Department of Biodiversity, Conservation and Attractions

GOVERNMENT OF WESTERN AUSTRALIA

Biodiversity and Conservation Science

We're working for Western Australia.

A perspective on prescribed burn success in semi-arid landscapes

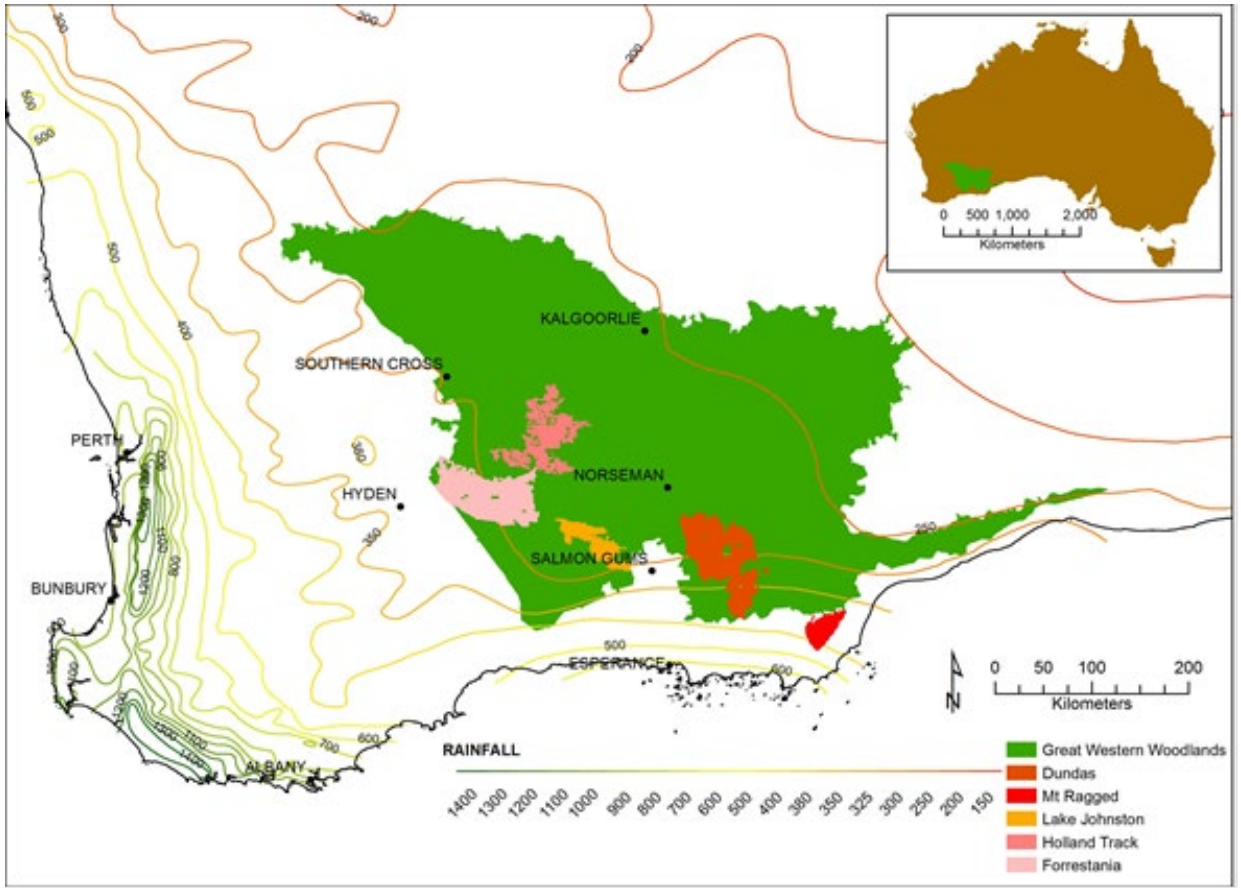
Lachie McCaw

Southern Rangelands Prescribed Burning Forum

Hyden 2-4 June 2021

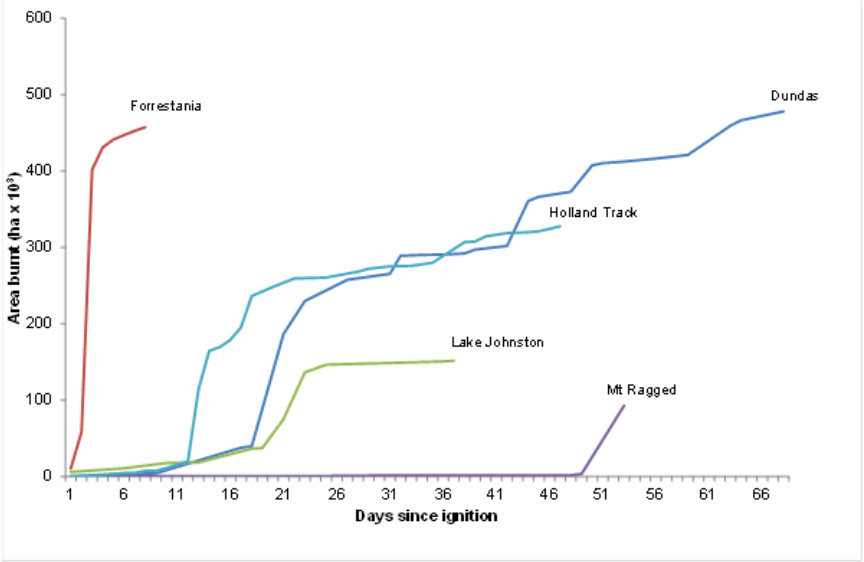
Context

- When might prescribed burning make a difference to the spread of bushfires?
- Vegetation and fuel type
- Previous fire history
- Weather factors



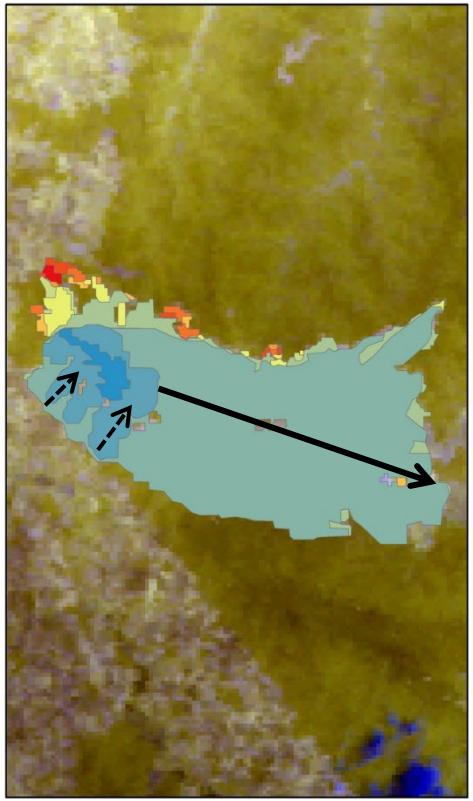
Southwestern Australia showing location of five large fires (>90 000ha)

1990/91 fire season
>700 000 ha burnt at:
Lake Johnston
Dundas
Mt Ragged



Re-constructed spread of five large fires
Thanks Katherine Z and Vicky R!

Fire	Start date	Duration of fire activity (days)	Final fire area (ha x 1000)
Lake Johnson	19 Dec 1990	36	151
Dundas	20 Dec 1990	70	478
Mt Ragged	6 Jan 1991	53	93
Forrestania	21 Jan 1994	9	466
Holland Track	5 Dec 2004	37	311



Historical Progression
Forrestania Fire

(January 1994)

Legend

Date of fire area burnt

- 22 January 1994
- 23 January 1994
- 24 January 1994
- 25 January 1994
- 26 January 1994 7:45 am
- 26 January 1994 5:03 pm
- 27 January 1994 7:23 am
- 27 January 1994 4:51 pm
- 28 January 1994 7:02 am
- 28 January 1994 4:40 pm
- 29 January 1994
- 30 January 1994

N

1:1,100,000

0 5 10 20 30 40

Kilometres

Projection: Universal Transverse Mercator
MGA Zone 50 Datum: GDA94

The remarkable spread of the 1994 Forrestania fire

22 Jan: ignited by lightning

23 Jan: 58 000 ha burnt, fire size increased by backfiring

24 Jan: Fire spread 80 km, area increase 350 000 ha

Weather
Max temp 40°+

Dry adiabatic mixing to 5000m+

NNW winds
46 knots at 1000 m (900hPa)
Linked to approaching low pressure system south of fire

Vegetation and fuel type

Gimlet – 19 year-old saplings burnt by mild fire May 2012 – 95% deaths

Dundas Nature Reserve

synchronous basal fire scars in an area burnt mildly during summer bushfire

Forrestania

Vegetation structure change along previous fire boundaries

Structural change in eucalypt woodlands near Lake Johnson burnt by high intensity bushfire in January 1991

Inputs for prescribed fire planning

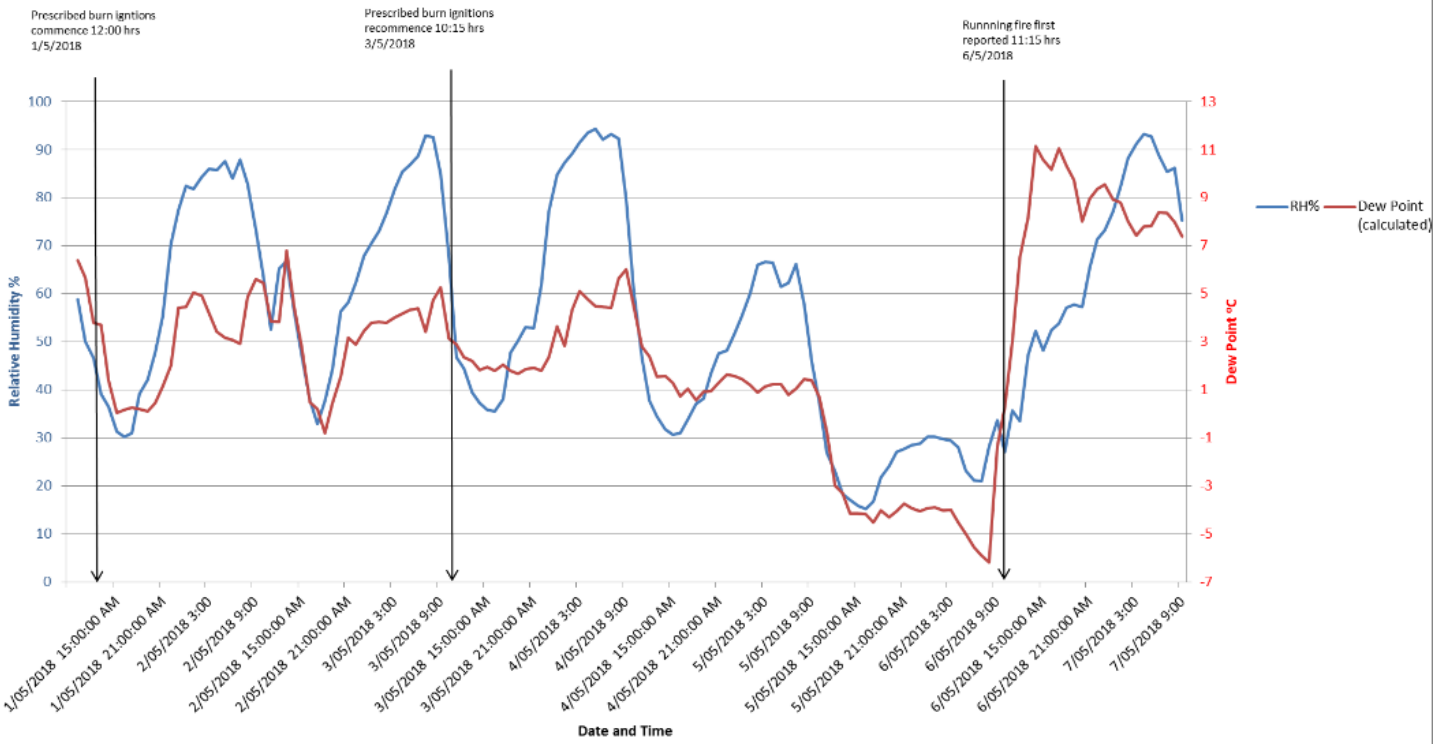
- Vegetation mapping
  - structural type (woodland, mallee, shrub)
  - dominant species (fire tolerance)
- Previous fire history (+severity)
  - structural condition
- Better understanding of fire response for key plant species, and tools to support practitioners

When temperature, dew point and fuel moisture interact

Temperature (C)	Dew Point (C)	Rel Humidity (%)	Dead fuel MC (%)	Relative rate of spread
25	10	35	7	X 1
25	**0**	**20**	**4.5**	**X 2.5**

Dew point drop out linked to:
- Shift in wind direction (eg on-shore to off-shore)
- Pre-frontal troughs
- Thermal mixing during the afternoon
- Descending dry air on lee slopes of ranges

Ironcaps Bushfire (CW_003)
Dew Point and Relative Humidity 1-7th May 2018



Weather factors

- Deployment of portable AWS to burn sites
- Building knowledge of good burning windows by good observation & recording
- Embedded meteorologist (MaxBurn)