Far West

Climate Change Snapshot

NARCliM

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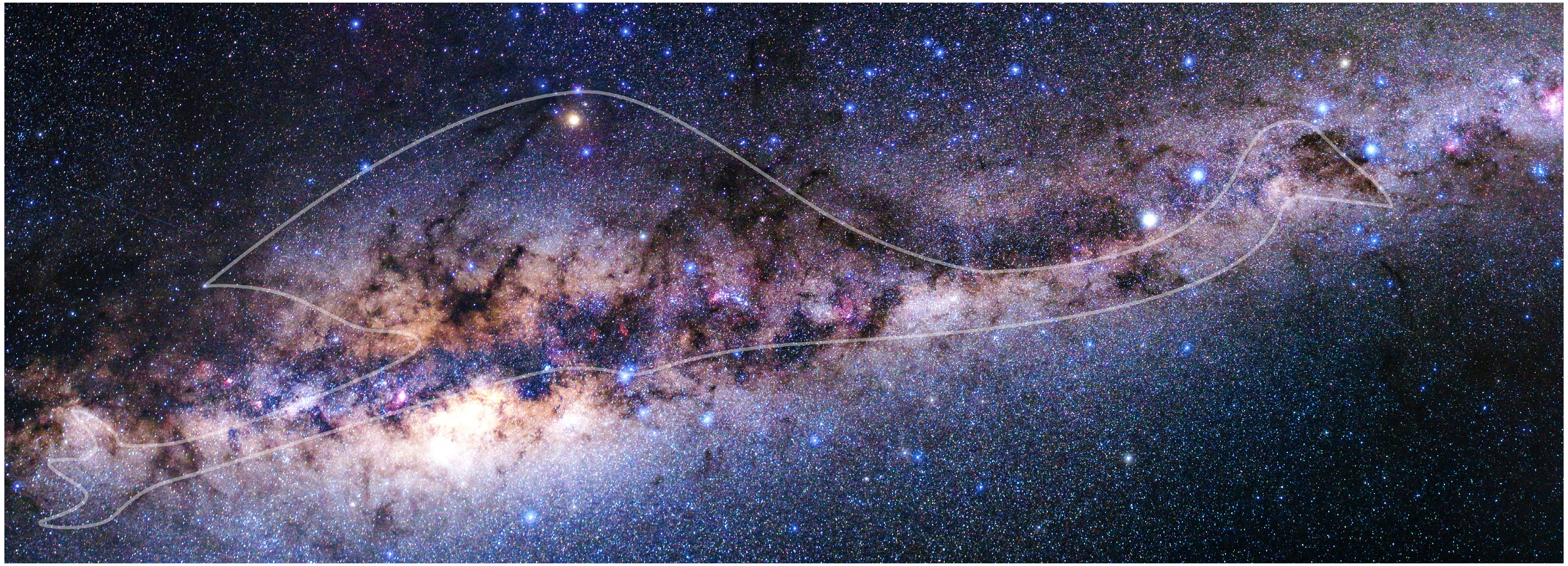
Photo caption:

The Emu in the Sky is an Aboriginal constellation that is made up of the dark clouds of the Milky Way. With the movement of the Earth, the position of the Emu in the Sky changes throughout the year. Aboriginal people in some nations across NSW and Australia relate the position of the Emu in the Sky to the breeding behaviour of the emu on the land. Cultural astronomy teaches us about the relationship between the sky and land; and that we are all interconnected.



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Acknowledgement of Country

The NSW Government acknowledges First Nations people as the first Australian people and the traditional owners and custodians of the country's lands and water. Australia's First Nations people have lived in NSW for over 60,000 years and have significant spiritual, cultural and economic connections with its lands, waters, seas and skies.

The Far West region encompasses the traditional lands of the Barundji, Karenggapa, Wadilgali, Malyangaba, Bandjigalia, Wandjiwalgu, Wiljali, Danggali, Barkindji, Barindji and Wongaibon peoples.

They are the first astronomers and scientists who have been listening, reading and understanding natural processes and caring for Country for generations.

We pay respects to Elders past and present and acknowledge the significance of their traditional knowledge in adapting to changes in climate over tens of thousands of years.

We recognise the importance of their cultural knowledge and guidance at this pivotal moment in time.

About this snapshot

The New South Wales (NSW) and Australian Regional Climate Modelling (NARCliM) project delivers high-resolution climate change projections for NSW and south-east Australia.

This snapshot provides the latest NARCliM2.0 climate projections for the Far West under low, medium and high emissions scenarios for the middle of the century (2050) and end of the century (2090). It includes projections for key climate variables including temperature, average rainfall, hot days (days ≥35°C), cold nights (<2°C), and severe fire weather days (Forest Fire Danger Index >50). The projections help illustrate potential climate changes and their impacts, as well as associated climate risks.

NSW is already experiencing climate change. This document provides local-scale climate modelling insights to help the Far West communities understand and plan for the impacts of climate change on their infrastructure, environment and way of life; and to support informed planning, risk assessment and action.

This snapshot offers a high-level overview, with more detailed data available through the AdaptNSW Interactive Map, Climate Data Portal and AdaptNSW.

How to use this snapshot

While there are several different ways to engage with the information in this snapshot, here are some key things to consider:

- **Explore each climate variable across scenarios –** review projections under low (SSP1–2.6), medium (SSP2–4.5), and high (SSP3–7.0) emissions scenarios to understand how climate risk differs depending on emissions pathways (Shared Socioeconomic Pathways, SSPs).
- **Compare scenario-based changes over time –** examine how each climate variable responds to different emissions scenarios for the middle of the century (2050) and the end of the century (2090) to understand how risks may evolve.
- **Identify where projections of climate variables align or diverge –** look for patterns across emissions scenarios and timeframes to see where risks remain consistent and where they escalate or diverge significantly.

Time periods in this snapshot

The projections for each time period represent averaged data across all climate models used for NARCliM for a 20-year period:

- **Baseline period: baseline** → The modelled average for each climate variable from 1990–2009, used for comparison with future projections.
- **Middle of the century: '2050' projection** → The projected average for each climate variable for 2040–2059.
- **End of the century: '2090' projection** → The projected average for each climate variable for 2080-2099.

About this snapshot

NARCliM climate projections

NARCliM is NSW's regional climate modelling project. NARCliM combines carefully selected global and regional climate models through a process known as dynamical downscaling, to generate detailed, locally relevant climate projections. These simulate a range of plausible future climates, helping to inform climate risk assessments and support planning at local and regional levels.

Launched in 2024, NARCliM2.0 provides nation-leading climate model data that span the range of plausible future changes in climate. It offers:

- climate projections out to the year 2100, and simulations of the past climate from 1951 to 2014
- 4-km scale projections for south-east Australia
- 20-km scale projections for the broader Australasian region
- projections for key climate variables and extremes.

There is more information About NARCliM, as well as specific information on Downscaling in NARCliM and Global and regional climate models used by NARCliM at AdaptNSW.

Methods and uncertainty

To help address future uncertainty, NARCliM2.0 is built on a selection of emissions scenarios, global climate models and regional climate models that, together, capture a range of climates that could occur. This is referred to as the NARCliM model ensemble. The NARCliM2.0 model ensemble is made up of different combinations of 5 global climate models and 2 regional climate models, giving 10 model combinations in total.

The data presented in this snapshot is generally an average for different 20-year time periods (e.g. the 2050 projection is the average for the 2040–2059 time period). Time series data are presented as annual averages. Combining multiple models through averaging and other statistical methods produces better projections by providing a comprehensive representation of possible future climate scenarios.

To ensure that NARCliM models adequately simulate regional climate, scientists use them to simulate the past climate and compare the results with actual observations. Outputs undergo rigorous quality control and scientific technical peer review.

There is more information on The NARCliM modelling methodology and NARCliM data processing, testing and validation at AdaptNSW.

Mental health support

Climate change information can be distressing for some readers, with many Australians of all ages experiencing significant eco-anxiety. For supporting information, please visit the Black Dog Institute or Australian Psychological Society or speak with your local healthcare provider.

About this snapshot

Shared Socioeconomic Pathways

NARCliM2.0 uses Shared Socioeconomic Pathways (SSPs), which are the most recent emissions scenarios adopted in Coupled Model Intercomparison Project Phase 6 (CMIP6) models and used in the Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report.

The SSPs are a type of storyline-based emission scenario that estimate the world's future emissions and how these will affect the climate. SSPs outline different global development trajectories based on factors such as population, economic growth, education, urbanisation and land use, and technological advancement.[1] By analysing SSPs, we can better understand the long-term consequences of today's decisions and determine if we are heading toward higher-risk scenarios.[2]

For more information on emissions scenarios visit Emissions scenarios used by NARCliM on AdaptNSW and Summary for policymakers report by the IPCC.

Why do we use 3 SSPs?

The future is uncertain. There are many plausible futures on the horizon, and the one we reach depends on the path we take to get there. NARCliM provides projections for 3 SSPs (low-, medium- and high-emissions), each representing a distinct future with varying levels of climate risk.

Considering a range of SSPs and understanding where these scenarios align or diverge – in both the middle of the century (2050) and the end of the century (2090) – helps inform better planning and decision-making. NARCliM data highlights just how stark the differences between futures can be.

For more information about how to integrate this information into your risk assessments see Climate risk ready guide and Limitations and appropriate use on AdaptNSW.

Low-emissions future

SSP 1–2.6

SSP1–2.6 describes a **low-emissions future** with a global transition towards sustainable and equitable development.

Medium-emissions future

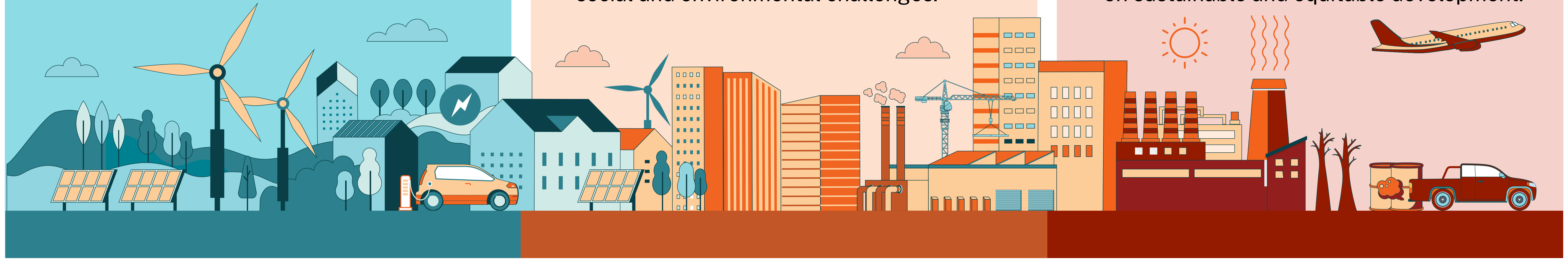
SSP 2–4.5

SSP2–4.5 describes a **medium-emissions future** with uneven economic growth, slow sustainability progress, ongoing environmental degradation, and persistent social and environmental challenges.

High-emissions future

SSP 3–7.0

SSP3–7.0 describes a **high-emissions future** of regional conflict and development where countries do not collaborate on tackling climate change and do not focus on sustainable and equitable development.



About this snapshot

Understanding the baseline period

To assess future climate projections, a climate baseline is used. This is a reference point which future change is relative to. In this snapshot, the baseline is the 20-year period from 1990 to 2009. This period is termed the baseline period to represent the average climate across those 2 decades.

A 20-year baseline averages out natural climate variability and avoids misleading comparisons with unusually hot, cold, wet or dry years. Using a fixed reference point prevents issues that may arise from using shifting reference points to compare future change against.

Climate during the baseline period is described in 2 ways in this snapshot:

- **Historical model:** The NARCliM2.0 simulation of past climate conditions.
- **Observed:** What was actually measured using weather station data during this period.

These 2 values are similar but not the same. Climate models aim to capture long-term patterns and trends, rather than matching observations perfectly. Observed values give context for comparison of the historical model with what it was in reality.

Looking backwards from the baseline

Before the baseline period, +0.84°C of observed warming had already occurred across NSW and the Australian Capital Territory (ACT) since records began. This is the difference between the 20-year average temperature of the 2 periods centred on 1920 (1910–1929) and 2000 (1990–2009). The Bureau of Meteorology's national climate records for temperature begin in 1910, making 1910–1929 the first available 20-year average for comparison with the baseline.

Consider the following when incorporating past warming into future projections:

- Warming before the baseline (+0.84°C) is not included in projections of future change.
- Warming after the baseline period is already included in future projections and should not be added again.

Looking forwards from the baseline

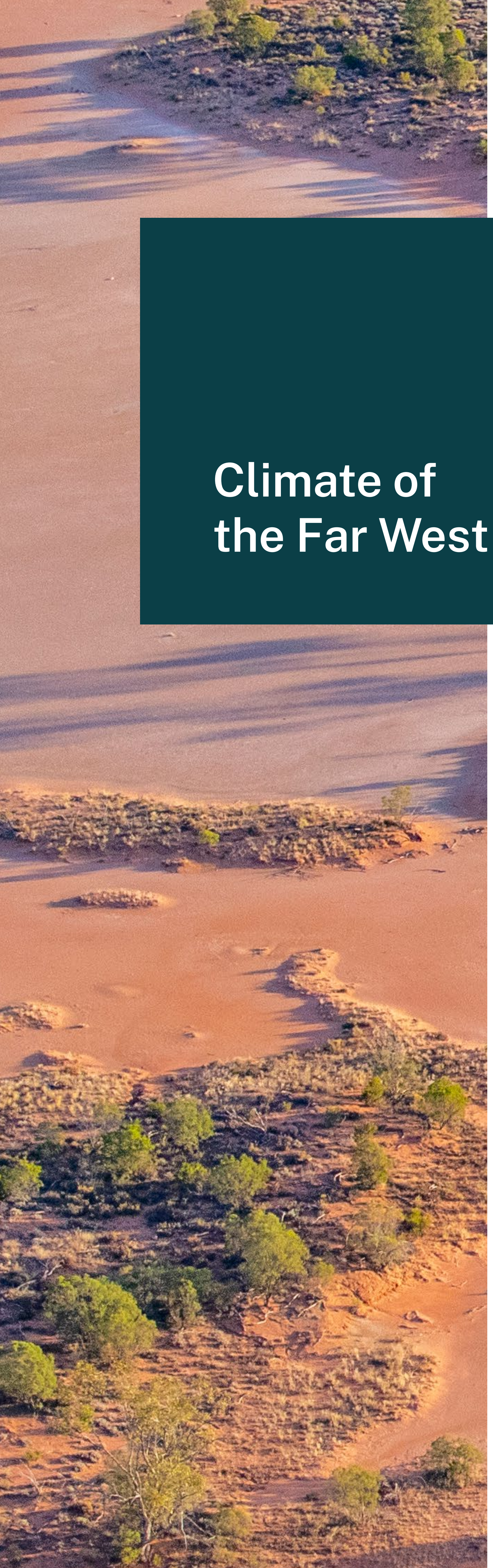
Use the historical model values in Table 1 as the baseline when interpreting both middle of the century and end of the century climate projections in this snapshot.

By comparing future projections to the historical model baseline values, we ensure the projected changes reflect genuine shifts, instead of also including the small differences between the modelled and observed data.

Table 1. Baseline climate for the Far West

	Average temperature	Average maximum temperature	Average minimum temperature	Hot days	Cold nights	Rainfall	Severe fire weather days
Observed	19.8°C	26.8°C	12.8°C	62.9 days	15.7 days	290 mm	15.2 days
Historical model	19.4°C	25.8°C	12.9°C	63.6 days	11.0 days	243 mm	16.6 days

Table 1 outlines the annual average values for the baseline period in this snapshot. All observed data is calculated from Bureau of Meteorology products. Long-term temperature change data is from the long-term temperature record.[3] Observed information and data in graphs come from Australian Gridded Climate Data (AGCD).[4]



Climate of the Far West

The climate of the Far West underpins a diverse array of important lifestyles, industries and natural ecosystems. A stable climate is critical to support a range of values in the Far West, including our unique biodiversity, recreational activities and food systems.

The Far West region encompasses the traditional lands of the Barundji, Karenggapa, Wadilgali, Malyangaba, Bandjigalia, Wandjiwalgu, Wiljali, Danggali, Barkindji, Barindji and Wongaibon peoples.

The Far West is the largest region in NSW and one of the most environmentally diverse, covering 40% of the state. The region includes the city of Broken Hill and remote towns such as Bourke, Cobar and Walgett. The Barwon–Darling River system connects Far West communities to each other and to the southern shires of Wentworth and Balranald.

The climate of the Far West region is influenced by its low-lying topography and distance from the coast. The eastern fringe experiences the highest rainfall totals in the region, while the central and western parts are very dry. It is hot in the north of the region during summer, with cool winters in the southern and central areas. Milder conditions are found along the southern fringe adjacent to the Victorian border, with cooler summers than the rest of the region.

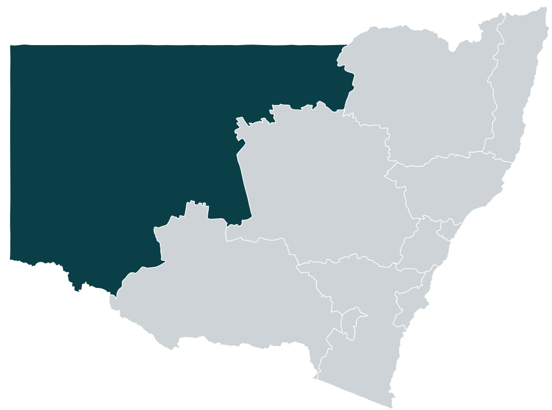
People aged 65 and over make up 21% of the population (slightly higher than the NSW and ACT average of 17.4%), while people aged 0–14 years represent 18.5% and working-aged people (15–64 years) represent 60.5% of the region's population.[5]

The Far West supports a diverse range of industries that are vital for NSW's economy, with the highest number of businesses in agribusiness (agriculture, forestry and fishing), construction and hospitality services (accommodation and food). The largest industries of employment for the region are health care and social assistance (14.8%), agribusiness (12.4%), education and training (9.3%), mining (8.4%) and retail trade (8.4%).[5]

The region's climate has provided the foundation for many of the region's current social, economic and ecological systems. These systems will be impacted by increased temperatures, more hot days, fewer cold nights, greater fire danger and higher rainfall variability.

The following pages outline the projected changes in these key climate variables across the Far West region.

PROJECTED CHANGES



	Low-emissions scenario		Medium-emissions scenario		High-emissions scenario	
	2050	2090	2050	2090	2050	2090
Increase in average temperature	+1.2˚C	+1.4˚C	+1.7˚C	+2.8˚C	+2.1˚C	+4.2˚C
Increase in hot days per year	+19.6	+21.1	+24.9	+40.7	+30.4	+57.6
Decrease in annual rainfall	–15.3%	–13.6%	–10.6%	–21.1%	–20.0%	–17.9%
Increase in severe fire weather days per year	+5.4	+6.0	+5.9	+11.9	+8.8	+15.6

REGIONAL IMPACTS

Murray-Darling River

Changes to rainfall

Inland wetland

Changes to rainfall

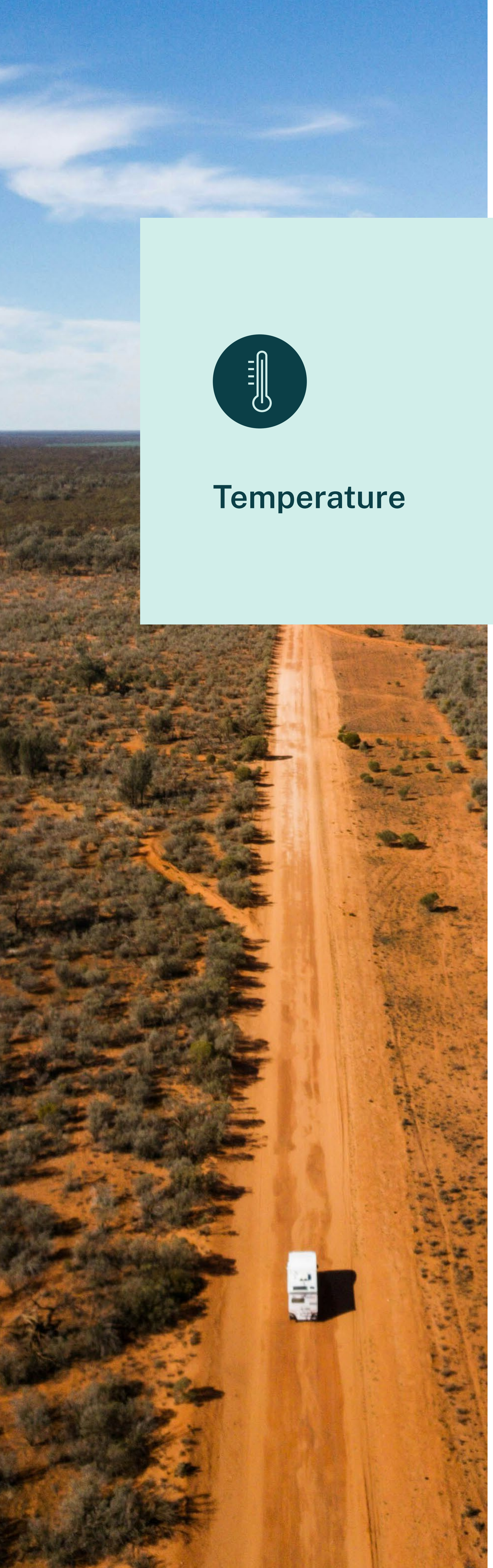
Changes to rainfall

Outback towns

Increased extreme heat

National Park

Data is based on NARCliM2.0 projections for SSP1–2.6 (low-emissions), SSP2–4.5 (medium-emissions) and SSP3–7.0 (high-emissions) and is presented relative to the baseline period of 1990–2009. Values presented are averages across the NARCliM2.0 model ensemble, and do not represent the full range of plausible climate futures. Regional climate change impacts are used to highlight how the region is likely to be affected by climate change, and impacts are not limited to the examples provided.



Temperature

In NSW, 8 of the 10 warmest years on record since 1910 have occurred since 2013.

4.2°C

rise in average temperature across the Far West by 2090 under a high-emissions scenario.

Temperatures are projected to be higher by 2050 under a high-emissions scenario than by 2090 under a low-emissions scenario.

The Far West is getting warmer

Temperature is the most robust indicator of climate change. In NSW, 8 of the 10 warmest years on record since 1910 have occurred since 2013. The warmest year on record for both average temperature and maximum temperature in the Far West region was 2019, when the average temperature was 1.1°C above the 1990–2009 baseline average.[4]

Projections

Across the Far West region, average temperatures will increase throughout this century (Figure 1).

Under a low-emissions scenario, the average temperature increase across the region is projected to be less than 0.2°C between 2050 and 2090 (Table 2). However, major temperature increase of 1.1°C under a medium-emissions scenario and 2.1°C under a high-emissions scenario are expected during the same period. Notably, the temperature projections for 2050 under both a medium-emissions scenario and a high-emissions scenario scenario are expected to exceed the projections for 2090 under a low-emissions scenario.

Temperature increases are expected in all parts of the region (Figure 2) and across all seasons. Northern areas of the region, including Bourke and Walgett, will see the greatest increases in temperature (Figure 2). By 2090, Bourke is likely to experience an increase in temperature of 1.6°C under a low-emissions scenario, 3.1°C under a medium-emissions scenario and 4.6°C under a high-emissions scenario. Comparatively, Wentworth in the south of the region is likely to experience an increase in temperature of 1.2°C under a low-emissions scenario, 2.4°C under a medium-emissions scenario and 3.6°C under a high-emissions scenario.

Table 2 and Figure 1 provide more information on how the projections differ across the 3 scenarios, and Figure 2 provides information on regional differences by 2090 across the 3 scenarios.

Table 2. Projected annual average temperature increase – Far West

2050

	Low-emissions	Medium-emissions	High-emissions
Temperature	**1.2°C** (0.6°C to 1.8°C)	**1.7°C** (1.2°C to 2.1°C)	**2.1°C** (1.0°C to 2.9°C)
Maximum temperature	**1.3°C** (0.7°C to 1.8°C)	**1.7°C** (1.1°C to 2.1°C)	**2.1°C** (1.0°C to 3.0°C)
Minimum temperature	**1.1°C** (0.6°C to 1.7°C)	**1.6°C** (0.9°C to 2.2°C)	**2.0°C** (0.9°C to 2.7°C)

2090

	Low-emissions	Medium-emissions	High-emissions
Temperature	**1.4°C** (0.7°C to 2.2°C)	**2.8°C** (2.0°C to 3.9°C)	**4.2°C** (2.8°C to 5.9°C)
Maximum temperature	**1.4°C** (0.7°C to 2.2°C)	**2.8°C** (1.9°C to 3.9°C)	**4.0°C** (2.9°C to 5.7°C)
Minimum temperature	**1.3°C** (0.7°C to 2.0°C)	**2.7°C** (1.9°C to 3.8°C)	**4.2°C** (2.7°C to 5.8°C)

The bold number is the ensemble average for the period. Underneath the average is the ensemble range. Temperature increases are additional to the historical model baselines of 19.4℃ for average temperature, 25.8℃ for average maximum temperature and 12.9℃ for average minimum temperature.

Figure 1. Historical and projected average temperature change – Far West

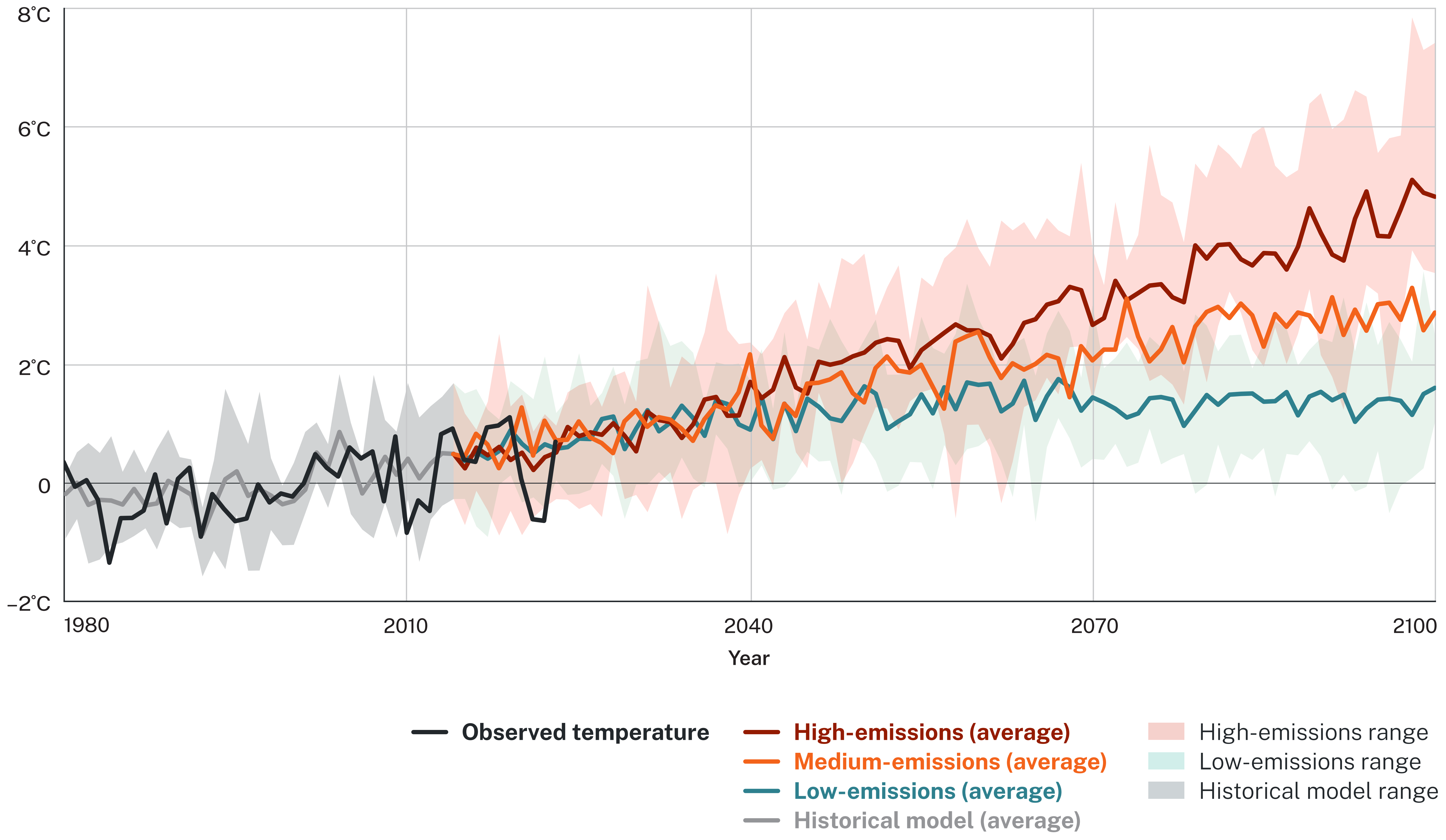
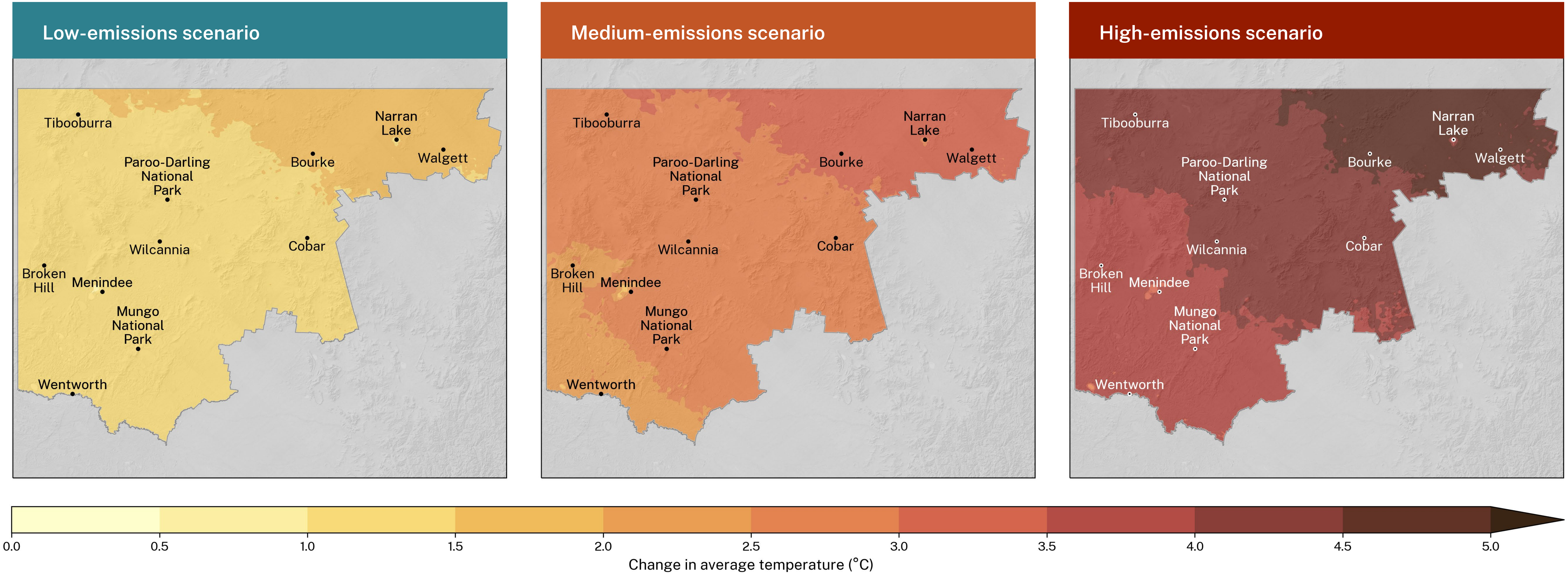


Figure 2. Projected change in average temperature by 2090 for the Far West



Hot days

Changes to temperature extremes often have more pronounced impacts than changes in average temperatures.

2x

The number of hot days across the Far West region is expected to nearly double by 2090 under a high-emissions scenario.

Higher maximum temperatures affect health through heat stress and exacerbate existing health conditions.

Hot days will become more frequent

Prolonged hot days, where maximum daily temperatures are equal to or above 35°C, increase the incidence of illness and death – particularly among vulnerable people. Seasonal changes in the number of hot days could have significant impacts on bushfire danger, infrastructure and native species.

During the baseline period, the number of hot days in the Far West region generally increased from south to north of the region. Southern areas such as Wentworth had on average 40 hot days per year and northern areas such as Bourke had on average more than 75 hot days per year.

Projections

Across the Far West, the average number of hot days per year will increase throughout this century (Figure 3).

The number of hot days will increase for the Far West region by 2050 for all emissions scenarios, with an even greater increase by 2090 under a medium-emissions scenario and a high-emissions scenario (Table 3). The number of hot days is projected to increase during spring, summer and autumn, with the largest increase in summer.

Under a low-emissions scenario, there is a small increase of only 1.5 additional hot days per year projected across the region between 2050 and 2090 (Table 3). However, increases of 15.8 additional hot days under a medium-emissions scenario and 27.2 additional hot days per year under a high-emissions scenario is projected during the same period.

Increases in the number of hot days will occur across all of the region. Northern areas of the region, including Bourke and Walgett, are projected to experience the greatest increases in the number of hot days (Figure 4). By 2090, Bourke will likely experience 25.8 additional hot days per year under a low-emissions scenario, 48.7 under a medium-emissions scenario and 67.2 under a high-emissions scenario. A medium-emissions scenario is projected to increase Bouke's baseline period average of 76.7 hot days per year by more than 60%, while a high-emissions scenario is projected to nearly double Bouke's baseline period average of hot days. Comparatively, in the south of the region, Wentworth's baseline period average is 39.1 hot days per year. By 2090, Wentworth is projected to experience an additional 13.1 hot days per year under a low-emissions scenario, 26.5 under a medium-emissions scenario and 40.8 under a high-emissions scenario.

Table 3 and Figure 3 provide more information on how the projections differ across the 3 scenarios, and Figure 4 provides information on regional differences by 2090 across the 3 scenarios.

Table 3. Projected increase in average annual number of hot days – Far West

2050

Low-emissions	Medium-emissions	High-emissions
19.6 days (6.3 to 32.2 days)	**24.9 days** (13.7 to 33.2 days)	**30.4 days** (12.1 to 43.8 days)

2090

Low-emissions	Medium-emissions	High-emissions
21.1 days (9.0 to 35.6 days)	**40.7 days** (26.3 to 56.3 days)	**57.6 days** (36.4 to 83.2 days)

The bold number is the ensemble average for the period. Underneath the average is the ensemble range. Hot day increases are additional to the historical model baseline of 63.6 hot days.

Figure 3. Historical and projected average annual number of hot days – Far West

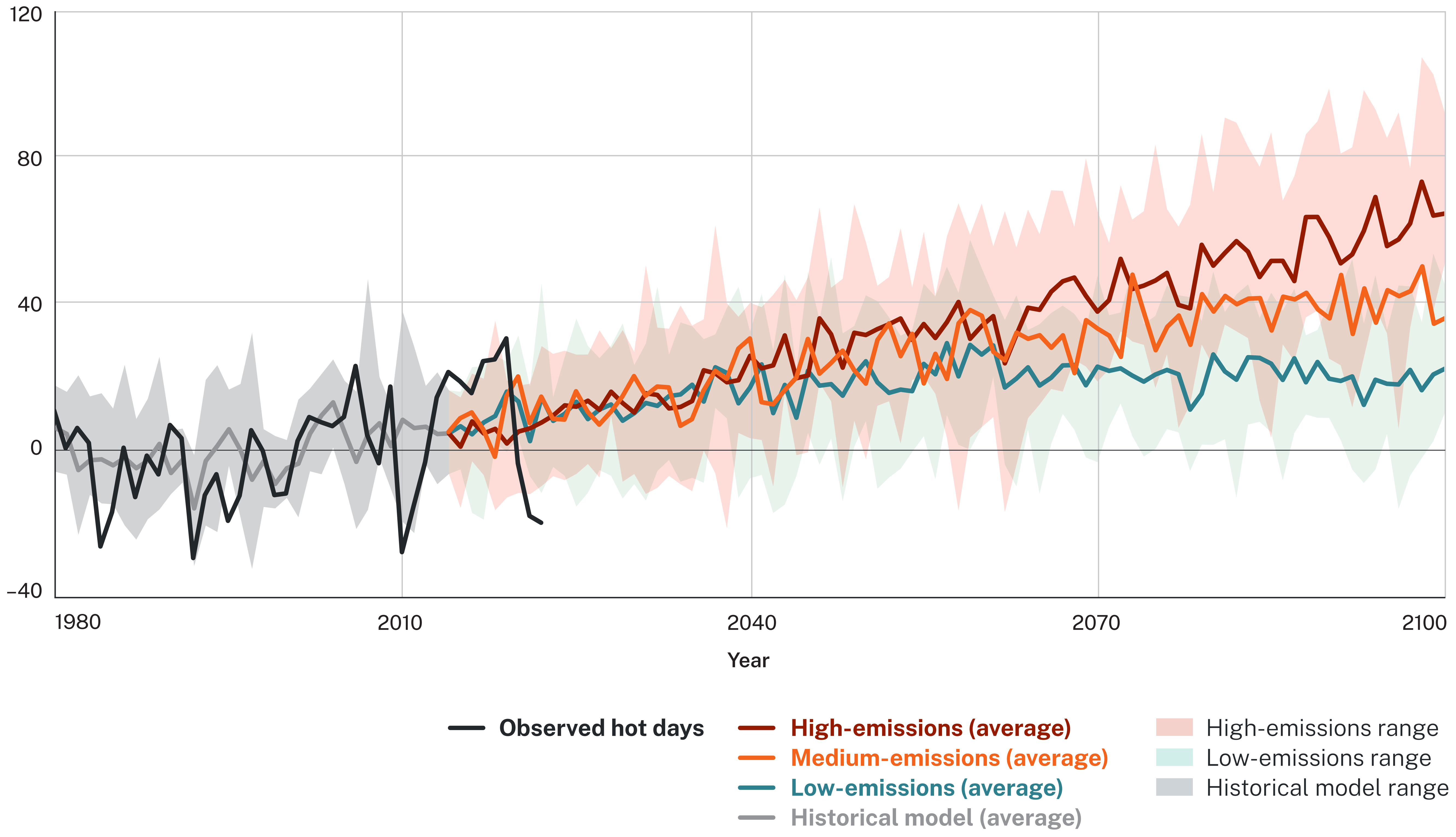
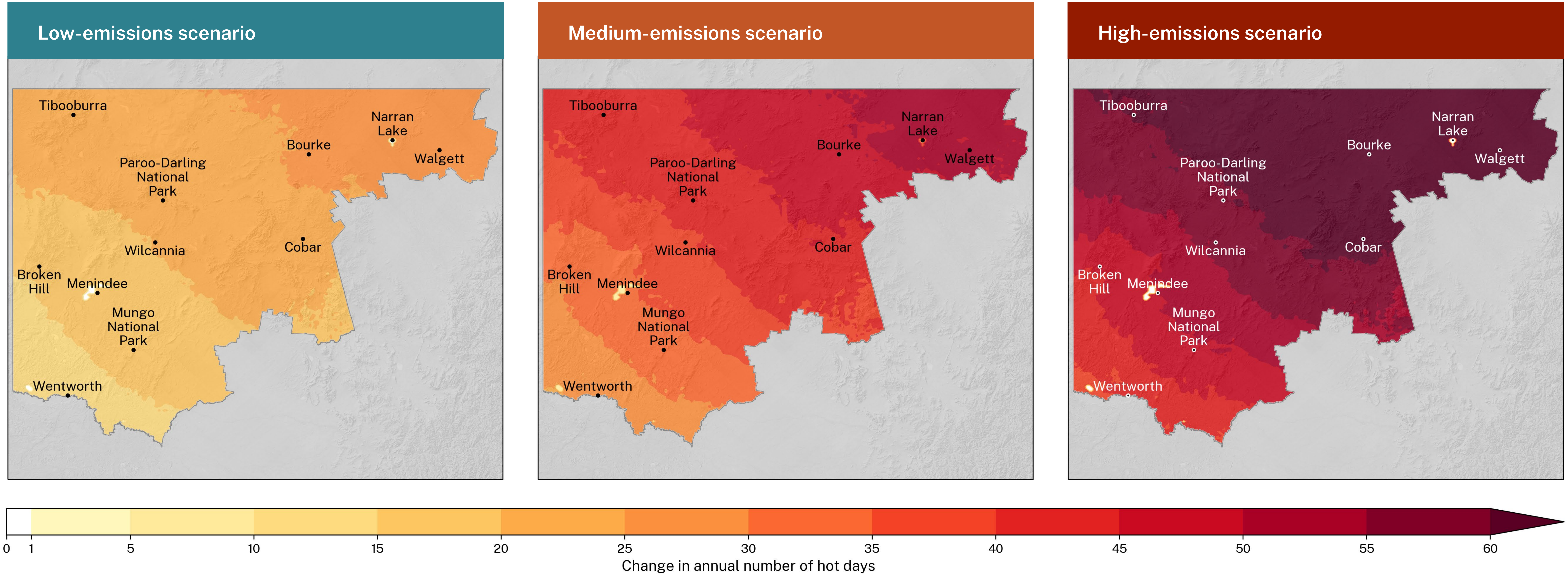


Figure 4. Projected change in annual number of hot days by 2090 for the Far West



Increased heat stress

Heatwaves have been responsible for more human deaths than any other natural hazard, including bushfires and floods. Heatwaves occur when both maximum and minimum temperatures are unusually hot over 3 days, compared to the previous month and historical weather. Heatwaves in 2011 and 2019 led to a 14% rise in NSW hospital admissions. In 2009, the heatwave in Victoria preceding the 2009 bushfires led to 374 deaths, with the bushfires directly responsible for 173 deaths.

Northern areas of the region are projected to experience greater increases in the number of hot days (Figure 4).

Southern areas of the region are projected to experience smaller increases in the number of hot days (Figure 4).

Communities and agricultural producers are expected to be increasingly impacted by more hot days of 35°C and above, which is likely to cause increased heat stress for people and could affect livestock during the reproductive phase.[6]

Cold nights

Cold nights are important for biodiversity in higher-elevation areas and the viability of important plant species, including some temperate fruits.

Under a high-emissions scenario, the number of cold nights across the Far West could reduce by more than 95% by 2090.

Under a low-emissions scenario, the number of cold nights across the Far West could reduce by more than 50% by 2090.

Cold nights will decrease

Cold nights are those where the minimum temperature drops below 2°C. These are important for the viability of some important plant species. For example, some common temperate fruit species require sufficiently cold winters to produce flower buds.

Generally, cold nights in the Far West region occur in the eastern areas of the region, with relatively fewer cold nights in western areas near the South Australian border. During the baseline period, the average number of cold nights ranged from more than 20 nights per year near Walgett to less than 5 cold nights per year near Broken Hill.

Projections

Across the Far West, the average number of cold nights per year will decrease throughout this century (Figure 5).

The number of cold nights will decrease for the Far West region by 2050 for all emissions scenarios, with an even greater decrease by 2090 under a medium-emissions scenario and a high-emissions scenario (Table 4). The number of cold nights is projected to decrease across autumn, winter and spring, with the largest decreases in winter.

Cold nights will decrease across all of the region, particularly in the east of the region (Figure 6). The greatest decreases are projected to occur east of Walgett and south of Cobar. By 2090, Walgett is projected to have 11.1 fewer cold nights per year under a low-emissions scenario, 18.5 fewer cold nights per year under a medium-emissions scenario and 21.6 fewer cold nights per year under a high-emissions scenario. A medium-emissions scenario is projected to reduce Walgett's 22.7 cold nights per year baseline period average by more than 80%, while a high-emissions scenario is projected to reduce Walgett's baseline average by more than 95%.

Table 4 and Figure 5 provide more information on how the projections differ across the 3 scenarios, and Figure 6 provides information on regional differences by 2090 across the 3 scenarios.

Table 4. Projected decrease in average annual number of cold nights – Far West

2050

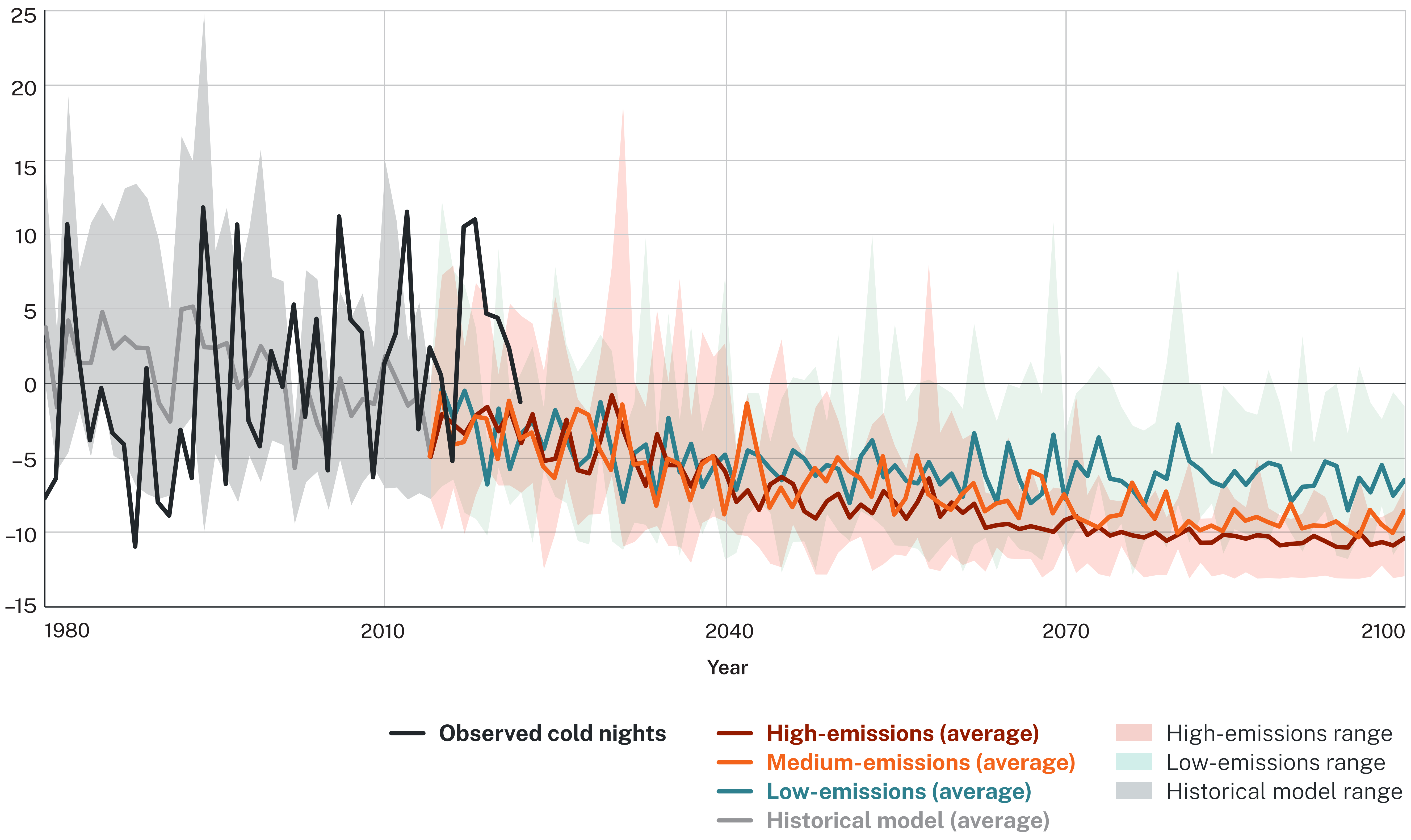
Low-emissions	Medium-emissions	High-emissions
5.7 days (3.5 to 8.9 days)	**6.5 days** (4.1 to 9.1 days)	**7.8 days** (3.0 to 10.3 days)

2090

Low-emissions	Medium-emissions	High-emissions
6.2 days (3.1 to 8.4 days)	**9.4 days** (7.4 to 11.3 days)	**10.5 days** (8.5 to 12.8 days)

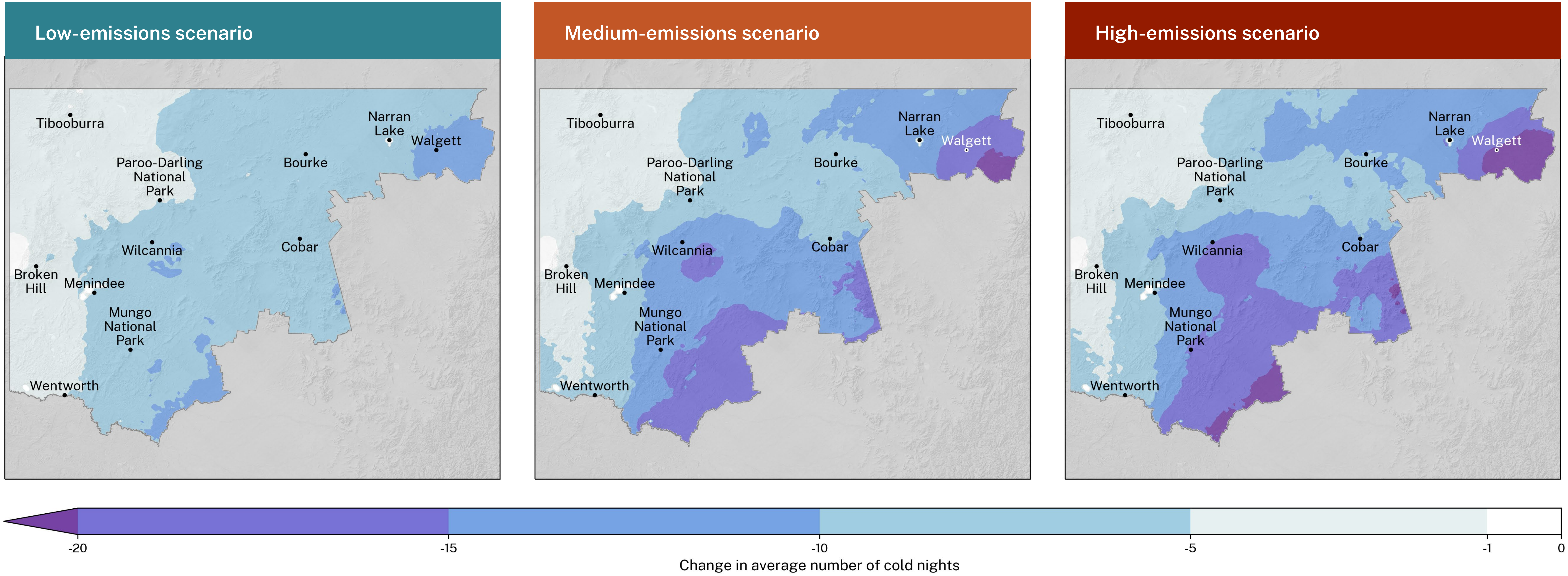
The bold number is the ensemble average for the period. Underneath the average is the ensemble range. Cold night decreases are relative to the historical model baseline of 11.0 cold nights.

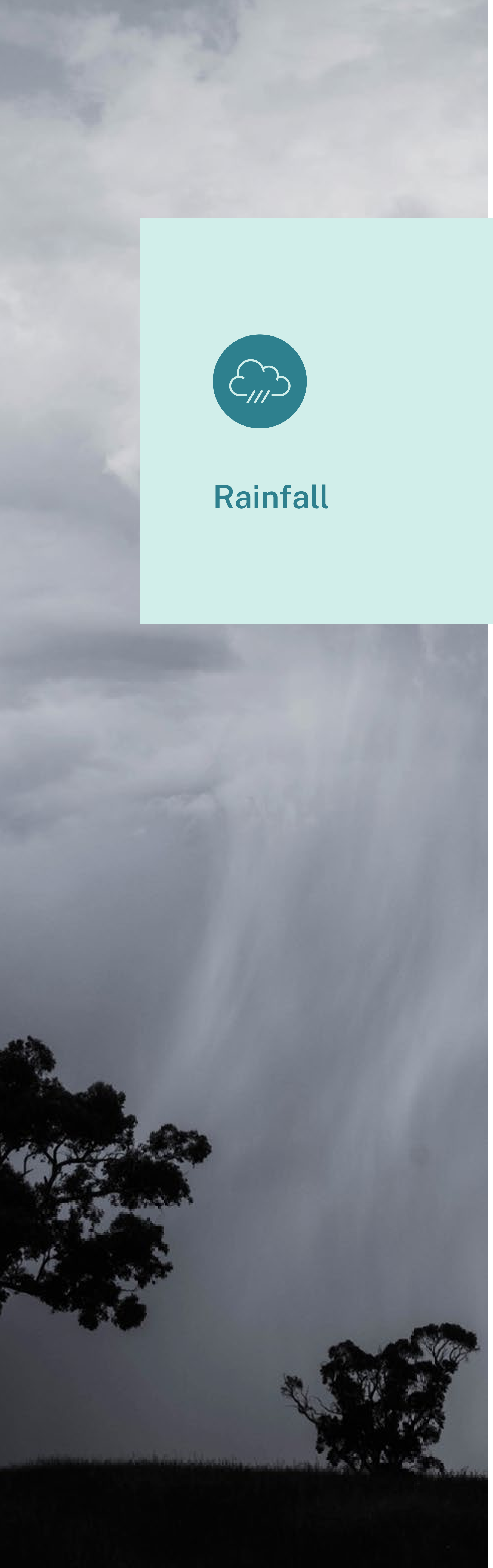
Figure 5. Historical and projected change in annual number of cold nights – Far West



Cold nights

Figure 6. Projected change in annual number of cold nights by 2090 for the Far West





Rainfall

Rainfall is projected to remain variable

Climate change will influence rainfall patterns and the amount of rainfall that NSW receives. These changes may have widespread impacts on water security, agricultural productivity and native species' reproductive cycles. For example, eucalypt woodlands and riverine plains in the interior west could struggle to cope with drier conditions. NSW has experienced rainfall extremes in recent decades, with significant impacts on communities, infrastructure and natural ecosystems.

Modelling rainfall is more difficult than modelling temperature due to the complexities of the weather systems that generate rain. NARCliM projections capture a range of plausible climate futures under the 3 emissions scenarios, including wet and dry outcomes. This means that rainfall is inherently more variable in the NARCliM projections than temperature, and the full range of rainfall projections should be taken into account. This can be explored further on the AdaptNSW Interactive Map.

This snapshot provides data on average rainfall change and does not provide data on rainfall extremes or the impacts of climate change on flooding.

Observed annual rainfall across the Far West region averages about 290 mm.[4] Rainfall is nearly uniformly distributed throughout the year, with most rainfall occurring episodically. Eastern areas of the region, such as Walgett and Balranald, experience relatively greater rainfall than western areas such as Broken Hill. The driest year on record was 1940, with an average rainfall of 120 mm across the region. Significantly dry years were also experienced in 2018 and 2019, with approximately 130 mm of average rainfall in each year.[4]

A decrease in average spring rainfall of approximately 30% by 2090 is projected for the Far West under medium-emissions and high-emissions scenarios.

Projections

Annual average rainfall in the region is projected to remain variable throughout this century (Figure 7). By 2090, on average, annual rainfall is projected to decrease by 14% under a low-emissions scenario, by 21% under a medium-emissions scenario and by 18% under a high-emissions scenario (Table 5).

By 2090, on average, spring rainfall is projected to decrease by almost 30% under all emissions scenarios (Table 5). Areas in the north and west of the region, such as Tibooburra and Broken Hill, are generally projected to experience greater decreases than other areas (Figure 12). On average, spring rainfall in Bourke is projected to decrease by 30% under a low-emissions scenario, by 26% under a medium-emissions scenario and by 29% under a high-emissions scenario.

On average, summer, autumn and winter rainfall is projected to change by 20% or less across the region by 2090 under both a low-emissions scenario and a high-emissions scenario.

Refer to the Interactive Map for further seasonal information.

Table 5 and Figure 7 provide more information on how the projections differ across the 3 scenarios, and Figures 8 to 12 provide information on regional differences by 2090 across the 3 scenarios by season.

Table 5. Projected change to average rainfall – Far West

2050

	Low-emissions	Medium-emissions	High-emissions
Annual	**–15.3%** (–37.1% to +6.0%)	**–10.6%** (–30.2% to +18.2%)	**–20.0%** (–44.3% to +7.7%)
Summer	**–10.9%** (–47.6% to +41.7%)	**–6.7%** (–43.7% to +98.4%)	**–22.6%** (–48.6% to +72.9%)
Autumn	**–16.4%** (–40.0% to +7.1%)	**–0.7%** (–28.4% to +39.2%)	**–18.3%** (–50.8% to +45.3%)
Winter	**–13.6%** (–25.4% to +34.5%)	**–17.5%** (–32.1% to +34.0%)	**–18.2%** (–46.4% to +26.3%)
Spring	**–21.4%** (–55.0% to +36.2%)	**–19.1%** (–48.5% to +37.7%)	**–20.4%** (–52.3% to +19.1%)

2090

	Low-emissions	Medium-emissions	High-emissions
Annual	**–13.6%** (–31.9% to +32.4%)	**–21.1%** (–40.3% to +31.7%)	**–17.9%** (–47.4% to +58.0%)
Summer	**–18.6%** (–53.4% to +74.5%)	**–19.8%** (–48.8% to +43.1%)	**–13.4%** (–44.4% to +55.2%)
Autumn	**–6.3%** (–35.6% to +42.7%)	**–12.1%** (–38.7% to +27.9%)	**–16.4%** (–48.9% to +58.5%)
Winter	**–1.9%** (–35.8% to +78.0%)	**–23.6%** (–52.3% to +81.7%)	**–14.0%** (–57.3% to +114.7%)
Spring	**–27.5%** (–49.0% to +43.7%)	**–29.9%** (–52.6% to +27.1%)	**–29.5%** (–56.6% to +65.7%)

The bold number is the ensemble average for the period. Underneath the average is the ensemble range. Percentages changes in annual average rainfall are relative to the historical model baseline of 243 mm. Average summer rainfall is relative to a baseline of 69 mm, average autumn rainfall is relative to a baseline of 60 mm, average winter rainfall is relative to a baseline of 58 mm and average spring rainfall is relative to a baseline of 55 mm.

Figure 7. Historical and projected change in average rainfall – Far West

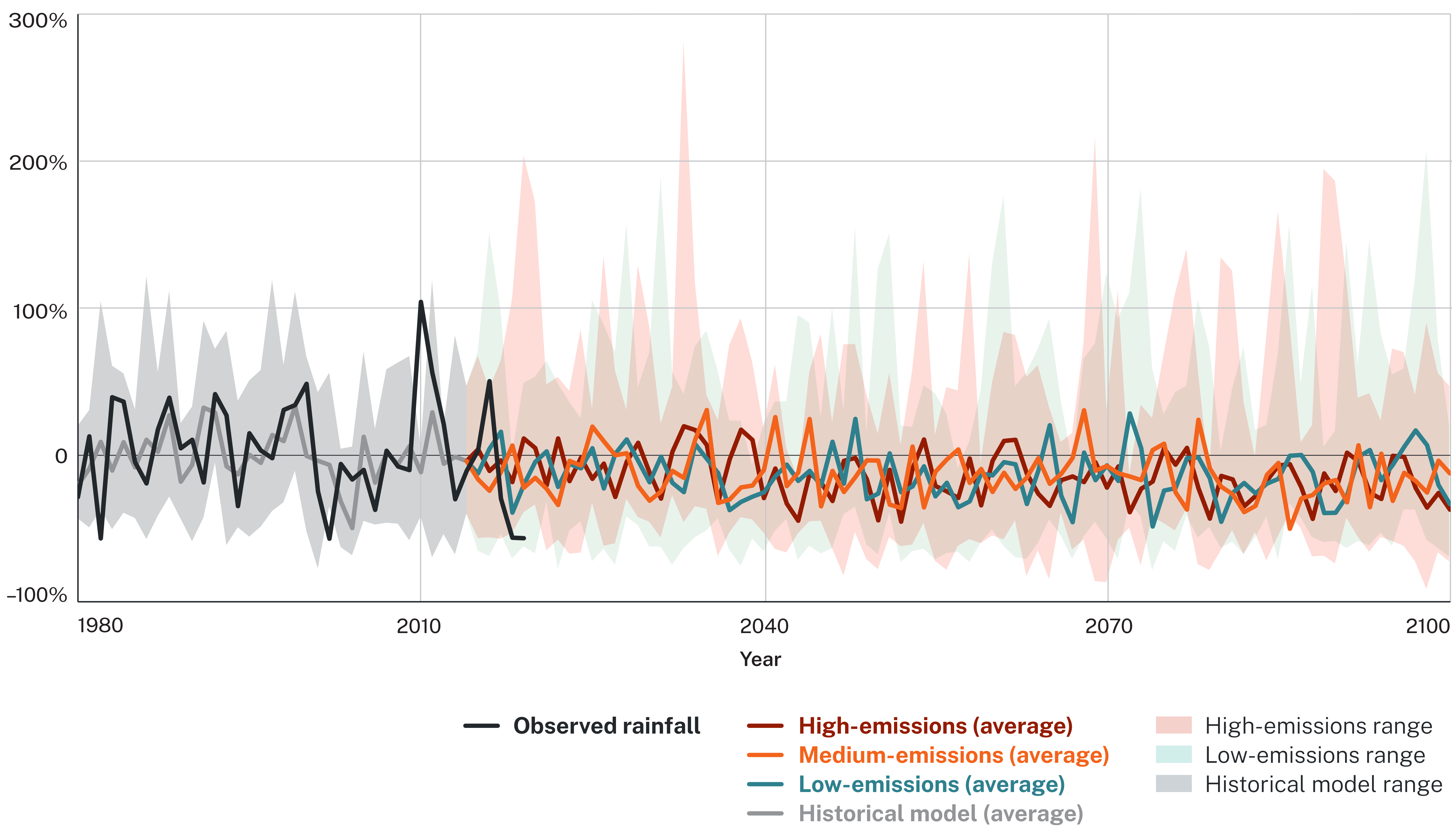


Figure 8. Projected change to average annual rainfall by 2090 for the Far West

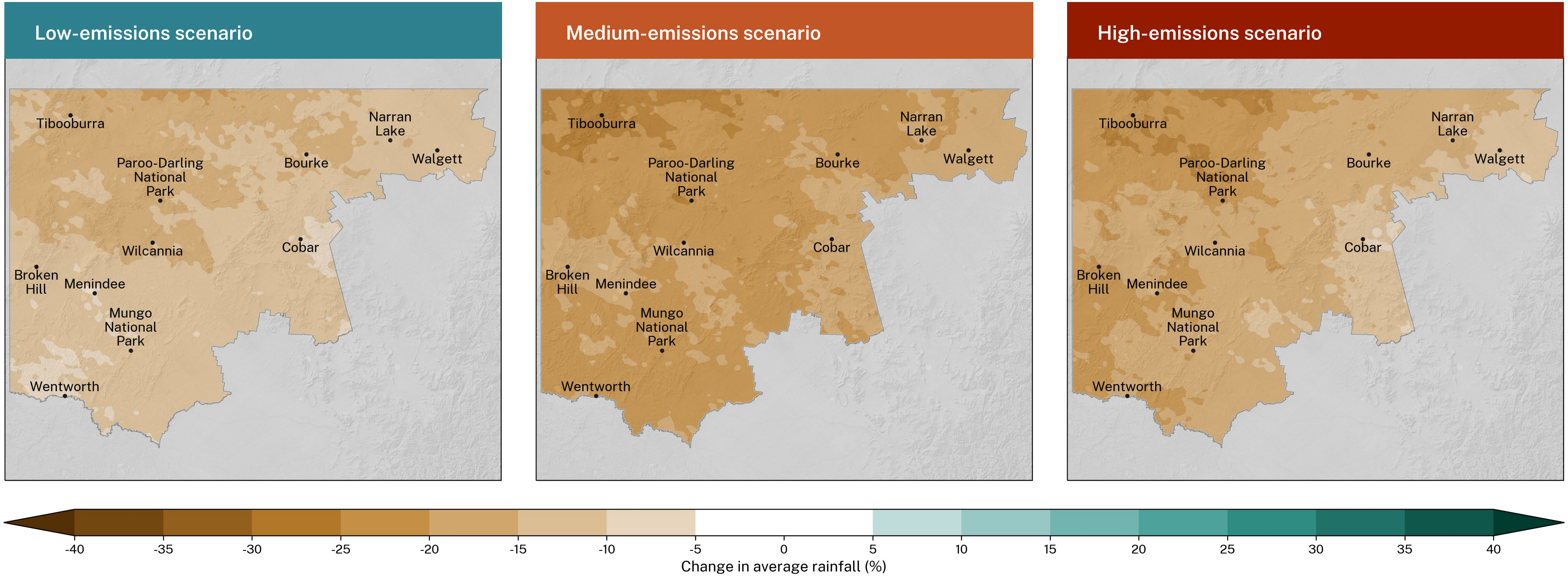


Figure 9. Projected change to average summer rainfall by 2090 for the Far West

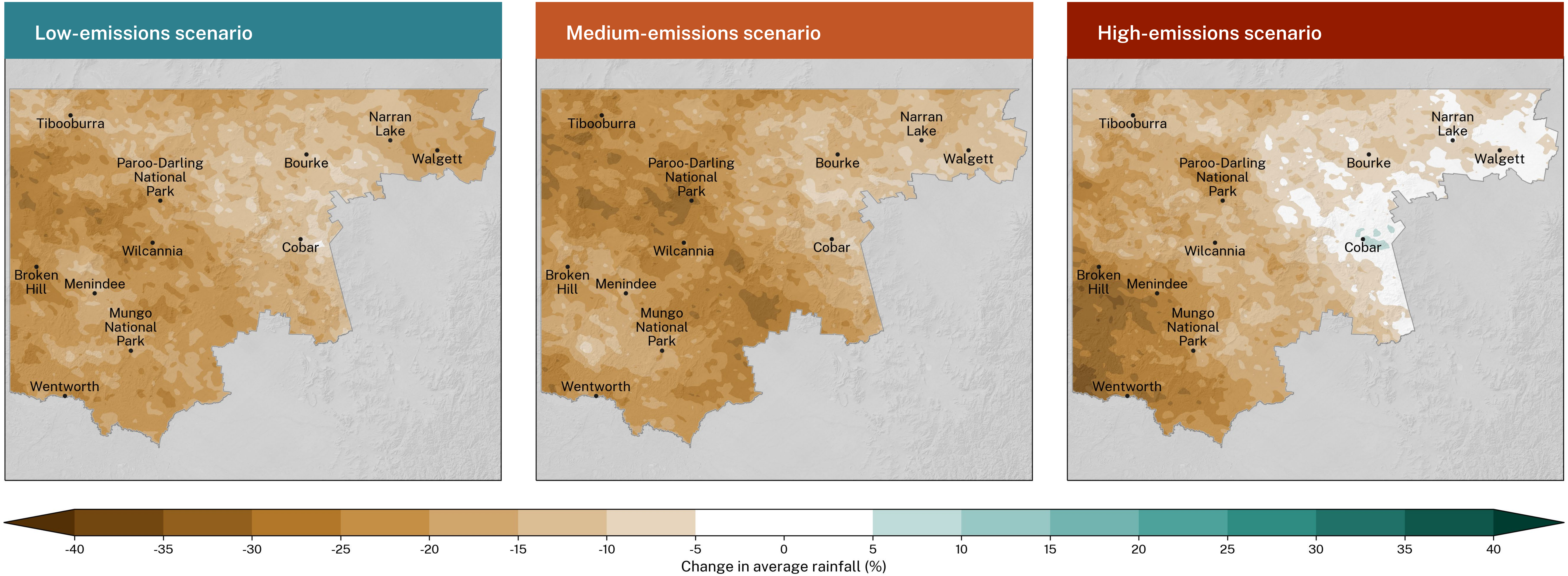


Figure 10. Projected change to average autumn rainfall by 2090 for the Far West

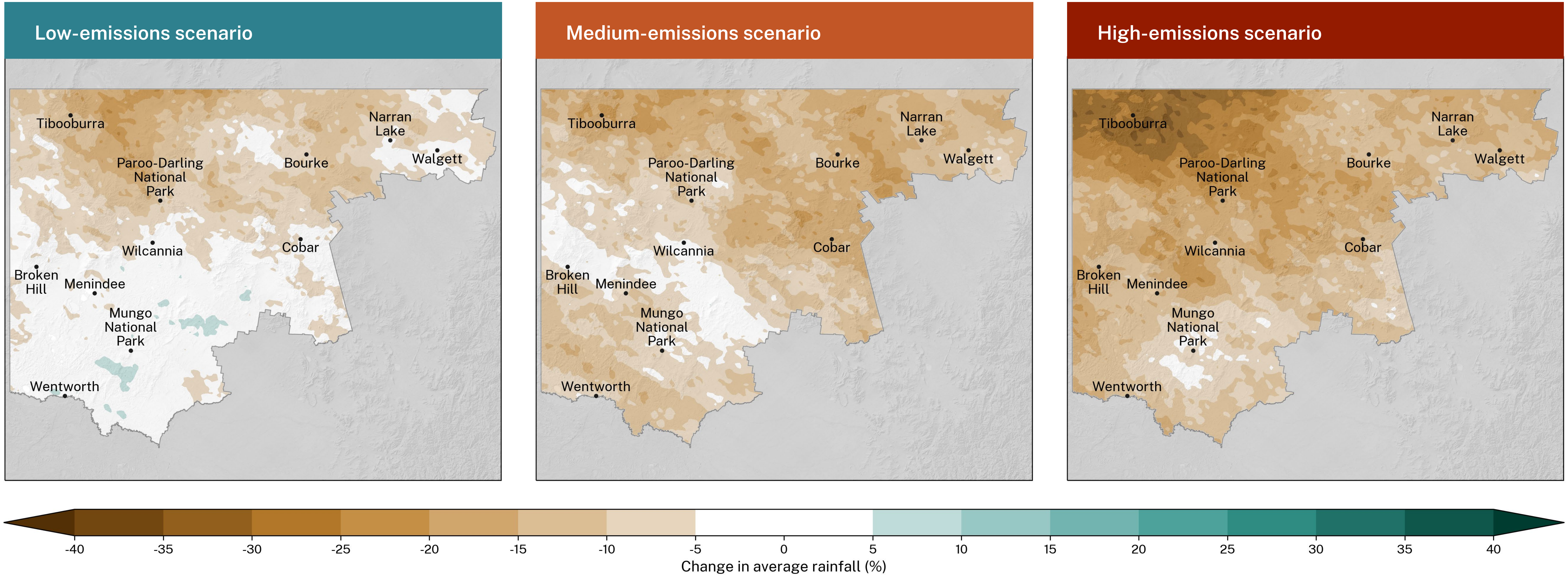


Figure 11. Projected change to average winter rainfall by 2090 for the Far West

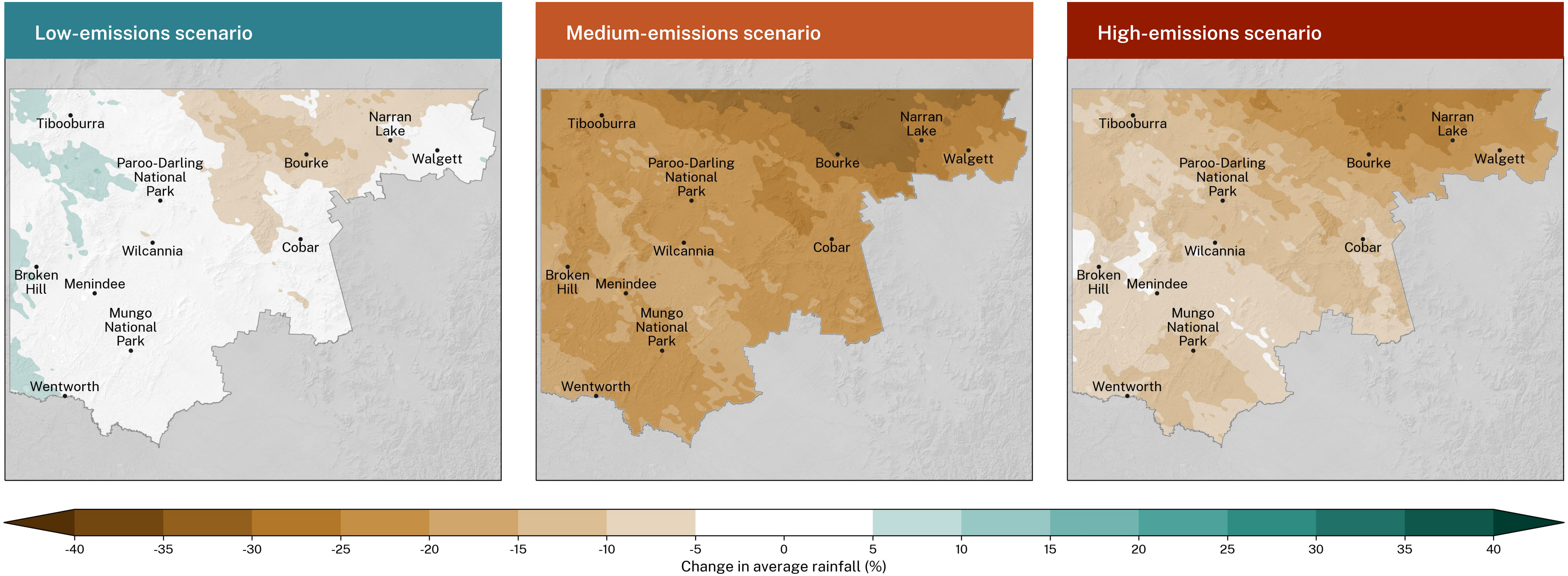
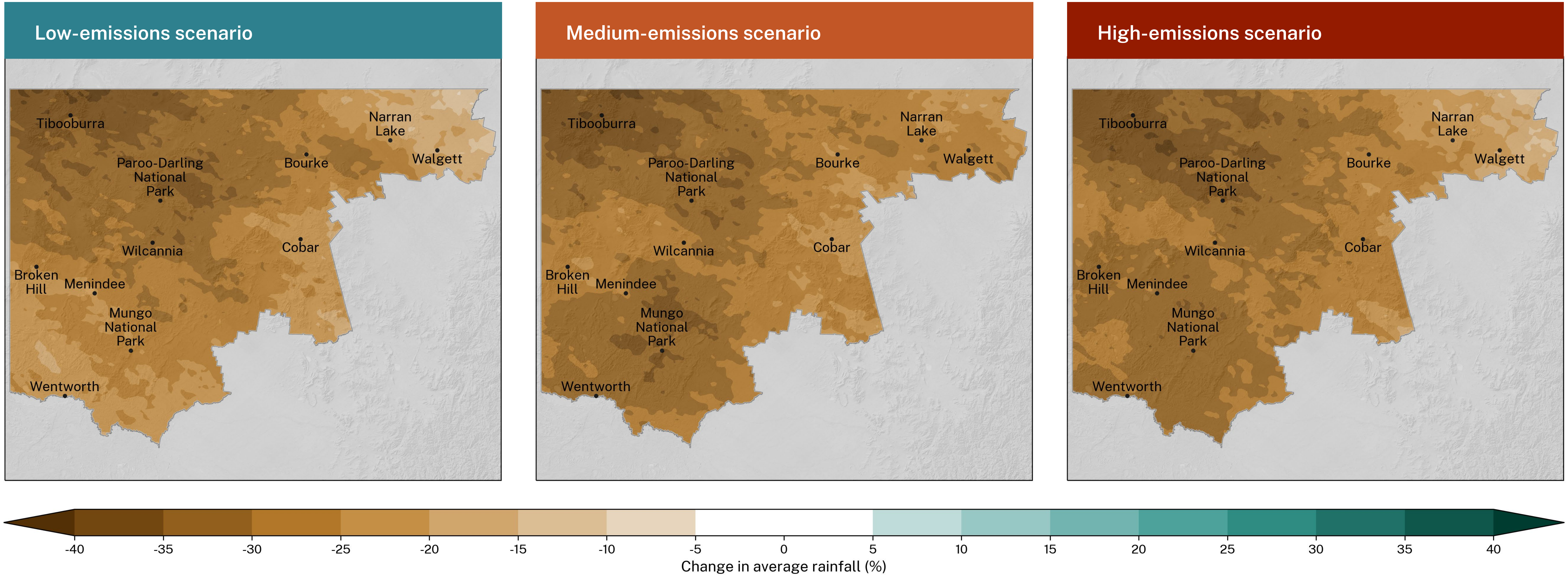


Figure 12. Projected change to average spring rainfall by 2090 for the Far West



Changes to rainfall

Increased rainfall variability from climate change is predicted to have significant impacts on the internationally significant Ramsar wetlands of the Far West such as the Paroo River Wetlands and Narran Lakes (Dharriwaa). For the Paroo River Wetlands, annual streamflow has already declined by 28% and waterbird abundance declined by 50% from 1981 to 2020 due to changes in temperature and rainfall.[6] Worse droughts could be possible under a future climate, resulting in significantly lower inflows into the Barwon–Darling River than those experienced in 2017–2020, which would impact town water supplies and agricultural production.[7]

The region's reliance on unregulated river flows and a regulated river make industries such as agriculture vulnerable to drought.[7]

Drought can significantly impact industries, impose hardships on communities and stress town water supplies.[7]

Further climate change impacts on town water supplies, wetland vegetation and waterbird abundance can be expected from increased hot days that cause evaporation and changes to rainfall, particularly under a high-emissions scenario.[7,8]

Severe fire weather

Severe fire weather will increase

The Forest Fire Danger Index (FFDI) represents an estimate of fire weather risk. The FFDI is calculated from temperature, relative humidity and wind speed, as well as an index representing fuel dryness.

Severe fire weather (FFDI greater than 50) is most likely in summer and spring. Fire weather was the strongest determining factor of house loss during the Black Summer bushfires.[9] FFDI was monitored by weather stations across NSW until the introduction in 2022 of the Australian Fire Danger Rating System. FFDI is used in this snapshot as it can be simulated using the NARCliM projections, whereas data used by the Australian Fire Danger Rating System currently cannot. FFDI also provides a long history of data and gives context to the NARCliM projections.

Projections

Across the Far West, the average number of severe fire weather days per year will increase throughout this century (Figure 13).

The number of severe fire weather days will increase for the Far West region by 2050 for all emissions scenarios, with an even greater increase projected by 2090 under a medium-emissions scenario and a high-emissions scenario (Table 6). The number of severe fire weather days is projected to increase during spring and summer, with the largest increase in summer.

Increases to severe fire weather days are projected to occur across the region (Figure 14). The greatest increases are projected to occur in northern areas of the region including Bourke and Tibooburra (Figure 14). By 2090, Bourke is projected to experience 7.6 additional severe fire weather days under a low-emissions scenario, 14.8 additional severe fire weather days under a medium-emissions scenario and 19 additional severe fire weather days under a high-emissions scenario.

2x

Under a high-emissions scenario, the number of severe fire weather days per year is projected to more than double in northern areas of the Far West.

Fire weather was the strongest determining factor of house loss during the Black Summer bushfires.[9]

A medium-emissions scenario is projected to nearly double Bourke's baseline period average of 18.8 severe fire weather days per year, while a high-emissions scenario is projected to more than double Bourke's baseline period average of severe fire weather days.

In the south of the region, Wentworth's baseline period average is 12.3 severe fire weather days. By 2090, Wentworth is projected to experience 3.6 additional severe fire weather days per year under a low-emissions scenario, 7.1 additional severe fire weather days per year under a medium-emissions scenario and 9.8 additional severe fire weather days per year under a high-emissions scenario.

Table 6 and Figure 13 provide more information on how the projections differ across the 3 scenarios, and Figure 14 provides information on regional differences by 2090 across the 3 scenarios.

Table 6. Projected increase in average annual number of severe fire weather days – Far West

2050

Low-emissions	Medium-emissions	High-emissions
5.4 days (–0.3 to 10.5 days)	**5.9 days** (0.0 to 12.9 days)	**8.8 days** (3.0 to 18.4 days)

2090

Low-emissions	Medium-emissions	High-emissions
6.0 days (0.9 to 14.0 days)	**11.9 days** (6.0 to 20.1 days)	**15.6 days** (6.7 to 29.3 days)

The bold number is the ensemble average for the period. Underneath the average is the ensemble range. Severe fire weather increases are additional to the historical model baseline of 16.6 severe fire weather days.

Figure 13. Historical and projected change in annual number of severe fire weather days – Far West

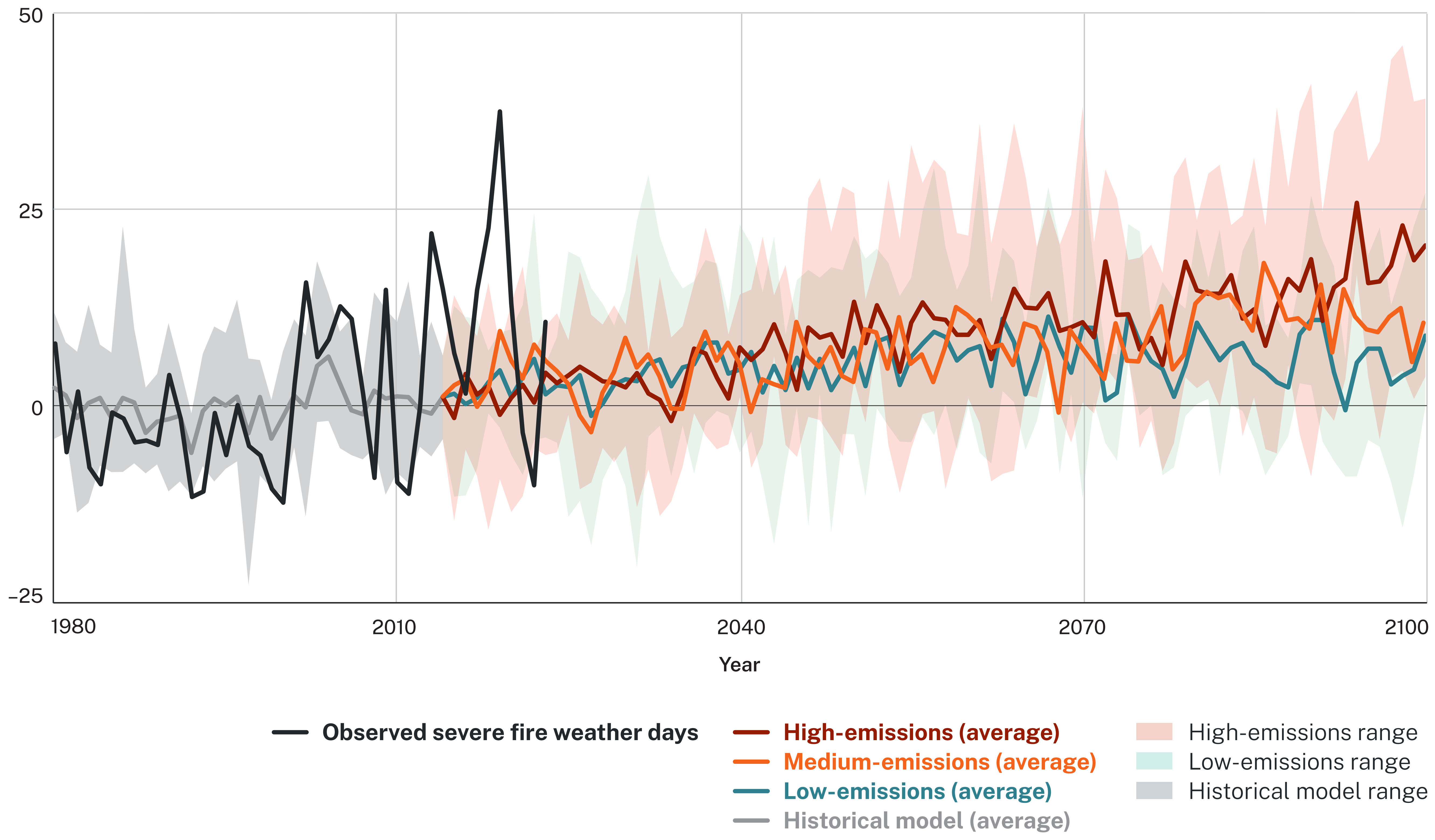
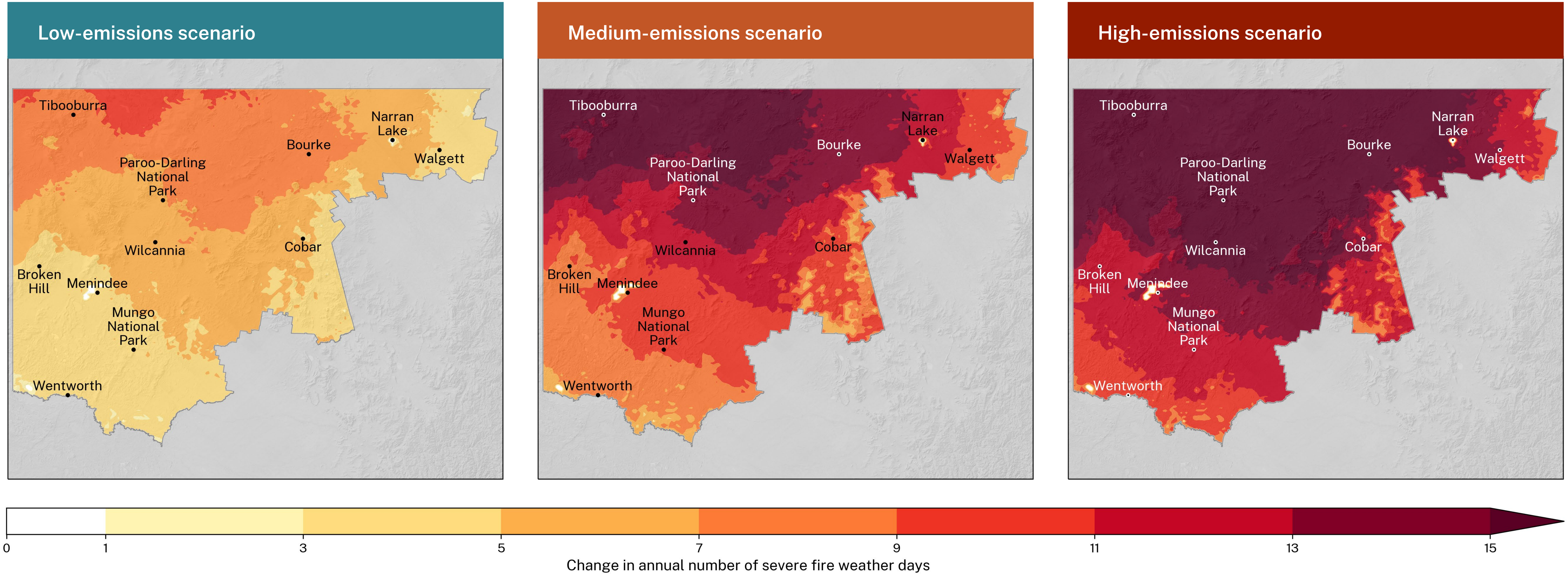
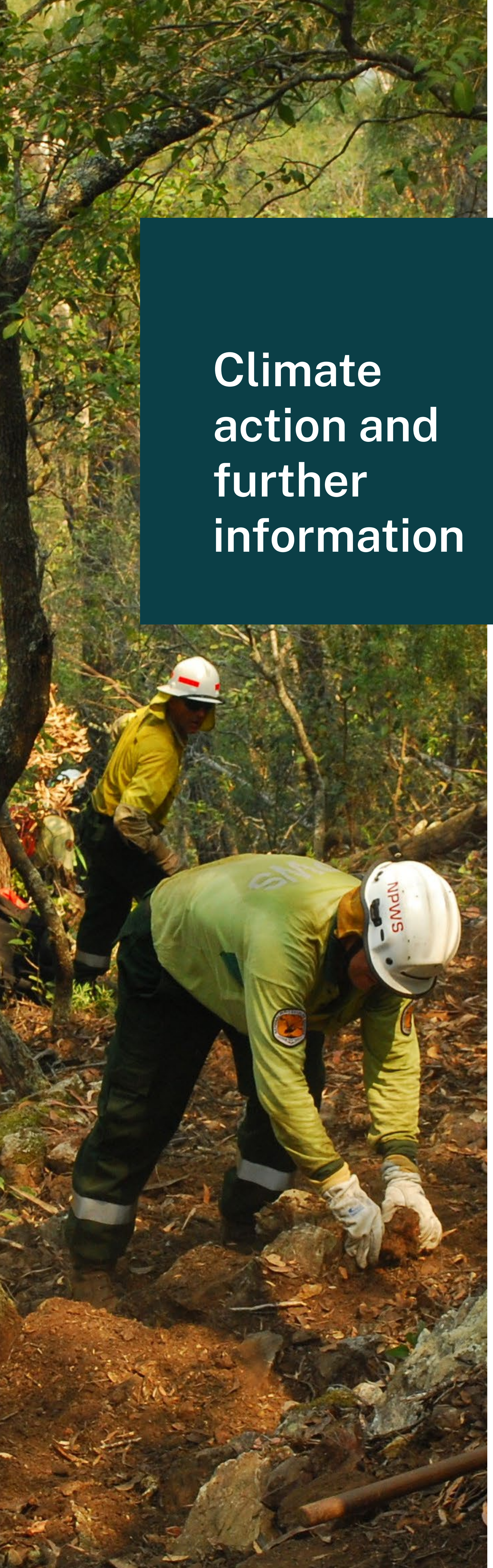


Figure 14. Projected change to average annual number of severe fire weather days by 2090 for the Far West





Climate action and further information

Climate action

The NARCliM projections for the low-, medium- and high-emissions scenarios highlight the stark difference in climate change impacts that will be experienced under each scenario. The differences provide a reminder of the required action across the world to reduce emissions, and specifically within NSW to meet our legislated Net Zero by 2050 emissions reduction targets. This is our best chance at ensuring the future projections under the high-emissions scenario are avoided. The NARCliM projections highlight the importance of taking action to adapt to the impacts of climate change. For more resources on reducing emissions and adapting to the impacts of climate change, visit AdaptNSW.

Additional resources

- For information on other climate change impacts, including sea level rise, visit AdaptNSW
- Climate change resources for local government on AdaptNSW
- Generate detailed climate information based on your local government area using SEED
- Climate Data Portal
- NARCliM case studies
- Climate risk ready NSW guide
- Local government climate change action in NSW: a guide to leadership

Further information

NARCliM projections are delivered with support from: the ACT, South Australian, Victorian and Western Australian governments; National Computational Infrastructure; Murdoch University; and the University of New South Wales. Detailed information on the methodology and application of the projections can be found on the AdaptNSW website. Climate change information in this snapshot is delivered as part of the NSW Government's commitment to 'Publish regularly updated and improved local level climate change projections' under Action 3 of the NSW climate change adaptation strategy.

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