

Supplementary Material

Australian Fire Danger Rating System: implementing fire behaviour calculations to forecast fire danger in a research prototype

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Table S1. Required weather forecast parameters for fire behaviour calculations and red flag warnings.

ADFD = Australian Digital Forecast Database (Bureau of Meteorology 2023b), AWRA = Australian Water Resource Assessment (Frost *et al.* 2018).

Parameter	Source	Frequency	Purpose
10 m wind speed (km h ⁻¹)	ADFD	Hourly	Fire behaviour calculations
Temperature (°C)	ADFD	Hourly	Fire behaviour calculations
Relative humidity (%)	ADFD	Hourly	Fire behaviour calculations
Drought factor	ADFD	Three hourly	Fire behaviour calculations
Precipitation (mm)	ADFD	Three hourly	Fire behaviour calculations
Curing (%)	ADFD	Daily	Fire behaviour calculations
0–10 cm soil moisture	AWRA	Daily	Spinifex fuel availability
Continuous Haines index	ADFD	Three hourly	Stability red flag
Wind change danger index	Calculated from ADFD parameters	Hourly	Wind change red flag

Table S2. Required fuel attributes for fire behaviour calculations.

Broad fuel type	Recorded in fuel attribute table	Implemented in model code	From spatial data
Forest	Fuel hazard score (surface and near-surface); height (near-surface, elevated, overstorey); wind factor; fuel load per strata; fuel curve constants	nil	Time since fire
Grassland	nil	Grass condition	Grass fuel load & curing
Northern Grassland (Savannah)	Wind factor; fuel load for gamba fuel type	Grass condition	Grass fuel load & curing
Spinifex	Wind factor, productivity	Fuel cover and fuel load curves or tables	Time since fire
Mallee-Heath	Overstorey height & cover; fuel load per strata; fuel curve constants	nil	Time since fire
Shrubland	Elevated height; wind factor; total fuel load; fuel curve constant	nil	Time since fire
Buttongrass	Productivity	Fuel load curves	Time since fire
Pine	nil	Generic values	nil

Fig. S1. Output map showing: (a) hourly forecast fire danger rating (FDR) for a day of elevated fire danger (4 January 2019 at 14:00); (b) the maximum daily forecast FDR by Fire Weather District for the same day; (c) the influence of time since fire on Spinifex FDR, insert shows time (in years) since last fire for Spinifex fuels only in the Northern Territory; (d) the influence of very different fuel types on FDR, inserts show the contrast between Buttongrass and wet forest in south west Tasmania; (e) influence of weather on FDR, insert shows GFDI for the same time in western Victoria.

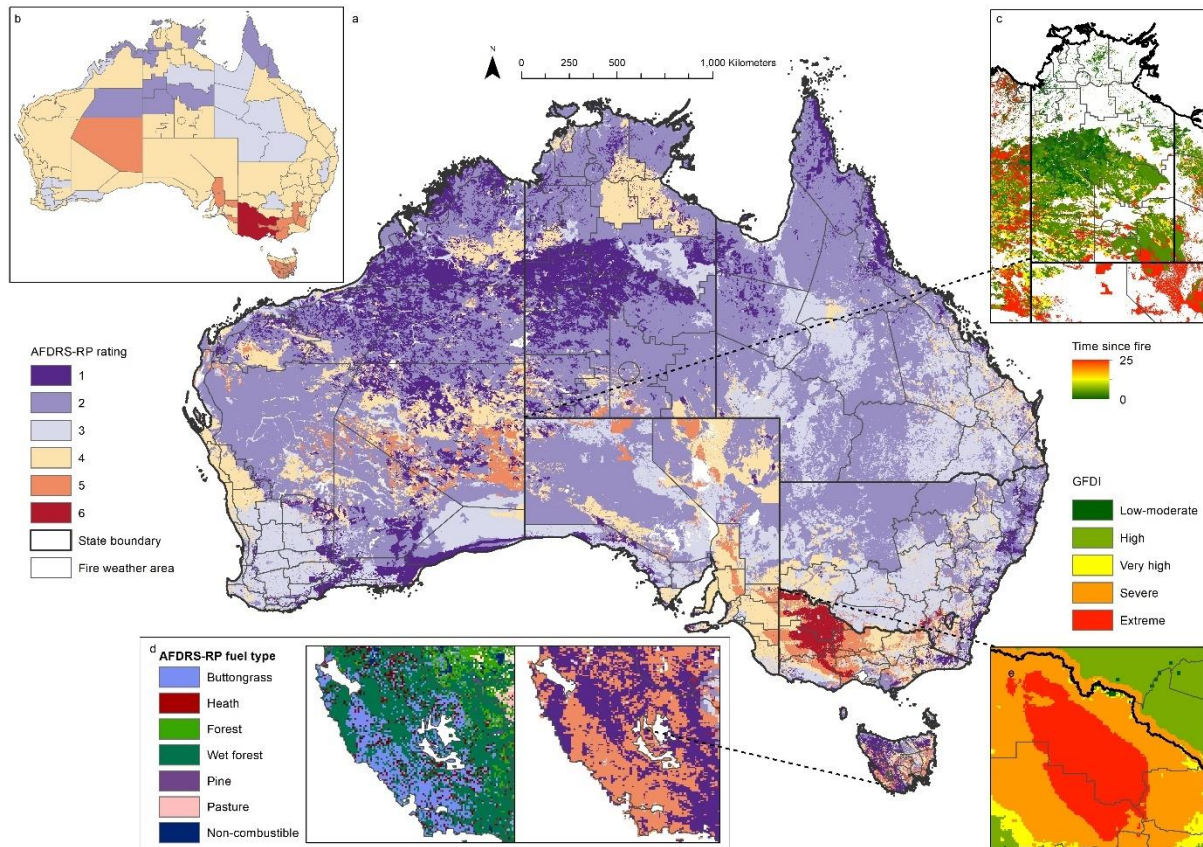


Fig. S2. AFDRS_{RP} Broad fuel type map. Insert is GFDI/FFDI map. Note in “combined” cells both GFDI and FFDI are calculated, with the higher rating being used.

