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Bureau of Meteorology Submission to the Joint Select Committee on Northern Australia

Inquiry into the Cyclone Reinsurance Pool

November 2022



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1. About the Bureau of Meteorology

The Bureau of Meteorology (the Bureau) is Australia's national weather, climate and water agency, providing a wide range of products and services to support informed decision-making by governments, emergency services, industry and the community.

The Bureau operates under the authority of the *Meteorology Act 1955* (Cth) and the *Water Act 2007* (Cth), which together provide the legal basis for its activities. The Bureau must also fulfil Australia's international obligations under the Convention of the World Meteorological Organization (WMO) and related international meteorological treaties and agreements.

The Bureau is an Executive Agency under the *Public Service Act 1999* (Cth), and a non-corporate Commonwealth entity under the *Public Governance, Performance and Accountability Act 2013* (Cth). The Bureau operates under the Climate Change, Energy, the Environment and Water portfolio and reports to the Minister for the Environment and Water generally, and to the Minister for Emergency Management on emergency management matters.

The Bureau's products and services include a range of observations, forecasts, warnings, analyses and advice covering Australia's atmosphere, water, ocean and space environments. Its expertise and services assist Australians to manage and live safely and productively within their natural environment.

The Bureau welcomes the opportunity to make a submission to the Committee.

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2. Response to Terms of Reference

2.1. Definition of a Tropical Cyclone

A **cyclone** is a non frontal low-pressure system, of synoptic scale, that:

- (a) has developed over warm waters; and
- (b) has organised convection; and
- (c) has a maximum mean wind speed of 34 knots or greater that:
 - (i) extends more than half-way around near the centre of the system; and
 - (ii) has persisted for at least 6 hours.

Note: This definition describes tropical cyclones, which in the Act are referred to as cyclones.

In lay terms, this means that to be classified as a tropical cyclone, a weather system must have developed in the tropics, be clearly distinguishable as a feature in satellite pictures, (usually appearing as an area of clouds with some curvature in it, and a relative lack of cloud near it) and have intense winds (winds over 63 km/h with associated gusts over 90 km/h) extending most of the way around it.

2.2. Information the Bureau provides to the Australian Reinsurance Pool Corporation

Under the *Treasury Laws Amendment (Cyclone and Flood Damage Reinsurance Pool) Act 2022* (Cth), the *Terrorism and Cyclone Insurance Act 2003* (Cth) (TCI Act) was amended to extend the reinsurance scheme to coverage for cyclone and flood damage.

Under the TCI Act, the Bureau is required to provide notifications to the Australian Reinsurance Pool Corporation (ARPC) when a cyclone begins, has reintensified, or ended, in accordance with sections 8E and 8F of the TCI Act.

The Bureau provided technical information on cyclones and floods during development of the 2022 amendment to the TCI Act, and will continue to support ARPC with relevant weather and climate services as required.

2.3. The incidence of cyclones in the Australian region

For the period since 1969–70, the average number of tropical cyclones in the Australian region each season is 11. Approximately 50% of tropical cyclones in the Australian region become severe tropical cyclones (category 3 or above). Intense tropical cyclones can cause serious impacts associated with catastrophic winds, storm surges and extreme rainfall and flooding.

Over the same period (since 1969-70) an average of 4 tropical cyclones have crossed the coast, (or come close enough to have substantial coastal impacts), each season. Over that period there has never been a tropical cyclone season without a coastal impact.

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Most significant tropical cyclone landfalls have been north of the Tropic of Capricorn but there have also been major impacts further south, particularly on the Western Australia coast.

The highest frequency of category 4 or 5 landfalls is on the Western Australian coast between Broome and North West Cape, but landfalls of this intensity can occur anywhere in the tropics.

Tropical cyclone activity in Australia's cyclone region varies substantially from year to year. This is partially due to the influence of large-scale climate drivers: the number of cyclones in our region generally declines with El Niño and increases with La Niña. There has been a downward trend in the number of tropical cyclones observed in the Australian region since reliable satellite observations began in 1982. Additional non-satellite observations suggest there has also been a longer-term reduction in the number of tropical cyclones since 1900.

The trend in cyclone intensity in the Australian region is harder to quantify than cyclone frequency, due to uncertainties in estimating the intensity of individual cyclones and the relatively small number of intense cyclones.

2.4. Future scenarios for cyclone incidence and intensity

The most recent global-level information on projected future occurrence of tropical cyclones was published in the Sixth Assessment Report (AR6) of the Intergovernmental Panel on Climate Change (IPCC) in 2021. Whilst Australia-specific assessments have not yet been derived from the AR6 findings, previous assessments of projected changes in Australian region tropical cyclones are broadly consistent with the AR6 global findings.

Key AR6 assessment findings at global scale are:

- That it is likely that the total number of tropical cyclones will decrease or remain unchanged.
- That it is very likely that the mean peak wind speed of tropical cyclones, and the proportion of tropical cyclones which reach category 4 or 5 intensity, will increase.
- That it is very likely that average rain rates during tropical cyclones, and hence the total rainfall associated with tropical cyclones, will increase with global warming.
- That the combination of rising baseline sea levels, increased average tropical cyclone intensity, and increased tropical cyclone rainfall rates will combine to further elevate the risk of storm surge and freshwater flooding associated with tropical cyclones.

While findings were made in some regions, such as the western North Pacific, of a potential poleward migration of tropical cyclones, no findings were made in this respect for the Australian region.

At this point in time, the clearest climate change signal associated with tropical cyclones is an increase in associated rainfall. For some tropical cyclones, such as Hurricane Harvey (2017) which caused severe flooding in Texas, USA, there is already strong evidence that the rainfall which occurred during the event was significantly higher than it would have been in the absence of anthropogenic climate change.