



# Incident Weather Forecasts improvements



Incident Weather Forecasts for fires (previously known as Spot or Special Weather Forecasts) provide critical information to incident managers to help them make important operational decisions.

Improved Incident Weather Forecasts will provide increased precision, extra information and a more targeted forecast, focusing on key weather parameters

## Why change?

Incident Weather Forecasts have been provided in a similar format for around 20 years. In that time significant advances have been made in Numerical Weather Prediction and in the past five years the Bureau has started providing gridded forecast products. To capitalise on these changes, we reviewed this service and users' needs in 2017, and the AFAC Predictive Services Group endorsed the recommendations in late 2017.

The result is the new Incident Weather Forecast. This will replicate the existing service and importantly include improvements based on the recommendations of the review.

Changing the name to Incident Weather Forecast provides a nationally consistent product name. Previously these forecasts were called Spot Fire Weather or Special Fire Weather Forecasts.

## When will the Incident Weather Forecasts begin?

The improved Incident Weather Forecasts are expected to be implemented in mid to late-March 2018.

## What is changing?

### Previous forecast sections:

1. Weather forecast
2. Assumptions and uncertainties associated with the forecast

### New forecast sections:

Three areas where Bureau of Meteorology forecasters can provide additional information on the key weather parameters critical to decision making.

1. Significant wind changes during the forecast period, including uncertainties
2. Forecast thunderstorm potential, precipitation and cloud, including uncertainties
3. Spatial variation of conditions and other important information

Extra columns in the forecast table provide important information on conditions above the surface and on thunderstorm activity.

- C-Haines: an index of atmospheric stability that can alert users to the possibility of increased or unexpected fire behaviour.
- Mixing height: used to determine smoke dispersion and expected fire behaviour.
- Thunderstorm activity level: allows for quick reference at each time step.

One-hourly time steps provide greater precision for the critical first 12 hours of the incident.

# Sample Incident Weather Forecast

Email: request@email.addr

- 1 Significant wind changes during the forecast period, including uncertainties
- 2 Forecast thunderstorm potential, precipitation and cloud, including uncertainties
- 3 Spatial variation of conditions and other important information

**30 Hour Forecast commencing 1800 hours Wednesday 14 February 2018**

Drought factor: 10    Curing value (%): 95    Fuel Loading: 4.5    5    6    7

| Local Time | Temp (C) | Dewpt (C) | RH (%) | 10m Wind (km/h) |       |      | 1000m AGL Wind (km/h) |       |    | FFDI | GFDI | cHaines | Mix Height (m) | TAL |
|------------|----------|-----------|--------|-----------------|-------|------|-----------------------|-------|----|------|------|---------|----------------|-----|
|            |          |           |        | Dir             | Speed | Gust | Dir                   | Speed |    |      |      |         |                |     |
| 1800       | 28       | 2         | 19     | NW              | 25    | 40   | SW                    | 35    | 35 | 19   | 8    | 2500    | 2              |     |
| 1900       | 23       | 4         | 29     | W               | 15    | 20   | SW                    | 35    | 17 | 7    | 8    | 2500    | 2              |     |
| 2000       | 22       | 6         | 35     | SW              | 10    | 20   | SW                    | 30    | 14 | 4    | 5    | 1900    | 1              |     |
| 2100       | 20       | 6         | 40     | SW              | 15    | 25   | SW                    | 30    | 15 | 6    | 5    | 1900    | 1              |     |
| 2200       | 18       | 5         | 43     | SW              | 10    | 20   | SW                    | 30    | 11 | 3    | 5    | 1900    | 1              |     |
| 2300       | 17       | 6         | 49     | SW              | 10    | 20   | SW                    | 25    | 7  | 3    | 6    | 600     | 0              |     |
| 0000       | 16       | 7         | 55     | SW              | 20    | 30   | SW                    | 25    | 7  | 6    | 6    | 600     | 0              |     |
| 0100       | 15       | 6         | 55     | SW              | 15    | 30   | SW                    | 25    | 6  | 4    | 6    | 600     | 0              |     |
| 0200       | 13       | 6         | 62     | SSW             | 10    | 30   | WSW                   | 25    | 4  | 2    | 6    | 300     | 0              |     |
| 0300       | 12       | 5         | 62     | SSW             | 10    | 15   | WSW                   | 25    | 3  | 2    | 6    | 300     | 0              |     |
| 0400       | 12       | 5         | 63     | SSW             | 5     | 10   | WSW                   | 25    | 2  | 1    | 6    | 300     | 0              |     |
| 0500       | 11       | 5         | 67     | SSW             | 5     | 10   | WSW                   | 30    | 2  | 1    | 4    | 100     | 0              |     |
| 0600       | 11       | 5         | 66     | SSW             | 10    | 20   | WSW                   | 30    | 2  | 2    | 4    | 100     | 0              |     |
| 0900       | 15       | 5         | 51     | SW              | 10    | 20   | WSW                   | 30    | 4  | 2    | 4    | 400     | 0              |     |
| 1200       | 22       | 5         | 33     | WSW             | 10    | 25   | WSW                   | 20    | 11 | 4    | 2    | 1500    | 0              |     |
| 1500       | 26       | 4         | 24     | W               | 10    | 25   | WSW                   | 20    | 16 | 5    | 4    | 2300    | 0              |     |
| 1800       | 27       | 5         | 24     | W               | 10    | 30   | WSW                   | 25    | 17 | 5    | 4    | 2700    | 0              |     |

- 4 Temp, Dewpt, RH, 10m Wind (Dir, Speed, Gust), FFDI and GFDI are all supplied at 1-hour time steps for the first 12 hours of the incident.

1 Significant wind changes are critical for firefighting operations and are given a standalone text area at the top of the forecast.

Including uncertainties allows the forecaster to add value to the forecast by communicating confidence and alternative scenarios specifically related to the wind change.

2 Thunderstorm potential is another critical parameter for firefighting operations. It is combined with cloud and precipitation forecasts to highlight significant weather during the forecast period in this text area.

3 This section details potential differences to the tabular forecast values based on spatial and topographic considerations of the incident location.

It also allows the forecaster to include other important information such as significant inversions, assumptions on the fire site location, fuel information used, and other assumptions made in constructing the forecast.

4 Temp, Dewpt, RH, 10m Wind (Dir, Speed, Gust), FFDI and GFDI are all supplied at 1-hour time steps for the first 12 hours of the incident.

Note: 1000m AGL wind, C-Haines, MixHgt and TAL are all calculated for a 3-hour time period so the 1-hourly values will typically only change every 3 hours.

5 C-Haines is an index of atmospheric stability and provides important information on conditions above the incident location.

High C-Haines values (increased instability) alert users to the possibility of unexpected fire behaviour, notably large plume-dominated fires and pyrocumulonimbus that may lead to thunderstorms with lightning and erratic downdraft winds. See Mills and McCaw for more information and examples.

Mills, G.A. & McCaw L. (2010). *Atmospheric Stability Environments and Fire Weather in Australia – extending the Haines Index*. CAWCR Technical Report No. 20. 151 p

6 Mixing Height is the upper height, to which the lower atmosphere will undergo mixing (mechanical or turbulent) resulting in a nearly uniform air mass—measured in metres above Mean Sea Level (MSL). To obtain the mixing height value Above Ground Level (AGL) you will need to subtract the fire site elevation from the value given.

In simple terms, the mixing height acts as a lid on the height that smoke can reach. Generally, the higher the mixing height, the more unstable the atmosphere is and the higher a smoke plume can potentially reach. Conversely, the lower the mixing height the more stable the atmosphere generally is and the greater potential for smoke to be trapped.

7 TAL is the thunderstorm activity level.

Values correspond to:

- 0. Storms not expected
- 1. Possible storm
- 2. Storm likely
- 3. Storms expected

## FIND OUT MORE

For more information about the new Incident Weather Forecast, and how you can use it in your agency, contact [SRFA@bom.gov.au](mailto:SRFA@bom.gov.au) or call (07) 3239 8632.

