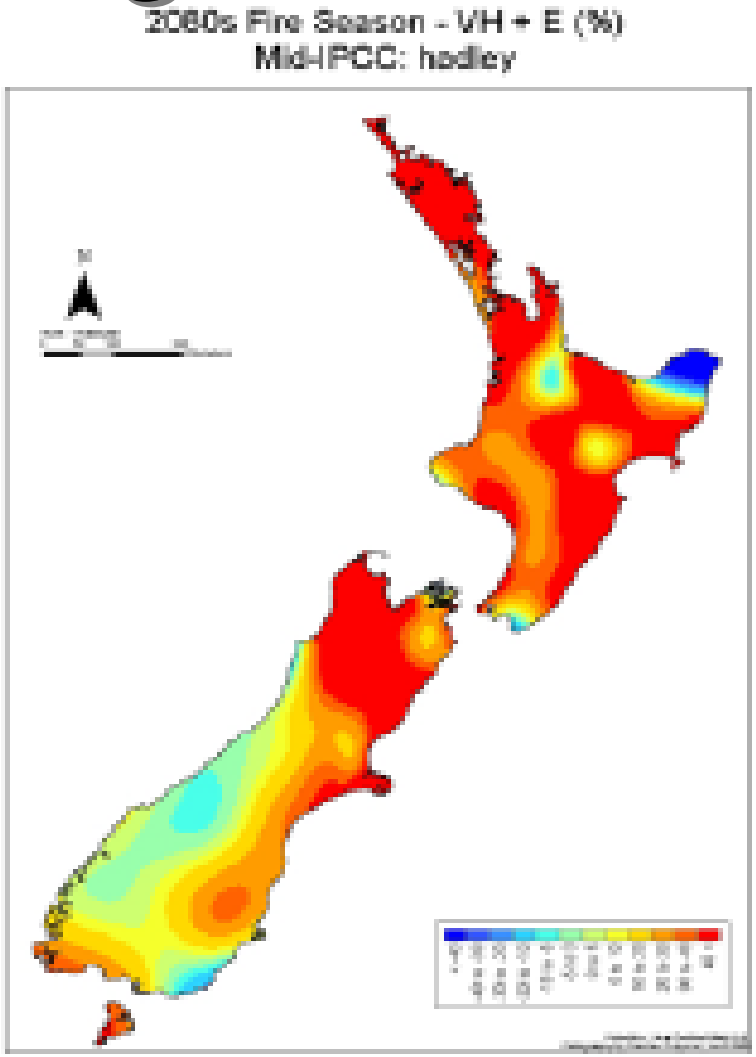
1977/78 2040s 2090s



Period	Median	Worst
Recent	Reference	71%
2030–2049	100%	52%
2080–2099	103%	52%

Fire Danger





Changes in the average number of days of Very High and Extreme (VH+E) Forest fire danger (%) occurring over the full calendar year versus fire season months for the Hadley mid-range climate change scenarios.

Results: more severe fire danger

- easier ignition, and therefore a greater number of fires
- drier and windier conditions, resulting in faster fire spread, greater areas burned
- longer fire seasons and increased drought frequency, and associated increases in fuel
- drying, greater fuel availability and increased fire intensities, more prolonged mop-up

Extreme weather events

- Winds 10% stronger on average (Westerlies)
- Storms more intense and/or frequent
  - Temperature higher implies more moisture
  - Temperature gradient stronger
  - More moisture – an energy source for our weather systems
- Tropical Storms
  - More intense
  - More frequent?

Changes in Rainfall Events

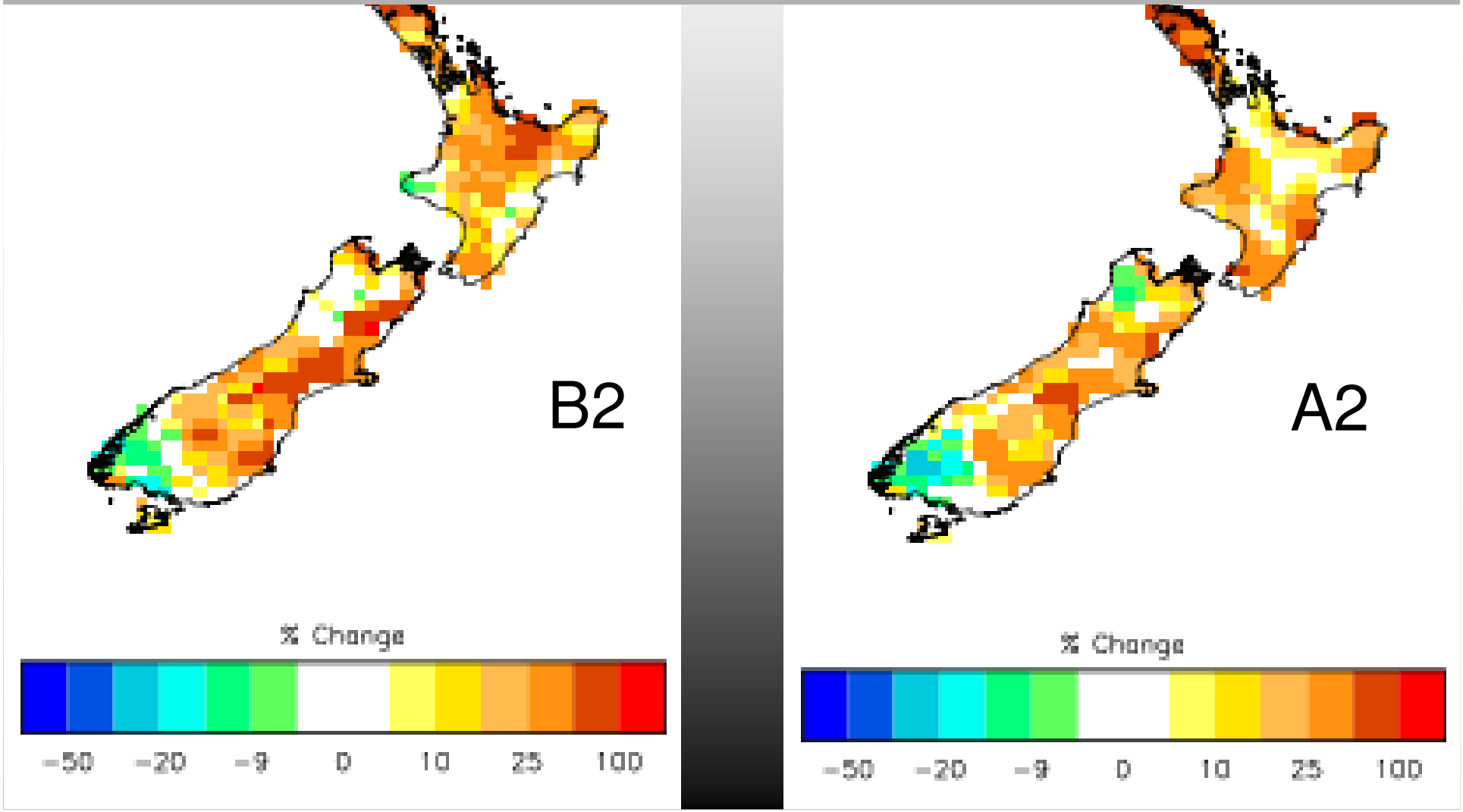
- ↑ rainfall intensity
- Change in rainfall duration
- Change in spacing between events
- Flow on effects for rainfall-triggered landslides, flooding, snowfall, droughts, water security/supply, CDEM planning

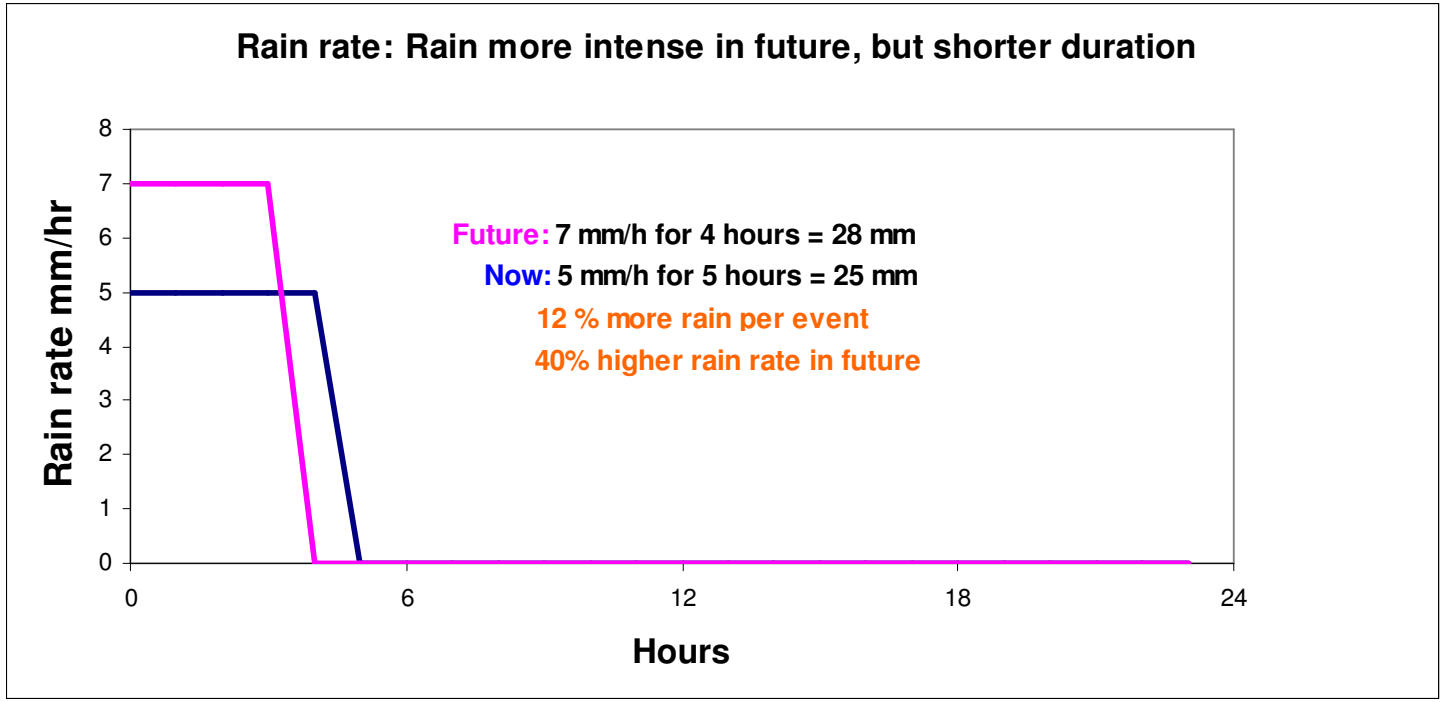
Flooding

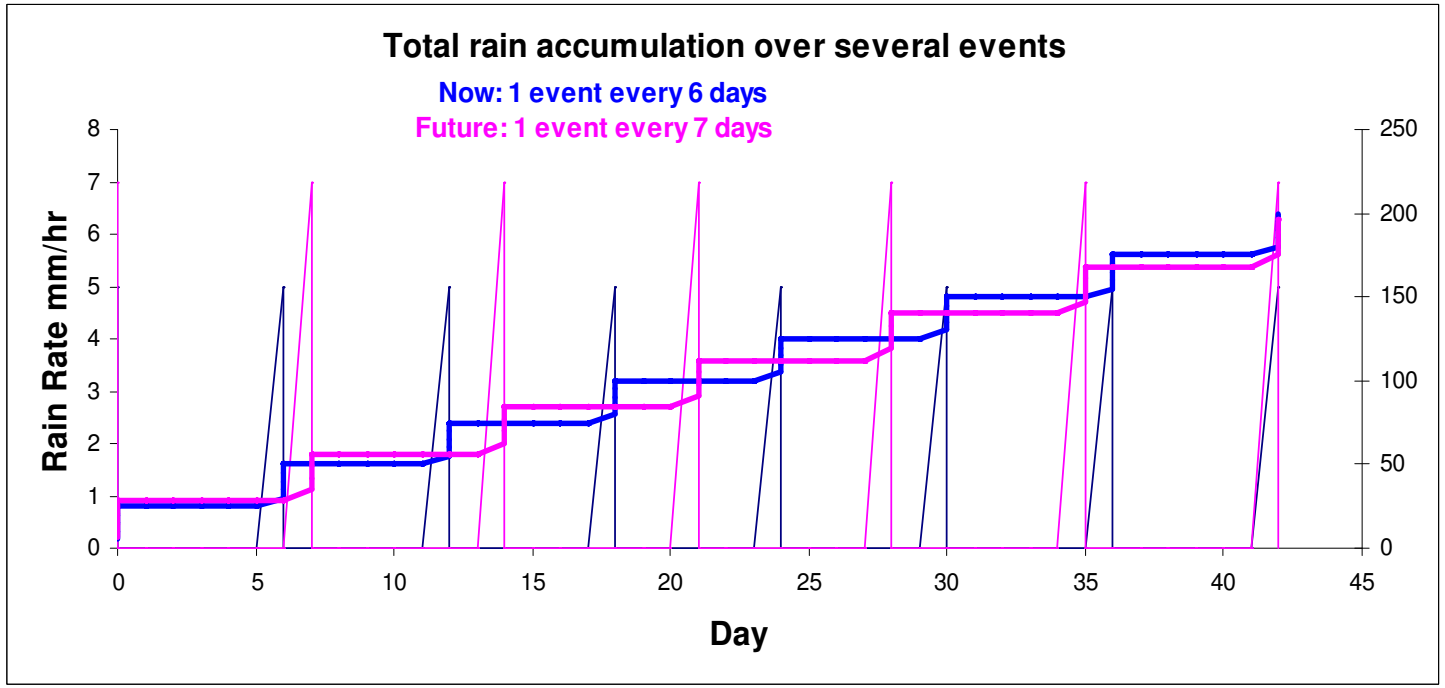
- Rain events likely to become more intense:
  → greater storm-runoff
  → increased flood frequency, flood peak & discharge
- But with lower river levels between events
- Drier areas still at risk of flooding, due to:
  - Source area of rainfall e.g. for rivers with catchments in Southern Alps but draining on Canterbury plains
  - Infrequent but intense rainfall events in eastern coastal areas

Change in extreme rainfall for Canterbury (high 2040s scenario):

A current rainfall event with a 100 yr return period, might have a 50 yr return period by 2040




Rain rate: Rain more intense in future, but shorter duration
Rain rate mm/hr
Hours
Future: 7 mm/h for 4 hours = 28 mm
Now: 5 mm/h for 5 hours = 25 mm
12 % more rain per event
40% higher rain rate in future
0
1
2
3
4
5
6
7
8
0
6
12
18
24


Total rain accumulation over several events
Now: 1 event every 6 days
Future: 1 event every 7 days
Rain Rate mm/hr
Day
0
1
2
3
4
5
6
7
8
0
50
100
150
200
250
0
5
10
15
20
25
30
35
40
45

Thunderstorms

- No definitive answers
- Possible changes:
  - No change in instability = same frequency **
  - Increased moisture
    - More intense rain ****
    - More intense downburst **
    - More intense tornadoes, same number *
  - Higher freezing = Smaller hailstones *
  - Lightning = no change **

**** likely
** possible
* conceivable

NZ Sea Level Rise

For planning and decision timeframes out to the 2090s, use the following in your risk assessment:

- use a **base value** of **0.5 m**, *and*
- assess consequences of higher sea-level rises of *at least* **0.8 m**, *and*
- allow **10 mm/year beyond 2100**

Planning for Sea Level Rise

- Possible NES on coping with sea level rise
- Regulation prescribing national environmental standards
- Can prescribe number(s), methods and requirements
- Can prohibit or allow activities
- Called for by local govt to support their planning & reduce risk to councils of relitigation of numbers
- 2(±) year process

Coastal Erosion & Flooding

- Magnitude/direction of change in sediment delivery to coasts uncertain
- Increased frequency of heavy seas & swell along western & southern coasts
- Possibly higher extreme waves during more intense ex-tropical cyclones and mid-latitude storms
- Possible increase in erosion or failure of cliffs
- Increased likelihood of coastal inundation, damage to coastal property, infrastructure and assets

Risks to major infrastructure likely to increase

- Design criteria for extreme events are very likely to be exceeded more frequently.
- Risks include:
  - failure of floodplain protection & urban drainage/sewerage
  - increased storm & fire damage,
  - more heatwaves causing deaths & black-outs
  - Rural fire damaging or destroying infrastructure & assets

Implications for loss adjusters

- Increase in severity of weather-related events=increase in claims & bigger losses?
- How do you manage uncertainty when a specific event won't be attributable to climate change, but there will be a changing risk profile?
- In remote areas is access to sites still available after an event?
- Will it take longer to close claims and restore people or businesses back to 'normal'?
- How can loss adjusters contribute to building resilience? Reducing risk? Influencing decision makers?

The Challenge

- Historical conditions no longer appropriate indicator for future
- Climate change knowledge is evolving and emerging
- Science talks in probability and scenarios, we translate this information into guidance

The Challenge

- No definitive “one answer” but still need to provide leadership
- Climate change is not a new hazard…it’s an exacerbater
- Businesses will have to deal with range of plausible changes for decades to come
- Need to be innovative and flexible

“Insurance will keep working for all New Zealanders, providing security and certainty. We must adapt our built environment to withstand the effects of climate change so the Insurance Industry continues to have investors with an appetite to fund future risk” Insurance Council of New Zealand.

The insurance industry is in a unique position to respond to impacts of climate change in NZ

- Weather and climate are “core business” for the insurance industry
- Industry is impacted by weather events already, will continue to be affected in the future
- Managing risk is a key focus, climate change exacerbates this risk
- Ability to influence to make NZ more resilient

What's the role of Ministry for the Environment?

- Coordinate adaptation across central government
- Engage with a wider range of professional bodies (including non-governmental organisations)
- Disseminate information about NZ climate scenarios, to raise awareness and support improved decision-making.
- Partner with key decision makers

www.climatechange.govt.nz

- Technical manuals
- Summary documents
- Local government planning
- Case studies

Working in Partnership

- Engineers
- Insurance industry
- Local government
- Lifeline utilities
- Surveyors
- Planners
- Multi-partner group

Mind catching!

- Liquefaction*
- Fog*
- Copper cable underground at coast*
- Salt spray
- Wind and powerlines
- Vermin

- Increased construction time
- Quote: design in flexibility to “allow” for future change rather than make things bigger/stronger
- “Current capacity inadequate!”

Conclusions

- Climate change is happening.
- We must continue to adapt.
- Up-to-date impacts information is important
- We need to inform and influence the decision makers
- We are committed to working with key partners to make this happen.
- What will you do?