The Bureau of Meteorology

HyFS-FEWS Performance Analysis Tool

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Community Services Group
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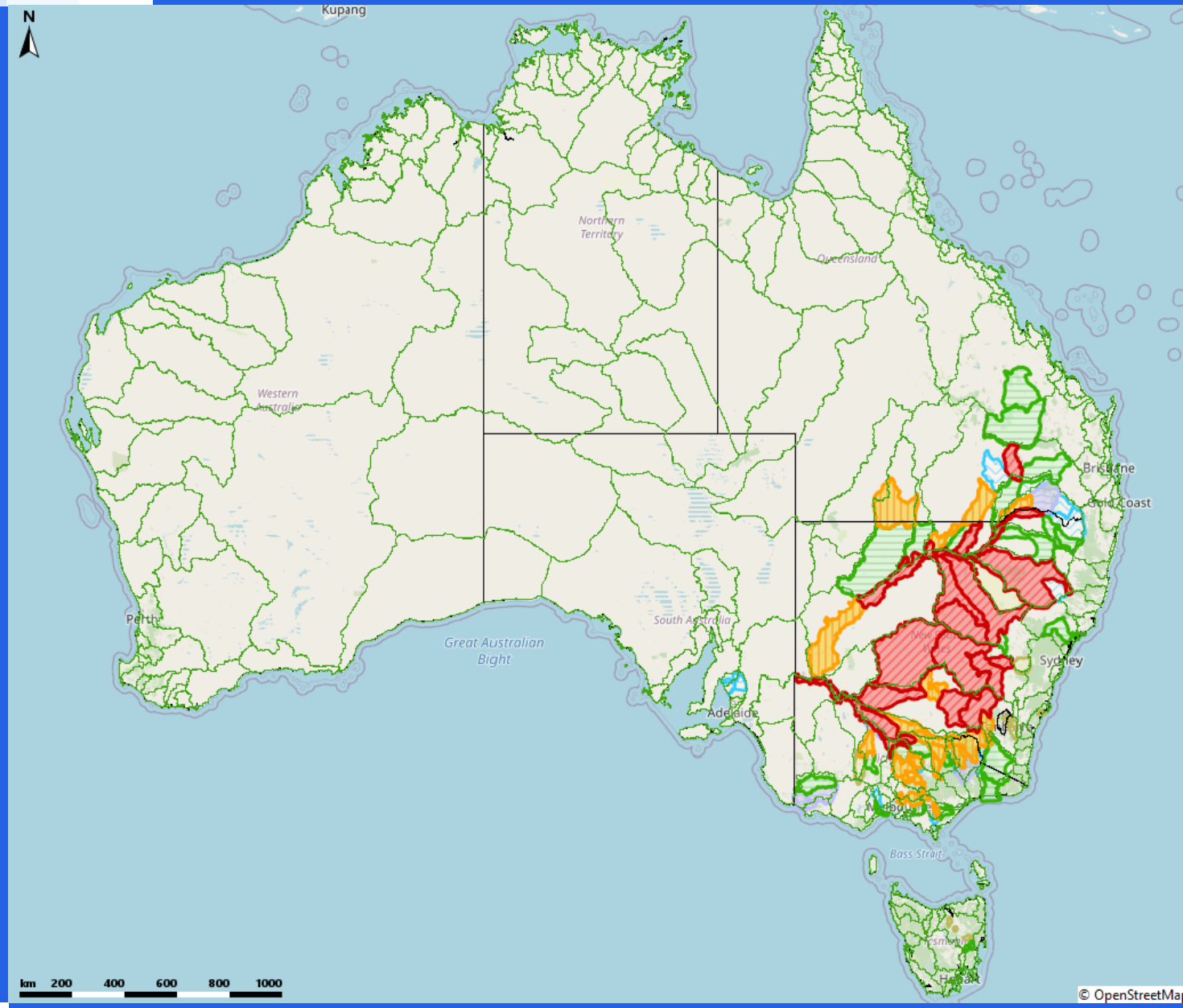
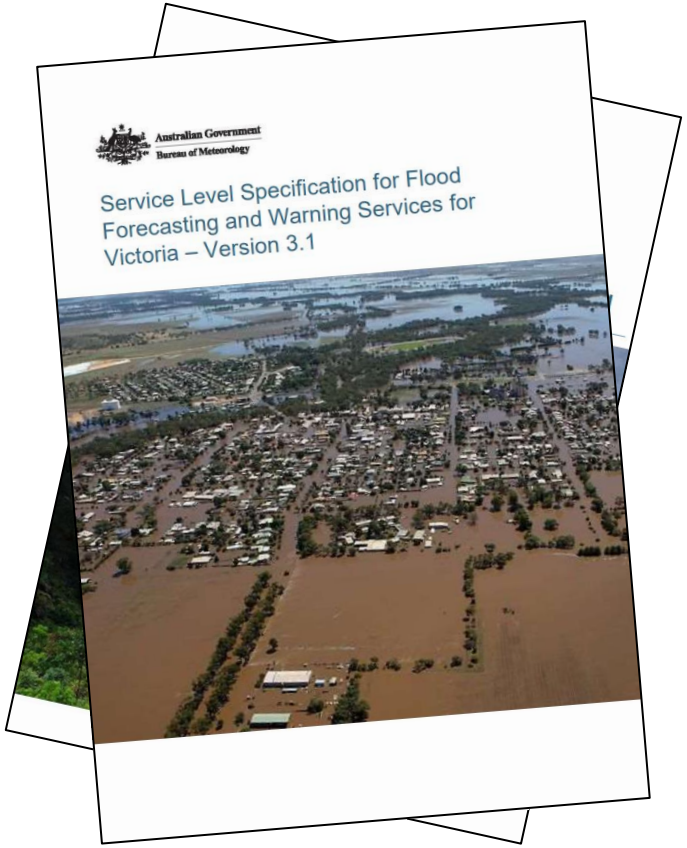
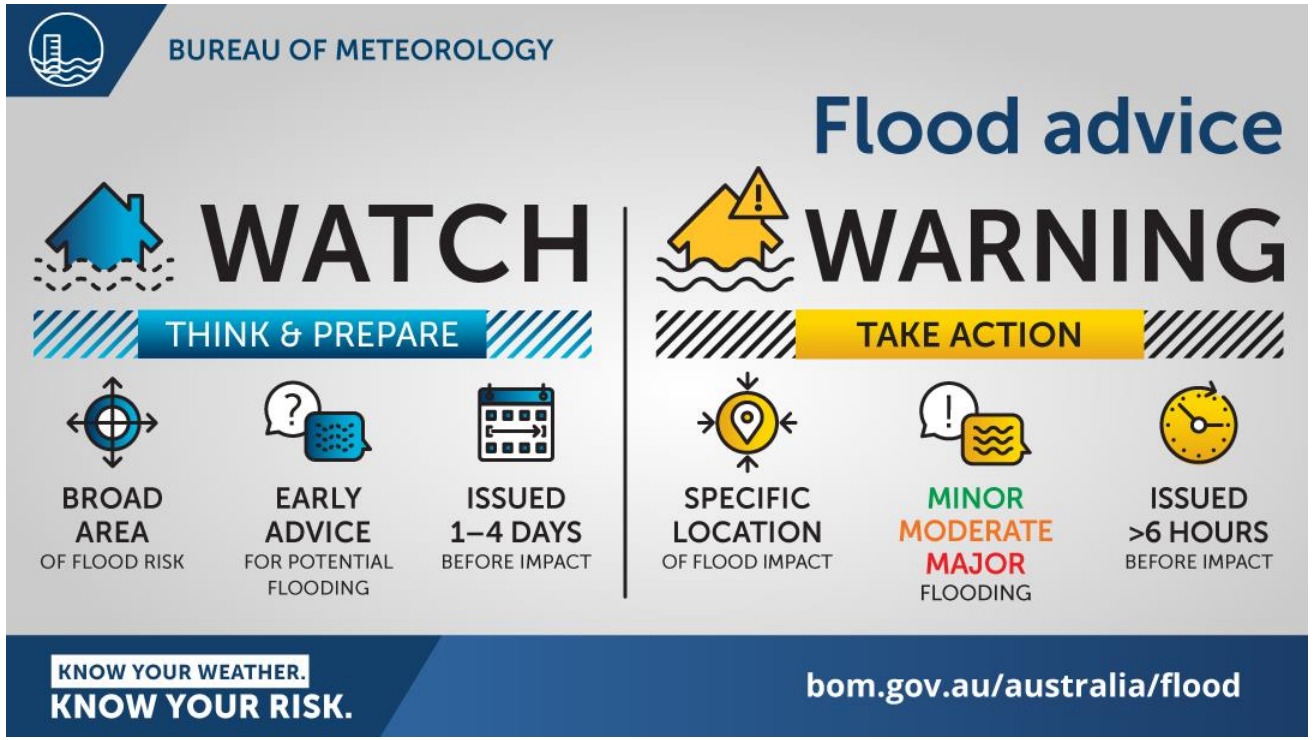


Flood Warnings on 4 November 2022

What is Bureau Flood Service Performance Analysis?





Performance targets are specified in service level specifications agreed with emergency management partners for each Australian State and Territory.

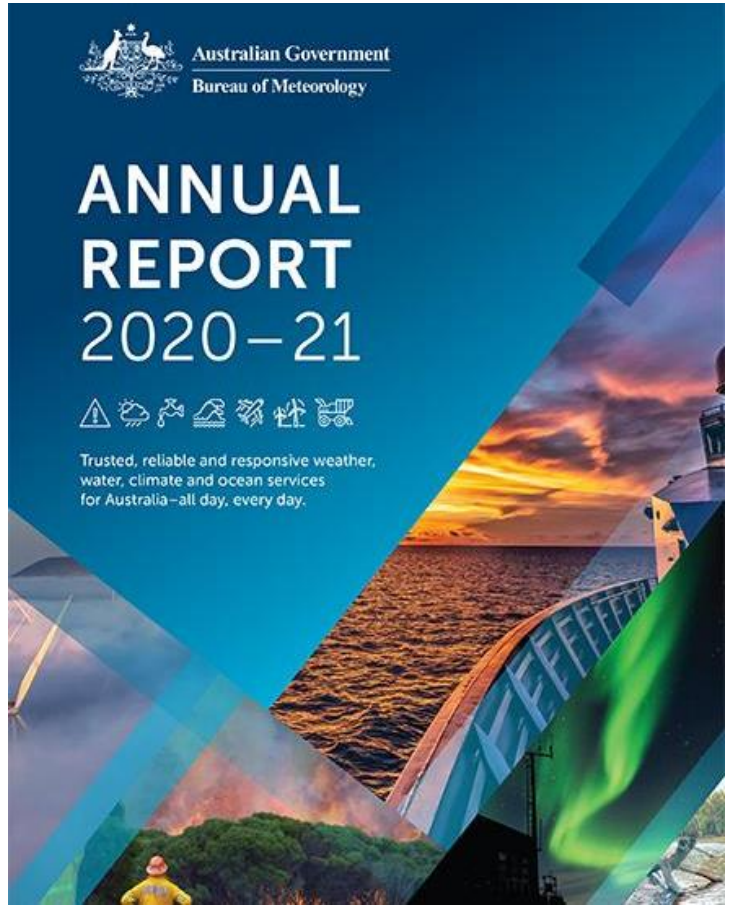
Performance analysis compares flood watches, warnings and forecasts against key targets that are defined for over 500 forecast locations across Australia.

Why do we evaluate our service performance

To improve the flood warning service for the Australian Community

Reporting

- Annual Report
- Flood Warning Consultative Committee (FWCC) meetings with emergency management partners
- Regular performance reporting to the Bureau Executive
- Regular performance reporting to operational forecasting teams
- Annual or Special Climate and Water Statement
- Flood event specific summaries
- Specific purpose requests



Performance of the flood warning service is provided in the Bureau's Annual Report

How do we measure performance?

Performance Measures

Timeliness (target 97%)

% flood watches and flood warnings issued to customers on time (before or at the stated next issue time)

Warning Lead Time (target 70%)

% trigger height exceedances for which target lead time was provided to customers as per Service Level Specifications (i.e. agreed warning lead time was met)

Forecast Accuracy (target 70%)

% peak predictions provided to customers within specified range (typically ±0.3 m) as per Service Level Specifications

Excerpt from the Service Level Specification of the Flood Warning Services for New South Wales and the Australian Capital Territory

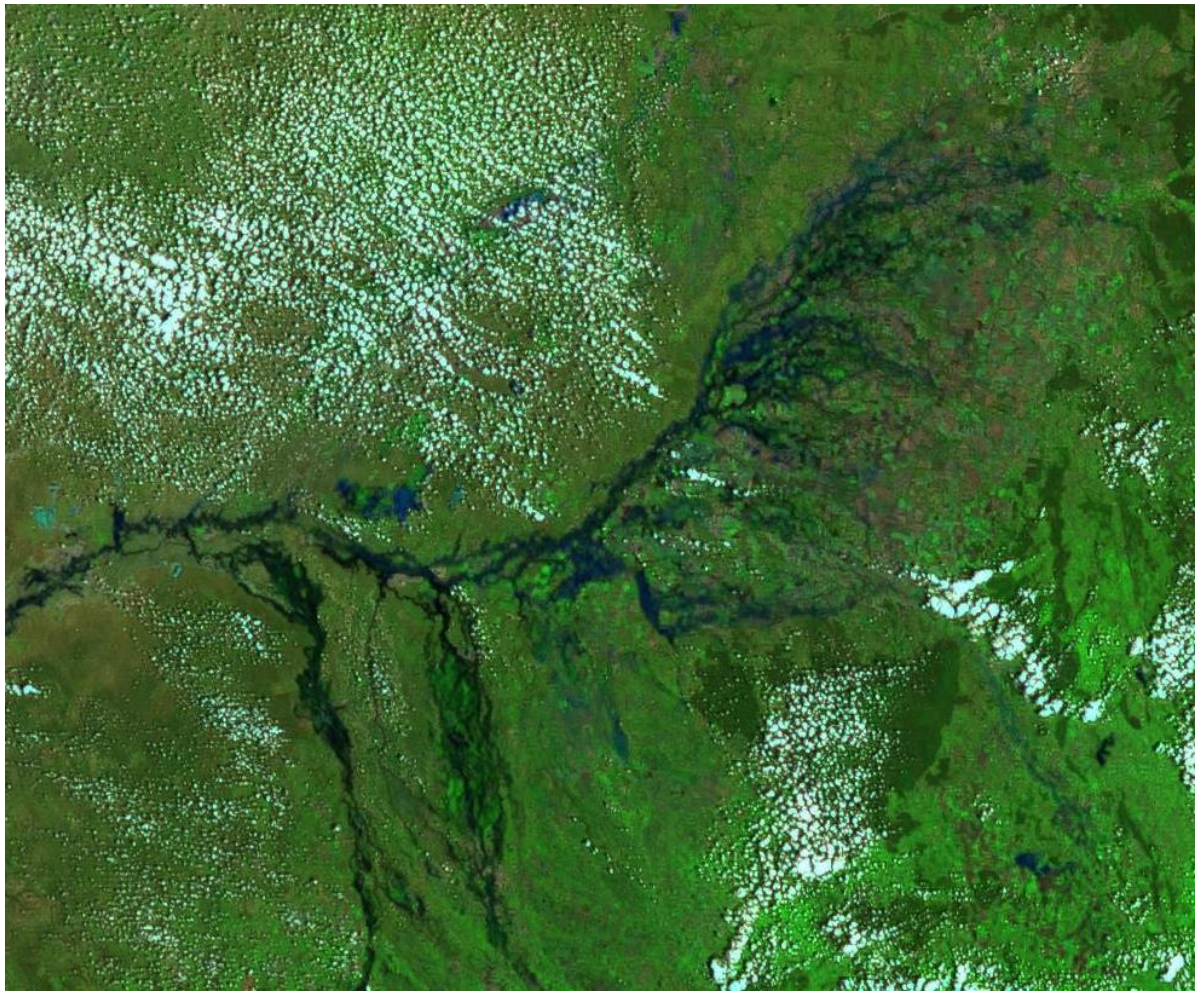
Bureau number	AWRC number	Forecast location	Flood classification (m)			Target warning lead time		70% of peak forecasts within
			Minor	Moderate	Major	Time (hrs)	Trigger height (m)	
416 – Macintyre River Valley								
56227	416009	Inverell (Ross Hill Bridge)	3.0	4.3	5.2	3 hrs	>3.0 m	+/- 0.3 m
54145	416006	Ashford	2.2	4.0	6.0	3 hrs	>2.2 m	+/- 0.3 m
554014	416058	Yetman	5.0	7.6	9.1	6 hrs	>5.0 m	+/- 0.3 m
53101	416002	Boggabilla	5.0	11.5	12.0	6 hrs	>5.0 m	+/- 0.3 m
41500	416201A	Goondiwindi	4.0	6.0	8.5	15 hrs	> 6.0	+/- 0.3m
425 – Barwon Darling River								
52068	416001	Mungindi	6.1	6.7	7.2	24 hrs	>6.1 m	+/- 0.3 m
548000	422004	Mogil Mogil	7.5	n/a	8.3	24 hrs	>7.5 m	+/- 0.3 m
48226	422003	Collarenebri	5.8	7.9	8.5	24 hrs	>5.8 m	+/- 0.3 m
552014	422001	Walgett	10.5	12.0	12.5	24 hrs	>10.5 m	+/- 0.3 m
48214	422002	Brewarrina	6.4	7.0	9.5	3 days	>10.0 m	+/- 0.3 m
548004	425003	Bourke	9.5	11.4	12.7	3 days	>13.2 m	+/- 0.3 m
548005	425004	Louth	8.6	10.0	12.0	3 days	>13.6 m	+/- 0.3 m
48213	425900	Tilpa	9.0	10.5	11.5	3 days	>12.2 m	+/- 0.3 m
546010	425008	Wilcannia	9.0	9.7	10.4	3 days	>10.0 m	+/- 0.3 m
47101	425001	Menindee	8.5	9.1	9.7	2 days	>8.8 m	+/- 0.3 m
47103	425005	Pooncarie	6.8	7.6	8.7	2days	>6.8 m	+/- 0.3 m
547015	425007	Burtundy	6.1	n/a	7.7	2days	>6.1 m	+/- 0.3 m

Location | Flood Classifications | Lead Time | Accuracy

Business Drivers for the HyFS-FEWS Performance Analysis Tool

Want to spend more time focusing on using performance analysis to improve services

- Reduce the effort required to produce the performance reports
- Ability to meet internal and external reporting requirements
- Ability to produce performance analysis during events
- Use performance analyse as part of our input into post event debriefs
- Make performance results available to operational forecasters
- Provide insights that enable service improvements



Flooding Across Australia (MODIS) November 2022

Calculating Performance Metrics

HyFS-FEWS Workflows

Australian Government Bureau of Meteorology

Minor to Major Flood Warning for the Murray and Edward Rivers
at Albury, Corowa, Yarrawonga downstream, Tocumwal, Echuca, Moama,Torrumbarry, Barham, Swan Hill, Wakool Junction, Boundary Bend, Deniliquin, Stevens Weir, Moulamein, Mildura and Wentworth

Issued at 4:04 pm EDT on Tuesday 25 October 2022

Flood Warning Number: 82

MAJOR FLOODING AT ECHUCA AND MOAMA IS PEAKING AROUND THE CURRENT LEVEL (94.90 METRES AHD) DURING TUESDAY, HIGHER THAN THE 1975 AND 1993 FLOODS

Floodwaters from the Campaspe and Goulburn Rivers combined with flows down the Murray River have caused major flooding at Echuca and Moama. River levels at Echuca Wharf have exceeded the October 1993 (94.77 m AHD) and November 1975 (94.80 m AHD) floods, and currently peaking slightly below 95.00 metres AHD, with major flooding.

As this flood peak extends downstream, it is likely to exacerbate the current major flooding at Torrumbarry and Barham, and cause addtional river level rises along the Murray River downstream of Barham. Forecasts for Swan Hill and downstream will be refined once the upstream flood peaks along the Murray River and its tributaries are observed.

Flood operations are being conducted by the Murray-Darling Basin Authority (MDBA) at Hume Dam to manage inflows from the upper Murray, Mitta Mitta River and other tributaries. MDBA are working closely with the Bureau and WaterNSW to plan release strategies.

Further rainfall is forecast for the reminder of Tuesday through to Friday across parts of the Murray River Basin, which may cause renewed river level rises and flooding. The situation is being closely monitored and revised predictions will be provided if necessary.

Murray River downstream of Hume Dam to Tocumwal:

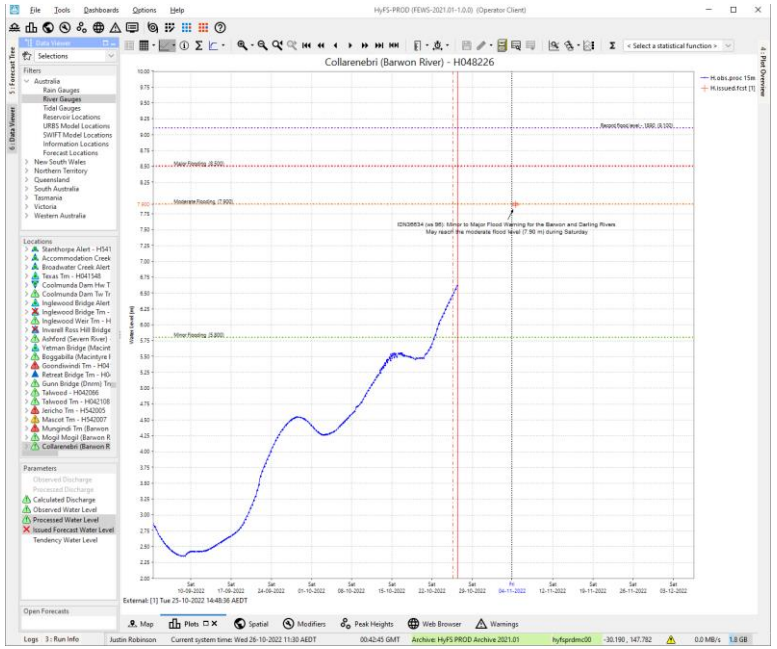
Minor flooding is occurring along the Murray River at Albury. Moderate flooding is occurring at Corowa. Minor flooding is possible at Yarrawonga Downstream and Tocumwal.

The Murray River at Albury is currently at 4.39 metres and steady, with minor flooding. Subject to the change of releases from the Hume Dam, the Murray River at Albury may remain above the minor flood level (4.30 m) until Friday.

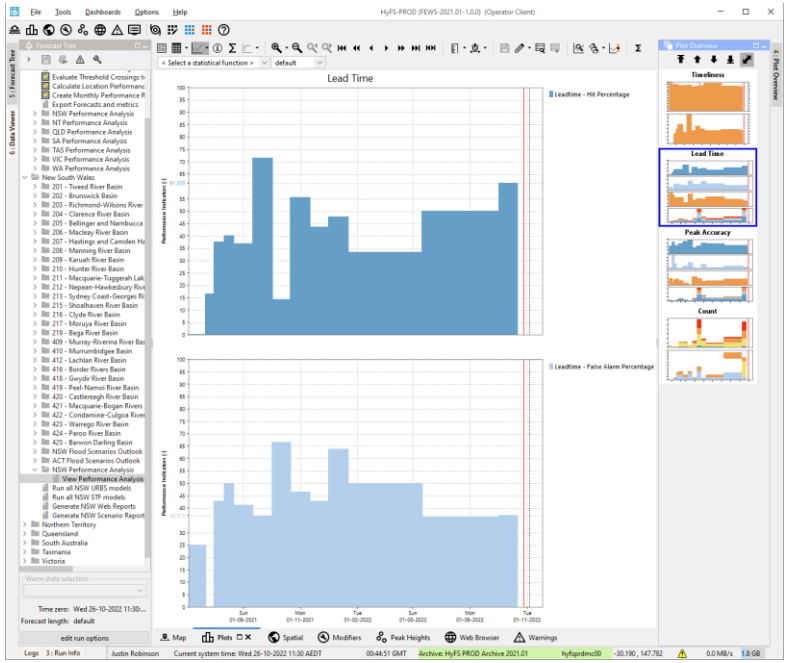
The Murray River at Corowa may reach around 6.25 metres around Wednesday, with moderate flooding.

The Murray River at Yarrawonga Downstream may reach around 6.50 metres Wednesday afternoon, with minor flooding. Further rises are possible.

Text flood forecasts and warnings, are also available in machine readable .xml formats



Flood forecasts and warnings are imported into HyFS-FEWS enabling quality control of the observations and forecasts.



HyFS-FEWS runs a monthly workflow that calculates the performance metrics.

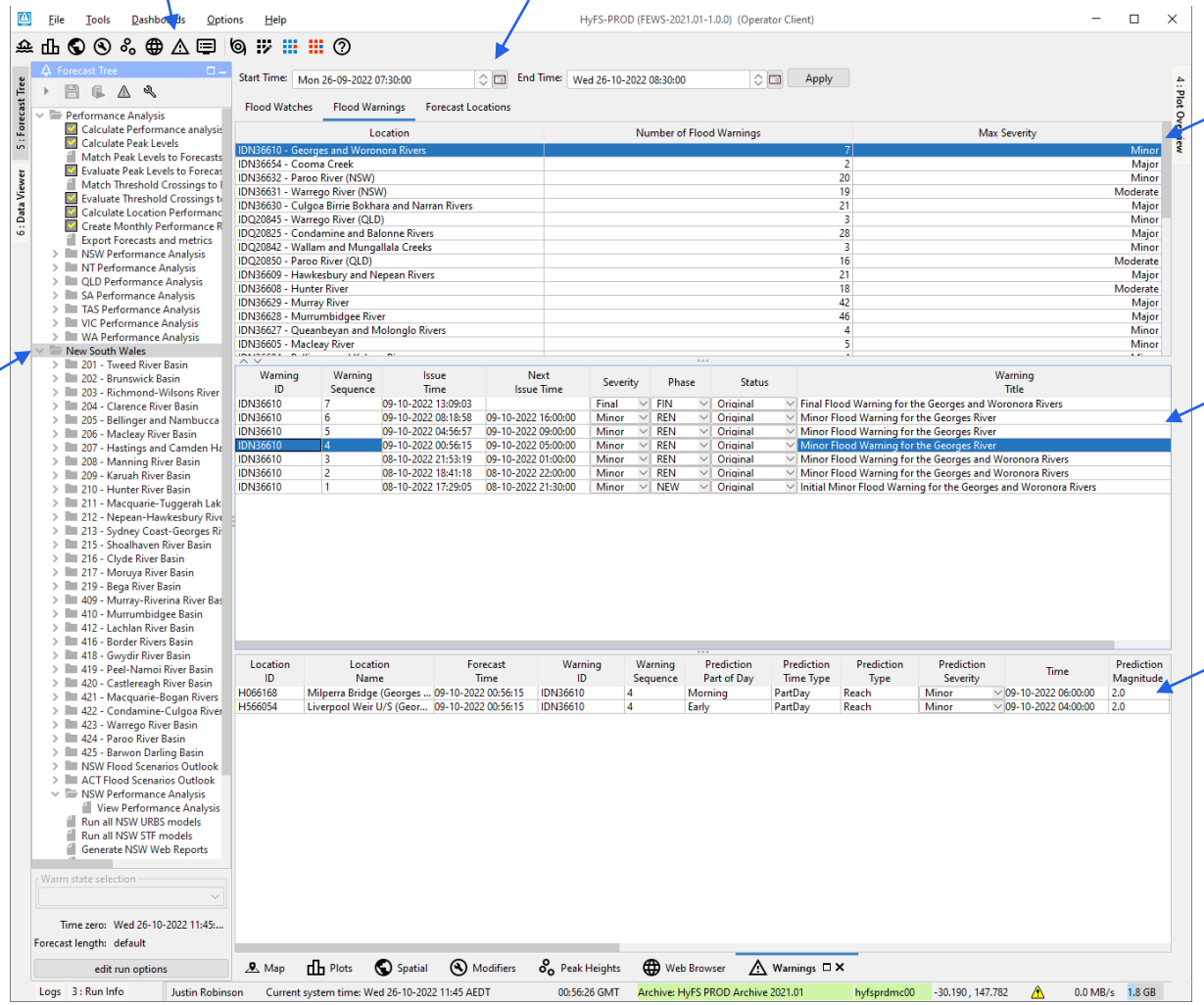
Displays in HyFS-FEWS

Warnings Display

The purpose of the warnings display is to interrogate each warning issued and to undertake quality control.

Click on the warning icon to bring up the warnings display

Search Period (1 month default)



Summary Stats for each warning

Filtering via Forecast Tree (Region or River Basin)

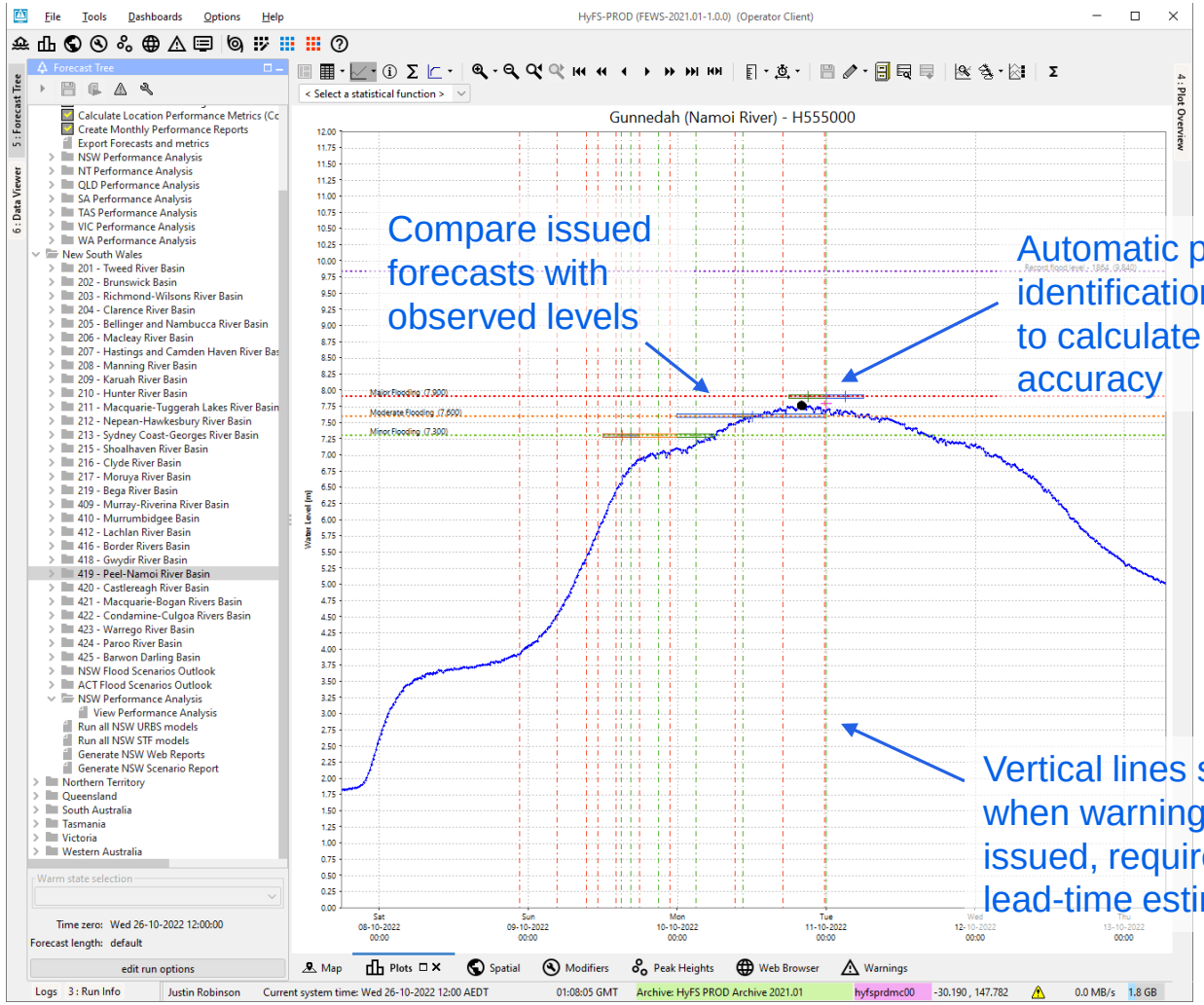
View summary of each warning issued

View summary of each forecast

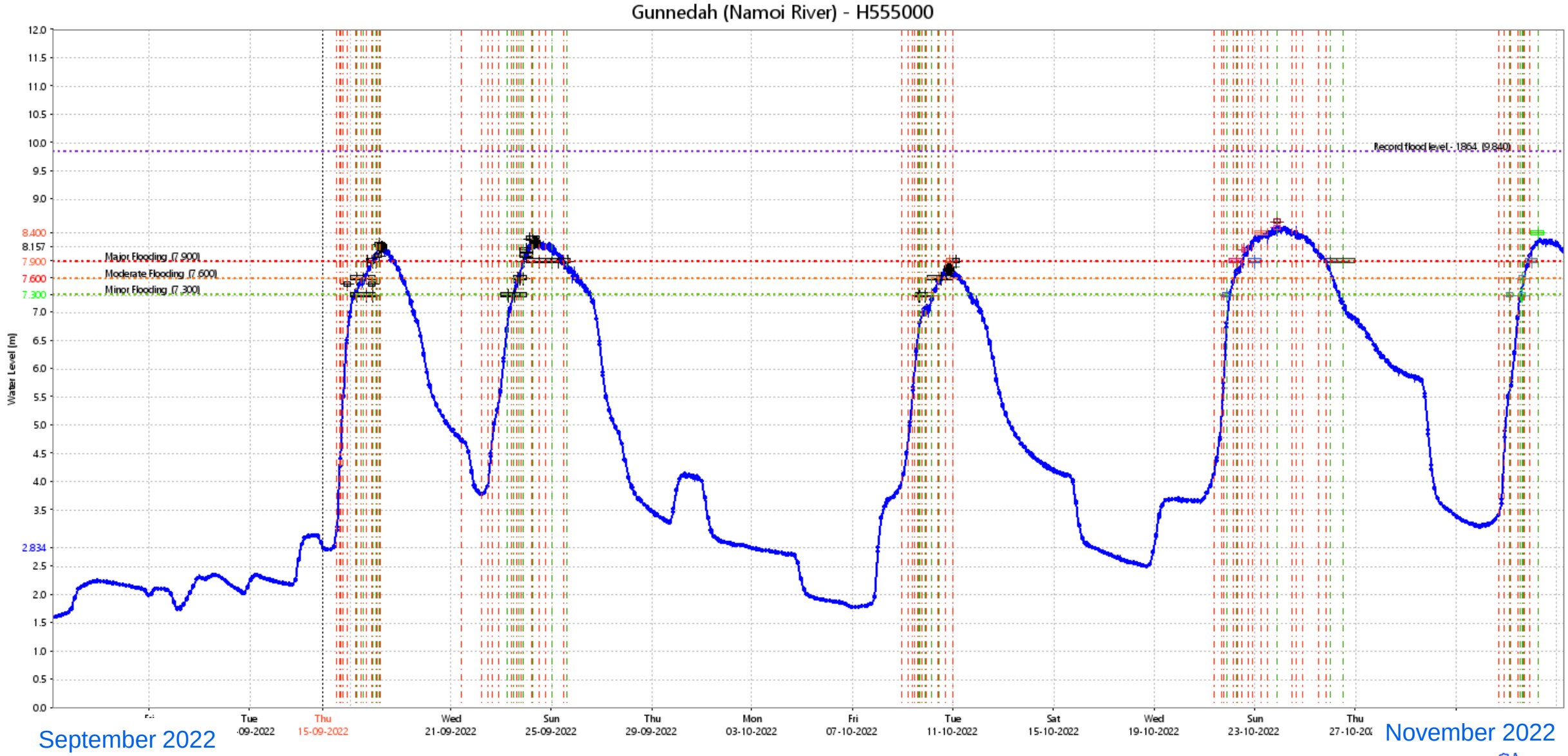
Displays in HyFS-FEWS

View forecasts issued

From the Warnings Display you can view all the forecasts issued for a location.



Displays in HyFS-FEWS

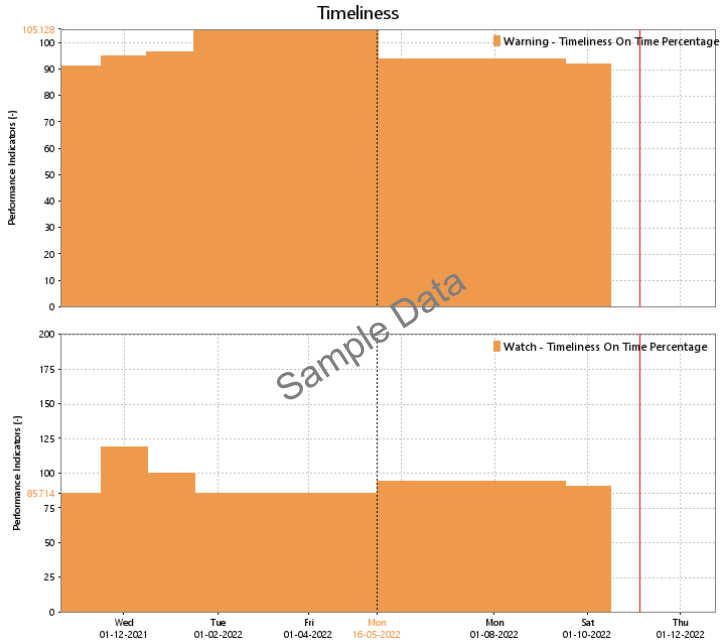


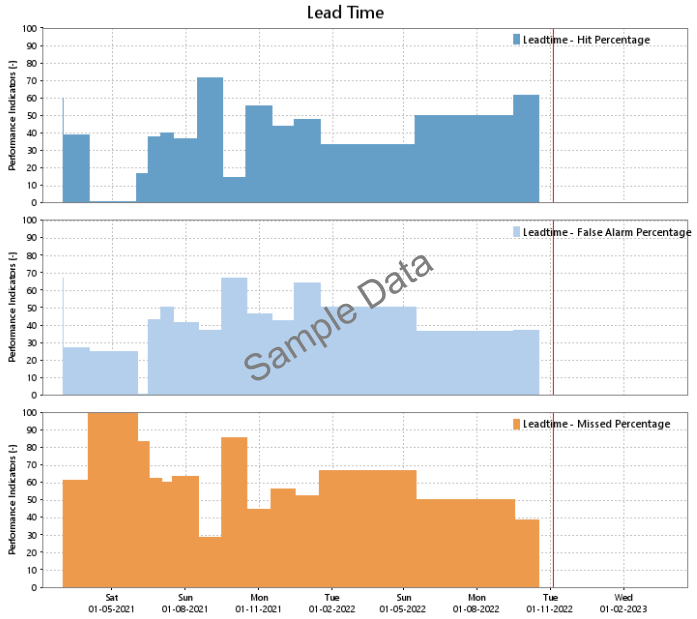
September 2022

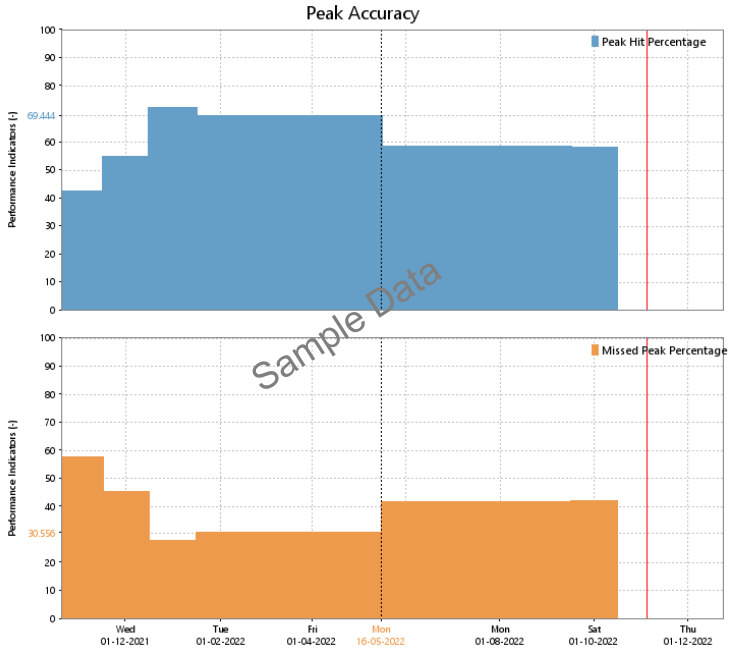
November 2022

Displays in HyFS

Predefined Plots Available at the Region, Basin and Location Level







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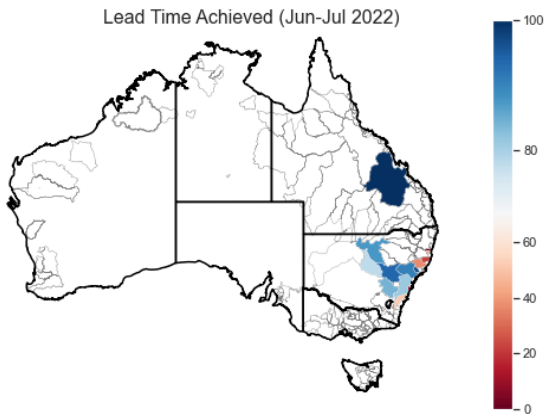
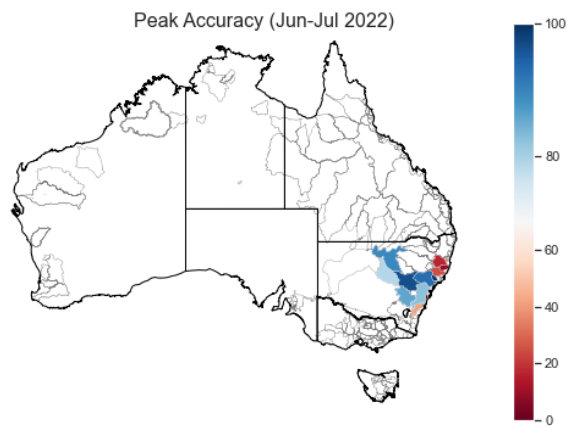
Offline Analysis and Reporting

Export Results for Further Analysis

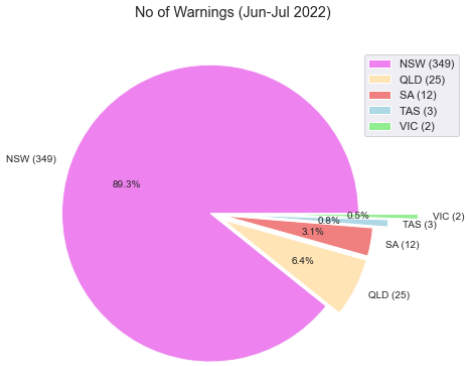
From the Forecast Tree you can export the performance metrics and associated peaks and other information for detailed analysis offline.



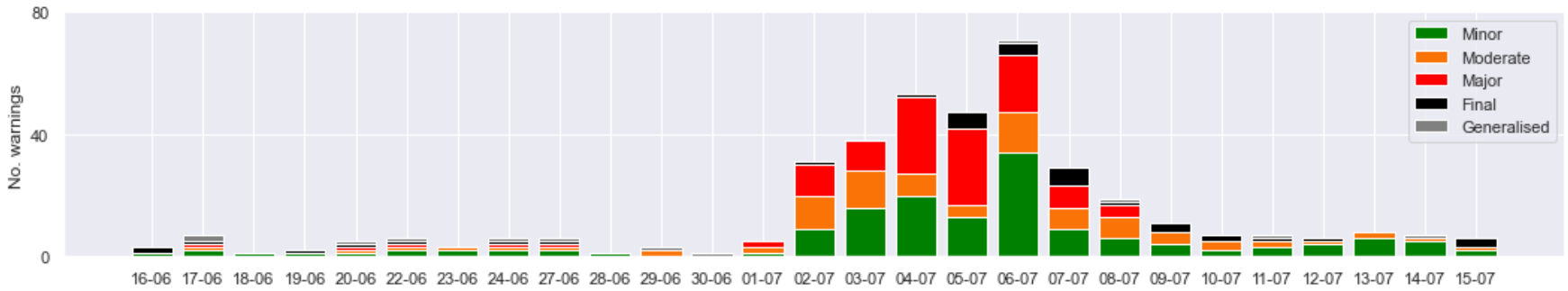
Lead Time by River Basin



Peak Accuracy By River Basin



Number of warnings by state and territory



Warnings Issued

Monthly Reporting & Training

Feedback to forecasting teams

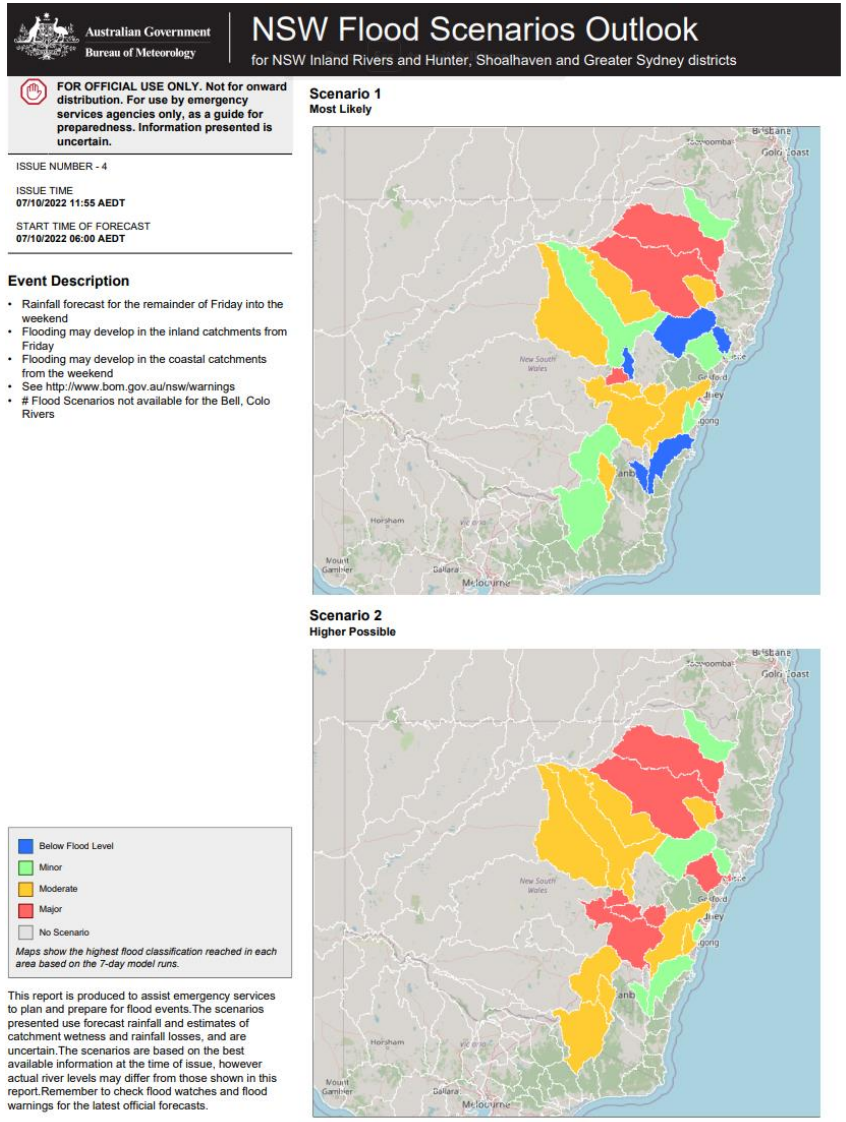
- Deeper analysis of the performance results nationally, but also at looking at forecasts for specific locations.
- Create awareness of where we need to improve, enabling operational forecasters to change their ways of working
- Opportunity for operational forecasters to share their lessons learned with others.
- Identify key areas for continuous improvement
- Opportunity to celebrate improvements in our service delivery

We have implemented monthly performance results and training sessions to provide feedback to forecasting teams.

Next Steps for the Performance Analysis Tool

- Keep improving automated Quality Assurance and Control
- Further improvements to visualisation of results to provide greater insights into our forecasting performance
- Extend the Performance Analysis Tool to other products and services, flood watch and flood scenarios outlook
- Apply the warning lead time and peak accuracy metrics to the results of our forecasting models

Can we apply the performance analysis tool to assess the flood scenario service?



The Bureau of Meteorology

Thank you

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