

Advances in forest fire research in Australia

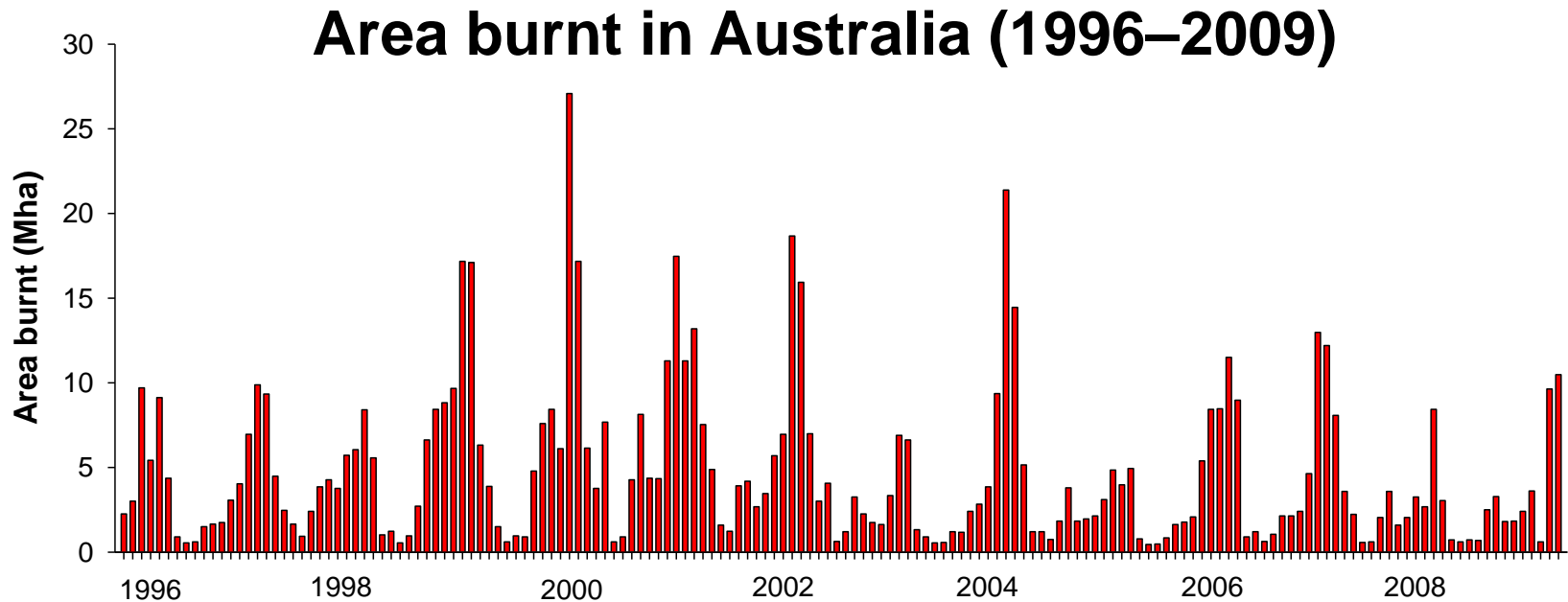
Tina Bell



THE UNIVERSITY OF
SYDNEY



Australia is a fire-prone country



Modified from Giglio *et al.* (2010) *Biogeosciences* 7, 1171–1186

Data sets compiled from four sensors (ATSR, VIRS, Terra MODIS, MODIS)

Australia is a fire-prone country

Region	Average area burnt (Mha yr ⁻¹)
Australia	53.8
Europe	0.7
Temperate North America	1.5
Africa (northern hemisphere)	131.0
Africa (southern hemisphere)	125.2
Global	371.2

Modified from Giglio *et al.* (2010) *Biogeosciences* 7, 1171–1186

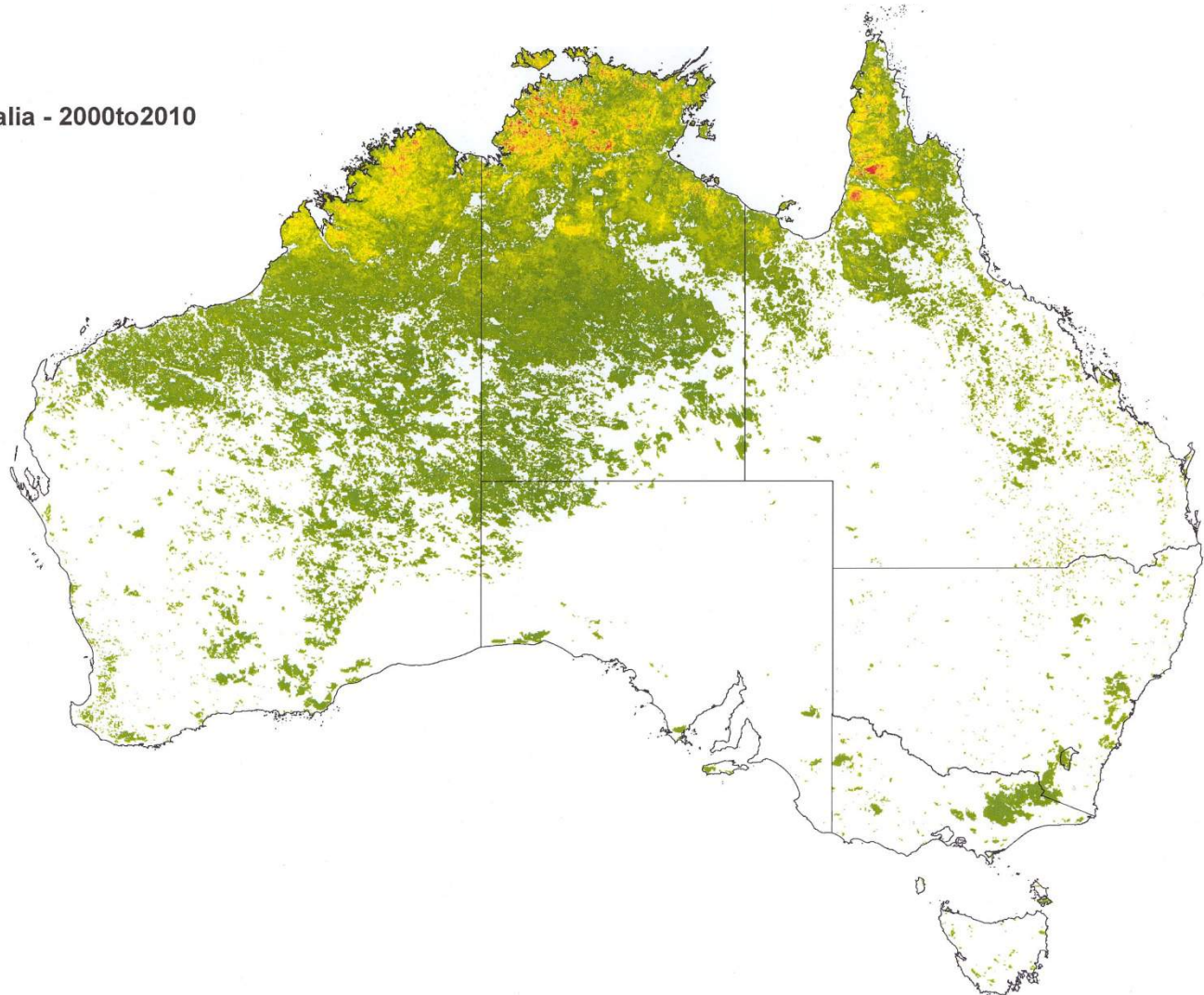
Data sets compiled from four sensors (ATSR, VIRS, Terra MODIS, MODIS)

Fire frequency 2000–2010

Legend

Fire Frequency Australia - 2000to2010

Years Burnt



Not all forests are the same...



Ash-type eucalypt forest in southern Australia



Mixed eucalypt forest in southern Australia



Savanna woodland in northern Australia



Not all fires are the same...



Fuel reduction burn/prescribed burn



Bushfire/wildfire



The aftermath of fire is not always the same...



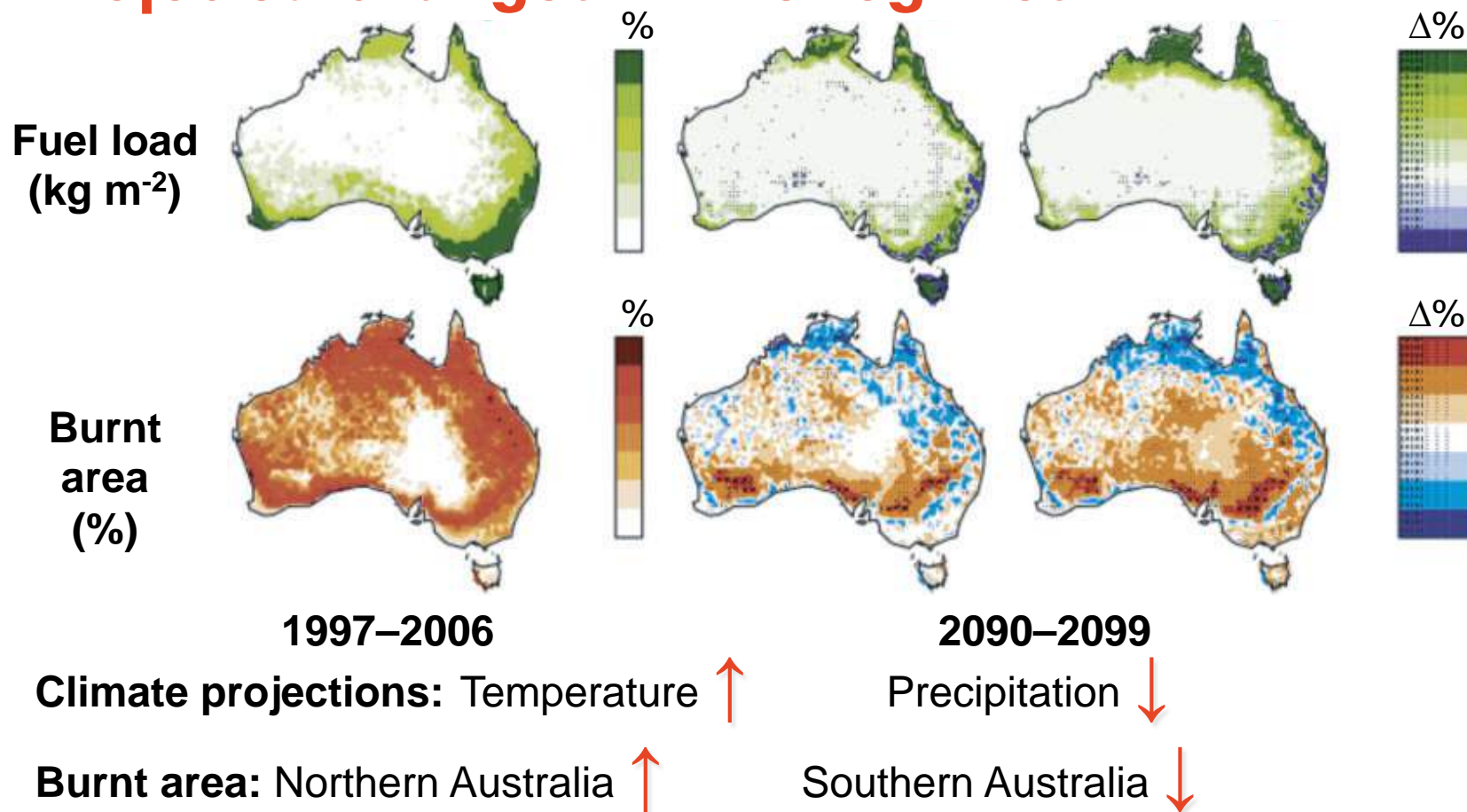
The aftermath of fire is not always the same...



Not all plants recover in the same way...



Projected changes in fire regimes



Projected increase in burnt area is small (0.7–1.3%) but fire regimes will change as vegetation patterns change

Harrison and Kelley (2016) *International Journal of Wildland Fire*
<http://dx.doi.org/10.1071/WF16032>

Managing bushfire risk

- Fuel reduction burning or prescribed burning: strategically targeted burning of vegetation
- Planned and managed fire that burns at a lower intensity (heat) than a bushfire
- Does not completely remove all bushfire risk but can reduce speed and intensity of a bushfire making it easier for fire-fighters to contain and control unplanned fire



Fuel reduction burning (FRB)



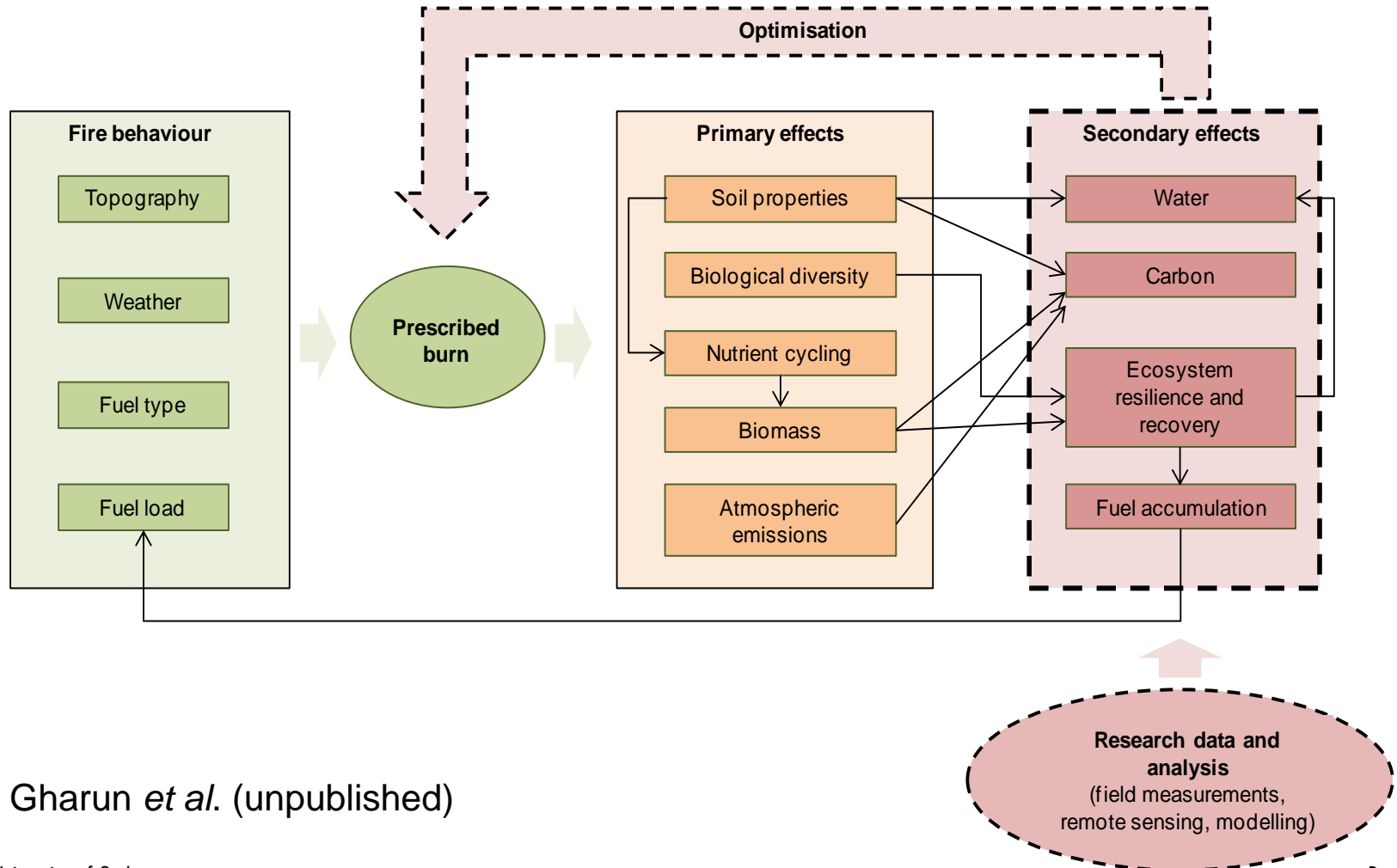
What do land managers want to know when they use fuel reduction burning?

- Cost and effectiveness of fuel reduction burns
- Effect on environmental values
 - Vegetation responses and fuel load
 - Water
 - Carbon
- Risks associated with/without doing fuel reduction burns



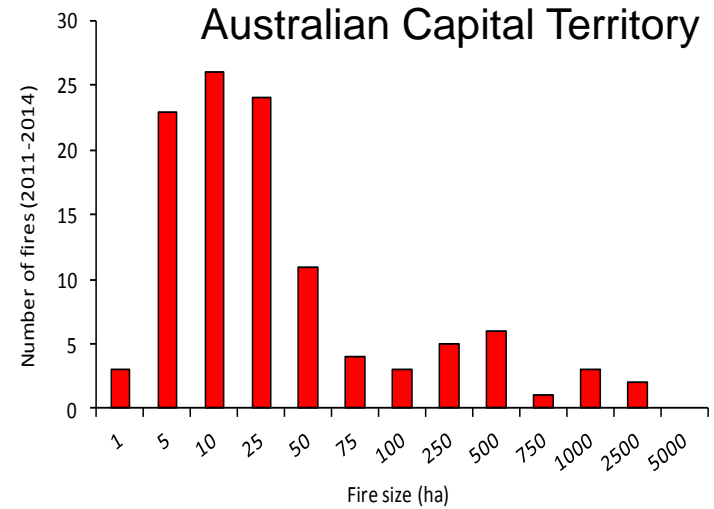
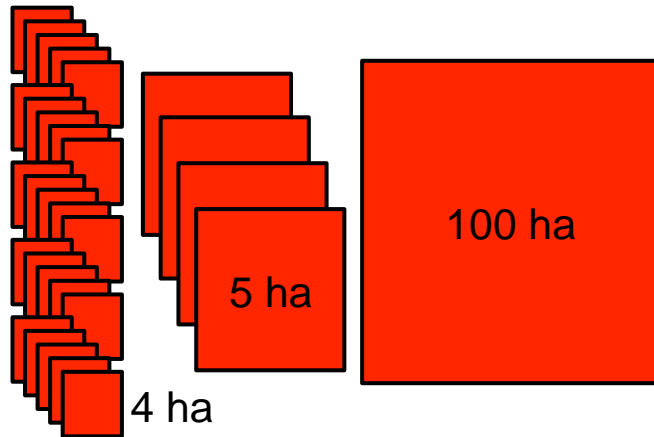
Optimisation of fuel reduction burning

Spatial decision support system

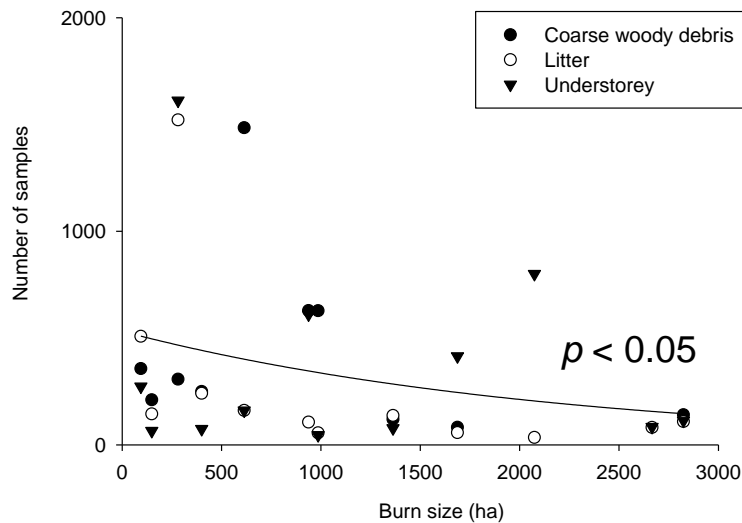
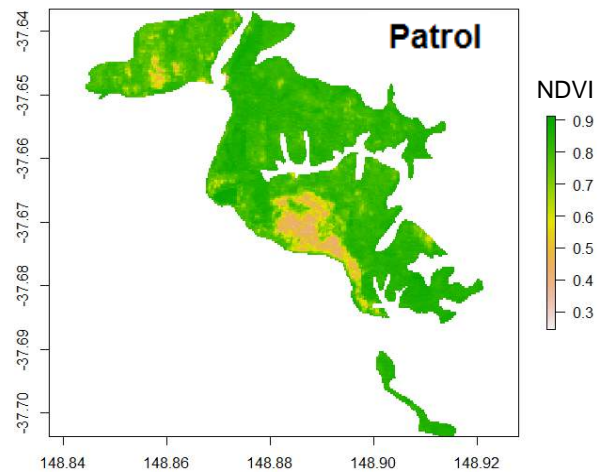


Gharun *et al.* (unpublished)

Burn size and sampling frequency



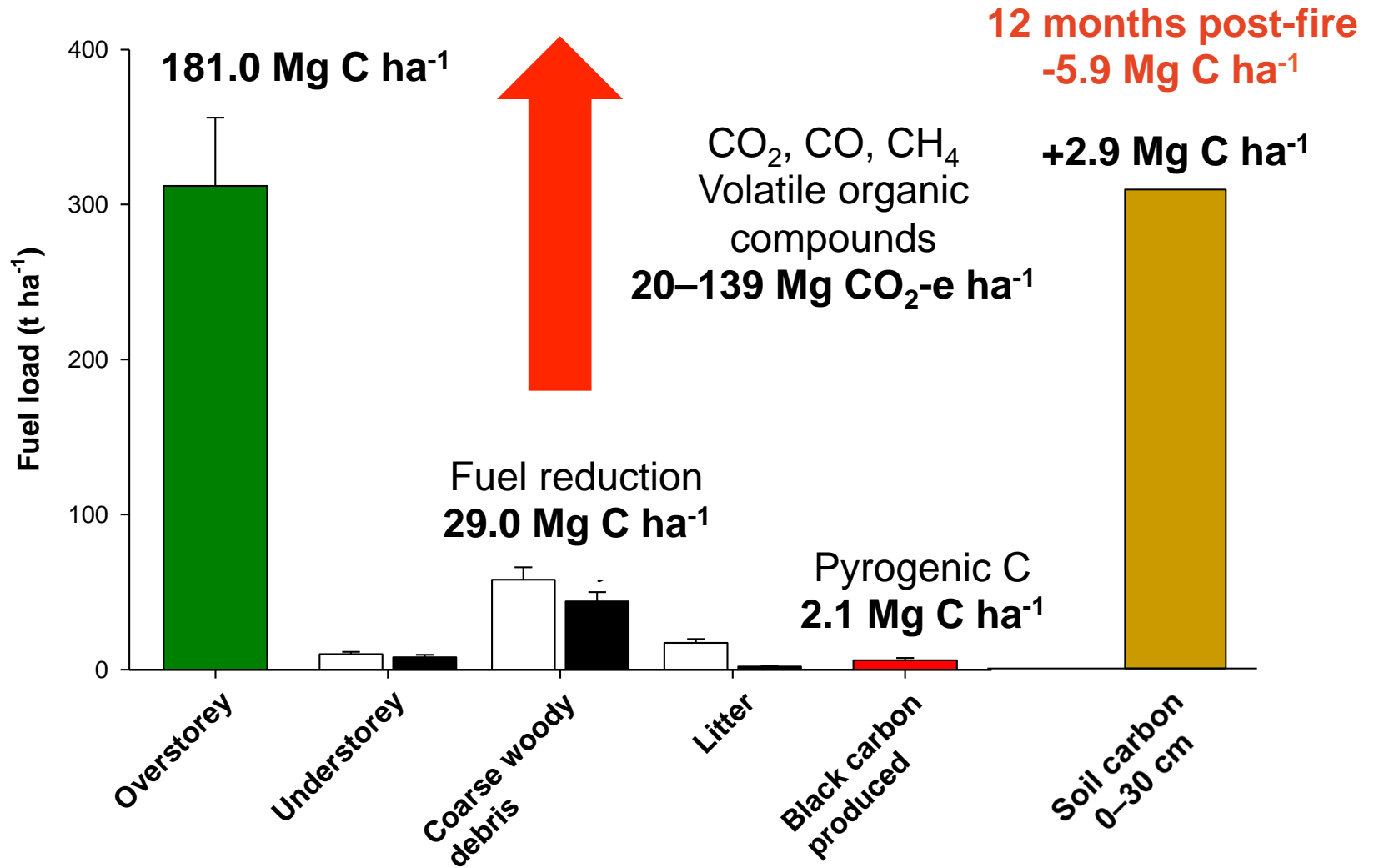
$N_{\text{stratified}} = 9$
 $N_{\text{not stratified}} = 87$
 Burn Area 1,359 ha



Forest carbon balance



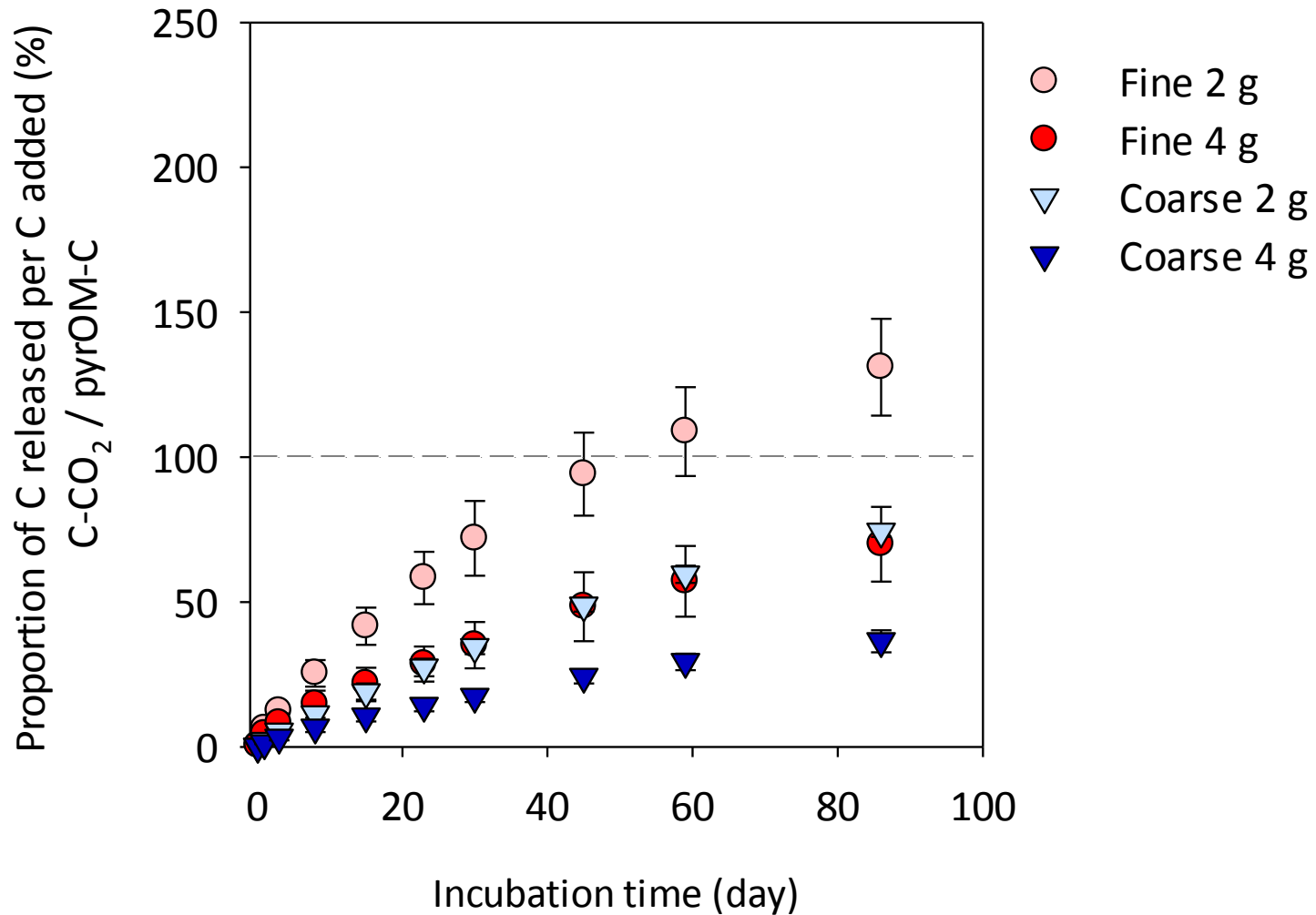
Forest carbon balance



Possell *et al.* (2015) *Biogeosciences*, 12, 257–268

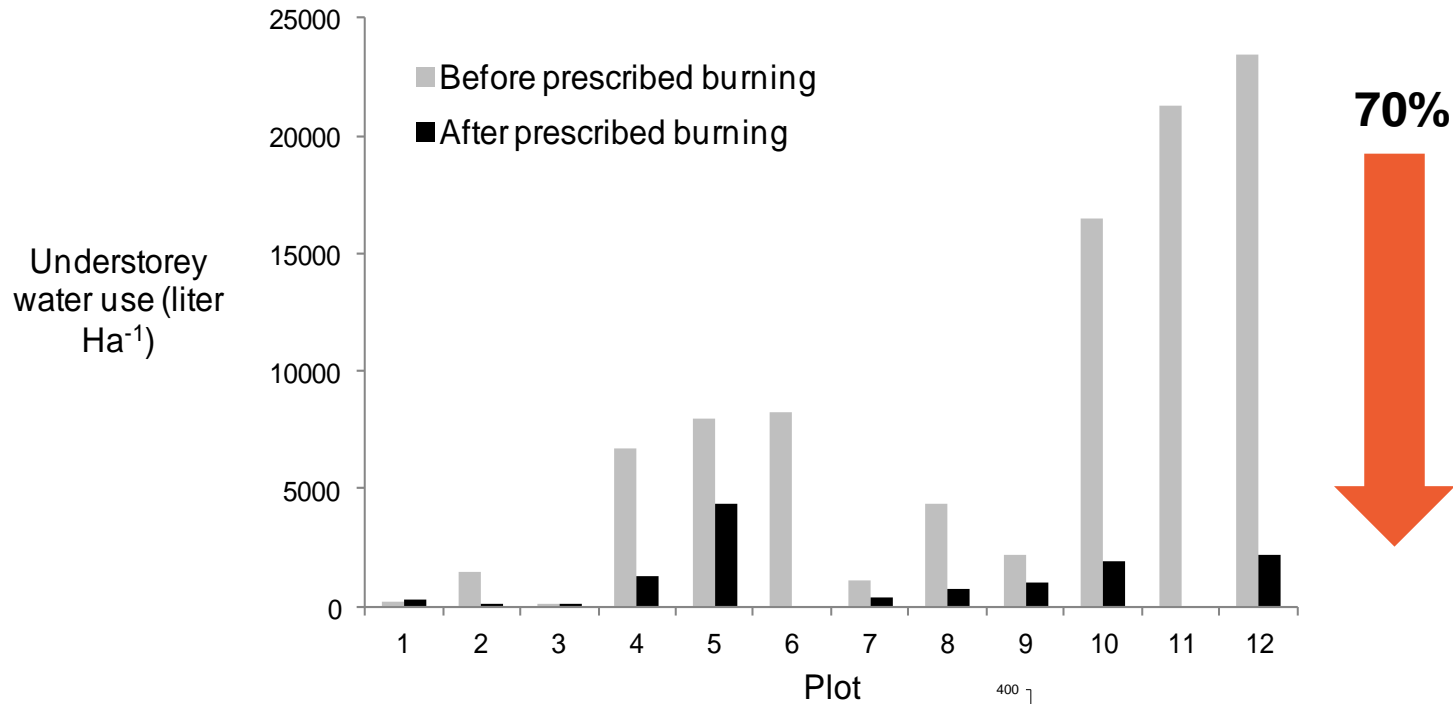
Jenkins *et al.* (2016) *Forest Ecology and Management* 373, 9–16

Microbial respiration of pyrogenic carbon

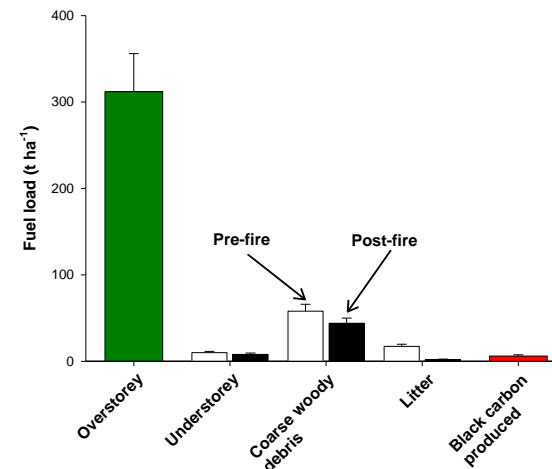


Jenkins *et al.* (2014) *International Journal of Wildland Fire* 23, 1027–1033
Poon *et al.* (unpublished data)

Impact of fuel reduction burning on water yield

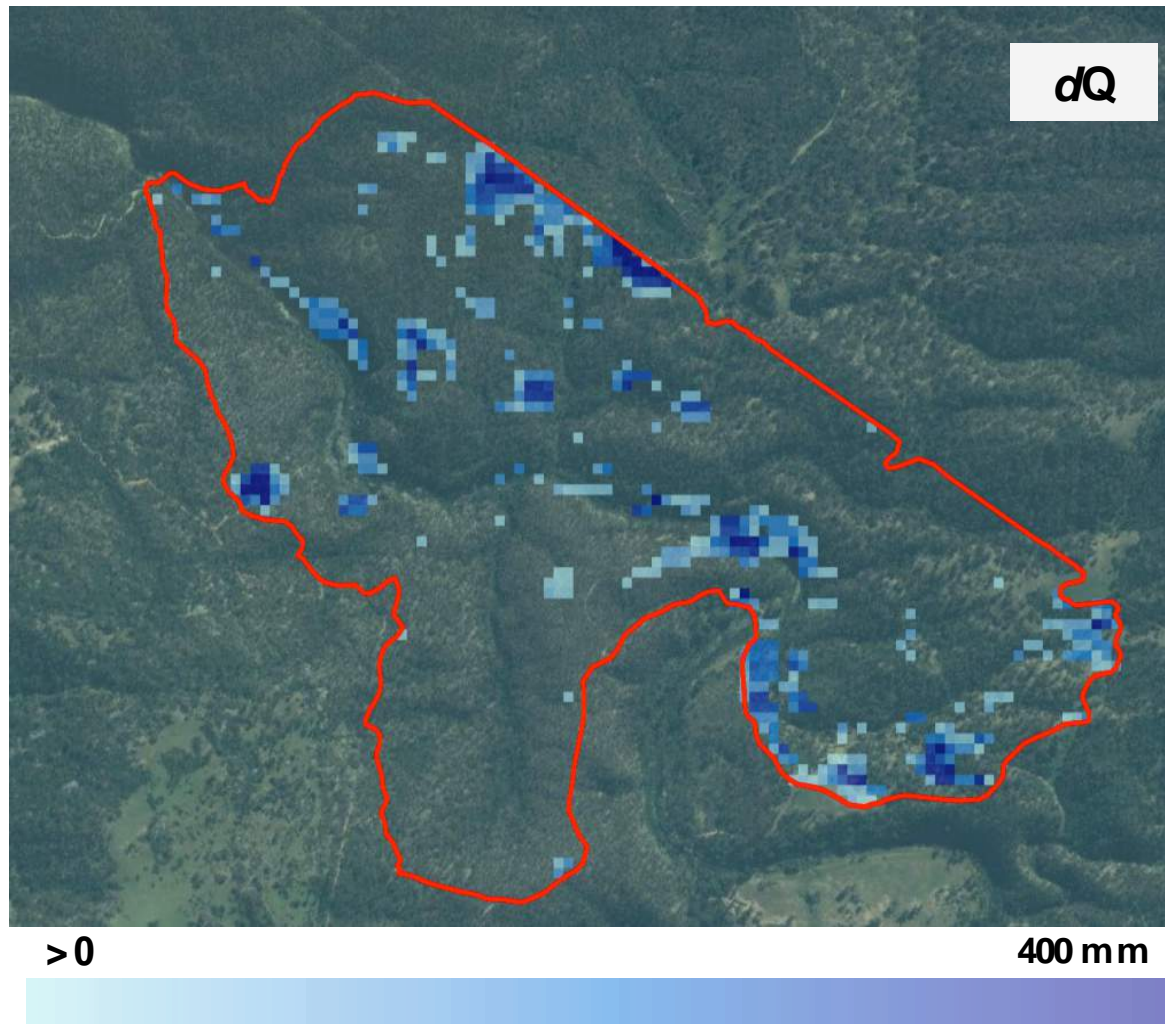


Gharun *et al.* (unpublished)



Mapping changes in plot-level tree water user → suitability index for fuel reduction burning

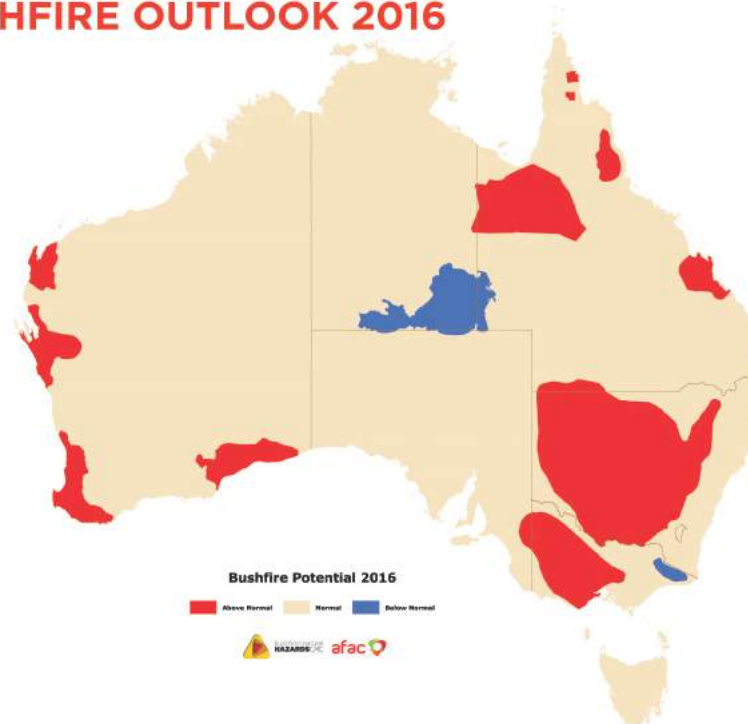
$$dQ = Q_{\text{pre burn}} - Q_{\text{post burn}}$$



Final comments

- We are aiming to “*build better models rather than more models*” (M. Adams, 26th Sept 2016)
- Strong industry focus for our research
- Annual reminder of the importance of bushfire research (summer)

SOUTHERN AUSTRALIA SEASONAL BUSHFIRE OUTLOOK 2016



Final comments

- We are aiming to “*build better models rather than more models*” (M. Adams, 26th Sept 2016)
- Strong industry focus for our research
- Annual reminder of the importance of bushfire research (summer)
- **The research group:**
 - Mark Adams, Mana Gharun, Malcolm Possell
 - Tarryn Turnbull, Meghan Jenkins, Cheryl Poon, many students
- Funding:

