User Guide

OFFICIAL

1 INTRODUCTION

1.1 ACCESS

Google Chrome is the preferred browser for using Foresight.

https://foresight.ffm.vic.gov.au

Anyone with a FireWeb username and password will be able to access the application. However, there is some data and functionality in the Foresight application that is only available to certain FireWeb users, such as fire behaviour analysts (FBANs). This enhanced data access and functionality is considered "Advanced Access" only. If they do not have access through their FireWeb user profile, users will need to request to have Advanced Access rights from the Foresight product owners.

1.2 WHAT IS FORESIGHT?

Foresight is an online fire weather forecast visualisation tool. It displays key forecast fire weather variables and indices across Victoria for the week ahead on an interactive map display. Foresight now has two modes - Foresight Bushfire (visualisation of key bushfire risk conditions) and Foresight Planned Burning (visualising conditions for a planned burn context).

Designed for emergency managers and fuel managers who wanted a zoomable, easy-to-use system that consolidates fire behaviour products on one interface, Foresight assists Victoria's decision makers to analyse fire risk and evaluate planned burn opportunities to inform strategic, tactical and technical decisions. Foresight contains live data for the week ahead and data sets are updated as they become available.

1.3 BACKGROUND

Foresight was initially developed in response to findings of a cross-agency user needs assessment conducted in 2017. The assessment report recommended improvements to the interpretability, accessibility, interactivity, reliability, consistency, transparency and compatibility of information for hazard prediction. Foresight brings together several datasets used for bushfire readiness into an easy-to-use interface to achieve this goal.

The development of Foresight was led by Predictive Services Victoria on behalf of fire agencies in Victoria. Initially developed with Code for Australia, Foresight was expanded with the assistance of the Technical Solutions Unit (TSU) in DELWP and Stock Software. Foresight Bushfire was successfully trialled in the 2018-19 fire season. A fully supported and operational version of Foresight Bushfire was launched in November 2019 which included some improvements beyond the trial version. Since that time, Foresight has undergone continuous development, allowing for an enhanced version of Foresight Bushfire to be released in September 2022 and the launch of Foresight Planned Burning in October 2022. Foresight is hosted and serviced by TSU with Predictive Services continuing to be the business owner of the product.

Thanks to all the generous staff of FFMVic and CFA who have contributed to the ongoing development of Foresight.

1.4 Audience

Foresight is intended to assist a wide range of people working in bushfire management roles across Victoria. Foresight was developed with a user-centred design approach. Three key user groups were considered which encompasses a range of roles across the state (Figure 1).
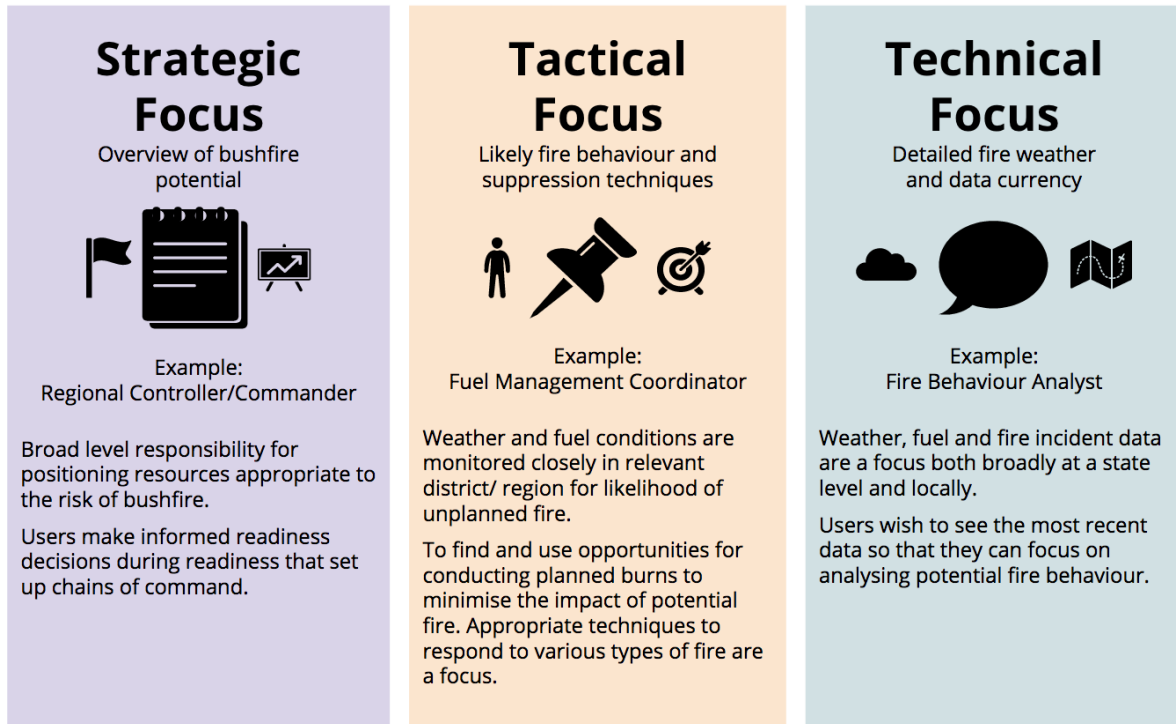

Strategic Focus
Overview of bushfire potential

Example:
Regional Controller/Commander

Broad level responsibility for positioning resources appropriate to the risk of bushfire.

Users make informed readiness decisions during readiness that set up chains of command.

Tactical Focus
Likely fire behaviour and suppression techniques

Example:
Fuel Management Coordinator

Weather and fuel conditions are monitored closely in relevant district/ region for likelihood of unplanned fire.

To find and use opportunities for conducting planned burns to minimise the impact of potential fire. Appropriate techniques to respond to various types of fire are a focus.

Technical Focus
Detailed fire weather and data currency

Example:
Fire Behaviour Analyst

Weather, fuel and fire incident data are a focus both broadly at a state level and locally.

Users wish to see the most recent data so that they can focus on analysing potential fire behaviour.

Figure 1. User groups considered when Foresight was designed.

1.5 Disclaimer

Foresight displays forecast data generated from Victorian Government and Bureau of Meteorology data. This material may be of assistance to you but the State of Victoria does not guarantee that the application is without flaw of any kind or is wholly appropriate for your particular purposes and therefore disclaims all liability for error, loss or damage which may arise from reliance upon it. All persons accessing this information should make appropriate enquiries to assess the currency of the data.

Also note that:

- Foresight includes data that requires training and experience to properly interpret. You should request assistance from a fire behaviour analyst or BOM meteorologist if you are unsure.
- The date and time that the visible indicator layer was last updated is shown in both the box in the top left-hand corner of the map window and at the bottom of the legend.
- Foresight does not replace the need for Incident Weather Forecasts (IWF). IWFs are a tailored meteorological forecast for an incident area that will be based on more information than that which is available within Foresight.

- Foresight displays the most recent available forecast data. Weather observations are only available within Foresight for specific weather station points and not as indicator layers across the state. Data displayed for time steps which are in the past use the last forecast available for that time step and has not been updated or verified based on weather observations.
- Near real-time incident information is best obtained from other spatial sources such as eMap and EM COP.
- Most of the datasets within Foresight were created using coarse (~3km resolution) data inputs. You should exercise caution when interpreting the data within Foresight at a fine scale.
- For more information about Foresight and the data available within it please read the Foresight user guide at http://foresight.help.ffm.vic.gov.au.

2   NAVIGATING THE DISPLAY

2.1   LANDING PAGE

When you access foresight.ffm.vic.gov.au/app/ via a FireWeb log in, you will be navigated to a landing page. The landing page will direct you to select the version you would like to access: Bushfire, Planned Burning or Hindsight[1]. The landing page will also show a disclaimer box overlaying a grey map of Victoria (Figure 2).
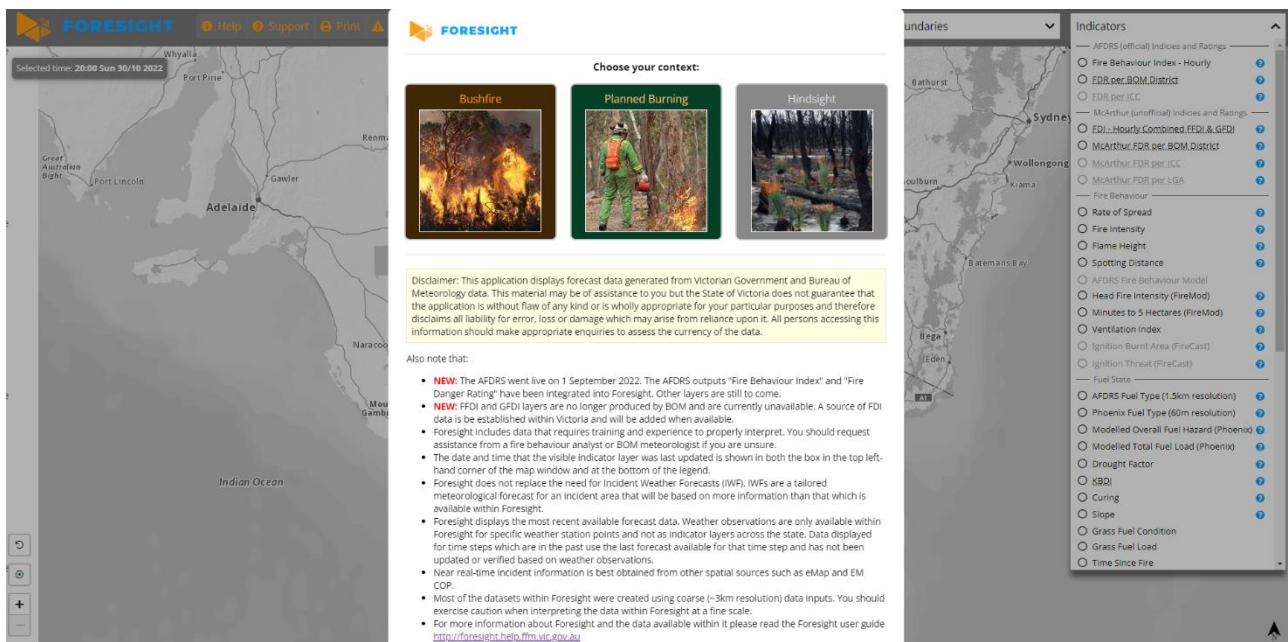

Figure 2. Landing page of Foresight, automatically navigated to after log in with FireWeb credentials

2.2   MAP VIEW

Once a Foresight version has been selected, you will be able to see the map of Victoria. Select an indicator from the Indicator drop-down list to get started. This will add data to the map and cause the time bar to appear.

Figure 3 and Table 1 provides information on the features accessible from the map display. Detailed information about each feature is shown in numbered sections, with numbers matching the numbers used in the figure and table.

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[1] As of October 2022, Hindsight is a planned functionality that has not yet been implemented and will be released as a new Foresight version in 2023.
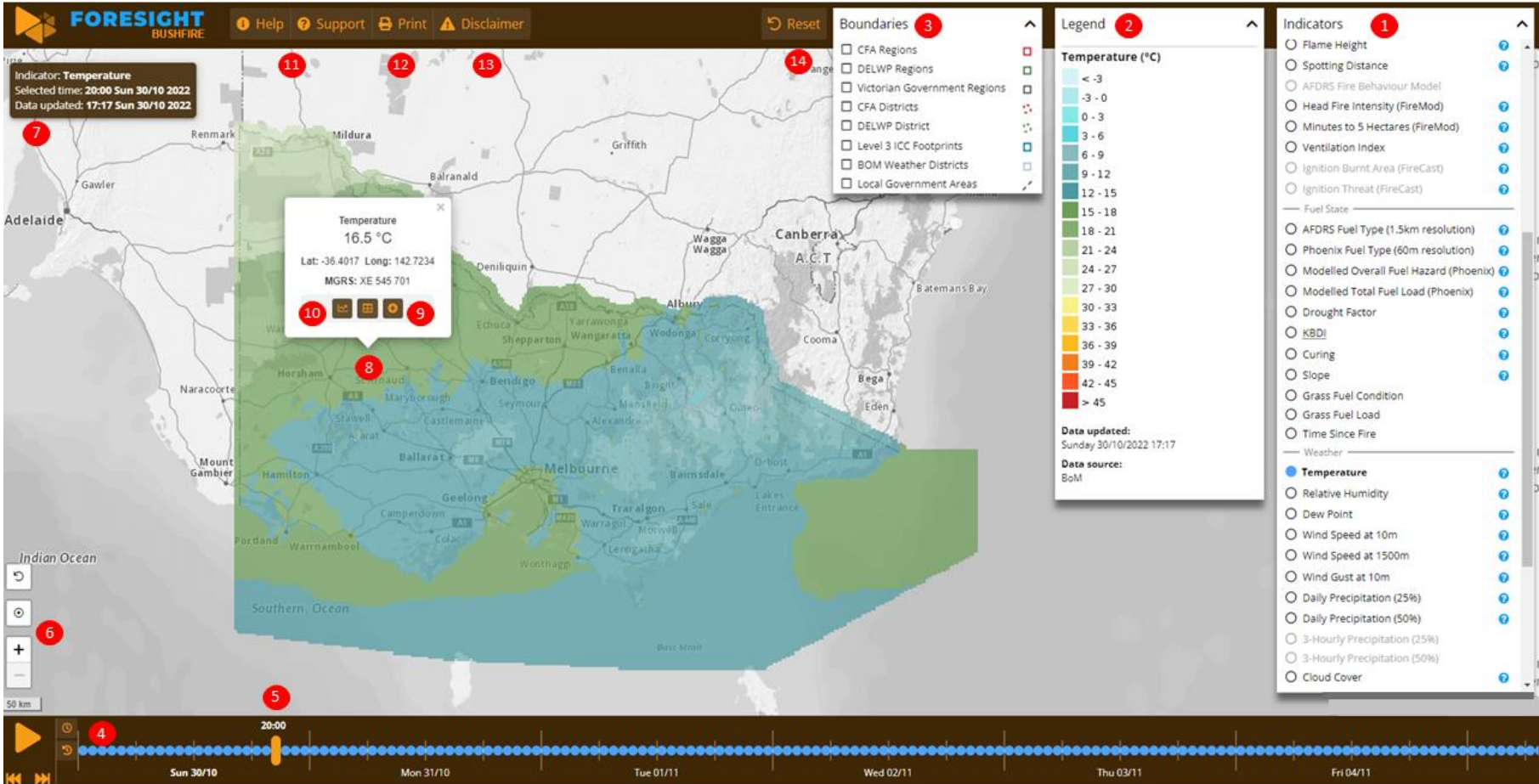
Figure 3. Key features of the Foresight map display

Table 1. Extended list of features of the Foresight display

1. Indicators	2. Legend
The 'Indicators' drop-down includes a range of fire weather variables and risk indices commonly used by emergency services in Victoria. An indicator can be displayed on the map by selecting an indicator from the list in the drop-down. This drop-down is organised into groups. Only one fire indicator or weather indicator can be displayed at a time. The exception to this are the 'Weather Overlays' and 'Incidents' layer groups, which can be displayed on top of a single spatial data layer.	The 'legend' drop-down displays the legend of the indicator. Units of measurement are displayed next to the indicator name. The colours and classes in legends are generally consistent with existing BOM, CFA or DELWP products. The legend drop-down includes the source of the data and the time and date of when that data was created at the source location. It is important to note that the data for the current and coming six days is sourced from the most recent forecast files available; this is the date and time shown in the legend. Modelled data displayed for the previous two days is sourced from the last created forecast for those days.
3. Boundaries	**4. Time step**
Using the 'boundaries' drop-down, several agency administration boundaries are available to view on the map. Multiple boundary layers can be switched on at once.	The vertical orange marker in the time bar identifies the selected 'time step'. The 'time step' shows the time/date of the forecast being displayed. You can click anywhere along the time bar to shift the time step. It is also possible to move to a different time step by clicking within a meteogram (refer to Meteograms). The blue data markers in the time bar indicate the duration of data points for the selected indicator. The duration may be daily, 3-hourly or hourly. If there is an absence of data in the nine-day period, then the blue data markers will be absent at relevant time steps.
5. Time bar	**6. Zoom**
When an indicator is selected, the time bar appears. The time bar includes a nine-day period: two days prior to today, today, and six days ahead. The time bar will automatically be positioned at the current date and hour when you open or refresh Foresight. When you press the 'play' button Foresight will automatically move through the time steps for the selected indicator. When it reaches the last time step, it will automatically start from the current time point and cycle again through the time steps. The 'pause' button can be used to halt the animation. The 'fast forward' and 'rewind' buttons move forward or backward in 24-hour jumps from the selected time step. For example, this can be used to view the 13:00 hours forecast on consecutive days. You can also more back and forth through timesteps dynamically by clicking and holding the timestep marker and dragging it back and forth along the time bar as desired	The 'plus' and 'minus' zoom buttons allow a user to zoom in and out in the map window. The scroll wheel on your mouse can also be used to zoom and pan in the map. It is worth noting that the web address of Foresight changes based on the selected boundaries and indicators. This allows you to create a bookmark for your favourite indicator layers.
7. Data info box	**8. Cell data**
Names the active indicator layer and gives relevant time stamps.	In the map, you can click your mouse to select a point location. When a point is selected a cell data pop-up appears. This pop-up includes the: • numerical indicator value for the cell for which the selected point falls within; • latitude and longitude and MGRS grid reference for that point; • graph button (for opening meteograms); • expand button (for obtaining more detailed cell values), and name and proximity of the nearest weather station to that point (if there is one within 10km)
9. Expand	**10. Meteograms**
In the cell pop-up, the 'expand' button can be clicked to open a secondary pop-up which displays the numerical values for all fire and weather indicators for the cell for which the selected point falls within.	In the cell data pop-up, the 'graph' button can be clicked to open the meteogram window. A meteogram is a graphical representation of one or more

| | meteorological variables with respect to time, whether observed or forecast, for a location.

It is useful for viewing a trend in weather variables and indices and how they may be interacting over time.

This can be important for identifying risks in fire behaviour, such as a lack of overnight recovery. |
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| 11 , Assistance buttons

Links to the user help page and application support page. | 12. Print button

Opens a print dialogue box. |
| 13. Disclaimer

Re-opens the landing page. | 14. Reset button

Switches off the active layer and any overlays. |

3 ACCESSING THE DATA

3.1 COMMON DATASETS

The Foresight application displays datasets that are common to both Foresight Bushfire and Foresight Planned Burning versions. The Foresight products display key spatial datasets related to fire behaviour indices, fire danger ratings, fuel state, weather and incidents.

Table 2 describes the spatial data layers that are available across all Foresight products and accessed via the Indicators list within the Foresight application.

Table 2. Foresight indicator descriptions

Indicator Group	Indicator	Description	Source	Source System/Product	Data point duration (temporal resolution)	Cell size (spatial resolution)	Accessibility
AFDRS (official) Indices and Ratings	Fire Behaviour Index - Hourly	Fire Behaviour Index (FBI) is a numerical scale from 0 to 100+ that indicates potential fire behaviour severity.	AFDRS	AFDRS gridded product / IDZ10161.	Hourly	1.5 km	All users
AFDRS (official) Indices and Ratings	FDR per BOM District	The official public facing Fire Danger Ratings (FDRs) for Victoria. FDRs indicate the potential level of danger should a bushfire start. These apply to BOM weather districts and are based on highest FBI that is met by at least 10% of the district for that day.	AFDRS	AFDRS text product / IDV18556	Daily	n/a (rating applies to each area)	All users
AFDRS (official) Indices and Ratings	FDR per ICC	For agency use only. The FDR for Incident Control Centre Footprints (as per JSOP 2.03) based on highest FBI that is met at least 10% of the ICC footprint for that day.	CFA/TSU	Area rating calculator (TBC)	Daily	n/a (rating applies to each area)	All users
AFDRS (official) Indices and Ratings	Max Fire Behaviour Rating	Maximum Fire Behaviour Rating for the day.	AFDRS	AFDRS text product	Daily	1.5 km	All users
McArthur (unofficial) Indices and Ratings	FDI Forest	Forest Fire Danger Index expresses fire risk and behaviour for forest fuels. Inputs include temperature, relative humidity, average wind speed at 10 m and fuel availability (drought factor).	TSU	Victorian FDI calculator (TBC)	Hourly	3 km	All users
McArthur (unofficial) Indices and Ratings	FDI Grass	Grass Fire Danger Index expresses fire risk and behaviour for grass fuels. Inputs include temperature, relative humidity, average wind speed at 10 m and fuel condition (curing).	TSU	Victorian FDI calculator (TBC)	Hourly	3 km	All users

Indicator Group	Indicator	Description	Source	Source System/Product	Data point duration (temporal resolution)	Cell size (spatial resolution)	Accessibility
McArthur (unofficial) Indices and Ratings	FDI Hourly Combined FFDI & GFDI	A combined map of forest and grass FDI. The FDI displayed for each cell is based on the predominant fuel type for that cell. To determine which fuel type applies to a cell of interest - open the expanded cell data pop-up and compare the FDI forest and FDI grass values to the FDI Hourly Fuel Based.	TSU	Victorian FDI calculator (TBC)	Hourly	3 km	All users
McArthur (unofficial) Indices and Ratings	McArthur FDR per BOM District	For agency use only. The forecast OLD FDRs (based on McArthur system, not AFDRS) for each BOM weather district calculated from the highest maximum fuel based FDI that applies to at least 10% of the BOM weather district for that day.	CFA/TSU	Area rating calculator (TBC)	Daily	n/a (rating applies to each area)	All users
McArthur (unofficial) Indices and Ratings	McArthur FDR per ICC	For agency use only. The forecast OLD FDRs (based on McArthur system, not AFDRS) for each Incident Control Centre footprint calculated from the highest maximum fuel based FDI that applies to at least 10% of the ICC footprint for that day.	CFA/TSU	Area rating calculator (TBC)	Daily	n/a (rating applies to each area)	All users
McArthur (unofficial) Indices and Ratings	McArthur FDR per LGA	For agency use only. The forecast OLD FDRs (based on McArthur system, not AFDRS) for each Local Government Area calculated from the highest maximum fuel based FDI that applies to at least 10% of the LGA for that day.	CFA/TSU	Area rating calculator (TBC)	Daily	n/a (rating applies to each area)	Advanced access

Indicator Group	Indicator	Description	Source	Source System/Product	Data point duration (temporal resolution)	Cell size (spatial resolution)	Accessibility
Fire Behaviour	Rate of Spread	The forecast rate of spread is the hourly rate of spread (m/h) at the selected time, defining the rate at which the head fire travels.	AFDRS	AFDRS gridded product / IDZ10138	Hourly	1.5 km	All users
Fire Behaviour	Fire Intensity	Byram's fire-line intensity. The intensity (kW/m) at the front of the fire.	AFDRS	AFDRS gridded product / IDZ10139	Hourly	1.5 km	All users
Fire Behaviour	Flame Height	The flame height (m) is the average height of flames above ground height in the head fire.	AFDRS	AFDRS gridded product / IDZ10141	Hourly	1.5 km	All users
Fire Behaviour	Spotting Distance	Only calculated for forest fuel types, in metres.	AFDRS	AFDRS gridded product / IDZ10142	Hourly	1.5 km	All users
Fire Behaviour	AFDRS Fire Behaviour Model	A simplification of the AFDRS fuel type map into the 8 fire behaviour models	DELWP	Bushfire Fuel Dataset	n/a (updated infrequently)	1.5 km	All users
Fire Behaviour	Head Fire Intensity (FireMod)	Headfire Intensity indicates how intense an established fire is likely to be. Specifically, it displays the rate of heat release per unit length of flame combustion extending from the leading edge of the fire front to the rear of the flaming zone.	DELWP – TSU	FireMod*	Hourly	3 km	Advanced access
Fire Behaviour	Minutes to 5 Hectares (FireMod)	Indicates the likely number of minutes it would take for a point source ignition to reach five hectares in size.	DELWP – TSU	FireMod*	Hourly	3 km	Advanced access
Fire Behaviour	Ventilation Index	Indicates the potential of the atmosphere to disperse airborne pollutants such as smoke in the lower atmosphere (from 0 m to 3000 m).	DELWP – TSU	FireMod*	Hourly	3 km	All users
Fuel State	AFDRS Fuel Type (1.5km resolution)	The fuel type used to calculate fire behaviour and danger in each grid cell. There are 23 different fuel types available.	AFDRS	AFDRS gridded product / IDZ10161	n/a (updated infrequently)	1.5 km	All users

Indicator Group	Indicator	Description	Source	Source System/Product	Data point duration (temporal resolution)	Cell size (spatial resolution)	Accessibility
Fuel State	Phoenix Fuel Type (60m resolution)	The fuel type used to calculate fire spread using the Phoenix software.	DELWP	Bushfire Fuel Dataset	n/a (updated infrequently)	60 m	Advanced access
Fuel State	Modelled Overall Fuel Hazard (Phoenix)	The overall fuel hazard scores (using Overall Fuel Hazard Assessment Guide, 4th edition[2]) as modelled by DELWP.	DELWP	Bushfire Fuel Dataset	n/a (updated infrequently)	60 m	Advanced access
Fuel State	Modelled Total Fuel Load (Phoenix)	Modelled total fine fuel load (t/ha) using fuel types and time since fire data.	DELWP	Bushfire Fuel Dataset	n/a (updated infrequently)	60 m	Advanced access
Fuel State	Drought Factor	An indicator of the fuel drying trend. Specifically, it gives a measure of the proportion of fine fuel that is flammable based on the degree of rainfall versus the rate of drying over the last 20 days.	BOM	Gridded Weather^ / IDV71127	Three-hourly	3 km	All users
Fuel State	KBDI	Indicates the level of drought affecting vegetation. Specifically, it is a measure of the cumulative moisture deficiency in the upper soil layers (top 200 mm of the soil profile). KBDI is used as an input when determining the Drought Factor.	BOM	Gridded Weather^ / IDV71147	Daily (from 11am)	3 km	All users
Fuel State	Curing	A measure of the amount of fuel available to combust or the percentage of dead material in grasslands. Based on data supplied from CFA to the AFDRS and then trimmed and modified by DELWP.	TSU	Weather data system (TBC) / modified from BOM IDZ10148)	Daily	3 km	All users
Fuel State	Slope	Slope of the ground surface in 1 degree intervals	DELWP	eMap	n/a (updated infrequently)	30 m	All users

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[2] Hines F.,Tolhurst K.G., Wilson A.A.G. & McCarthy G.J. 2010. **Overall fuel hazard assessment guide, 4th edition July 2010**. *Fire and adaptive management, report no. 82*. Victorian Government Department of Sustainability and Environment. Melbourne, Australia.

Indicator Group	Indicator	Description	Source	Source System/Product	Data point duration (temporal resolution)	Cell size (spatial resolution)	Accessibility
Fuel State	Grass Fuel Condition	Whether the grass fuel is natural (3), grazed (2) or eaten out (1)	AFDRS (from CFA)	AFDRS gridded product / IDZ10149	n/a (updated infrequently)	1.5	Advanced access
Fuel State	Grass Fuel Load	Load (t/ha) of grass fuels (default is 4.5 t/ha)	AFDRS (from CFA)	AFDRS gridded product / IDZ10159	n/a (updated infrequently)	1.5	Advanced access
Fuel State	Time Since Fire	Years since grid cell was burned by a bushfire or planned burn.	AFDRS (from DELWP)	AFDRS gridded product / IDZ10162	n/a (updated infrequently)	1.5	All users
Weather	Temperature	Ambient air temperature at ground level.	BOM	Gridded Weather^ / IDV71000	Hourly	3 km	All users
Weather	Relative Humidity	The most commonly used measure of atmospheric moisture and is defined as the ratio of the amount of water vapour measured to that which air could hold at saturation.	BOM	Gridded Weather^ / IDV71018	Hourly	3 km	All users
Weather	Dew Point	A measure of the moisture content of the air and is the temperature to which air must be cooled for dew to form.	BOM	Gridded Weather^ / IDV71001	Hourly	3 km	All users
Weather	Wind Speed at 10m	The 10-minute averaged wind speed, based on a 10-metre standard height. Wind gusts can be 40 percent stronger than the average speeds presented.	BOM	Gridded Weather^ / IDV71006[3]	Hourly	3 km	All users
Weather	Wind Speed at 1500m	Wind magnitude at 1500m above sea level in km/h	BOM	Gridded Weather^ / IDV71110	Hourly	3 km	All users
Weather	Wind Gust at 10m	Wind gust at surface level	BOM	Gridded Weather^ / IDV71072	Hourly	3 km	All users

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[3] The wind speed product currently being used is IDV71006 (Wind_Mag_SFC), which is *Wind speed for specified time (Hourly) (knots or m/s)*. This has been converted into km/h in the Foresight code.

Indicator Group	Indicator	Description	Source	Source System/Product	Data point duration (temporal resolution)	Cell size (spatial resolution)	Accessibility
Weather	Daily Precipitation (25%)	Amount of rainfall (mm) for which there is a 25% chance of exceeding in the 24 hours from 15UTC	BOM	Gridded Weather^ / IDV71014	Daily	3 km	All users
Weather	Daily Precipitation (50%)	Amount of rainfall (mm) for which there is a 50% chance of exceeding in the 24 hours from 15UTC	BOM	Gridded Weather^ / IDV71015	Daily	3 km	All users
Weather	3-Hourly Precipitation (25%)	Minimum amount of precipitation forecast with 25% certainty	BOM	Gridded Weather^ / IDV71032	Three-hourly	3 km	All users
Weather	3-Hourly Precipitation (50%)	Minimum amount of precipitation forecast with 50% certainty	BOM	Gridded Weather^ / IDV71033	Three-hourly	3 km	All users
Weather	Cloud Cover	A measure of the percentage of cloud cover in the atmosphere.	BOM	Gridded Weather^ / IDV 71017	Hourly	3 km	All users
Weather	Continuous Haines	An indicator of atmospheric instability and dryness. These factors contribute to plume dynamics, so the Continuous Haines (C-Haines) shows where there is potential for the development of a significant smoke column, plume-dominated fire and/or a pyrocumulonimbus event.	BOM	Gridded Weather^ / IDV71115	Three-hourly	3 km	All users
Weather	Mixing Height	A measure of the upper height, in metres above sea level, to which the lower atmosphere will undergo mixing (mechanical or turbulent) resulting in a nearly uniform air mass.	BOM	Gridded Weather^ / IDV71109	Hourly	3 km	All users
Weather	Lightning Activity Level	A measure of the likelihood and amount of lightning from 0 (No lightning) to 3 (Widespread lightning)	BOM	Gridded Weather^ / IDV71114	Three-hourly	3 km	All users

Indicator Group	Indicator	Description	Source	Source System/Product	Data point duration (temporal resolution)	Cell size (spatial resolution)	Accessibility
Weather overlays	BOM Weather Stations	Locations of Automatic Weather Stations (AWS) and other non-automatic weather stations from which the BOM collects observation data. AWS generally provide observations every half hour. Non-AWS data is less frequent (e.g. twice daily).	BOM	BOM observations	n/a	n/a	All users
Weather overlays	Fuel Moisture Stations	Locations of FFMVic fuel moisture stations where weather variables, fuel moisture and soil moisture data are collected.	DELWP	Fuel Monitoring Portal	n/a	n/a	All users
Weather overlays	Wind at 10m Animated	An animated representation of forecast wind particle movement. Produced using the gridded weather forecast.	BOM	Gridded Weather^	Hourly	3 km	All users
Weather overlays	Wind at 10m Barbs	A combined indicator of forecast wind speed (10-minute averaged wind speed, based on a 10-metre standard height) and wind direction.	BOM	Gridded Weather^	Hourly	3 km	All users
Incidents	DELWP/CFA Bushfires	Recorded fire incidents in Victoria	DELWP	eMap	n/a	n/a	All users

^Gridded Weather
The Gridded Weather is a compilation of datasets (NetCDF files) of forecast weather variables for the present day and the week ahead. The Gridded Weather is produced by the BOM using the Graphic Forecast Editor (GFE) system. The Gridded Weather for Victoria is produced at a 3km resolution using data sourced from a range of global weather forecasting models. The Gridded Weather data files are updated twice daily. A full update of all days in the forecast period occurs in the afternoon update. The morning update (usually completed by 6am) provides updated NetCDF files where only the data for the current day has been updated.

*FireMod
FireMod uses the Gridded Weather, together with fuel and topography datasets, to calculate a range of forecast fire weather and fire behaviour spatial data sets. The FireMod system is maintained by TSU within Forest, Fire and Regions at DELWP. FireMod will be triggered to run when the BOM release updated Gridded Weather.

3.2 ACCESSING THE CHARTS/GRAPHS

When an indicator layer is selected and displayed on the map, there are a few methods of accessing more information about a point of interest. If you select a point on your map with your cursor, then the pop-up box will appear and you can select the 'charts/graphs' option to access meteograms for that location, by selecting the graphic on the bottom left-hand side of the pop-up (Figure 4).
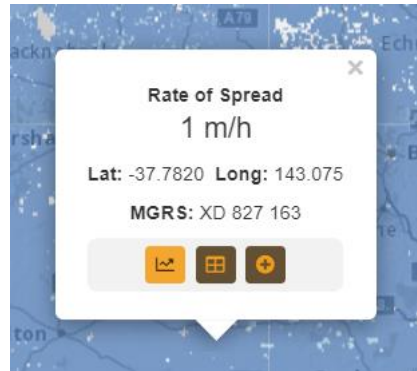
Figure 4. Pop-up box at a point location on the map display, showing the charts function selected.

A data display window will pop-up at the right side of the screen. At the top of the data window, information related to the location of the selected point will be displayed, specifically Latitude, Longitude, MGRS Coordinate System location and Phoenix Fuel Type for that location.

Relative Humidity, Cloud Cover
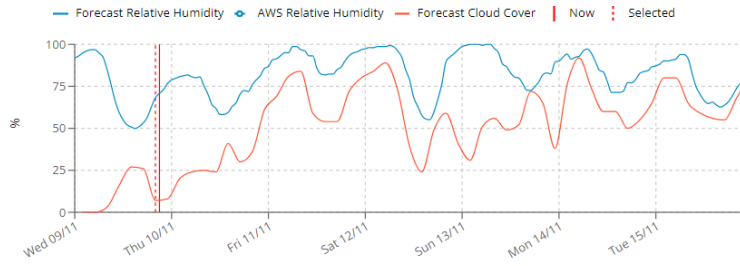
Temperature, Dew Point
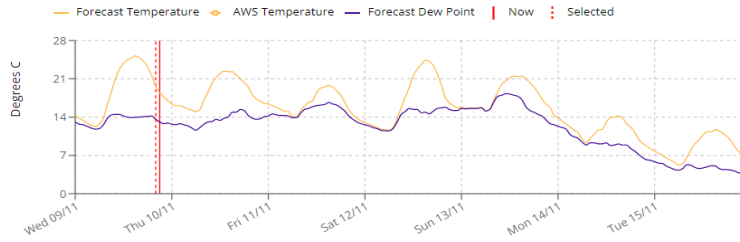
Fire Danger and Behaviour Indexes
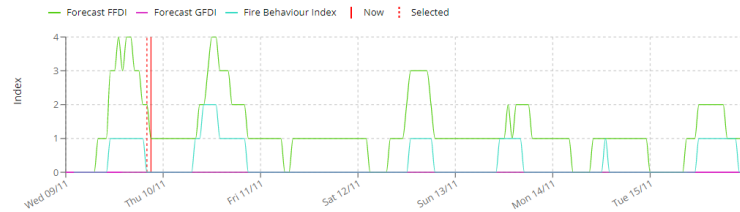
Wind Speed, Wind Direction
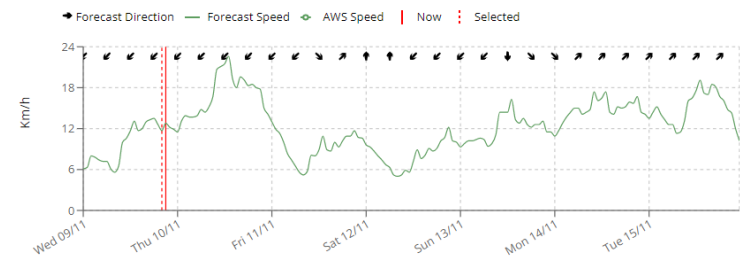
Head Fire Intensity
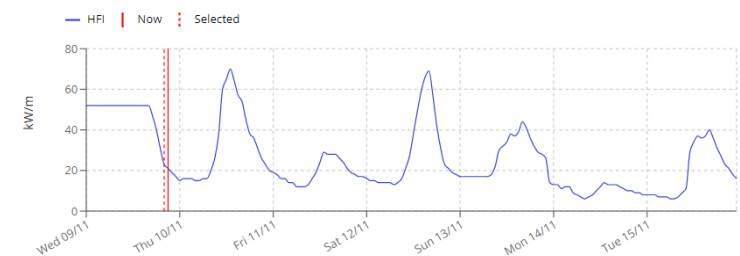
Figure 5. Meteogram window

Within each meteogram, the selected date and time is represented by a dashed red line (Figure 6). The solid red line shows the current date and hour (now).
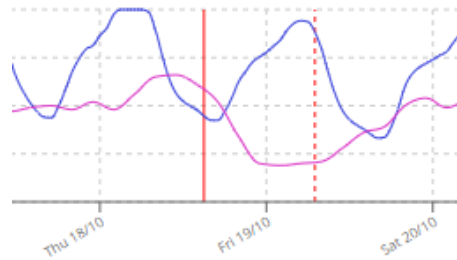
Figure 6. Now and selected time steps

Scrolling over a data point in a meteogram will reveal the numerical value for that indicator at that time step (Figure 7).
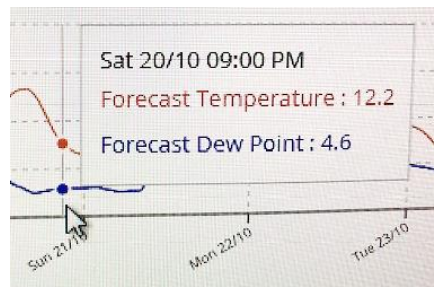
Figure 7. Data will appear upon scrolled over

At the top of the meteograms, click 'Show' on the 'History' button to switch on/off the visibility of the two days prior to the present within the meteograms. Use the 'Days' button to switch between visibility of a two-day or seven-day forecast period within the meteograms (Figure 8).
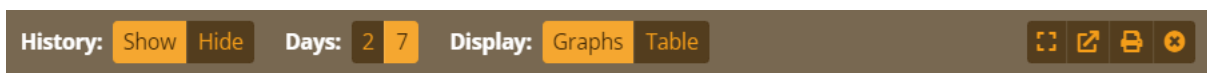
Figure 8. The header page of pop-up meteogram and chart box, showing the history and days functions.

AWS are fully automated BOM weather stations that collect a large set of weather variables according to stringent methods. Data is reported on a half hour frequency (Figure 9). Non-AWS are weather stations that generally collect fewer variables and data is usually reported less frequently (e.g. twice daily). Portable weather stations will also appear if any have been deployed in the state.
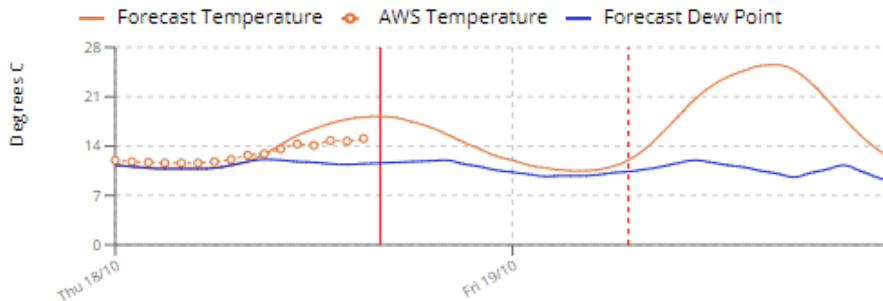
Figure 9. AWS observation data in a meteogram

If a weather station is within 10km of the selected point, then observation data for the nearest weather station is also shown on the meteogram. This allows comparison of the forecast (predicted) conditions against the observed weather (actual) at the nearby weather station. This is important for helping to assess the reliability of the forecast.

3.3 ACCESSING THE DATA TABLES

You can also access data tables for the selected point, by selecting the 'Tables' option on the bottom middle of the pop-up (Figure 10).
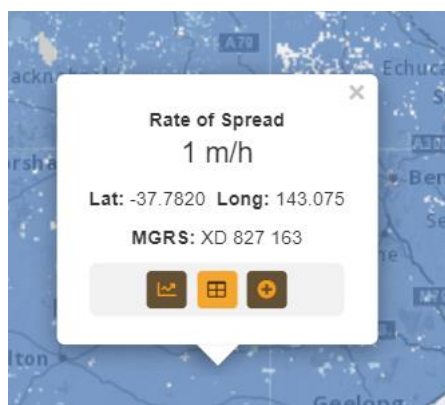
Figure 10. Pop-up box at a point location on the map display, showing the tables function selected.

When you access the data tables, all Foresight versions will present a data table of weather variables (Figure 12). This table data can display forecast history, in the same way as the meteograms. You can also toggle between the meteograms and the data table using the 'Graphs-Table' toggle option at the top of the data display screen. The left side of the data table allows display functions to be activated. Background colours can be selected to add legend colours into the table cells according to values, and the wind direction information can be changed to arrows, cardinals or degrees. You can also move the time at the top of the table between 'now' and a selected time step.

The weather variables displayed in the data tables are consistent across all Foresight products. Users with Advanced Access to Foresight can manually edit variables that are used in any fire behaviour models. This is done by double-clicking on a data table cell of interest or on the 'edit' icon (📝) for the relevant row or column. This will open a pop-up which allows all values contributing to the calculation of that data cell to be edited (Figure 11). Any data that is dependent on edited data will be highlighted in the data table and the map.

The weather variables displayed in the data table are shown in Table 4.

Table 4. List of weather variables in data tables

Weather variable	Additional information
Temperature	Degrees Celsius
Relative humidity	%
Wind direction	Degrees, with visualisation in data table able to be edited
Wind speed at 10m	Km/h
Wind speed at 1500m	Km/h
Continuous Haines	Whole numbers between 0 and 13
Drought Factor	Entire column able to be edited using edit function in column header
KBDI	0-200 mm
Curing	%, entire column able to be edited using edit function in column header
Cloud cover	%
Dew point	Degrees Celsius
FDI - Forest	Calculated by TSU from BOM data
FDI - Grass	Calculated by TSU from BOM data
FBI	Accessed from AFDRS
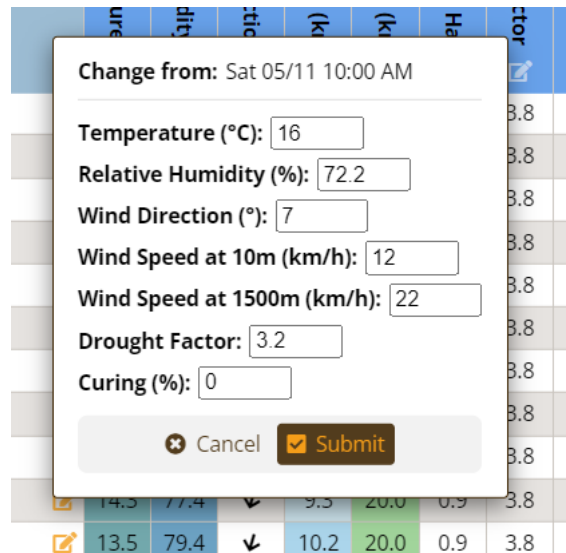
Figure 11. Pop-up box that appears when hovering cursor above a data cell in the data table. All fields can be edited for that cell.

The export function ( ) to the right side of the Data Set options allows you to export the data tables in several different formats, for printing or import into other programs.
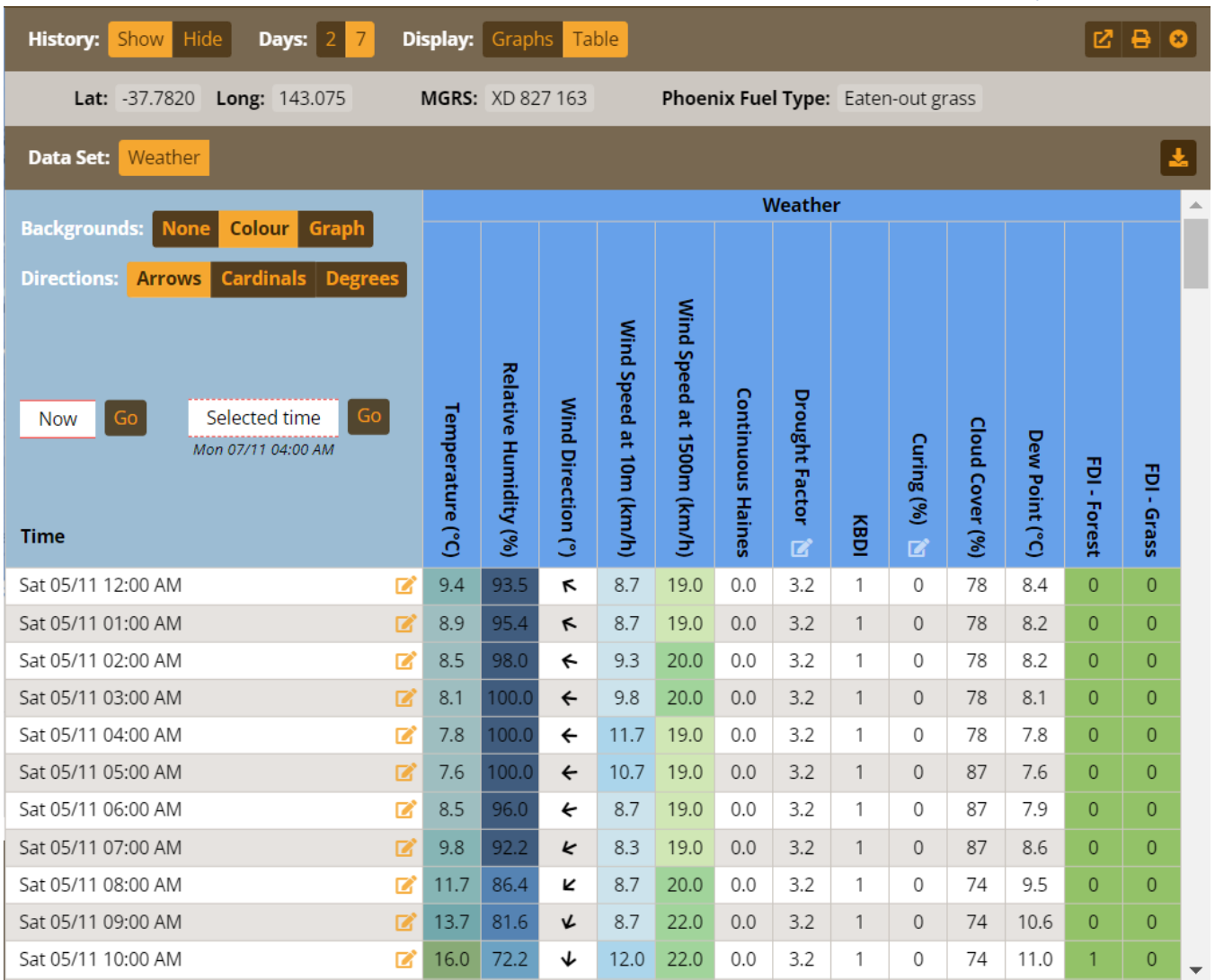
Figure 12. Data table of weather variables available in all Foresight products

4 FORESIGHT BUSHFIRE – ADDITIONAL SPATIAL LAYERS AND DATA TABLES

4.1 ADDITIONAL SPATIAL LAYERS

In addition to the layers described in Table 2, Foresight Bushfire displays the following data layers (Table 5).

Indicator Group	Indicator	Description	Source	Source System/Product	Data point duration (temporal resolution)	Cell size (spatial resolution)	Accessibility
Preliminary Forecast	Preliminary Fire Behaviour Index	Preliminary FBI values are early an indication to agencies of the potential fire weather ahead of time.	AFDRS	Gridded Weather^	Hourly	1.5 km	Advanced access
Preliminary Forecast	Preliminary Max Daily FBI	This preliminary maximum FBI value provides an early indication up until 15 UTC.	AFDRS	Gridded Weather^	Daily	1.5 km	Advanced access
Preliminary Forecast	Preliminary Max Daily FDR	This preliminary maximum FDR provides an early indication.	AFDRS	AFDRS text product	Daily	1.5 km	All users
Incidents	DELWP/CFA Burns	All burns from status 'Ready' to 'Under Control – 2'	DELWP	eMap / FMS	n/a	n/a	All users

4.2 DATA TABLES

In addition to the weather variables, the data tables in Foresight Bushfire also display a range of fire behaviour models (Figure 13). The fire behaviour models available are:

- McArthur Mk5
- Leaflet 80
- VESTA
- Grass
- Mallee Heath

You can use the tab at the top of the data table to select a fire behaviour model. This will display the relevant model output for that location, using the forecast weather and fuel variables for that location. The calculation variables, fine fuel load, slope and wind reduction factor for the model selected is displayed at the top of the table and can be edited by users with Advanced Access.

Figure 13. Data tables available in Foresight Bushfire, showing the McArthur Mk5 model data and the export function selected.

5 FORESIGHT PLANNED BURNING – ADDITIONAL SPATIAL LAYERS AND DATA TABLES

5.1 ADDITIONAL SPATIAL LAYERS

In addition to the layers described in Table 2, Foresight Planned Burning displays the following data layers (Table 6).

Indicator Group	Indicator	Description	Source	Source System/Product	Data point duration (temporal resolution)	Cell size (spatial resolution)	Accessibility
Incidents	Burns – Ready	This is a planned burn that is ready to be ignited.	DELWP	eMap / FMS	n/a	n/a	All users
Incidents	Burns – Scheduled	This is a planned burn that is scheduled for ignition.	DELWP	eMap / FMS	n/a	n/a	All users
Incidents	Burns – Ignition Authorised	This is a planned burn that is authorised and awaiting scheduling.	DELWP	eMap / FMS	n/a	n/a	All users
Incidents	Burns – Ignition	This is a planned burn that is being ignited.	DELWP	eMap / FMS	n/a	n/a	All users
Incidents	Burns – Under Control 1 and Burns Under Control 2	This is a planned burn where ignition is complete but may have hot spots and is being patrolled	DELWP	eMap / FMS	n/a	n/a	All users
Incidents	Prescription Evaluation	Overall evaluation based on prescription recorded in the Fuel Management System. Green outer circle shows planned burns that meet the prescription for that hour. Yellow outer circle shows planned burns with only one variable out of prescription, or only a few out by less than 10% for that hour. Red outer circles show planned burns outside of prescription. Grey outer circles shows planned burns where no prescription has been recorded in FMS.	DELWP	FMS and Foresight	Hourly	n/a (applies to burn point)	All users
Incidents	Fuel Treatment Areas	Total burn polygon area	DELWP	eMap / FMS	n/a	n/a	All users

5.2 Data tables

In addition to the weather variables, the Foresight Planned Burning data table also shows the Leaflet 80 fire behaviour model and the Prescriptions data table (Figure 14).
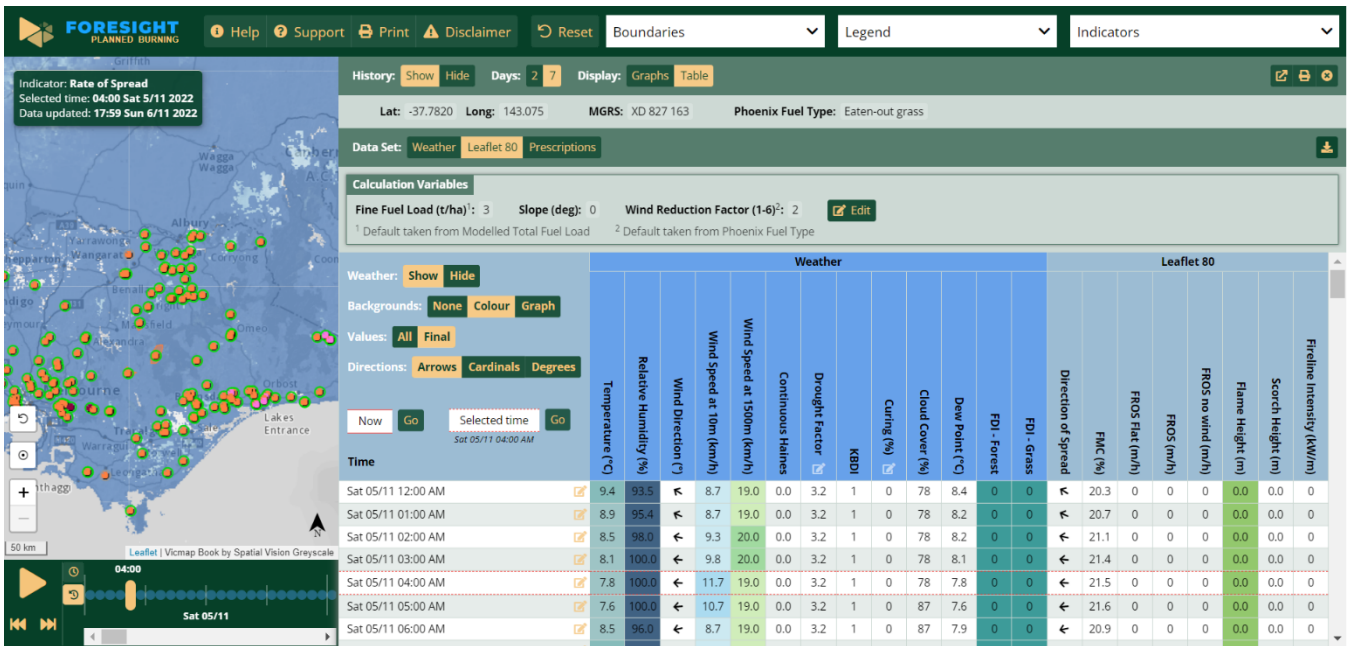

Figure 14. Data tables available in Foresight Planned Burning, showing the Leaflet 80 model data.

When a burn is selected, a user can choose to open the Prescriptions Data Table to the right of the weather table for the burn location. This Prescription table should automatically use the prescription information stored in FMS for the burn. For points of interest outside of a burn, users may be prompted to select a Prescription Burn Class appropriate for the location (Figure 15).
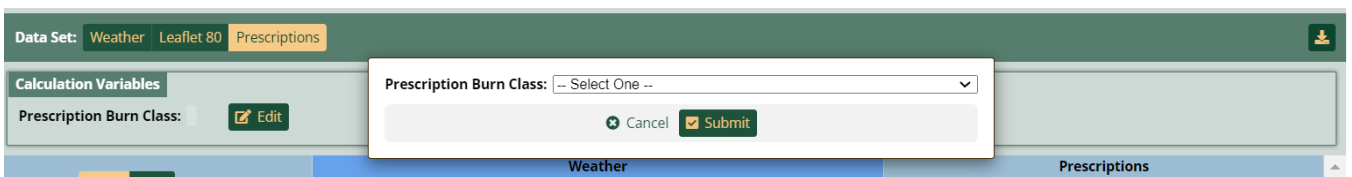

Figure 15. Drop-down box requesting a Prescription Burn Class to be supplied for prescription calculations in Foresight Planned Burning.

The Prescription data table shows key weather variables relevant to the prescribed conditions. It also shows a colour-coded and ticks/crosses display, indicating which variables are below prescription, within prescription or above prescription (this colour function can be turned off with the "background" option) (Figure 16). For even

further detail, you can hover your cursor above the data cells in the Prescription table to see exactly what the weather values are and the relevant prescription ranges.
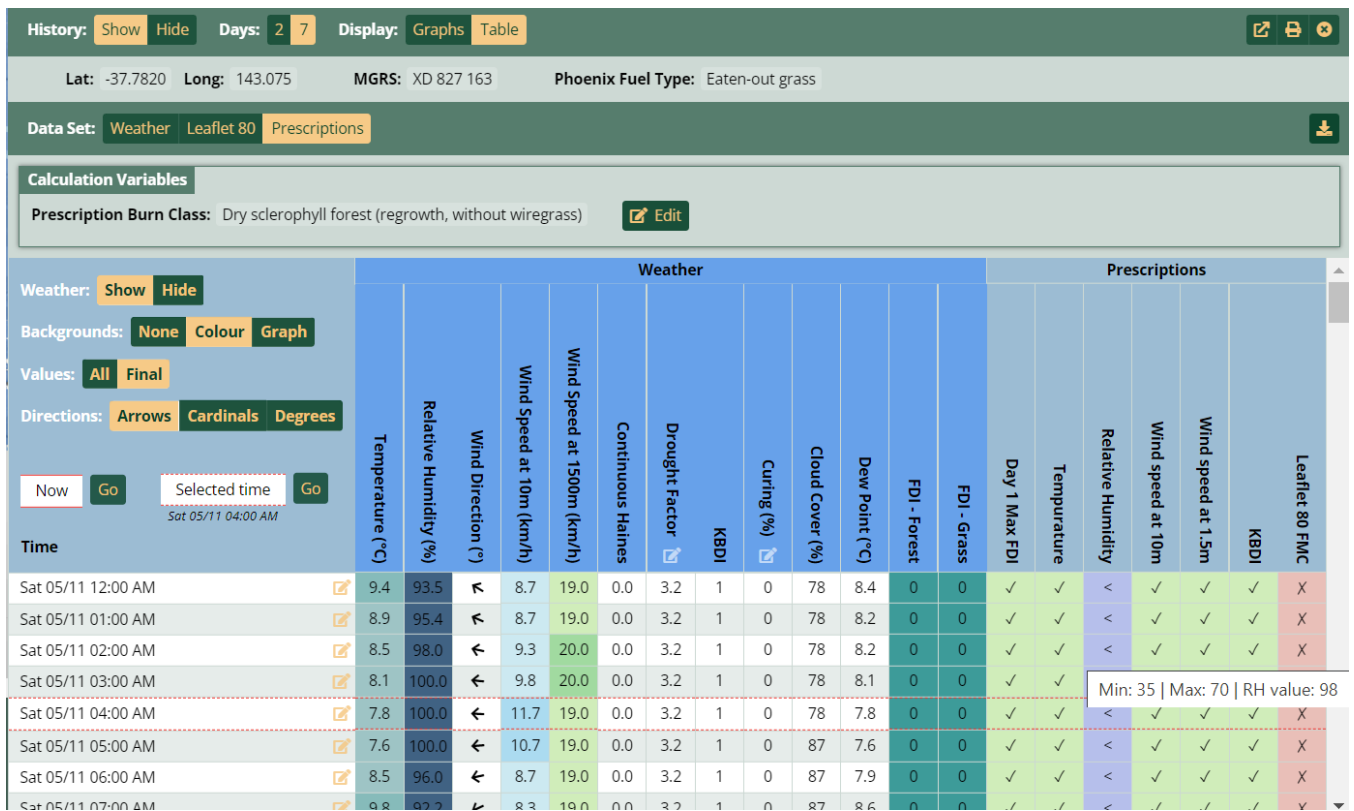

Figure 16. Data tables available in Foresight Planned Burning, showing the Prescriptions calculation data.

6 ACRONYMS

AFDRS	Australian Fire Danger Rating System
BOM	Bureau of Meteorology
CFA	Country Fire Authority
DELWP	Department of Environment, Land, Water and Planning
FBI	Fire Behaviour Index
FDI	Fire Danger Index
FDR	Fire Danger Rating
FFMVic	Forest Fire Management Victoria
FFRAU	Forest and Fire Risk Assessment Unit
FMS	Fuel Management System
GFE	Graphical Forecast Editor
ICC	Incident Control Centre
LGA	Local Government Area
MGRS	Military Grid Reference System
TSU	Technology Solutions Unit

7 TROUBLESHOOTING

Since Foresight is a new platform some unexpected technical errors may occur from time-to-time. Table 7 lists some potential problems and solutions. Foresight should be an application that is helpful and works smoothly at a range of locations around Victoria. Therefore, to support this objective, it is important that users provide feedback about their experience. If you have ongoing issues/frustrations, you are encouraged to report these by submitting feedback via clicking the 'Feedback' button within Foresight.

Table 7. Possible Foresight problems, causes and suggested solutions

Problem	Possible causes	Suggested solutions
Can't access Foresight	• Incorrect FireWeb credentials	• Contact FFMVic Application Support
Data loading slowly or not at all	• Browser cache cluttered by too much history (this a common issue) • Incompatible internet browser • Server overload • Poor internet connectivity	• Clear your browser cache (three dots in top right corner of chrome > more tools > clear browsing data) • Use Google Chrome rather than Internet Explorer, Edge or Firefox. • Refresh or relaunch the Foresight page • Provide details via 'Feedback' button • Use existing products
Error message or crash	• Server overload • Poor internet connectivity	• Refresh or relaunch the Foresight page. • Provide details via 'Feedback' button • Use existing products
Unsure of how to	• Unfamiliarity with the data sets and/or interface	• Read the indicator descriptions in the user guide • Talk to your local FBAN

interpret the data		• Use existing products • Ask a question via 'Feedback' button
Data sets appear incorrect	• Source data set is incorrect • Error in data creation • Error in data retrieval • Error in data display	• Provide details via 'Feedback' button • Use existing alternative products