

Bushfire Ignition in Victoria

An adventure in wrangling spatial data

Elle Saber

The Inspiration



The Fire Danger Rating System

The McArthur Forest Fire Danger Index:

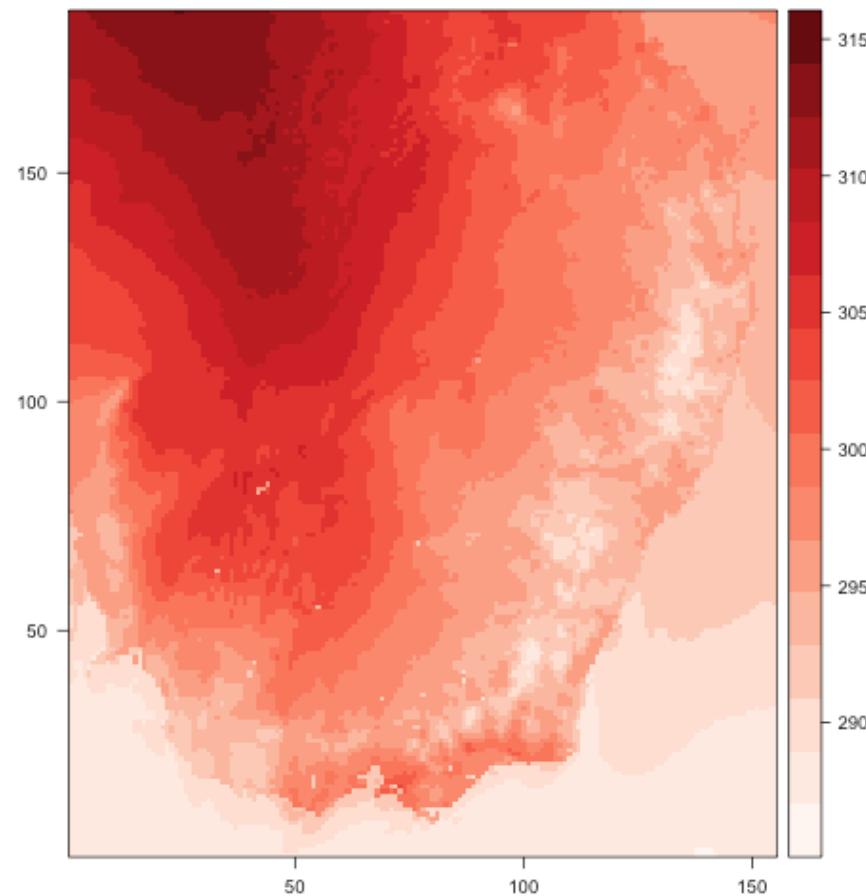
$$F = 2.0 \exp(-0.450 + 0.987 \ln(D) - 0.0345H + 0.0338T + 0.0234V)$$



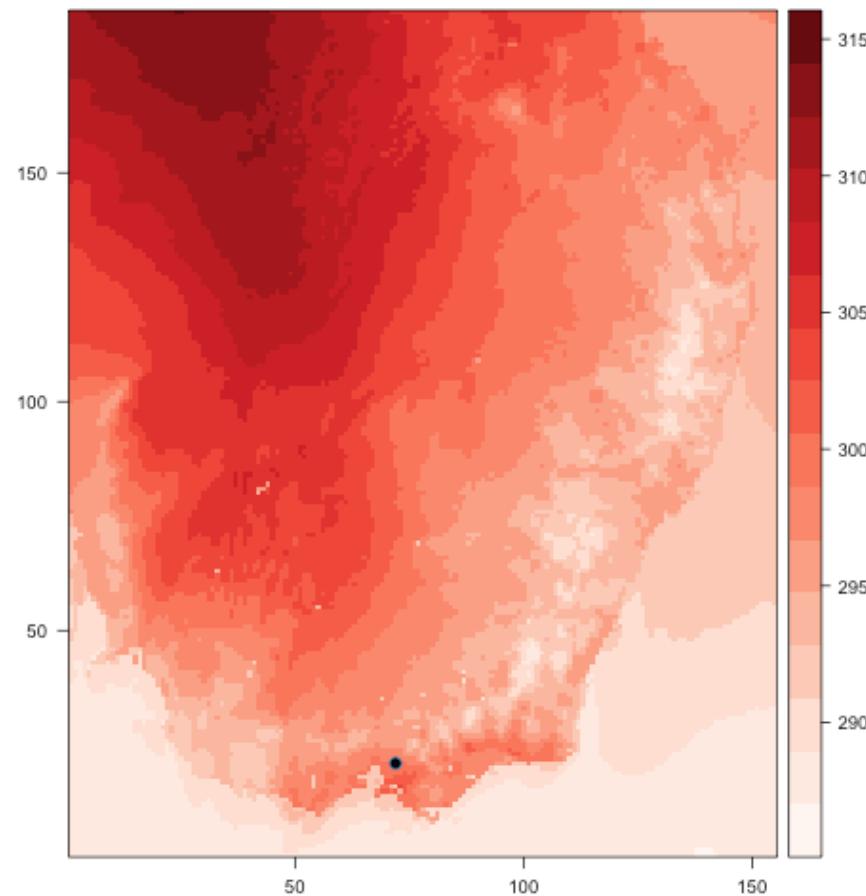
Historical Fire Weather dataset (Lucas, 2010)



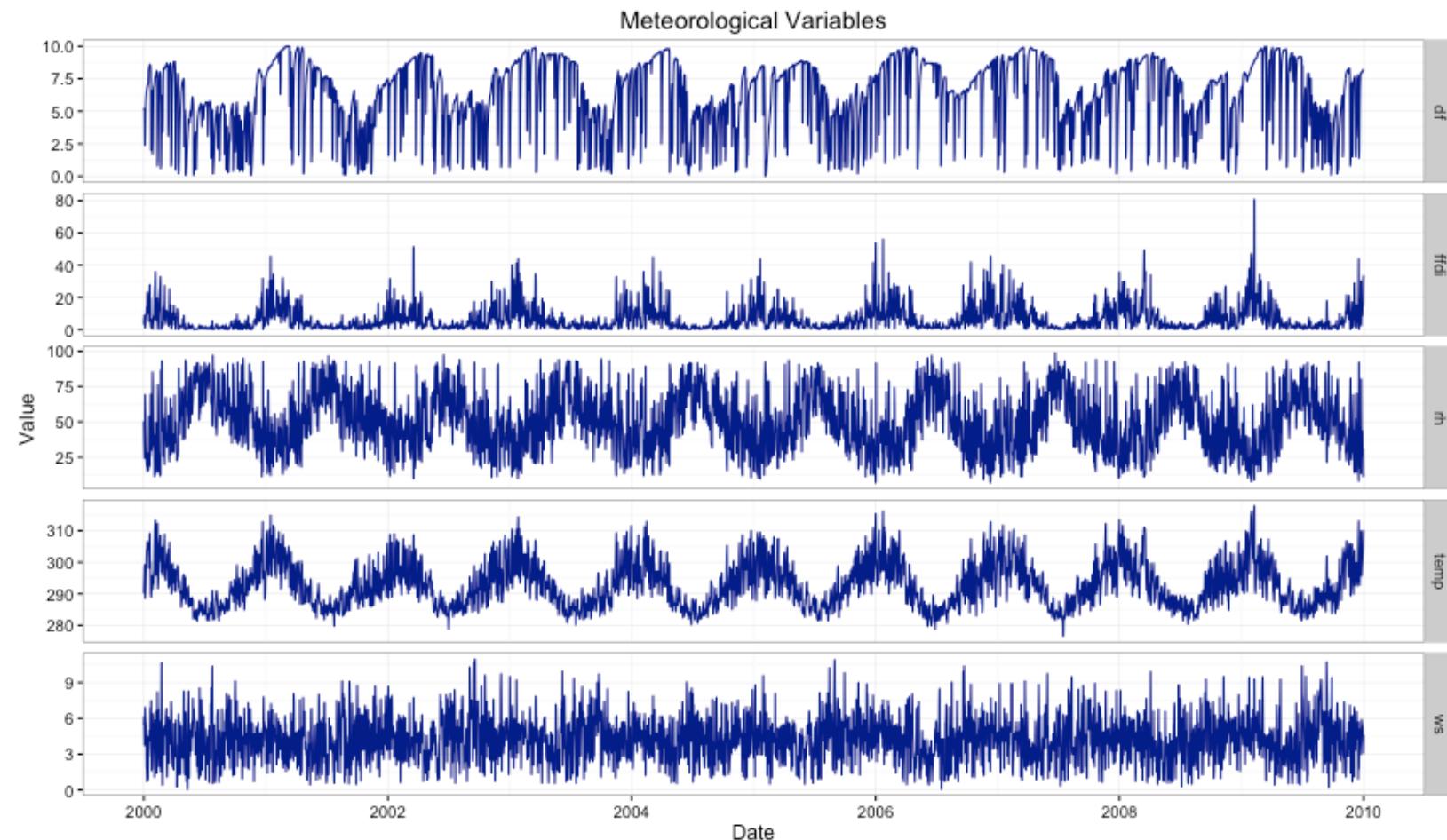
WRF Model Temperature



WRF Model Temperature



WRF Data Time Series - Silvan



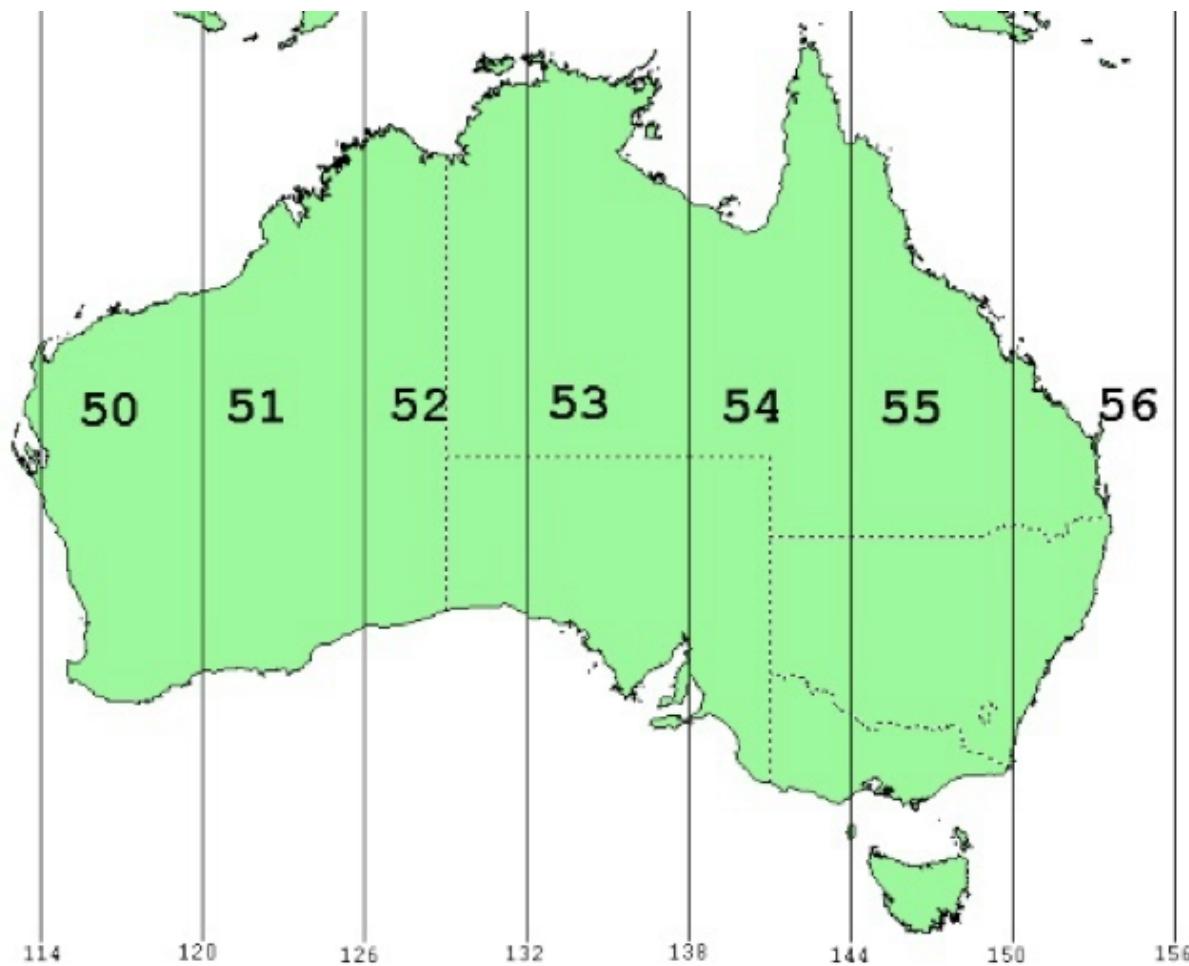
ABS Statistical Divisions

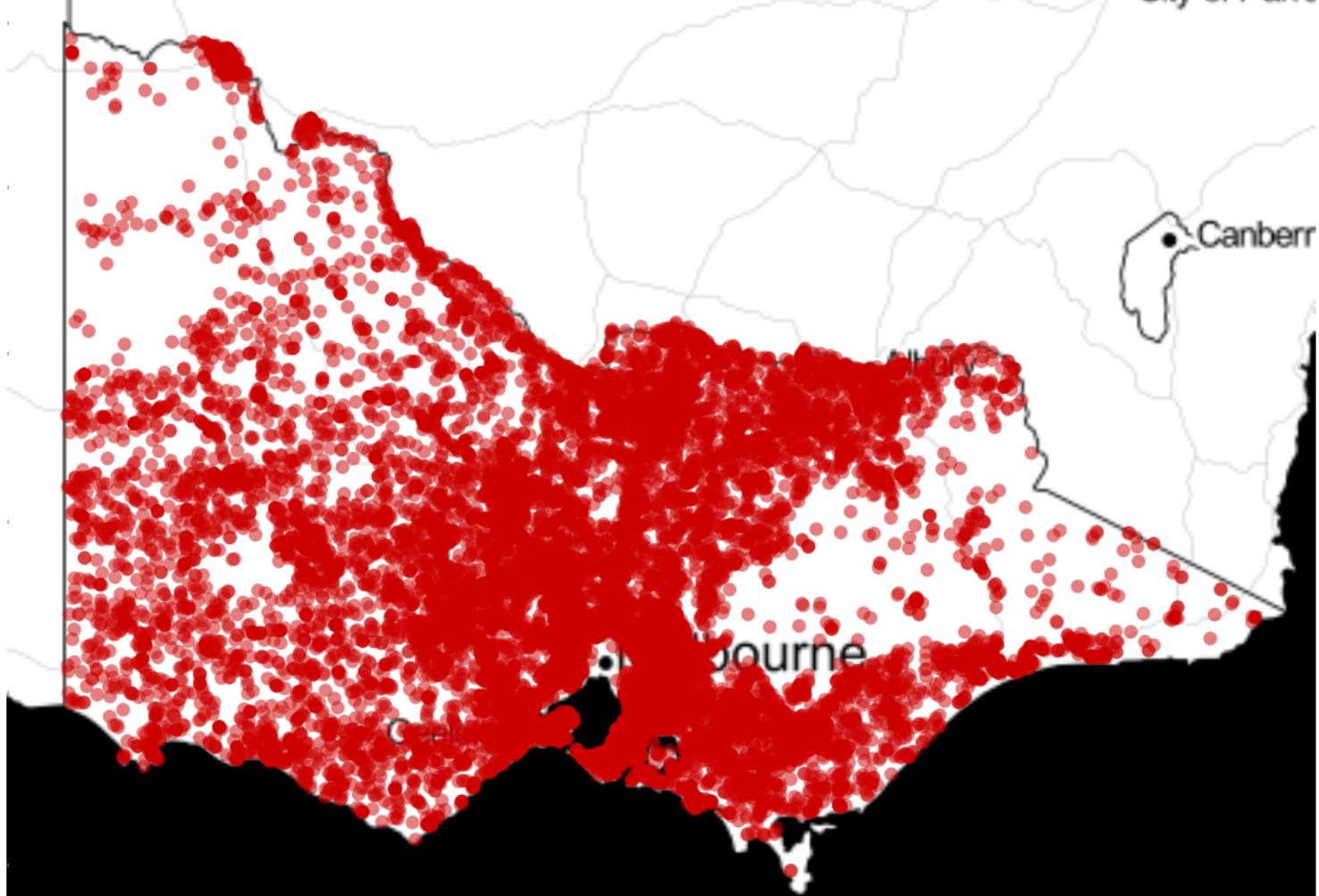


Fire & Incident Reporting Service

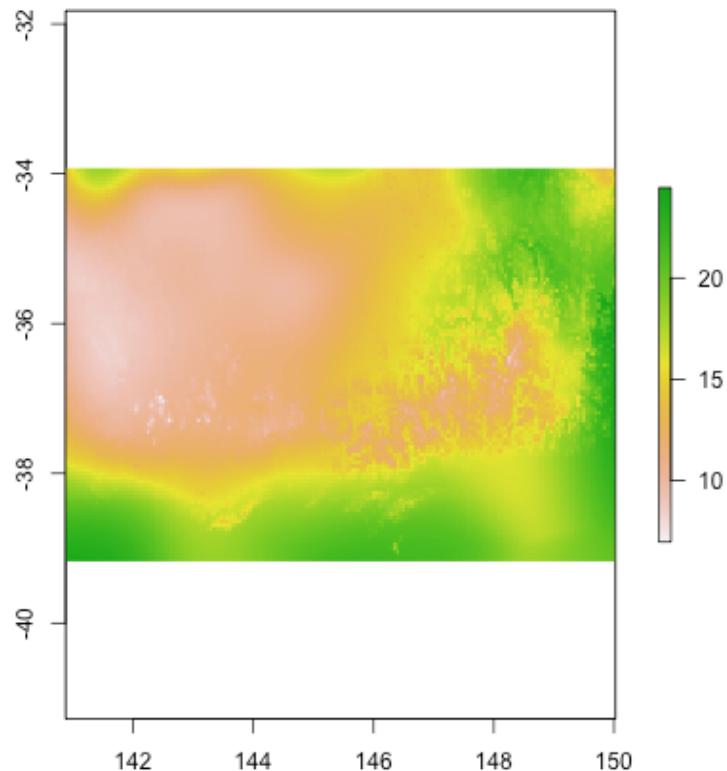
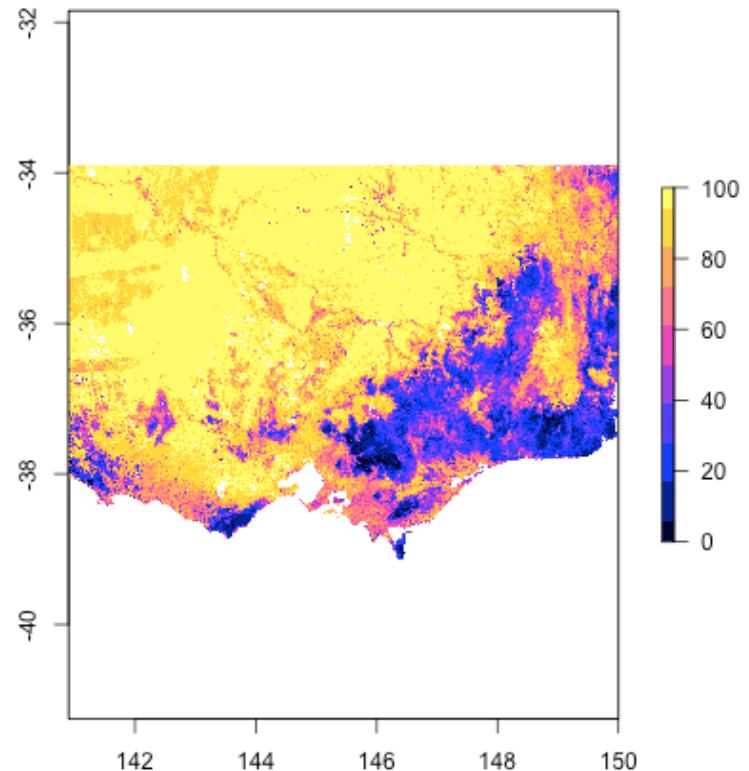
02/04/05 23:11:40	MELTON	182,474	MELTON SOUTH	Grass fire (more than one hectare)	55	286,745	5,825,070
02/04/05 22:15:51	TERANG	8,306,292	TERANG	Scrub or bush and grass mixture fire (more than one hectare)	54	666,657	5,765,670
02/04/05 20:09:00	CORIO	182,460	BELL PARK	Grass fire (more than one hectare)	55	267,181	5,780,087
02/04/05 18:48:41	CRANBOURNE	182,450	CRANBOURNE	Grass fire (more than one hectare)	55	348,117	5,783,408
02/04/05 13:29:31	ROWVILLE	182,421	LYSTERFIELD	Grass fire (more than one hectare)	55	351,621	5,799,809
02/04/05 13:27:00	SEBASTOPOL	5,608,928	SEBASTOPOL	Grass fire (more than one hectare)	54	750,421	5,833,977
02/04/05 12:57:42	LESLIE MANOR	8,306,248	LESLIE MANOR	Scrub or bush and grass mixture fire (more than one hectare)	54	704,255	5,782,355
02/04/05 09:09:22	FRANKSTON	182,396	FRANKSTON NORTH	Grass fire (more than one hectare)	55	337,848	5,778,794
01/04/05 19:44:17	DANDENONG	182,365	DANDENONG SOUTH	Grass fire (more than one hectare)	55	344,547	5,791,726
01/04/05 19:15:35	DANDENONG	182,359	DANDENONG SOUTH	Grass fire (more than one hectare)	55	344,545	5,790,898
01/04/05 15:19:49	FRANKSTON	182,336	FRANKSTON NORTH	Grass fire (more than one hectare)	55	337,614	5,778,831
01/04/05 14:39:20	CLONBINANE	8,306,196	BROADFORD	Scrub or bush and grass mixture fire (more than one hectare)	55	334,273	5,875,965
01/04/05 13:23:56	DUNOLLY	8,306,183	DUNOLLY	Grass fire (more than one hectare)	54	743,620	5,917,277
31/03/05 22:09:11	KINGLAKE DISTRICT /DEI	182,289	KINGLAKE	Scrub or bush and grass mixture fire (more than one hectare)	55	354,919	5,846,322
31/03/05 19:38:00	MILDURA	6,502,469	MILDURA	Grass fire (more than one hectare)	54	605,800	6,216,800

Australian Map Grid Zones



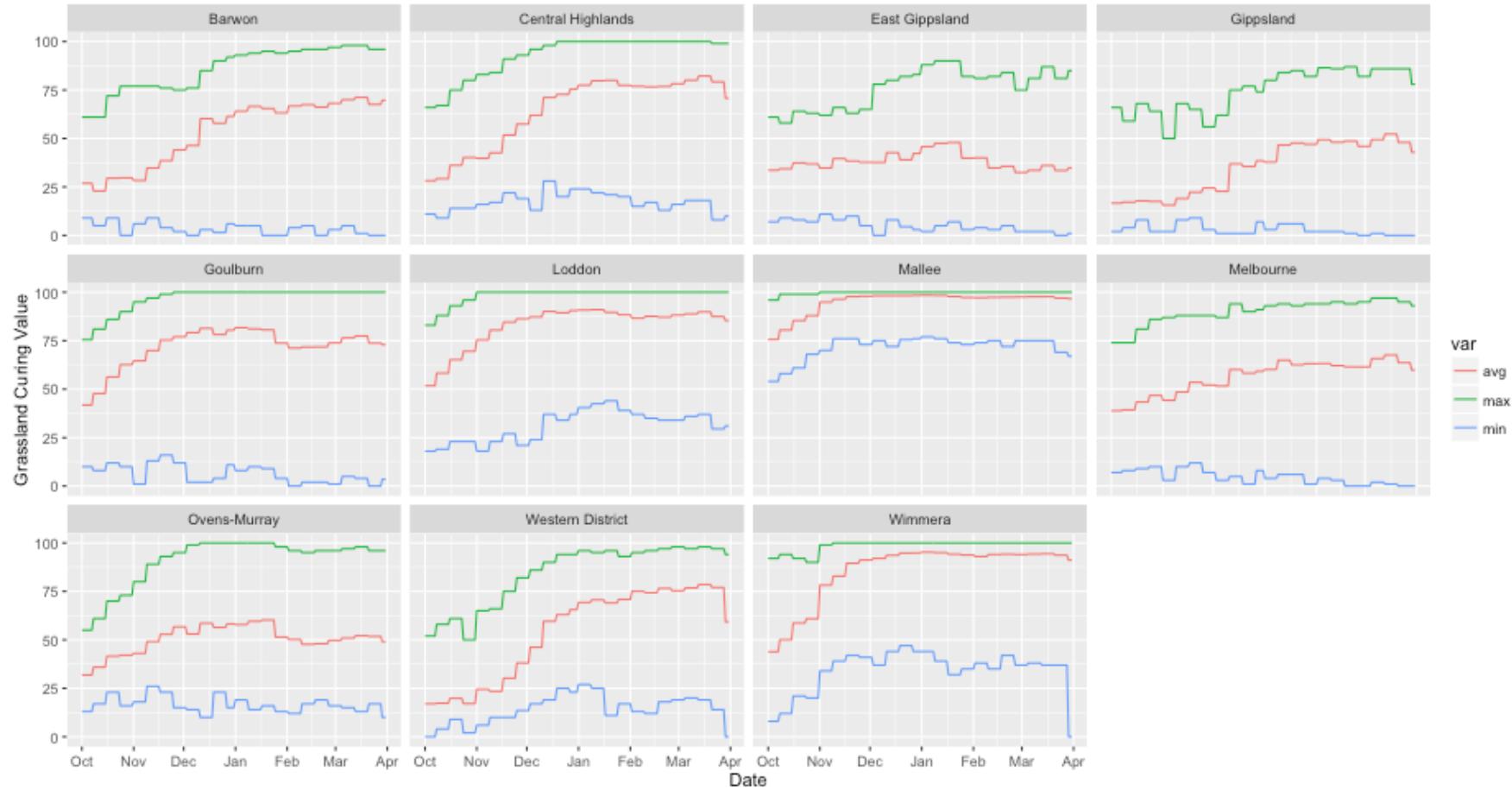


Grassland Curing & Vapour Pressure

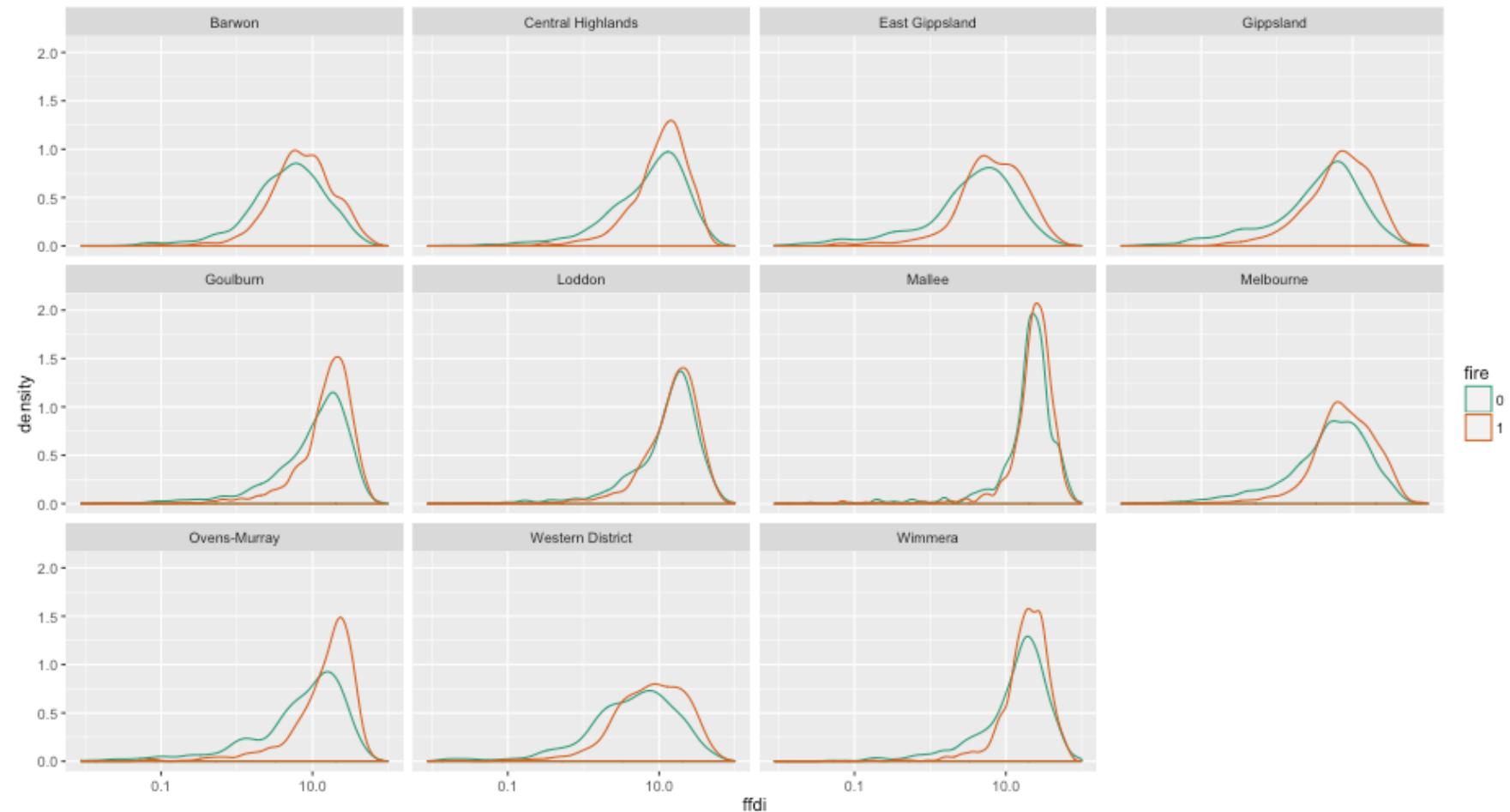


Grassland Curing Evolution

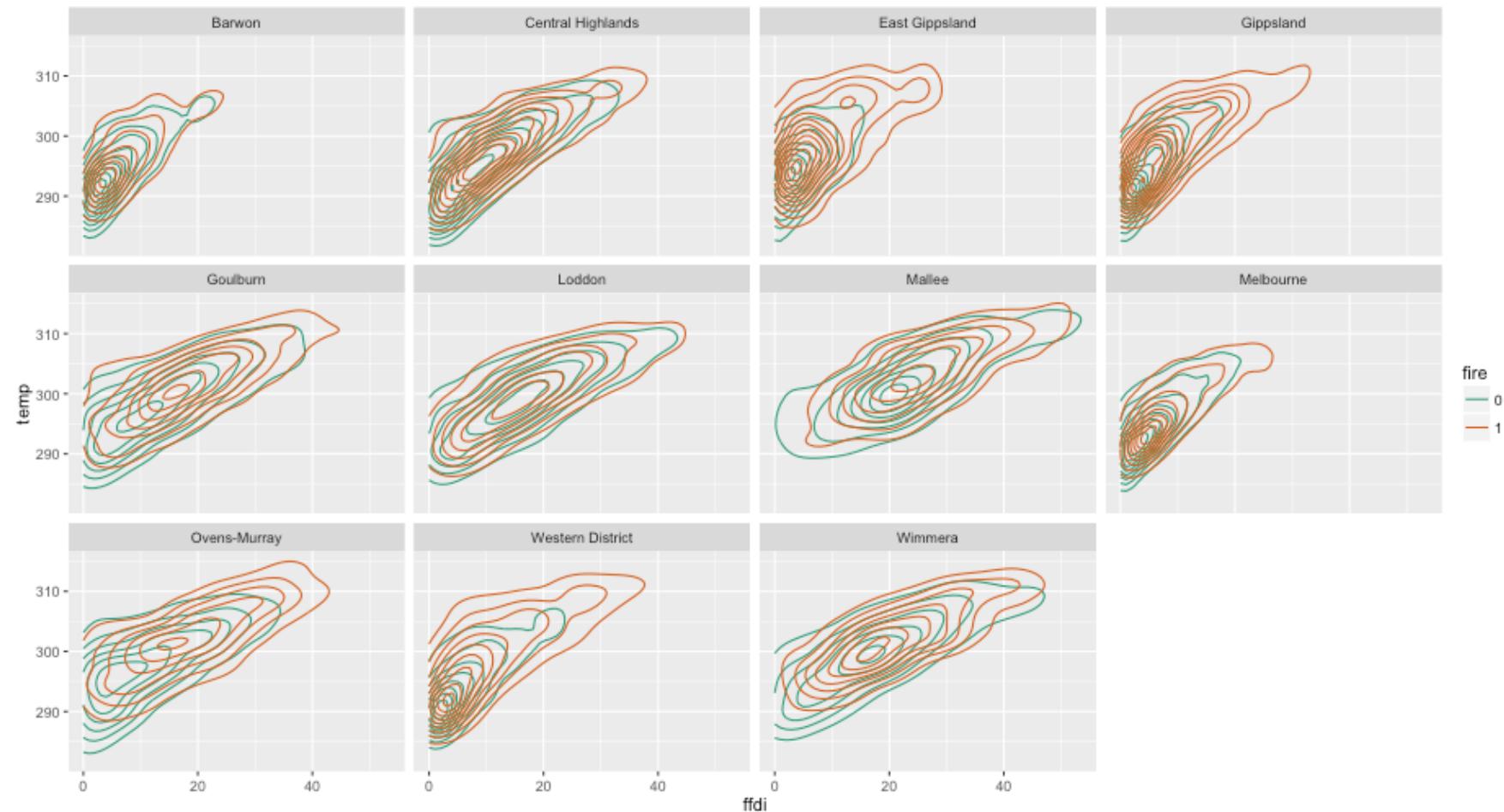
Grassland Curing over 2008 Fire Season



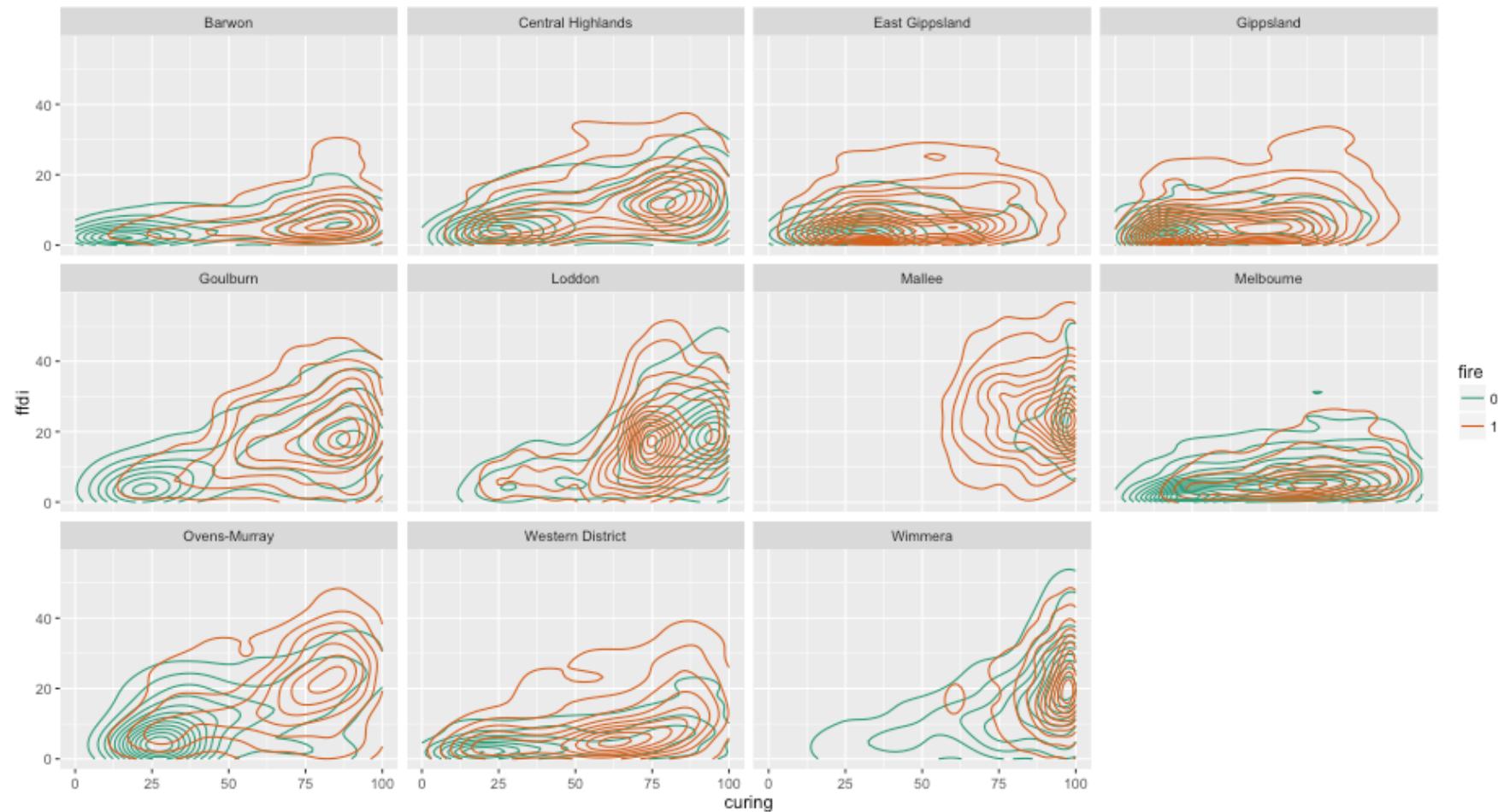
The Fire Danger Index and Fire Occurrence



The Fire Danger Index and Temperature



The Fire Danger Index and Grassland Curing



Data sets

- WRF Model
- CFA Fire & Incident Reporting Database
- CFA Grassland Curing
- BOM Vapour Pressure & Precipitation

Key R Packages

- dplyr & tidyr
- rvest
- NCDF
- raster
- sp
- rgdal

Organisations

- The Country Fire Authority Victoria
- Bureau of Meteorology
- Rural Fire Service NSW

Special Thanks

- Rob Hyndman
- Di Cook
- Euan Ferguson
- Hamish Clarke
- Earo Wang
- Klaus Ackerman