

**Australian Actuaries Climate Index  
Actuaries Institute Submission - ACCC Northern Australia Inquiry**

Environment Institute of Australia and New Zealand

Rade Musulin

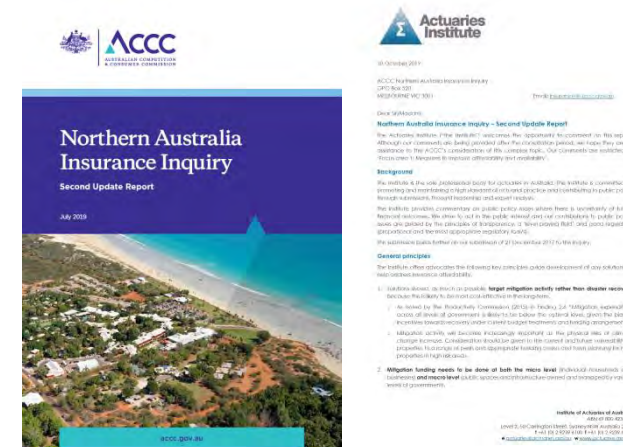
Climate Change Forum

6 November 2019



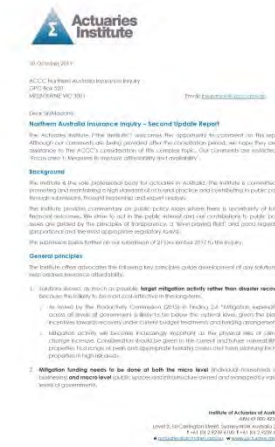
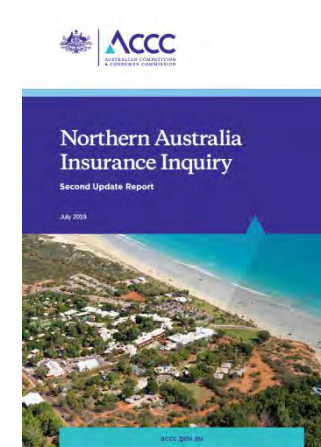
# Agenda

- Description of the AACI
  - Purpose and process in Australia
  - AACI components and data sources
  - Global actuarial work on climate indices
- Results
  - High level results
  - Comparison to North America
  - Risk index and ICA Loss List
- ACCC Northern Australia Inquiry
  - ACCC Second Update Report
  - Actuaries Institute Submission



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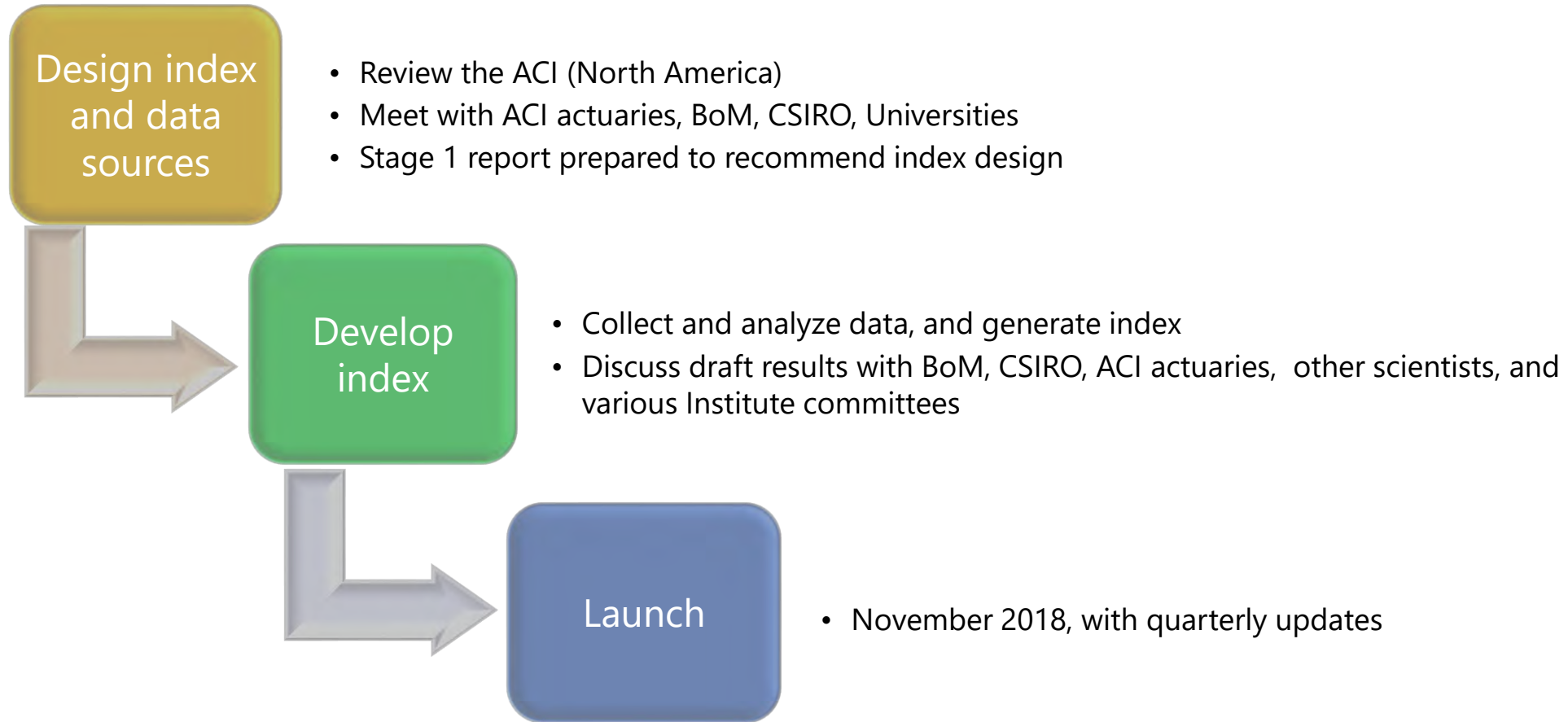
# Purpose of the AACI

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- The Australian Actuaries Climate Index (AACI) refers to a number of indices that provide objective measures of historical extreme weather and sea levels
- Designed to help inform actuaries, public policymakers, companies, and the general public about climate trends in Australia
- Backwards looking, but structured to enable comparisons with forward projections
- Extremes are linked to risk, but not explicitly
- More explicit and specific risk measures will be considered in the future
- <https://www.actuaries.asn.au/microsites/climate-index>

# AACI Development Process

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# Challenges and Options

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- Challenges:
  - Timing of homogenization of temperature data
  - Homogenized wind and rain data
  - Homogenized sea level data
  - Gaps in the data
  - Regions with missing metrics
  - Bias from exceedance measure
- Options Investigated
  - 90<sup>th</sup>, 95<sup>th</sup>, or 99<sup>th</sup> percentile
  - Using trends in absolute measures rather than exceedance frequencies
  - Maximum rainfall period
  - Mean vs. high sea level

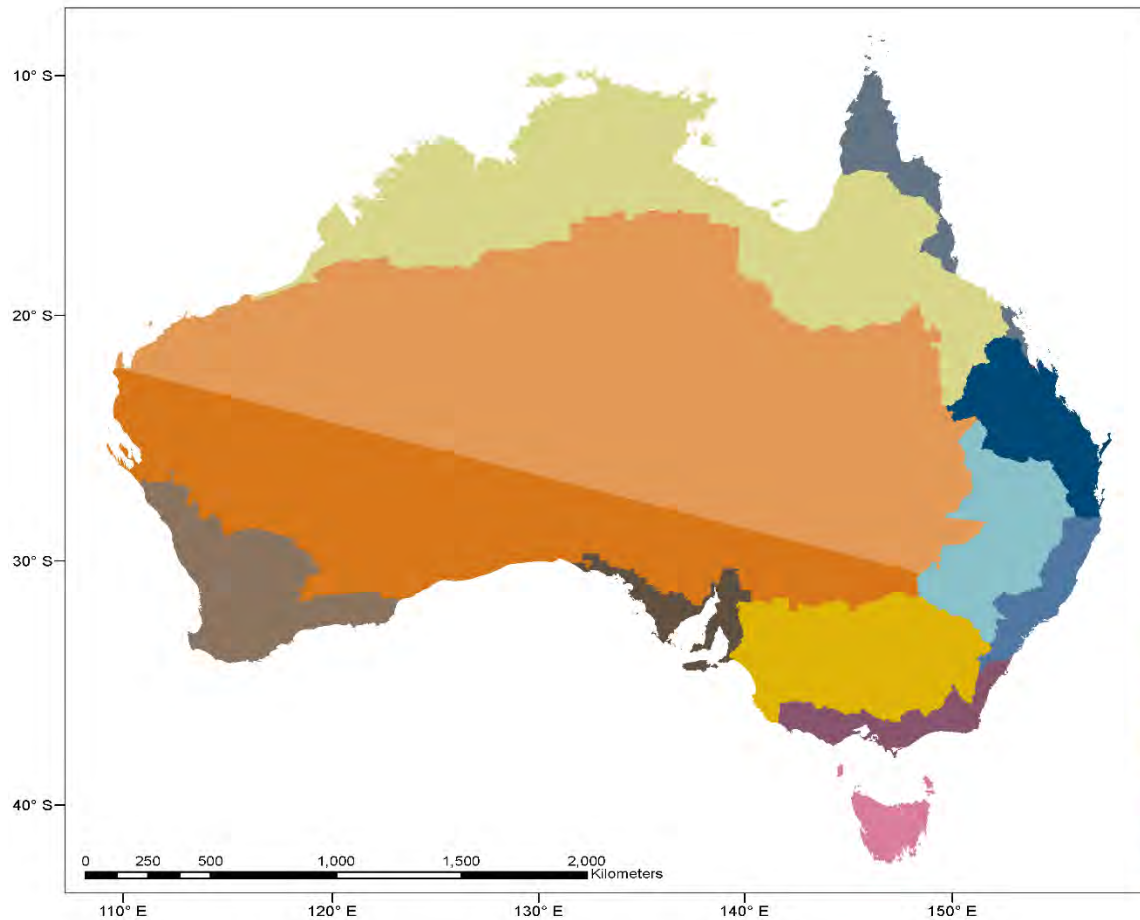
# Component Indices

Component	Description
High Temperature	Monthly frequency of maximum and minimum temperatures above the 99 <sup>th</sup> percentile
Low Temperature	Monthly frequency of maximum and minimum temperatures above the 1 <sup>st</sup> percentile
Precipitation	Monthly frequency of 5 day consecutive rainfall above the 99 <sup>th</sup> percentile
Wind	Monthly frequency of daily wind gust above the 99 <sup>th</sup> percentile
Consecutive Dry Days	Annual maximum consecutive dry days
Sea Level	Monthly maximum sea level

The wind gust data is only shown for the period post installation of the cup anemometers (typically around 1995).



# Regions



Regions are based on CSIRO's 15 sub-clusters used for the "Climate Change in Australia" data, with some grouping

**NRM clusters and sub-clusters**

- Central Slopes
- East Coast (North)
- East Coast (South)
- Monsoonal North
- Murray Basin
- Rangelands (North)
- Rangelands (South)
- Southern Slopes (Tas)
- Southern Slopes (Vic)
- Southern and South Western Flatlands (East)
- Southern and South Western Flatlands (West)
- Wet Tropics



# Sources of Data

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Component	Source
High and Low Temperature	112 ACORN-SAT BoM weather stations
Precipitation and Drought	Approx. 2,000 BoM weather stations that report on rain
Wind	38 BoM weather stations that the BoM considers more reliable measures, noting that wind data is more uncertain
Sea Level	16 tide gauges from Baseline Sea Level Monitoring project

# Composite Index

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- Combines the indices for three of the six components
- The components included are high temperature, rainfall, and sea level
  - Wind data was excluded as data was not available back to 1981
  - Drought measure (consecutive dry days) was excluded as it shows a strong inverse correlation with the rainfall measure
  - Low temperature was excluded so that temperature was not overweighted in the composite index, noting that high temperature is included
- Combination based on the standard deviation like ACI, but mean was considered

# Global Actuarial Associations

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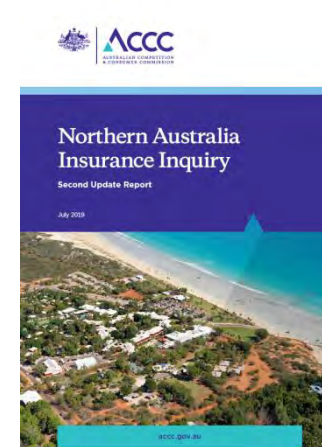
- *International Actuarial Association*: Resource and Environmental Working Group is facilitating information exchanges between member associations
- *North American Organizations*: The American Academy of Actuaries, Canadian Institute of Actuaries, Casualty Actuarial Society, and Society of Actuaries have developed the Actuaries Climate Index for North America (<http://actuariesclimateindex.org/home/>)
- *Institute and Faculty of Actuaries*: in 2015, commissioned a feasibility study for the extension of the Actuaries Climate Index to the UK and/or Europe; after a pause, they have resumed consideration of launching a UK index
- *Actuarial Association of Europe*: in 2017, established the European Actuaries Climate Index Working Group, now actively pursuing the creating of an index comparable to the ACI and the AACI
- *Institute of Actuaries of India*: in 2018, received a detailed proposal for an Indian Actuaries Climate Index, with subsequent indices to include a Climate Risk Index and a Climate Volatility Index; work is continuing

# Key Differences with the North American ACI

Element	Description
Reference period	1981 to 2010, whereas the ACI uses 1961 to 1990; a more recent period means better quality data and a more contemporary view of changes in risk
Definition of exceedance threshold	99 <sup>th</sup> (not 90 <sup>th</sup> ), a more extreme threshold provides a better link to risk
Wind	Based on the maximum wind gust each day, while the ACI uses the average wind speed over the 24 hours; this better links to risk in Australia
Sea level	Based on the maximum sea level for the month, whereas the ACI uses the mean; this better links to risk in Australia
Composite index	Based on only three component indices, not all six

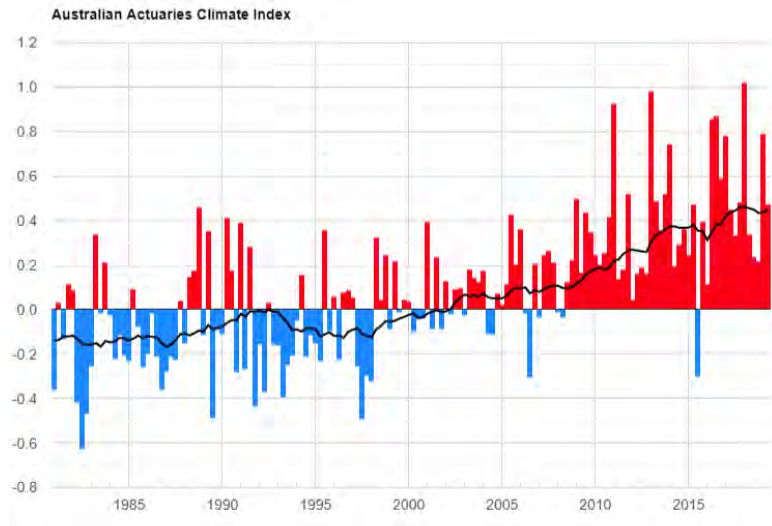
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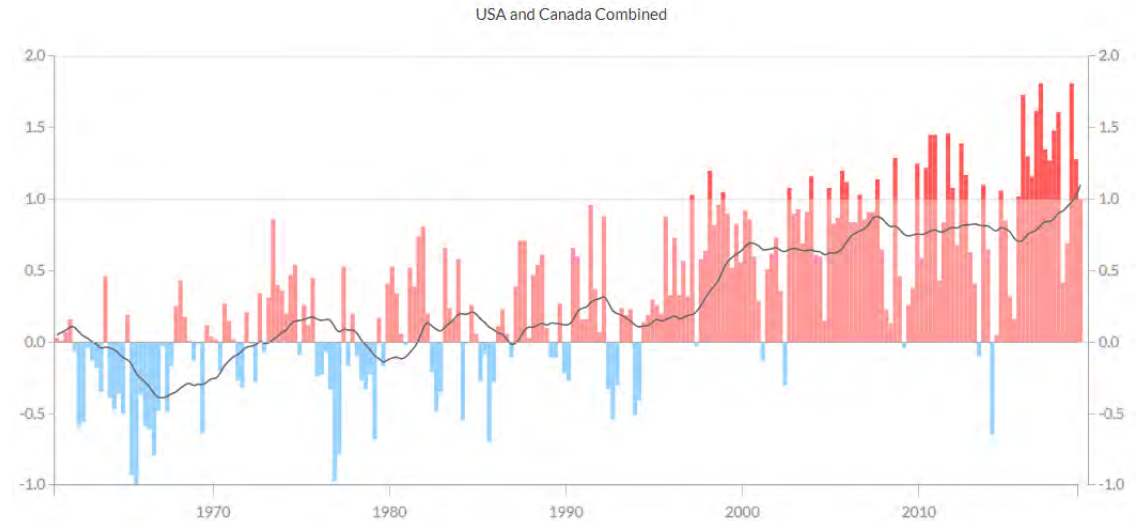


# AACI and ACI Overall Results

Australia

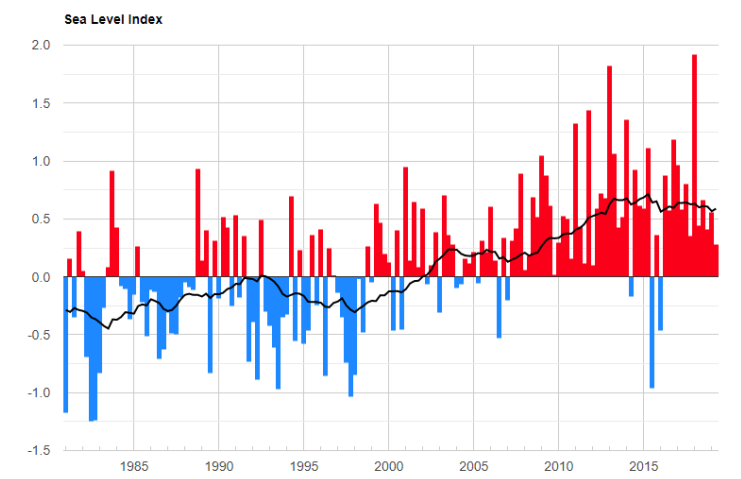
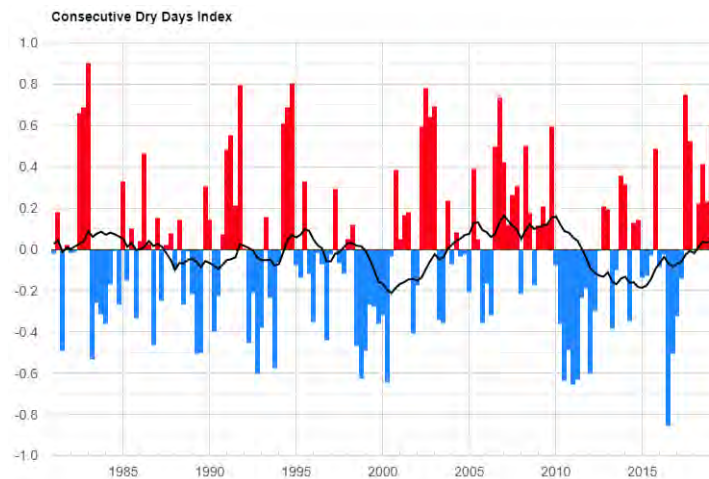
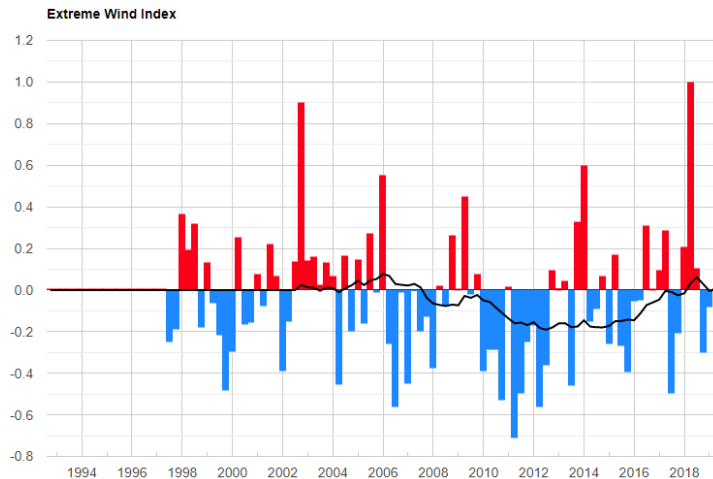
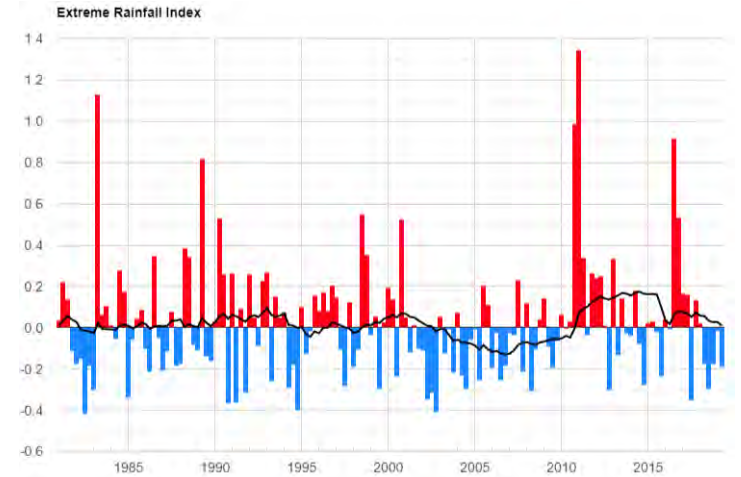
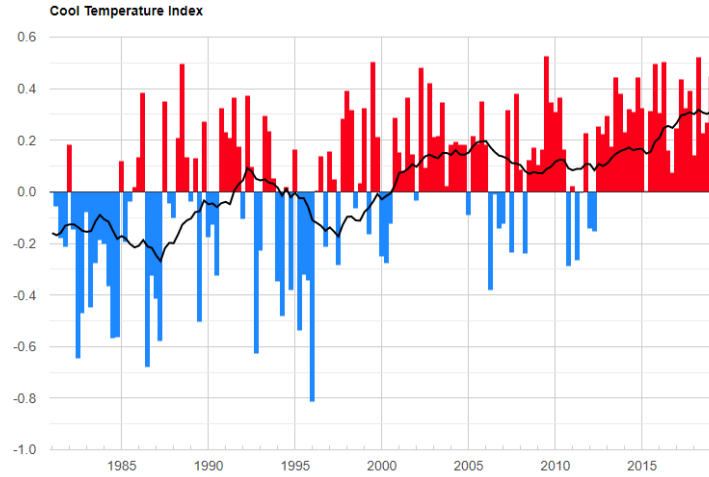
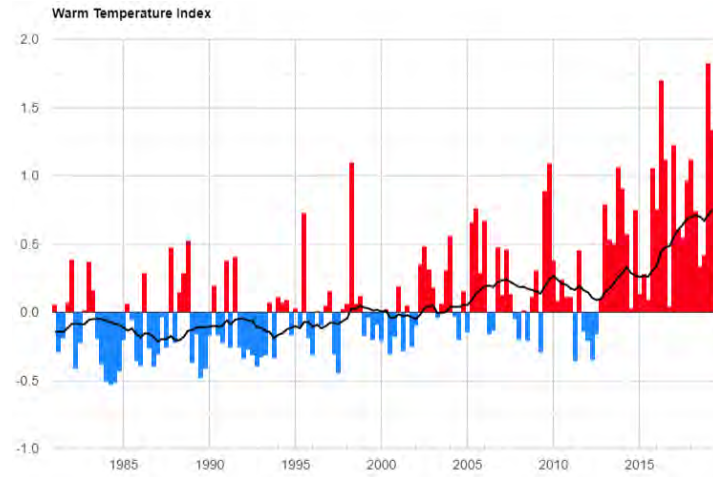


North America



- Scale and time periods differ
- 8 years since the end of reference period in Australia vs 28 years in North America; we would expect Australia to be lower
- Component parts are different

# AACI Component Indices

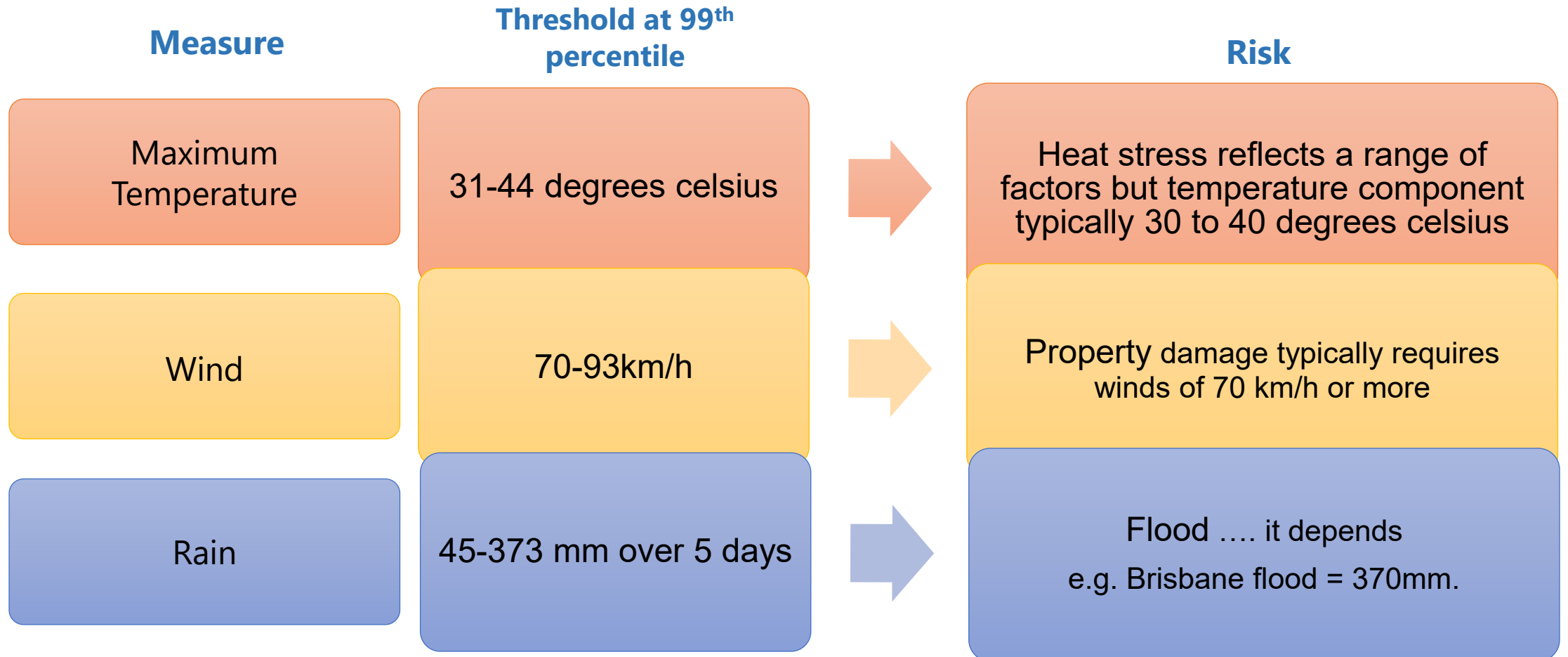


Scale differs among charts

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# Link Between Extremes and Risk

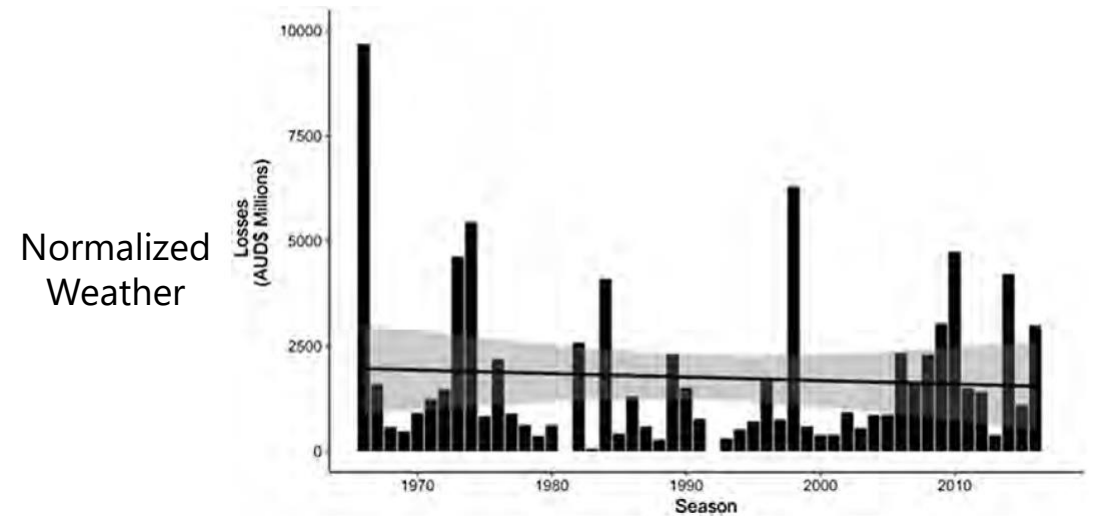
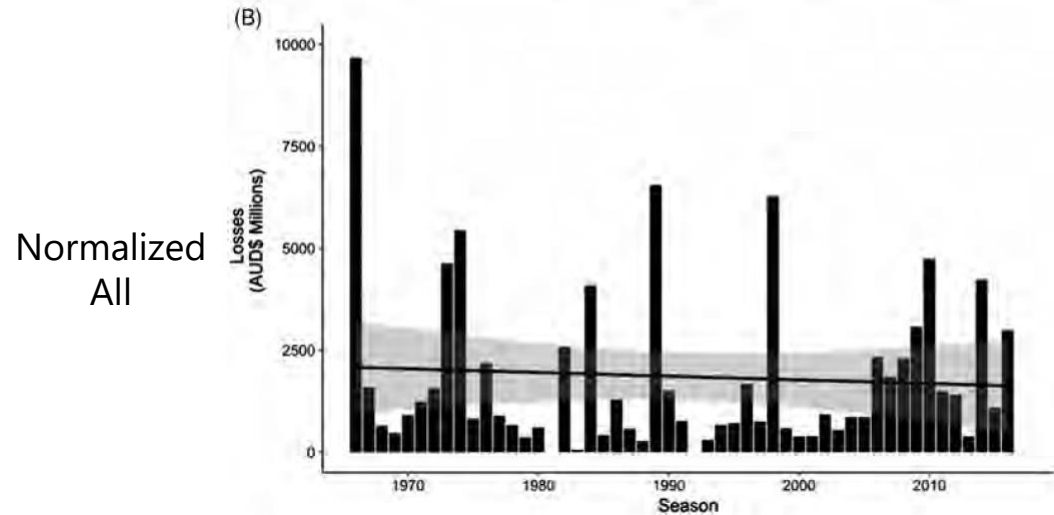
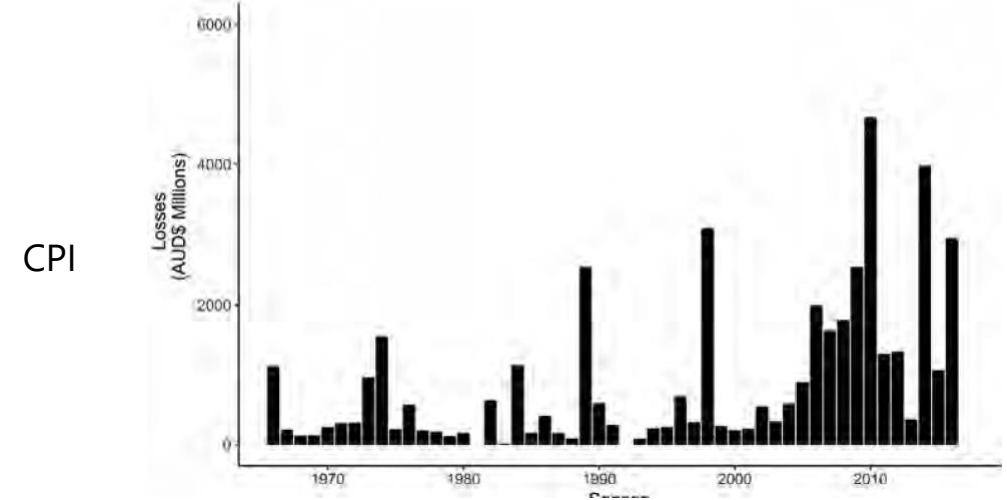
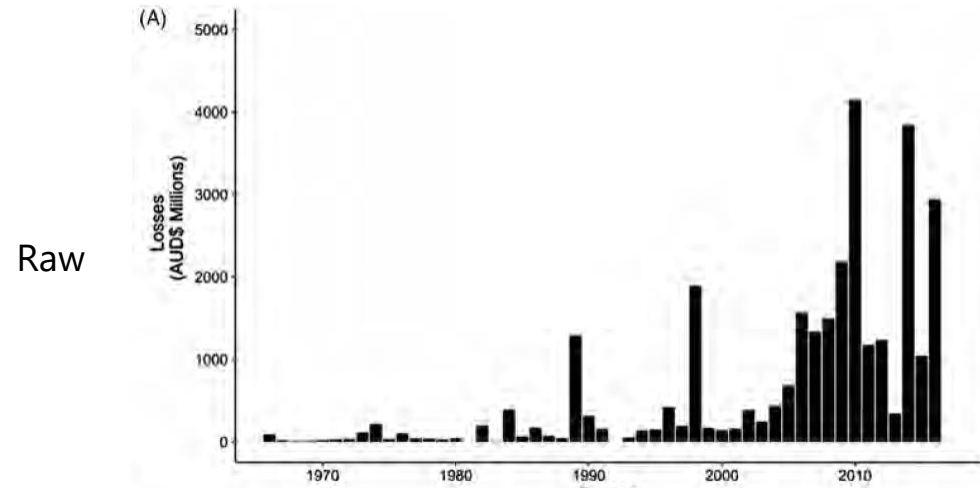


# Australian Loss Data – ICA Loss List

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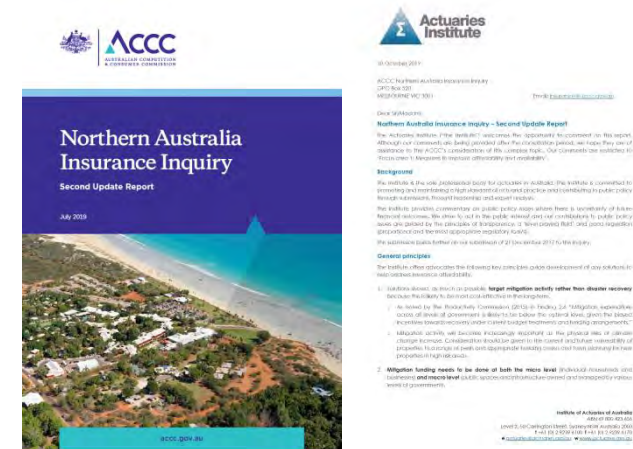
- The Institute is investigating creating a risk index; North Americans are close to launching one
- The Institute has served as a peer reviewer for the ACRI and looks to leverage learnings from North America
- There will be differences due to type of perils, availability of data, etc.
- A source of data is the Insurance Council of Australia's Disaster Loss List
  - Almost 300 events dating from the 1960s
  - Information gathered from a variety of sources, including archival document searches (e.g. newspapers) by ICA staff
- The data is described in a recent academic paper "Normalised insurance losses from Australian natural disasters:1966–2017" in Environmental Hazards, by John McAneney, Benjamin Sandercock, Ryan Crompton, Thomas Mortlock, Rade Musulin, Roger Pielke Jr, and Andrew Gissing

# Normalization Paper Results

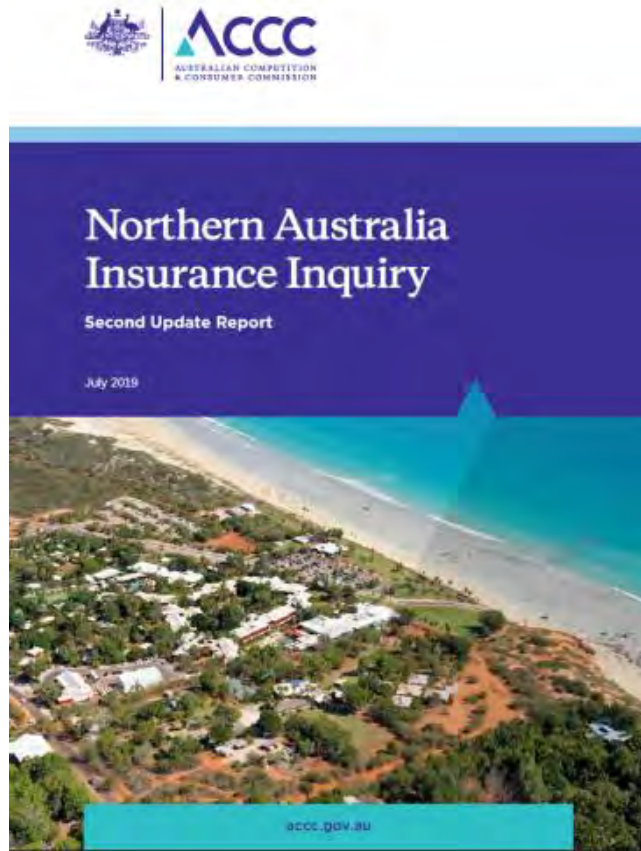


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# ACCC Report and Institute Submission



<https://www.accc.gov.au/focus-areas/inquiries-ongoing/northern-australia-insurance-inquiry/second-update-report>



10 October 2019

ACCC Northern Australia Insurance Inquiry  
GPO Box 520  
MELBOURNE VIC 3001

[Email: \[actuaries@act.gov.au\]\(mailto:actuaries@act.gov.au\)](mailto:actuaries@act.gov.au)

Dear Sir/Madam,

### Northern Australia Insurance Inquiry – Second Update Report

The Actuaries Institute (the Institute) welcomes the opportunity to comment on this report. Although our comments are being provided after the consultation period, we hope they are of assistance to the ACCC's consideration of this complex topic. Our comments are restricted to: "Focus area 1: Measures to improve affordability and availability".

#### Background

The Institute is the sole professional body for actuaries in Australia. The Institute is committed to promoting and maintaining a high standard of ethical practice and contributing to public policy through submissions, thought leadership and expert analysis.

The Institute provides commentary on public policy issues where there is uncertainty of future-focused outcomes. We strive to act in the public interest and our contributions to public policy issues are guided by the principles of transparency, a 'level playing field' and good regulation (proportionate and the most appropriate regulatory tool).

The submission dates reflect the submission of 21 December 2017 to the inquiry.

#### General principles

The Institute often advocates the following key principles, aside development of any solutions to help address insurance affordability.

1. Solutions should, as much as possible, **target mitigation activity rather than disaster recovery** because this is likely to be most cost-effective in the long-term.
  - As noted by the Productivity Commission (2015) in finding 3.4 "Mitigation, especially across all levels of government, is likely to be below the optimal level, given the biased incentives towards recovery under current budget treatment and funding arrangements."
  - Mitigation activity will become increasingly important as the physical risks of climate change increase. Consideration should be given to the current and future vulnerability of properties to a range of both non-spiritual (natural) events and town planning in low properties in high risk areas.
2. **Mitigation funding needs to be done at both the micro level** (individual households and businesses) **and macro level** (public services and infrastructure owned and managed by various levels of government).

Institute of Actuaries of Australia  
ASN 67 800 423 455  
Level 2, 50 Castlereagh Street, Sydney NSW Australia 2000  
T +61 2 9239 6100 F +61 2 9239 6170  
[actuaries@act.gov.au](mailto:actuaries@act.gov.au) [www.act.gov.au](http://www.act.gov.au)

<https://www.actuaries.asn.au/Library/Submissions/GI/2019/ACCC.pdf>

# ACCC Inquiry - Triggers

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- *ACCC: "Home, contents and strata premiums are, on average, considerably higher in northern Australia than in the rest of Australia and have increased more in recent years"*
- Drivers (Institute):
  - Improved technology
  - Higher resolution data at an address level
  - Learnings from recent events, such as the Queensland floods and Cyclone Yasi
- Effects of more refined rating (Institute):
  - Generally positive, sending appropriate economic signals, providing incentives for mitigation, and lowering aggregate long-term costs
  - Many policyholders benefit from lower prices
  - A limited cohort have experienced significant price increases

# ACCC high level findings

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- First report:
  - Consumer information and choices
  - Intermediaries and other third parties
  - Claims settlement
  - Mitigation
- Current focus areas:
  - Measures to improve affordability and availability, including reinsurance pool, insurance mutual, direct subsidy, and mitigation
  - Case studies
  - Examination of premium adjustments
  - Barriers to expansion (or re-entry)
  - Understanding and addressing non-insurance



# Institute Submission – General Principles

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- Target mitigation activity rather than disaster recovery
- Mitigation funding needs to be both micro and macro
- Multiple stakeholders
- To the extent possible maintain market-based price and/or benefit signals
- Where there is a market failure other measures can be considered; look to global examples of success/failure
- Develop solutions on a national basis

# Cross-subsidies

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- In some cases it is not practical for existing policyholders to mitigate sufficiently to address affordability
- Cross-subsidies can be employed to address this
  - Can lead to adverse outcomes:
    - Increased incentives for over-development or reduced ones for mitigation
    - Long term dependence on subsidies
    - Increased cost burden to those paying subsidies
  - Best practice principles:
    - Narrowly targeted
    - Only available to existing property
    - Maximize private market participation, minimize market disruption
    - Market neutral

# Pools and climate change

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- Pools:
  - Can be a mechanism for providing cross-subsidies
  - Can lead to adverse outcomes, including large deficits, cost inefficiencies, and displacement of private insurers
  - There are many global examples that can be studied



- Climate change:
  - Likely to trigger further changes in risk understanding
  - May lead to market disruption elsewhere
  - Long term consideration is essential, particularly for building codes, land use, and infrastructure investment

# A final thought – will we face a “mitigation gap”?

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- Climate change will alter risk
- Mechanisms that send mitigation signals may fail to do so:
  - Insurance premiums reflect risk during the policy period (usually one year)
  - Building codes generally reflect current risk
  - Neither is likely to reflect climate risk which may arise decades in the future
- Consider:
  - Rising sea levels and coastal inundation
  - Poleward migration of tropical cyclones
  - Extreme precipitation and riverine flooding



# About the Institute

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The Actuaries Institute (<https://www.actuaries.asn.au/>) is the professional body representing the actuarial profession in Australia. The Institute is committed to promoting and maintaining a high standard of actuarial practice and represents and supports its members by:

- educating the next generation of actuaries and ensuring skills and knowledge are constantly developed through continuous professional development;
- establishing and maintaining strict professional and ethical standards;
- fostering a strong professional network and promoting and advancing knowledge in specialist areas of actuarial science through research and events and seminars; and
- contributing to public policy through policy submissions, thought leadership and expert analysis.