Legislative Council Environment and Planning Committee

Hearing date: 1/05/2026

Questions taken on notice

Directed to: Bureau of Meteorology, Matthew Collopy

Received date: 4/06/2026

- **P.84-85 Gaelle Broad**

Question: Gaelle BROAD: There has been some criticism of the accuracy of the BOM over time. Are you generally heading in the right direction?

Matthew COLLOPY: Yes. On notice I can provide some statistical information that we use in our annual report and the other reporting functions and website-type information we provide to the public-

Response:
The Bureau assesses its forecast accuracy as part of routine continuous improvement processes. The Bureau's forecast accuracy has continuously improved over time. Since 1 July 2025:

- The forecast for tomorrow's maximum temperature was within 2°C of that observed 90% of the time, an increase from around 88% in 2015–16.
- The forecast for tomorrow's minimum temperature was within 2°C of that observed 84% of the time, an increase from around 79% in 2015–16.
- 90% of all hourly wind speed forecasts for the next day were within 5 knots of observed wind speed, an increase from around 83% in 2015–16.

Comparisons with international meteorological agencies show the Bureau's ACCESS-G global weather forecasting model is in the top 5 of available global models. The Bureau and its international partners continue to invest in science and technology to improve the timeliness and accuracy of its forecasts and warnings.

The Bureau's Annual Report for 2024–25[1] included the accuracy of fire weather forecasts as a contributing measure (CM6.2):

> ***Results and rating:*** *Performance met expectations and showed improvements compared to the previous year.*

> *In 2024–25 the accuracy of the primary fire behaviour index was 96% and the secondary fire behaviour index was 94%, both exceeding the target of 75%.*

[1] Bureau of Meteorology Annual Report 2024-25

> ***Previous results:*** *In 2023–24 the average accuracy of the primary and secondary fire behaviour indices was 95% and 92% respectively.*

- **P.85 Sarah Mansfield**

Question: In the Otways there were a number of difficult fire days, but there was also that significant rain event that caused flooding along the Great Ocean Road that seemed to catch those communities by surprise. The concentration of rain and volume of rain that fell there was quite unexpected. What factors from your perspective contributed to those extreme events happening basically concurrently?

Matthew COLLOPY: On notice I can provide – we did do some reports – some information about that exact event-

Response:

The following antecedent conditions contributed to the bushfire event:

- 2025 was Victoria's eighth-warmest year on record, 0.94 °C above the 1961–1990 average. Temperatures were above average (in the warmest 10% of all years since 1910) across the entire state.
- Rainfall totals in 2025 were below average for much of Victoria, including for the Otways' South West fire weather district.
- Over the 24-month period from January 2024 to December 2025, areas with severe or serious rainfall deficiencies (rainfall totals in the lowest 5% or 10% of periods since 1900, respectively) extended across much of Victoria's fire weather districts, including the South West.

The flooding along the Great Ocean Road was a flash flood event caused by heavy rain from thunderstorms impacting a small and steep catchment, and was therefore a very localised and rapid event. Flash flooding from thunderstorms can occur over areas that have experienced below average recent rainfall, and therefore it is not unexpected to have bushfire events and thunderstorm with flash flooding occur at similar times and areas.

Additional questions

Melina Bath

- Coverage gaps:
  Where are the key gaps in wind speed and humidity monitoring in bushfire-prone forests, slopes and valleys?

Response:

The Bureau's automatic weather station (AWS) network is maintained in accordance with World Meteorological Organization (WMO) standards, with siting optimised to capture well exposed conditions at aerodromes, population centres, coastal areas and elevated locations. While a greater number of weather stations can provide more information on conditions in real-time, this is not the only information the Bureau uses for fire weather services. In addition to weather stations, the Bureau uses remote sensing capabilities to monitor current conditions, such as satellite and radar imagery, which are not restricted to weather station sites, together with numerical weather prediction models that help interpolate monitoring data and forecast forwards in time.

The Bureau uses this information, from weather stations, remote sensing, and numerical weather prediction (NWP) models, to generate a gridded dataset of forecasts for wind speed, humidity and other parameters across the entire landscape. This data is provided at 3 km resolution for Victoria, with fire weather forecast indices calculated at 1.5 km resolution to match fuel information that is provided by fire agencies.

- On-ground measurement:
  How many BoM stations directly measure fire-weather conditions within forested or fuel-rich landscapes?

Response:

The Bureau has approximately 80 AWS in Victoria that report every minute, as well as about 10 manual weather stations that report once or twice per day. These are dispersed across a range of landscapes within Victoria, as shown in maps publicly available on the Bureau's website Victorian Weather Observation Stations and Melbourne Area Weather Observation Stations

AWS record observations of weather conditions. This information contributes to fire weather forecasts and warnings. Fuel-rich landscapes are not easy to define and will vary from fire season to fire season based on antecedent conditions and recent fire history.

The Bureau also receives data from a number of portable automatic weather stations operated by Victorian fire agencies that can be deployed to areas near active fires or areas of fire concern.

- Reliance on modelling:
  In high-risk fire areas, what proportion of wind and humidity information is directly observed versus interpolated or modelled?

Response:

There is no clear way to separate the proportions of observed versus modelled wind and humidity data – nor would it be meaningful. Observed data helps to inform and improve models which are then used to form the basis of fire weather forecasts. Observed data is used to initialise NWP models, as well as to validate the performance of models by comparing model outputs with observations.

Areas of high fire risk vary from one fire season to the next as the risk is dependent on antecedent conditions and recent fire history.

- Wind extremes:
  Does BoM consider current stations adequately capture short-duration extreme wind gusts and sudden wind shifts that drive fire spread?

Response:

Yes. The Bureau operates its network in line with WMO guidelines to ensure fit for purpose data.

The Bureau's wind sensors measure wind speed and direction. All AWS provide 1-minute average wind speed and direction, and statistical measures of variability within the 1-minute period.

- Gust relevance:
  Is BoM satisfied that published gust data reflects actual fire-front wind conditions during major bushfires?

Response:

The extent to which observations reflect actual conditions is dependent on distance from the observation site, the nature of the surrounding area, such as topographical variations, and the characteristics of the weather.

In addition, fires can drive localised extreme winds due to interactions between the fire, the atmosphere and topography that may not be reflected in conditions at the nearest automatic weather station.

However, the Bureau operates its observational network in line with WMO guidelines to obtain measurements of conditions that can generally be considered representative of conditions in the surrounding area.

- Relative humidity:
  Does BoM consistently record and publish daily maximum relative humidity at fire-weather stations, and how reliable is this data during extreme events?

Response:

The Bureau publishes current weather conditions including humidity for all its AWS on the Bureau website and BOM Weather app. 30-minute data for AWS for the past 72 hours can also be found on the website and app. The Bureau does not specifically publish a daily maximum relative humidity. Uptime of the Bureau's AWS in 2024–25 was 98.7%.

The Bureau also supplies weather data to fire weather agencies through registered-user services. These services include 10-minute updates of observations and related fire weather information.

- Data loss:
  How frequently are wind or humidity observations lost during bushfires due to power, sensor or infrastructure failure?

Response:

Infrastructure failures are not uncommon during extreme weather events. For example, during the 2026 bushfires in Victoria, two automatic weather stations were damaged, one at Hunters Hill (near Tallangatta) and one at Cape Otway. In both cases the AWS lost power and data transmission capabilities – the 4G network was not operating. For safety reasons, there was a delay of 1 to 2 months before the sites could be visited and remediated.

In some cases when an AWS is damaged, local fire agencies might install a portable AWS (see response to question #4).

- Uncertainty transparency:
  How are data gaps and uncertainty communicated to fire agencies when warnings and fire danger ratings are issued?

Response:

The Bureau provides information on forecast confidence to fire and emergency services partners in numerous ways, including through direct verbal briefings and advice, and the issue of specialised products at the Victorian State Control Centre, such as the State Control Centre (SCC) Fire Weather and Heat Intelligence Briefing .

- Standards review:
  Have fire-weather observation standards and station siting been reviewed specifically against modern fire-behaviour science?

Response:

The Bureau's AWS network is maintained in accordance with WMO standards, with siting optimised to capture well exposed conditions at aerodromes, population centres, coastal areas and elevated locations.

Fire behaviour research in recent years has produced evidence that wind speed and direction can vary significantly around a fire line, with wind speed ranging from 10 to 100 km/h in response to interactions between the fires, atmosphere and topography. There are no direct observational arrays capable of capturing this level of spatial variability in wind conditions around active fire lines. Bureau forecasters also use remote sensing capabilities to monitor current conditions, such as satellite and radar imagery, which is not restricted to weather station sites.

- Post-fire learning:
  After major bushfires, does BoM formally assess data gaps, and are these findings driving changes in monitoring investment?

Response:

Following significant events, the Bureau conducts post-event reviews as part of our continuous improvement process. The Bureau also undertakes annual reviews of the fire season. These reviews consider all aspects of the service, although they rarely identify observational data gaps as being an issue. Any identified areas for improvement inform strategic planning ahead of the next fire season.