NSW GOVERNMENT
Office of Environment & Heritage

AdaptNSW

New South Wales
Climate change snapshot

Overview of **New South Wales** climate change

According to long-term (1910–2013) observations, air temperatures have been increasing since the 1950s, with the highest temperatures on record being experienced in recent decades. The rate of change has also increased, with mean temperatures rising by 0.5°C per decade since 1990, compared to about 0.1°C per decade during the 1950s to 1980s.

NSW is projected to continue to warm in the near future (2020–2039) and far future (2060–2079). The warming is projected to average about 0.7°C in the near future, increasing to about 2.1°C in the far future. There are not many differences across the state in the projected increases in average temperatures with all regions becoming warmer. The warming projected for NSW is large compared to natural variability in temperature.

NSW currently experiences considerable rainfall variability across regions, seasons and from year-to-year and this variability is also reflected in the projections.

Projected changes

Projected **temperature** changes	
Maximum temperatures are projected to increase in the near future by 0.4 – 1.0°C	Maximum temperatures are projected to increase in the far future by 1.8 – 2.6°C
Minimum temperatures are projected to increase in the near future by 0.0 – 0.5°C	Minimum temperatures are projected to increase in the far future by 1.4 – 2.6°C
The number of hot days will increase	The number of cold nights will decrease
Projected rainfall changes	
Rainfall is projected to decrease in spring and winter	Rainfall is projected to increase in summer and autumn
Projected Forest Fire Danger Index (FFDI) changes	
Average fire weather is projected to increase in summer and spring	Number of days with severe fire danger is projected to increase in summer and spring

Regional snapshots

NSW and ACT Regional Climate Modelling project (NARCliM)

The climate change projections in this snapshot are from the NSW and ACT Regional Climate Modelling (NARCliM) project. NARCliM is a multi-agency research partnership between the NSW and ACT governments and the Climate Change Research Centre at the University of NSW. NSW Government funding comes from the Office of Environment and Heritage (OEH), Sydney Catchment Authority, Sydney Water, Hunter Water, NSW Office of Water, Transport for NSW, and the Department of Primary Industries.

The NARCliM project has produced a suite of twelve regional climate projections for south-east Australia spanning the range of likely future changes in climate. NARCliM is explicitly designed to sample a large range of possible future climates.

Over 100 climate variables, including temperature, rainfall and wind are available at fine resolution (10km and hourly intervals). The data can be used in impacts and adaptation research, and by local decision makers. The data is also available to the public and will help to better understand possible changes in NSW climate.

Modelling overview

The NARCliM modelling was mainly undertaken and supervised at the Climate Change Research Centre. NARCliM takes global climate model outputs and downscales these to provide finer, higher resolution climate projections for a range of meteorological variables. The NARCliM project design and the process for choosing climate models has been peer-reviewed and published in the international scientific literature (Evans et. al. 2014, Evans et. al. 2013, Evans et. al. 2012).

Go to climatechange.environment.nsw.gov.au for more information on the modelling project and methods.

Interpreting climate projections can be challenging due to the complexities of our climate systems. 'Model agreement', that is the number of models that agree on the direction of change (for example increasing or decreasing rainfall) is used to determine the confidence in the projected changes. The more models that agree, the greater the confidence in the direction of change.

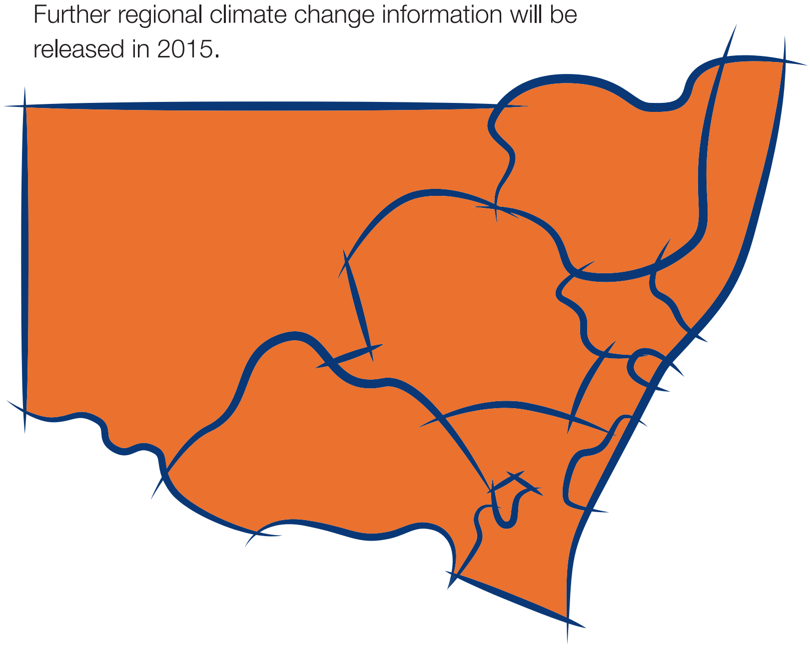
In this report care should be taken when interpreting changes in rainfall that are presented as the average of all of the climate change projections, especially when the model outputs show changes of both wetting and drying. To understand the spread of potential changes in rainfall the bar charts should be considered along with the maps provided in this document. Help on how to interpret the maps and graphs in this report is provided in Appendix 1.

Summary documents for each of the state planning regions of NSW are available and provide climate change information specific to each region.

The snapshots provide descriptions of climate change projections for two future 20-year time periods: 2020–2039 and 2060–2079.

1. The climate projections for 2020–2039 are described in the snapshots as **NEAR FUTURE, or as 2030**, the latter representing the average for the 20-year period.
2. The climate projections for 2060–2079 are described in the snapshots as **FAR FUTURE, or as 2070**, the latter representing the average of the 20-year period.

Further regional climate change information will be released in 2015.



Introduction

This snapshot presents a summary of climate change projections for NSW. It outlines some key characteristics of the state, including its current climate, before detailing the projected changes to the state's climate in the near and far future.

Topography and hydrography

Situated in the mid-latitudes of eastern Australia, NSW covers an area of more than 800,000 km^2, and has just over 2000 km of coastline.

The Great Dividing Range is an elevated region of undulating terrain and broad plains which includes the Snowy Mountains, with Mount Kosciuszko (2228 m), Australia's highest peak. The eastern side of the Great Dividing Range forms a steep escarpment with densely forested areas. The mountainous areas of the range and surrounding elevated areas include the Southern Highlands, Central Tablelands and the Northern Tablelands. The western side of the Range is less steep, ending in a series of hills and valleys which include much of the state's fertile agricultural land.

The western plains cover almost two-thirds of the state. These vast plains covered by riverine sediment are almost entirely flat.

The coastal rivers of NSW rise in the Great Dividing Range and flow eastwards to the sea. These rivers are short, navigable at their lowest reaches and subject to flooding during high rainfall periods. The inland rivers rise on the other side of the range and flow westwards, with most of these rivers eventually combining into the Murray–Darling River network which flows to the sea in South Australia.

Population and settlements

NSW is Australia's most populous state with over 73 per cent of the NSW population living in major cities. Between 1961 and 2011, the population of NSW almost doubled from 3.9 million to 7.2 million people. Population growth has been greatest in Metropolitan Sydney, as well as the Central Coast, Lower Hunter and Illawarra. Population growth has also been seen in coastal areas and in larger inland centres like Albury, Orange, Wagga Wagga and Tamworth (Department of Planning & Environment 2014).

The state's population is projected to reach 9.2 million people by 2031, with 64 per cent of this population (5.9 million), residing in Metropolitan Sydney. Population growth is projected to be larger in places near Metropolitan Sydney, such as the Central Coast, Wollongong, Newcastle and Port Stephens, coastal areas such as Tweed Heads and Port Macquarie, areas to the north and east of Canberra and the ACT, and regional centres such as Tamworth, Bathurst and Wagga Wagga (Department of Planning & Environment 2014).

Natural ecosystems

The diversity of NSW landscapes is evident in the wide variety seen in the state's bioregions. The Border Ranges of northern NSW is the most biologically diverse area in the state and includes subtropical rainforest, wet sclerophyll forest, mountain headlands, rocky outcrops and transition zones between forests. The Brigalow Belt, located in inland northern NSW, is another important area for biodiversity. It has large tracts of eucalypt woodlands and is a stronghold for endemic invertebrates. These two locations have been identified on the list of Australia's 15 National Biodiversity Hotspots[1].

1. www.environment.gov.au/topics/biodiversity/biodiversity-conservation/biodiversity-hotspots/national-biodiversity-hotspots

Climate of NSW

CURRENT CLIMATE

The climate of NSW is highly variable. The north-east of the state is dominated by summer rainfall, with relatively dry winters. Conversely the south of the state experiences regular rainfall from cold fronts and cut-off lows traversing south-eastern Australia during the winter.

The coast of NSW is influenced by the warm waters of the Tasman Sea, which moderate temperatures and provide moisture for abundant rainfall. Moist onshore winds deposit considerable precipitation on the steeply rising terrain of the Great Dividing Range. The ranges enhance rainfall near the coast and contribute to a strong east to west reduction in annual rainfall across much of the state. The dry north-west of the state receives most of its highly variable rainfall in very irregular, high intensity, rainfall events. Sporadic rainfall events can occur over the arid north-west at any time of the year but are more likely in summer. Annual average rainfall varies from less than 200 mm in the north-west of NSW, to more than 1800 mm along the north-east coast.

Very high temperatures are regularly recorded in the arid north-west of NSW and sub-freezing temperatures are frequently observed in the southern alpine regions. Afternoon sea breezes usually moderate the summer temperatures along the coast.

Temperature

Cooler temperatures occur along the Great Dividing Range, with more moderate temperatures experienced along the coast. Temperatures get progressively hotter moving inland and towards the far north-west of the state. Annual average temperatures (calculated from 1961-1990) range from about 4°C in the Snowy Mountains to over 20°C in the far north-west and parts of the far north coast (Figure 1).

In the summer, average temperatures range from 28–30°C in the state's north-west to 10–12°C in the Snowy Mountains. In winter, average temperatures range from 14–16°C on the far north coast to –2 to 0°C in the Snowy Mountains.

In summer, average maximum temperatures range from over 34-36°C in the state's north-west to 14–16°C in the Snowy Mountains.

In winter, the average minimum temperature ranges from –6 to –4°C in the Snowy Mountains, to 8–10°C along the far north coast near Byron Bay

Temperature extremes

Temperature extremes, both hot and cold, occur infrequently but can have major impacts on health, infrastructure and our environment. Changes to temperature extremes often result in greater impacts than changes to average temperatures.

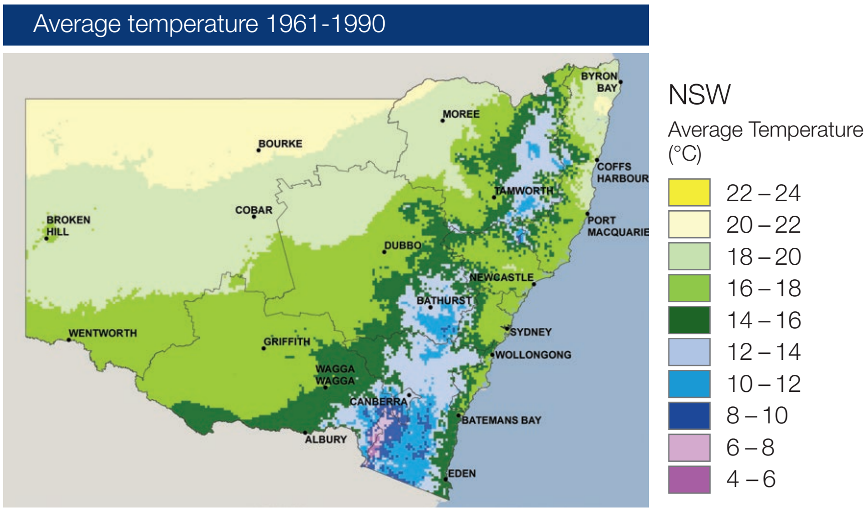


Figure 1: Map of average annual temperatures across NSW, 1961–1990 (Source: Bureau of Meteorology).




Hot days

Generally, the number of hot days (maximum temperatures above 35°C) in NSW increases as you move further inland. Near the coast there are on average fewer than 10 hot days per year, while inland in north-western NSW there are more than 80 hot days each year. On average, there are few hot days along parts of the Great Dividing Range, the Snowy Mountains and near Coffs Harbour on the far north coast where the mountains are closest to the coast.

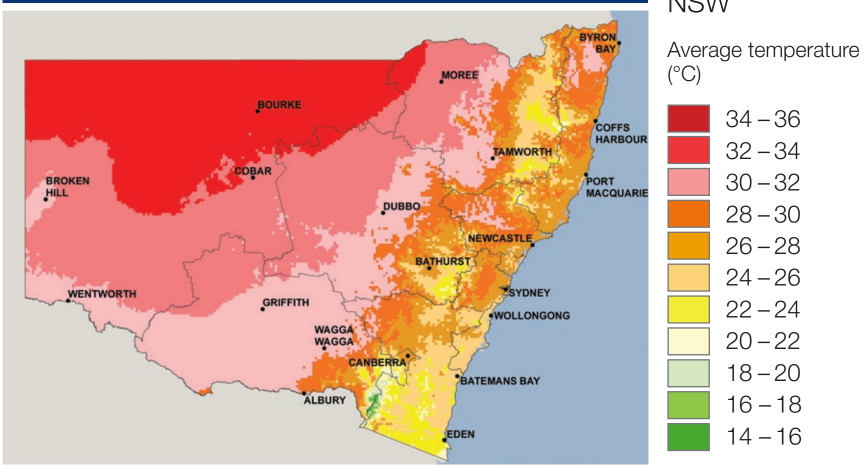
Cold nights

The number of days per year with minimum temperatures below 2°C varies considerably across New South Wales. The Great Dividing Range has a considerable influence on the distribution of cold nights across NSW.

On the eastern side of the range, in proximity to the coast, the number of cold nights ranges from fewer than 10 to about 30 nights per year near the escarpment. Along the range, the number of cold nights is notably higher, with the Snowy Mountains experiencing up to 220 cold nights per year. From the western slopes of the range the number of cold nights gradually decreases with distance inland, with fewer than 10 cold nights per year in the far west of the state.

For NSW as a whole, 2013 was the warmest year on record for maximum temperatures, and the third-warmest for average temperature. All years from 1997 to 2013 were warmer than the 1961-1990 average, an unprecedented sequence in the historical records. Since the start of this century, all years have recorded an annual average temperature more than 0.5°C warmer than the 1961-1990 average. The hottest year on record for NSW was 2009 when the average temperature was 1.37°C above the 1961-1990 average.

b) Summer maximum temperature



b) Winter minimum temperature

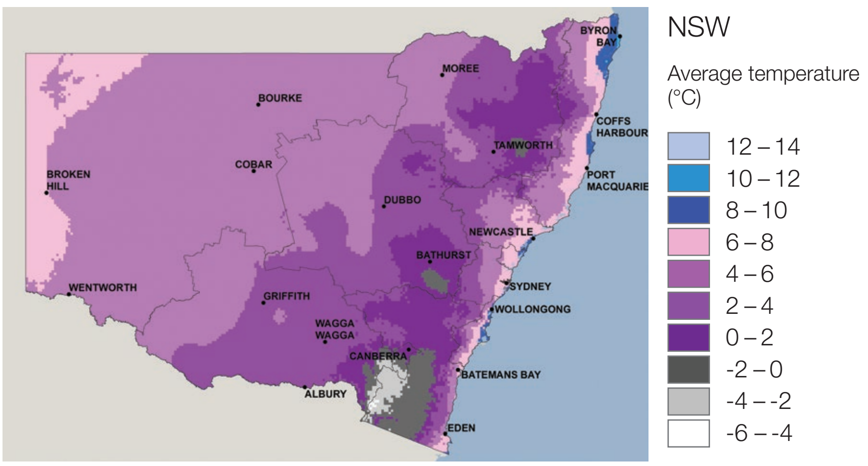


Figure 2: Maps of a) average summer daily maximum temperature and b) average winter daily minimum temperature for 1961–1990, based on gridded AWAP (www.csiro.au/awap/) temperature data.

Rainfall

Average annual rainfall varies considerably across NSW, ranging from 1600–2400 mm on the far north coast and parts of the Snowy Mountains, to less than 200 mm along the NSW – South Australia border. Large parts of eastern NSW experience annual rainfall of 400–800 mm per year, while much of the west typically experiences 200–400 mm per year. The coastal strip east of the Great Dividing Range typically receives over 800 mm of rainfall per year.

The north-east of NSW gets most of its rainfall in summer, with autumn rainfall also considerable, but experiences relatively dry winters. In contrast, in the south of the state winter rainfall dominates. Over a significant part of NSW the distribution of rainfall is fairly even.

The long term rainfall record (1900-2013) shows that NSW has experienced considerable variation in rainfall with periods of both wetter and drier conditions. During much of the first half of the 20th century the state experienced dry conditions. From the 1950s to the 1990s there was more inter-annual variability with many wet years and many dry years. The first decade of the 21st century saw a long period of below average rainfall during the Millennium Drought. This dry period ended with two of the wettest years on record for Australia (2010-2011), with 2010 being the third wettest year on record for NSW.

Climate classes*

Summer Dominant
Marked wet summer & dry winter
- More than 1200
- 650 – 1200
- 350 – 650

Winter
Wet winter & low summer rainfall
- More than 800
- 500 – 800
- 250 – 500

Summer
Wet summer & low winter rainfall
- More than 1200
- 650 – 1200
- 350 – 650

Winter Dominant
Marked wet winter & dry summer
- More than 800
- 500 – 800
- 250 – 500

Uniform
Uniform rainfall
- More than 800
- 500 – 800
- 250 – 500

Arid
Low rainfall
- More than 350

Figure 3: Major seasonal rainfall zones of Australia[2].

2. Bureau of Meteorology 2014, Seasonal rainfall zones of Australia, Product Code IDCJCM0002, Australian Bureau of Meteorology, Melbourne, viewed October 2014, http://archive.today/DWzJ. *Based on a median annual rainfall and seasonal incidence. The seasonal incidence is determined from the ration of the median rainfall November to April and May to October. Based on a 100 year period from 1900–1999. © Commonwealth of Australia 2008.

Fire weather

The risk of bushfire in any given region depends on four 'switches'. There needs to be enough vegetation (fuel), the fuel needs to be dry enough to burn, the weather needs to be favourable for fire to spread, and there needs to be an ignition source (Bradstock 2010). All four of these switches must be on for a fire to occur. The Forest Fire Danger Index (FFDI) is used in NSW to quantify fire weather. The FFDI combines observations of temperature, humidity and wind speed with an estimate of the fuel state.

Long-term observations of FFDI come from daily measurements of temperature, rainfall, humidity and wind speed at only a small number of weather stations in Australia, with 17 stations located in NSW and the ACT (Lucas 2010). Although these stations are spread fairly evenly across the state, there are no stations in alpine regions.

The annual average FFDI for the period 1990–2009 ranges from 3.3 in Coffs Harbour to 21.2 in Tibooburra. The highest average FFDI occurs in summer and spring and the lowest is usually in winter.

Fire weather is classified as 'severe' when the FFDI is above 50, and most of the property loss from major fires in Australia has occurred when the FFDI reached this level (Blanchi et al. 2010). FFDI values below 12 indicate low to moderate fire weather, 12-25 high, 25-49 very high, 50-74 severe, 75-99 extreme and above 100 catastrophic.

Severe fire danger days are more likely to occur in summer and spring months. Tibooburra (20 days) and Wilcannia (12 days) record considerably more sever fire weather days each year than other stations. Severe fire weather conditions are estimated to occur at least once a year at all stations except Lismore and Coffs Harbour.

Baseline average FFDI and days with severe FFDI in NSW

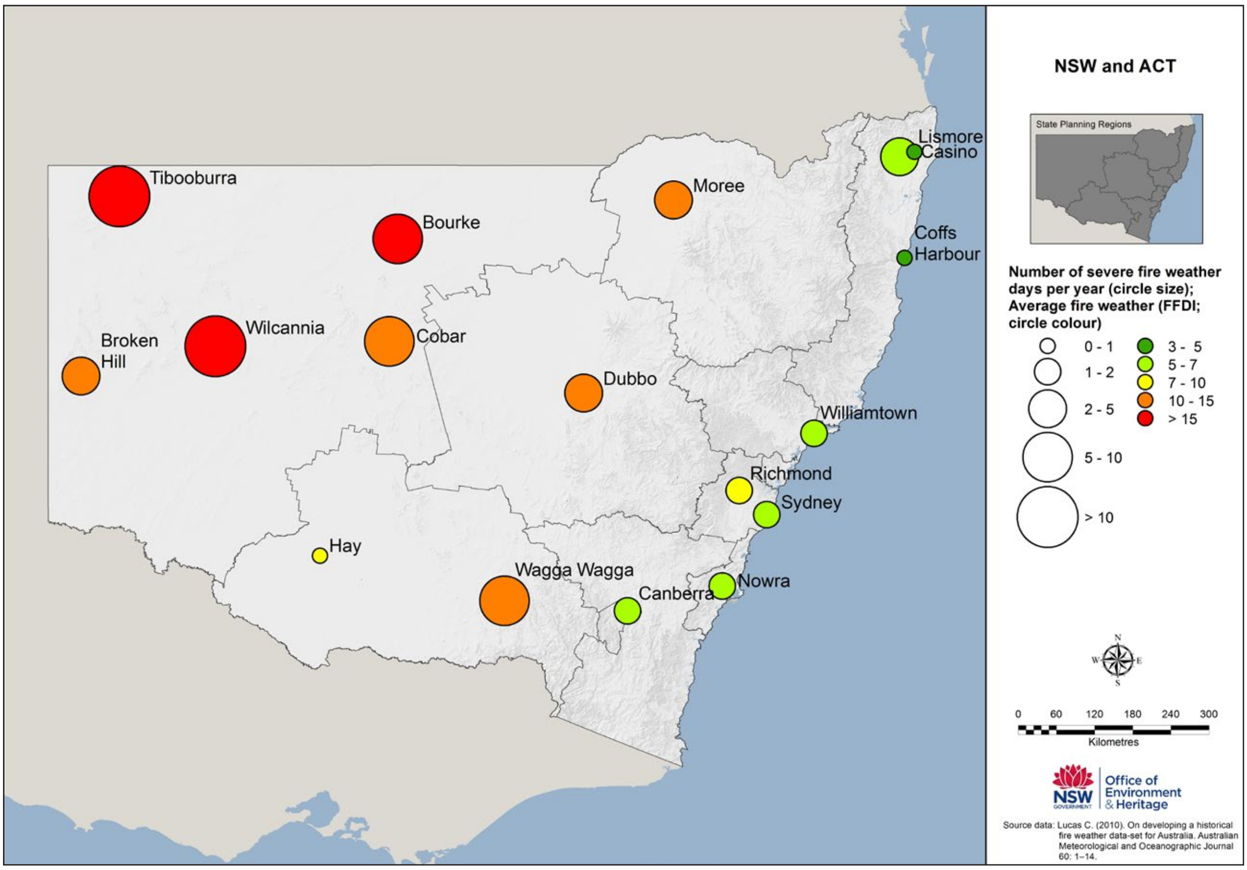


Figure 4: Baseline mean FFDI values and severe fire weather days (FFDI>50) for meteorological stations within NSW.

Temperature

Climate change projections are presented for the near future (2030) and far future (2070), and are compared to the baseline modelled climate (1990–2009). The projections are based on simulations from a suite of twelve climate models run to provide detailed future climate information for NSW and the ACT.

Temperature is the most reliable indicator of climate change. Across NSW all of the models agree that average, minimum and maximum temperatures are all increasing (Figure 5).

Summary temperature

- Maximum temperatures are projected to increase in the near future by 0.7°C
- Maximum temperatures are projected to increase in the far future by 2.1°C
- Minimum temperatures are projected to increase by near future by 0.7°C
- Minimum temperatures are projected to increase by far future by 2.1°C
- The greatest increases are projected for the north-west of the state in summer
- There are projected to be more hot days and fewer cold nights

Projected statewide climate changes

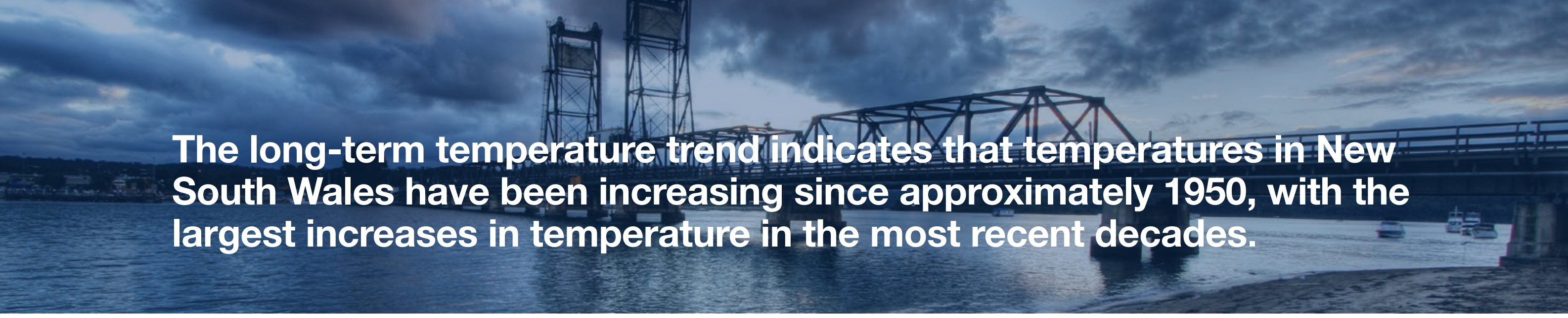
NSW is expected to experience an increase in all temperature variables (average, maximum and minimum) for the near future and an even greater increase in the far future.

Maximum temperatures are projected to increase by 0.7°C in the near future and up to 2.1°C in the far future (Figure 5b). Summer and spring will experience the greatest change with maximum temperatures increasing by up to 2.4°C in the far future (Figure 5b). Increased maximum temperatures are known to impact human health through heat stress and increasing the number of heatwave events.

Minimum temperatures are projected to increase by 0.7°C in the near future and up to 2.1°C in the far future (Figure 5c). Increased overnight temperatures (minimum temperatures) can have a significant effect on human health especially during heatwaves.

The greatest increases in average temperatures are projected for the north-west of the state during summer.

Increases in temperatures are projected to occur across all of the state (Figures 6–9).



The long-term temperature trend indicates that temperatures in New South Wales have been increasing since approximately 1950, with the largest increases in temperature in the most recent decades.

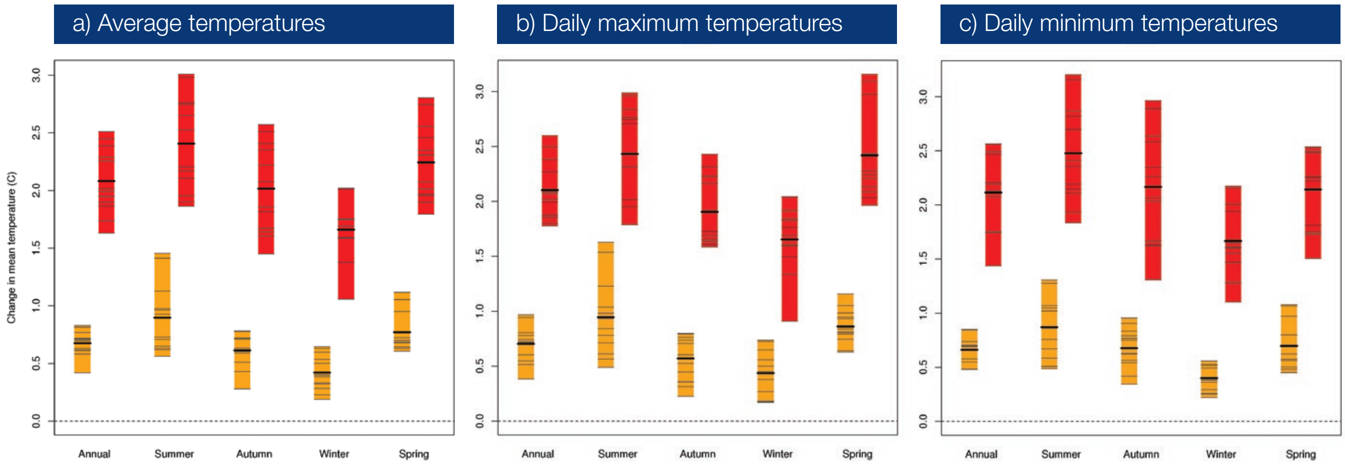


Figure 5: Projected changes in air temperature for NSW, annually and by season (2030 yellow; 2070 red): a) average, b) daily maximum, and c) daily minimum. (Appendix 1 provides help with how to read and interpret these graphs).

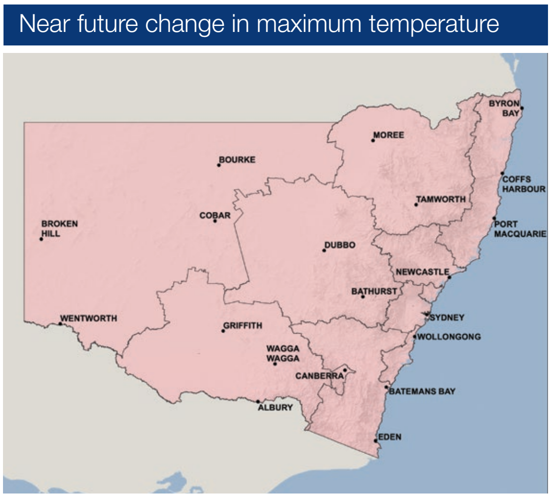


Figure 6: Near future (2020–2039) change in annual mean maximum temperature, compared to the baseline period (1990–2009).

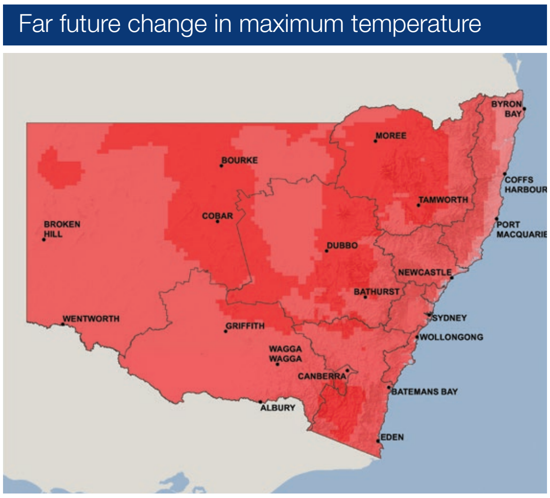


Figure 7: Far future (2060–2079) change in annual mean maximum temperature, compared to the baseline period (1990–2009).

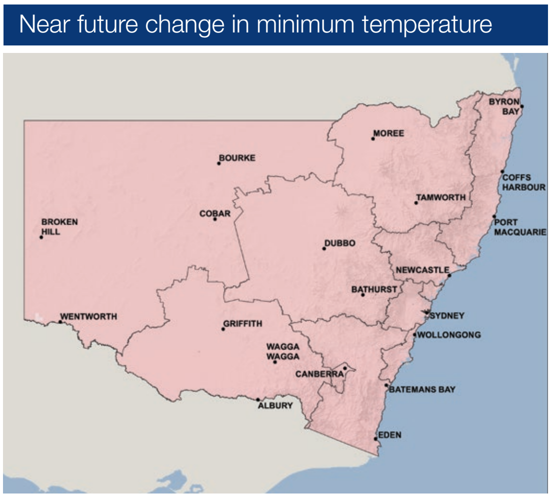


Figure 8: Near future (2020–2039) change in annual mean minimum temperature, compared to the baseline period (1990–2009).

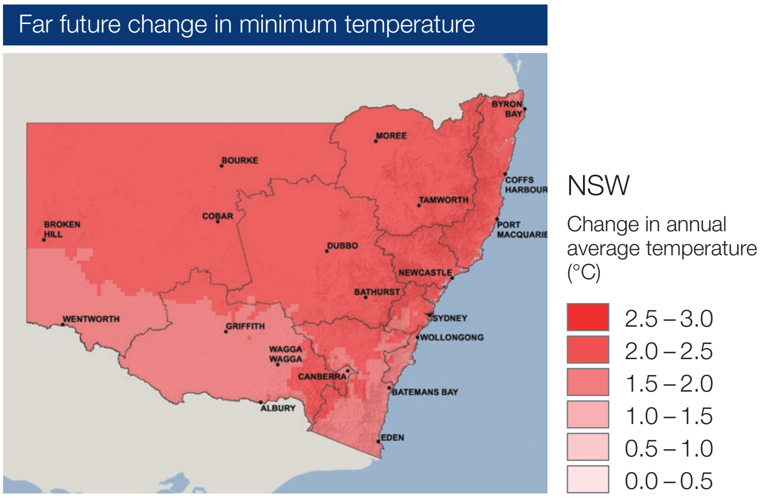


Figure 9: Far future (2060–2079) change in annual mean minimum temperature, compared to the baseline period (1990–2009).

Hot days

DAYS PER YEAR ABOVE 35°C

The number of hot days in NSW increases with distance inland, ranging from no days in the more mountainous parts of the state, fewer than 10 days per year near the coast and more than 80 hot days per year in the far north-west. International and Australian experiences show that prolonged hot days increase the incidence of illness and death – particularly among vulnerable population groups such as people who are older, have a pre-existing medical condition or who have a disability. Seasonal changes in hot days could have significant impacts on bushfire danger, infrastructure development and native species diversity.

Projected statewide climate changes

NSW is expected to experience more hot days in the near future and the far future (Figure 10).

There are however significant regional differences in the projected changes to the number of hot days.

The greatest change is projected for north-western NSW with an additional 10–20 hot days in the near future increasing to over 40 additional hot days per year by 2070 (Figures 11 and 12). Currently this part of the state experiences between 50 and 80 hot days each year. These projections suggest that by 2070 parts of north-western NSW may see one third of the year with temperatures above 35°C.

Areas east of the Great Dividing Range and along the coast experience fewer hot days than inland regions. Along parts of the coast and Ranges the number of hot days is projected to increase by up to an additional 20 days per year by 2070.

These increases in hot days are projected to occur mainly in spring and summer although in the far future hot days are also extending into autumn (Figure 10).

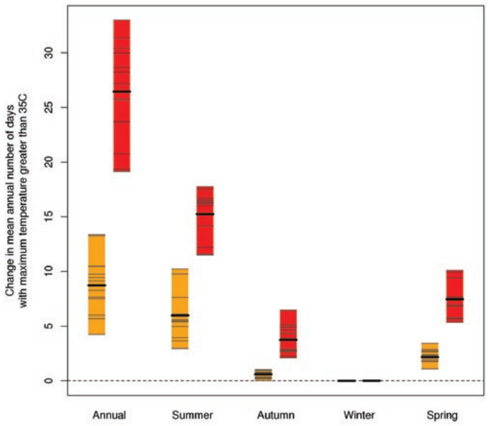


Figure 10: Projected changes in the number of hot days (with daily maximum temperature of above 35°C) for NSW, annually and by season (2030 yellow; 2070 red). (Appendix 1 provides help with how to read and interpret these graphs).

Near future change in days per year above 35°C

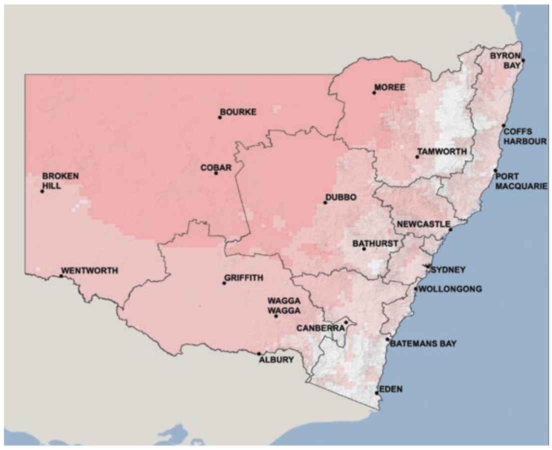


Figure 11: Near future (2020–2039) projected changes in the number of days per year with maximum temperatures above 35°C.

Far future change in days per year above 35°C

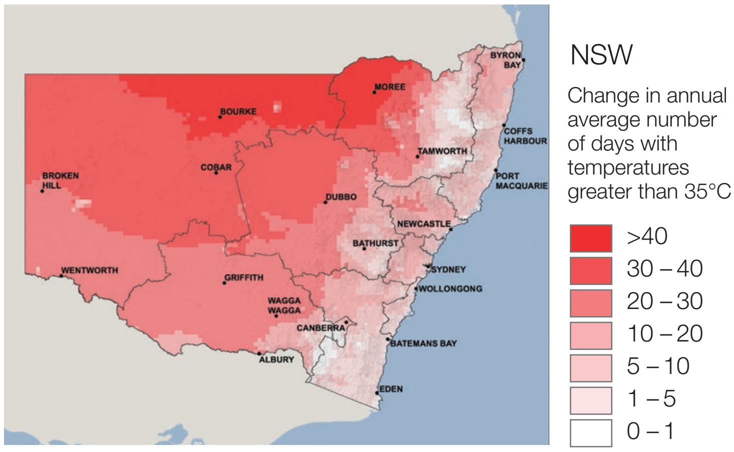
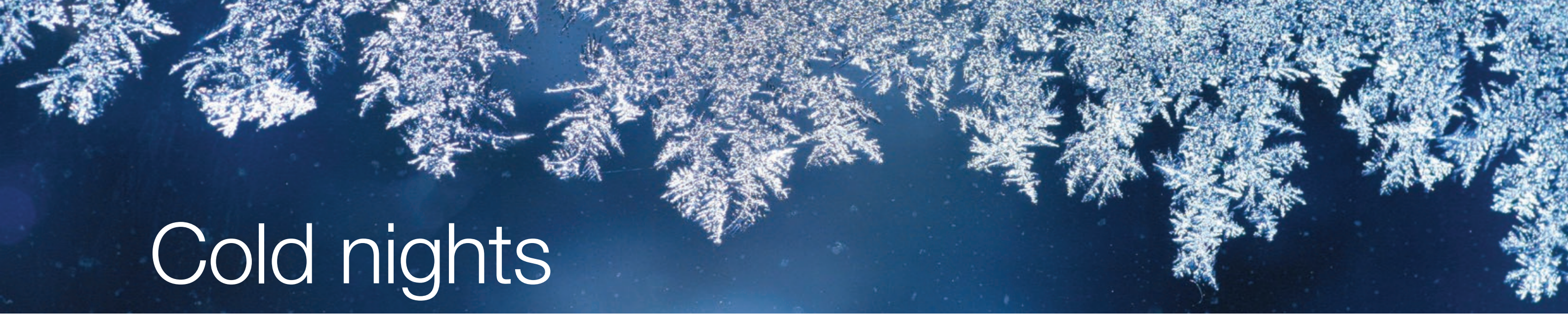


Figure 12: Far future (2060–2079) projected changes in the number of days per year with maximum temperatures above 35°C.



Cold nights

DAYS PER YEAR BELOW 2°C

Most of the emphasis on changes in temperatures from climate change has been on hot days and maximum temperatures, but changes in cold nights are equally important in the maintenance of our natural ecosystems and agricultural/horticultural industries; for example, some common temperate fruit species require sufficiently cold winters to produce flower buds.

Projected statewide climate changes

NSW is expected to experience fewer cold nights in the future. The changes will occur across all seasons, with the largest decreases during winter and spring (Figure 13).

The greatest changes are projected to occur along the Great Dividing Range including the Snowy Mountains, with 10–20 fewer cold nights in the near future, and over 40 fewer cold nights by 2070 (Figures 14 and 15). This is a considerable reduction in cold nights for our Alpine regions, with the potential to impact our natural ecosystems, snow tourism and industry.

Minor changes are projected for coastal NSW and the far west. Approximately 5–10 fewer cold nights are projected for the western slopes and plains (Figures 14 and 15).

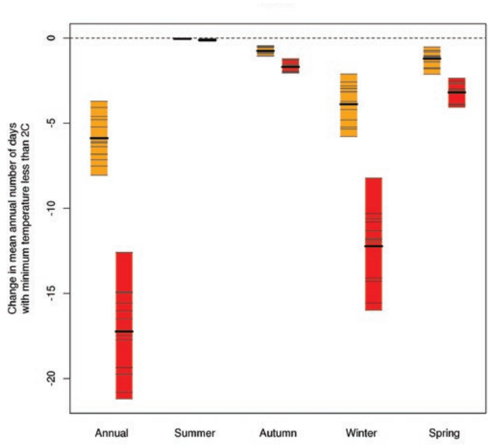


Figure 13: Projected changes in the number of low temperature nights for the NSW, annually and by season (2030 yellow; 2070 red). (Appendix 1 provides help with how to read and interpret these graphs).

Near future change in number of cold nights (below 2°C) per year

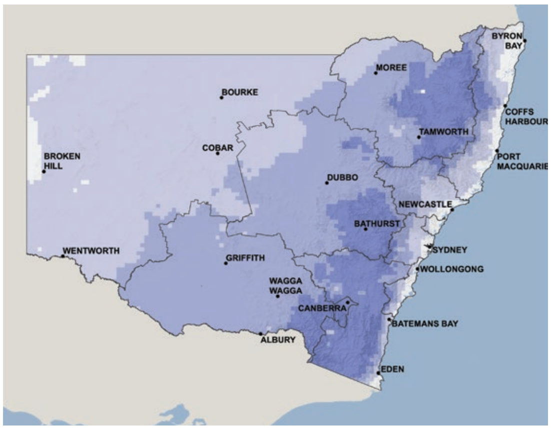
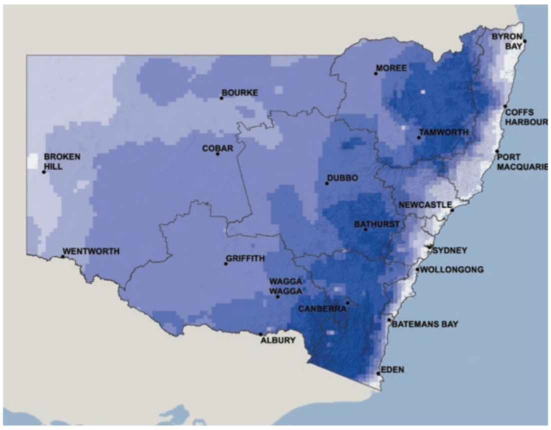


Figure 14: Near future (2020–2039) change in the number of days per year with minimum temperatures below 2°C, compared to the baseline period (1990–2009).

Far future change in number of cold nights (below 2°C) per year



NSW

Change in annual average number of days with temperatures below 2°C

- -1 – 0
- -5 – -1
- -10 – -5
- -20 – -10
- -30 – -20
- -40 – -30
- < -40

Figure 15: Far future (2060–2079) change in the number of days per year with minimum temperatures below 2°C, compared to the baseline period (1990–2009).

Rainfall

Changes in rainfall patterns have the potential for widespread impacts. Seasonal shifts in rainfall can impact native species' reproductive cycles as well as impacting agricultural productivity; for example crops that are reliant on winter rains for peak growth.

Rainfall changes are also associated with changes in the extremes, such as floods and droughts, as well as secondary impacts such as water quality and soil erosion that occur as a result of changes to rainfall intensity.

Modelling rainfall is challenging due to the complexities of the weather systems that generate rain. 'Model agreement', that is the number of models that agree on the direction of change (increasing or decreasing rainfall) is used to determine the confidence in the projected change. The more models that agree, the greater the confidence in the direction of change.

Care should be taken when interpreting changes in rainfall from averaging climate change projections when the model outputs project changes of both wetting and drying. To understand the spread of potential changes in rainfall the bar charts should be considered along with the maps provided in this document. Single model outputs are available for download from the Adapt NSW website.

Rainfall is projected to decrease in spring and to increase in autumn

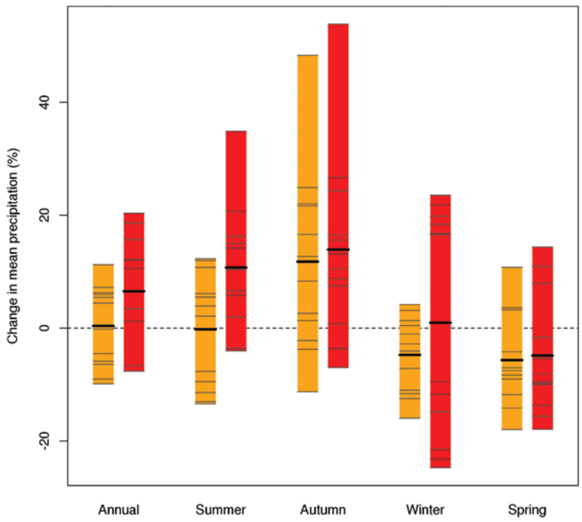


Figure 16: Projected changes in mean rainfall for NSW, annually and by season (2030 yellow; 2070 red) compared to the period (1990–2009). (Appendix 1 provides help with how to interpret these graphs).

Projected statewide climate changes

Across NSW and the ACT the majority of models (9 out of 12) agree that spring rainfall will decrease in the near future and far future. However there are important regional variations in the changes in spring rainfall.

NSW currently experiences considerable rainfall variability across regions, seasons and from year-to-year and this variability is also reflected in the projections (Figures 17 and 18).

Spring rainfall is projected by the majority of models to decrease in the near and far future for inland regions west of the Great Dividing Range, and in southern NSW (Murray Murrumbidgee and the South East and Tablelands regions) (Figures 17 and 18). In contrast spring rainfall is projected by the majority of models to increase along the coast north from Newcastle to the Queensland border.

Autumn rainfall is projected by the majority of models to increase across NSW in the near future and the far future (Figure 16).

Projected changes in summer and winter rainfall vary across the state.

Seasonal projections for the near future span both increases and decreases for summer (–13% to +12%), autumn (–11% to +48%), winter (–16% to +4%), and spring (–18% to +11%). By 2070 the projections are: summer (–4% to +35%), autumn (–7% to +54%), winter (–25% to +24%), and spring (–18% to –14%) (Figure 16).

Projections for the state's annual average rainfall range from a decrease (drying) of 10% to an increase (wetting) of 11% by 2030 and still span both drying and wetting scenarios (–8% to +20%) by 2070.

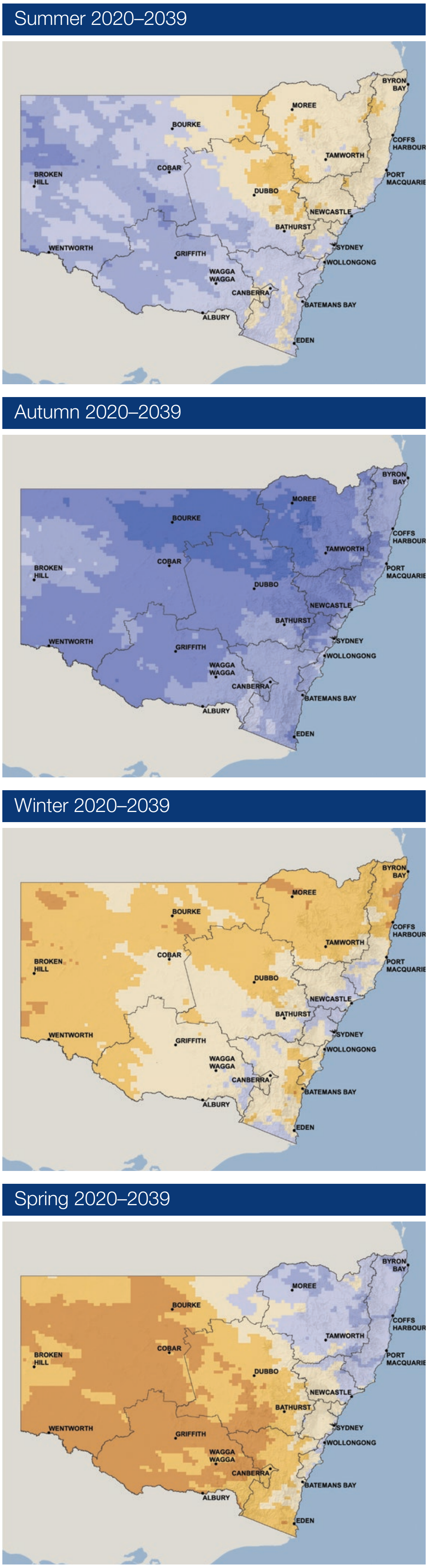


Figure 17: Near future (2020–2039) projected changes in mean rainfall by season compared to the baseline period (1990–2009).

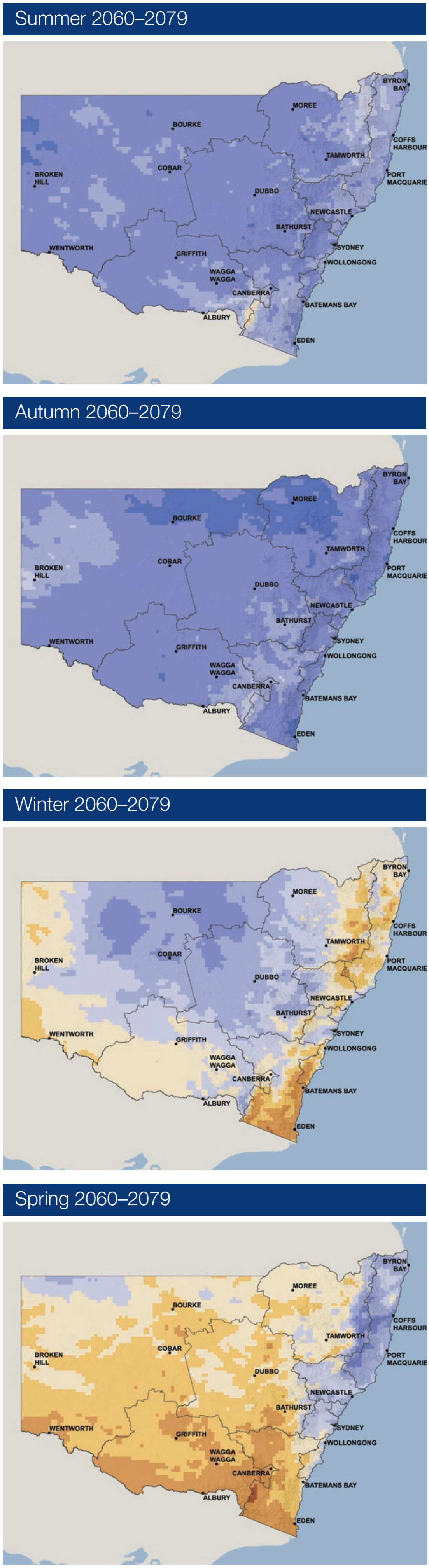
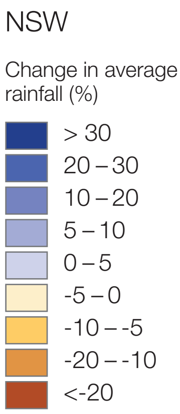


Figure 18: Far future (2060–2079) projected changes in mean rainfall by season compared to the baseline period (1990–2009).



North-east NSW

The north-east of the state is projected to have decreases in rainfall in summer and winter by 2030. By 2070 the majority of models project a decrease in winter rainfall along the coast and an increase in winter rainfall inland.

The north-east is projected to have increases in rainfall during autumn and spring by 2030.

By 2070 the north-east is projected to have increased rainfall in autumn and summer, and spring (along the coast).

North-west NSW

The north-west of the state is projected to have increases in summer and autumn rainfall in the near and far future and decreases in spring rainfall in the near and far future.

The north-west is projected to see decreases in winter and spring rainfall in the near future. Decreases in spring rainfall persist but by 2070 changes in winter rainfall patterns are less certain.

South-east NSW

The south-east of NSW is projected to have increases in summer and autumn rainfall with greater increases by 2070.

The south-east is projected to see decreases in winter and spring rainfall, with greater declines by 2070, particularly along the south coast in winter.

South-west NSW

The south-west of the state is projected to have increases in rainfall during summer and autumn in the near and far future, while spring rainfall decreases.

Winter rainfall decreases in the near future but changes in winter rainfall patterns in the far future are more variable.

Greater Metropolitan Region

Projected changes in rainfall across the Greater Metropolitan Region (Sydney, Newcastle and Wollongong) vary. More detail on the projected changes to rainfall in these areas is provided in the local snapshots for the Sydney Metropolitan, Hunter, Illawarra and Central Coast regions.

Fire weather

The Bureau of Meteorology issues Fire Weather Warnings when the FFDI is forecast to be over 50. High FFDI values are also considered by the Rural Fire Service when declaring a Total Fire Ban.

Average FFDI values are often used to track the status of fire risk. These values can be used when planning for prescribed burns and help fire agencies to better understand the seasonal fire risk. The FFDI is also considered an indication of the consequences of a fire if one was to start – the higher the FFDI value the more dangerous the fire could be.

FFDI values below 12 indicate low to moderate fire weather, 12-25 high, 25-49 very high, 50-74 severe, 75-99 extreme and above 100 catastrophic.

Average fire weather and severe fire weather days are projected to increase in summer and spring

Projected statewide climate changes

NSW is projected to experience an increase in average and severe fire weather in the future (Figures 19 and 20).

The increases in average and severe fire weather are projected to occur mainly in summer and spring. The western region has the greatest increases in the state, and these increases occur across all seasons (Figures 21 and 22).

Models mainly project a relatively small change in severe fire weather for coastal regions, the south-east and the Southern Tablelands.

Autumn is projected to have a decrease in mean fire weather across large parts of the state and a decrease in severe fire weather in the east of the state. As fire weather measurements take into account rainfall, it is likely that the decrease in FFDI during autumn is due to projected increases in autumn rainfall (compare Figures 17 and 18 with Figures 21 and 22).

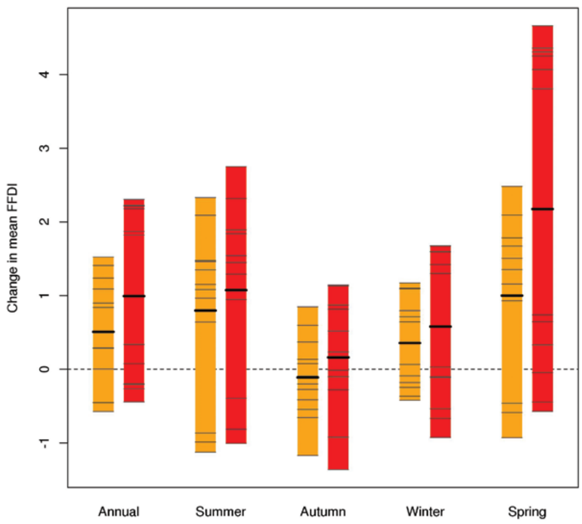


Figure 19: Projected changes in the mean daily forest fire danger index (FFDI) for NSW annually and by season (2030 yellow; 2070 red). (Appendix 1 provides help with how to read these graphs).

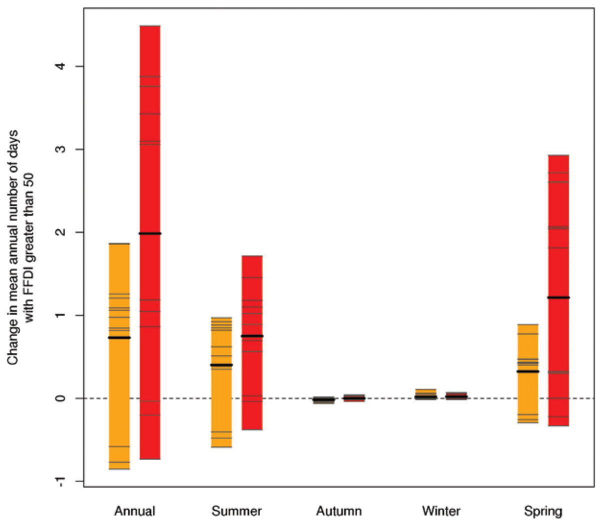


Figure 20: Projected changes in mean annual number of days with a forest fire danger index (FFDI) greater than 50 for NSW, annually and by season (2030 yellow; 2070 red). (Appendix 1 provides help with how to read these graphs).

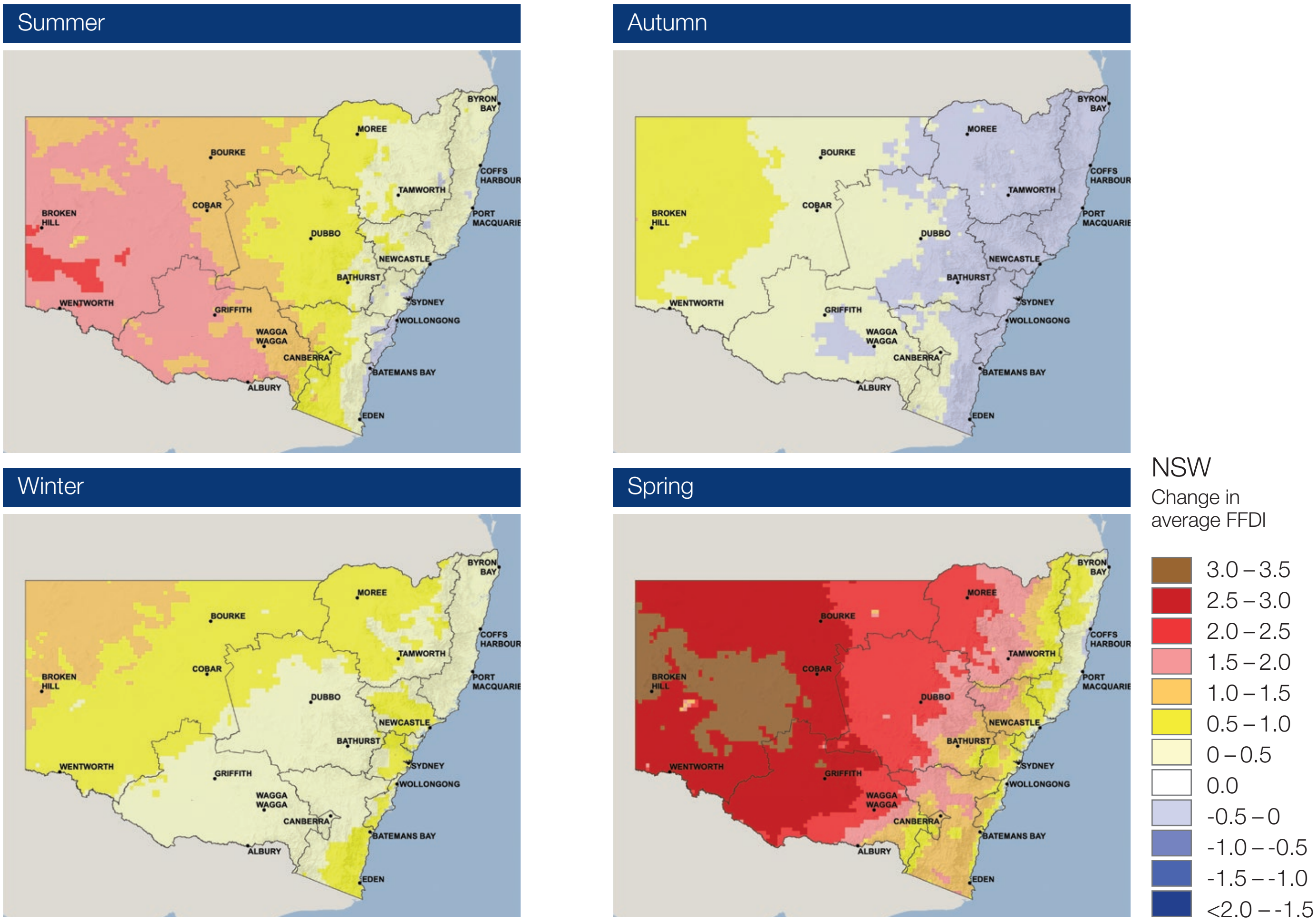


Figure 21: Far future (2060–2079) projected changes in average daily FFDI, compared to the baseline period (1990–2009).

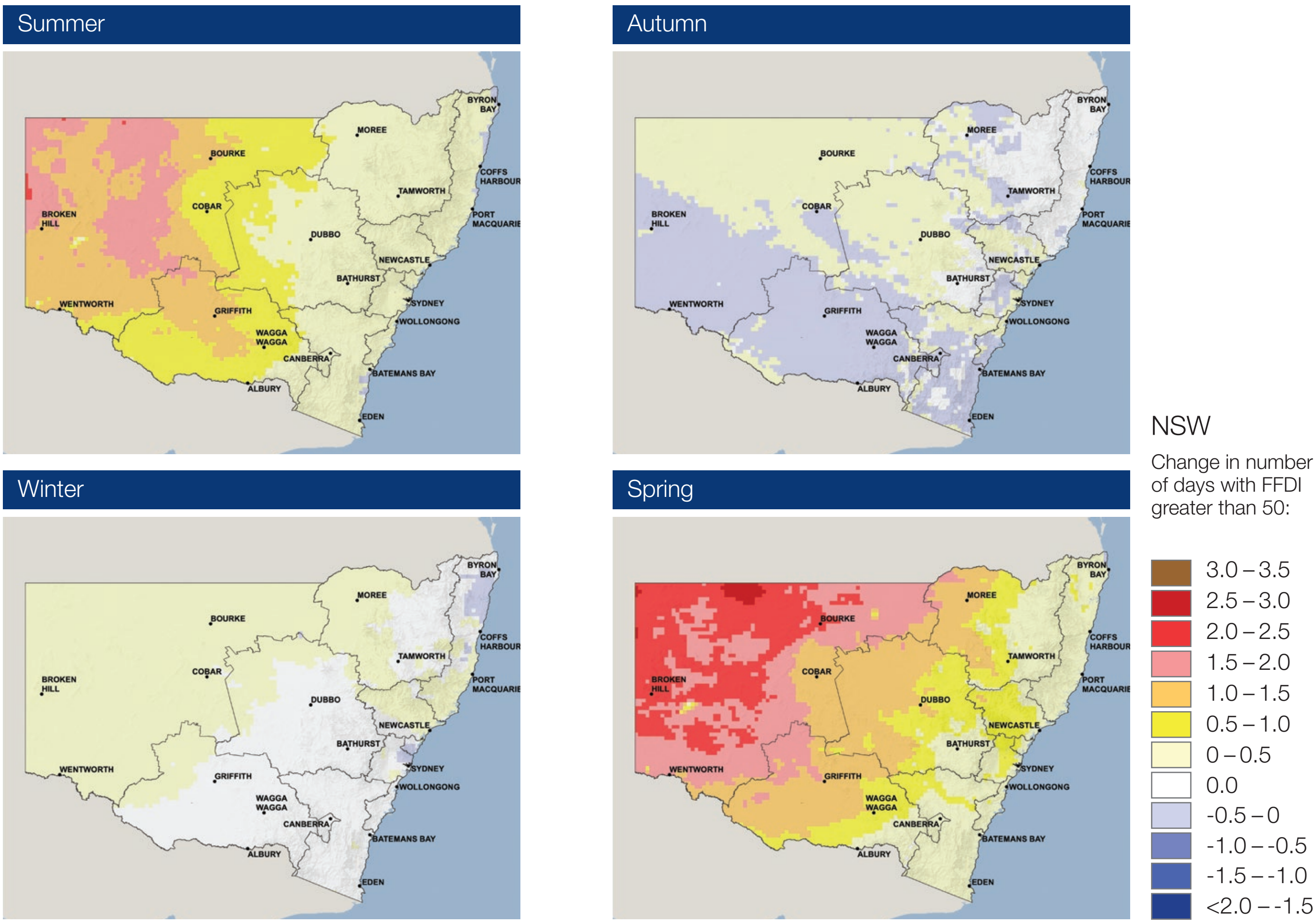


Figure 22: Far future (2060–2079) projected changes in average annual number of days with a FFDI greater than 50, compared to the baseline period (1990–2009).

Appendix 1 Guide to reading the maps and graphs

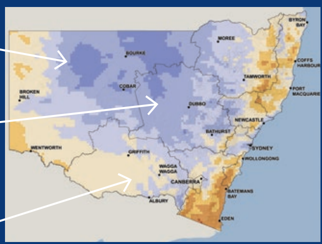
This document contains maps and bar graphs of the climate change projections. The maps present the results of the twelve models as an average of all twelve models. The bar graphs show projections averaged across the entire state and do not represent any particular location within the state. The bar graphs also show results from each individual model. See below for more information on what is displayed in the maps and bar graphs.

How to read the maps

The maps display a **10km** grid.

NSW has been divided into State Planning Regions and each region has a Local Snapshot report.

The colour of each grid is the **average of all 12 models** outputs for that grid.



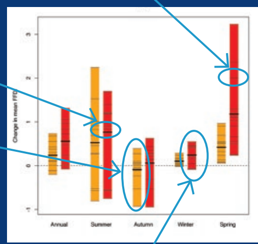
How to read the bar graphs

The thin grey lines are the **individual models**. There are 12 thin lines for each bar.

The thick line is **the average of all 12 models** for the region.

The length of the bar shows the **spread of the 12 model values** for the region

Each line is the **average for** the region. They do not represent a single location in the region.



Note: The yellow bars represent the near future (2020–2039), while the red bars represent the far future (2060–2079).

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59–61 Goulburn Street
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