Mapping bushfire hazard and impacts

Research advisory forum / **2019**

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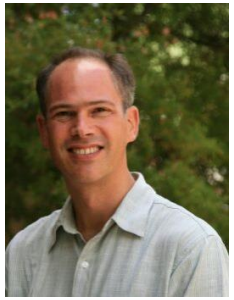
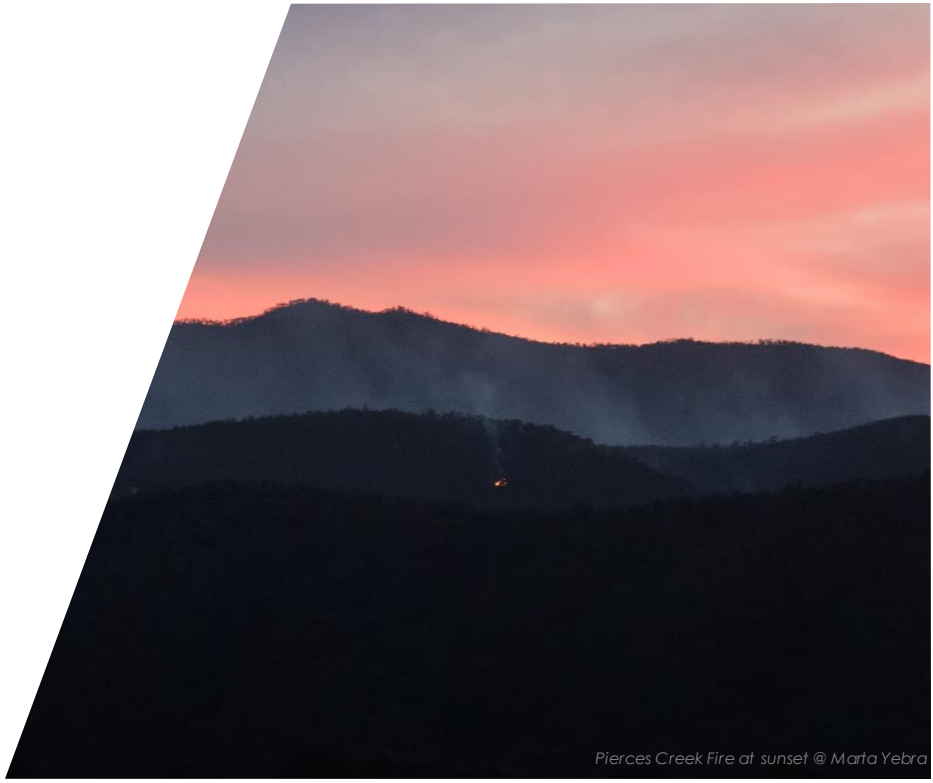
@myebra12


@anu_wald




@Li_Zhao


Pierces Creek Fire at sunset @ Marta Yebra

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Australian Government
Department of Industry, Innovation and Science

Business Cooperative Research Centres Programme

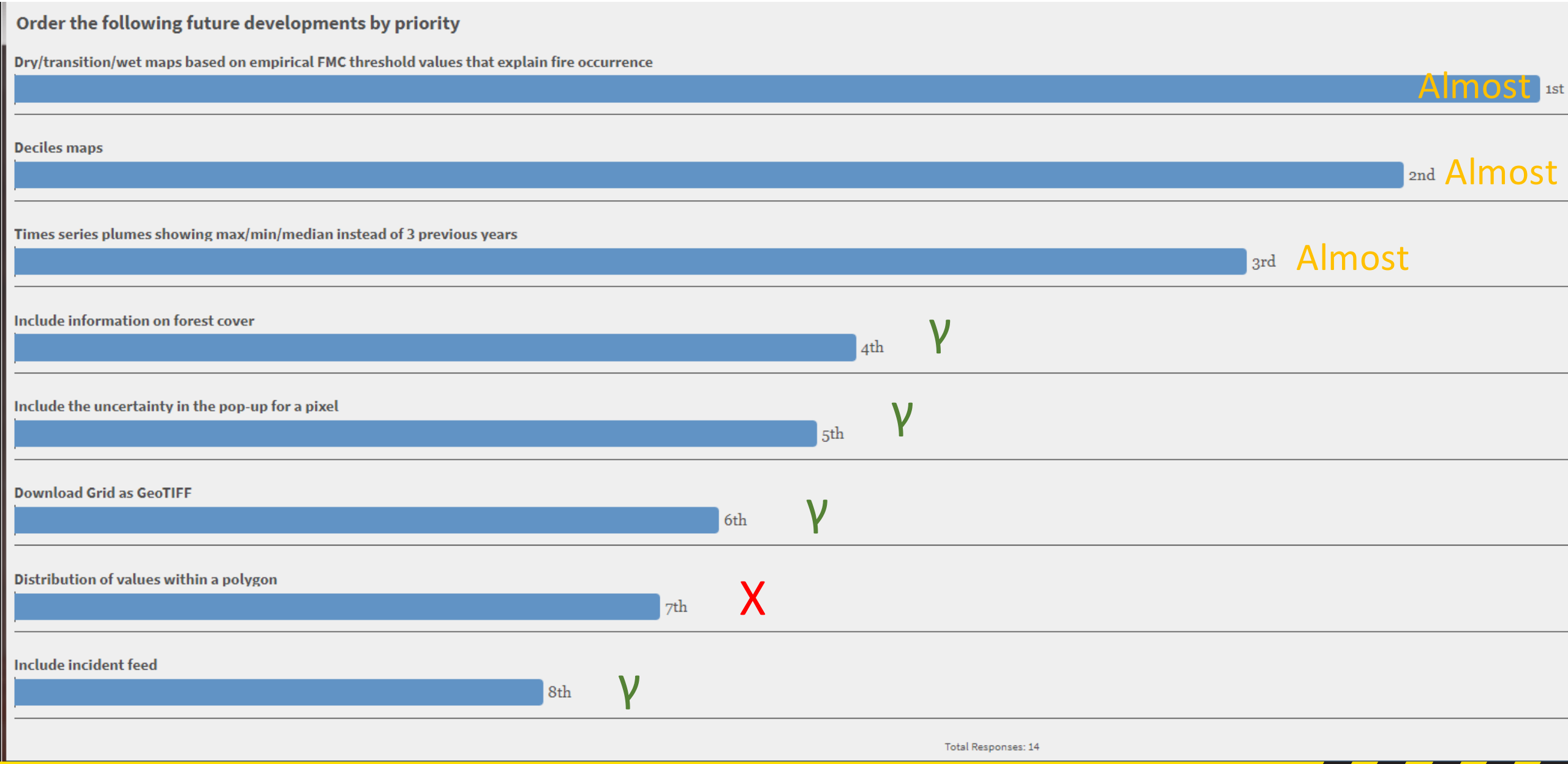
Outline

- What our research has sawn
- How our research is currently being applied or is intended to be applied.
- The broader opportunities for our research to contribute to bushfire mitigation.

The Australian Flammability Monitoring System (AFMS)

Layer	Method	Resolution		Latency	Reference
		Spatial	Temporal		
Live FMC (%) **Uncertainty** (%) **Flammability Index** (0-1, unitless)	Inversion of **physical models** using MODIS reflectance data (water inside the fuels absorbs solar energy in the short wavelength water bands) **Standard deviation** of 40 best FMC estimates **Logistic regression** models between fire occurrence from the MODIS burned area product (binary dependent variable) and predictor variables derived from FMC estimates (independent variable)	500 m	4 days	2/4 days **8 days* forecast**	Yebra *et al.* 2018. RSE
Soil moisture at 0-10 and 10-35 cm	BoM's **JASMIN** modelling system	5km	Daily	7 days	Dharssi *et al.* 2017

Future priorities AFMS



Australian Flammability Monitoring System

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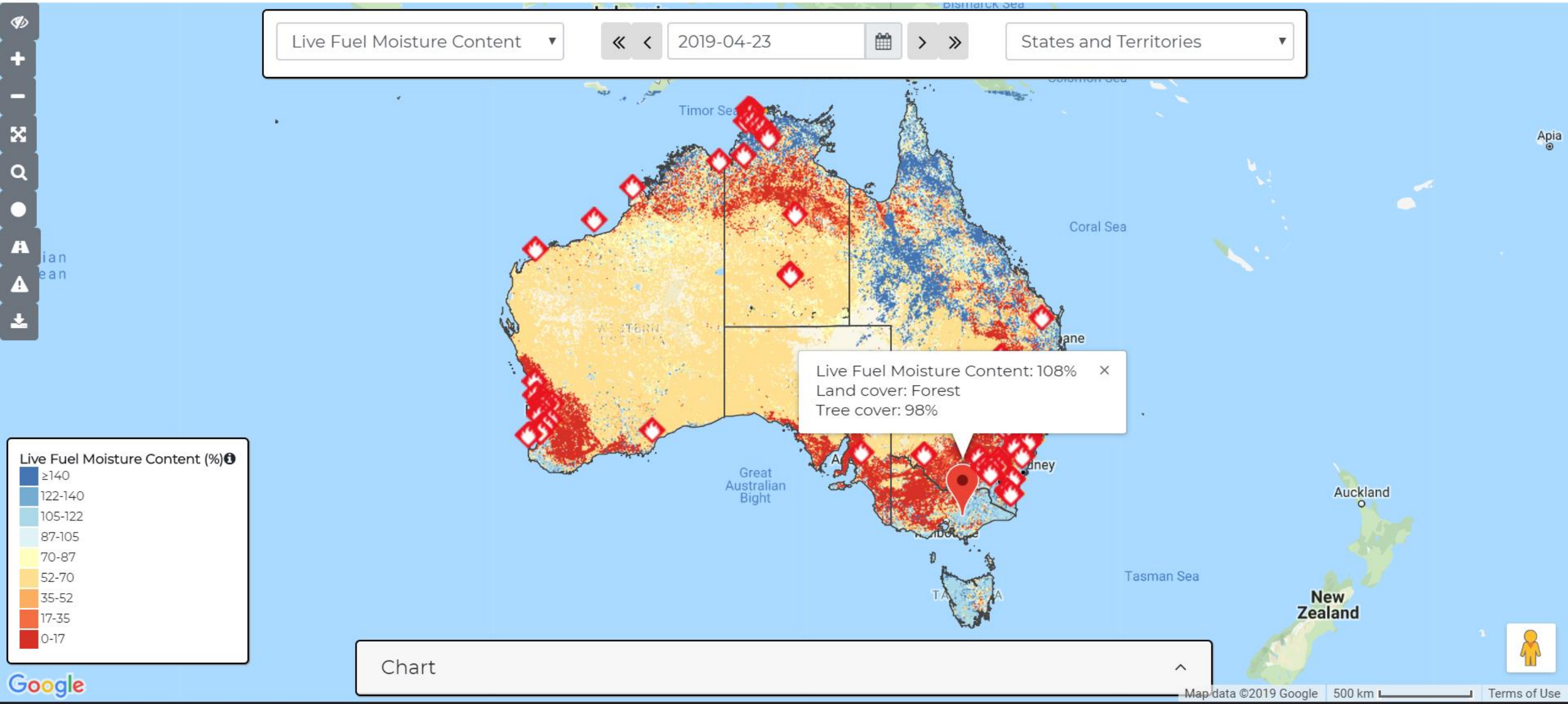
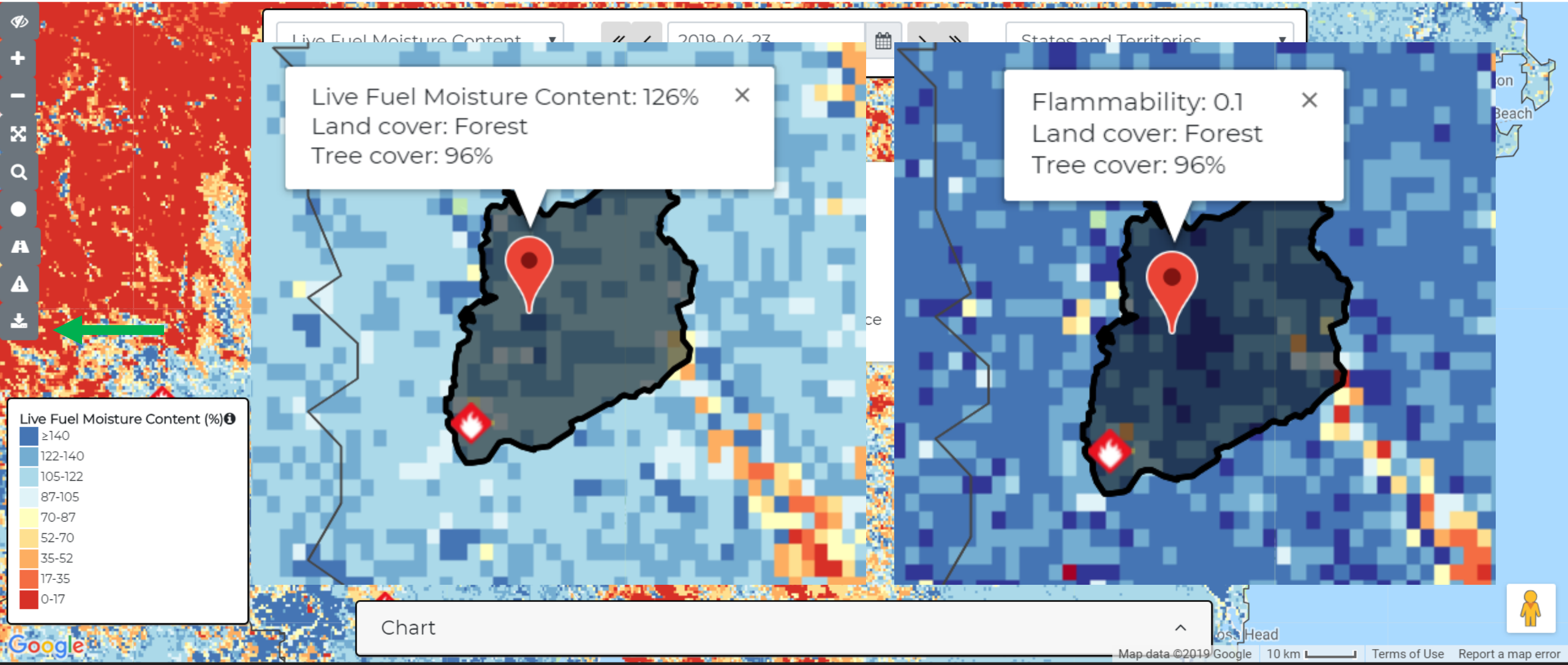


ABOUT THIS SITE SEND FEEDBACK SITE TOUR

Australian National University

http://anuwald.science/afms

Australian Flammability Monitoring System



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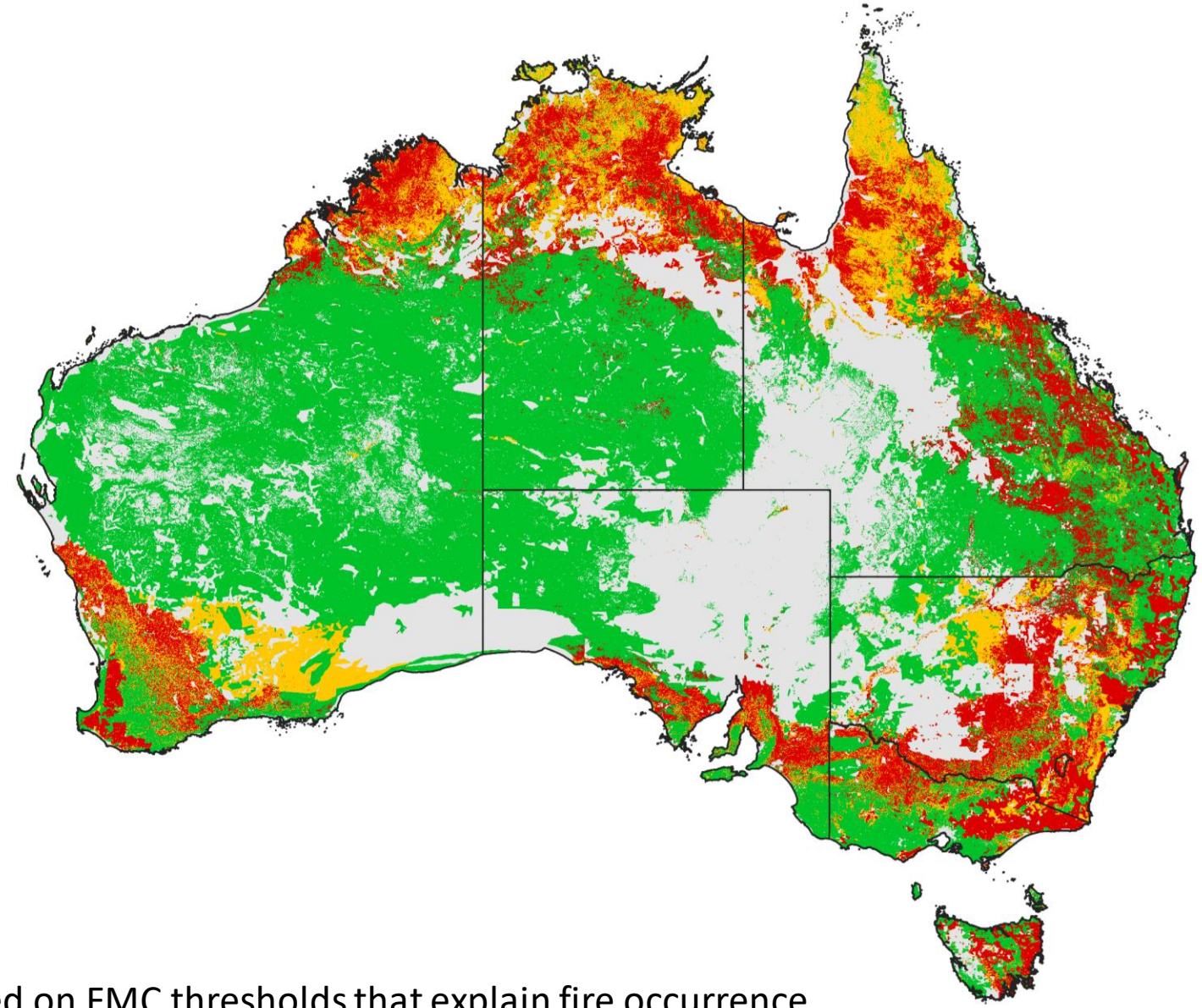
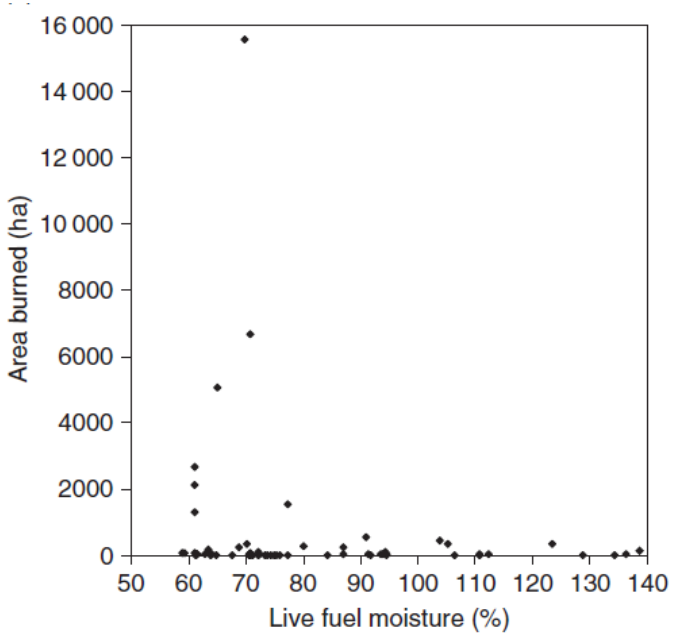
FMC map for Australia



Wet
Transitional
Dry

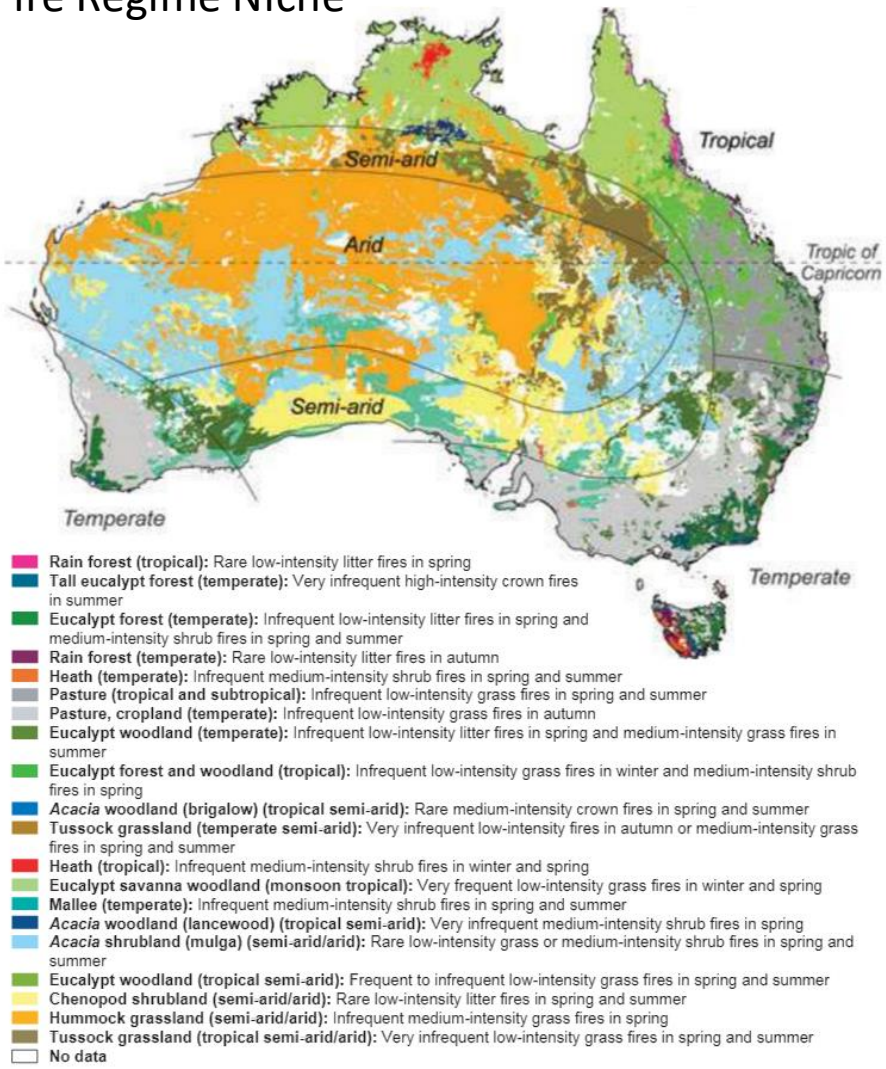


Based on FMC thresholds that explain fire occurrence

Dennison *et al.* 2008, IJWF

FMC empirical thresholds

Fire Regime Niche



Murphy et al (2013)

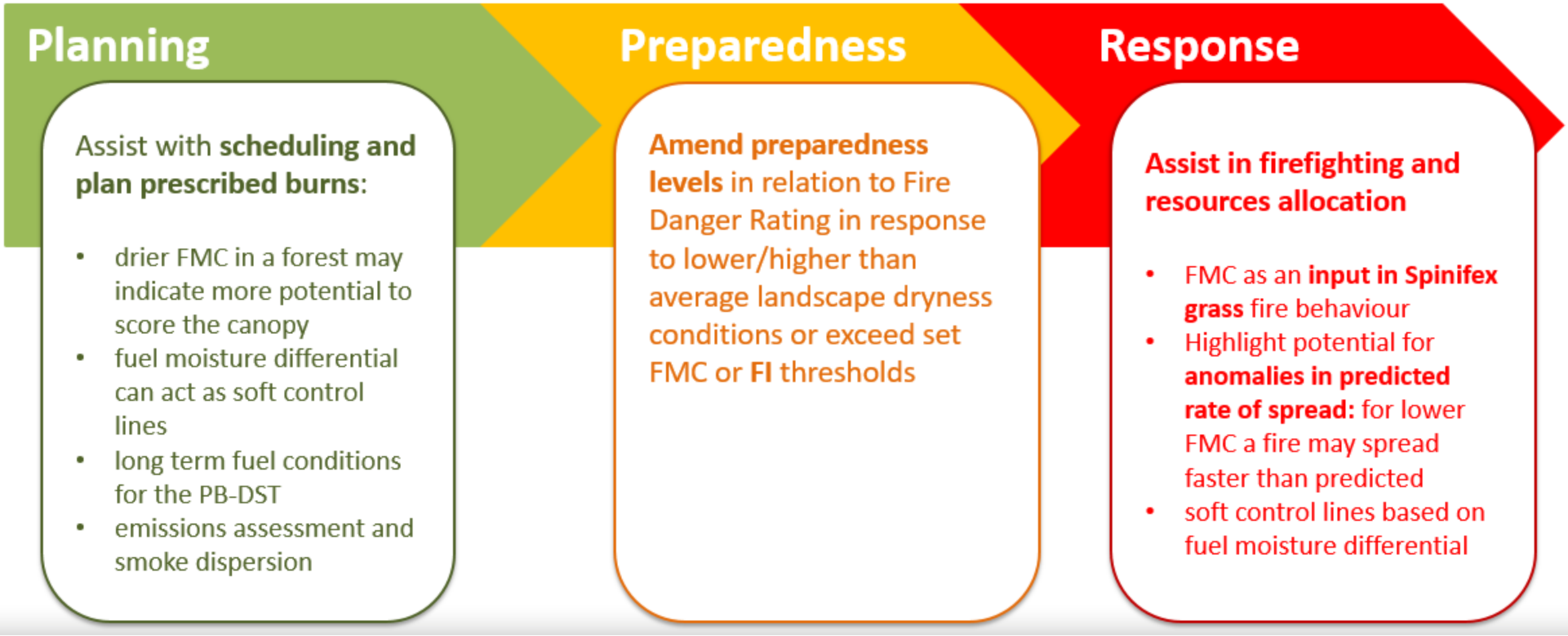
Table 1: Approximate LFMC threshold values indicating marked increases in burnt area, and the proportion of each studied niche burnt during the studied time period (2002-2014).

Fire Regime Niche	Threshold LMFC (%)	% Area Burnt
Temperate Eucalypt forest	160, 135	1.6
Tall Temperate Eucalypt Forest	160, 130	6.5
Temperate heath	55, 20	6.4
Tropical and subtropical pasture	20	10.7
Cropland pasture	65, 20	14.49
Temperate Eucalypt woodland	130, 45	2.5
Tropical Eucalypt forest and woodland	45, 15	26.9
Tropical Heath	95, 50, 20	158.2
Eucalypt savanna woodland	90, 55, 20	19.7
Temperate mallee	45	3.1
Acacia shrubland (mulga)	45	9.2
Hummock grassland	45, 20	43.5

Gale et al., In preparation

How your research is currently being applied or is intended to be applied

Spatially-explicit knowledge of FMC and flammability must be a key aim for fire managers



Examples

David Taylor. Tas Parks " tools for out Fire Duty Officer → Bushfire Operational Hazard Model(BOHM) "… if you were to drop a match how hot a fire would get, we use that in prepositioning fire crews and patrols"

Simeon Telfer "We having been using the website today to try and figure out the best time for our burning. We are planning a burn in a patch of low heath (1.5m) which is only 5 years or so since last burn, but is extremely thick. The issue we are having is that there is practically no dead fuel, so dead fuel moisture content is irrelevant. The live fuel moisture is good to know, but we have no correlation to fire behaviour! The JASMIN soil moisture profile are very interesting too, but again, **we need to correlate this to fire behaviour, or probably risk of burn escape**."

The broader opportunities for your research to contribute to bushfire mitigation

- Improving spatial resolution may open more opportunities for schedule and plan prescribed burns

- By linking to other initiatives/projects

    - Input for Extreme fire behavior prediction (Trent Penman et al.)?
    - Input for the new FDRS?
    - Inputs for fire behavior

What's next?

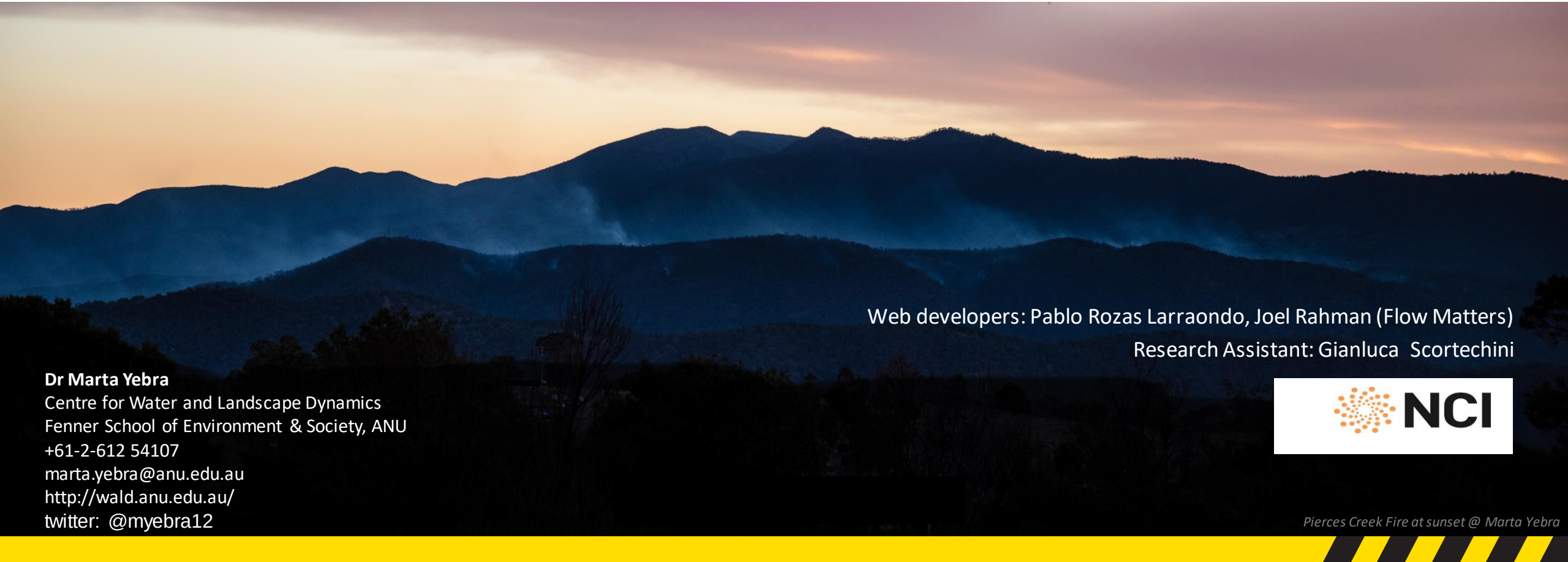
Comprehensive Flammability index; probability of having a fire of x intensity (still to be define) given a ignition source

- Dependent variable: Fire ignitions (date+intensity)

- Drivers:

a. LFMC
b. Jasmin soil moisture
c. T, RH and wind speed
d. Total Biomass

Thanks



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Pierces Creek Fire at sunset @ Marta Yebra