Environment and Communications References Committee

Climate Risk Assessment Inquiry

ANSWER TO QUESTION ON NOTICE

Hearing Date: 16 September 2025

Division/Agency: Australian Climate Service

Topic: National Climate Risk Assessment coastal regions

Senator: Larissa Waters

Reference: Spoken Question (Hansard Page 3)

Question:

Senator WATERS: Please tell me: **in what places do those 597,000 people live** such that, in five years time, they will be inundated?

Ms Manson: I'll take that on notice, and I'll table something for you.

Answer:

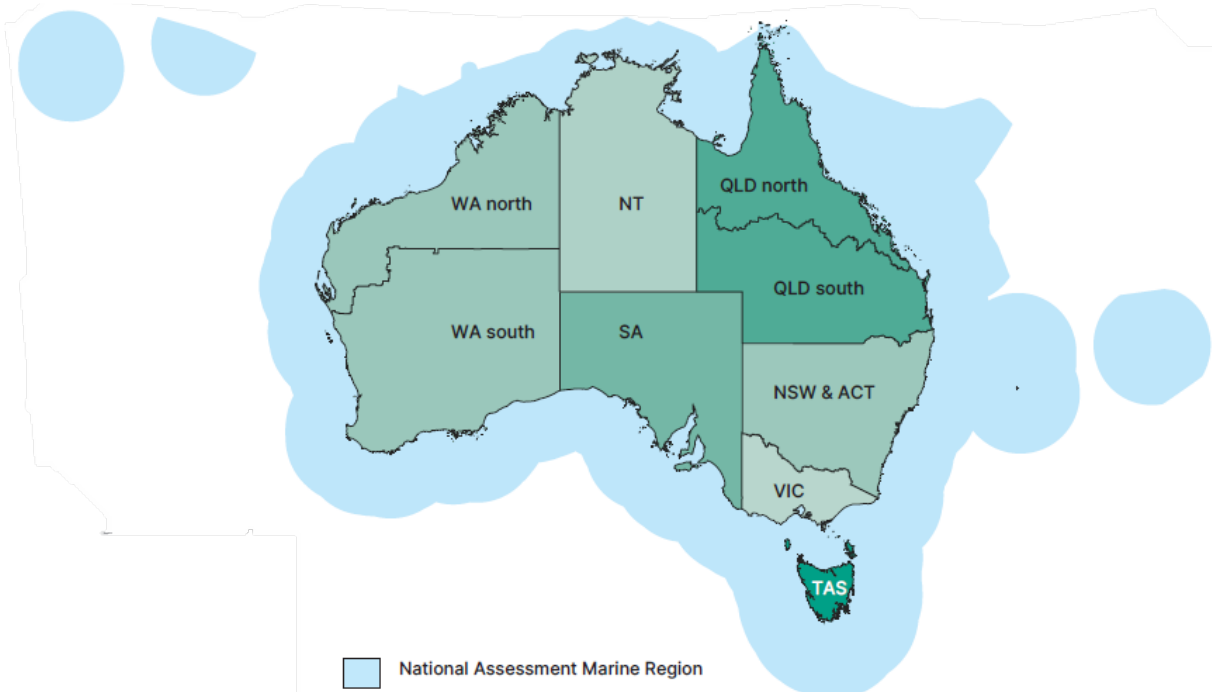
The Australian Climate Service analysed populations in the National Climate Risk Assessment regions that were at risk from sea level rise. Sea level rise risk was considered for all communities within 10km of soft shorelines.

The 597,000 people who live in high to very high-risk areas are noted in the table below (populations in high to very high are noted with a bold black box). This is reported in Table 5 (page 53) of the National Climate Risk Assessment report. The table below provides the populations for each National Climate Risk Assessment study region.

Population in at-risk areas to sea level rise, per National Climate Risk Assessment region – total number, rounded to nearest 1,000

		Year			
Region	**Area risk**	**2030**	**2050**	**2090 (best)**	**2090 (worst)**
NSW	High	8,000	78,000	239,000	420,000
	Very high		70,000	126,000	326,000
NT	High			2,000	29,000
	Very high				2,000
Qld north	High	73,000	68,000	89,000	40,000
	Very high	46,000	169,000	197,000	260,000
Qld south	High	281,000	354,000	158,000	234,000
	Very high	189,000	524,000	856,000	918,000
SA	High		155,000		27,000
	Very high			155,000	249,000
Vic	High		79,000	78,000	208,000
	Very high		9,000	105,000	228,000
WA south	High		11,000	46,000	8,000
	Very high		11,000	34,000	79,000

National Climate Risk Assessment geographic regions are below.



Environment and Communications References Committee

Climate Risk Assessment Inquiry

ANSWER TO QUESTION ON NOTICE

Hearing Date: 16 September 2025

Division/Agency: Australian Climate Service

Topic: National Climate Risk Assessment external consultants

Senator: Dean Smith

Reference: Spoken Question (Hansard Page 8)

Question:

Senator DEAN SMITH: On notice, could you just provide to the committees **which external consultants were engaged**, and at **what cost**, to inform the technical reports.

Dr Landsberg: We can.

Answer:

The Australian Climate Service publishes, under the Bureau of Meteorology, contracts on AusTender <www.tenders.gov.au>. These published contracts are below.

Supplier Name	Title	Contract Start Date	Contract End Date	Austender Value (AUD$)
Finity Consulting Pty Ltd	Economic analysis for the NCRA	1-Jul-24	31-Oct-24	313,390
Deloitte Touche Tohmatsu	Socioeconomic scenarios for the NCRA	25-Mar-24	13-Dec-24	374,000

Environment and Communications References Committee

Climate Risk Assessment Inquiry

ANSWER TO QUESTION ON NOTICE

Hearing Date: 16 September 2025

Division/Agency: Australian Climate Service

Topic: National Climate Risk Assessment process

Senator: Dean Smith

Reference: Spoken Question (Hansard Page 9)

Question:

Senator DEAN SMITH: Just quickly, if I may—on notice, could you provide us with a **detailed overview** of the various inputs to the whole process? The assistant minister talked about roundtables and use of expert advisers. You've talked about a quality assurance process. Others have talked about methodologies. Could you labour over a very detailed document for us that **explains the entire process**?

Ms Manson: I am happy to, yes.

Answer:

The National Climate Risk Assessment used a phased approach with **3 key stages**, drawing on international experience in understanding climate risks and undertaking risk assessments:

- A preliminary stage, led by the Department of Climate Change, Energy, the Environment and Water (DCCEEW), comprised initial scoping of the physical risk assessment and the development of the National Assessment **methodology** (published August 2023).
- The **first pass assessment** (July 2023 – December 2023) consisted of a rapid qualitative assessment to identify a list of nationally significant risks and a subset of these as priority risks. The outcomes of the first pass assessment are presented in the report linked above (published March 2024).
- The **second pass assessment** (from January 2024 – July 2025) was an in-depth analysis of 11 priority risks, selected by the Australian Government using both qualitative and quantitative methods (published September 2025), and includes analysis of how they interact.

A detailed overview of the inputs at each of the key stages has been outlined below.
An infographic of the process is at Attachment A.

Across all 3 stages of the National Assessment, there were 2,013 participants involved in 41 workshops. There were 254 climate risk experts and authors who contributed to the National Assessment. All engagement was undertaken in collaboration with the DCCEEW to inform the National Adaptation Plan.

The methodology

The National Assessment methodology was developed through a partnership between the Australian Climate Service, and the Australian Government DCCEEW, with support from Deloitte and Murawin.

A series of working groups brought together a range of inputs to develop the National Assessment methodology, this included:

- A review of domestic and international (e.g., United Kingdom, United States, New Zealand, and Germany) approaches to conducting multi-sector risk assessments.
- A stakeholder engagement process that engaged future end users of the National Assessment's outputs. This included stakeholders from all levels of government, private sector, academia, non-government sector and First Nations people.
- Two sectoral risk assessments piloted, which are reported on separately, along with select stress tests conducted on components of the National Assessment methodology.

An independent Expert Advisory Committee was established to provide guidance on approach and key findings. This included: Professor Mark Howden (Chair), Professor Hilary Bambrick, Dr Veronica Doerr, Mr Simon Forsyth, Professor Emma Johnston, Professor Tom Kompas, Mr Stan Lui and Professor Lucas Walsh.

The first pass assessment

Purpose

The first pass assessment was a qualitative assessment of Australia's climate-related risks. It included a comprehensive literature scan, rapid adaptation stocktake, and a series of expert elicitation workshops.

The first pass assessment reviewed climate risks within 8 systems of national importance. It considered how risks can compound, cascade, and aggregate across these systems.

Engagement

From September to November 2023, 10 stakeholder workshops were held across the 8 systems that were identified in the Risk Assessment methodology, including an integration and synthesis workshop. Participants were given pre-identified risks (from the literature scan).

Participants were encouraged to discuss gaps in the risks, as well as any new risks. They also discussed risks that were crosscutting, had commonalities and posed challenges.

The risks were then synthesised to reduce overlap, and participants were asked to rank risks in order of priority based on impact, adaptation shortfall and decision urgency.

Aboriginal and Torres Strait Islander peoples from around the nation were engaged with as part of the first pass of the National Assessment. They attended 2 gatherings to discuss climate risks to Country and their communities.

Outputs

The outcomes of the first pass assessment provided robust, expert-led insights into which climate risks are nationally significant. Fifty-six nationally significant climate risks were identified.

A subset of 11 priority risks was selected by the Australian Government for a detailed quantitative assessment by the Australian Climate Service. Further engagement with Aboriginal and Torres Strait Islander peoples was committed to as part of the second pass assessment. This engagement aimed to identify the nationally significant risks to the Aboriginal and Torres Strait Islander Peoples system.

The second pass assessment

Purpose

The second pass assessment analysed 11 priority risks selected by the Australian Government across 7 systems and identified 7 new nationally significant risks in the Aboriginal and Torres Strait Islander Peoples system.

The 11 priority risks selected by the Australian Government in the second pass assessment relate to:

- Coastal communities and settlements
- Concurrency pressures in emergency response and recovery
- Critical infrastructure
- Governance
- Health and wellbeing
- Natural ecosystems
- Primary industries
- Real economy
- Regional and remote communities
- Supply chains
- Water security.

The analysis undertaken was both quantitative and qualitative. The second pass assessment used climate hazard, exposure, vulnerability and response data and subject matter expert analysis to understand key risks, and how these risks interact across systems.

Engagement

Prior to the start of the second pass National Assessment a workshop was held with members of the Expert Advisory Committee and people from the Intergovernmental Panel on Climate Change Working Group 2 to gather their advice on the design and approach to the second pass of the National Assessment.

A workshop was also held with risk assessment experts from state and territory governments in November 2023 to integrate lessons from state and territory risk assessments and to build a national community for climate risk knowledge.

The National Climate Risk Assessment was planned with a consultative approach to delivering the second pass, to enable codesign and collaboration with experts and government representatives.

From the start of the second pass, a staged set of Checkpoints were held with representatives across government, peak bodies, industry and the scientific community. The checkpoints included:

- Checkpoint 1 (March 2024): advice on the second pass project scope and methodology
- Checkpoint 2 (July 2024): expert elicitation of how system risks, drivers of risk, and opportunities interact
- Checkpoint 3 (September 2024): Feedback on preliminary insights.

The Australian Climate Service undertook a co-development process to collaborate with Aboriginal and Torres Strait Islander people, to identify nationally significant climate risks. The collaborative approach explored and identified, through conversations and 2 Gatherings, 7 new nationally significant priority risks in the Aboriginal and Torres Strait Islander Peoples' system.

An Australian Climate Service Workshop (100+ participants) was held early November 2024 and invited stakeholders from across government and non-government organisations to explore the evidence base through technical briefings and working sessions. Participants explored what the evidence is telling the ACS about national climate risks, provided feedback on strengths and weaknesses of the key findings and contributed to the national evidence base.

Australia's National Climate Risk Assessment Report and the Overview are structured around each of the 8 National Assessment systems. The draft Report and each system chapter was sent out to independent experts and Commonwealth Government departments in the relevant field for review and feedback, this included relevant members of the Expert Advisory Committee. Feedback was considered and assessed and, where technically sound, additional insights and or context were applied. Following the quality checks and finalisation of the second pass assessment reports, the Australian Climate Service prepared the National Assessment for public release, including of the preparation of final reports including all technical reports, communication materials and data visualisation.

This engagement was further supplemented by a Project Advisory Group (made up of senior Commonwealth Officials), a Senior Economic and Policy Reference group, and peer and external expert review processes. For example, the Senior Economic and Policy Reference

Group generally met monthly through most of the project to review concepts, working-progress and advise on direction and best practice.

All technical reports that contributed to the project went through the normal review and quality assurance process for the agency that led that stream.

Outputs

The final National Climate Risk Assessment Report and the Overview detail 63 nationally significant risks (now including Aboriginal and Torres Strait Islander risks) and provides detailed analysis of 8 systems across 11 priority risks.

These key resources are supported by additional suite of materials that include intelligence and data on the Australian Climate Service website.

Delivering Australia's first National Climate Risk Assessment

Scoping phase (January 2023 – June 2023)

Through this process the Department of Climate Change, Energy, the Environment and Water and the Australian Climate Service, developed a methodology to:

- demonstrate the intent of the National Assessment, including how it will inform national adaptation
- provide an understanding of the risk assessment requirements, scope and objectives
- outline the approach to identifying and prioritising Australia's most significant climate-related risks
- outline how feedback will be elicited
- document methodology assumptions and dependencies
- outline a framework for learning and continuous improvement during and between each iteration of national assessment processes.

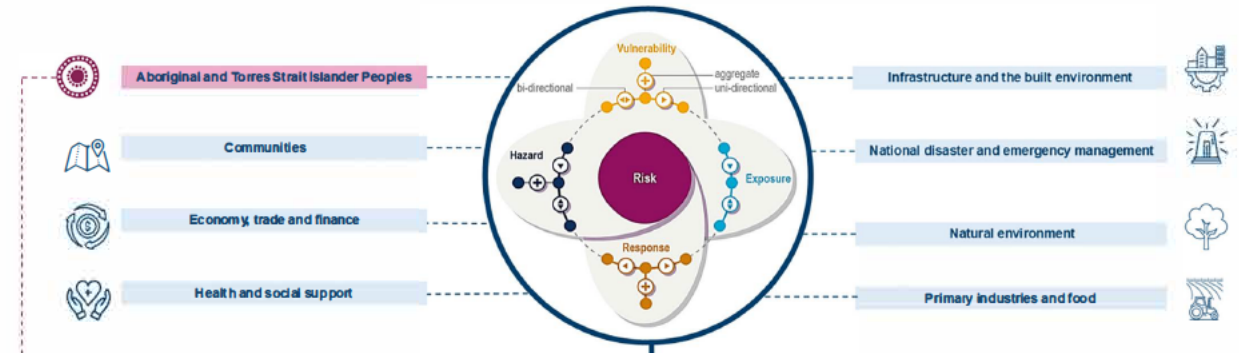
Key outputs

- 10 priority hazards
- 4 global warming levels
- 8 key systems
- 10 key regions
- 3 time horizons

First Pass Assessment (July 2023 – December 2023)

First pass assessment

The first pass assessment reviewed climate risks within 8 systems of national importance. It considered how risks can compound, cascade, and aggregate across multiple systems. This involved 10 stakeholder workshops across 8 x systems.



Key outputs

- 56 nationally significant risks
- 11 priority risks for the second pass

Aboriginal and Torres Strait Islander Peoples

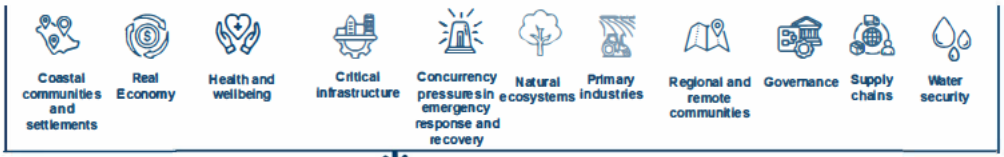
Parallel process to understand risks in a culturally appropriate way

Second pass assessment

The second pass risk assessment analysed 11 priority risks across 8 key systems. It has also developed and consolidated other information to highlight the integrated nature of risk and potential for cascading and compounding impacts identified in the first pass assessment.

Three checkpoints saw a range of experts provide input at scoping, development and preliminary insight phase. An ACS National Workshop was also held to gain feedback on early findings, and draft chapters were shared with relevant experts within government, and experts to illicit feedback.

11 priority risks for the second pass



Second Pass Assessment (January 2024 – July 2025)

Two National Gatherings were held to explore risks to Aboriginal and Torres Strait Islander Peoples

Key outputs

- **Evidence base**
  Data and climate information
- **National Climate Risk Assessment**
  - 63 nationally significant risks (now inc. Aboriginal and Torres Strait Islander risks)
  - 8 systems analysed across 11 priority risks
- **ACS Platform**
  Accessible information for decision making

Environment and Communications References Committee

Climate Risk Assessment Inquiry

ANSWER TO QUESTION ON NOTICE

Hearing Date: 16 September 2025

Division/Agency: Australian Climate Service

Topic: National Climate Risk Assessment definition of tipping point

Senator: David Pockock

Reference: Spoken Question (Hansard Page 10–11)

Question:

Senator DAVID POCOCK: One of the things that the assessment suggests is that the **reef would reach a tipping point at 1.5 degrees Celsius**, but it doesn't clearly explain what that means. **What does that mean?** What tipping point does it reach at 1.5 degrees Celsius?

...

CHAIR: To be clear, you want a definition of what 'tipping point'—

…

CHAIR: Whether it's being used as a descriptive term or a scientific term, you want to know what it actually means? Thanks.

Senator DAVID POCOCK: And what temperature change can the Great Barrier Reef and Ningaloo survive, based on the best scientific—

Dr Landsberg: I would have to refer to the technical reports, but I'm happy to provide that.

Answer:

A tipping point is reached when the rate of coral reproduction becomes lower than the rate needed to maintain healthy reef populations — meaning corals can no longer recover from damage as quickly as they are being lost.

This is estimated to occur when ocean chemistry changes to a point where the water becomes less suitable for coral growth. Specifically, scientists have identified a threshold in the Great Barrier Reef where the saturation level of a key mineral (aragonite) drops below 4.5–4.6. At this point, young corals become less common and seaweed starts to take over.

These conditions are projected to occur, on average, when global warming reaches 1.5 degrees Celsius. This means the reef is approaching a critical point where its ability to sustain itself could rapidly decline.

The National Climate Risk Assessment Natural Ecosystems Technical Report: Marine available via www.acs.gov.au on page 23 provides more details.

Environment and Communications References Committee

Climate Risk Assessment Inquiry

ANSWER TO QUESTION ON NOTICE

Hearing Date: 16 September 2025

Division/Agency: Australian Climate Service

Topic: National Climate Risk Assessment marine heatwaves

Senator: Sarah Hanson-Young

Reference: Spoken Question (Hansard Page 12)

Question:

CHAIR: Obviously the South Australian government is trying to work out how to respond to this. Have you had any contact from anyone in the SA health department or South Australian government in relation to any of the health impacts, or, indeed, any of the climate risks of algae blooms and **marine heatwaves**, given everything?

Dr Landsberg: No. We have provided some briefing on heatwaves to input into decision-making related to the algal bloom, but not in the health space. It has been more about looking at the climate changes and what our research might have said about heatwaves and future heatwaves.

CHAIR: Could I ask you to **table the advice you've given**?

Dr Landsberg: Sure.

Answer:

See Attachment A.

It should be noted that this briefing was provided for the Head of the Australian Climate Service and shared with colleagues involved in the development of the National Adaptation Plan at the Department of Climate Change, Energy, the Environment and Water. This brief was not a direct input to the response activities that were occurring as this was covered by other technical and policy specialists.

SOUTH AUSTRALIA - BLUE GREEN ALGAE AND CLIMATE CHANGE

ISSUE

Communities and environmental impacts of persistent toxic phytoplankton blooms in SA coastal waters – causes and responses

KEY POINTS:

- Coastal waters of South Australia have been anomalously warm over the last 6 months (up to 2.5 °C above average during late 2024–early 2025), meeting the definition for marine heatwaves. During this time, phytoplankton blooms have occurred, and due to the toxicity, are termed Harmful Algal Blooms (HAB). HABs can have negative effects on marine ecosystems, with impacts including water discolouration, foam accumulation, anoxia, seafood contamination, disruption of food webs, and large-scale mortality of marine biota (Bindoff et al., 2019).
- A hot, warm summer with light winds created stable water columns ideal for phytoplankton blooms (increased light)
- Phytoplankton blooms of Karenia mikimotoi, a motile, toxin-producing dinoflagellate, have occurred throughout the region, lasting many weeks.
- Nutrient enrichment from the offshore summer upwelling of deep, nutrient-rich water and nutrient influx from the 2022–23 Murray River flood and more generally from land use (i.e. agriculture fertiliser use) helped sustain the phytoplankton bloom. Characterising nutrient sources will require additional sampling.
- Lack of ocean vertical mixing from storms and waves this Autumn has failed to cool the water sufficiently to help disperse the blooms.
- The bloom is neither fully “curable” nor quickly dissipated. It may reappear again as waters warm in Spring and summer. This reemergence has been the case for other regions of the world experiencing HAB blooms.

BACKGROUND AND FAST FACTS:

- The region has experienced anomalous warming since October 2024, peaking in March 2025 (up to 2.5 °C above average during late 2024–early 2025). The CSIRO-BOM marine heatwave forecasting system predicted this warming and discussed it in the National Briefings beginning November 2024.

- Surface warming is now weakening (June 2025) (IMOS maps) and MHW conditions are no longer evident – www.marineheatwaves.org/tracker, but sea surface temperatures are forecast to remain anomalously warm in this region over the next few months.
- All waters around Australia are warming and increasing the intensity and duration of marine heatwaves (MHW). (Brodie et al., 2025)
- Spencer Gulf is a region showing an increasing trend in the intensity of Marine Heatwaves over the 1982 – 2020 period (Kajtar et al., 2021)
- HABs are a common ecological impact of marine heatwaves, and have been observed globally (Smith et al., 2021). A large-scale MHW-driven HAB occurred previously in the Great Australia Bight in 2013 (Roberts et al., 2019).
- Elevated temperature increases the growth rate of phytoplankton (greater phytoplankton bloom); however, it is uncertain whether this leads to increased occurrence of toxic phytoplankton blooms as experienced in SA
- HABs tend to thrive in warm waters, species like Karenia mikimotoi or Alexandrium, grow faster and outcompete phytoplankton when temperatures are elevated.
- Warmer oceans can amplify the effect of nutrient supplies from river runoff and re-cycling from the sediments
- Warmer winters may also enhance the over-winter retention of cyst-forming HAB species, like Karenia mikimotoi, allowing them to bloom more frequently in subsequent years.
- Ocean warming and acidification can favour HAB species (Cooley et al. 2022), but there is no observed global trend in HAB occurrence once monitoring efforts were accounted for (Hallegraeff et al., 2021).

POSSIBLE FOLLOW UP ACTIONS

- Besides monitoring, another management strategy is to control nutrient input from river runoff.
- Develop and enhance early warning systems and link them to response plans for future HAB and MHW events (e.g. Champion et al. 2025; Hobday et al., 2024; Figure 5)
- Engage with industry and community to understand impacts, and implement adaptation strategies (e.g. adaptive management, adaptive harvest)
- Undertake habitat restoration or stock enhancement as needed
- Initiate policy and legislative review to consider marine extreme events under Australia's emergency response framework

References:

Bindoff, N.L., W.W.L. Cheung, J.G. Kairo, J. Arístegui, V.A. Guinder, R. Hallberg, N. Hilmi, N. Jiao, M.S. Karim, L. Levin, S. O'Donoghue, S.R. Purca Cuicapusa, B. Rinkevich, T. Suga, A. Tagliabue, and P. Williamson, 2019: Changing Ocean, Marine Ecosystems, and Dependent Communities. In: IPCC Special Report on the Ocean and Cryosphere in a Changing Climate [H.-O. Pörtner, D.C. Roberts, V. Masson-Delmotte, P. Zhai, M. Tignor, E. Poloczanska, K. Mintenbeck, A. Alegría, M. Nicolai, A. Okem, J. Petzold, B. Rama, N.M. Weyer (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA, pp. 447–587. https://doi.org/10.1017/9781009157964.007.

Brodie, Steph; Bailleul, Fred; Blanchard, Julia; Chandrapavan, Arani; Fulton, Beth; Jackson, Gary; et al. Sea Change Australia: Climate Reports 2025. Brisbane: CSIRO; 2025. csiro:EP2025-2901. https://doi.org/10.25919/7hh2-5a15

Champion, C., & Coleman, M. A. (2025). The emerging need for marine heatwave response plans: A globally relevant example from New South Wales, Australia. Ocean & coastal management, 261, 107526.

Cooley, S., D. Schoeman, L. Bopp, P. Boyd, S. Donner, D.Y. Ghebrehiwet, S.-I. Ito, W. Kiessling, P. Martinetto, E. Ojea, M.-F. Racault, B. Rost, and M. Skern-Mauritzen, 2022: Oceans and Coastal Ecosystems and Their Services. In: Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, B. Rama (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA, pp. 379–550, doi:10.1017/9781009325844.005.

Hobday, A. J., Spillman, C. M., Allnutt, J., Coleman, M. A., Bailleul, F., Blamey, L. K., ... & Stuart-Smith, J. (2024). FORECASTING A SUMMER OF EXTREMES. *Oceanography*, *37*(3), 42-51.

Hallegraeff, G. M., Anderson, D. M., Belin, C., Bottein, M. Y. D., Bresnan, E., Chinain, M., ... & Zingone, A. (2021). Perceived global increase in algal blooms is attributable to intensified monitoring and emerging bloom impacts. *Communications Earth & Environment*, *2*(1), 117.

Kajtar, J.B., Holbrook, N.J., Hernaman, V., 2021. A catalogue of marine heatwave metrics and trends for the Australian region. J. South. Hemisph. Earth Syst. Sci. 71, 284–302. https://doi.org/10.1071/ES21014

Roberts, S. D., Van Ruth, P. D., Wilkinson, C., Bastianello, S. S., & Bansemer, M. S. (2019). Marine heatwave, harmful algae blooms and an extensive fish kill event during 2013 in South Australia. *Frontiers in Marine Science*, *6*, 610.

Smith, K. E., Burrows, M. T., Hobday, A. J., Sen Gupta, A., Moore, P. J., Thomsen, M., ... & Smale, D. A. (2021). Socioeconomic impacts of marine heatwaves: Global issues and opportunities. Science, 374(6566), eabj3593.

List of Contributors

Dr Steph Brodie
Dr Alistair Hobday
Dr Eva Plaganyi
Dr Richard Matear
Dr Kate Bongiovanni

List of Figures

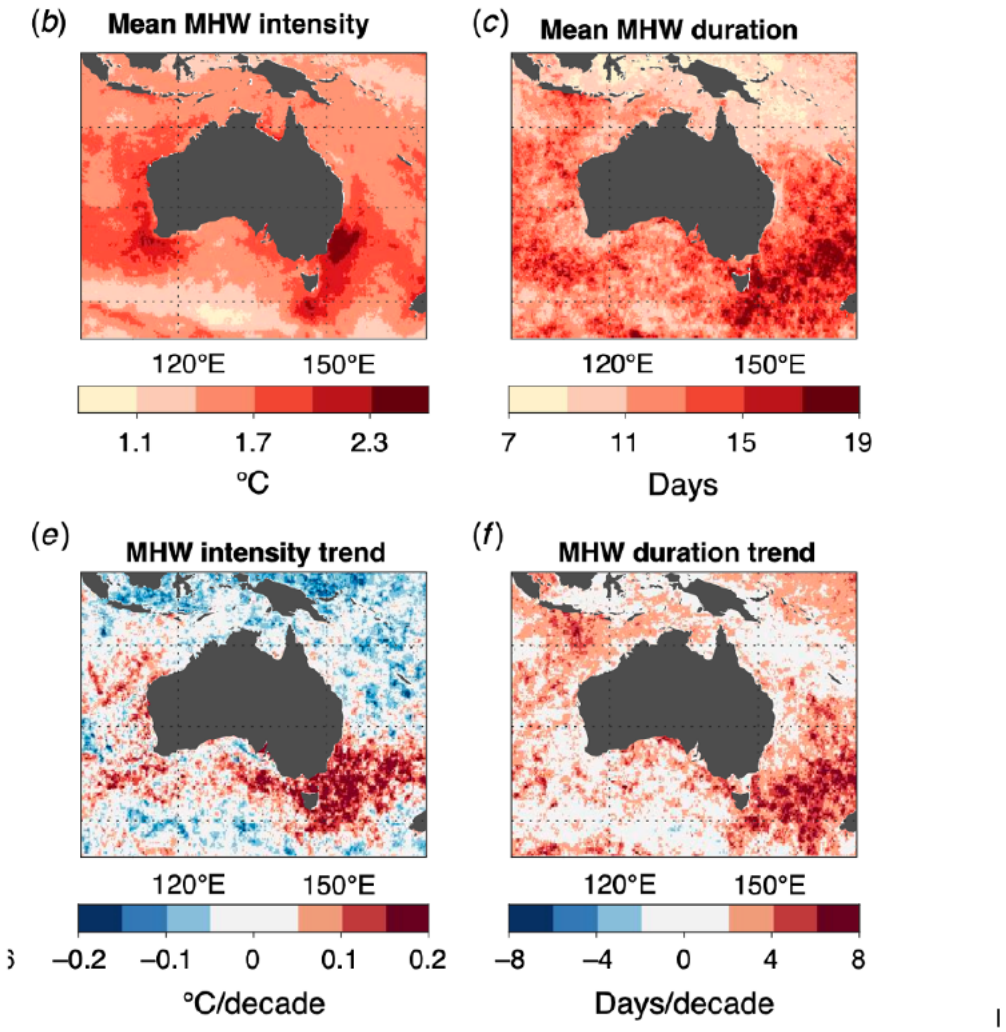
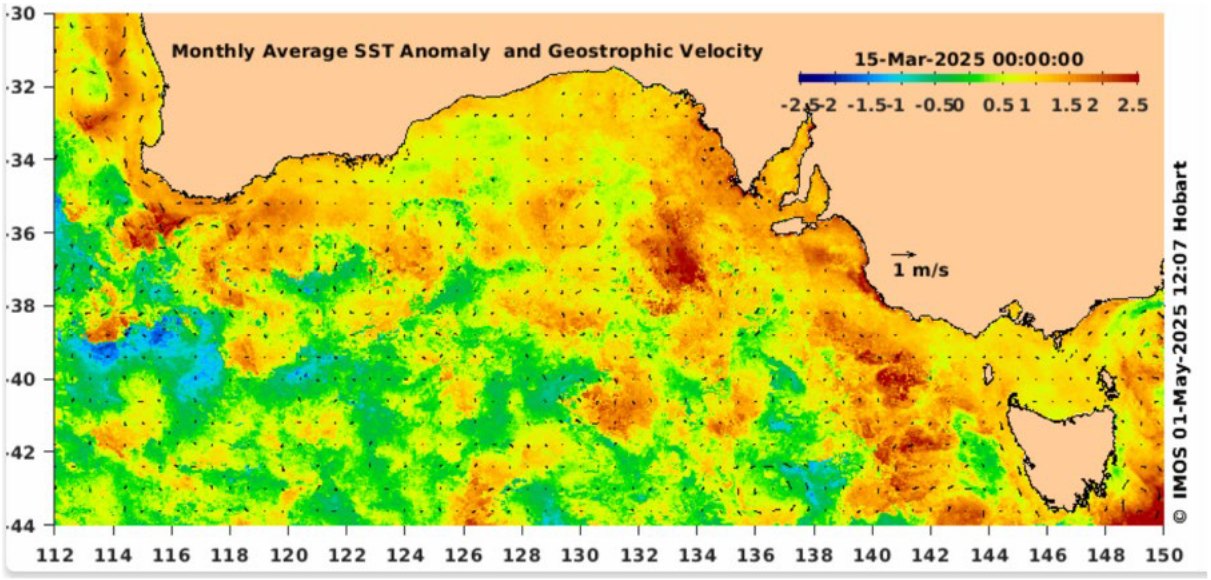
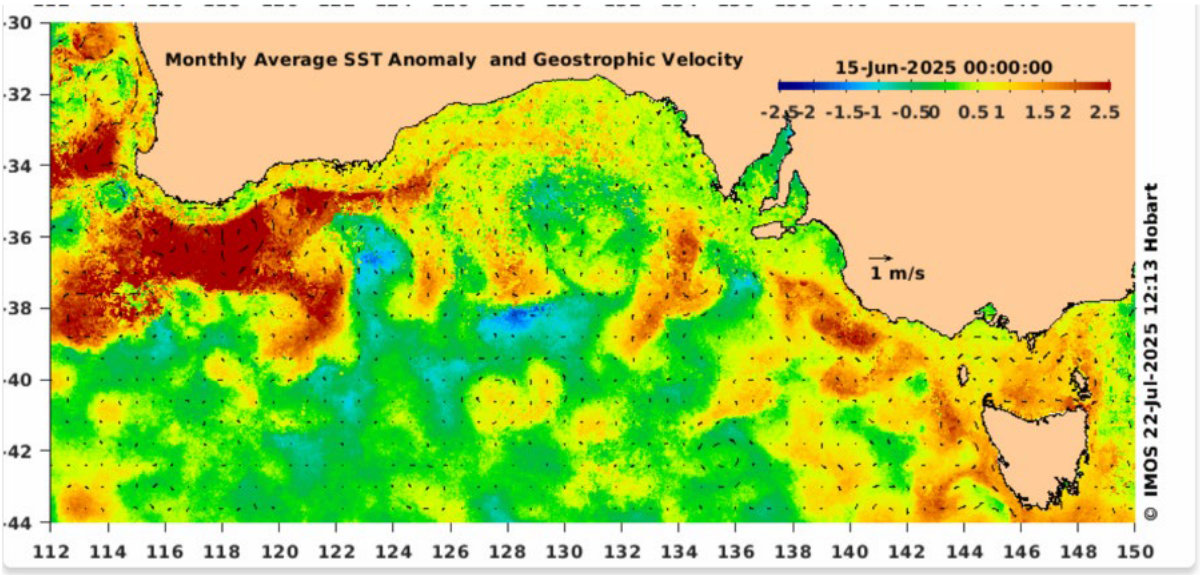


Figure 2. Observed marine heatwave around Australia (1982- 2020) (Kaitar et al., 2021). observational SST data, using the 0.25° gridded Daily Optimum Interpolation Sea Surface Temperature (DOISST), version 2.1, provided by the National Oceanic and Atmospheric Administration (NOAA; Huang et al. 2021a). Here the climatological period is chosen as 1983–2012, following the recommendation of Hobday et al. (2018). The climatological mean and 90th percentile threshold were computed over an 11-day window centred on each calendar day, sampling each year within the baseline period.

From Bureau Research Hazard Report and NCRA climate hazard overview report

The following are from IMOS (https://oceancurrent.aodn.org.au/monthlymeans.php#)


Monthly Average SST Anomaly and Geostrophic Velocity
15-Mar-2025 00:00:00
-2.5 -2 -1.5 -1 -0.5 0 0.5 1 1.5 2 2.5
1 m/s
© IMOS 01-May-2025 12:07 Hobart
30
32
34
36
38
40
42
44
112 114 116 118 120 122 124 126 128 130 132 134 136 138 140 142 144 146 148 150


Monthly Average SST Anomaly and Geostrophic Velocity
15-Jun-2025 00:00:00
-2.5 -2 -1.5 -1 -0.5 0 0.5 1 1.5 2 2.5
1 m/s
© IMOS 22-Jul-2025 12:13 Hobart
30
32
34
36
38
40
42
44
112 114 116 118 120 122 124 126 128 130 132 134 136 138 140 142 144 146 148 150

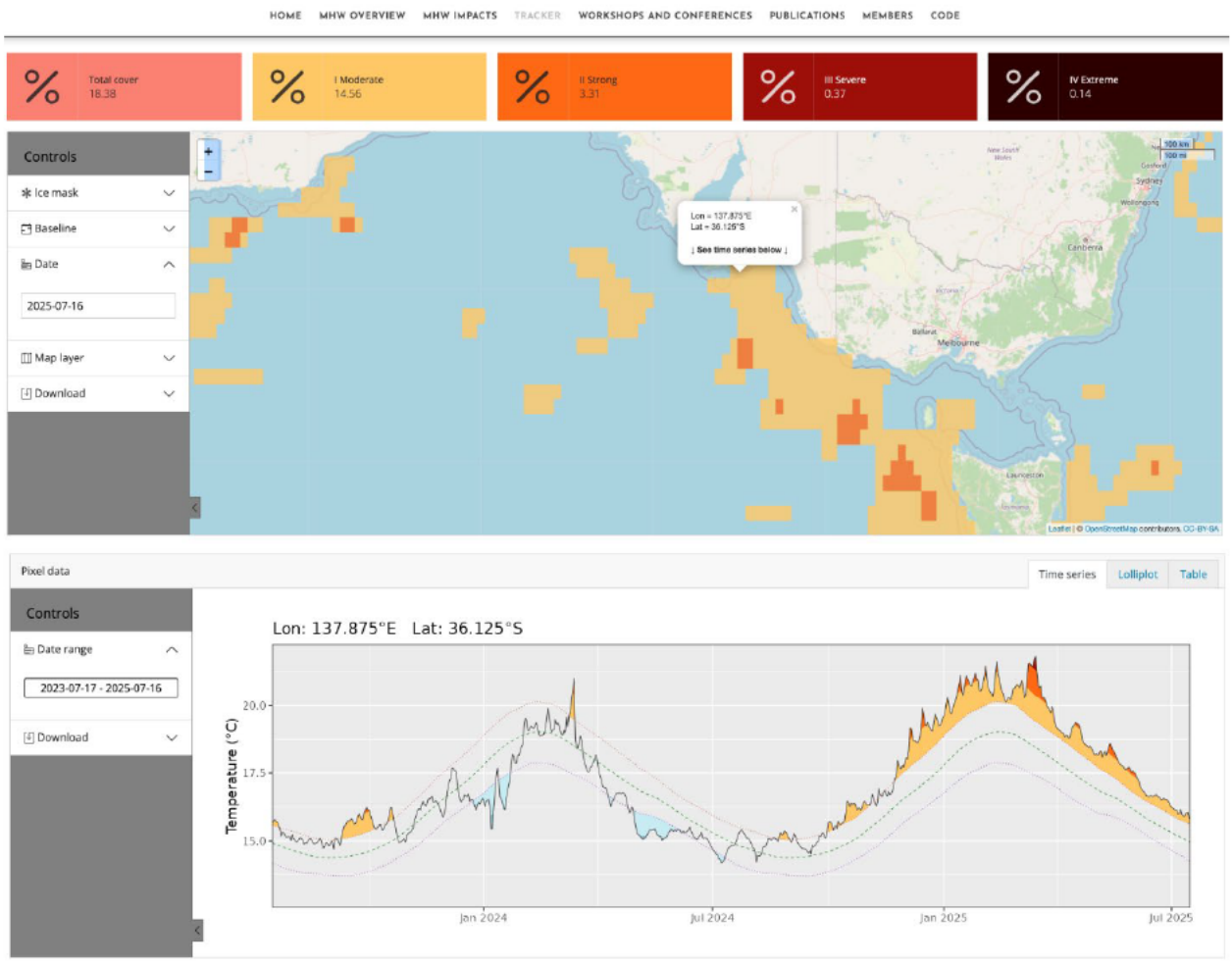


Figure 3 Example screenshots of the MHW Tracker web application (https://www.marineheatwaves.org/tracker.html). Top plot shows a map of marine heatwave (moderate and strong categories) for an example day, 16-Jul-2025. Bottom plot shows the time-series of an example grid cell off Kangaroo Island, showcasing sea surface temperatures during the 2024/2025 summer were high enough to be classified as moderate-to-severe marine heatwaves.

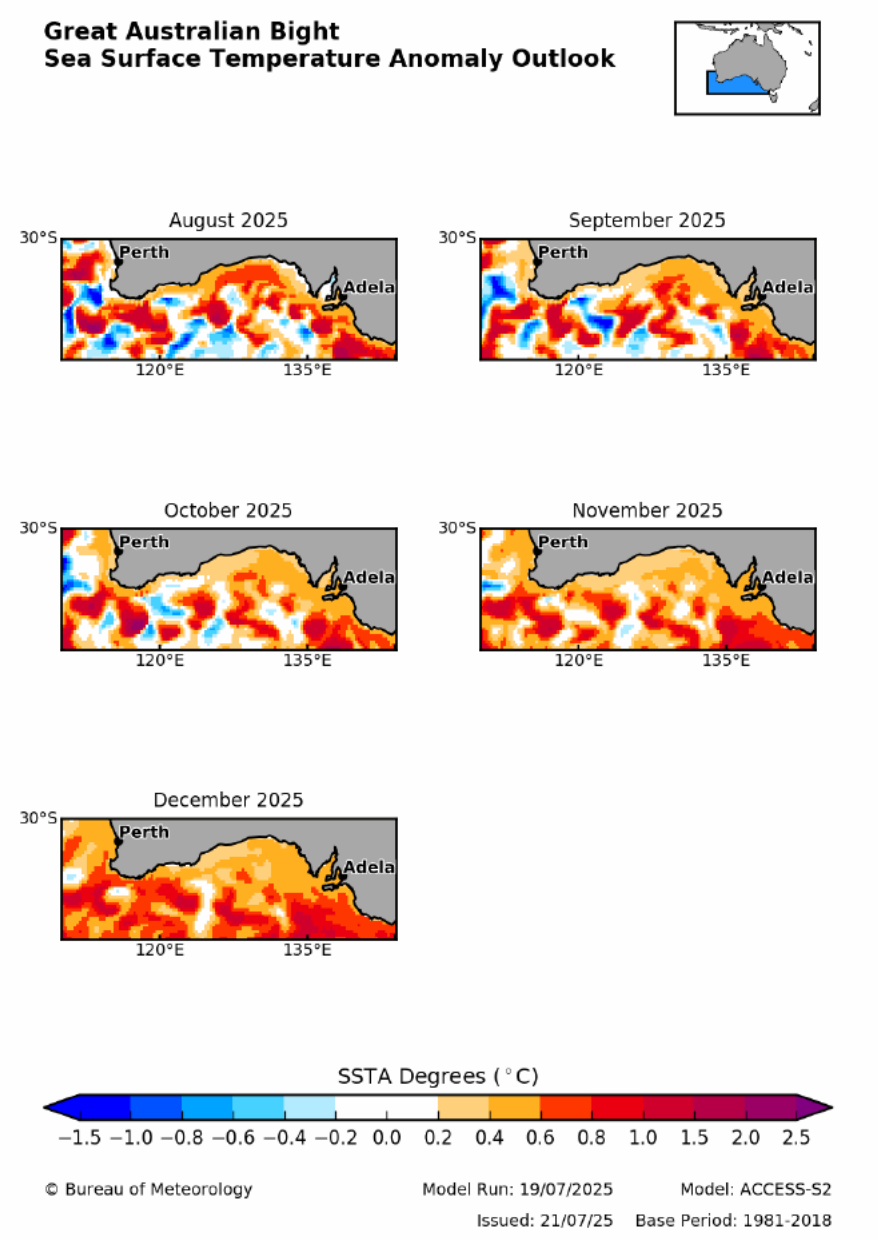


Figure 4 Seasonal forecasts of Sea Surface Temperature Anomalies show waters off South Australia are predicted to remain warmer than the long-term average.
http://www.bom.gov.au/oceanography/oceantemp/sst-outlook-map.shtml

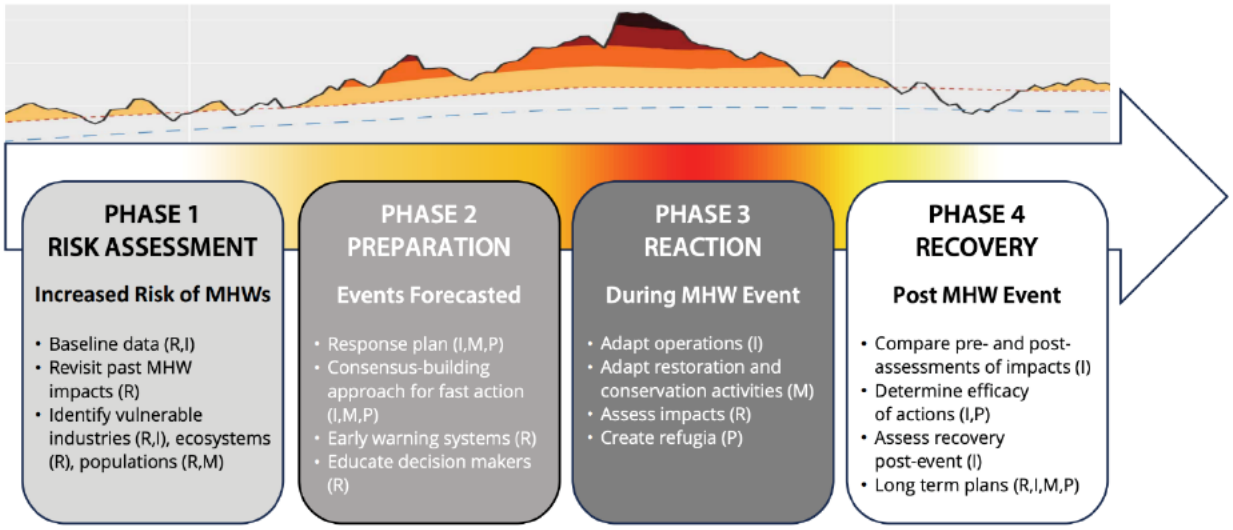


Figure 5 A conceptual overview of stages for marine heatwave (MHW) preparation together with examples of actions that could be taken at each stage. An example MHW time series is shown above the stages. Stakeholders are included as follows: industry (I), researchers (R), managers (M), and policymakers in local or national governments (P). Sourced from Hobday et al., 2024.

Environment and Communications References Committee

Climate Risk Assessment Inquiry

ANSWER TO QUESTION ON NOTICE

Hearing Date: 16 September 2025

Division/Agency: Australian Climate Service

Topic: National Climate Risk Assessment Western Australia changes to rainfall

Senator: Dean Smith

Reference: Spoken Question (Hansard Page 15)

Question:

Senator DEAN SMITH: I thought I heard last night on an ABC Radio National story someone talking about **how changes to rainfall in the north-west of Western Australia** could lead to improvements in **agricultural production**, but I couldn't find it in the report, and I'm sure this expert was quoting from the report. Could you make a comment about that if it's familiar to you and perhaps direct me to where that was in the report?

Ms Manson: I'm sorry; I'll have to take that on notice. I'm not familiar with exactly where that's quoted in the report or the source of it.

Answer:

Active adaptation is a feature of the Agricultural sector, but it is unclear if current approaches will be sufficient to keep pace with the risks of future climate change.

The Primary Industries Technical Report available via www.acs.gov.au states on page 39 *"For industries that operate in the north of the country, wet and dry seasons were evaluated to match the dominate seasonal rainfall patterns for these regions. Similar to annual rainfall results for these regions, there is notable uncertainty in the direction of change of rainfall across the projections for the wet and dry season for all GWLs with not consistent projection for wetter or drier conditions (Figure 20 and Figure 21)."*

Environment and Communications References Committee

Climate Risk Assessment Inquiry

ANSWER TO QUESTION ON NOTICE

Hearing Date: 16 September 2025

Division/Agency: Australian Climate Service

Topic: National Climate Risk Assessment and National Construction Code

Senator: Sarah Hanson-Young

Reference: Spoken Question (Hansard Page 17)

Question:

CHAIR: Could you take on notice for me **which changes or proposed improvements** to the **National Construction Code** this report references and where that information has gone?

Ms Manson: I'm not sure we would be able to answer it exactly the way you've asked, but we can look at how our work might inform the National Construction Code. I don't think we're providing recommendations. We're identifying where there might be risks and opportunities.

Answer:

Building codes are mentioned 16 times in the National Climate Risk Assessment report, all in the context as an area for consideration for climate adaptation.

Environment and Communications References Committee

Climate Risk Assessment Inquiry

ANSWER TO QUESTION ON NOTICE

Hearing Date: 16 September 2025

Division/Agency: Australian Climate Service

Topic: National Climate Risk Assessment heat related mortality

Senator: Larissa Waters

Reference: Spoken Question (Hansard Page 17)

Question:

Senator WATERS: Just one about **heat related deaths**. Thanks for your indulgence. The report says that, under the three degrees of warming scenario, there's a **444 per cent increase in heat related deaths in Sydney. How many people is that?** …

For **Melbourne, there's a 259 per cent increase** in mortality. How many people will die there? … And in **Townsville it's a 335 per cent increase**. How many people are dying under the three-degree scenario? … If you could, please take those on notice—and the **312 per cent in Perth, 146 in Launceston and 423 in Darwin**—and let us know how many folk face demise under the heat predicted under the scenario that the government's targets are sending us towards.

Answer:

Mortality data was sourced from the Australian Bureau of Statistics Deaths Registrations collection (extracted from the Person Level Integrated Data Asset (PLIDA)), where each record in this dataset represents an individual death recorded. Data between 2007 and 2022 were used.

The method used in this work considered how shifts in climate would impact selected areas by comparing the temperature distribution and estimated excess mortality during the current period, with +1.5, +2 and +3 Global Warming Level (GWL) scenarios. The models underpinning the analysis used an approach that estimates 'excess deaths' above what is expected during a given time and that are attributable to temperature. The current heat related mortality per year for each location ranged from 10 to 40 (Table 1).

Table 1: Heat related mortality estimates by Global Warming Level

Location	Estimated heat-related mortality by GWL				Percent change by GWL		
	Current (1.2°C)	1.5°C	2.0°C	3.0°C	1.5°C	2.0°C	3.0°C
Darwin	10	20	29	50	112%	199%	423%
Melbourne	36	58	82	131	60%	126%	259%
Perth	12	20	28	48	68%	139%	312%
Sydney	40	81	116	217	103%	190%	444%
Townsville	7	14	19	32	94%	159%	335%

Mortality estimates do not account for future demographic or socioeconomic changes and should not be interpreted as precise forecasts.

Environment and Communications References Committee

Climate Risk Assessment Inquiry

ANSWER TO QUESTION ON NOTICE

Hearing Date: 16 September 2025

Division/Agency: Australian Climate Service

Topic: National Climate Risk Assessment adaptation stocktake

Senator: Ross Cadell

Reference: Written Question

Question:

Can the Australian Climate Service table a list of the adaptation programs and policies that were counted in the report for agriculture – page 225, Figure 96?

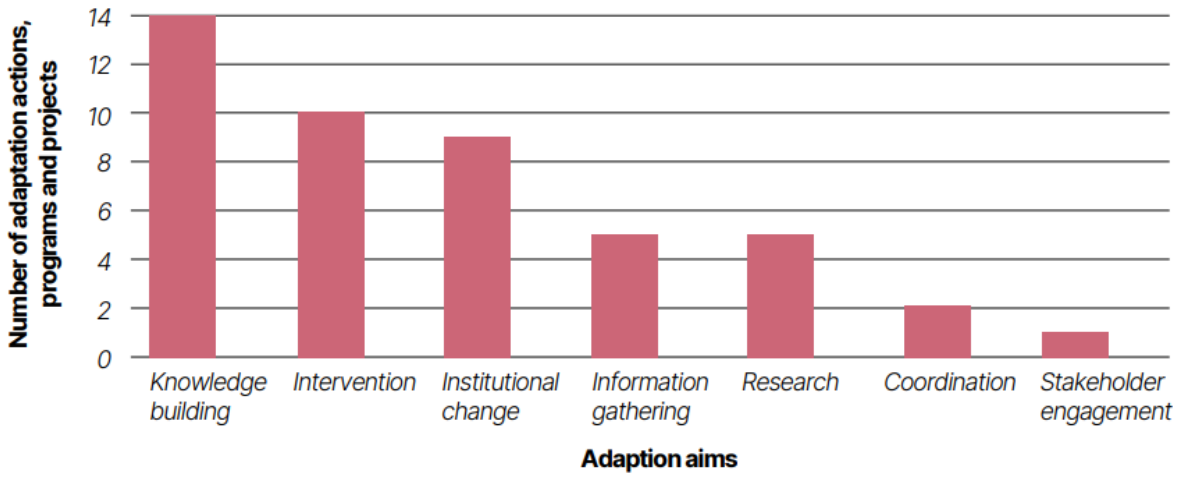


Figure 96: Distribution of adaptation programs, projects and actions across adaptation aims in the Primary industries and food system. *(Source: Insights from the Adaptation Stocktake)*

Answer:

The Australian Adaptation Database at: https://australianadaptationdatabase.unimelb.edu.au/search?filters%5Bncra_systems%5D%5B0%5D=Primary+industries+and+food+system includes the primary industries and food actions, programs, projects, policies, strategies, laws and plans analysed for the National Climate Risk Assessment. This is an active database, adaptation examples may have been added to the database after analysis and some of the examples such as policies listed in the online database may not have been included in the counts used in Figure 96. Adaptation actions that may be effective against climate change but are not specifically labelled as such, for example drought relief programs, may not be included in the database.