DEPARTMENT OF
TERRITORY AND
MUNICIPAL SERVICES

Winter Burning of Grass Fuels in the ACT

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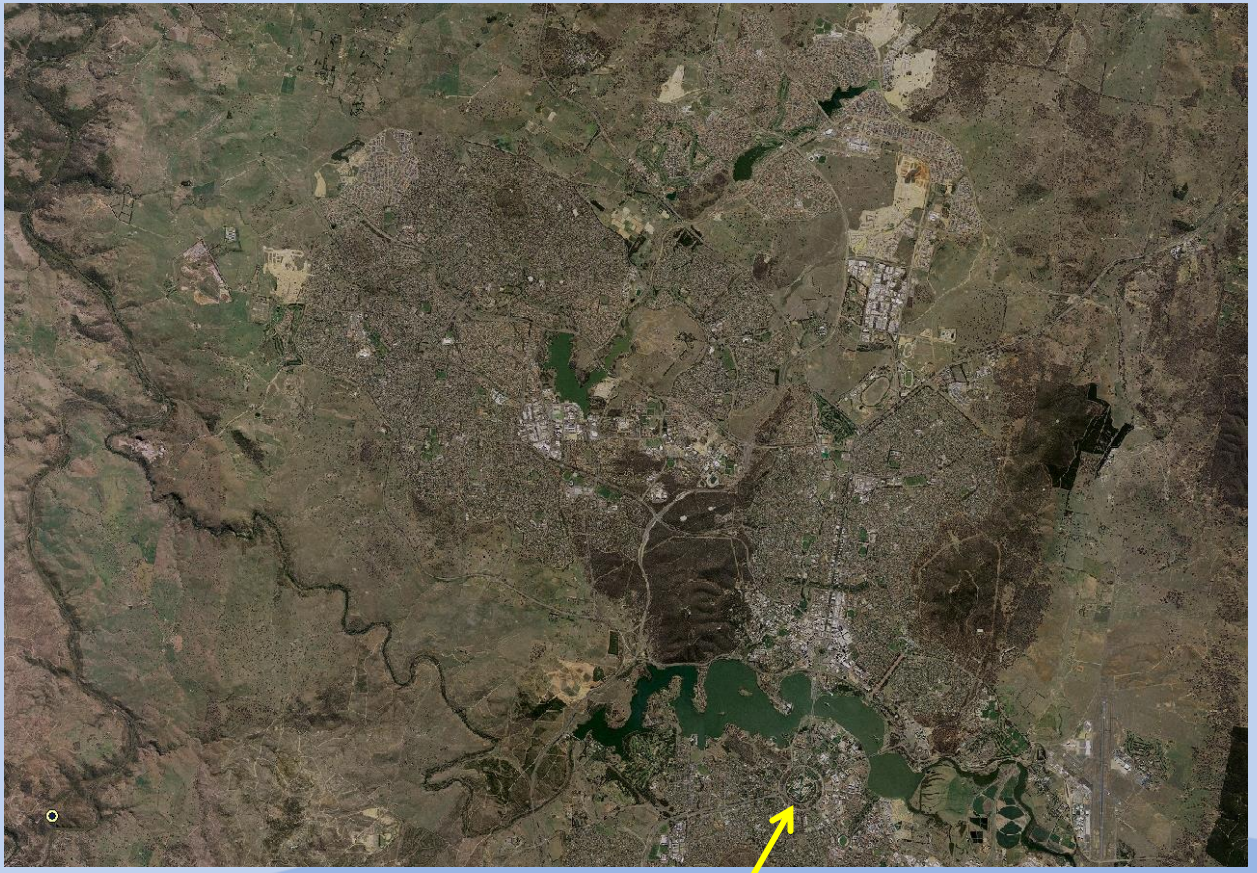
Introduction

- La Nina from 2010-2012
- Lots of rain brought lots of grass

Phalaris – 9t/ha

Canberra's surrounded by grass



800km of grassy interface

Parliament House

Fuel management zones

- Inner Asset Protection Zone (IAPZ)
- Outer Asset Protection Zone (OAPZ)
- Strategic Fire Advantage Zone (SFAZ)

Urban-rural interface

SFAZ

Under grazing

OAPZ

(Under grazing)

IAPZ

(Mowed)

Fuel management standards

- IAPZ = height <200mm when curing >70%
- OAPZ = GFH <35 when curing >70%
- SFAZ = GFH <50 when curing >70%

GFH = Grass fuel hazard

GFH = % cover x height (m)

High Fuel Loads...

- ... and fuel continuity across the landscape
- An average of 60 burning days/year
- Similar budget to previous years

- **What if we burn in winter?**

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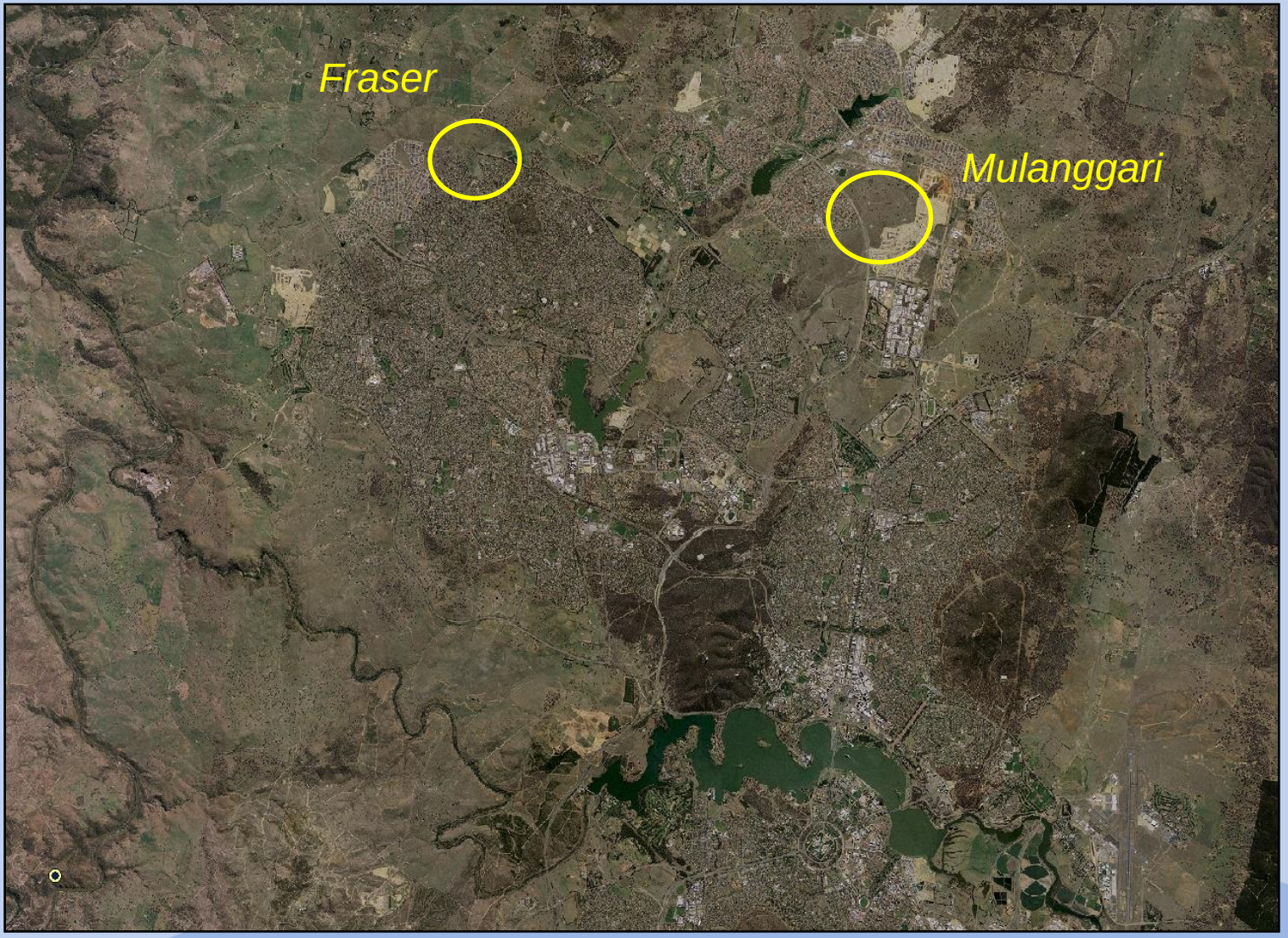
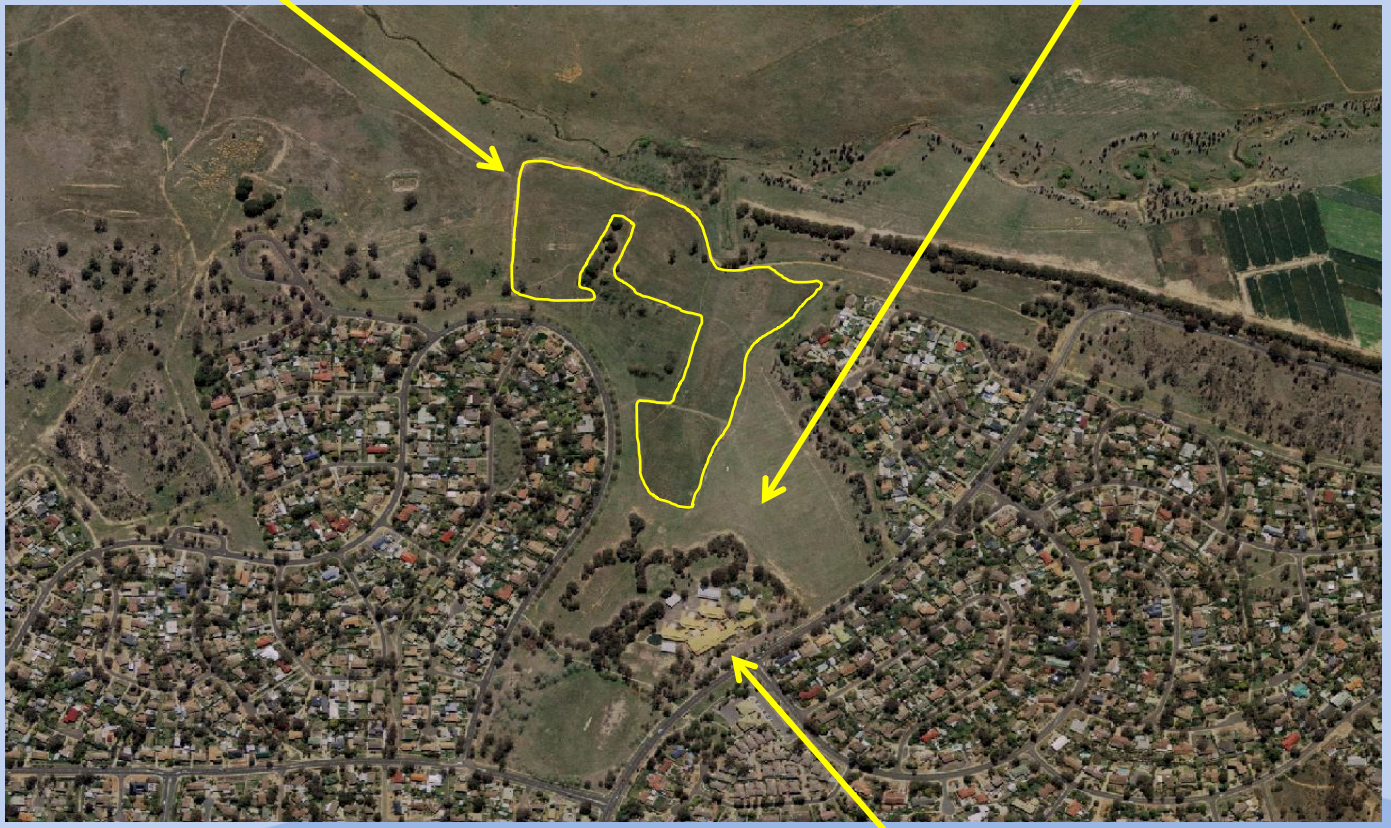


Fraser – urban-rural interface



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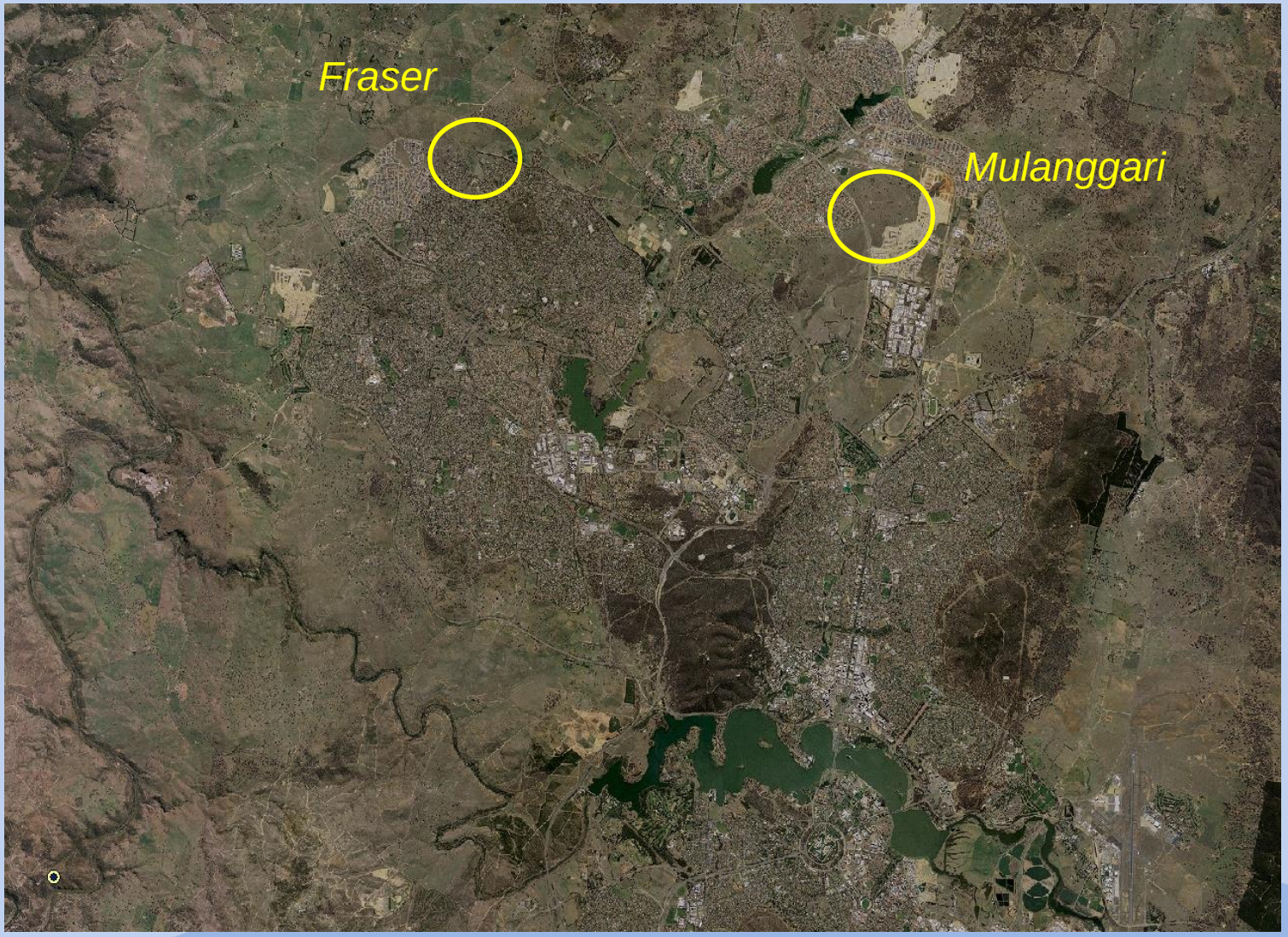
Fraser
Mulanggari

Mulanggari Grasslands

Gungahlin Town Centre

Franklin Early Childhood School

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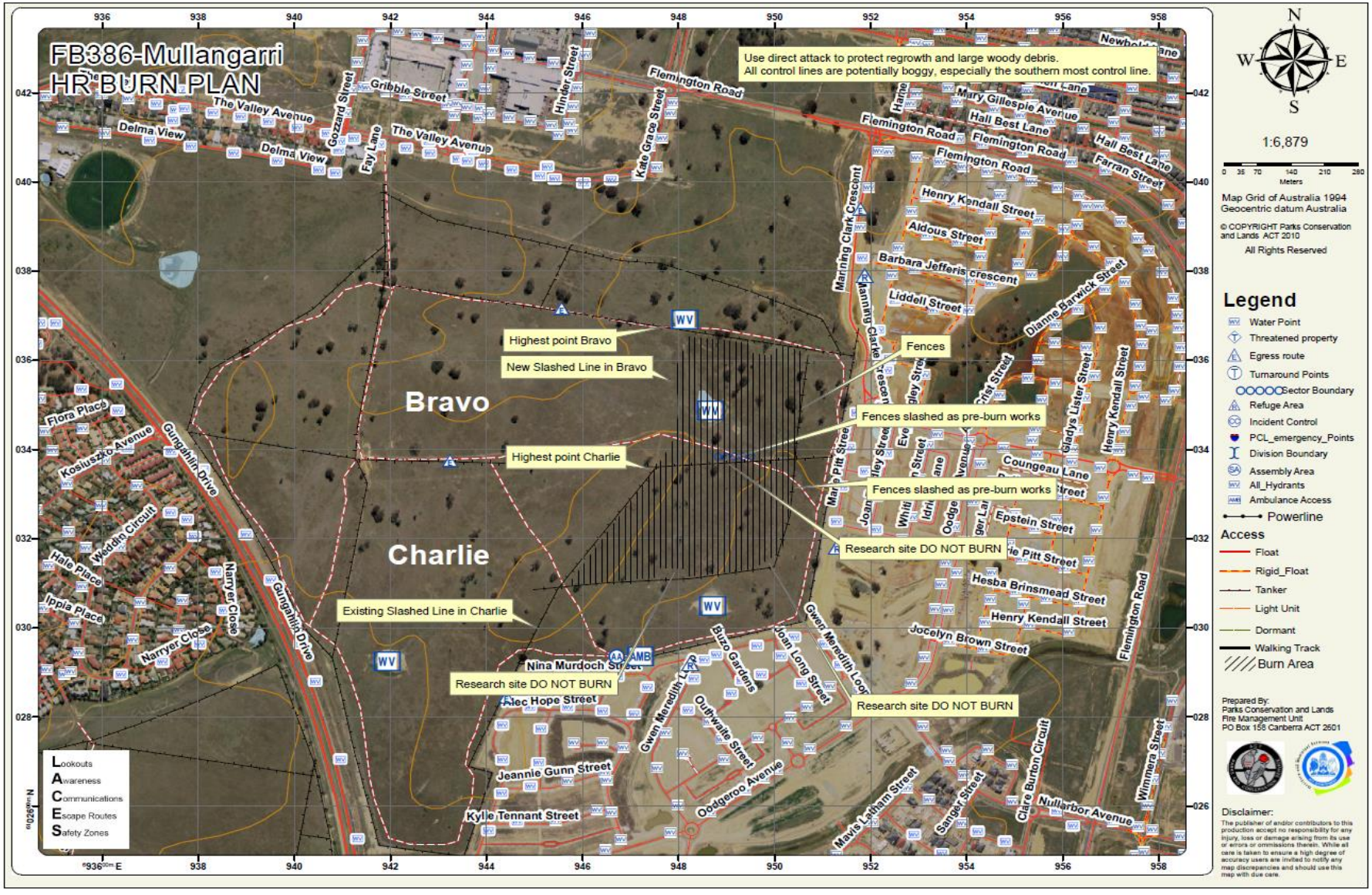


Fraser – urban-rural interface

- *Phalaris canariensis* (exotic pasture species)
- Grows in spring (cool season)
- 4 paddocks
- Fuel load measured 23 July 2012
- Burnt 22 August 2012
- Measured February

Mulanggari Grasslands

- *Themeda triandra* (native)
- Grows in summer (warm season)
- 3 paddocks
- Fuel load measured 24 July 2012
- Burnt 3 September 2012
- Measured February

Study design

- Before-After-Control-Impact

- Paddocks divided into burnt and unburnt areas
- All areas measured before
- Paddocks burnt (impact), and unburnt areas left (control)
- All paddocks measured after

Method

- 5 x 1m^2 plots per replicate (10 plots /paddock)

MEASUREMENTS

- Fuel load (t/ha)
- Fuel moisture content (% dry weight)
- Grass height
- Grass cover (%)
- Grass Fuel Hazard = Height (m) x Cover (%)

Method

- Cut the grass one paddock at a time (10 plots)
- Collect grass curing, cover and height
- Weigh grass at CSIRO
- Dry at 105˚ C for 24 hours (Matthews, 2010)
- Weigh again

Analysis

Distribution

- **Kolgomorov-Smirnov test**

Differences

- **ANOVA (normal)**
- **Wilcoxon signed ranks (non-normal)**

Correlation

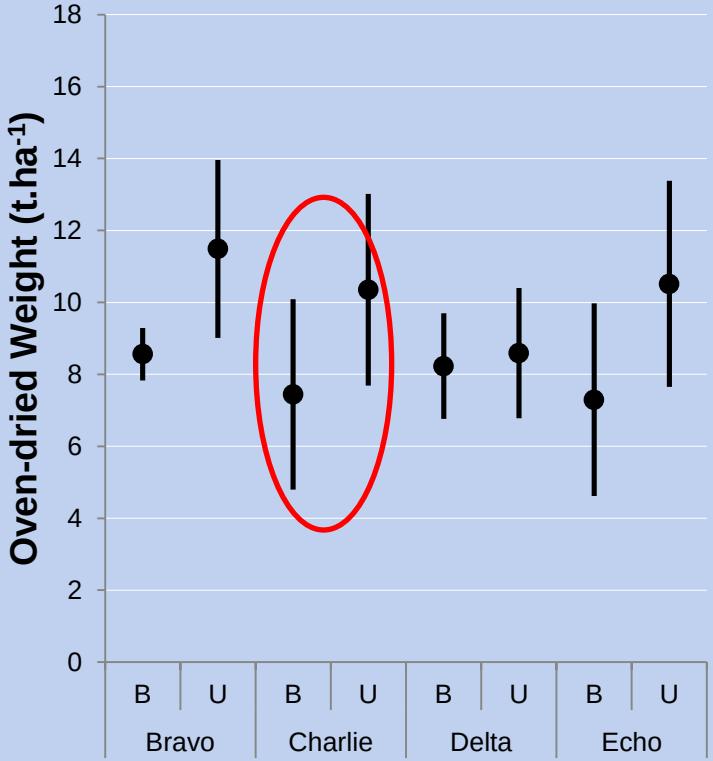
- **Pearsons (normal)**
- **Spearmans (non-normal)**

Distribution

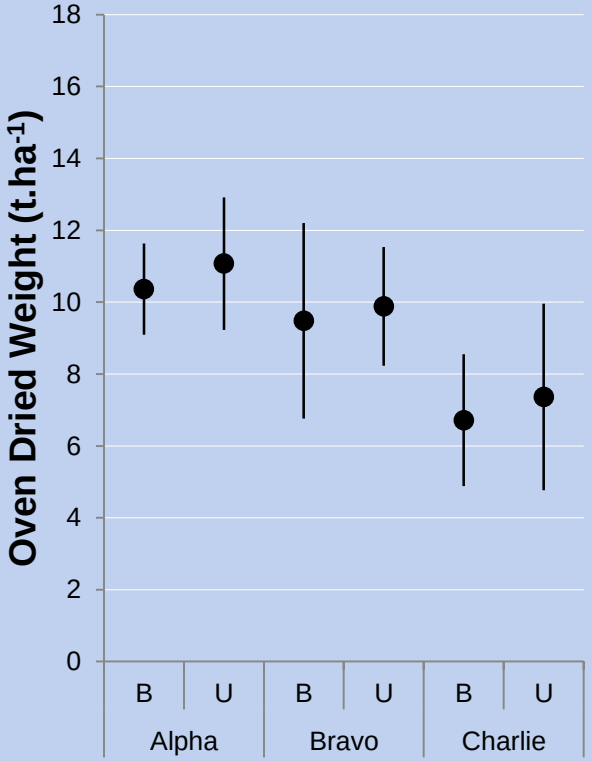
- Fuel load (Z = 0.9, p = 0.4)
- Fuel moisture content (Z = 0.9, p = 0.3)
- Curing (Z = 1.4, p = 0.04)
- Grass height (Z = 1.2, p = 0.1)
- Grass fuel hazard (Z = 1.2, p = 0.1)

All normally distributed except for Curing

Before – Fuel load

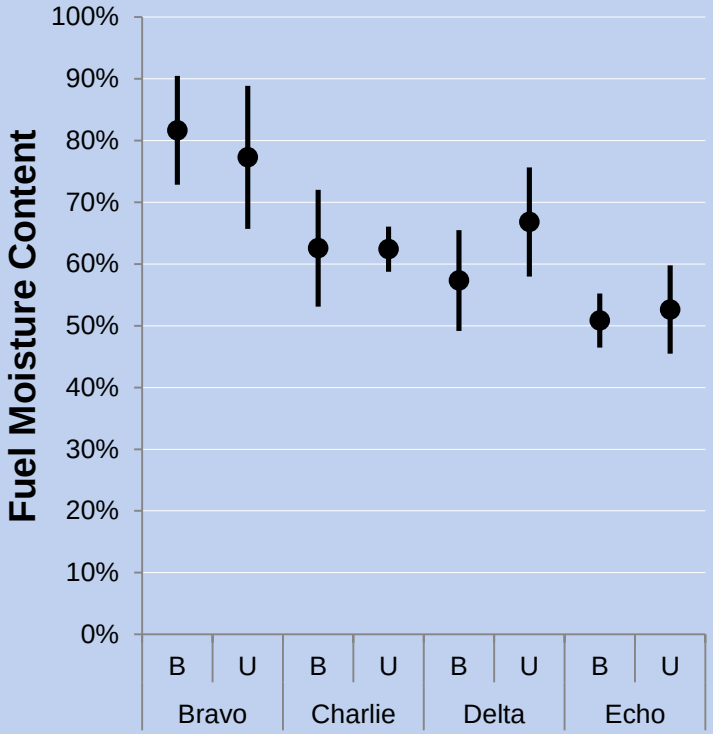


Pasture grass (*Phalaris*)



Native grass (*Themeda*)

Before – Fuel moisture content



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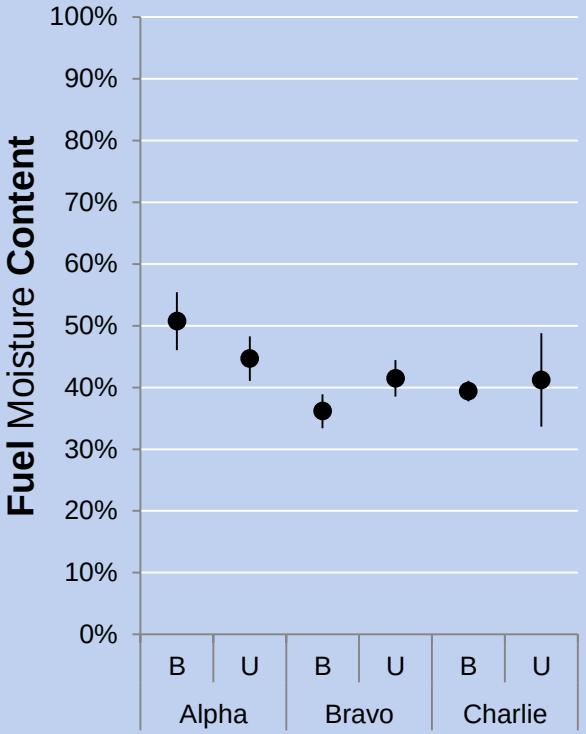
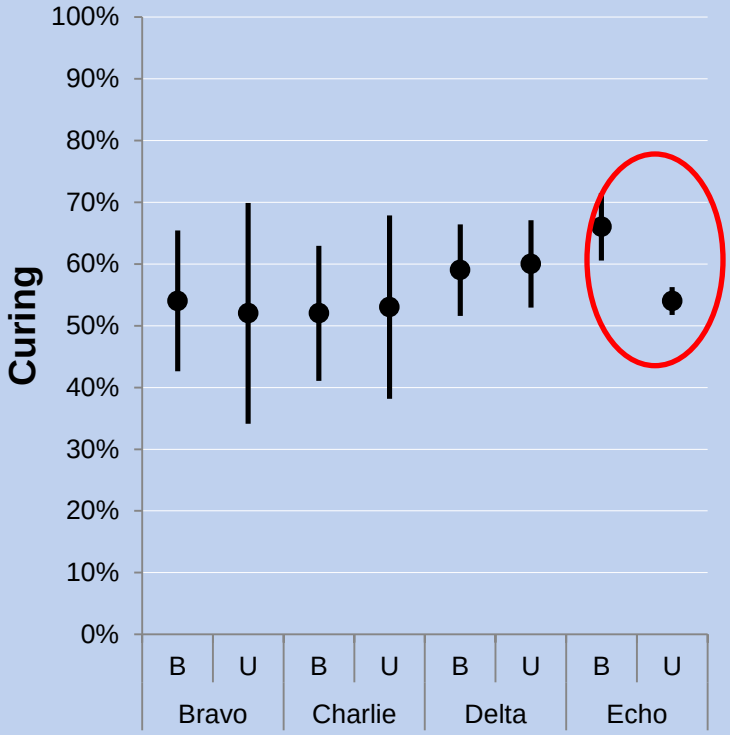


Native grass (*Themeda*)

Before – Curing



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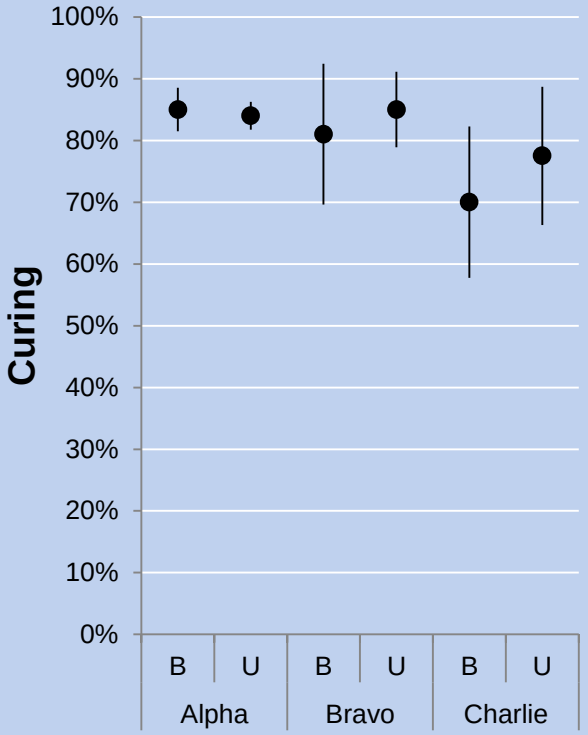
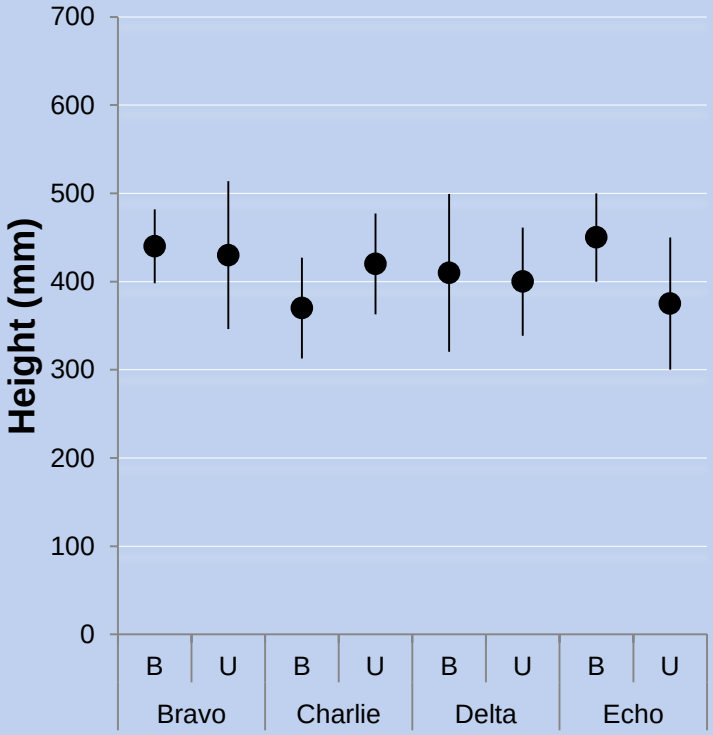


Native grass (*Themeda*)

Before – Height



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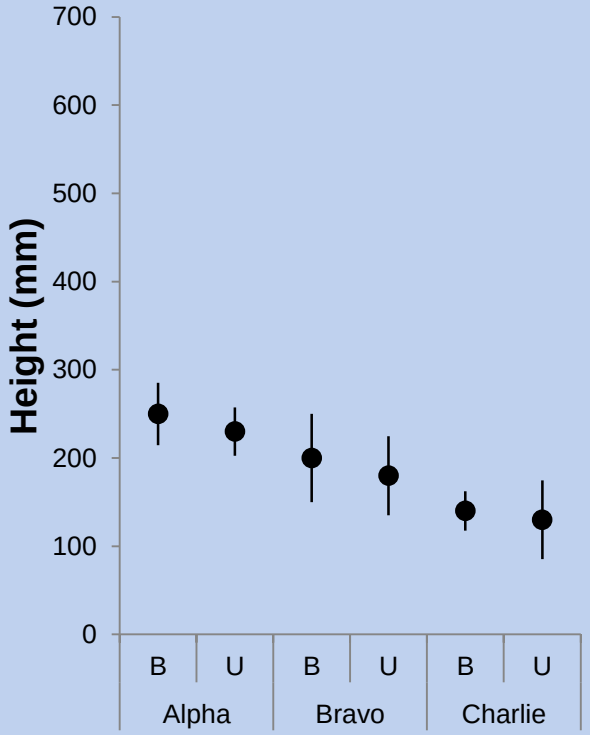
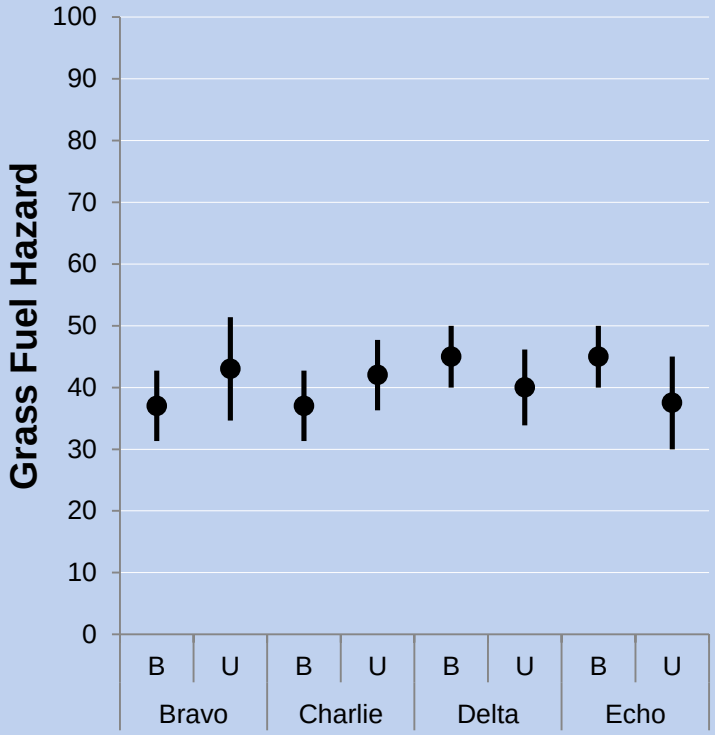
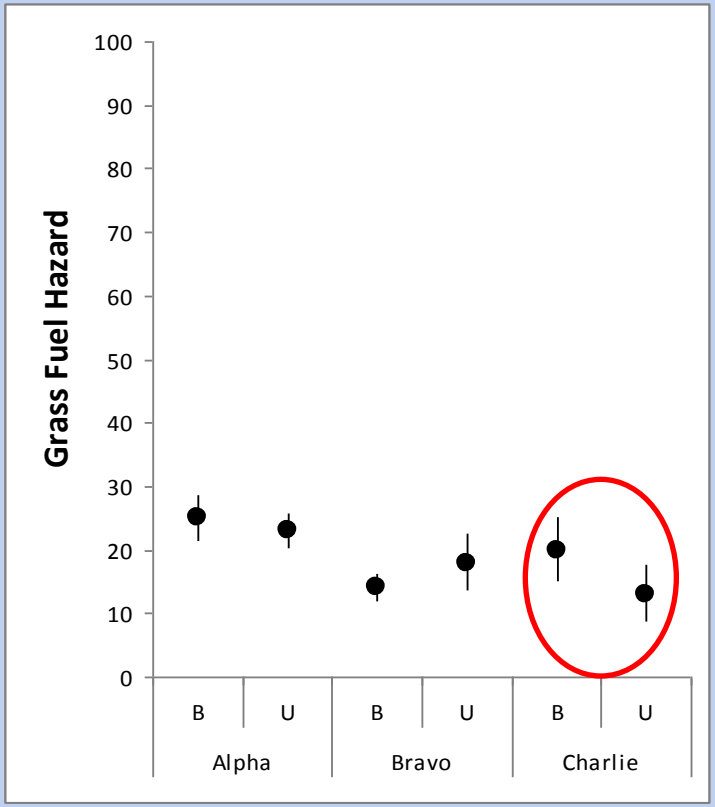


Native grass (*Themeda*)

Before – Grass fuel hazard



Pasture grass (*Phalaris*)



Native grass (*Themeda*)

Before - summary

- The experimental units of the same species were not different
- There were differences between species

Phalaris at Fraser

Themeda at Mulanggari

Impact - Fraser

- Burnt 22 August 2012

Impact - Mulangarri

- Burnt 3 September 2012

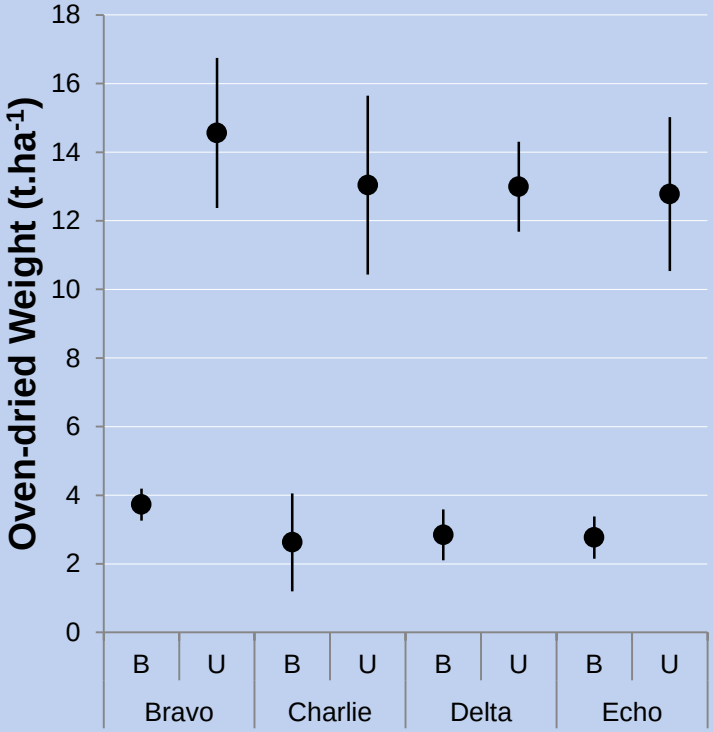
After - Fraser

Residue and regrowth 37 days after the burn

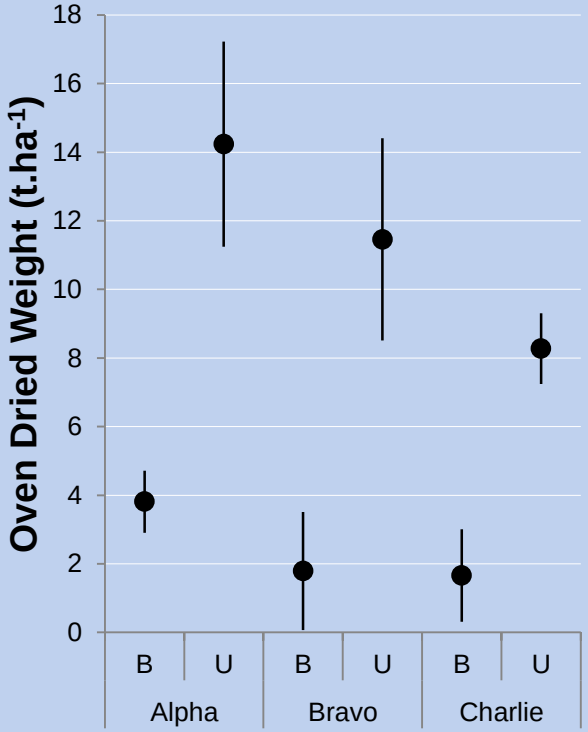
After - Mulanggari

Regrowth 30 days after the burn

After – fuel load



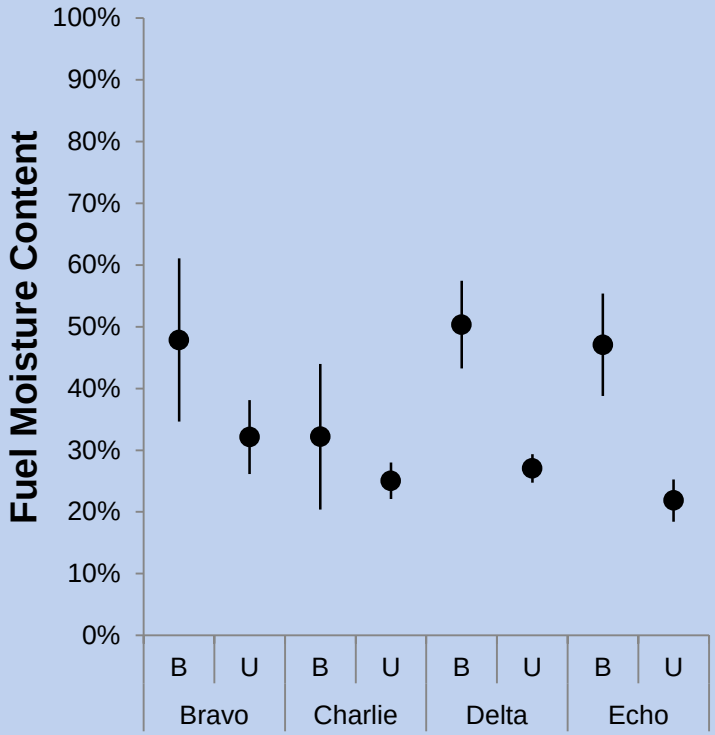
(P < 0.001)



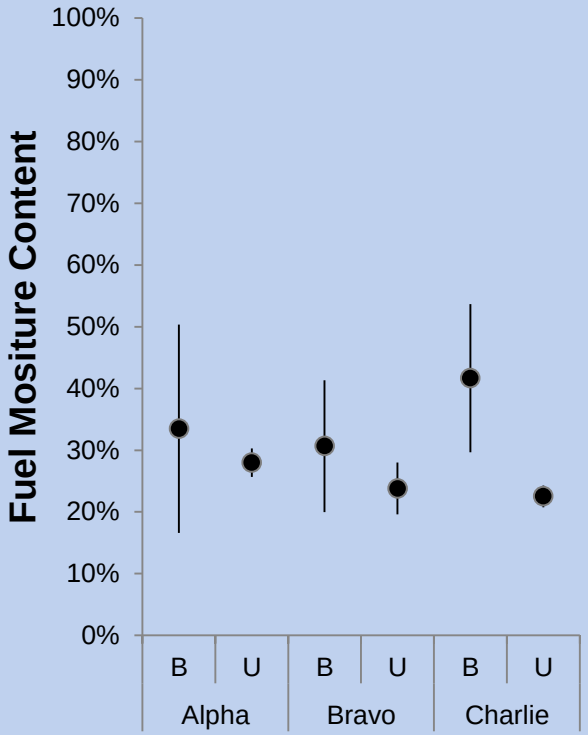
Pasture grass (*Phalaris*)

Native grass (*Themeda*)

After – fuel moisture content

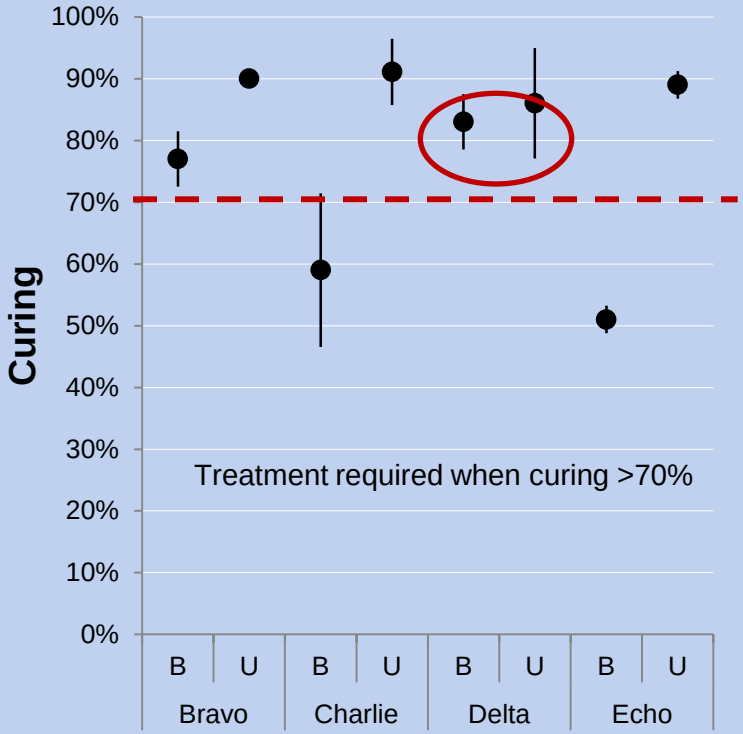


Pasture grass (*Phalaris*)



Native grass (*Themeda*)

After – grass curing



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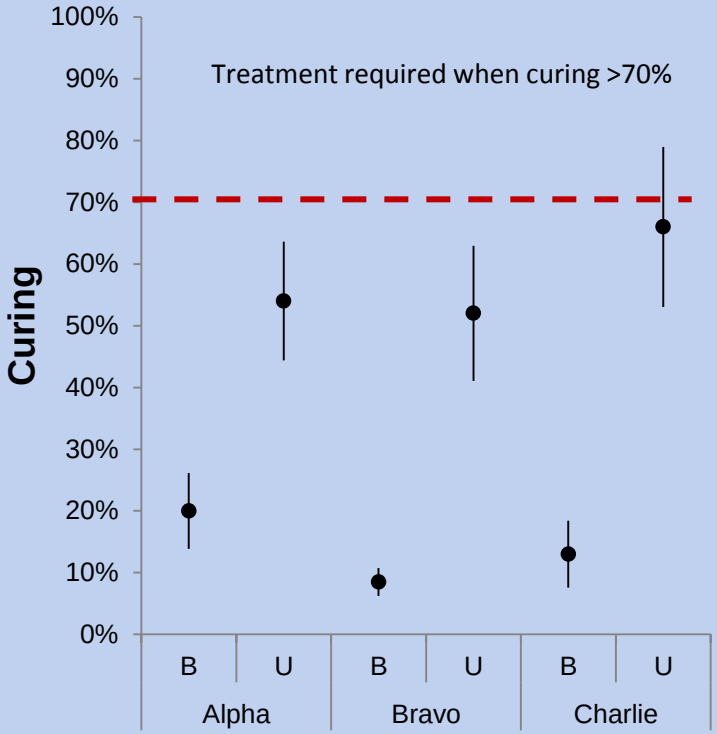
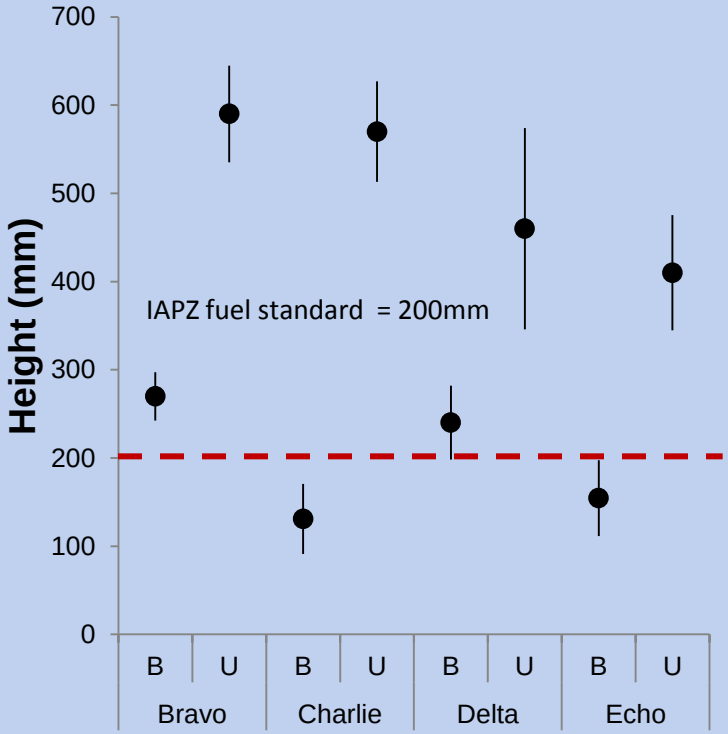


Pasture grass (*Phalaris*)

Native grass (*Themeda*)

After – grass height



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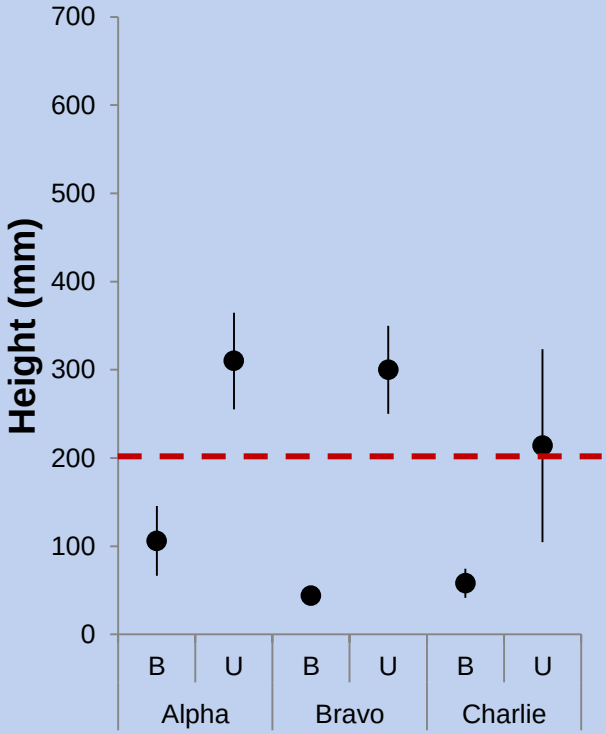
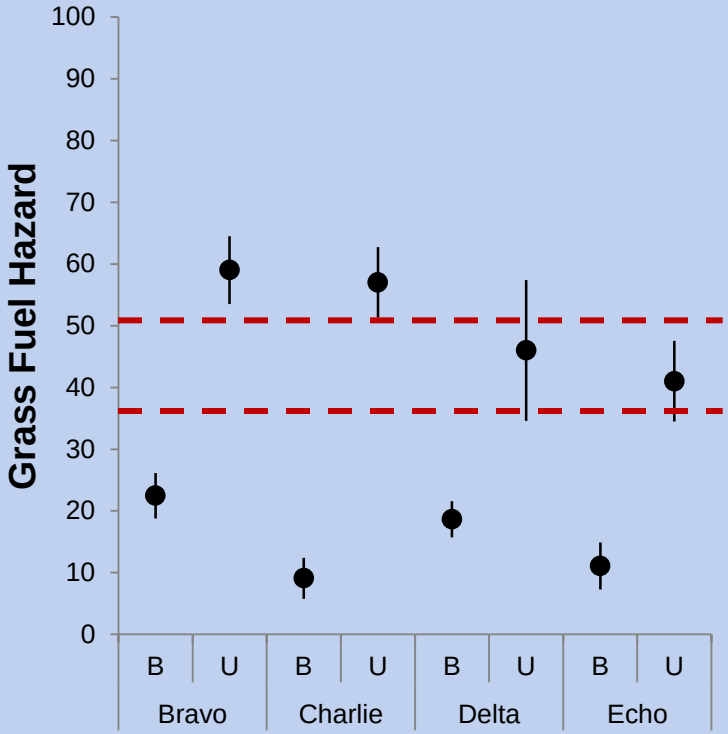


Pasture grass (*Phalaris*)

Native grass (*Themeda*)

After – grass fuel hazard



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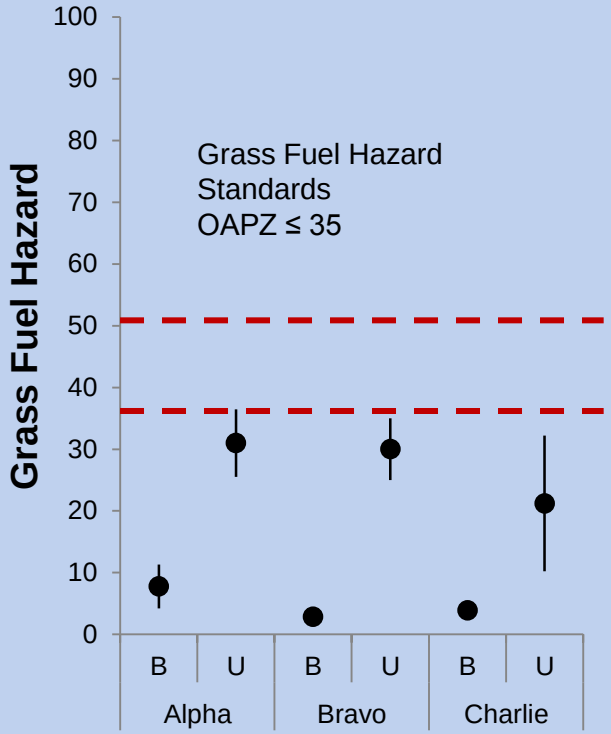


Pasture grass (*Phalaris*)

Native grass (*Themeda*)

Summary

- **It works...**

Late-winter/early spring burning:

1) **Met the fuel management standards for OAPZ and SFAZ**
2) **Met the IAPZ standards in native grass**
3) **Marginally failed the IAPZ standards in *Phalaris***

Correlations

- **Question:**

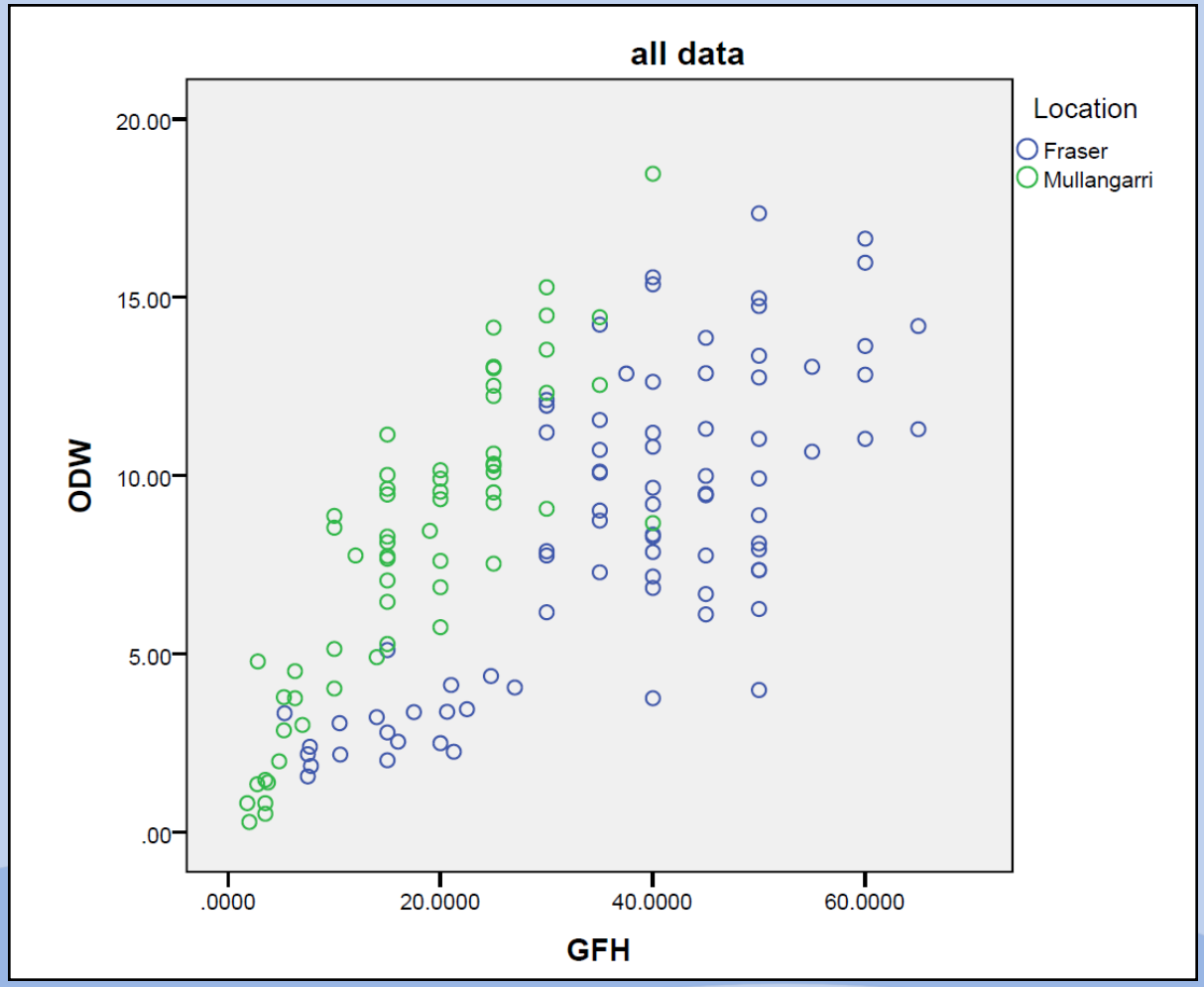
- **How do the observations compare to the measurements?**

Correlations

Fuel load and GFH

Fraser - *Phalaris*
(r = 0.7, N = 80, p <0.001)

Mulanggari - *Themeda*
(r = 0.9, N = 60, p <0.001)



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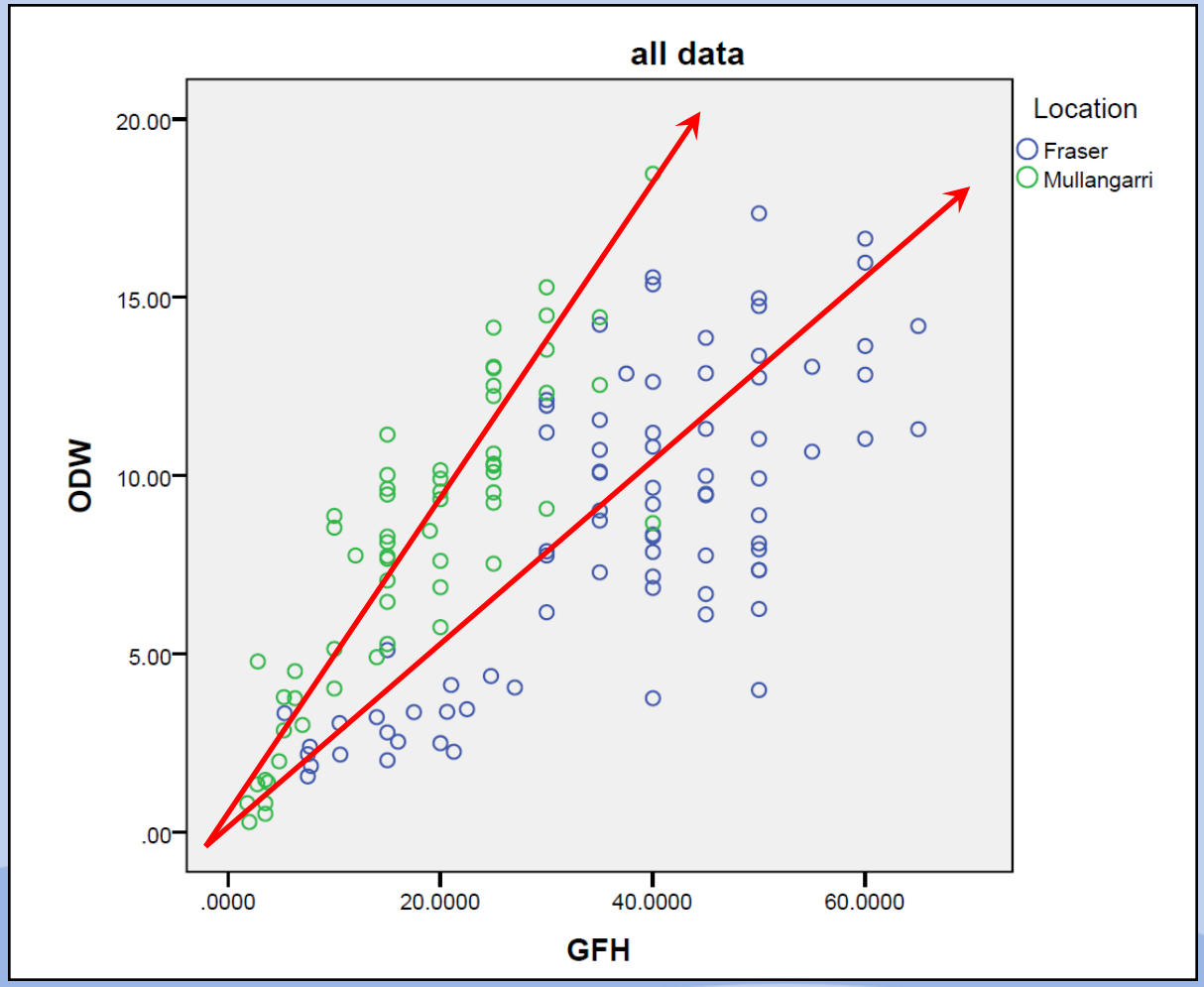
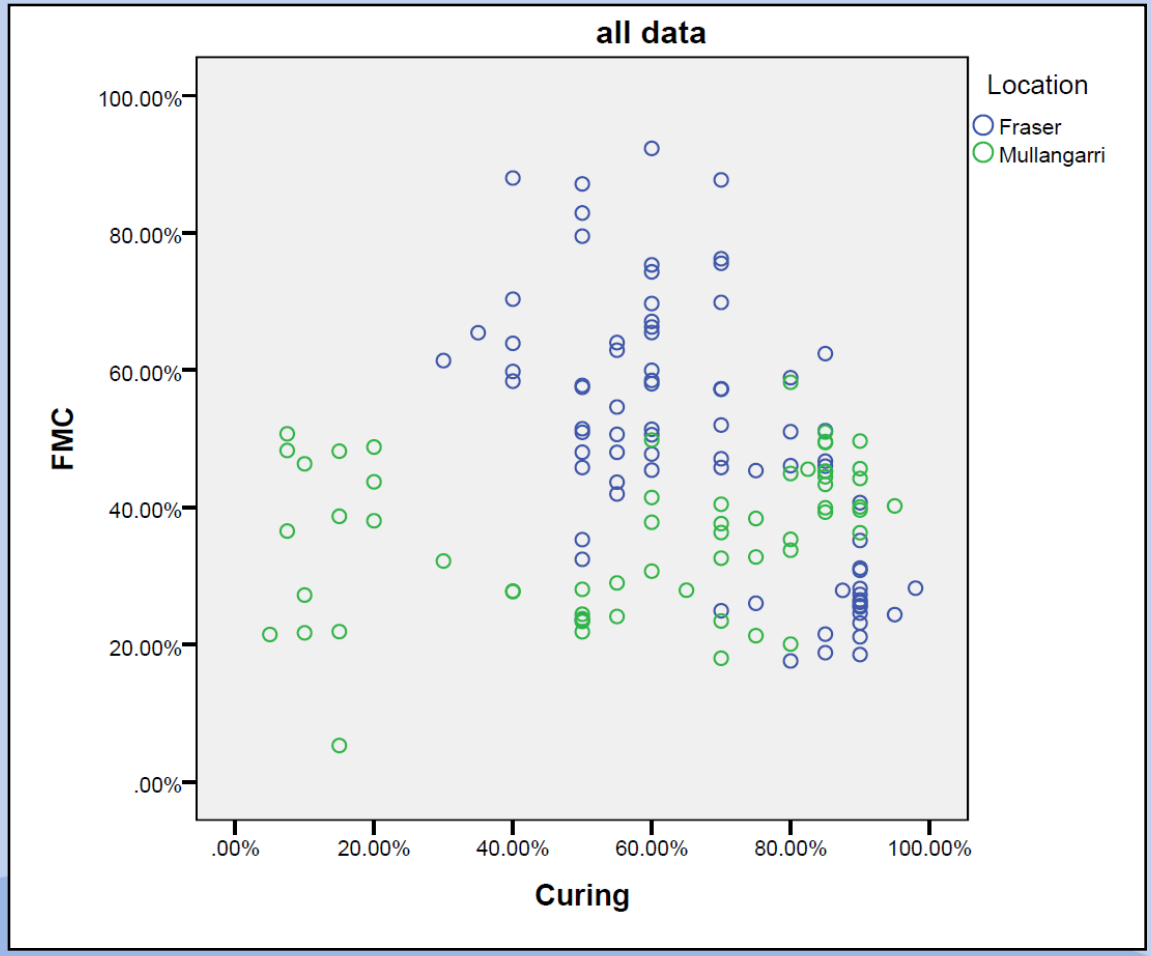


Correlations

Fraser - *Phalaris*
(Rs = -0.6, N = 80, p <0.001)

Mulanggari - *Themeda*
(Rs = 0.3, N = 80, p = 0.007)



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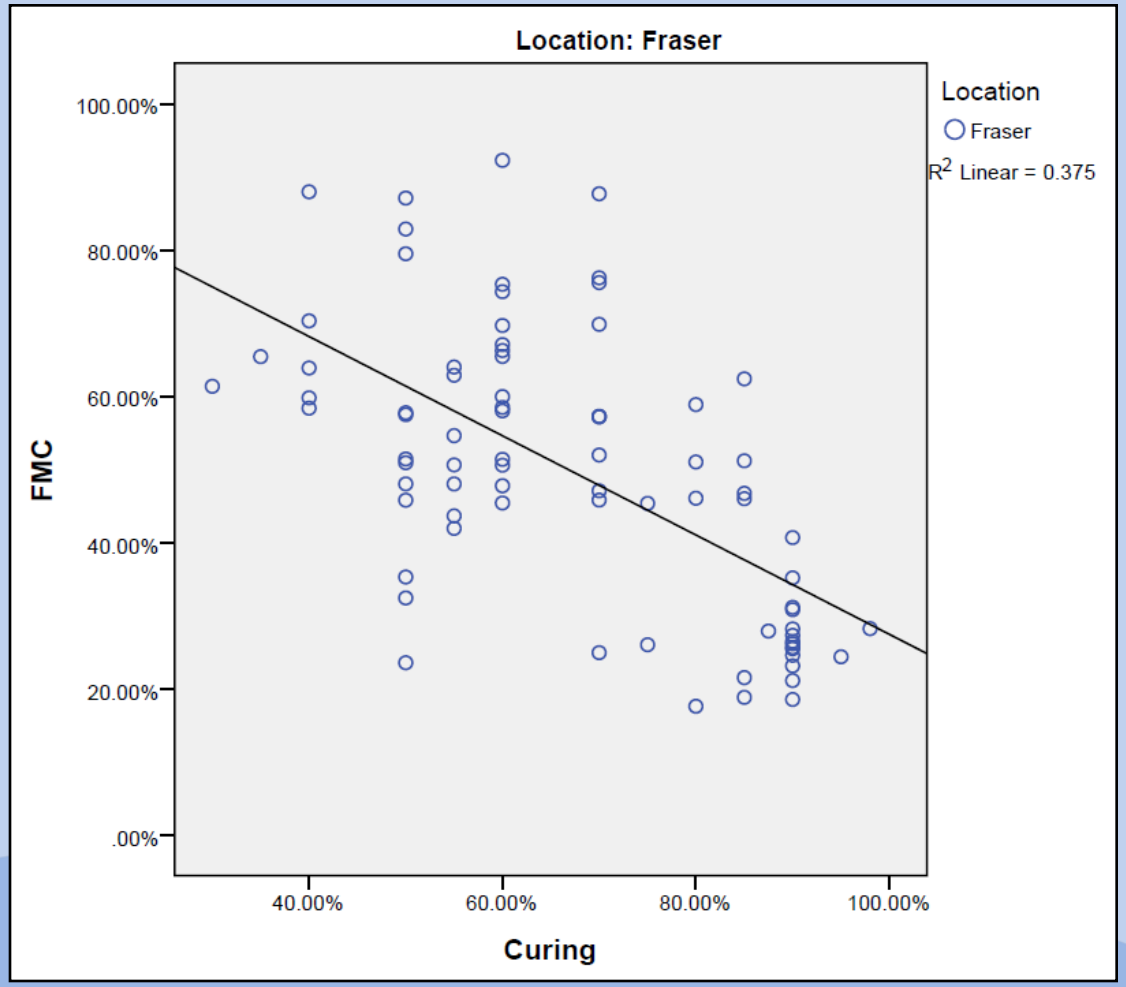

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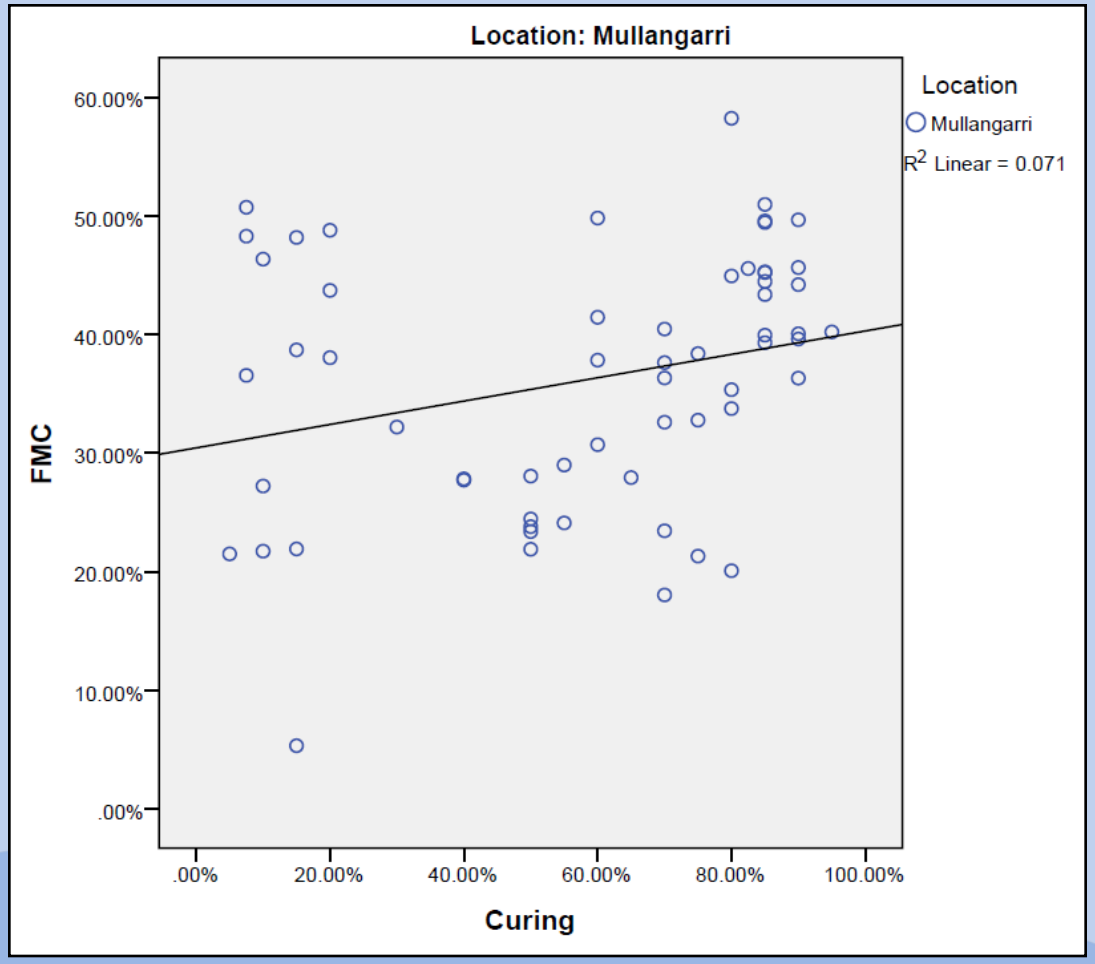

Summary

1) *Themeda* fuel loads can be as high as *Phalaris* even though they don't look it.
2) The FMC of *Themeda* is not necessarily well represented by curing.

Acknowledgements

Thanks to:

CSIRO Bushfire Dynamics for use of the kiln and helpful discussions.

My colleagues in the fire crews for all the cutting and burning.