



Section 3:

Group performance

Community Services

Goal: Deliver trusted, reliable and responsive weather, water, climate and ocean analyses and forecasts, contributing to the social and financial value we deliver to Government, industry and the Australian community.

The Community Services Group is responsible for providing high quality weather, water, climate and ocean services to the Australian community and emergency management sector. These services are aimed at preventing loss of life and reducing the social and economic impacts of natural hazards.

The group's services span the breadth of Australia, its territories and oceans. These services are delivered with national context typically derived centrally and tailored locally to meet customer needs.

The group's focus is to do this in a resilient, efficient and sustainable way that enables the Bureau to deploy its capabilities when and where they are needed most. The group does this by:

- delivering customer-focused services all day, every day – including during prolonged and extreme events
- implementing projects to increase the value of Bureau services to customers

- undertaking verification of Bureau forecasts and warnings, performance reporting and service monitoring
- managing continuous improvement processes
- building a valued, safe and inclusive workforce with a clear sense of purpose through a focus on the health, wellbeing, capability and empowerment of staff.

For 2024–25, the group consisted of 3 programs:

Program	Responsibilities
National Production Services	• Produce and coordinate 24/7 national forecast and warning services • Incident management including assessing warning potential and service escalation • Undertake actions that leverage automation and business intelligence to optimise operations.
Environmental Prediction Services	• Provide high-quality analyses, forecasts, warnings and long-term projections for flood, thunderstorms, severe weather, fire, heatwaves, cyclones, tsunami, oceans, water and climate • Support the Australian Climate Service • Deliver specialist forecast services to the Australian Antarctic Division.
Decision Support Services	• Supply specialist expertise and local insights to customers, partners and stakeholders to support their activities • Invest in partnerships and information exchange with the emergency management sector at both strategic and operational levels • Embed customer engagement and opportunity management processes to continually inform sector plans and deliver on opportunities.

Throughout 2024–25, the group focused on delivering 3 outcomes that support the achievement of the Bureau’s strategy and purpose. The group’s achievement in delivering each of these outcomes is outlined below.

Outcome 1: Our customers’ decisions are informed by the delivery of routine and high impact weather, water, climate and marine services, that are robust and reliable.

Achieving the outcome

Helping emergency managers prepare for high risk weather

While severe weather happens year-round in Australia, during October to April, there is a higher occurrence of severe thunderstorms, floods, heatwaves and bushfires, as well as being tropical cyclone season.

Each year, ahead of this period, the Bureau supports the emergency management sector’s preparedness activities. The Bureau supports national coordination by delivering its higher risk weather season outlook – including the likelihood of specific events across all regions of Australia – and fostering a shared understanding of the seasonal forecast and its potential impacts.



Left to Right: Brendan Moon (Coordinator General, NEMA), Senator the Hon Jenny McAllister (then Minister for Emergency Management), Dr Karl Braganza (the Bureau's National Manager Climate Services) at the National Preparedness Summit.

In 2024–25, to support the National Emergency Management Agency's (NEMA) National Preparedness Program, the Bureau:

- co-designed and facilitated the weather aspects of a multi-hazard national exercise scenario for the National Preparedness Summit
- delivered sector specific briefings to over 2,500 people across all levels of government, industry and the not-for-profit sector
- briefed Members of Parliament.

Strengthening community readiness for high-impact weather

The Bureau's annual public safety campaign, *Know your weather, Know your risk* (see p.137), aims to inform communities about severe weather risks and provide them with the knowledge needed to prepare and respond effectively. To extend the campaign's reach, the Bureau's Community Engagement Team delivered a community preparedness program in partnership with more than 60 government and community-based organisations, including the Melaleuca Refugee Centre, the New South Wales Primary Health Network, the Australian Migrant Resource Centre, and the Northern Territory Aboriginal Interpreter Services. The team conducted both in-person and online presentations to explain how to prepare for and respond to hazards when they arise.

The program focused on communities at greater risk, such as older Australians, those living with a disability, culturally and linguistically diverse and First Nations peoples. Reaching over 1,000 people, the program helped at-risk communities understand what hazards to expect where they live, how to access warnings and where to get further information.

In an example from just one event, the Bureau worked with the Yolngu Radio Station, which broadcasts in the Yolngu Matha language to 10,000 speakers across the Northern Territory. The Bureau explained targeted severe weather and warning information, and facilitated practical exercises, including the translation of Bureau warnings into Yolngu Matha. Bureau staff gained an understanding of cultural weather knowledge and challenges the broadcasters face in delivering timely information to their community.



Ian Shepherd, Nigel Mules, Josie Matthiesson from the Bureau's Decision Support Services Program with the Yolngu Radio team in Darwin in October.

Extending the abnormally high tides service to Victoria

In June 2024, the Bureau completed the nationalisation of its Coastal Hazard Warning for Abnormally High Tides service with the final extension into Victorian coastal areas. The nationalisation is part of several recent improvements to the Bureau's coastal hazard services, including changes to enable customers to better differentiate hazards.

Less than a month after the service was extended to Victoria, it was put into action following severe weather events across southern states in July and August that led to sea water flooding of low-lying areas in Victoria. During 2024–25, the Bureau provided over 60 Coastal Hazard Warnings for Victoria that included abnormally high tides, making up a significant portion of the 311 Coastal Hazard Warnings issued for the mainland.

The impacts of abnormally high tides range from low-level flooding to significant damage. This can be a concern for a range of stakeholders, including emergency management, roads and transport authorities, ports, councils, marine safety organisations and the Australian community. The value and timeliness of the extended service to Victoria was appreciated by stakeholders and decision-makers, many of whom had been consulted in the development of the warning thresholds.

Building our rainfall intelligence capability to enhance flood services

Rainfall forecasts are a critical input to the Bureau's flood watch and warning services, particularly ahead of, and during, flooding events.

In December, the Community Services Group established the Rainfall Intelligence (RI) capability as an ongoing trial. The RI capability involves experienced meteorologists analysing current and future rainfall trends to deliver the best possible rainfall information to flood hydrologists and decision support officers through tailored products and advice, to inform flood watches, warnings and customer briefing services.

The RI capability enabled more seamless operations, and ultimately more accurate and timely flood warnings and advice to the emergency management sector and the Australian community. This capability was valuable in ensuring communities had reliable, accurate information for their decision-making during the many recent extreme rainfall events, including tropical cyclone Alfred. While the RI capability is currently small, the Bureau hopes to expand it through research, verification, training and process development to improve its heavy rainfall forecasting.

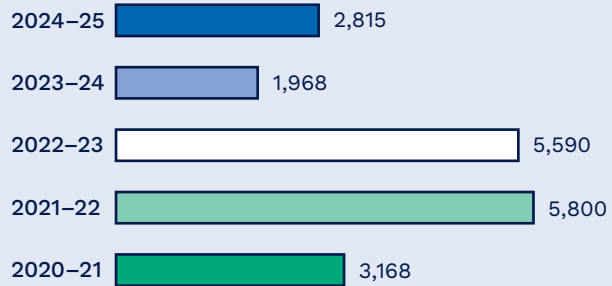


Number of flood warnings issued

Over

2,800

flood warnings issued



Boosting forecast accuracy with a new forecast guidance system

In April, the Bureau achieved a significant milestone in its forecast improvement journey with the seamless transition to a new foundational guidance system for public weather forecasts and warnings, including those on the BOM Weather app.

The Integrated Model post-PROcessing and VERification (IMPROVER) system replaces the Bureau's long-standing Gridded Objective Consensus Forecast system. IMPROVER is a modern, ensemble-based post-processing system developed through international collaboration with the UK Met Office. Since 2019, the Bureau has worked with the UK and other global partners to adapt and operationalise IMPROVER for Australian conditions.

The seamless transition to IMPROVER reinforces the Bureau's commitment to providing trusted, reliable and responsive weather services for Australia, with:

- improved routine forecast accuracy
- a shift towards probabilistic, scenario-based guidance
- a reduction in the manual editing workloads of Bureau meteorologists
- support for more informed decision-making during high-impact weather events.



Bureau meteorologists from the National Production Services Program using IMPROVER.

Strengthening Australia's tsunami warning capability

As part of the Bureau's commitment to deliver secure, resilient, future-ready systems that support timely and accurate hazard warnings, this year, the Bureau successfully launched the Tsunami Observation and Simulation Terminal (TOAST), a purpose-built, internationally recognised software solution for tsunami detection, assessment, simulation, and product generation.

TOAST was developed through a collaboration between Bureau tsunami experts and the software provider. It delivers improved system stability and a modern, customisable interface that supports faster, more informed decision-making.

The new software enhances the Bureau's ability to deliver tsunami warnings through the Joint Australian Tsunami Warning Centre (JATWC). As a partnership between the Bureau and Geoscience Australia, the JATWC plays a critical role as Australia's national tsunami warning centre and the Indian Ocean region's Tsunami Service Provider.

Delivering specialised training to keep Australians safe in Antarctica

The Bureau has been an active and fully integrated member of Australia's Antarctic Program for decades. The Bureau has a 17-member team of Antarctic weather forecasters, observers and technicians embedded in the program who, with support from mainland Bureau colleagues, monitor the climate and deliver thousands of forecasts, ice analyses and in-person briefings for every weather-sensitive planning and tactical decision made by the Australian expedition.

To ensure its forecasters can meet the unique needs of Antarctic customers, the Bureau provides specialised training each year. In 2024–25, the Bureau delivered training to 6 forecasters from the Bureau and one from the Royal Australian Navy. After completion of their training, the forecasters voyaged to Macquarie Island station for ship-based resupply before being deployed into the Casey and Davis summer expeditions.



Australia's flagship icebreaker RSV Nuyina conducting the annual resupply of Macquarie Island in cold stormy seas.

Putting our long-range climate forecasts in the spotlight

In December, the Bureau made changes to the climate information on its website and in emails to subscribers to encourage the Australian community to follow the Bureau's long-range forecasts when making climate-sensitive decisions. Changes include:

- emphasising the Bureau's long-range forecasts as the most reliable source of information
- ceasing issue of La Niña and El Niño Watch and Alert statements

- discontinuing issue of Climate Driver Updates to subscribers
- introducing the Southern Hemisphere Monitoring and Southern Hemisphere Outlook pages on the Bureau website to report on conditions in the Pacific and Indian oceans and high southern latitudes.

These changes aim to guide the Australian community to information that reflects the complexity of Australia's climate system, rather than a reliance on La Niña and El Niño events to infer conditions ahead. The Bureau's climate model, which is used to generate long-range forecasts, incorporates all influences from the oceans, land and atmosphere, and provides the best guidance on rainfall and temperature patterns for the weeks, months and seasons ahead. The changes were supported by a significant communications campaign (see p.138)

Enhancing Pacific data to better understand climate extremes

In March, the Bureau delivered a regional training workshop in Fiji focused on enhancing the quality and application of historical climate data to better understand and manage climate extremes across the Pacific. The workshop was delivered through the Australian Government's Climate and Oceans Support Program in the Pacific (COSPPac).

Thirteen National Meteorological and Hydrological Services (NMHSs) from across the Pacific participated, with representatives from Palau, Federated States of Micronesia, Republic of the Marshall Islands, Papua New Guinea, Solomon Islands, Vanuatu, Fiji, Tonga, Niue, Samoa, Cook Islands, Kiribati and Tuvalu.

The workshop supported NMHSs to identify and quality control their longest and most reliable station records and generate internationally recognised climate indices. These indices translate historical climate data into actionable information and are valuable for national planning and decision-making in climate-sensitive sectors such as health, agriculture and water management. For example, in the Solomon Islands, rainfall-related indices can help identify periods when there may be greater risk of mosquito-borne diseases, while for other countries, heatwave and drought indices can inform public health and emergency services.

This capability allows the Pacific NMHSs to meet local, regional and global reporting needs and enhances the credibility and visibility of Pacific data in global climate assessments.



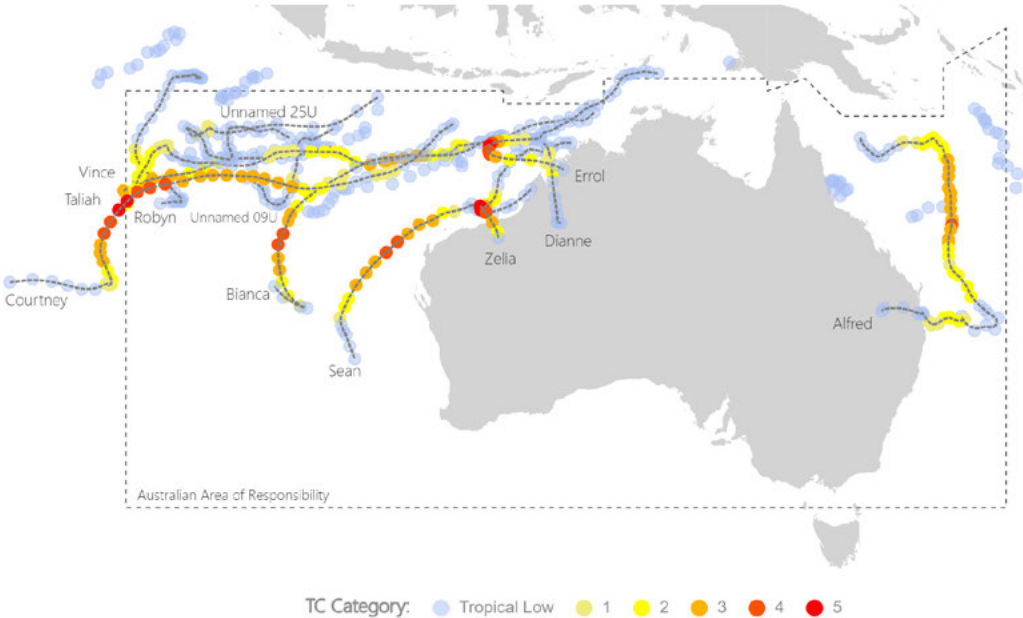
From left: Amy McGowan (Fiji), Bouchard Solomona (Cook Islands), Simon McGree (Bureau), Boyd Mackenzie (Chuuk State – Federated States of Micronesia), Kikuko Mochimaru (Palau).

The 2024–25 tropical cyclone season

There were 12 tropical cyclones in the Australian region during the 2024–25 tropical cyclone season, one above the long-term average of 11. 2024–25 was the most active season since 2005–06 which also recorded 12 cyclones. Eight tropical cyclones – Sean, Taliah, Vince, Zelia, Alfred, Bianca, Courtney and Errol – reached Category 3 or above (severe tropical cyclone) while in the Australian region, again the highest number since the 2005–06 season.

Of the 12 cyclones, 11 were located in the Indian Ocean, off Australia’s north-west coast, with just one – tropical cyclone Alfred – affecting eastern Australia and having the greatest impact on Australian communities (see p.81). Five tropical cyclones impacted the west coast of Australia, however, only Zelia crossed the coast as a severe tropical cyclone. Severe tropical cyclone Zelia crossed the coast as a Category 4 system in a sparsely populated area east of Port Hedland.

For the 2024–25 tropical cyclone season, the position accuracy (where the tropical cyclone travelled) of Bureau forecasts was comparable to, or better than, the 5-year average for all forecast lead times, indicating continued incremental improvement in position forecasting. The intensity forecast accuracy (how intense the tropical cyclone is likely to be) was comparable to the 5-year average for lead times up to 48 hours, but slightly worse than the 5-year average for longer lead times. This reflects the high proportion of severe tropical cyclones, the intensity of which are more challenging to forecast.



Map showing tropical cyclones in the Australian region during the 2024–25 tropical cyclone season.

Highlights and significant events

Supporting the community during tropical cyclone Alfred

Tropical cyclone Alfred was one of the most significant weather events in recent Australian history. This was, in part, due to its impact – causing damages of around \$1.36 billion, one fatality and extensive damage to roads, infrastructure and agriculture – but also due to its path being well south of typical areas where tropical cyclones make landfall, impacting communities, including Brisbane, which were not familiar with action to take during a cyclone.

Between late February and early March, a large area from south-eastern Queensland through to north-eastern New South Wales braced for the impact of a tropical cyclone. While Alfred was downgraded to a category 1 system and then to a sub-tropical system as it crossed the coast, the broader region was significantly impacted by damaging wind gusts, heavy rainfall, flooding and severe coastal erosion. More than 500,000 customers were without power, with many remaining without electricity for several days. Wind damage, power outages and flooding caused significant losses to agriculture and other industries.

In the lead up to and throughout the event and the subsequent flooding, the Bureau delivered targeted, up-to-date forecasts and warnings through a range of channels, including the Bureau website, the BOM Weather app, and directly to emergency management agencies. These included:

- 49 tropical cyclone advices
- 52 severe weather warnings
- 38 coastal hazard warnings
- 10 flood watches
- 102 flood warnings
- 331 briefings to the emergency management sector via the Queensland Disaster Management Arrangements.

The Bureau also stood up additional briefing capability to support emergency management decision-making and keep the community informed. This included positioning Bureau experts from around the country into Brisbane, Sydney and Canberra to ensure there was consistent on-the-ground support for the duration of the event's impacts. The Bureau also deployed additional non-operational staff into operations to bolster its ability to sustainably deliver critical services.



Matt Collopy, General Manager of the Bureau's Environmental Prediction Services supporting community preparedness at a press conference during tropical cyclone Alfred.

Strengthening climate resilience in the Pacific with ACCESS-S

Through the Climate and Oceans Support Program in the Pacific (COSPPac), the Bureau continues to support Pacific Island countries to strengthen their resilience to climate extremes by delivering tailored forecasts using the Bureau's ACCESS-S climate prediction model. Developed in response to stakeholder demand and co-designed with regional input, the services include weekly to seasonal outlooks for rainfall, temperature, sea surface temperature, sea level, and tropical cyclones.

National Meteorological and Hydrological Services in 15 Pacific Island countries now routinely use ACCESS-S to inform early warnings and planning across critical sectors such as agriculture, water management, and disaster preparedness. COSPPac works with partners to provide data, tools, training, and user support, helping to build local capacity and ensure forecasts are applied in meaningful ways.

Forecast products are delivered through the Bureau's Pacific climate portal and embedded in services across the region. In Fiji, ACCESS-S supports a co-produced sugarcane bulletin guiding planting, fertiliser application, and harvest timing. In Niue and the Cook Islands, ACCESS-S forecasts underpin monthly food security and water resource bulletins, enabling early action in remote and outer island communities.

The growing use of ACCESS-S reflects a shift from reactive to proactive climate risk management, ensuring high-quality, locally relevant climate services are reaching those who need them.



Shweta Shiwangni, a Federated States of Micronesia participant in COSPPac's monthly Online Climate Outlook Forum.

Next steps

In 2025–26 the group intends to:

- deliver improved forecast production processes, including an increase in frequency of routine production from 2 to 4 times per day through the completion of Forecast Improvement Delivery Stream
- further uplift the Bureau's Rainfall Intelligence capability by enhancing the 'post-processing' output of the numerical models to improve flood forecasts
- extend lean methodology across all priority operational services.

Outcome 2: A deep and evolving understanding of the Australian community and emergency management sectors, that leads to targeted, high-impact products and services.

Achieving the outcome

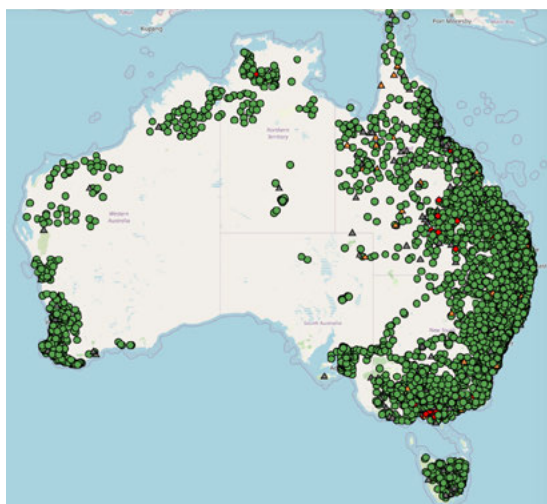
Enhancing the Bureau's flood warning systems

The Bureau's national flood warning service is underpinned by systems and data that support preparedness, response, and recovery for the community and partners in flood-risk areas. This year, the Bureau completed the Flood Remediation project and reached a major milestone in its journey of uplifting the security, stability and resilience of its flood systems.

Through this project the Bureau:

- replaced the flood warning network data collection system, Enviromon, with the Australian Rain and River Observation (ARRO) solution
- re-platformed and expanded the Hydrological Forecasting System (HyFS), which is used for flood forecasting and warning, data management, and product creation and dissemination.

These changes improved efficiency and reduced duplication in the Bureau's flood systems. Bureau meteorologists and hydrologists will experience improved functionality through a simplified interface, minimising the need to access multiple systems. Completion of the Flood Remediation project furthers the Bureau's commitment to work towards nationally consistent products for the emergency management sector.



Screenshot of the Australian Rain and River Observation (ARRO) system showing the status of sites in the flood warning network.

Uplifting the Hazards Services Forum for more responsive delivery

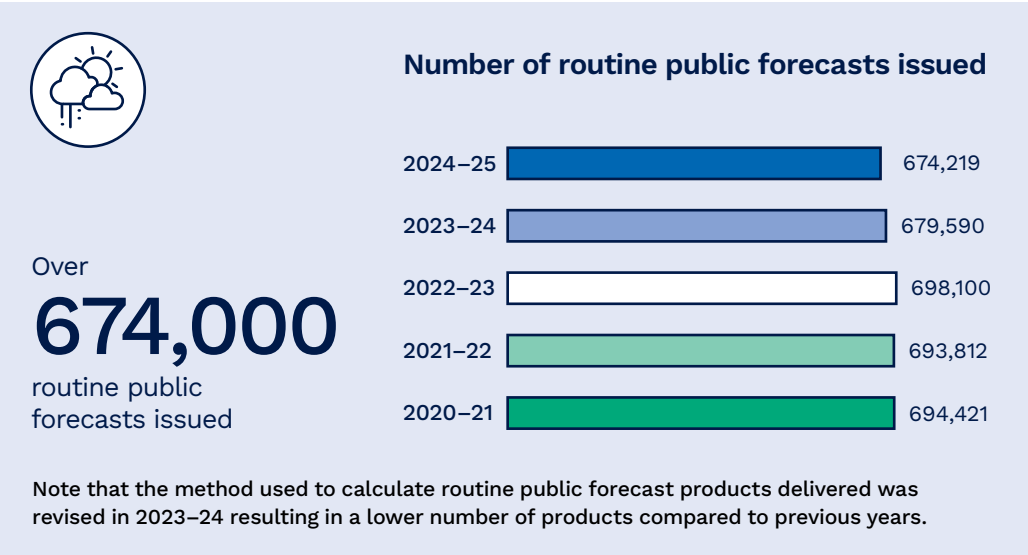
The Bureau of Meteorology Hazards Services Forum (HSF) is a national advisory group that brings together Australia's emergency service agencies to guide strategic development of the Bureau's hazard services. The HSF was established in 2017 under the *Intergovernmental Agreement on the provision of Bureau of Meteorology Hazard Services to the States and Territories* (the IGA), along with agreed schedules of services that the Bureau provides to the Australian community and emergency services sector.

In 2024–25, the Bureau updated the IGA service schedules to provide emergency management agencies with a current and accurate understanding of the Bureau's nationwide services to the sector. IGA terms of reference were also updated with a requirement for a biennial review to ensure the schedule is current and accurate.

During the year, the HSF also endorsed a new process for the management of service requests from the emergency services sector to the Bureau. The Bureau commenced engagement activities in response to 2 service requests from the HSF that will inform future updates to the weather

intelligence provided to state and territory agencies for flash flood warnings and emergency aerial operations.

The HSF also continues to explore options for national consultation and technical advice on weather services for flood, severe weather and marine weather which will complement existing consultation arrangements.



Providing decision support services to the National Emergency Management Agency

Bureau Decision Support Services (DSS) staff deliver custom briefings and products to the National Emergency Management Agency (NEMA) to support its coordinating role during natural disasters. The Bureau’s support includes:

- embedding DSS staff in the National Situation Room (NSR), deepening our understanding of the Australian Government’s needs
- delivering briefings and advice routinely and on request to staff within the NSR
- co-developing situational awareness intelligence
- delivering briefings at NEMA’s National Coordination Mechanism meetings, where representatives from federal and state governments and the private sector convene for crisis management during severe weather events.

In 2024–25, the Bureau delivered over 1,000 products to NEMA, including 18 briefings to NEMA’s National Coordination Mechanism meetings across the following events:

- tropical low 04U impacts on Cocos (Keeling) Islands and its potential to develop into a tropical cyclone in December
- North Queensland floods in January and February
- tropical cyclone Alfred in March
- NSW flooding in May.

Together with NEMA, the Bureau also delivered 13 briefings to government, including to the Prime Minister, the Governor-General, ministers and members of parliament.

Gathering insights for future warnings

In 2024–25, the Bureau received funding through the Commonwealth-funded Disaster Risk Reduction Package (DRRP) to undertake engagement activities with the Australian community and emergency management sector to inform ways in which the Bureau's warnings communication could improve. This included conducting surveys to help understand communities' hazard exposure, understanding of risk, and current use and comprehension of the Bureau's public warnings. This work contributed to the objectives of the DRRP to reduce current and future natural disaster risk and give decision-makers better risk-reduction tools and information.

The outcomes of this activity will ensure the Bureau's future warnings services meet the needs of all Australians and provide a sound evidence base for future investments in Bureau warning services. Survey findings informed the preliminary design of a consistent, accessible, contemporary product set with information across the long, intermediate and short (warning) timescales to support timely warnings for hazardous events.

Supporting the UN Early Warnings for All initiative

The Early Warnings for All initiative (EW4All) – launched by the UN Secretary-General in 2022 – calls for every person across the globe to be protected by early warning systems by 2027. To support this goal, the World Meteorological Organization's World Weather Research Program established the PEOPLE project (Progressing EW4All Oriented to Partnerships and Local Engagement) to ensure that early warning systems are people-centred, inclusive, and effective at the local level.

The second Steering Group meeting of the PEOPLE project, to which the Bureau contributed, was held in Geneva from 10 to 12 June. The focus of the meeting was to refine the activities for the coming year around improving the design, reach and response to early warning systems. The Steering Group comprises representatives from the UK, Mexico, South Africa, Uganda, Japan, Philippines, Bangladesh, Australia and New Zealand, with diverse experience across meteorological and disaster response agencies, universities and research institutions.

Participation in the project helps the Bureau keep up to date with warning service innovation, influence future research agendas, contribute to the achievement of the EW4All initiative and strengthen collaboration across the weather research community.



The PEOPLE Steering Group at the WMO, including Bureau member Carla Mooney.

Exercising Australia's tsunami preparedness

The Bureau and its partners continue to enhance tsunami warning systems, processes and procedures through regular exercises and shared learnings. These efforts ensure Australia remains tsunami-ready, empowering emergency responders and the Australian community to act swiftly and appropriately to protect lives and build resilience in coastal communities.

In October, Australia participated in PacWave24, a biennial Pacific tsunami exercise coordinated by UNESCO's Intergovernmental Oceanographic Commission. The Bureau led the exercise, which tested the end-to-end Australian tsunami warning and emergency response system.

The scenario for the exercise was a magnitude 9.1 earthquake in the Puysegur Trench in the seabed of the Tasman Sea, south-west of New Zealand, that triggered simulated tsunami warnings for Australia's east coast and offshore islands. The Bureau's new Tsunami Observation and Simulation Terminal (TOAST) was deployed to assess threats and disseminate warnings (see p.78).

During the exercise, emergency services in Queensland, New South Wales, Victoria and Tasmania activated response plans, issued mock evacuation orders, and tested public messaging workflows. These coordinated actions during the exercise tested and confirmed the effectiveness of Australia's tsunami warning system, with only minor opportunities for improvement identified.

This capability and collaboration reflects the significant progress made by the Bureau and its partners since the devastating 2004 Indian Ocean tsunami claimed over 230,000 lives, which marked its 20th anniversary in December.

Partnering with the Victorian SES through highs and lows

The Bureau has a strong and enduring relationships with its State Emergency Service (SES) partners. The Bureau's role is to ensure each SES has the weather and flood intelligence needed to make important decisions that keep their staff, volunteers and the communities they serve safe.

This year, the Victorian SES celebrated 50 years of operations. The Bureau has worked alongside the Victorian SES over the decades, including 16 years with a Bureau meteorologist embedded within the SES operations centres to provide emergency managers with analysis and insights into weather systems capable of producing severe weather, including localised severe thunderstorms and heavy rain events that lead to flooding.



Victorian SES volunteers clear debris after a storm.

With severe weather systems being dynamic in their evolution, a critical aspect of the embedded staff's role is to communicate time sensitive updates to the SES so they can prepare and respond. The SES values this direct relationship and the support the Bureau provides with up-to-date weather intelligence 24 hours a day, 7 days a week.

Understanding customers' needs during flash flooding

The Bureau now has a better understanding of the use and flow of information during flash flooding events and community comprehension of that information, following the outcomes of a project funded by Natural Hazards Research Australia. Flash flood warnings are issued by state, territory and local governments. Their warnings and response strategies are informed by the Bureau's forecasts and severe weather warnings.

The project gauged emergency management and public understanding of predictions and the communication of uncertainties during flash flood events through:

- case-studies on the operation of the end-to-end warning service
- a survey of public and emergency management practitioner understanding, including comprehension of uncertainty terms and rainfall language.

The survey revealed that flash flooding is not well understood and that the current terminology used in forecasts and warnings is confusing. A consistent finding across the case-studies was the need to improve the flow of information to improve community safety.

The results of the project will help the Bureau and its partners in future warnings enhancements for flash flooding and support the design of educational campaigns.

Highlights and significant events

Strengthening tropical cyclone collaboration and knowledge-sharing

The 22nd Session of the World Meteorological Organization (WMO) Region V Tropical Cyclone Committee was hosted by the Bureau in Brisbane during July and August. Held annually, the meetings focus on cross-border coordination, real-time data sharing and updates to tropical cyclone name lists (a critical element with cyclones moving across areas of responsibility).



Bureau meteorologist David Grant with participants at the Region V Tropical Cyclone Committee meeting in Brisbane.

Representatives from 19 countries across the South Pacific and southeast Indian Ocean shared seasonal reports, discussed cyclone impacts, exchanged lessons learned from the past few tropical cyclone seasons, and outlined planned service improvements. These contributions foster a deeper understanding of regional challenges and opportunities.

The Bureau's participation in this international forum ensures its services remain responsive to the diverse needs of communities, and the evolving demands of emergency management, across Australia and the broader region. It also enables the Bureau to offer targeted support to other nations in the region, such as tropical cyclone analysis and forecast information for the Solomon Islands Meteorological Service, to assist them to provide timely and accurate warnings for their communities.

Partnering with the outdoor sector to strengthen weather readiness

In April, the Bureau partnered with the National Centre for Outdoor Risk and Readiness (NatCORR) to deliver 5 workshops aimed at strengthening weather related decision-making in the outdoor sector. Outdoor practitioners such as outdoor education teachers and tourism operators frequently take groups of people into high risk outdoor environments, so the value of their decision-making is high.

This initiative was informed by a survey undertaken by NatCORR in February 2024 developed with support from the Bureau's Social Science team, which identified how outdoor practitioners use weather information, highlighted capability gaps and revealed a clear demand for practical, tailored training in weather decision support, particularly in the face of increasingly extreme and unpredictable weather events.

The workshop content drew on diverse expertise from across the Bureau to address the real-world needs of the sector that were identified through contributions from NatCORR. A key feature of the workshops was the inclusion of state-specific case studies and scenarios to simulate real-life weather scenarios and encourage applied learnings from the day.

Participants from the outdoor sector were guided in:

- making weather observations
- accessing weather related information
- interpreting thresholds and warnings
- understanding natural hazards they may encounter.



Senior meteorologist Jonathan How presents at the Melbourne workshop.

The workshops were held in Brisbane, Melbourne, Canberra, Hobart and Perth, and were in high demand with most sessions at capacity. Feedback was overwhelmingly positive – 92% of attendees reported feeling greater confidence in using weather information to support safer decision-making and being more likely to use and recommend Bureau products and services.

Next steps

In 2025–26 the group intends to:

- uplift flood warning services by supporting the Flood Warning Infrastructure Network (FWIN) Program and the delivery of new and/or improved flood warning services, including the Melbourne Water flood service transition, supplementary flood services in New South Wales and Victoria and the southeast Queensland probabilistic flood forecasting service
- deliver the full capability of Australian Smoke Dispersion System to all states and territories, including the new national fire spread modelling capability
- further developing the Future Warnings Framework to support the delivery of a nationally consistent, multi-hazard, impact-based warning and alerting system for the Australian community.

Outcome 3: A valued, safe and inclusive workforce with a clear sense of purpose.

Achieving the outcome

Supporting the wellbeing of our frontline staff

Ahead of the 2024–25 higher risk weather season (October to April), the Bureau delivered a comprehensive, months-long program to support the wellbeing of frontline operations staff by providing education and fostering personal resilience strategies.

The program was delivered by the Bureau's Employee Assistance Program provider, Converge International, through 2 webinars and 3 workshops that focused on strategies for supporting mental wellbeing. This was supplemented with onsite support, where counsellors and psychologists were available in 9 Bureau offices across the country for face-to-face consultation. The onsite support involved 239 individual or small group sessions.

The program equipped staff with strategies to enhance their capacity during high stress events, and to shorten their recovery time after an event.

Delivering enhanced services through a new operating model

In late-2024 a project to refine the Decision Support Services (DSS) operating model was launched with the aim of enhancing role clarity and ensuring the program is well equipped to meet current and future customer needs. Over a 6-month period, opportunities to uplift duties, operations, processes and training were identified and potential solutions co-designed in collaboration with impacted staff. In May, a formal consultation process was carried out and proposed changes to rosters and roles were presented for staff and union feedback.

During the consultation period many unique pieces of feedback were received, each of which was considered and responded to. The collated input will help to shape the future direction of the project and ensure the success of the new operating model. The Bureau was thanked by staff and the union for the genuine approach it has taken to consultation and codesign in this change process.

Highlights and significant events

Inter-disciplinary collaboration towards reconciliation

In 2024–25, the Bureau's Decision Support Services team in Western Australia provided expert guidance to the Art Gallery of Western Australia's interactive exhibition FORECAST. FORECAST invited audiences to engage with climate instability through immersive and contemplative experiences. The innovative exhibition combined art with Indigenous and scientific perspectives on the environment to foster community connection – with one another and the environment – and encourage reflection on the complexities of environmental and climatic change.

The exhibition featured large-scale photo-montage works by artists Dianne Jones, a Ballardong Noongar woman, and Eva Fernandez, who is of Spanish heritage. Drawing on their personal family histories, the artists depicted intergenerational connections and forest landscapes, enabling gallery visitors to gain a deep understanding of environmental interdependence.

This collaboration was a great opportunity to explore creative avenues for engagement the Australian community and share scientific insights that complemented the exhibition's artistic and cultural narratives.



Bureau and Art Gallery of Western Australia staff at the launch of the FORECAST exhibition in May. The featured image in the background is 'When you pass through' the waters by Dianne Jones and Eva Fernandez as presented in FORECAST. Image credit: The Art Gallery of Western Australia, photo by Rift Photography.

Collaborating with the US National Weather Service on fire forecasting

In January, the Bureau hosted Heath Hockenberry and Julie Malingowski from the US National Weather Service (NWS) Fire Forecasting Hub in Boise, Idaho. The 2 Fire Program Managers oversee coordination and training of NWS Incident Meteorologists who attend wildfire control centres to produce detailed on-site forecasts.

Knowledge exchange across the week-long visit included a demonstration of the Bureau's fire services, verification practices, forecasting techniques and recent advances in fire-related research. Heath and Julie explained the NWS fire services, including insights on the recent catastrophic Los Angeles Fires and the NWS's tiered warning approach.

The visit was a great opportunity to discuss and promote NWS and Bureau collaboration and support, future fire weather services, and research. In particular, plans were instigated to collaborate with the NWS on the Bureau's ground-breaking work on the Pyrocumulonimbus Firepower Threshold, which quantifies the intensity a large fire requires before generating a fire-induced thunderstorm.

The Bureau is currently finalising plans for the first cohort of Australian meteorologist secondments to the US who will support the NWS's Boise and Reno offices during their peak season for 5 to 6 weeks, commencing August 2025. Initial planning is also underway for reciprocal support from the US for Australian operations in early 2026.



The Bureau's Fire weather program leads Bradley Santos (left) and Evan Morgan (third from left) with US National Weather Service representatives Heath Hockenberry and Julie Malingowski in Melbourne in January.

Next steps

In 2025–26 the group intends to:

- continue to foster a proactive safety culture and processes that focus on all aspects of fatigue, wellbeing and psychological safety of staff
- progress strategic leadership capabilities of our emerging leaders
- continue to enhance the group's diversity and inclusion and use of flexible working arrangements.

Business Solutions

Goal: To enable customers in the Bureau’s focus sectors to achieve their missions by supporting strategic decision-making and contributing to the prosperity, safety and security of those sectors and Australia.

The Business Solutions Group builds deeper, more focused, and systematic engagement with the Bureau’s customers and partners. Its goal is to deliver greater impact, innovation, quality and value in critical sectors including agriculture, aviation, land and maritime transport, energy, resources, national security, space, water and international development. The group is also responsible for activities to uplift Australia’s flood warning network infrastructure and for delivering the Bureau’s regulatory functions under the *Water Act 2007*.

For 2024–25, the group comprised 6 programs:

Program	Responsibilities
Agriculture and Water	• Deepening the Bureau’s relationships • Developing an in-depth understanding of each sector and needs • Delivering responsive, coordinated, world-class services.
Aviation, Land and Maritime Transport	
Energy and Resources	
Flood Warning Infrastructure Network	
International Development	
National Security and Space	

Throughout 2024–25, the group focused on delivering 3 outcomes in support of the Bureau’s strategy and purpose. The group’s achievement against these outcomes is outlined below.

Outcome 1: Sustained delivery of existing essential services and growth in our capacity to mobilise the Bureau’s capability to create impact and value by meeting customer needs.

Achieving the outcome

Delivering essential Aviation Meteorological Services

Throughout 2024–25, the Bureau delivered the essential suite of Aviation Meteorological Services agreed by industry and government.

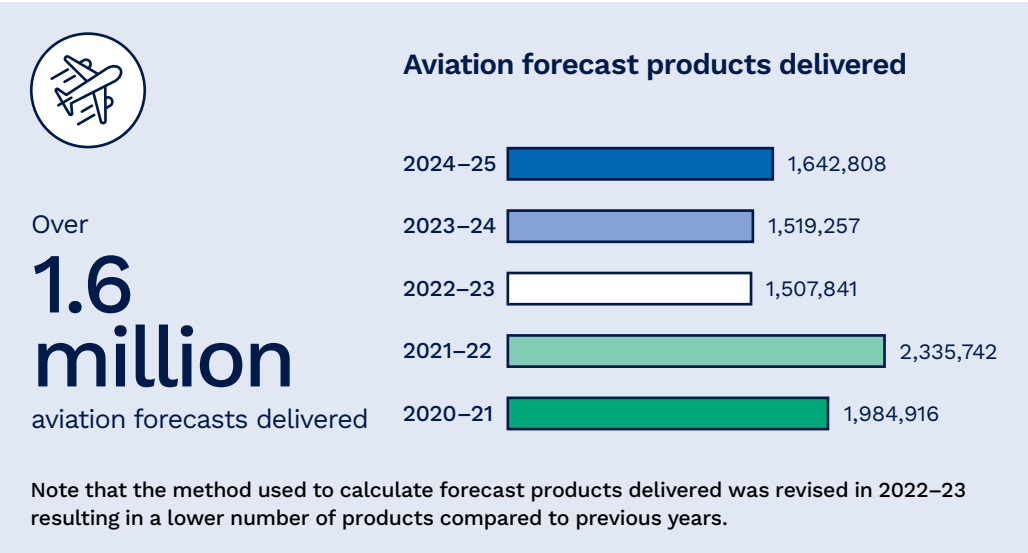
The Bureau’s goal is to support safe, efficient and resilient aviation operations by providing accurate, timely and relevant observations, forecasts, warnings and insights. Its aviation services are delivered across 4 streams:

- low-level aviation services (below 10,000 feet)

- hazardous weather services for enroute aviation including thunderstorms, volcanic ash, space weather and tropical cyclones
- Air Traffic Management
- airport operations.

The Bureau delivers this service by providing aviation-focused meteorological observations, meteorological forecasts and warnings, hazardous weather advisories, and climatological observations and forecasts.

The Bureau also provides research and development to strengthen its aviation services. It supports investigations into aviation weather-related incidents and accidents, delivers and enacts policy and standards pertaining to aviation meteorological services, and provides education, competency and training programs.



Advancing renewable energy capabilities for Australia’s resources sector

During 2024–25, the Bureau made significant advancements in translating research insights into practical and operational applications for the resources sector. The primary focus was to develop world-leading solar and wind nowcasting and forecasting technologies that are critical to supporting the sector’s net zero ambitions. Informed by industry insights, research was undertaken to tackle the major emerging scientific challenges facing the resources sector as it moves towards green energy sources and ambitious net zero goals.

The Bureau worked in partnership with leading sector organisations to support them in addressing their energy transition challenges through operational deployment of world-leading forecast technologies. A signature initiative was the development of a Solar Sensitivity Study which was designed to enhance the accuracy of solar nowcasting and satellite observations.

The Bureau will continue to actively explore further opportunities to expand and optimise solar observation networks, while also investigating the integration of machine learning and artificial intelligence into weather systems.

Supporting Australia's first controlled re-entry of spacecraft

The Australian Spaceflight Weather Service (ASWS) supported multiple controlled spacecraft re-entries during the year. These missions successfully returned spacecraft from low earth orbit to Earth, in a joint venture between Varda Space Industries, Rocket Lab and Southern Launch.

The first re-entry occurred on 28 February 2025, marking Australia's first commercial re-entry event. On 14 May 2025, Southern Launch successfully executed the second planned commercial re-entry of a spacecraft. Both capsules executed a safe, controlled landing at Southern Launch's Koonibba Test Range near Ceduna, South Australia.

The ASWS provided bespoke weather products to support Southern Launch's operations. With critical input from the Bureau, Southern Launch later confirmed it could estimate the touchdown point to within 3 km of the GPS location. The Bureau also facilitated an additional weather balloon launch from Ceduna, providing Southern Launch with important atmospheric data for post-flight reconstruction and validation of the re-entry trajectory.



The Winnebago-3 (W-3) capsule at Southern Launch's Koonibba Test Range on 14 May 2025. Image Credit: Southern Launch.

Supporting NBN Co through significant events

The Bureau played a pivotal role in NBN Co's emergency response to significant weather events during year. In March, the Bureau's flexible support and direct engagement enabled NBN Co's timely decision-making to inform field safety and enabled timely communications for communities affected by tropical cyclone Alfred. By tailoring briefings to operational needs, the Bureau enabled NBN Co's Emergency Management Team to focus on key impact areas, making a significant difference in the overall response effort.

During the NSW Mid North Coast Flooding in May, the Bureau provided timely forecasts and clear briefings that shaped NBN Co's emergency response. Close collaboration enabled informed decisions on safety warnings, resource deployment and planning. Flexible delivery of updates at short-notice was critical to managing rapidly changing conditions. NBN Co acknowledged the Bureau's professionalism and support during the event.

Supporting Australia's energy sector through tropical cyclone Alfred

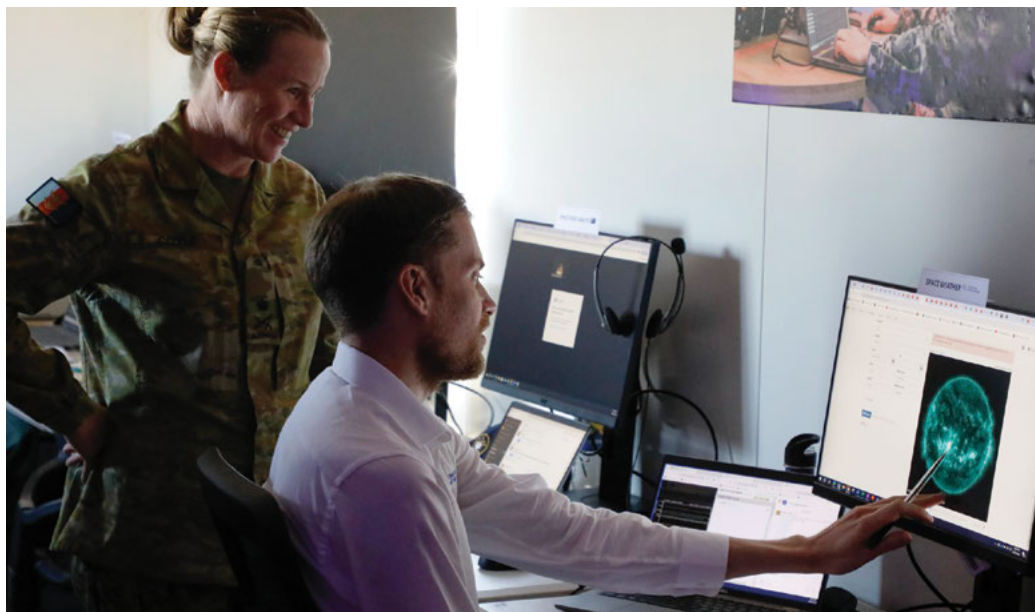
In February and March, the Bureau's Energy and Resources Decision Support Specialists worked closely with the Australian Energy Market Operator's (AEMO) operational forecasting team before, during and after tropical cyclone Alfred's crossing of the southeast Queensland coast. AEMO were concerned that strong winds could damage power lines and that flooding might make it difficult for their crews to access repair sites or even reach their operations centre in Brisbane. The Bureau shared the latest observations, forecasts and warnings with AEMO throughout the event, including providing advance notice of expected changes to official forecasts. The Bureau's interpretation and synthesis of relevant information enabled AEMO to make timely decisions with increased confidence.

Optimising Australia's electricity network

Dynamic Line Rating (DLR) is an operational practice used by electricity network businesses to adjust power flows through transmission lines to account for weather conditions. During 2024–25, the Bureau collaborated with Transmission Network Service Providers and key market bodies to understand their current capabilities and to develop a blueprint to implement DLR nationally. This project identified an opportunity to safely increase network capacity, which can lead to reduced network congestion, increased utilisation of the lowest cost power, and deferred investment in new transmission development. The Blueprint was completed in June.

Supporting Exercise Pitch Black

In July, the Australian Spaceflight Weather Service (ASWS) supported the Joint Commercial Operations (JCO) Pacific Cell by embedding a space weather forecaster directly into the operations floor in Darwin for Defence Exercise Pitch Black 2024. This integration enabled real-time delivery



Space Weather Forecaster Andrew Jackling explains details of solar activity to Australian Defence Force Chief of Joint Capabilities, Lieutenant General Susan Coyle, AM, CSC, DSM during her visit to the Air Force Space Command Operations Centre at RAAF Base Darwin during Exercise Pitch Black 24. Image Credit: Department of Defence.

of space weather information, enhancing the cell’s ability to monitor and interpret satellite behaviour, orbital shifts, and potential space-based threats.

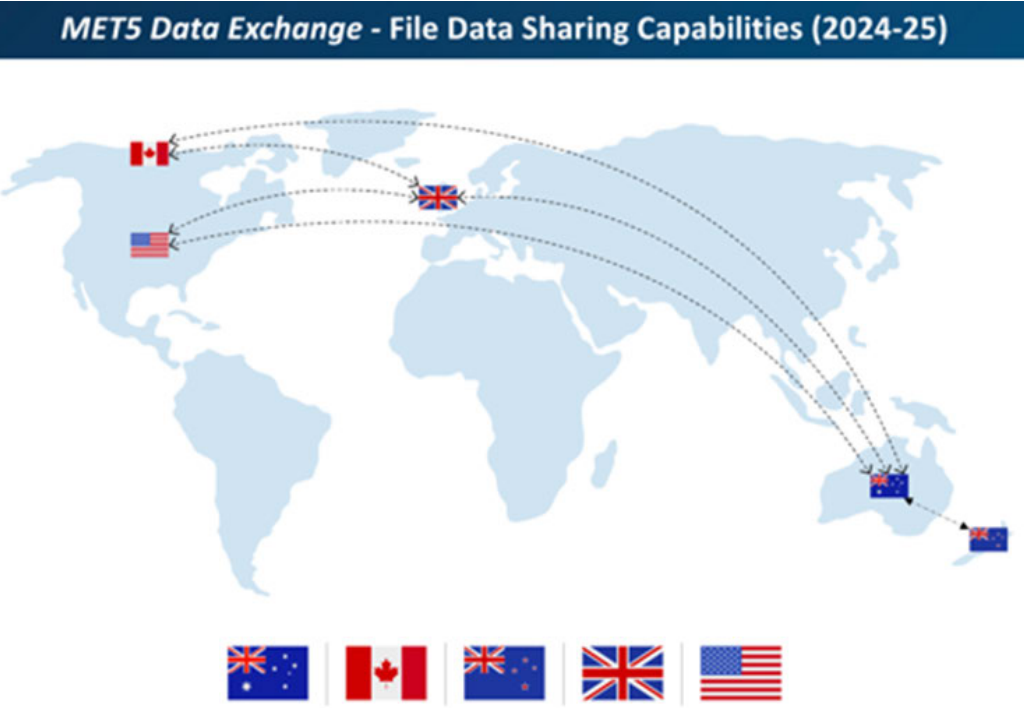
As part of the U.S. Space Force-led JCO initiative, the Pacific Cell operates under a ‘follow-the-Sun’ model, leveraging Australia’s geographic advantage to maintain continuous space domain awareness (SDA). ASWS’s on-site presence ensured that environmental space weather conditions – such as solar activity and geomagnetic disturbances – were factored into SDA assessments and JCO’s operational decisions during the exercise.

The ASWS maintains an ongoing service into the JCO, providing space weather intelligence to support its global network of space situational awareness and SDA activities.

Expanding the data exchange capabilities of the MET5

The Bureau’s work with the Meteorological Five Eyes (MET5) partnership highlights its global standing in the exchange of meteorological and oceanographic data to support Australia’s national security and defence activities, together with the Five Eyes nation partners of Canada, New Zealand, the United Kingdom and United States. In 2024–25, the Bureau led the development of the data exchange platform with its partners to significantly expand data sharing capabilities.

Australia and its Five Eyes partners used the data exchange to support their contributions to the world’s largest military maritime exercise, Rim of the Pacific, in early 2024–25. Bureau modelling data were used by Defence partners in forecasting environmental conditions to optimise the use of tactical radar systems, and by the US Air Force to trial new concepts in targeted local weather modelling for their field operations.



MET5 Sharing of Meteorological and Oceanographic Data.

Continuing to support Defence through Bluelink

In May, the Bureau, the Department of Defence and CSIRO signed a new Memorandum of Understanding to support long-term collaboration on the Bluelink ocean forecasting platform.

Bluelink is a significant and long-standing joint effort to better understand and predict ocean conditions and provide real-time ocean forecasts to support Defence operations. This collaboration has led to the development of the world's most accurate global ocean forecast system, predicting sea level and three-dimensional temperature, salinity and ocean currents.

In addition to servicing Defence, Bluelink forecasts are also available to other marine users, including maritime transport providers, the fishing industry and tourism operators, creating broader economic and social benefit to the community.

Bluelink is truly world-leading, with a next-generation data assimilation method that no other forecasting centre in the world has implemented. The Bluelink Global Ocean Science Team was recognised with the prestigious 2024 Department of Defence Eureka Prize for Outstanding Science in Safeguarding Australia.

Delivering products and services to support Defence aviation

The Bureau has a long history delivering meteorological, oceanographic and space weather intelligence to Defence. This support enables Defence's operational effectiveness and efficiency and reduces the risk to personnel and platforms posed by severe weather events.

The Bureau's Defence Weather Service (DWS) provides forecasting services and face-to-face briefings at 5 Royal Australian Air Force and 2 Army Aviation-managed bases. This face-to-face service enhances the ability of these units to achieve training and meet preparedness objectives, while operating safely.

The Bureau's DWS meteorologists form close relationships with the units they support, developing a deep understanding of their location, business needs and risks, to ensure their expertise is utilised to optimise Defence operations.

During 2024–25, the Bureau's DWS issued a total of 23,848 Aerodrome Forecasts, Route Forecasts, Military Area Forecasts and Aerodrome Warnings. Additionally, DWS conducted 3,272 military briefings and answered 2,076 military enquiries.



The Bureau's Urshla Connor briefing aircrew at RAAF Base Amberley.

Deploying weather and space weather expertise on military exercises

The National Security and Space Program's partnership with the Australian Defence Force (ADF) is underpinned at the tactical and operational level through the Bureau's Defence Weather Service and the Australian Space Weather Forecasting Centre. By providing critical environmental and space weather intelligence, the Bureau helps the ADF achieve an operational edge.

An important service to Defence is the Bureau's participation in exercises where environmental and space weather intelligence is injected into exercises to simulate real-world events and challenges. The exercises practice planning and military operations, improving combat readiness and interoperability between Australian forces and their partners.

During 2024–25, the Bureau supported 14 military exercises, including several public events such as the Gold Coast Airshow, Avalon Airshow, Warbirds Downunder Airshow (Temora), and Riverfire (Brisbane). The team also supported military relief efforts during the floods in Townsville in February and tropical cyclone Alfred in March.



Two Australian Army CH-47F Chinook helicopters from 5th Aviation Regiment provide assistance during the North Queensland floods in 2025. Image credit: Department of Defence.

Supporting Western Queensland producers during severe weather

In late March, the Bureau's Agriculture team provided timely support to primary producers in western Queensland ahead of forecast severe weather. The team issued targeted email alerts to contacts across producer and advisory organisations detailing expected rainfall and flood conditions. Recipients forwarded the advice to producers in their networks. These alerts enabled producers to take early action, including relocating livestock and implementing other risk mitigation measures. The Bureau also contributed to the recovery effort by briefing the Queensland Agriculture Recovery Taskforce. Bureau forecasts supported the coordination of aerial fodder drops for stranded livestock. Feedback from the sector was positive, highlighting the value of targeted, timely and accurate information.

Highlights and significant events

Supporting Australian aviation during tropical cyclone Alfred

In addition to the provision of routine services supporting the aviation industry, the Bureau provides emergency support to the aviation industry during major events. This support ranges from providing emergency forecasts to support search and rescue activities and aerial evacuations, to the provision of expert advice in relation to critical infrastructure across airport and airline operations.

Embedded in Airservices Australia's National Operations Management Centre, the Bureau's aviation meteorologists provide bespoke analysis and forecasts to enhance the efficiency of aircraft movements both in the sky and on the ground. Our meteorologists provided decision support services for Airservices Australia during major events such as tropical cyclone Alfred.

The embedded meteorologists played a key role in enabling Airservices Australia and the wider aviation industry to maintain situational awareness and assess potential impacts to national aviation operations. This information fed into assessments of the impacts of tropical cyclone Alfred on aviation-related infrastructure, and the ability to provide ongoing aviation services to the community. The decision support function provided by the Bureau enabled Airservices to effectively engage with their customers including airline and airport operators throughout the event. Impacts to services were minimised through the ability to scale decision support services to meet the dynamic needs of the event.



Gold Coast Airport terminal during tropical cyclone Alfred. Image credit: Australian Federal Police.

Protecting aircraft, passengers and crew from volcanic ash impacts

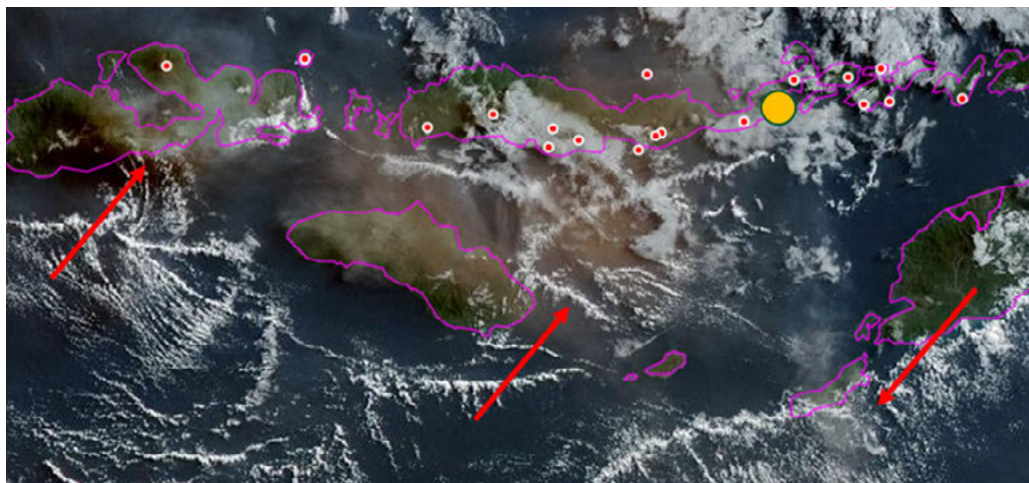
The Bureau's Volcanic Ash Advisory Centre (VAAC Darwin) provides advice to the aviation industry about the location and movement of potentially hazardous volcanic ash. Operating from Melbourne, VAAC Darwin is staffed by meteorologists who are specially trained to detect and forecast the movement of volcanic ash, which is a known aviation hazard.

The VAAC Darwin is responsible for the area that covers the active volcanic regions of Indonesia, Papua New Guinea and the southern Philippines, and extends southwards to the pole.

During the year, 15 different volcanoes produced volcanic ash eruptions, compared to eruptions at 21 different volcanoes during 2023–24. In 2024–25, VAAC Darwin issued 6,139 volcanic ash advisories (compared to the annual average across 2015–2025 of 3,180 advisories).

This included advisories for multiple high impact events, which generally have discernible or visible ash that is impacting or expected to impact aircraft at cruising levels or international aerodromes.

High impact events on 4 November 2024, 21 March and 17 June 2025 were associated with Lewotobi Laki-laki located on the island of Flores in Indonesia. The events impacted Indonesia's island of Bali and Denpasar International airport, which is approximately 830km west of the volcano.



Himawari-8 visible satellite imagery at 17 June at 2330 UTC (18 June at 09:30am AEST) of the Lewotobi Laki-laki eruption where the orange dot is the volcano location and red arrows are pointing to volcanic ash. Imagery courtesy of the Japan Meteorological Agency.

Supporting the future of Pacific food security

Pacific Island Countries (PICs) are on the front line of climate-driven food insecurity. Food systems in larger PICs such as Fiji, already shaped by geographic isolation, are increasingly reliant on cheap imported food due to population increase and urbanisation. Smaller PICs battle sea level rise, increased soil salinity and other climate challenges which make growing food domestically more challenging and less reliable, all of which leads to micro-nutrient deficiencies, malnutrition, and a range of preventable non-communicable diseases. Amid these disruptions, there are calls for communities to return to local crops and smallholder farming as sources of strength and resilience.

During the year, the Bureau's Agriculture team worked with the Department of Foreign Affairs and Trade, CSIRO, local organisations and the Pacific Community (SPC) on the Pacific vision for Adapted Crops and Soils, a program that forms part of a worldwide movement to help improve food security through research and support for neglected and underutilised crops such as breadfruit, cassava and pandanus.

In April, members of the Bureau's Agriculture team travelled to Fiji for a inception workshop with SPC to chart a way forward for the program over the next 2 years, starting with a review of existing research and mapping of complimentary programs across the region. This work will continue in 2025–26.

Building farm business resilience through the Climate Services for Agriculture project

During late 2024, significant progress was made in partnership with CSIRO to enhance climate resilience and engagement across northern Australia. The Bureau collaborated with Tropical North Queensland Drought Hub, the Farm Business Resilience Program, and the CSIRO social science team to develop a training program for Farm Business Resilience Program facilitators. These facilitators work closely with farmers and are well placed to use My Climate View to support long term farm business planning.

A demonstration video for My Climate View was produced to support national outreach, while a successful pilot First Nations co-design workshop occurred in Darwin. This marked the beginning of a series of ongoing climate workshops with First Nations communities across the region.

Key governance processes, including First Nations engagement ethics and Indigenous Cultural and Intellectual Property protocols, were further refined. A comprehensive communications and engagement plan, including detailed stakeholder mapping, was submitted to the Department of Agriculture, Fisheries and Forestry. Additionally, a First Nations engagement report and user experience design concepts were developed to guide future engagement and inform potential product development.



Image from the My Climate View summary video.

Next steps

In 2025–26 the group intends to:

- continue to deliver essential suite of aviation meteorological services, including volcanic ash advisory services
- grow sector awareness of space weather risks and impacts
- continue to deliver critical weather and climate services to support Australia's national security and prosperity.

Outcome 2: Flagship projects delivered on time and on budget to achieve planned impact and value.

Achieving the outcome

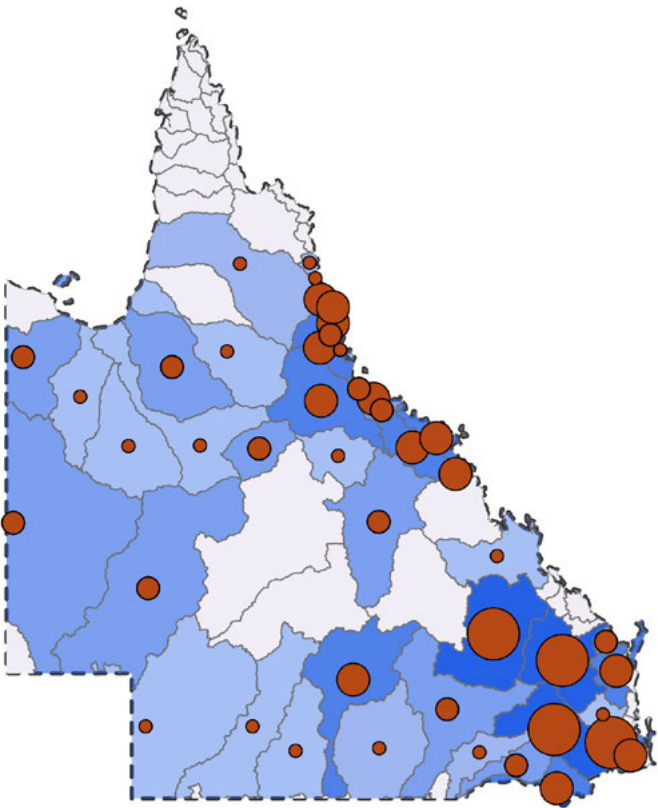
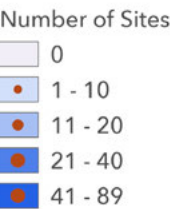
Upgrading Australia’s flood warning infrastructure

In 2024–25, the Bureau continued to lead the \$236 million national Flood Warning Infrastructure Network (FWIN) Program to upgrade Australia’s flood warning infrastructure and improve community access to rain and river level observations. The program also supports improved flood forecasts and warnings to support disaster preparedness, response and recovery. FWIN is on schedule, achieving key milestones on time and within budget.

In Queensland, the Bureau negotiated the inclusion of approximately 830 (of the expected 1,100) flood warning sites with the current owners, with 153 sites being formally transferred to the Bureau. Remediation commenced at 7 sites in the Cairns, Townsville and Bundaberg local government areas. This included piloting an innovative design to retrofit existing rain gauges with contemporary communication systems.

Detailed site prioritisation was completed for New South Wales, with the initial program of work announced in June, identifying 141 of the 258 sites agreed to form part of the program, as well as specifying the first 30 sites for remediation in 2025–26.

Flood Warning Infrastructure Network Program - Queensland



Map showing the location of sites in Queensland accepted for the FWIN Program.

Enhancing Pacific climate data and forecast services

The Bureau migrated 12 climate data management systems to fully managed cloud instances to maintain operations for 15 Pacific partner countries. Enhanced quality control visualisations and historic data ingestion were also deployed. Parallel upgrades to Pacific ACCESS-S added real-time forecast verification and inverse-barometer sea-level outlooks. More than 180 people gained new skills through national, regional and virtual training, strengthening the capacity of Pacific national meteorological and hydrological services to turn quality data into actionable climate services.

Supporting our Pacific neighbours to elevate aviation safety

In 2024–25, the Bureau supported 2 of its Pacific neighbours in strengthening their meteorological observation capabilities to enhance the safety and efficiency of air travel in the region. Reliable weather observations are essential for providing accurate weather forecasts, reducing the risk of weather-related incidents and enhancing operational resilience in one of the world's most isolated airspaces.

In a significant leap forward for aviation safety, Tuvalu launched a state-of-the-art aviation weather station in October that is already making skies safer for pilots navigating this remote island nation. The station was built by the Tuvalu Meteorological Service with support from the Bureau under the Australian aid funded Partnerships for Aviation initiative, and is equipped to provide real-time monitoring of cloud cover, wind speed, temperature, humidity, and atmospheric pressure.

The Bureau also provided technical guidance and support to the Vanuatu Meteorology and Geo-Hazards Department to successfully restore the Vanuatu Upper Air Sounding Station in December, after a 10-year pause following significant damage to the station inflicted by tropical cyclone Pam. This station collects pressure, temperature, and wind data at various altitudes using radiosondes attached to balloons.



Tuvalu's new aviation weather station located at Funafuti Aerodrome which includes (from left to right) the thunderstorm sensor, cloud sensor, present weather sensor and rain gauge.

Highlights and significant events

Building community resilience in remote Australia

For many remote communities, airstrips serve as the sole means of transport when flooding cuts off road access for extended periods. With increased heavy rainfall events being experienced and predicted into the future, safe access to remote airstrips is essential. In 2024–25, the Bureau conducted a climate vulnerability assessment of remote airstrips across the Kimberley, Pilbara, Gascoyne and Goldfields regions to support the Aboriginal Community Airstrips Renewal Program, led by the Western Australian Department of Transport.

The focus of the assessment was to provide evidence-based information on the vulnerability of 32 remote airstrips to flooding, so that remote and isolated communities continue to have access to essential goods and services. Given the limited flood observation networks across remote regions in Western Australia, the Bureau used rainfall as a proxy for flood risk by establishing relationships between flooding and trigger rainfall to infer potential future flooding events. The findings give insight into the likely rainfall and potential flooding regime, recognising there are unique challenges and needs specific to each region that need to be considered. The project highlighted the complexity for translating climate science into actionable insights for local decision-making needs.



The Fitzroy Crossing airstrip during the January floods. Image credit: Shoal Air.

Reducing the cost of severe weather in the Pacific

In March, the Australian Government signed an arrangement with the Secretariate of the Pacific Regional Environment Program to support and fund the flagship Weather Ready Pacific Decadal Programme of Investment. A culmination of many years of planning, the arrangement's objective is to reduce the human and economic cost of severe weather events across the Pacific. Importantly, the agreement is Pacific led and owned, representing the new way in which the Bureau will partner and collaborate with Pacific nations.

The Bureau is the Australian Government technical agency and advisor to the Weather Ready Pacific Programme. One of the programme’s early successes has been the graduation of 3 staff from the Samoa Meteorological Agency in the Bureau-delivered Graduate Diploma in Meteorology, developing the next generations of forecasters. The Bureau is also supporting the Pacific to establish their own World Meteorological Organization designated training centre and Pacific training capability for long-term sustainability and resilience.



Sepi Gafa (Samoa Meteorological Agency) receiving a Graduate Diploma in Meteorology from Mitzi Wotton, Principal of the Bureau of Meteorology Training Centre.

Applying early warnings to water management in the Cook Islands

The Climate and Oceans Support Program in the Pacific (COSPPac) is helping Pacific Island countries translate seasonal forecasts into sector-specific early action. In the Cook Islands, the COSPPac-developed Early Action Rainfall (EAR) Watch has become a central component of drought preparedness and response planning across several sectors.

In 2024–25, the Cook Islands Meteorological Service (CIMS) worked in partnership with To Tatou Vai (the national water utility) and the Bureau to co-develop and embed EAR Watch as an early warning system for water supply management. This tailored product has transformed the role of CIMS from weather service to operational partner. The EAR Watch is now embedded in the national drought plan and aligned with catchment-specific thresholds to support day-to-day decisions and long-term planning.

The benefits extend beyond government. In partnership with the Cook Islands Red Cross, EAR Watch is also used to inform community-based action plans. Training and workshops supported by the Bureau helped embed drought preparedness into local routines, from installing water tanks



Fine Arnold, Secretary General of the Cook Islands Red Cross Society, and Rebecca McNaught collaborate with Cook Island workshop participants to develop community-based action plans using EAR Watch triggers.

to launching inclusive awareness campaigns.

COSPPac's approach of co-designing locally relevant services ensures that climate information is not just shared, it is used. Through the EAR Watch, communities and agencies across the Cook Islands are better equipped to anticipate drought risks and take proactive steps to safeguard lives and livelihoods.

Next steps

In 2025–26 the group intends to:

- continue flood warning infrastructure upgrades by:
 - acquiring sites in New South Wales and additional sites in Queensland
 - remediating and maintaining sites in Queensland
 - prioritising sites in Victoria
- support the ongoing transition of Weather Ready Pacific strategic leadership to the region
- implement the Bureau's Energy Sector Services plan.

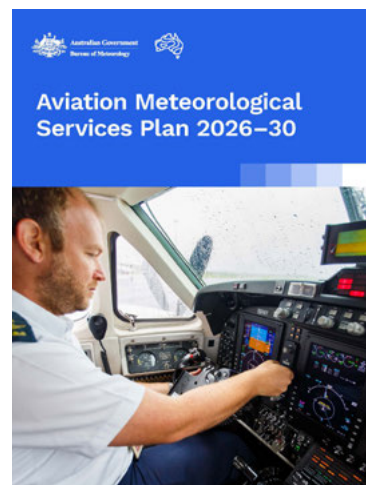
Outcome 3: Secured and expanded our flagship projects to ensure we grow the path to impact and value.

Achieving the outcome

Gaining industry endorsement of the Bureau's future aviation services

The Bureau regularly consults with all levels of the aviation industry to ensure the ongoing value of its essential aviation meteorological services. In 2024–25, the Bureau reviewed and revised its consultation and governance approach with the aviation industry, resulting in the commencement of an Aviation Meteorological Services Strategic Advisory Group.

The advisory group, which comprises senior industry representatives, endorsed the Bureau's Aviation Meteorological Services Plan 2026–2030. The plan defines an investment pathway, in the form of 13 service modernisation initiatives, to meet the changing regulatory environment and the operational needs of all segments within the aviation industry. Implementation of these initiatives over the next 4 years will deliver an uplift in the services provided to all industry users, enhancing the safety, efficiency and resiliency of the air transport ecosystem.



The cover of the Aviation Meteorological Services Plan 2026–30.

Operational excellence in the delivery of aviation services

The Bureau's delivery of essential aviation meteorological services must be certified against ISO9001:2015. The certification requires the Bureau to demonstrate continual improvement activities supporting better outcomes for the aviation industry. The maintenance and enhancement of ISO 9001:2015 certification ensures the Quality Management System not only provides assurance but is leveraged as a driver of value and decision-making.

In 2024–25, the Bureau improved its aviation meteorological service provision by more closely aligning it against requirements outlined by the International Civil Aviation Organisation (ICAO). This enhancement has also focused on embedding risk-based thinking into everyday processes, helping the Bureau better integrate lessons learned and opportunity identification into business-as-usual activities. This governance-focused capability directly supports the sustained delivery of essential services, while also positioning the Bureau to grow its future impact through improved quality, compliance, and customer confidence.

A new partnership with the Solomon Islands

Australia and the Solomon Islands have agreed to collaborate through a meteorological twinning arrangement. The partnership focuses on enhancing weather and climate technical capabilities of the Solomon Islands. Under the partnership the Bureau will be supporting the development and enhancement of meteorological infrastructure, ensuring the Solomon Islands has the physical resources needed for accurate and timely weather forecasting.

The Bureau will also be providing capacity-building opportunities and training programs for meteorological staff. This will help to equip them with the skills and knowledge to effectively utilise the infrastructure and manage weather-related challenges. These efforts will extend to strengthening technological systems and people processes to improve operational resilience.

This targeted approach aims to enhance the Solomon Islands' ability to better forecast, withstand and respond to weather events. Overall, this arrangement represents a significant step forward in international collaboration and strengthening of meteorological capabilities in the region.

Enhancing our National Water Reporting framework and indicators

The Bureau's Urban National Performance Report (NPR) framework provides an annual, independent benchmark of pricing and service quality of Australian urban water and wastewater service providers. It plays a key role in urban water performance. Through a range of indicators, the framework enables comparison between providers and helps identify innovation and improvement opportunities.

Under the guidance of the water industry, the Bureau is progressively expanding the NPR framework to enhance transparency and build public confidence in the performance of water utilities. In 2024–25, the Bureau successfully updated the reporting handbook, upgraded its database to support revised indicators and expanded the framework to include smaller service providers. These changes allow the Bureau to incorporate data from about 300 service providers across the country, up from 86 providers previously.

These changes will strengthen national water data, which can support international reporting obligations, such as those related to the Sustainable Development Goals (see p.191) – and help address water security challenges due to climate change.

Next steps

In 2025–26 the group intends to:

- deliver capability improvement projects in line with the Aviation Meteorological Services Plan 2026–2030
- deliver flagship projects such as Climate Services for Agriculture 2
- support development of a new National Water Agreement.

Data and Digital

Goal: To provide our customers and colleagues an outstanding experience all day, every day.

The Data and Digital Group (DDG) is responsible for the Bureau’s data, observation and information technology that underpins the Bureau’s core operations through to production and dissemination to customers. The group’s focus is to efficiently manage service-focused, secure, resilient and adaptive information and observations technology portfolios that leverage emerging technologies and data, enabling the Bureau to deliver services and products.

For 2024–25 the group consisted of 6 programs:

Program	Responsibilities
Planning and Architecture	• Technology policies and standards • DDG planning uplift • Demand and pipeline management • Enterprise architecture.
Observing Systems and Operations	• Operation of the observing network • Observations planning and delivery • Maintenance and sustainment of the network.
Data	• Data governance, advice and standards • Data management and services • Data requirements and quality • Managing data partnerships.
Digital Channels and Customer Experience Design	• Customer research, user design and prototyping • Digital channel development and operations • Digital customer analytics • Service delivery management.
Application Services	• Delivery and support of ICT applications and platforms • Digital workplace and application lifecycle services • Testing and quality assurance • DevSecOps (Development, Security, and Operations) • Geospatial systems.
Service and Infrastructure Management	• Reliable and secure ICT operations • High-performing computing • ICT support services • Cyber operations.

Throughout 2024–25, the group focused on delivering 4 outcomes that support the achievement of the Bureau’s strategy and purpose. The group’s achievement in delivering each of these outcomes is discussed below.

Outcome 1: Strengthen our customer focus by working with our colleagues who engage with customers.

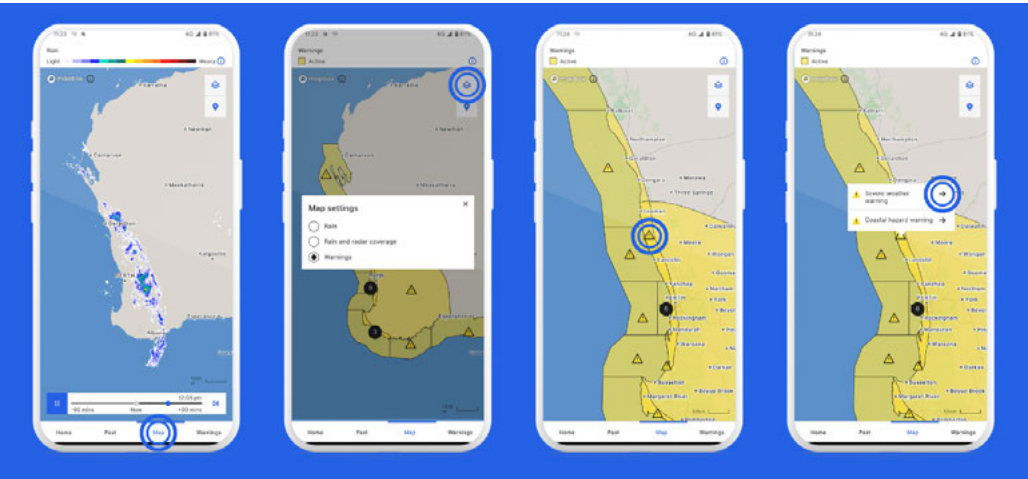
Achieving the outcome

Continuing to enhance the BOM Weather app

In December, 2 significant updates were made to the Bureau’s BOM Weather app.

A new feature was added to enable customers to view warnings visually on the map rather than seeking the content via one location.

An acknowledgement of Country feature was also added to the app, aligning with the Bureau’s new website and its commitment in the new Reconciliation Action Plan (see p.142).



Screenshots of the steps to enable and view the warnings map layer in the BOM Weather app.

Enhancing our meteorological visualisation and processing systems

In 2024–25, the Bureau completed several upgrades to its Visual Weather systems, which are used by forecasters to display maps of numerical model output and real-time weather data.

In July, over 220 Visual Weather workstations and 27 servers used by the Bureau’s Community Services Group were upgraded with the latest software for smooth and efficient forecaster operations. In August, over 40 Visual Weather workstations and 9 servers used across the Bureau’s aviation services were upgraded with the latest software, significantly improving operational capabilities.

Boosting weather observation infrastructure for the aviation sector

In 2024–25, the Bureau strengthened aviation safety and resilience by installing back-up automatic weather stations at Hobart and Darwin airports. Additionally, 27 Centralised Automated Weather Information Broadcast units were deployed at regional airports, providing pilots with real-time weather updates specific to the location.

To further improve safety near runways and taxiways, the Bureau began installing frangible (fibreglass) anemometer masts. These structures are designed to break upon impact and therefore reduce risks to aircraft and personnel while offering greater flexibility in site selection, ensuring compliance with aviation safety standards.

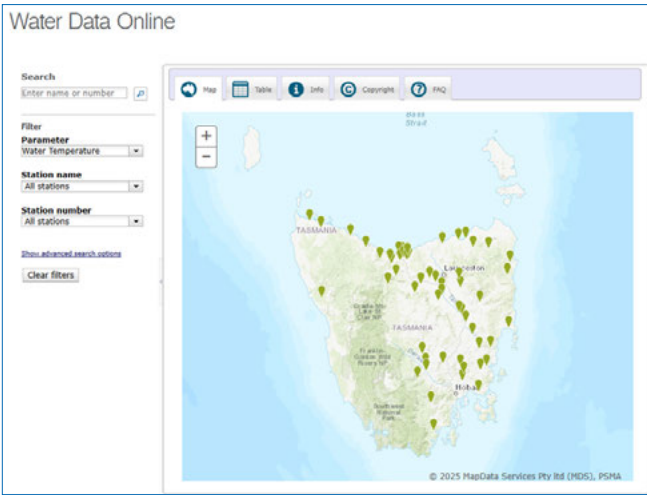


The backup automatic weather stations at Darwin airport.

Completing national coverage of surface water data

The Bureau’s Data Program fulfills a critical role in collecting, holding, managing and disseminating many categories of Australia’s water information. As part of this responsibility, Tasmanian surface water quality data was published in the Water Data Online portal in November, completing national coverage of surface water quality data available on the portal.

Water quality data includes electrical conductivity, water temperature, acidity pH and turbidity. This data supports external water customers and partners to understand what water resources can be used for and how to manage them effectively.



Screenshot of the Water Data Online portal showing water quality data for Tasmania.

Enhancing the discoverability of the Bureau’s data

During the year, the Bureau added metadata for 89 records to the Australian Government Data Catalogue, a new centralised, searchable repository that allows users to discover metadata records of data held by various government agencies.

The additions ensure the Bureau’s data is more discoverable and has opened up another pathway for Australians to find the Bureau’s data and derive value from it.

Enhancing trust in our data with ISO 17025 accreditation

In May, the Bureau achieved ISO/IEC 17025 Accreditation for Electrical Metrology from the National Association of Testing Authorities, following the successful development of an automated calibration system by the Standards and Metrology Laboratory. This system tests automatic weather station data acquisition cards under an exhaustive range of simulated environmental conditions from -30°C to +60°C, ensuring performance under real-world extremes faced across Australia and our territories.

Developed through multiple design iterations, the capability meets stringent customer requirements and delivers consistent and reliable measurement outcomes. It supports the Bureau's commitment to achieving consistent uncertainty in calibration processes, aligned with international standards, and enhances the reliability of national observation systems.

The accreditation strengthens trust in the Bureau's observations and scientific outputs, setting a benchmark for future capability development and reflecting the highest standards in electrical calibration.

Highlights and significant events

Maintaining operations during and after tropical cyclone Alfred

In March, the Bureau's Observing Systems and Operations Program rapidly established a rostered 24/7 flood network monitoring function in response to tropical cyclone Alfred and resulting flooding in southern Queensland and northern New South Wales.

It was an exceptional example of cross-Bureau collaboration, drawing in staff from several teams to ensure forecasters and the emergency services could continue to access reliable flood data. The Bureau's flood warning network maintained reliability despite daily rainfall totals in the region exceeding 100 mm and gale force winds. Post-event, technical staff quickly pivoted to their field work while navigating flooded roads and power outages.

The Application Services Program, in coordination with other teams across the Bureau, mobilised to prepare contingency plans in the event of an impact to the Bureau's infrastructure in Brisbane. Additional support staff were placed on standby to provide critical support including after hours and over the weekend. Fortunately, the Brisbane office remained unaffected, and continuity of all critical functions was maintained.



Flooding closed the road to the Mt Stapylton radar following tropical cyclone Alfred in March.

Next steps

In 2025–26 the group intends to:

- launch and continue to enhance the new website in collaboration with other Bureau groups
- continue to enhance the BOM Weather app based on customer feedback and the Bureau’s Digital Channels Roadmap.

Outcome 2: Ensure resilient, trusted and secure services delivered through sustainable and reliable IT, OT and data operations.

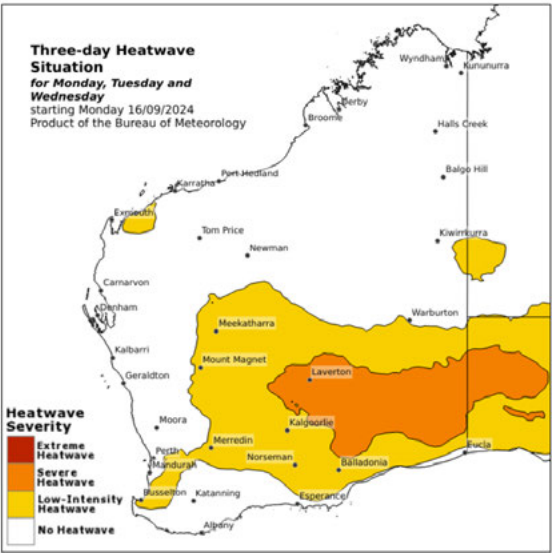
Achieving the outcome

Testing system readiness ahead of the higher risk weather season

Through extensive enterprise collaboration, the Bureau successfully completed the annual end-to-end severe weather testing for its heatwave and tropical cyclone systems in September and October.

These exercises successfully validated critical workflows and system integrations and ensured the Bureau was well-prepared to deliver seamless, efficient, and resilient services to Australian communities ahead of the start of the heatwave and tropical cyclone seasons in October and November respectively. These reliable and well-supported applications were critical in managing extreme events during one of the warmest and most active cyclone seasons on record.

The Bureau also delivered enhancements to the 7-day tropical cyclone outlook based on feedback from the Australian community and emergency services, in preparation for the start of the higher risk weather season.



Comprehensive testing of heatwave products occurs each September, before the start of the warm season. This image was produced for a test Severe Heatwave event in Western Australia.

Enhancing our Enterprise Integration Platform

The Bureau’s Enterprise Integration Platform (EIP) is a modern integration solution that was operationalised in November 2023 under the ROBUST Program. As a Category 1 system, EIP is critical to the Bureau’s operations and is supported 24/7 by the Bureau and its external delivery partner. The platform is a cornerstone of the Bureau’s digital transformation strategy, enabling future asset remediation projects and significantly improving the Bureau’s ability to deliver reliable, secure, and high-performing data services.

In February, the Bureau implemented a series of enhancements to the alerting platform, aimed at improving system reliability and reducing unnecessary after-hours escalations. Key improvements included the suppression of non-critical alerts, elimination of false positives, and clearer

visibility into system status during scheduled maintenance windows. These changes form part of the Bureau's ongoing service delivery uplift, focused on strengthening system resilience and addressing technical debt.

Continuing to improve the Bureau's observing systems

The Bureau undertook a range of activities to enhance the security, stability and resilience of its observing network during the year. The new Karratha radar went live in October, replacing the Dampier radar which was significantly damaged by severe tropical cyclone Damien in February 2020. The upgraded radar delivers higher-quality imagery during heavy rain and storms, enhancing image resolution to better differentiate between rain and hail. Installation of the Townsville radar was completed in November.

Automatic weather stations (AWS) were installed on the ships *MV Goliath*, *CSL Resilience* and *OOCL Houston* during the year. Shipborne AWS contribute to the Australian Voluntary Observer Fleet and are part of a global network of ship observations that underpin the Bureau's marine forecasts and warning services. These installations provide a significant uplift with observations now transmitted hourly, building on the crews' up to 20-year manual observation record. The installation also improves the quality of various parameters through the addition of high quality sensors for measuring wind speed/direction and sea surface temperature.

AWS were also successfully installed under the AWS Replacement Project with a critical milestone met in June with all 10 pilot site installations now in place.



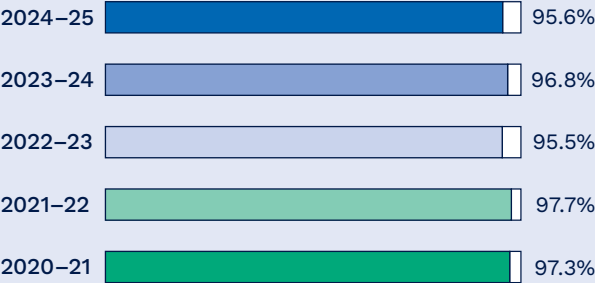
The new Karratha radar was installed in October.



Real-time radar data coverage was available for

95.6% of the year

Uptime of the Bureau's radar network



In October, Hobart Airport became the first of 7 capital city airports to be fully automated under the Bureau's Automation of Capital City Airports (ACCA) project. The ACCA project continues the work of delivering the Bureau's objectives to transition its observing investment and effort through automation.

Streamlining data storage and archival practices

In March, a new Warm Storage and Cold Archive system went live to enhance the Bureau's data management and compliance with the *Archives Act 1983*. This system streamlines how data on the Bureau's new Beta test website is stored, accessed, and archived, improving operational resilience and data discoverability. By leveraging modern cloud-based archival platforms, users benefit from faster, self-service access to data, reduced reliance on advanced retrieval scripts, and more efficient storage and responsiveness to external requests for historical data.

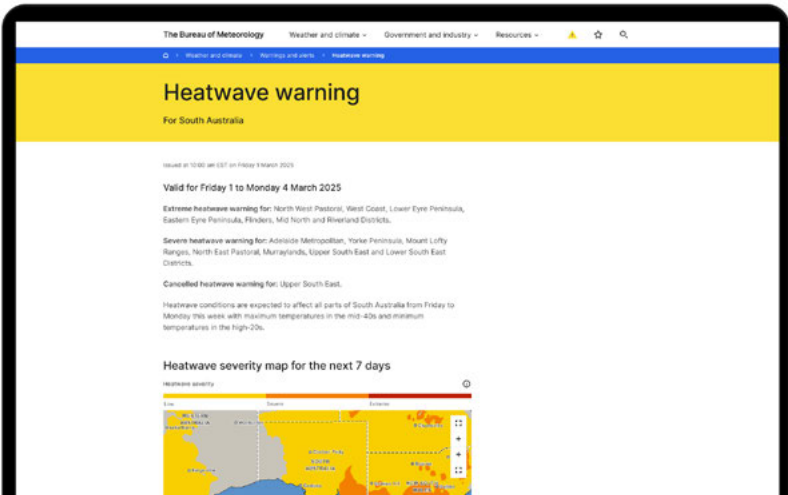
Continuing development of our new website

Development and testing of the Bureau's new website continued during 2024–25. Following the release of the test website beta.bom.gov.au in June 2024, the test website operated in parallel with the Bureau's existing website throughout the year.

Since the release of the Beta test website, the Bureau has received over 13,000 items of community feedback through the website's customer satisfaction (CSAT) survey. The community response to the Beta test website has been very positive, with the CSAT score (the percentage of survey respondents who reported being satisfied or very satisfied with their experience on the test website) continuing its upward trend from 69.6% in July 2024 to 77.3% at 30 June 2025.

In 2024–25, there were 7 incremental releases made to the Beta test website to publish new features, improvements and defect fixes. Significant changes included:

- updates to the rain radar images to provide more detailed radar information and better definition of small but intense rainfall
- updates to warnings, including the addition of heatwave warnings
- addition of new weather map forecast layers
- updates to flood warning products
- addition of tropical cyclone forecast track maps and past weather map layer.



Screenshot a heatwave warning on the Bureau's Beta test website.

The Bureau's new website is expected to be launched for the 2025–26 higher risk weather season once performance testing is completed. The Bureau is committed to delivering a secure, stable and resilient website that meets the needs of 90% of website traffic (visits) and provides essential public safety information.

Improving the security and resilience of our ionosonde network

During the year the Bureau's Ionosondes Upgrade project improved the security and resilience of the ionosonde network which services civil, aviation and defence high frequency radio communications. An ionosonde is a high frequency radar system used to monitor the ionosphere – the part of the Earth's atmosphere that forms a boundary between the lower atmosphere where we live and breathe and the vacuum of space. The new 6A ionosonde at Casey Station went live in September and new battery systems were installed throughout the network at Learmonth, Perth, Darwin, Townsville, Norfolk Island and Niue. The project also completed go live for 6A ionosondes at Norfolk Island and Mawson Station in October and November respectively following successful data comparisons by the Bureau's Space Weather Forecasting team.

Migrating our Central Message Switching System

The Central Message Switching System (CMSS) is the Bureau's primary real-time message switching system, designed to ingest raw meteorological observations, text data, binary data, and file data. Ingested data is decoded and stored into the Bureau's Oracle database. CMSS also switches ingested data to the Bureau's state and territory offices and web servers, as well as to external organisations, both in Australia and internationally.

As part of the Data Centre Consolidation Program, this critical core system was moved to the Bureau's new Eastern Data Centre in November, without causing any disruptions to the day-to-day operations of the Bureau.

Highlights and significant events

Restoring tsunami detection stations in the Tasman Sea

Deep ocean tsunami observation stations within the Australian Tsunami Warning System (ATWS) perform a vital role in the early detection and real-time reporting of tsunamis before reaching land. The ATWS deep ocean network consists of 6 stations deployed as pairs in proximity to tectonic plate subduction zones in the Indian Ocean, Coral Sea and Tasman Sea.



Left: Previous ocean bottom sensor being recovered. **Right:** New replacement buoy deployed late-May 2025.

In February and May, the Bureau restored 2 tsunami detection stations in close succession to address a dual station outage in the Tasman Sea. In April 2024, 1 of the 2 stations servicing the Tasman Sea zone became adrift and went offline after the mooring prematurely failed, and in late-2024 the data service from the second station became unreliable.

The Bureau worked with Earth Sciences New Zealand to undertake the deployment works at the challenging ocean locations, requiring considerable equipment preparation and logistics to achieve.

Successfully completing our supercomputer mid-term upgrade and migration

In June, the Bureau successfully completed the production cutover to its Australis II supercomputer in the new Eastern Data Centre (EDC) and migrated its numerical weather prediction (NWP) models from the existing Australis I supercomputer in the Main Data Centre (MDC). The move to Australis II as the Bureau's primary production supercomputer represents a significant upgrade to its global NWP capability and another step towards secure, stable and resilient IT infrastructure.

The complex and challenging transition was the result of years of planning and significant cross-enterprise collaboration involving many dedicated team and individuals. More than 500 distinct tasks were undertaken with 100 individuals responsible for actioning them at various stages of implementation.

As part of the transition, the Bureau implemented the fourth iteration of its core NWP model – Australian Parallel Suite (APS4) – which provides significant improvements in model physics and ensemble forecasting compared to earlier iterations (see p.131).

The mid-term upgrade also included:

- relocating 28 model suites from Australis I (MDC) to the new Australis II (EDC)
- updating core suites with model data management system SIMPLER (see p.132)
- completing implementation of the IMPROVER post processing system (see p.77) which provides forecasts for wind, temperature, dew point temperature, rainfall and other variables



The Bureau's Gareth Johnson, Gem Lloyd, Mick Logan and Nichole Brinsmead in the 'Control Room' on cutover day.

- implementing new automation tools for controlled production releases with the DevSecOps build pipeline
- upgrading the workflow functionality of each suite to the Cylc workflow engine
- migrating approximately 300 virtual machines across all business areas with minimal service interruption
- integrating with new and legacy enterprise services for data ingestion and distribution, including interim data storage solutions hosted by the secondary supercomputer for disaster recovery (Sentinel) in the Future Data Centre
- extensive downstream testing and adjustments with both supercomputers operating in a parallel run for verification purposes.

Following the cut-over, a 6-week period of hypercare was instigated to ensure a smooth transition and address any initial issues through enhanced incident monitoring and support. Exit from the Main Data Centre (MDC) and make-good activities will be completed in 2025–26.

Next steps

In 2025–26 the group intends to:

- continue lifecycle management of observing systems and information technology and building of asset management capability, including decommissioning of IT and OT assets
- continue ongoing development and maintenance of business continuity plan and disaster recovery plans
- deliver Data Management Maturity Uplift Roadmap activities.

Outcome 3: Expand and cultivate our partner ecosystem.

Achieving the outcome

Securing our supply of lightning data

In 2024–25, the Bureau secured supply of critical lightning data to support its customers and operations by extending its contract with Weatherzone for both global and Australian lightning data. The Bureau also contracted Metraweather to supply lightning data for internal Bureau use in exchange for the Bureau hosting Metraweather sensors at several Bureau sites across the country.

Lightning data are a critical input to Bureau forecasts of severe weather and thunderstorms for the public, emergency services and many critical sectors such as aviation, national security, energy and resources. Lightning data are also critical for fire weather and are used by the Bureau to provide decision support to fire agencies across the country. The contracts enable the Bureau to continue to add to its national lightning climate record which contributes to climate monitoring activities and supports its Calibrated Thunder product.

Supporting emergency management through portable weather stations

The Bureau onboarded 7 fire agency portable automatic weather stations (PAWS) sites in 2024–25, taking the total number nationally to 99 sites. Observations from PAWS are incorporated into Australian Fire Danger Rating System products which are provided to emergency management agencies to support incident response and planned burns, as well as being shared with the Australian community through the Bureau's website. The Bureau's commitment to onboarding this data and other fire weather services is outlined in the Fire Weather Service Level Specification.

Advancing weather resilience through regional collaboration

In January, the Bureau hosted a meeting of the World Meteorological Organization (WMO) Working Group on Infrastructure involving staff from the Bureau's Data and Digital Group and representatives from Indonesia, Singapore, Fiji, Malaysia, the Philippines and Samoa. The meeting focused on data, observations and IT for enabling key service priorities in the south-west Pacific related to multi-hazard early warning systems, climate, hydrological, aviation and marine weather services. Such events enable and enhance data sharing across the globe for regional, national and local weather service provision.



Members of the World Meteorological Organization (WMO) Working Group on Infrastructure hosted by the Bureau in January 2025.

At the meeting, participants assessed progress and updated plans implementing Regional WMO Integrated Global Observing System (WIGOS) Centres, which routinely monitor the availability and quality of surface and upper-air observations across member countries using the WIGOS Data Quality Monitoring System. This initiative, combined with the ongoing creation of a Regional Basic Observations Network, aims to better predict and respond to key regional hazards including heavy rainfall, tropical cyclones, coastal inundation, marine hazards, severe convection, droughts and heatwaves.

Over the course of the next year, Regional WIGOS Centres will routinely report on data availability and quality issues to improve the quality of critical weather data exchanged internationally. Documentation will also be prepared to guide countries to exchange data that will enhance the prediction and monitoring of the key regional challenges that align with the Early Warnings for All program (see p.85).

Fostering community engagement at Giles Weather Station

In June, the Bureau's first Community Engagement Cadet commenced work at the Giles Weather Station, located in remote Central Australia, near Warakurna (Western Australia) on Ngaanyatjarra Land. Giles Weather Station attracts numerous tourists who visit to observe the daily balloon flights and learn about the station's operations and history. The cadet engages with visitors while they observe the balloon release and tour the station's museum. The Bureau's Observing Systems and Operations Program and its First Nations Office worked together during the year to establish the 12-month position. The position provides an employment opportunity for the local community and it supports the Bureau's Reconciliation Action Plan by supporting indigenous employment opportunities.

Streamlining labour hire arrangements for greater efficiency

During the year, the Bureau's Enterprise Business Systems team – in collaboration with Bureau colleagues and vendor partners – successfully transitioned 28 labour hire agencies to the new internal Cross-Application Time Sheet system (CATS). As part of its Business Systems

Transformation program, this initiative streamlines payment processing by enabling full automation and eliminating the need for managers to confirm invoices separately through multiple external portals. The transition to CATS enables all contractor timesheets to be processed through a single Bureau-managed system, improving accuracy, timeliness, and reducing administrative burden.

Highlights and significant events

Collaborating to better understand atmospheric processes in the Southern Ocean

The Cloud and Precipitation Experiment at Kennaook (CAPE-k) has been operating continuously at Kennaook / Cape Grim (KCG) since April 2024 and is set to conclude in October 2025. This experiment is being led by the US Department of Energy Atmospheric Radiation Measurement (ARM) in partnership with the Bureau's Observing Systems and Operations Program and CSIRO's Aerosols and Reactive Gases team at KCG.

The overarching goal of this campaign was to obtain the first seasonal cycle of detailed, vertically resolved measurements of cloud and precipitation in the marine boundary layer and to discern how these properties co-vary with aerosols and dynamical and thermodynamic factors, in a region of the world known to exhibit the strongest model radiation biases.

CAPE-k involved the deployment of a suite of instrumentation to measure a variety of cloud properties which complemented the station's extensive existing aerosol program. The station also hosted a range of guest instruments from Queensland University Technology, University of Michigan, University of York and Karlsruhe Institute of Technology as part of this global effort to understand the aerosol-cloud-precipitation interactions in pristine Southern Ocean air masses.

Clean Ocean Air Sampling upwind of Tasmania – Kennaook (COAST-k) was a parallel intercomparison study that ran in April and May. Utilising the Marine National Facility's Research Vessel (RV) Investigator scientists from CSIRO, the University of Melbourne, the University of Wollongong, German Weather Service (Deutscher Wetterdienst) and the Bureau's Science and Innovation Group collected ship and KCG observations from the same air masses.



Atmospheric Radiation Measurement (ARM) Technician Tom Day maintaining the Marine Atmospheric Emitted Radiance Interferometer (MAERI) as part of CAPE-k with the RV Investigator around 2 nautical miles offshore. The MAERI is a passive instrument which measures sea surface temperature and other radiative parameters at an above the sea surface. Image credit: Frank Zurek.

The science objectives of this study compliment those of CAPE-k, but also included the first direct comparison between 2 Global Atmospheric Watch stations: the RV Investigator and KCG. Instrument data onboard the RV Investigator, which is the world's first mobile Global Atmospheric Watch station, will be scrutinised alongside KCG observations to validate data quality as well as the regional representativeness of KCG's baseline sector.

CAPE-k and COAST-k data will be disseminated through world data repositories, ensuring global access for the climate science community. Covering around 25% of the Earth's surface, the Southern Ocean is one of the cloudiest and most data-sparse regions on the planet. Accurately characterising these vast regions of the atmosphere is essential to solving known biases in global climate and numerical weather prediction model outputs.

Next steps

In 2025–26 the group intends to:

- commence implementation of radar modernisation
- continue to meet requirements of the water regulations
- work with international partners to enhance the Bureau's rapid scan earth observations capability.

Outcome 4: Maintain a future ready workforce through maturing our core capabilities.

Achieving the outcome

Continuing to mature the Bureau's asset management

Over the last 4 years, the Bureau has matured its asset management capability by implementing an Asset Management Framework to provide a structured approach to managing its observing assets. The framework is designed to improve whole-of-life asset efficiency, reduce risk, and enable better decision-making.

In 2024, the Australian National Audit Office (ANAO) undertook an audit of the Bureau's management of assets in its observing network. The final report was published in January.

The report found the Bureau is partly effective in managing assets in its observing network and outlined 4 key recommendations. The Bureau accepted all 4 recommendations and committed to delivering actions in response by June 2026.



The new and old Townsville radars. The radar replacement occurred in November 2024.

Strengthening knowledge and skills in radioactive particle monitoring

The Bureau has a long-standing (26 years) Memorandum of Understanding with the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) supporting Australia's radionuclide monitoring obligations to the Comprehensive Nuclear-Test-Ban Treaty (CTBT). The Bureau hosts radionuclide monitoring equipment and collects daily radionuclide samples at 4 locations – Darwin Airport, Cocos Island, Perth Airport and Townsville Airport. Darwin also hosts one of 2 Noble Gas stations in Australia. The purpose of radionuclide monitoring is to detect radioactive particles or gases from atmospheric explosions or vented by underground or underwater nuclear explosions. In 2025, Bureau staff attended the inaugural Station Operator Workshop, bringing together CTBT operators from Australia and Pacific Islands to increase awareness and understanding of the CTBT International Monitoring System, discuss the fundamentals of radionuclide monitoring and share station operator perspectives.

Maturing our approach to technician competency training

The Bureau is committed to maintaining a skilled and capable workforce to underpin the reliability and precision of its meteorological infrastructure. Bureau technicians play a critical role in ensuring the Bureau's observing equipment is maintained and operating effectively in support of Bureau operations. The Bureau has applied a structured approach to technician training for several years, with the development of network-specific competency frameworks for Observing Systems and Operations field staff largely complete. During the year, focus shifted to completing scheduled reviews and updates of these competency frameworks, driven by the introduction of new technologies, procedures and operational processes.

The Bureau uses a set of integrated tools to effectively record and quantify competency data to monitor the currency of staff competencies over time, and to respond proactively to emerging training needs. Through continuous development and rigorous competency management, the Bureau ensures its technical teams are equipped to support the evolving demands of our national observation network.

Expanding our business analysis skills and capability

The Bureau's business analysis capability aims to provide all Bureau business analysts (BAs) with a set of guiding frameworks, principles, templates, governance arrangements and tools to perform their role in a consistent, high performing and effective way to help the Bureau achieve its strategic objectives.

In July, the Bureau launched new Business Analysis eLearning modules to build its capability in this practice. Uptake of the learning modules increased throughout the year, with staff choosing to add business analysis skills to their repertoire, adding value to their everyday role and better enabling the Bureau's workforce to support its initiatives.

Next steps

In 2025–26 the group intends to:

- adopt Senior Executive Service data accountabilities and commence implementation
- continue to review its operating model and embed new capabilities.

Science and Innovation

Goal: To use research and innovation, to continually improve our knowledge and systems enabling the Bureau to deliver world class services and insights to our customers and shared value with our partners.

The Science and Innovation Group is responsible for research and innovation supporting Bureau services and delivering shared value for our partners. The group’s focus is on world class science and development that enables the Bureau to deliver better weather, water, climate, ocean, space weather and Earth system information and insights. The group also has stewardship of the Bureau’s Innovation Framework.

For 2024–25, the group consisted of 2 programs:

Program	Responsibilities
Research	• Earth system modelling • Observations and data science • Applications science • Seamless prediction science • Hydrology science.
Research to Operations	• Transfer of research outputs to operations • Validation and verification of models and model output • Data assimilation and post processing.

Throughout 2024–25, the group focused on delivering 4 outcomes that support the achievement of the Bureau’s strategy and purpose. The group’s achievement in delivering each of these outcomes is discussed below.

Outcome 1: The application of scientific and technological skills and knowledge uplifts Australia’s capability to manage a changing climate and increasing natural hazards, leading to enhanced national resilience.

Achieving the outcome

Providing a consistent view of Australia’s climate – past, present and future

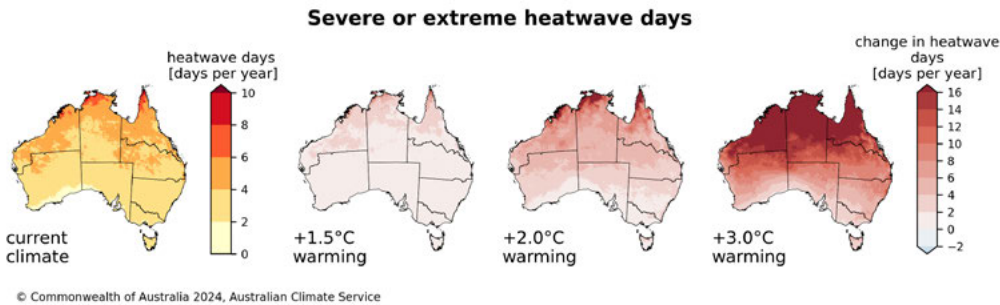
The Australian Climate Service (ACS) relies heavily on climate modelling undertaken by the Bureau in partnership with CSIRO, ensuring Australians benefit from the nation’s best science and modelling capability. The Bureau’s climate modelling contributions cover both the past and the future, extending from 1979 to the present for the Bureau’s historical reanalyses (BARRA), with

climate change projections out to 2100 using the Bureau's Atmospheric Regional Projections for Australia (BARPA) version of the ACCESS forecast system.

The climate change projections from BARPA and the reanalyses from BARRA have now been published to the National Computing Infrastructure and are available on a standard 5 km grid for ease of use by the ACS and Bureau partners including state and territory governments. These models provide the first nationally consistent view of Australia's past, present, and possible future climate with many uses being explored in climate change adaptation across emergency management, energy infrastructure, urban design and agriculture.

Supporting the National Climate Risk Assessment

To support the ACS with its National Climate Risk Assessment (see p.150), the Bureau has extended its inputs beyond the traditional variables which come from climate modelling to the inclusion of hazards that will be important in the future safety and prosperity for Australia. These hazards include heatwaves, bushfire, drought and aridity. To allow objective assessments to be performed, the Bureau has developed hazard indices which provide a measure of how the hazards change through time. Current and future estimates of the hazard are made against different projected Global Warming Levels (GWLs). GWLs indicate the increase in global average surface temperature relative to pre-industrial levels. As such they describe plausible climate futures out to around 2100. For example, this allows the ACS to estimate the likely count of severe and extreme heatwaves under different GWLs.



Change in the number of days experiencing severe or extreme heatwave conditions from current conditions (GWL 1.2 °C) to future conditions (GWL 1.5, 2.0 and 3.0 °C)

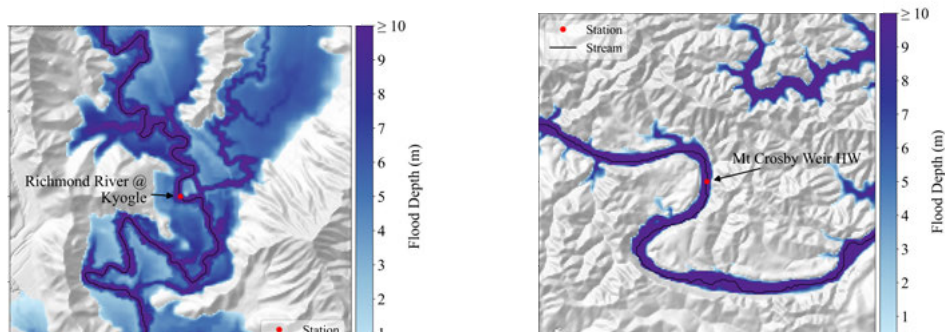
Updating Australia's hydrological projections for improved flood prediction

Scientists have known for a long time that a warmer world will see more hydrological extremes and that the past is not an accurate representation of the future. As such, past events don't provide a reliable basis for future hazard prediction. In response to this challenge and a request from the National Emergency Management Agency with the support of the ACS, the Bureau is developing the first national mapping of future hydrological extremes and flood risk.

The first phase has been delivered using the Bureau's current operational landscape model coupled to the river routing model (CaMa-Flood), to develop flood maps of the 1% annual exceedance probability inundation depth for parts of the Richmond and Brisbane rivers (New South Wales and Queensland respectively) in a cool and wet plausible future scenario at 2 degrees warming.

Known as Next Generation Flood Projections, the project will provide a consistent representation

of flood risk for the coming century, drawing on a range of climate model inputs and future emissions scenarios, with the goal of having the coupled modelling component: land surface and river routing (JULES-ES+CaMa-Flood), implemented within BARRA and BARPA. This mapping is critical for properly designing Australian infrastructure and cities for the future, reducing the impact of extreme events, and assisting with insurance affordability which is a rapidly growing problem as hazardous events increase.



The projected cool and wet scenario's 1% annual exceedance probability inundation depth at 2 °C global warming at (left) the Richmond River at Kyogle and (right) Mt Crosby Weir along the Brisbane River.

Highlights and significant events

Developing a national climate attribution capability

Attribution is the process of explaining why a trend or extreme event has occurred. It can be applied to observations after something has occurred, or before-hand to understand why a forecast or climate outlook might be showing a certain feature. Research in the Bureau has been exploring multiple approaches to the challenge of making accurate and timely attributions, recognising that the best practice approach is to use multiple lines of evidence. While it might seem straightforward to ask how an event has been modified by global warming, for example, there is no accepted single approach to the problem. For Australia, Bureau customers want to know about global warming impacts as well as other causes of extreme events, which can help with improving prediction and projection models.

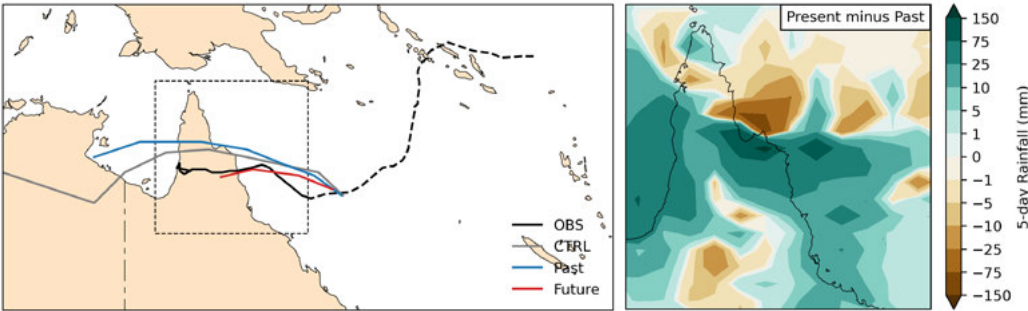
The Bureau has developed 3 distinctly different approaches to attribution which can each give different insights:

- a forecast perturbation approach using the Bureau's models (ACCESS-S initially) to explore how individual events might change if we remove global warming (to produce 'counterfactuals') or switch off part of the climate system such as the influence of the El Niño / La Niña
- a distribution shift approach which looks at how the likelihood of an event changes if greenhouse gas increases are removed, for example
- a regression approach which explores how climate influences like El Niño contribute to the extremity of climate events, on time scales of weeks to seasons.

These have been developed through the Victorian Government sponsored Victorian Climate and Water Initiative, the National Environmental Science Program and the ACS, with strong advocacy from priority users for developing this nationally critical capability.

Each of these approaches can also be used to assess how recent events would present in the future, to help better quantify risks from climate hazards. The past year has seen each of these

methods progress further, with applications in near real-time. As an example, the Bureau has explored the flooding rains of tropical cyclone Jasper to see how the tropical cyclone might be affected by climate change to date and into the future. The Bureau also examined how the likelihood of the extensive marine heatwave off the north-west coast was altered by climate change.



Tropical cyclone Jasper stalled over land and the extensive rain had major impacts through Cairns and far north Queensland. Left image – the Bureau’s modified initial conditions attribution system (ACCESS-MICAS) shows changes in the track and rainfall amount in different climates (blue is the track in the past, red in the future). Right image – preliminary results suggest increasing rainfall totals to the south of the storm with global warming, but the track is very important.

Next steps

In 2025–26 the group intends to:

- uplift priority hazard data to better meet user needs, focused on flooding, heavy rainfall, tropical cyclones and severe convective storms
- enhance foundational climate and hazard modelling focused on the convective scale (~5 km) and hydrology to support the uplift of critical key hazards
- facilitate an enduring Climate Risk Service including ensuring data availability, documentation, review and accessibility through the ACS platform.

Outcome 2: Research, innovation and collaboration deliver improved forecast, warning, analysis and observing systems that enhance Bureau services providing greater benefits to the Australian government, community and industry.

Achieving the outcome

Predicting floods with artificial intelligence (AI)

To address the challenges of accurate flood prediction, the Bureau has leveraged deep learning using Long Short-Term Memory (LSTM) techniques on high-frequency radar rainfall and river level data. Radar rainfall provides high-resolution spatial and temporal information, making it ideal for capturing the dynamics of intense precipitation which can often lead to hard-to-predict events such as rapidly evolving floods or flooding from tropical cyclones. By employing advanced deep learning architectures such as convolutional neural networks or convolutional LSTMs, the Bureau aimed to extract complex spatial patterns and relationships between rainfall characteristics, terrain, and flood occurrences.

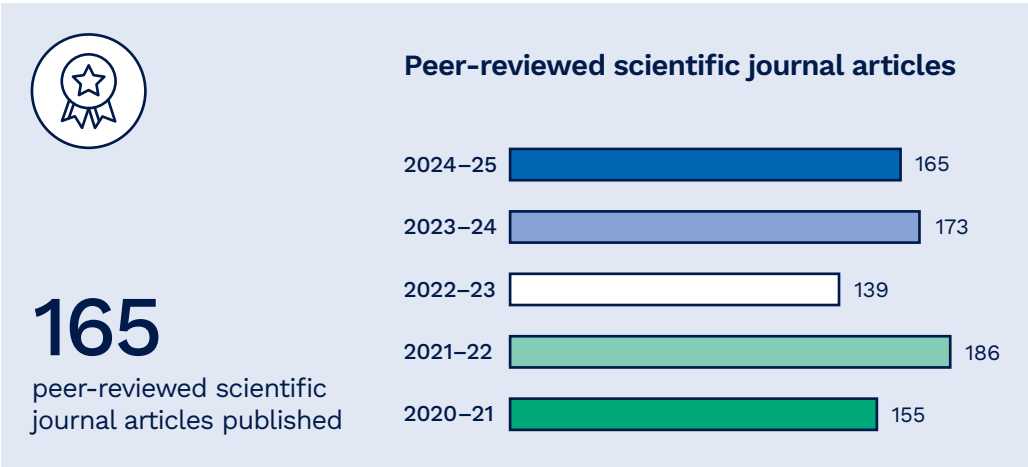
To translate flood level forecasts into actionable information, LSTM outputs were combined with Light Detection and Ranging (LiDAR)-derived digital elevation models to generate inundation maps. These maps showed high agreement with flood extent observed with satellite-based remote sensing (Sentinel-2), achieving over 94% overall accuracy and up to 85% critical success index at 12-hour lead time. The approach has the potential to significantly improve prediction accuracy with more lead time for communities to prepare and respond, offering a powerful tool for Bureau services and disaster management and mitigation.

Blending AI and physics-based models for improved weather forecasts

A model post-processing workflow was developed by the Bureau for the new AI-based weather model (AIFS) from the European Centre for Medium-Range Weather Forecasts (ECMWF). The Bureau’s IMPROVER post-processing system was applied to AI forecasts of temperature, dew point temperature, and wind speed. The existing operational physics-based configuration of IMPROVER demonstrated strong performance when applied to AI model data, delivering improvements of several days in forecast skill.

Incorporating AIFS into a blended forecast, together with traditional physics-based weather models, resulted in a notable enhancement in overall forecast accuracy. These findings indicate that integration of AIFS into the Bureau’s operational forecasting system is both feasible and beneficial using its existing tools, techniques, and capabilities.

A journal article detailing this research has been submitted for publication, and a poster presentation was delivered at the UK Met Office Seamless Global Modelling Workshop held in Bristol in June. Ongoing work is focused on evaluating techniques for the use and improvement of AIFS precipitation forecasts for Australian conditions.



Scoring forecast accuracy on a global scale

Evaluating and verifying the accuracy of forecasts and warnings is essential for continuous improvement. This year, the Bureau’s verification capabilities were significantly enhanced by upgrading the core engine of Jive (the Bureau’s primary operational verification system) and releasing it as open source. The resulting package ‘scores’ enables anyone in the Bureau to apply advanced verification tools across any system. Developed collaboratively by 3 teams from the Bureau’s Science and Innovation Group, and with external partners such as CSIRO, the package has empowered teams across the Bureau to assess forecast quality more effectively. Beyond

internal use scores has gained traction nationally and internationally. It has been adopted by private institutions, research agencies, meteorological organisations, and has been downloaded in over 100 countries. It has supported 10 peer-reviewed publications in the past year, demonstrating its value to the broader scientific community.

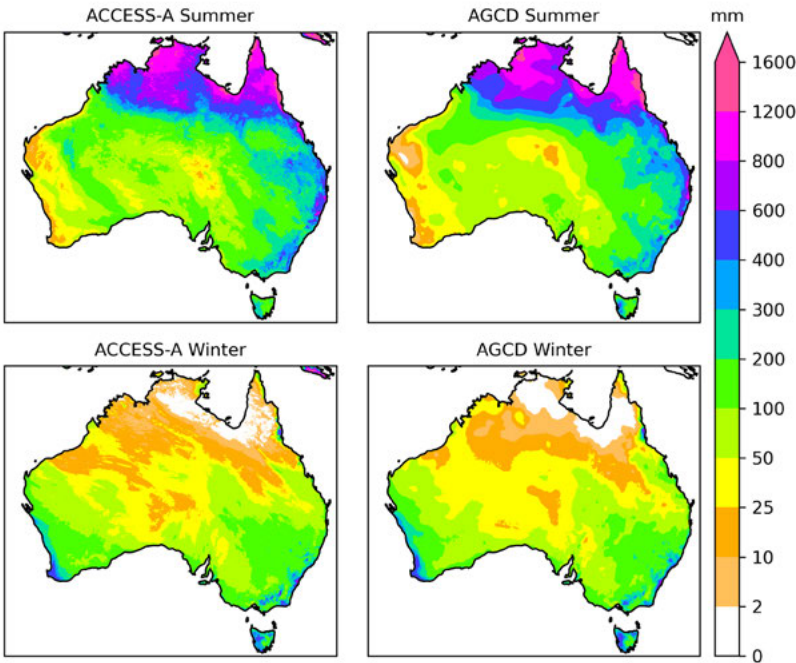
Enabling better decision-making using warnings based on risk matrices

The goal of warning systems is to enable early action to save and protect lives, livelihoods and assets of people at risk. During the year, Bureau researchers developed a framework for issuing and evaluating multi-level warnings using risk matrices. The warning framework accounts for the likelihood and severity of the hazard, as well as the urgency of the response, and is compatible with the Common Alerting Protocol.

The approach addresses key challenges in traditional warning systems by providing information that supports consistent response behaviour backed by objective measurement of warning performance and accuracy. This approach has been demonstrated with examples using data from tropical cyclone Jasper (2023). The approach provides a framework for transparent, reliable and trustworthy meteorological alerts and will help people make better decisions when faced with severe weather.

Trialling national weather forecasting at kilometre scale

The new continental-scale numerical weather prediction system, ACCESS-A, will provide national forecast guidance at high spatial resolution. ACCESS-A has been developed into an hourly cycling system that takes in a wide range of conventional and satellite observations. It has been trialled over 3-month periods in summer and winter to validate and evaluate the skill of the system. These extended trials enabled ACCESS-A to demonstrate its stability over an extended period and



Three-month rainfall accumulations from ACCESS-A trials (left column) and the Australian Gridded Climate Data (AGCD, version 1) (right column) over summer (Dec 2023-Feb 2024) and winter (May-Jul 2024).

generate a large dataset for evaluation. An extensive variety of verification has been conducted on the trial data. It was found that ACCESS-A can represent weather events on large and small scales, with realistic representation of rainfall. Verification against automatic weather stations indicated a good level of skill.

With kilometre-scale resolution across all of Australia, ACCESS-A will replace ACCESS-C that covers 7 of Australia's most populated areas. ACCESS-A uses a new science configuration that includes improved moist physics schemes compared to ACCESS-C and appears to be comparable or better than ACCESS-C in all metrics examined. The conclusion of the trials and verification is that the ACCESS-A system is suitable to be transitioned to operations.

Highlights and significant events

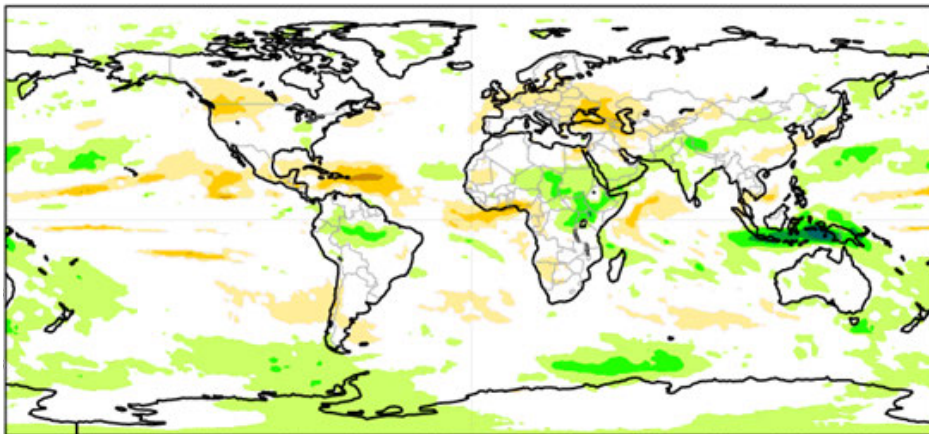
Contributing to the global picture on climate change

In May, the Bureau's operational seasonal forecast model, ACCESS-S2, joined other international models in the Copernicus Climate Change Service (C3S) implemented by the ECMWF.

C3S provides a multi-model ensemble of seasonal atmospheric and ocean forecasts from leading international centres from around the world, including the UK Met Office, Météo-France, the US National Weather Service and the Japan Meteorological Agency. These forecasts extend out to 6-months into the future and are updated on the tenth day of every month. Graphs for a variety of variables such as air temperature, wind speed, precipitation and sea surface temperature are displayed at different lead times on the C3S website. The combined model data is also served publicly through the Copernicus Climate Data Store.

Each model simulates the Earth system processes that influence weather patterns in slightly different ways, leading to different kinds of model error. Combining the output from a range of models enables a more realistic representation of the uncertainties. Using multi-model ensembles can improve forecast skill by averaging results from different models, which helps reduce errors and biases of the individual models.

The Bureau's contribution to C3S will lead to future improvements in weather and climate products and services in Australia. It will also provide new opportunities for climate modelling and joint research for the benefit of European and Australian communities.



Copernicus C3S multi-system seasonal forecast rainfall for July 2025, issued on 1 June 2025. Green indicates an increased chance of wetter than usual, brown/yellow shows an increased chance of drier than usual. Image credit: Copernicus Climate Change Service.

A new global wave hindcast for the Australian Climate Service

In 2024–25, the Bureau developed a new global wave dataset to support the Australian Climate Service (ACS) in its mission to improve data intelligence on climate hazards and risks. Coastal hazards driven by extreme wave activity and high sea levels can lead to erosion and inundation, posing significant risks to critical infrastructure and communities. The Wave Hindcast for ACS (WHACS) dataset provides hourly wave information globally and at high resolution in the Australasian region from 1979 to the near-present.

This work was led by the Bureau's Research Program, in collaboration with CSIRO, and utilises improved winds and ice data from the ECMWF atmospheric Reanalysis v5, aligning with the Bureau's Atmospheric Regional Reanalysis for Australia (BARRA2). WHACS uses a new high-resolution model grid, providing more wave information near coasts and in shelf regions.

WHACS supplies critical inputs to the new ACS Coupled Coastal Hazard Prediction System coastal water level hindcast (produced by CSIRO) and will provide important wave metrics and operational forecast context for Bureau customers via its marine and Antarctic services.

WHACS will be highly valuable in providing wave information for coastal hazard assessments, offshore and coastal engineering design, renewable energy projects, erosion studies, and wave model downscaling work. The new hindcast has been highly anticipated by customers and is expected to have significant uptake across multiple sectors.



Blackmans Bay, Tasmania.

Advancing hailstorm prediction through international cooperation

Hail is consistently the most damaging thunderstorm hazard for both Australia and globally, with events impacting homeowners, business, aviation, agriculture, transportation, energy and resources. To drive significant improvements in the prediction of hailstorms and their impacts, Bureau staff participated in the *In-situ Collaborative Experiment for the Collection of Hail In the Plains* (ICECHIP) project, the first US hail-focused field campaign in more than 40 years.

Bureau scientists collaborated with more than 100 scientists and students from the US, Canada, Switzerland and Germany to collect critical observational data by deploying mobile weather radar, ground instruments, unmanned aerial vehicles and balloon-launched equipment. During a 6-week

period, more than 20 hailstorm events and more than 15,000 individual hailstones were sampled. The Bureau led innovations to directly measure the pathways taken by damaging hailstones using the 'hailsonde' probe and made world-first discoveries of how hail grows and moves inside thunderstorms. This information will be used to evaluate and improve short-term forecasts of thunderstorms to produce more accurate footprints of where large hail is expected to fall, thereby improving guidance for future severe thunderstorm warnings.



Bureau scientist releasing hailsondes into a supercell in western Texas on 25 May that produced 15 cm hailstones.

Next steps

In 2025–26 the group intends to:

- explore new methods for evaluating AI-based weather prediction models
- replace the current Mesoscale Surface Analysis Scheme with the new National Analysis System to produce analysis and short-range forecasts for a wider range of surface and upper-level fields, providing additional information for forecasters and downstream applications
- prepare the ensemble version of ACCESS-A, ACCESS-AE, to run long trials and assess readiness for operational use
- investigate techniques to enhance short- to medium-range extreme rainfall forecasts through improved post-processing and calibration of ensemble model output
- improve seasonal hydrological forecasts using the Land Surface Model (JULES) and the river routing (CaMa-Flood) model.

Outcome 3: Support the development and uplift of the Bureau's HPC numerical modelling, analysis and post processing systems to provide high quality, secure and resilient NWP capability.

Achieving the outcome

Upgrading our forecast models on the Bureau's new supercomputer

The Australian Parallel Suite (APS) is the primary suite of numerical weather prediction (NWP) models used by the Bureau. The APS is a parallel processing system that enables multiple models to be run concurrently, increasing the accuracy and detail of weather forecasts. The APS is comprised of different Australian Community Climate and Earth-System Simulator (ACCESS) models, including ACCESS-G (global deterministic), and ACCESS-GE (global ensemble), ACCESS-C (city deterministic) and ACCESS-CE (city ensemble).

In June, the Bureau's high-performance computing (HPC) Earth system models and post-processing systems were migrated to its new Australis II supercomputer (see p.116). Australis II brings a 150% boost in performance, enabling the Bureau to complete more frequent and complex model runs.

New versions of the Bureau's ACCESS global NWP models became operational in the fourth release of the Australian Parallel Suite (APS4), representing a significant upgrade to the Bureau's global NWP capability. Improvements to the models included:

- improved probabilistic forecasts of temperature, mean sea level pressure, relative humidity and rainfall
- soil and snow temperature analyses in land surface data assimilation
- more accurate representation of extreme sea states
- more frequent ocean model data assimilation, from 3 days to daily.

Model and computer upgrades enable the Bureau to produce more accurate and timely weather information to support public safety and decision-making.



The Bureau's Australis II supercomputer in production.

Improving application management through a new centralised system

SIMPLER is a new piece of software infrastructure that will improve the Bureau's HPC data resilience. It was developed to support the migration of applications to HPC by isolating those applications from changes to the systems that provide input data or consume output data. It does this by providing a standardised and easily configurable method for moving data into and out of HPC applications. This also simplifies operational support of such data movement.

Next steps

In 2025–26 the group intends to:

- implement disaster recovery for HPC applications on the secondary HPC system called Sentinel
- extend accessibility of HPC data through the integration of the HPC data management system (SIMPLER) with the centralised data-stores
- further improve resilience and performance of HPC applications.

Outcome 4: Research and innovation aligned with the Bureau's R&D Plan creates enhanced impact and value for the Bureau's customers.

Achieving the outcome

Ensuring expert review through the Bureau Science Advisory Committee

The Bureau Science Advisory Committee met for the fourth time in December, providing a mechanism for peer review and international benchmarking of the Bureau's scientific progress aligned with delivery of its Research and Development Plan 2020–2030.

The Committee complimented the Bureau's progress over the past year and commended its mission-driven focus to deliver to customers. The Committee noted the significant effort for the migration of modelling systems to the new supercomputer, the delivery of the Bureau's world-class global model ACCESS-G, and the progress in developing an operational version of the regional modelling systems ACCESS-A and ACCESS-AE.

The Committee provided recommendations to the Bureau focused on strengthening its scientific output in completing ACCESS-A/AE, communicating uncertainty to customers and exploring AI models and their downstream impacts.

The Committee meets annually, with the next meeting scheduled for December 2025.

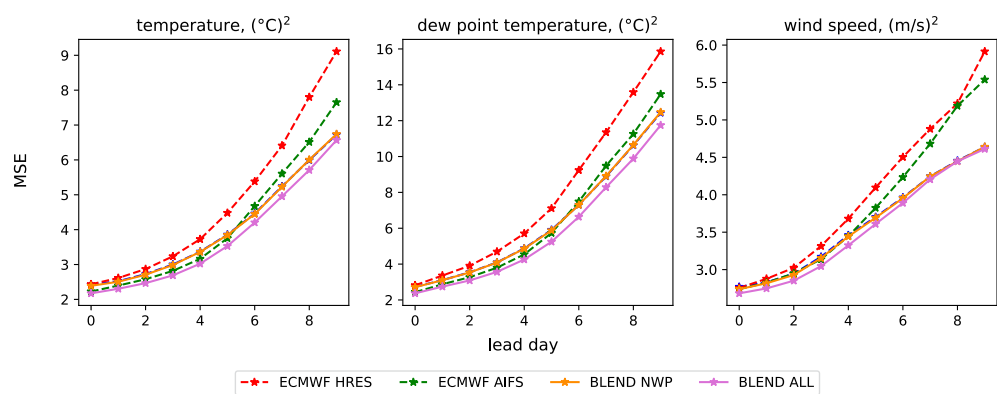
Adopting machine learning: the new frontier of Earth system science

The last year has seen good progress in the Bureau's investigation and uptake of artificial intelligence (AI) and machine learning (ML) to support its core functions. Underlying ML algorithms can now also be applied to scientific models used to predict weather in a 'physically informed' neural network approach.

During the year, Bureau researchers produced multiple publications on the construction and evaluation of ML models, and their integration with traditional numerical models. Investigations show that the most accurate predictions result from integrating ML model outputs with physical model outputs.

Bureau researchers are members of the World Meteorological Organization working groups for machine learning and model verification and are part of many other international collaborations. Bureau researchers on the Machine Learning for Climate and Weather Community Working Group at the ACCESS National Research Infrastructure also collaborate with Australian university researchers.

In 2025–26, the Bureau will trial delivery of integrated model outputs to forecasters for their expert feedback, to fully understand how these models could be used to enhance services for the Australian public.



Skill of ML models, physical models, and a blended approach. Lower scores are better. The diagram shows that ML models contribute an improvement to the blended skill, and that the blending approach remains effective when integrating an ML model input.

Advancing global river routing through MOMENTUM leadership

During 2024–25, the Bureau has continued to make significant contributions to the MOMENTUM Partnership involving operational and research centres from countries across the world to improve forecasts based on a shared seamless modelling framework. Building on its success in integrating a river routing scheme with a land surface model in Australia (see p.123), the Bureau has taken a leadership role in advancing the global implementation of this in collaboration with the UK Met Office. This initiative aims to couple river routing (CaMa-Flood), within the global coupled model (GC) to enhance the representation of streamflow and include human activities such as dam operations. Releasing CaMa-Flood within GC will mark a major milestone as it delivers a coupled model that integrates high-resolution hydrology across weather and climate timescales that will deliver improved hydrological predictions on a global scale.

Highlights and significant events

Engaging future STEM colleagues at Parliament House

During National Science Week in August, Canberra and Sydney-based colleagues joined Australia's Chief Scientist, Dr Cathy Foley, in the Great Hall at Parliament House for the inaugural Government Scientists Group STEM Expo. The Government Scientists Group (GSG) brings together all Australian Public Service (APS) Chief Scientists to drive collaboration across the APS.

This was a great opportunity to showcase the Bureau's work and inspire the next generation of science, technology, engineering and maths students about why they might think about a career in the Bureau. The event showcased the diversity of careers available within the 24 departments,

agencies, and regulators that make up the GSG. More than 1,500 people attended the event, from schools and universities across the ACT and the greater NSW region, along with several VIPs including Government ministers and other members of parliament.

Around 600 people also watched the livestream of the event which included a series of presentations from GCS agencies including Dr Luigi Renzullo, Senior Research Scientist in the Bureau's Hydrological Modelling team. Luigi spoke about how his passion for STEM at school, particularly in mathematics and physics led him to a career in the Bureau, monitoring the Earth through satellites and incorporating this information into our understanding of the hydrological system.



The Bureau's booth at the STEM Expo at Parliament House (Tiffany Day, Luigi Renzullo, Piers Flook, Dr Cathy Foley (Australia's Chief Scientist) and Lucy McGarva).

Engaging the next generation in forecasting futures

In June, the Bureau hosted a second industry immersion day, for 28 year 10 and 11 students from Wheelers Hill Secondary College, Highvale Secondary College and Mount Waverley Secondary College in Melbourne, following the success of the inaugural immersion day held in 2024. The event was facilitated by Monash Tech School, as part of The Education State Tech Schools Initiative to deliver industry sector-specific programs to students from participating schools.

The day provided a platform for students to explore the exciting world of science, technology, engineering, and mathematics (STEM) and shape their thinking around career options. The day involved a series of practical workshops and discussions, through which the students gained invaluable insights into the work of the Bureau in observations, meteorology and climate science.

The 3 rotations, each critical workforce pipelines for the Bureau, were carefully crafted to show the interdependence between these areas and the range of skills that go into weather forecasting, with options for students considering either a vocational qualification or higher degree. Each rotation covered some technical skills and how the interpretation of that information translated into products that were used by different customer sectors such as agriculture, government and aviation, to make decisions.

A particular highlight of the day was the live-cross Q&A with Bureau colleagues in Antarctica, Willis Island and at Giles station in central Australia, which gave the students an appreciation for the variety of locations and types of work they could be involved in. Feedback from students on



Students learning how to identify clouds on an aerological diagram with Tim Smith, Meteorology Trainer, in the Introduction to Meteorology rotation.

the day showed that 100% of students agreed they learnt about industries that use STEM, and 32% more likely to think about a career in STEM following school.

Next steps

In 2025–26 the group intends to:

- continue to pursue opportunities to broaden and strengthen collaboration with academia to support delivery of the Bureau's Research and Development Plan 2020–2030
- continue to leverage the scientific and technical expertise of the Bureau Science Advisory Committee to enhance the Bureau's science delivery in collaboration with national and international partners.

Enterprise Services

Goal: A trusted partner that best positions the Bureau to execute its strategy and deliver for Australia – all day, every day.

The Enterprise Services Group is responsible for designing and delivering integrated enterprise-wide solutions to support the delivery of the Bureau's Strategy 2022–2027. As trusted strategic partners, the group develops the Bureau's strategic, people, change, governance, product management, customer engagement, communications, project, financial, and risk management capabilities including workforce planning and development to enable the Bureau's staff to work in a safe and secure environment.

The group ensures effective controls are in place and that the enterprise services, systems, and processes are accessible, fit for purpose, and enable the Bureau to govern and manage its business well.

For 2024–25, the group consisted of 6 programs:

Program	Responsibilities
Strategy and Performance	• Strategy integration • Strategic policy • Planning and performance.
Portfolio Management	• Enterprise program and project management • Procurement, contract and vendor management • Protective security.
Communications	• External communications • Internal communications • Government relations • Strategic content and media • Creative.
Business Management	• Finance • Customer engagement • Product management • Property services.
Organisational Resilience	• Meteorological Authority Office • Legal services • Freedom of information and privacy • Risk management, internal audit and organisational resilience • Quality management system assurance • Health, safety and environment.

Program	Responsibilities
Organisational Development	• Workforce planning and reporting • Talent management and recruitment • Employee engagement • Workplace relations • Enterprise transformation • Diversity and inclusion • Health and injury case management • Learning and development • Meteorological technical training • Payroll.

Throughout 2024–25, the group focused on delivering 3 outcomes that support the achievement of the Bureau’s strategy and purpose. The group’s achievement in delivering each of these outcomes is outlined below.

Outcome 1: Integrated enterprise planning and investment ensures the Bureau can sustainably deliver strategic outcomes to its customers and stakeholders.

Achieving the outcome

Applying our communications expertise to support public safety

The Bureau’s annual public safety campaign, *Know your weather, Know your risk*, is crucial in preparing the Australian community for the higher risk weather season (October to April). The objective of the campaign is to inform communities about severe weather risks and equip them with information and confidence to act when they need to.

In 2024–25, the Bureau delivered the campaign in September and October, ahead of the start of higher risk weather season for the first time.

The Bureau’s campaign message was disseminated through its social media accounts, website and blogs, and was supplemented with links to videos and information on fire weather, flood, severe thunderstorms, heatwaves and tropical cyclones.

The pre-season campaign enabled greater coordination of community preparedness activities and proved successful in terms of several customer metrics. Compared to the 2023 campaign, there was:

- a 45% increase in page views of the Bureau’s knowledge centre website
- a 13% increase in engagement and a 6% increase in session times with the Bureau’s social media reels.

Planning ahead for smarter product distribution to customers

The Bureau’s products and services are distributed across a wide array of platforms, systems and technology. While the Bureau’s website and app cater to millions of users daily, there are several

other distribution channels with unique characteristics that provide access to the Bureau's data, information, knowledge, and insights.

The Bureau's Distribution Channel Plan is used to maintain strategic oversight and to support the evolution of its distribution channels to enable greater impact and value. In 2024–25, the Bureau's Customer Engagement team updated the Distribution Channel Plan and supporting documentation to ensure it remains relevant and representative of the Bureau's vast and complex channel landscape.

A dynamic channel catalogue was created to provide staff with visibility and transparency across all Bureau channels so they can be compared, measured, and used consistently to provide customer access to data, information, knowledge, and insights.

A new product distribution framework was developed and has been used to support recent distribution channel transition activities including the retirement of the Bureau's fax service and re-directing customers to more efficient and resilient channels. An enterprise distribution channel management procedure was also developed to describe the roles and responsibilities that are integral to good distribution channel management.

Clarifying the role of long-range forecasts

In late 2024, the Bureau began to make a series of changes to improve how it communicates long-range forecasts (formerly known as climate outlooks), shifting the focus from climate drivers such as La Niña and El Niño to the forecasts that reflect the complexity of Australia's climate system (see p.78). The Bureau undertook extensive communications and targeted engagement activities to deliver clearer messaging and encourage the community to use its long-range forecasts.

The focus on long-range forecasts was positively received by customers, media, and the broader community. Media outlets reported extensively on the changes, underscoring the value of simple, clear messaging and early engagement.

Key elements of this success included:

- the use of trusted voices – expert and credible spokespeople played a vital role in delivering clear, consistent messages across internal presentations and media channels, helping maintain trust in the Bureau's services
- early engagement – proactively involving key customers and media outlets before the release allowed the Bureau to build understanding and address questions early
- supporting staff – effective change management empowered staff to confidently support customers through established relationships and communication channels.



The Bureau used a video series to explain how to use long-range forecasts to plan beyond the next 7 days.

Delivering value through product leadership

The Bureau is committed to delivering relevant, modern, and customer-centric products, supported by strategic leadership and continuous improvement.

This year, the Bureau's Product Management team made substantial progress in developing its product management capability across 4 areas of focus:

- product transition and modernisation
- strategic collaboration and planning
- product testing and innovation
- evaluation and stakeholder engagement.

The team leveraged the Bureau's Customer Relationship Management database to extract customer intelligence to better inform product lifecycles across all the Bureau portfolios. This intelligence provided valuable insights into how customers engage with the Bureau's state and territory forecasts online, helping to guide future enhancements.

Customer feedback was strategically integrated into the Bureau's product management processes, supporting the retirement of low-value or outdated products. In contrast, popular offerings like the Water and the Land rainfall forecasts were revitalised through migration to more robust, modern systems.

Cross-enterprise collaboration was key to the team's delivery, partnering with decision support teams across Australia to finetune their operating model, contributing to the Aviation Meteorological Services Plan 2026–2030 (see p.106), supporting the flood remediation project with product lifecycle expertise (see p.83) and uplifting the long-range forecast suite to better meet community needs (see p.138).

Highlights and significant events

Providing trusted information during tropical cyclone Alfred

During severe weather events, the Bureau significantly increases its efforts to amplify weather information and warnings across a broad range of channels.

In late February and early March, the Bureau's Communications and Community Information teams found strategic and impactful ways to lead the narrative, counter misinformation and communicate updates as tropical cyclone Alfred tracked towards major population centres impacting areas across southeast Queensland and northeastern New South Wales.

In addition to a strong presence across morning television, hourly ABC Emergency broadcasts and daily joint press conferences with emergency services agencies, Bureau meteorologists posted directly to the ABC News live event blog, providing familiar and trusted expert voices to update readers directly.

The Bureau issued audio news releases to inform the weather narrative at the start of each day – sometimes issuing multiple releases per day – helping to ensure warnings and safety messaging were consistent no matter where or how they were received.

With the long lead time for the event, the Bureau increased the volume of educational and expert analysis focus in its social media content and severe weather videos to help the community better understand influences on the weather system and its likely impacts.

As the system neared the coast, Bureau teams provided extended communications coverage, in conjunction with emergency broadcasting radio crosses. As conditions changed in the early



Senior meteorologist Jonathan How provides a severe weather update on tropical cyclone Alfred.

hours of the morning, real-time updates were issued to address community uncertainty, manage increased demand in media enquiries and immediately explain the change as Alfred's intensity, impacts and path were evolving.

During the event, from 23 February – 11 March, the Bureau delivered:

- 20 press conferences
- 965 social media posts (across Facebook, X, Instagram and YouTube) which resulted in over 120,000 new followers and saw almost 4.3 million page and profile impressions on Facebook and Instagram alone
- 24 severe weather update videos which received over 2.6 million views on YouTube, and resulted in over 15,000 new YouTube subscribers, tipping the Bureau past the 100,000 milestone (see p.157)
- 38 audio news releases and video news releases to media outlets
- 163 ABC Emergency crosses in addition to weekly routine radio crosses.

The Bureau's widespread, timely and authoritative communications also saw 53 million visits to the Bureau website, 78 million visits to the BOM Weather app and 290,000 new downloads of the BOM Weather app.

The community showed strong appreciation of the information and how the Bureau delivered this information during the event, thanking the Bureau for its clear, authoritative and factual approach.

Next steps

In 2025–26 the group intends to:

- maintain accuracy and utility of the Bureau's product catalogue and provide strategic investment advice about product priorities
- provide clear and proactive communication and engagement that supports the delivery of severe weather communications
- measure customer experiences through a consistent approach in its customer experience measures framework.

Outcome 2: The Bureau's people are customer-focused, capable and engaged; contributing to a safe, secure, productive, inclusive and sustainable environment.

Achieving the outcome

Celebrating Harmony Week with a chorus of belonging

In March, the Bureau's offices across Australia were transformed by the gentle power of shared stories, songs, and meals for the 2025 Harmony Week celebration. The week's theme Everyone Belongs became more than a calendar event, it became a movement of connection, purpose, and pride.

In the Melbourne office, a group of employees gathered to form an informal choir to sing a rendition of 'We Are Australian'. What started as a musical experiment became a symbol of courage and unity.

Across the Bureau, staff brought dishes from their cultural backgrounds – sweet, savoury, and deeply personal. Each plate came with a story, each gathering with laughter and reflection. These moments weren't just social – they were acts of inclusion, of saying 'you matter' in the language of everyday kindness.

The Bureau's Multicultural Employee Network's 3-part campaign wove these threads together. From choir performances to photo compilations, from cultural cookbooks to heartfelt reflections, the campaign celebrated not just diversity, but the purpose it brings to the Bureau's commitment to the Australian Community.

The Bureau has a vibrant, multicultural workforce:

- 36% of employees were born overseas from over 70 countries
- 25% of employees speak a language other than English, with over 30 different languages spoken.

This diversity of thought and experience is a rich resource for the Bureau, helping to develop and deliver critical products and services to the Australian public. This wealth of diversity helps to continuously strengthen the Bureau's practices and ways of working, achieving business priorities and ensuring everyone can be successful at work by feeling safe, included, and valued.

Maturing our management of psychosocial risk

In 2023, the Work Health and Safety Regulations 2011 were amended to formally incorporate psychosocial risk management. These changes heightened focus on identifying and addressing hazards that affect workers' psychological and physical safety.

Following the introduction of the Code of Practice on Managing Psychosocial Hazards at Work in October, the Bureau implemented several initiatives to strengthen its psychosocial risk management, including:

- delivering mandatory psychosocial hazard training for all staff
- delivering specific training and guidelines in relation to social media hazards
- completing an internal audit which found no instances of non-compliance with the WHS Regulations or the then-applicable Model Code of Practice

- updating its psychosocial risk assessment to reflect new Code requirements
- developing and implementing a risk assessment in line with the Sexual and Gender-based Harassment Code of Practice.

Fostering a respectful, safe and inclusive workplace

In March, the Bureau launched a centralised Diversity and Inclusion Action Plan, marking a significant milestone in its commitment to fostering a safe, respectful, inclusive, and flexible workplace. Developed through extensive employee engagement, the Action Plan reflects the unique needs of the Bureau's workforce and aligns with organisational priorities. It promotes a culture where all employees feel valued and empowered to contribute meaningfully. By embracing diverse perspectives and ensuring equal access to opportunities, the Bureau aims to strengthen collaboration, encourage innovation, and support the engagement and professional growth of all colleagues.

The Action Plan complements broader organisational efforts to uphold positive duty obligations under recent legislative reforms. These include initiatives that embed clear behavioural standards and promote a culture of accountability and care. Implementation is reinforced through a standalone procedure, mandatory training, robust reporting pathways, statistical tracking, and enterprise risk assessment.



Cover of the Bureau's Diversity and Inclusion Action Plan 2024–2027.

Highlights and significant events

Weathering Change, Walking Together with a new Reconciliation Action Plan

In June, the Bureau launched its Innovate Reconciliation Action Plan (RAP) 2025–2027 during National Reconciliation Week. The RAP is the Bureau's statement of commitment to progress reconciliation initiatives with its people, stakeholders, and communities in a way that further links the Bureau's core business and priorities toward supporting Aboriginal and Torres Strait Islander peoples and communities.

The RAP builds on the significant work already undertaken across the Bureau by seeking to build the organisation's cultural capability and responsiveness through learning and development opportunities, building the Bureau's Aboriginal and Torres Strait Islander workforce, and enhancing its work with communities directly affected by severe weather events and a changing climate.

The RAP was developed to better align with current and future enterprise initiatives, and to ensure its actions are realistic and sustainable. RAP initiatives offer valuable opportunities to strengthen the Bureau's ability to work not only with Aboriginal and Torres Strait Islander communities, but with a broader and more diverse cross-section of the Australian community.

One of the highlights of the new RAP is the inclusion of the *Weathering Change, Walking Together* artwork by Aboriginal Artist and Graphic Designer, Lani Balzan. Lani is a proud Aboriginal woman from the Wiradjuri people of the three-river tribe.

The artwork portrays that long ago, the Ancestors walked this land, reading the skies, winds, and waters as if they were written in song. They understood that every cloud, wave, and gust carried a message—a story of change, renewal, and balance. This sacred knowledge was passed from Elder to child, woven into ceremonies, songs, and painted stories on rock and skin.

Lani says that ‘*Weathering Change, Walking Together*’ reminds us that the wisdom of the past must guide the future.



Weathering Change, Walking Together artwork by Lani Balzan used in the Bureau’s Innovate Reconciliation Action Plan (RAP) 2025–2027.

Next steps

In 2025–26 the group intends to:

- deliver on its RAP actions and commitments and deliver an Indigenous Employment Plan
- lead implementation of the Diversity and Inclusion Action Plan, including monitoring and reporting on progress of deliverables
- deliver the 2025–2027 enterprise workforce plan.

Outcome 3: The advice and services provided by the Enterprise Services Group are accessible, fit-for-purpose, and enable the Bureau to understand its risks and to govern and manage its business well.

Achieving the outcome

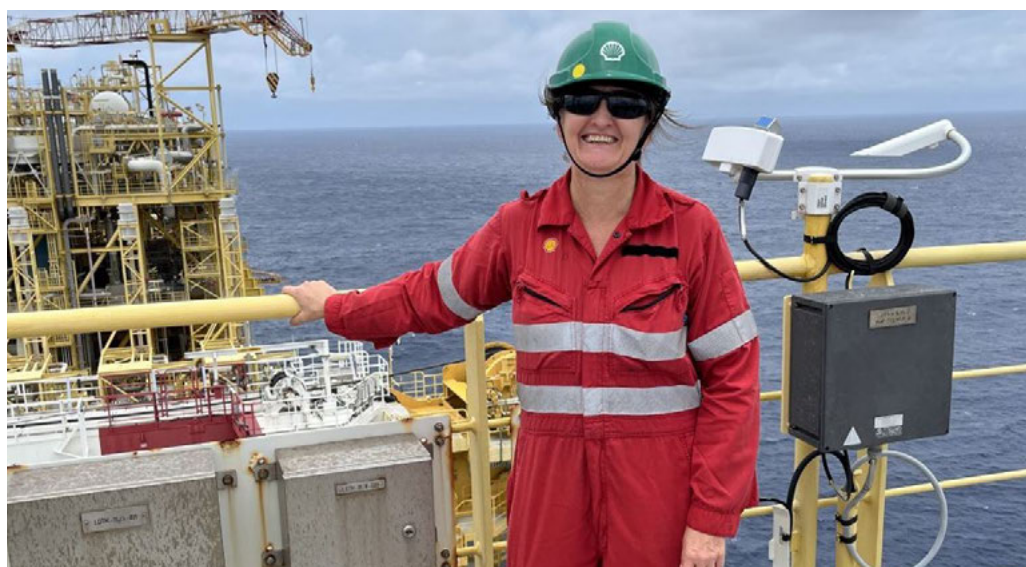
Gaining an independent view on the Bureau's community services

In August, an independent panel of 4 experts undertook a review of the Community Services Group to assess delivery of the group's activities and responsibilities, and the outcomes of the Public Services Transformation.

A series of actions is being implemented in response to the review's 15 recommendations, focusing on enhancing internal collaboration, clearer articulation of roles and competencies, strengthening governance and enterprise support, and improving customer engagement during change. Implementation of the review recommendations and actions will continue to be tracked and reported on every 6 months.

Supporting offshore aviation operations

The Bureau is the designated Meteorological Authority for Australia under the *Convention on International Civil Aviation 1947* (the Chicago Convention) and is required to ensure that aviation meteorological services are provided in accordance with international standards. During 2024–25, the Bureau's Meteorological Authority Office facilitated 2 new approvals for automatic weather stations located on helidecks. The Bureau can approve automatic weather stations at aerodromes for the purpose of Civil Aviation Safety Regulations 1998 which enable safe and efficient aviation operations. These automatic weather stations will support the offshore operations of Shell Australia and Santos located near Broome and Darwin respectively.



The Bureau's Sarah Manning conducting an audit of an automatic weather station on an operational floating liquefied natural gas facility located offshore of Broome, Western Australia.

In facilitating these approvals, the Meteorological Authority Office inspected the siting of each automatic weather station and the applicant's exposition of compliance to confirm compliance with the Bureau's policy.

Implementing new crisis management arrangements

In late 2024, the Bureau implemented a new Crisis Management Procedure for responding to disruptive events affecting the Bureau's staff, products, services and critical business functions.

The Bureau has adopted a 3-tier incident management model – Issue, Incident, Crisis – as outlined in the International Standard for crisis management (ISO 22361). The approach provides appropriate command and control of incidents in the form of the Crisis Management Team, which comprises members of the Bureau's Executive Team, supported by subject-matter experts.

The new approach ensures that the Bureau can respond as efficiently and effectively as possible to these events by providing role clarity, removing administrative overheads and avoiding areas of confusion. The new crisis management arrangements were activated and tested during tropical cyclone Alfred in March.

Refurbishing the Bureau's Melbourne office and operations centre

Lengthy and detailed lease negotiation for the Bureau's premises at 700 Collins Street culminated in May with a favourable outcome for the Bureau.

The suitability of the location and incentives from the lessor presented an opportunity to optimise the Bureau's footprint and update the fit-out. Remaining in-situ was ideal with comparatively less disruption for the more than 1,000 staff that are based in the Bureau's Melbourne office.

The new fit-out is expected to take approximately 2 years to complete and will be designed to suit contemporary ways of working, building a sense of community and connection in the workspace. Design consultation will commence in 2025–26.

Within these premises, construction of the new Melbourne National Operations Centre (MNOC) commenced in May and will provide a critical foundation for the Bureau's national forecasting capability. Considerable effort has gone into the consultation, design and planning of this strategically important facility, with contributions from a broad range of stakeholders.

Planned features include increased and improved situational awareness screens, improved information flow and cross-team collaboration, enhanced flexibility and functionality of the space – sight lines, configurations of teams and improved ergonomics and comfort – furniture, workstation selection, acoustics and design.

Next steps

In 2025–26 the group intends to:

- sustain and consolidate delivery of core enterprise services, including through delivery of expert, co-ordinated and practical advice
- continued development of physical work environments that meet enterprise requirements
- plan for the improvement of business systems, including reviewing process, systems and tools for project and program management.

Australian Climate Service

Goal: Improve access to integrated, authoritative, trusted data, information and expert advice; build and enhance national climate and weather hazard intelligence capability.

The Australian Climate Service (ACS) is responsible for providing data, intelligence and expert advice on climate and natural hazard risks and their impacts to inform decision-making. The ACS vision is to advance information and knowledge that is used to support a safer, adaptive and prosperous Australia that is resilient and prepared for climate challenges and natural hazards.

The ACS is made up of world-leading expertise from the Bureau, CSIRO, the Australian Bureau of Statistics and Geoscience Australia. The partnership draws together the national data, systems and expertise needed to inform climate and natural disaster decision-making. Each of the partners brings knowledge and expertise to the partnership and collectively this knowledge and expertise provides better information for decision-makers.

Bureau of Meteorology	CSIRO
 Australian Government Bureau of Meteorology The Bureau of Meteorology is the national weather, climate and water agency. It provides observational, meteorological, hydrological, oceanographic and space weather services.	 CSIRO CSIRO, as Australia's national science agency, brings its world leading research, science and innovation with a focus on climate observations and modelling, projections, resilience, adaption and transformation science and practice.
Australian Bureau of Statistics	Geoscience Australia
 Australian Bureau of Statistics The Australian Bureau of Statistics brings critical social and economic information to the partnership, enabling an improved picture of the vulnerability of communities and how these are changing across Australia.	 Australian Government Geoscience Australia Geoscience Australia, a trusted advisor on national geology and geography, brings national hazard and exposure information, and geospatial and location services.

The Australian Climate Service partners.

The ACS is included in this Annual Report as the Bureau hosts the ACS. The Bureau's CEO and Director of Meteorology is the Accountable Authority and Senior Responsible Officer for the ACS.

Responding to the Independent Review of the Australian Climate Service

The ACS was established on 1 July 2021 in response to the Royal Commission into National Natural Disaster Arrangements, with an initial focus on supporting the Australian Government's emergency management functions and investments in disaster recovery and resilience.

In October 2023, the Australian Government announced the appointment of an independent panel to review the performance of the ACS and assess its suitability to meet Australia's current and future climate information needs.

The Independent Review Panel's final report made 11 recommendations to the Australian Government on 30 April 2024.

Following review of the panel's recommendations, the 2024 interim Statement of Expectations refined the focus for the ACS and transferred responsibility for operational support services for emergency management to the National Emergency Management Agency (NEMA). The transfer, effective from 1 July 2024, has been transformative allowing the ACS to focus on medium and longer-term climate impacts. Understanding potential future climates and the changes that natural hazards pose is crucial to being prepared and able to respond and adapt.

On 23 December 2024, the Hon Josh Wilson MP, Assistant Minister for Climate Change and Energy, released the Australian Government's response to the independent review of the ACS. The Government response made a commitment to supporting the ACS to consolidate and strengthen its current operations to deliver on outcomes for the community, including the National Climate Risk Assessment and Hazards Insurance Partnership (HIP).

The Government response indicates further reforms to the ACS will be considered following the finalisation of the National Climate Risk Assessment and National Adaptation Plan.

In line with the Government response, the Assistant Minister for Climate Change and Energy issued a new Statement of Expectations to the ACS on 3 March 2025. The ACS responded with a Statement of Intent outlining the priorities and intended approach to deliver on the Government's vision through the Statement of Expectations 2025. The 2 statements are available at:

www.acs.gov.au/pages/about-us.

The ACS seeks to achieve 2 main outcomes. The achievements in delivering these are discussed below.

Outcome 1: Enhanced national climate and weather hazard intelligence capability.

Achieving the outcome

Establishing the National Insurance Dataset

Natural hazard risk is increasing in Australia, driving up the cost of insurance and making it unaffordable for some households and communities.

The ACS is working with the HIP, including the insurance sector, to address these challenges by providing expert advice, data, and other information to inform risk reduction and adaptation options.

A key activity the ACS undertook during 2024–25 was to establish a comprehensive dataset on insurance characteristics including coverage and affordability. The new National Insurance Dataset includes data from the insurance sector to strengthen the understanding of insurance affordability and coverage issues. The ACS through the Australian Bureau of Statistics created bilateral data-sharing agreements with 6 major insurers to gather the data.

Developing the Future Climate Water Scarcity Risk Index

Water is essential for all forms of life – the survival of our natural ecosystems, communities and economies. Rising temperatures and altered rainfall patterns are leading to more frequent and intense droughts, impacting water scarcity.

The Future Climate Water Scarcity Risk Index created by the Bureau as part of the National Climate Risk Assessment (see p.150) aims to provide a national-level comparative assessment of regional water system risks during periods of acute water scarcity under future climate scenarios.

The activity developed and tested the concepts of a water security risk index that integrates hazard, exposure, and vulnerability across multiple water uses. This integrated approach will provide a final risk ranking and severity assessment, helping to prioritise adaptive responses.

The Future Climate Water Scarcity Risk Index provides a detailed assessment of water scarcity risks across Australia, highlighting regional variations in hazard, vulnerability, and loss. The findings can inform policy and decision-making to enhance the resilience of water systems to future climate impacts.

Understanding the link between air quality and disease transmission

Australian cities are frequently affected by bushfire smoke such as the large areas of Australia exposed to dangerous levels of smoke during and after the Black Summer bushfires of 2019–20. The major impact of bushfire smoke on the healthcare system comes from patients seeking care for respiratory symptoms.

ACS partner CSIRO conducted a comprehensive study on the impacts of climate change on air quality and the transmission of communicable diseases. This project, part of the National Climate



Bushfire smoke over Melbourne suburbs, January 2020.

Risk Assessment (see p.150), focused on 2 main workstreams, the effects of bushfires on air quality and health, and the emergence and increased transmission of communicable diseases due to climate change.

This project underscores the critical intersection between climate change, air quality, and public health. The climate risk information is being used to inform and support policy and other decision-making by combining multiple datasets for exposure, vulnerability and response diversity to develop an integrated risk index by Local Government Area.

Understanding the vulnerability of residential buildings in floods

Flooding is one of the deadliest natural hazards in Australia, occurring most commonly from heavy rainfall when watercourses do not have the capacity to carry excess water. As floodwaters rise, properties with lower floor heights are affected first, while properties elevated above the surrounding terrain and above the height of surrounding waterways may escape damage.

The ACS, led by Geoscience Australia, developed observed or modelled floor height data for residential homes for selected high-priority and significantly flood prone regions. This activity will assist the ACS to provide high-quality, nationally consistent data, intelligence, and evidence-based insights.

An integrated view of floor height data is a key piece of intelligence in understanding where those homes most vulnerable to flood are located. This activity aims to develop a scalable pattern that can be applied to other infrastructure types, hazards and geographies.



Homes affected by major floods in Brisbane during 2011.

Highlights and significant events

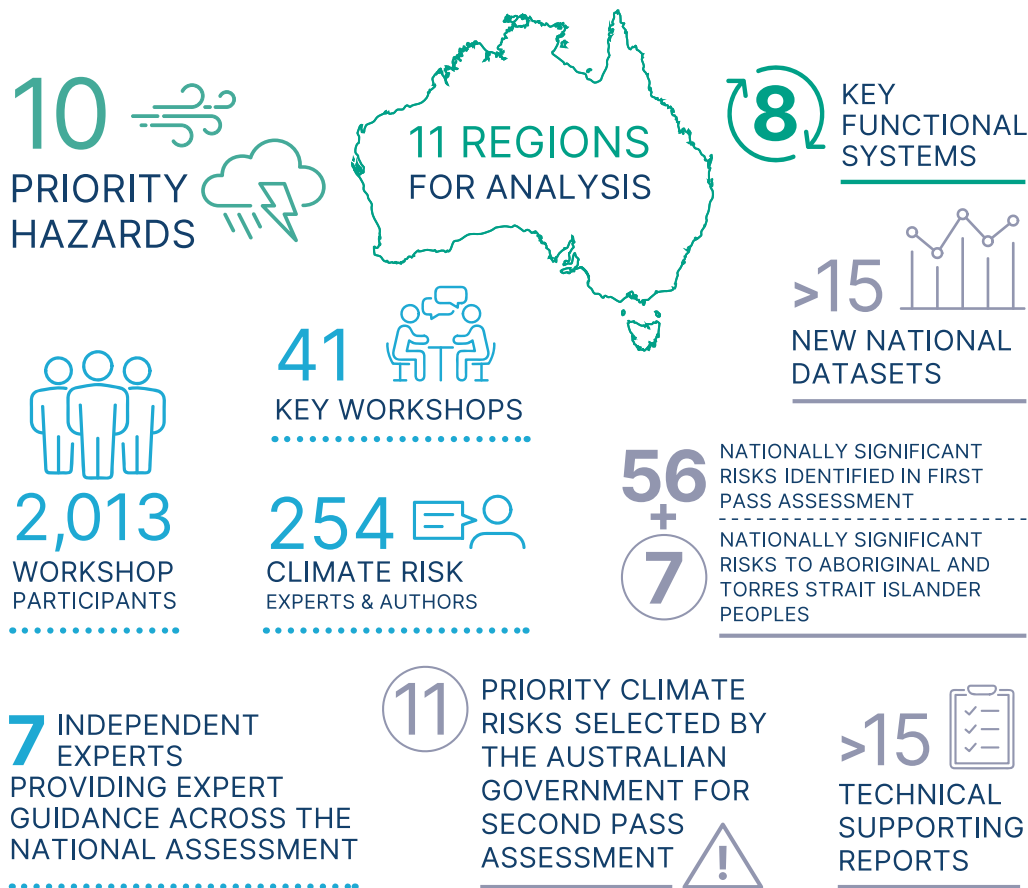
Delivering the National Climate Risk Assessment

Australia is facing a future where the impacts of climate change will increasingly affect our communities, infrastructure, economy, and natural environments.

The National Climate Risk Assessment (National Assessment) provides a comprehensive view of the risks across the entire country – pulling together the best available data, science, and evidence to understand what Australia is up against. Without this broad, science-based understanding, it would be difficult for decision-makers to prioritise what needs to be done to protect Australians and adapt to the changes ahead.

The ACS worked towards delivering Australia's first National Assessment detailing the most significant climate risks facing the nation, identifying how Australia's people, infrastructure, economy, and environment are exposed and vulnerable to climate change this century.

During the year, the ACS analysed 11 priority risks across 8 systems and identified 7 new risks in the Aboriginal and Torres Strait Islander Peoples system to highlight the integrated nature of risk and potential for cascading and compounding impacts identified in the first pass assessment released in March 2024.



Snapshot of National Climate Risk Assessment deliverables.

Between July 2022 and June 2025, the ACS collaborated with a range of experts to deliver different elements of the National Assessment including 41 key workshops with over 2,000 participants. Seven independent experts provided consistent advice across the National Assessment compiled by 254 climate risk experts and contributing authors. The ACS also leveraged the expertise and data from the Bureau, CSIRO, the Australian Bureau of Statistics and Geoscience Australia.

The National Assessment will support decision-making for Australian Government adaptation planning processes, and the assessment of priority risks will be used by many Australian Government agencies, industries and communities.

Next steps

In 2025–26 the ACS intends to:

- leverage the insights and data prepared under Australia's first National Climate Risk Assessment to support the Government's medium- to longer-term adaptation responses
- develop an improved national understanding of climate risk decision-maker and user needs for Australia
- provide assets and intelligence to support the HIP.

Outcome 2: Improved access to integrated, authoritative, trusted data, information and expert advice.

Achieving the outcome

Understanding climate impacts through Aboriginal and Torres Strait Islander perspectives

The ACS values the role Aboriginal and Torres Strait Islander peoples' knowledge and cultural values play in understanding and responding to Australia's climate and natural hazard risk.

During 2024–25, the ACS collaborated with Aboriginal and Torres Strait Islander peoples and organisations to recognise and embed what communities are seeing and experiencing on Country and its different impacts on the climate.

The ACS conducted both one-on-one interviews and focus groups with over 20 different groups and individuals represented and asked questions on climate risk information, gaps and barriers in data and information.

The ACS collated stories to highlight how climate change is affecting Aboriginal and Torres Strait Islander communities and how Aboriginal and Torres Strait Islander knowledge and practices are being used to adapt to climate change.

Assessing the capability needed for building Australia's climate resilience

Australia has a strong history of research and data collection on climate and natural hazards. High-quality observational datasets and advanced climate models are available for many hazards.

In 2024–25, experts from the ACS, predominantly CSIRO and the Bureau, together with external subject matter experts, conducted a Hazard Capability Stocktake assessing the climate hazard projections capability needed to provide a national basis for resilience and adaptation planning, highlighting strengths, weaknesses, and future priorities.

The capability stocktake assessed hazards that significantly impact Australia’s built, social, environmental, and economic domains. These include bushfires, coastal flooding, drought, extreme rain, riverine and flash flooding, tropical cyclones, coastal erosion, severe convective storms, extratropical storms, and ocean warming and acidification. The hazards were assessed by ACS experts using data, scientific understanding, and infrastructure maturity categories. This systematic evaluation developed an overall maturity rating for each hazard that will inform future ACS planning in support of resilience activities.

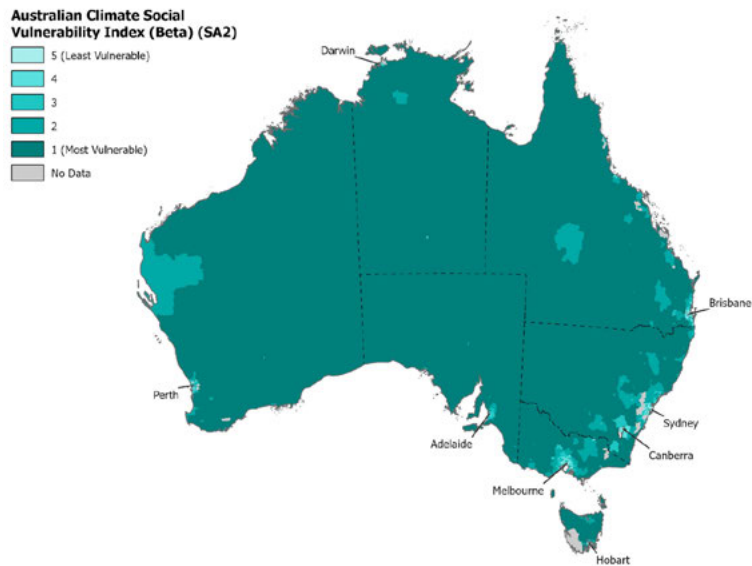
Highlights and significant events

Measuring community vulnerability in Australia

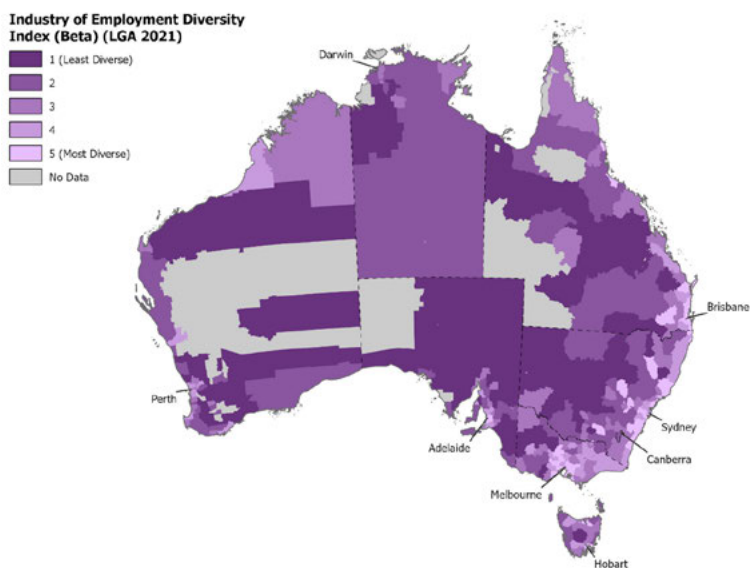
As part of understanding the impacts of climate change and severe weather, the ACS has invested in advancing the nation’s understanding of community vulnerability through the development of 2 new indexes, currently in beta (β) version.

The Australian Climate Social Vulnerability Index (ACSVI β) was developed to better understand the relative social vulnerability of Australian communities, in the context of a changing climate. It uses indicators from multiple vulnerability themes: socioeconomic factors, access to services, social cohesion, health and disability, housing and transport.

The Industry of Employment Diversity Index (IEDI β) provides a nationally consistent measure of how diverse a Local Government Area’s (LGA) industries are, by measuring how concentrated employment is in these industries. An LGA with diverse industries of employment is likely to have a diverse economy that does not rely on a single industry. Reliance on a few industries is considered to make an LGA more vulnerable, as the impacts of climate change and natural hazards on these industries will affect the LGA’s economy more significantly than LGAs with more industries that may be able to absorb these shocks.



Map showing the beta (β) version of the Australian Climate Social Vulnerability Index (ACSVI β).



Map showing the beta (β) version of the Industry of Employment Diversity Index (IEDI β).

These indexes are nationally consistent measures that have been developed by the ACS to uplift measures of vulnerability of Australian communities to climate change and natural hazards in the social and economic domains. They are key inputs into the National Assessment and will be published on the ACS website.

The indexes allow the ACS to highlight different kinds of vulnerability for decision-makers to gain a better understanding of how climate change and severe weather may impact Australian communities.

Next steps

In 2025–26 the ACS intends to:

- deliver increased and timely access to hazard, exposure, vulnerability and response, climate risk and impacts, data and insights
- further develop the ACS digital platform to be the national, authoritative and trusted source of climate risk information
- continue to engage with Aboriginal and Torres Strait Islander peoples to apply their perspectives on Australia's climate and natural hazard risks.

Recognition of performance

Throughout 2024–25, the Bureau continued to recognise the excellent work of individual staff, volunteers and teams who contribute to the delivery of trusted, reliable and responsive weather, water, climate, ocean and space weather services to all Australians.

Recognising and celebrating the Bureau’s people is an important part of the workplace culture. Through the Recognition and Reward Framework, the Bureau recognises staff formally or informally, ranging from ‘cause for applause’ moments in team meetings to formal awards.

Bureau Excellence Awards

In September, the Bureau recognised and celebrated outstanding achievements by teams and individuals across the organisation at the 2024 Bureau Excellence Awards. Established in 1987, the Awards are an opportunity to highlight excellence across the Bureau through successful projects, initiatives or delivery of services during extreme weather.

Awards were presented across 5 categories: the Director’s Choice Award and awards representing achievements aligned with the Bureau’s 4 pillars of success – Impact and value, Operational excellence, Insight and innovation and the Bureau way.

2024 award	Recipient(s)
Director’s Choice	Bluelink Team For sustained contributions and excellence in leading the development and improvement of ocean forecasting capability ensuring risk-based decision-making.
Impact and value	Probabilistic Flood Forecasting Service Team For leading the delivery of advanced probabilistic weather and flood prediction services that have significantly enhanced community safety outcomes.
Impact and value	Climate Services for Agriculture Program Team For developing My Climate View which has enabled the agricultural sector to confidently contextualise complex future climate trends to better inform decision-making and improve resilience to climate change.
Operational excellence	Enterprise Agreement Negotiations and Implementation Team For leading the delivery of the Bureau’s Enterprise Agreement, resulting in overwhelming acceptance of the new agreement, improved automation of related processes, and greater understanding of entitlements.
Operational excellence	Cairns Hub Team For unwavering professionalism and commitment to restoring the Cairns Airport automatic weather station following tropical cyclone Jasper, enabling the continuation of emergency services and aviation operations.

2024 award	Recipient(s)
Insight and innovation	Dr Anja Schubert, Manager, Value and Quality, Science and Innovation Group For outstanding contributions in the fields of model-data systems and improved software practices, and for excellence in leading the development of the SIMPLER High Performance Computing model-data management system.
The Bureau way	Hadley Black, Cyber Operations Lead, Data and Digital Group For leading the development and implementation of the Security Information and Event Management solution, which has significantly uplifted cyber security capability for the Bureau.

Australia Day Achievement Medallion Awards

Every year the Bureau recognises the achievements of its people through the Australia Day Achievement Medallion Awards for outstanding performance on a special project that has made a significant contribution to the nation, or for exceptional performance of duties.

In February, the Bureau’s CEO and Director of Meteorology, Dr Andrew Johnson, presented the 2025 Australia Day Achievement Medallion Award to the Digital Channels and Customer Experience Design team.



The Digital Channels and Customer Experience Design team with the Bureau’s CEO.

The award recognised the team’s sustained excellence in designing, delivering and enhancing the BOM Weather app, providing an outstanding customer experience for millions of Australians every day and enabling profound impact and value for the Australian community from the Bureau’s capabilities.

World Meteorological Day – Long Service Awards

In March, the Bureau celebrated World Meteorological Day 2025, which commemorates the Convention establishing the World Meteorological Organization (WMO) coming into force in 1950.

As part of World Meteorological Day celebrations, the Bureau recognised 16 staff members who have contributed more than 30 years of service to the Bureau and its customers.

2025 National Emergency Medal

In February, the Bureau's Queensland embedded meteorologist David Grant was awarded the prestigious National Emergency Medal.

The Bureau supports emergency services in many states and territories by providing dedicated experts to brief on the weather and advise their decisions, as a supplementary, funded service.

David has supported Queensland's emergency services in the embedded role at the Kedron State Disaster Coordination Centre since 2017. He has provided trusted and valued advice throughout many severe weather, flood and coastal events, including providing briefing and analysis to support incident controllers, Commissioners and Premiers.

In awarding the medal, Acting Commissioner of Police, Shane Chelepy, stated: 'David has been an indispensable asset, providing up-to-the-minute weather forecast advice during numerous seasons. His tireless dedication and ability to deliver multiple briefings to diverse audiences is nothing short of remarkable.'

Volunteer Rainfall Observer Excellence Awards

Manual rainfall observations are collected from across Australia and transmitted to the Bureau by around 3,100 volunteers who form an integral part of the Bureau's composite observations systems. The Bureau recognises the dedicated and sustained commitment of its long-serving volunteer rainfall observers by presenting them with excellence awards for 50 and 100 years of service.

In 2024–25, the following awards were presented:

- Noel Cooke for 50 years of continual rainfall observations at Yarra Creek, King Island, Tasmania (station 98023)
- John Newton for 50 years of continual rainfall observations at Doctors Creek (station 41024)
- The Nichols family for 100 years of continual rainfall observations at Richmond (Brookbank) (station 94055).



The Bureau's Brendan Hanigan (far left) and Will Tankard (far right) with Noel, Judith and Mark Cooke with their excellence award for 50 years of service and a rain gauge.

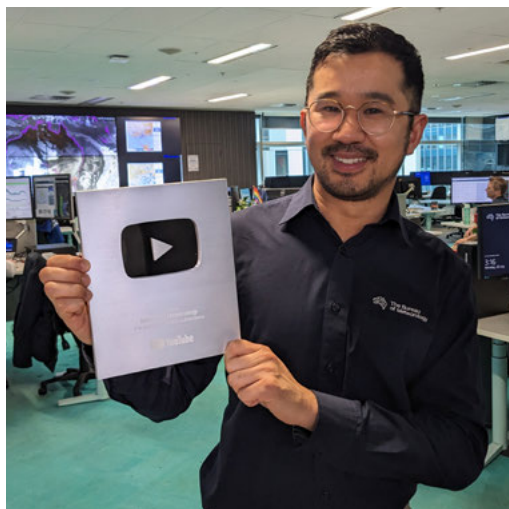
YouTube Silver Creator Award

On 6 April 2025, the Bureau's YouTube channel reached the milestone of 100,000 subscribers. YouTube recognised this accomplishment with the Silver Creator Award, signifying the Bureau's dedication and success in building a thriving community.

The Bureau first published videos on YouTube in 2011 to showcase its services as the platform was beginning to boom in popularity. Now, 14 years on, the Bureau has expanded its video catalogue to include forecasts, severe weather updates, and knowledge building videos explaining key weather and climate concepts.

YouTube has become one of the Bureau's key communication channels and supports the delivery of impact and value to the Australian community.

The success of the Bureau's YouTube channel is the result of the strong collaboration between multiple Bureau teams in the Community Services Group and the Enterprise Services Group.



The Bureau's senior meteorologist Jonathan How with the Silver Creator Award.

Australasian Reporting Awards

The Australasian Reporting Awards acknowledge organisations that produce high quality annual reporting. The Awards provide organisations an opportunity to benchmark their reports against their peers across the Asia-Pacific region.

The Bureau was recognised with its seventh consecutive Gold Award for its Annual Report 2023–24 at the Awards in May. The Award recognises the clarity, transparency and commitment of the Bureau's reporting and confirms that it continues to benchmark well against the annual reports of businesses and governments across Australia, New Zealand and beyond.



The Bureau's Manager, Planning and Performance, Ben Van Doorn, with the Gold Award for the Bureau's Annual Report 2023–24.