Projections

SELECTION OF KEY GLOBAL FINDINGS RELEVANT TO AUSTRALIA
From the United Nations **Intergovernmental Panel on Climate Change's (IPCC's)** Synthesis Report. This is the final report in the IPCC's Sixth Assessment Cycle (AR6), integrating all IPCC reports from the past 7 years.

Global warming is more likely than not to reach 1.5°C

between 2030 and 2035, even under the very low GHG emissions scenario

Sea level rise is unavoidable
for centuries to millennia

Current commitments are consistent with warming
of **2.8°C** in 2100

In 2081–2100, global warming will reach:
1.0–1.8°C under a very low emissions scenario
3.3–5.7°C under a very high emissions scenario

Every degree of warming leads to many changes including:

- Higher average and extreme temperatures
- Higher variability in average and extreme rainfall
- Changing agricultural productivity, including wheat, maize and fisheries yield
- Higher rate of coral reef loss and degradation

These changes will have more severe impacts on humans and natural ecosystems than what we are seeing today.

Only deep, rapid and immediate GHG emissions reductions
would limit the warming close to 1.5°C or less across the century

Continued emissions will impact all major parts
of our climate and ocean systems

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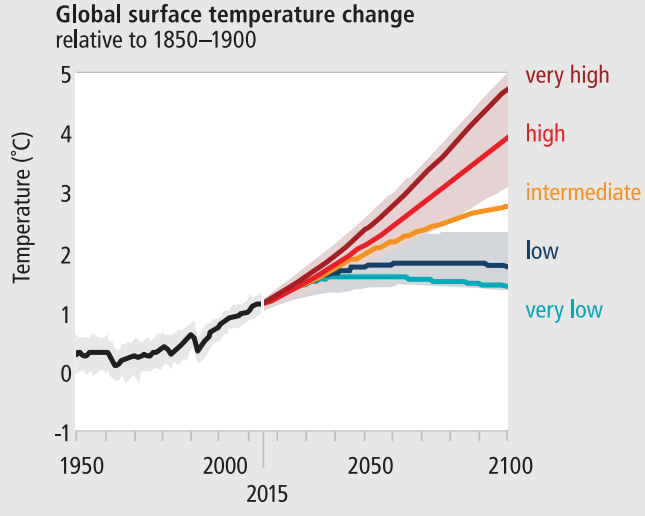
Global warming will continue to increase in the near term. Even under the very low emissions scenario it is more likely than not that we will reach 1.5°C of warming.[1] 1.5°C is recognised as a global target to limit the more severe effects of climate change and reduce the likelihood of irreversible impacts.[2] Global GHG emissions are projected to peak between 2020 and at the latest before 2025 to limit warming to 1.5°C or 2°C.[3]

WHERE ARE WE HEADING?

A very low emissions scenario would lead to global warming between 1.0–1.8°C for 2081–2100[4], with a very high emissions scenario taking us to warming between 3.3–5.7°C for the same period.[5]

Global warming will continue to increase in the near term (2021–2040) mainly due to increased cumulative CO_2 emissions in nearly all considered scenarios and modelled pathways. In the considered scenarios and modelled pathways, the best estimates of reaching global warming of 1.5°C is 2030–2035.[6]

Global surface temperature changes in °C relative to 1850–1900 for emissions scenarios assessed in the IPCC report.



Adapted from Figure SPM.4(a) — Depending on levels of GHG mitigation, global temperature changes relative to 1850–1900 in five illustrative emissions scenarios range from very low to very high. The shaded areas indicate the very likely ranges (5–95%) for the low and high scenarios.
See Box SPM.1 for more information on each scenario.

Sea level rise is unavoidable for centuries to millennia due to continuing deep ocean warming and ice sheet melt, and sea levels will remain elevated for thousands of years.** However, **deep, rapid and sustained GHG emissions reductions would limit further sea level rise acceleration and projected long-term sea level rise commitment.[7]**

The global policies that were in place at the end of 2020 were not consistent with the national emissions reduction targets at the time, showing a gap between ambition and actual policies. Without a strengthening of policies, global warming of 3.2°C is projected by 2100.* In its analysis of projected global GHG emissions of current policies by 2030, the IPCC used data and targets available until the end of 2020.[8]

Only deep, rapid and immediate GHG emissions reductions would limit warming close to 1.5°C or less than 2°C across the century.[9]**

Limiting global warming requires net zero CO_2 emissions and strong reductions in other GHGs. Reaching net zero GHGs requires deep reductions in CO_2, methane and other GHG emissions, and net negative CO_2 emissions[10].** The timing of net-zero GHG emissions depends on many variables, including the climate goal, the mitigation strategy and the gases covered**[11].

Global GHG emissions peak between 2020 and at the latest before 2025 in global pathways that limit warming to 1.5°C and 2°C.[12]

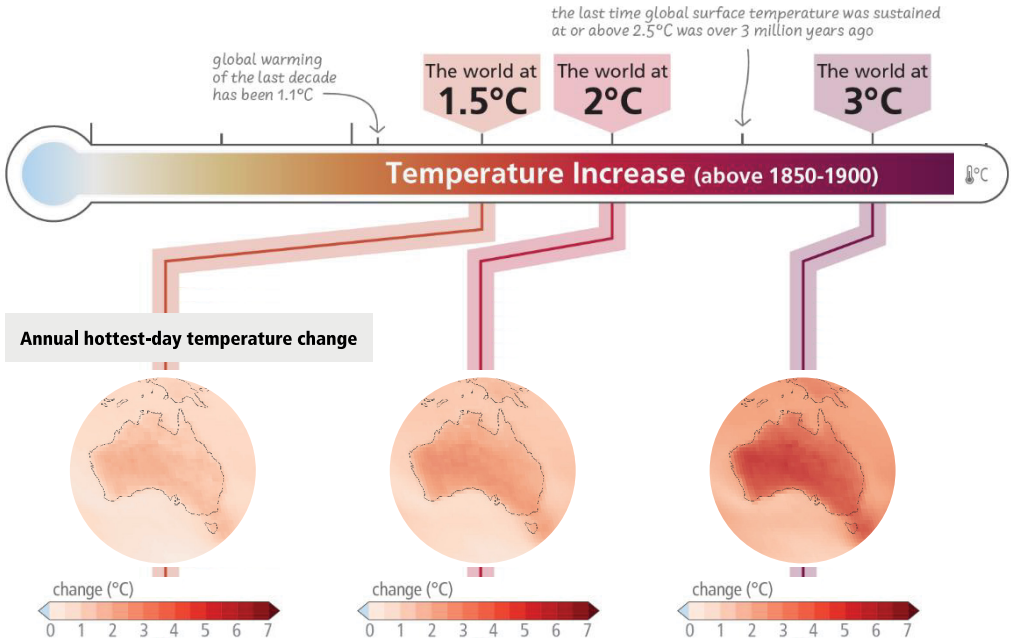
In pathways that limit warming to 1.5°C with no or limited overshoot, global GHG emissions reduce by 43% below 2019 levels by 2030 and 60% below 2019 levels by 2035, and global methane emissions reduce by 34% below 2019 levels by 2030.[13] This assessment included emissions up until 2019. In 2020 and 2021 an extra 80.7 Gt CO_2 has been emitted.[14]

* = medium confidence ** = high confidence *** = very high confidence

1 SPM B.1.1
2 See IPCC 2018 for detail, https://www.ipcc.ch/sr15/
3 SPM B.6.1
4 Compared to 1850–1900 levels
5 SPM B.1.1
6 SPM B.1.1
7 SPM B.3.1
8 SPM A.4.4
9 SPM B.6
10 SPM B.5.1
11 Figure SPM5 Panel d
12 SPM B.6.1
13 SPM Table XX
14 Global Carbon Project 2022; Friedlingstein et al 2022 'Global Carbon Budget 2022'.

WHAT CHANGES WILL WE SEE?

Continued emissions will further affect all the major components of our climate and ocean systems[15].**
With any future warming, many climate-related risks are higher than previously assessed, and the long-term impacts are projected to be significantly higher than what we are seeing today.**[15]



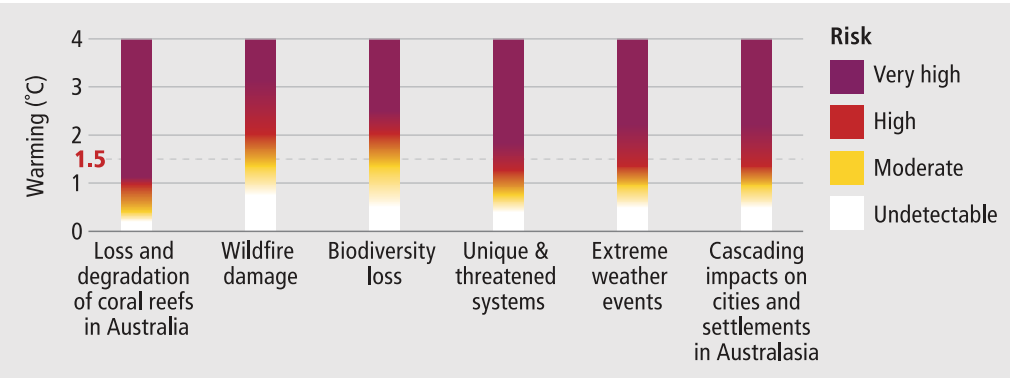
Adapted from Figure SPM 2(a)

Projected annual hottest-day temperature change at global warming levels of 1.5, 2 and 3 degrees relative to 1850–1900. In Australia, every increment of global warming results in larger temperature changes than the global average. Urbanisation further intensifies heat extremes.

Additional warming will make the global water cycle more variable and intensify monsoon rain and very wet and very dry weather seasons.** Ocean acidification will continue to rise across this century, at rates dependent on future emissions.****[16] Additional warming will lead to more frequent marine heatwaves** and is projected to quicken loss of seasonal snow cover.****

Long-term risks and the likelihood of abrupt and irreversible changes increase with higher levels of global warming.[17]**

Risks are increasing with every increment of warming. Higher risks are now occurring at lower temperatures.[18]



Adapted from Figure 3.3

The purple 'Very high' risk/impact on the bar indicates the presence of significant irreversibility, or the persistence of climate related hazards combined with the limited ability to adapt due to the nature of the hazard or impact/risks.

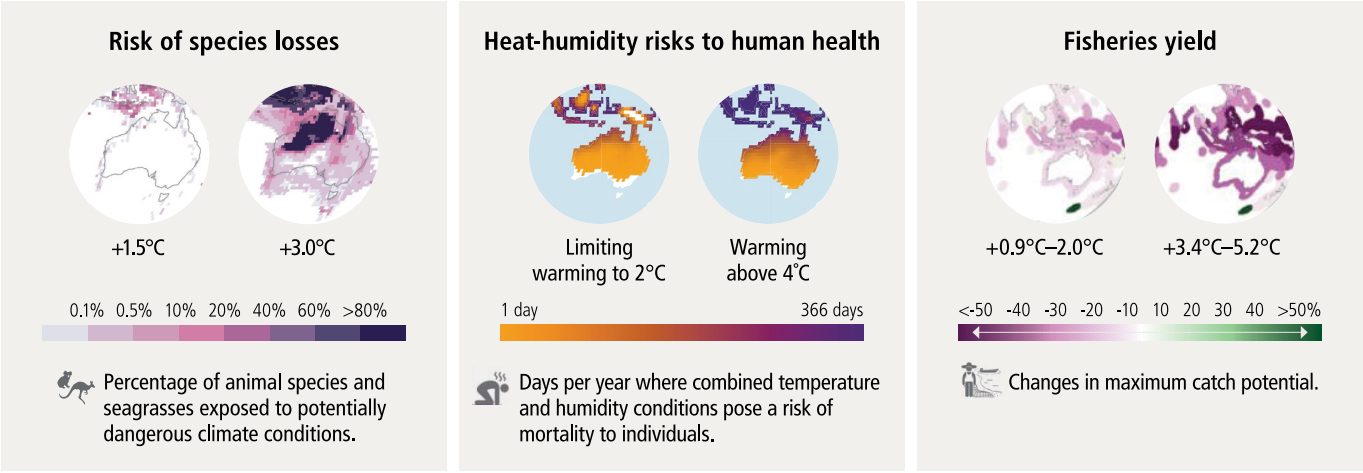
Key risks to Australia from a warming climate include[19]:

- Degradation of tropical shallow coral reefs and associated biodiversity and ecosystem service values
- Loss of human and natural systems in low-lying coastal areas due to sea level rise
- Impact on livelihoods and incomes due to decline in agricultural production. Vulnerability in rural areas will be especially heightened as a result
- Increase in heat-related mortality and morbidity for people and wildlife
- Loss of alpine biodiversity in Australia due to less snow

15 SPM B.2; Figure SPM.3, Figure SPM.4
16 SPM B.1.3; Longer Report 3.1.
17 SPM B.3
18 A selection of diagrams from the longer report, Section 3, Figure 3.3
19 Figure 3.3 panel e)

* = medium confidence
** = high confidence
*** = very high confidence
**** = virtually certain

Global impacts at different levels of warming[20]	
At 1.5°C	• Climate-related risks for natural and human systems are far higher for global warming of 1.5°C than at present.** Climate-related risks to health, livelihoods, food security, water supply, human security, and economic growth are all projected to increase. • Every additional 0.5°C of global warming causes clear increases in hot extremes and extreme precipitation.** • Globally, 3–14% of the tens of thousands of land-based species assessed will *likely* face a very high risk of extinction. • Coral reefs would decline by a further 70–90% under this level of global warming.
At 2°C	• Risks and impacts associated with extreme weather events*, and risks to unique and threatened systems such as coral reefs and biodiversity hotspots would progress to very high levels.** • Warming of 2°C by 2100 would especially disrupt livelihoods of people in high exposure regions and those with low adaptation levels in climate-sensitive areas, ecosystems and economic sectors.**
At 3°C	• Risks in many sectors and regions reach high or very high levels, with widespread systemic impacts, irreversible change and many more adaptation limits.** • The very high extinction risk for endemic species in biodiversity hotspots would increase at least tenfold on a global scale if warming rises from 1.5°C to 3°C.*
At 4°C	• Warming of 4°C is projected to lead to far-reaching impacts on natural and human systems.** • Beyond 4°C of warming, projected impacts on natural systems include local extinction of ~50% of tropical marine species* and biome shifts across 35% of global land area.* • At this level of warming, approximately 10% of the global land area is projected to face more variability in extreme streamflow, affecting over 2.1 billion people* and about 4 billion people are projected to experience water scarcity.* • At 4°C of warming, the global burned area is projected to increase by 50–70% and the fire frequency by ~30%.*



Adapted from Figure SPM.3 — Increasing climate change is projected to intensify risk across natural and human systems.

Projected risks and impacts of climate change on biodiversity, human health and fisheries yield relative to 1850–1900 levels differ across regions, and emission scenarios. The impact to biodiversity, human health and fisheries all increase as temperatures rise.

20 Section 3.1.2

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** = high confidence
*** = very high confidence

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