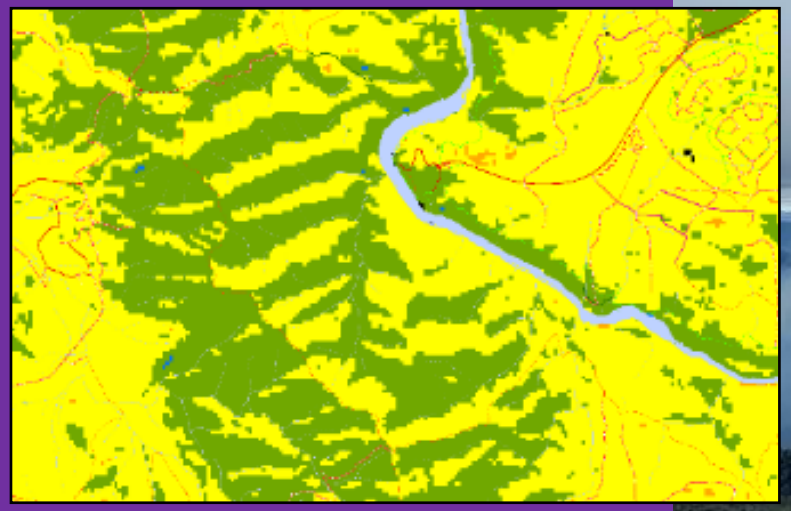
GLOBAL WILDFIRE INFORMATION SYSTEM, MILAN, ITALY, SEPTEMBER 2024

Remotely-sensed Evaluation of Prescribed Burning



Adam Leavesley, Tony Scherl

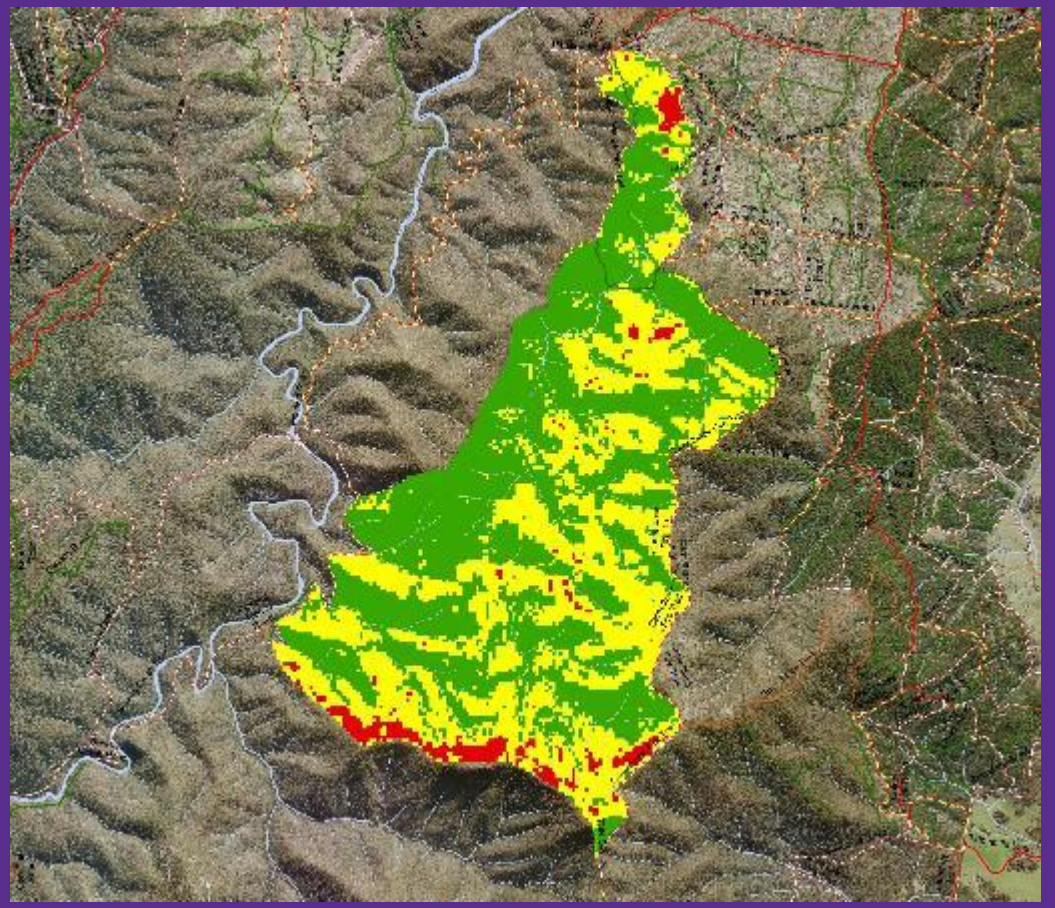
Planning, Evaluation and Innovation

Planning data

- Flammability[1a, 1b]
  (Sub-canopy micro-climate model)
- Fuel cover[2]
  (Processed from Airborne LiDAR)
- Hydrological risk mapping[3]
  (Processed from Airborne LiDAR)
- Fuel Moisture Content[4]
  (Australian Flammability Monitoring System)

1a. Nyman, P., Baillie, C., Duff, T., Sheridan, G., 2018. Eco-hydrological controls on microclimate and surface fuel evaporation in complex terrain. Agricultural and Forest Meteorology 252: 49-61. DOI:10.1016/j.agrformet.2017.12.255
1b. Nyman P, (2019) Sub-canopy microclimate model for fuel moisture mapping in ACT – data inputs, methods and description of model outputs. Alluvium, Melbourne, 17pp.
2. Van Dijk A. Paget M. Suarez. Gale M. (2018) TERN airborne LiDAR and hyperspectral products document. Australian National University, Canberra, 27pp.
3. Nyman P, Smith HG, Sherwin CB, C Langhans C, Lane PNJ, and Sheridan GJ (2015), Predicting sediment delivery from debris flows after wildfire, *Geomorphology*, *250*, 173-186, doi:http://dx.doi.org/10.1016/j.geomorph.2015.08.023
4. : Yebra M & Shokirov S (2022) Validation of fuel moisture content estimates from the Australian Flammability Monitoring Systems for coastal shrublands in the Perth region – Black Summer final report, Bushfire and Natural Hazards CRC, Melbourne.

Cotter Hill Burn Ignition Map and Burn Severity map

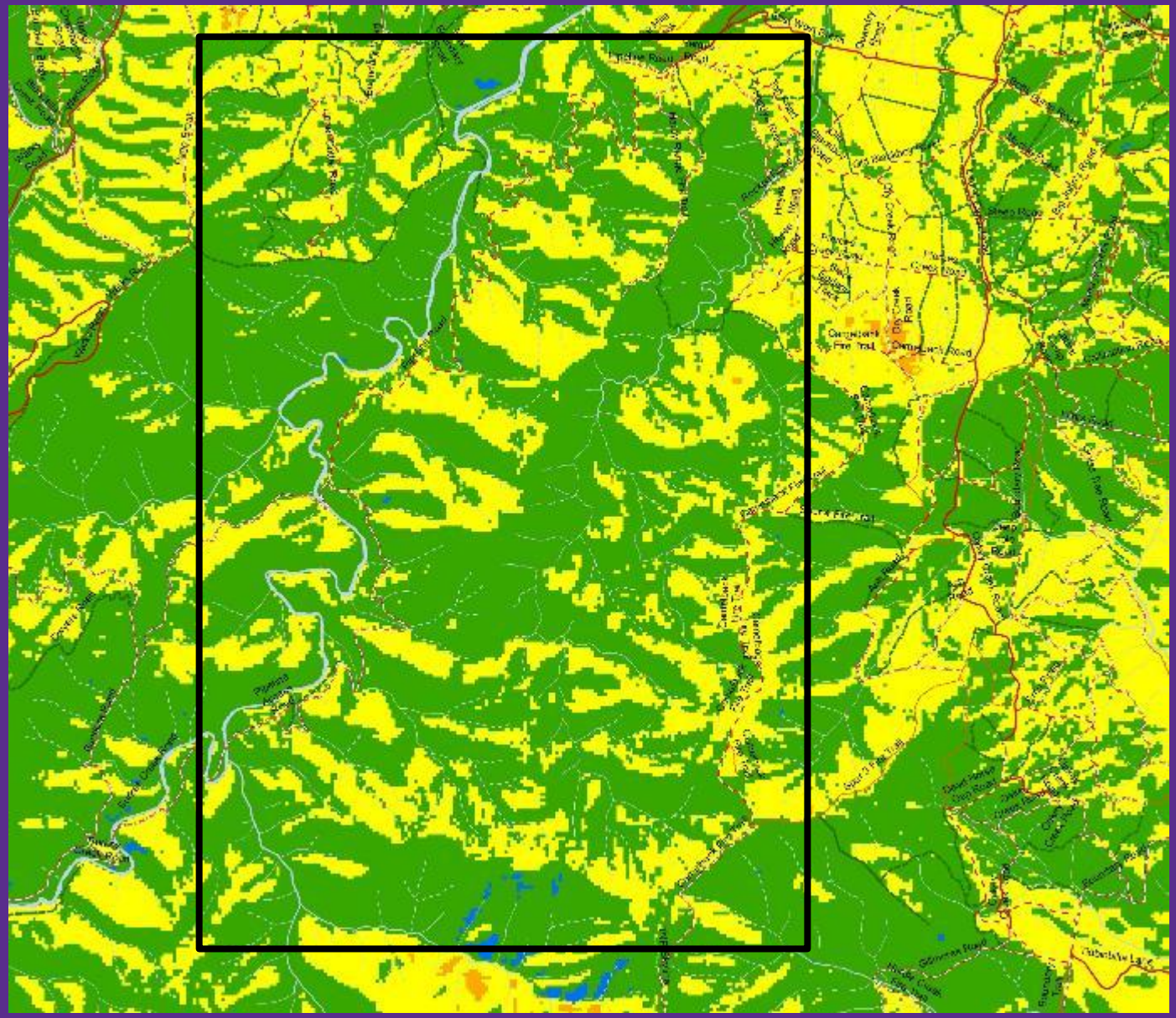


Cotter Hill Flammability Mapping

APRIL

Sub-canopy micro-climate model, (Nyman et al 2018)

Yellow = flammable
Green = not flammable

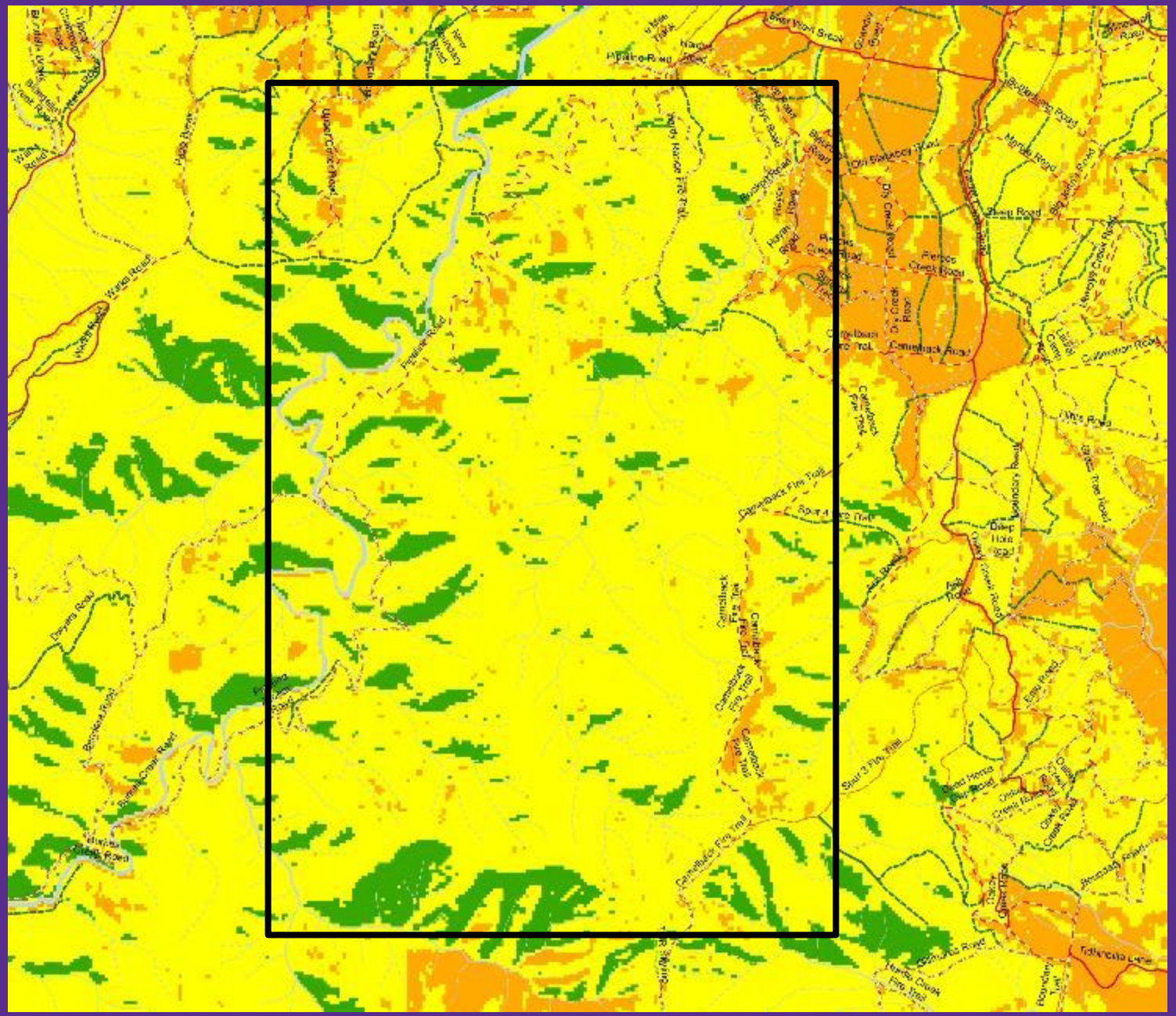


Cotter Hill Flammability Mapping

MARCH

Sub-canopy micro-climate model, (Nyman et al 2018)

Yellow = flammable
Green = not flammable
Orange = too flammable?

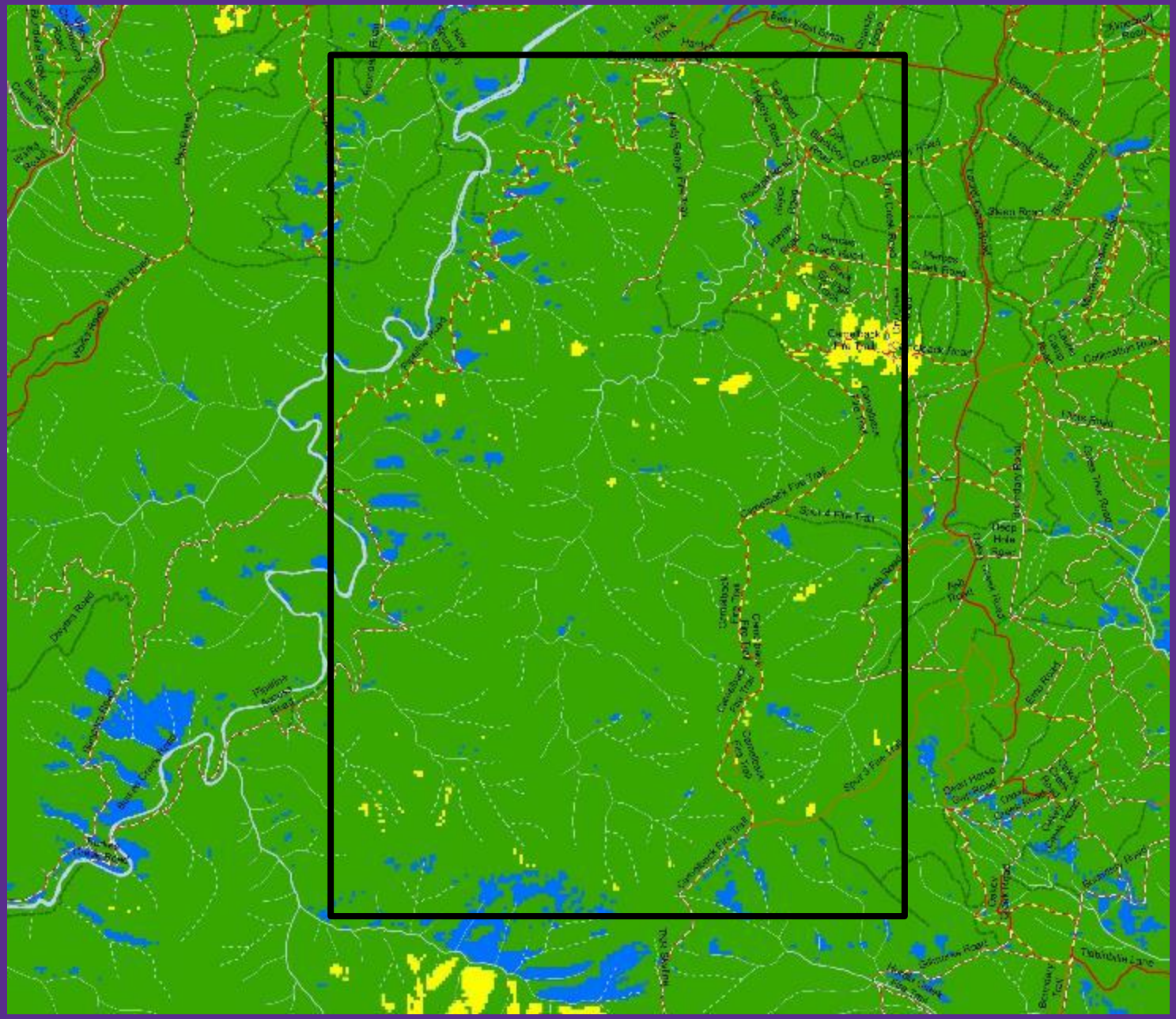


Cotter Hill Flammability Mapping

MAY

Sub-canopy micro-climate model, (Nyman et al 2018)

Yellow = flammable
Green = not flammable

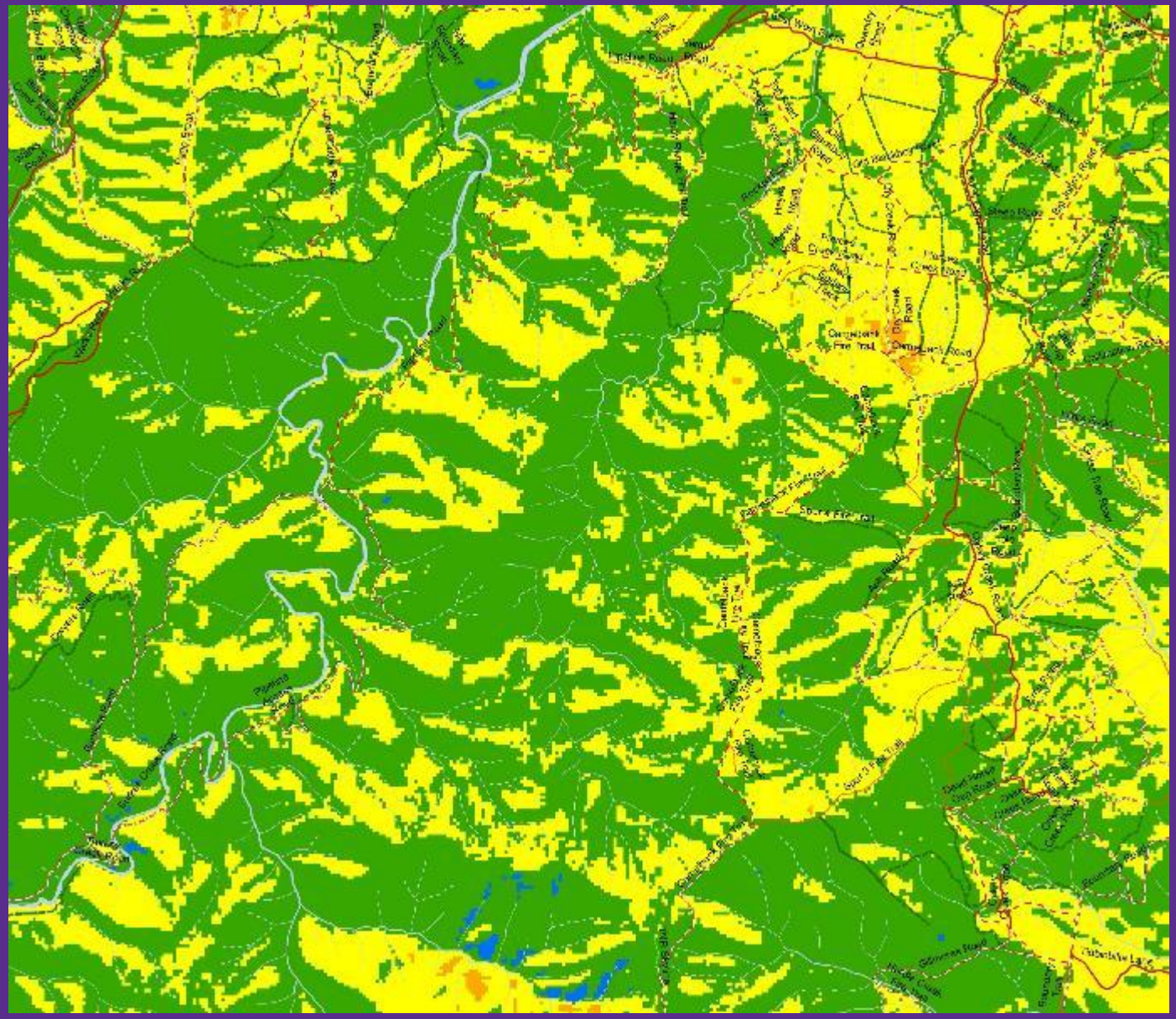


Cotter Hill Flammability Mapping

APRIL is the only month with a strong gradient across the landscape

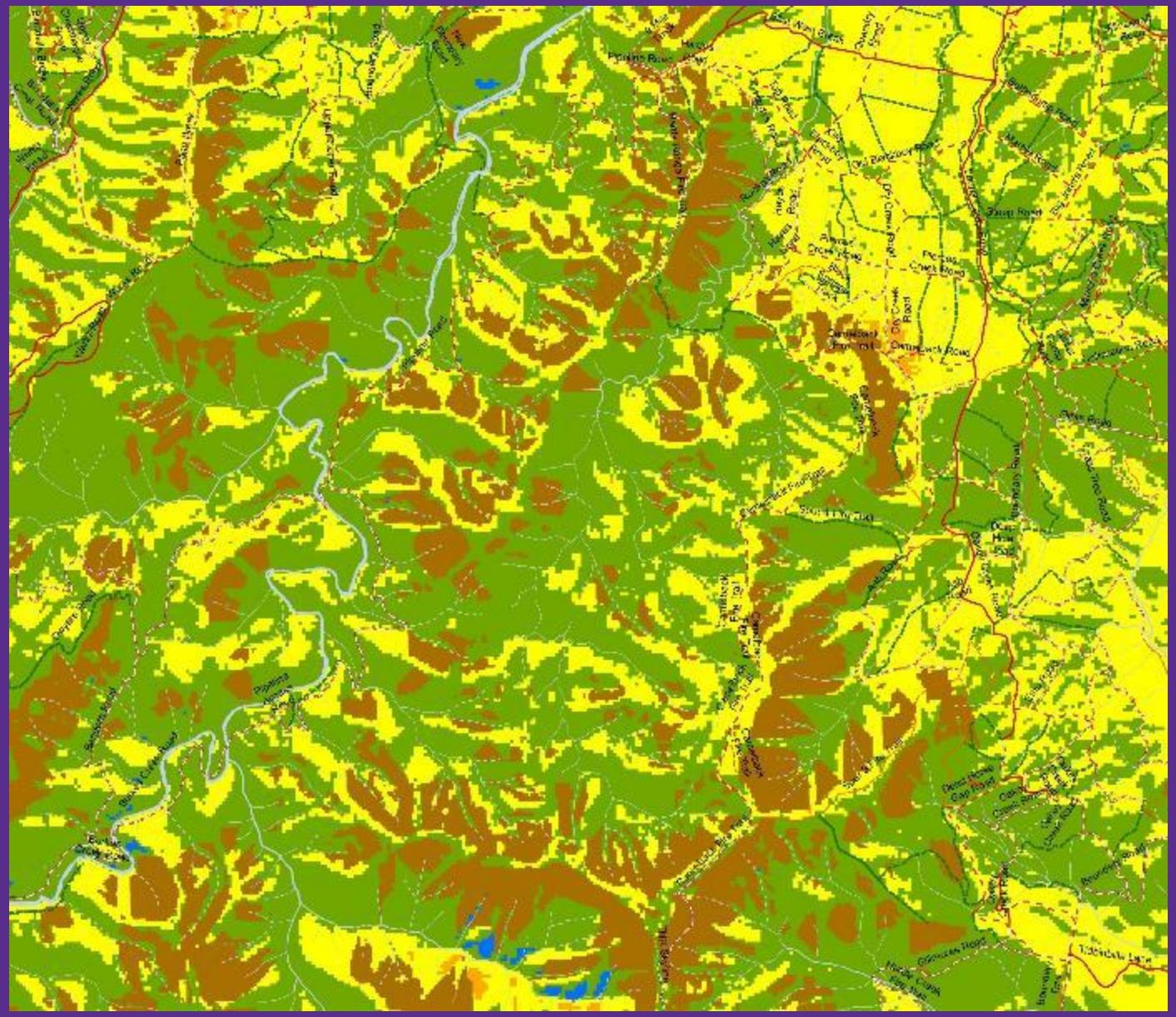
Sub-canopy micro-climate model, (Nyman et al 2018)

Yellow = flammable
Green = not flammable



Cotter Hill Flammability and Erosion Source Mapping

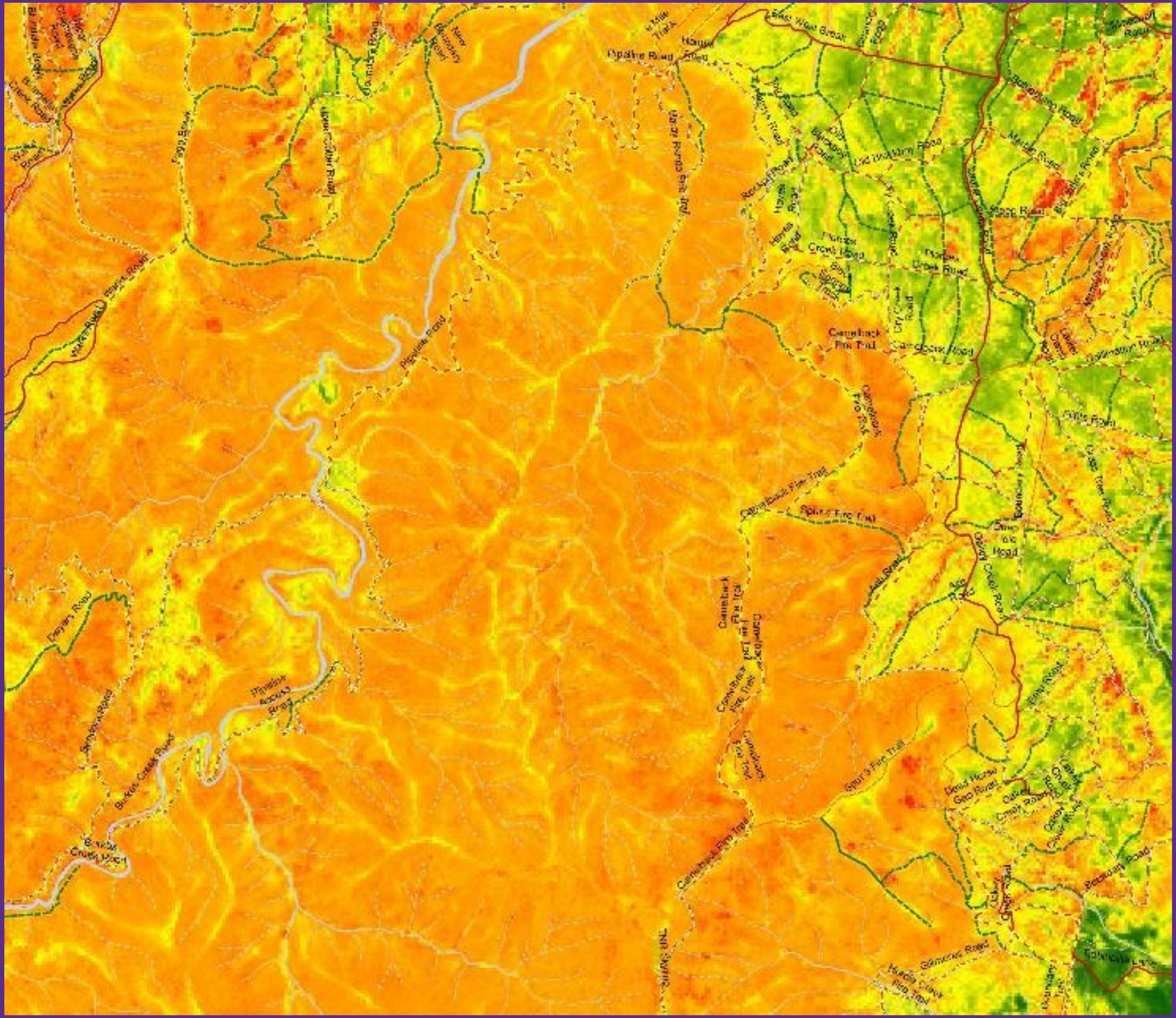
Yellow = flammable
Green = not flammable
Brown = erosion sources



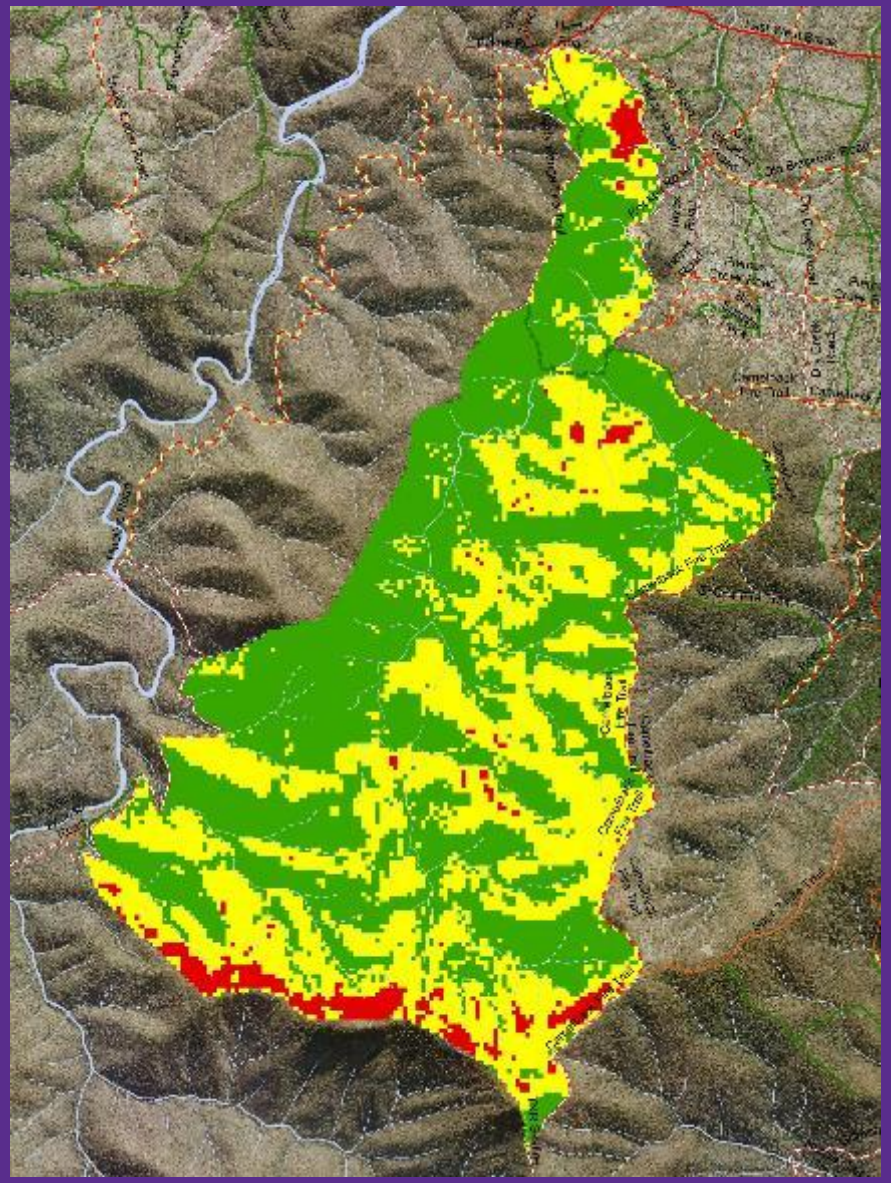
Cotter Hill, cover of Near-surface fuel

Red-green colour gradient

Red = greater cover
Green = less cover

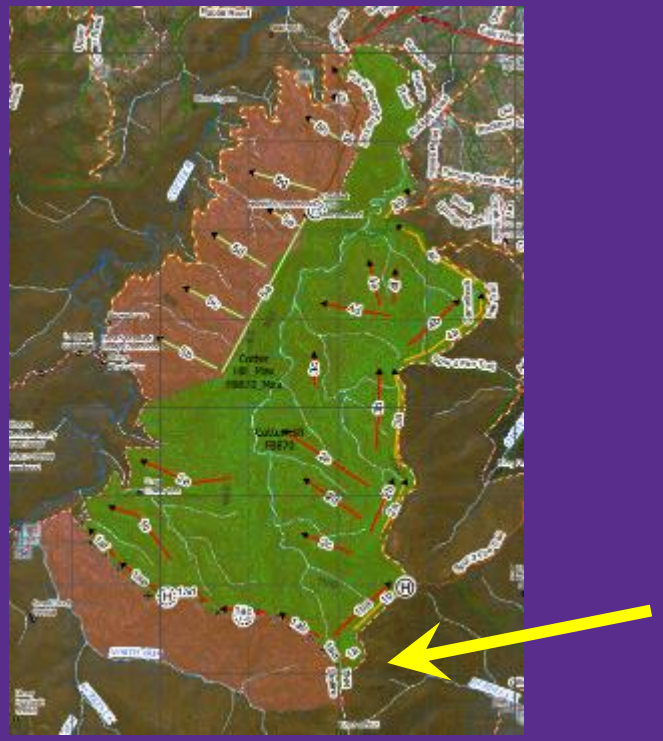


Cotter Hill Burn Ignition Map and Burn Severity map



Cotter Hill, Implementation

Day 1:
Hand lighting at the high point



Cotter Hill, Implementation

Day 1:
Ground incendiary of the eastern boundary fire trail

Cotter Hill, Implementation

Day 2:
Aerial incendiary of the southern containment

Cotter Hill, Implementation

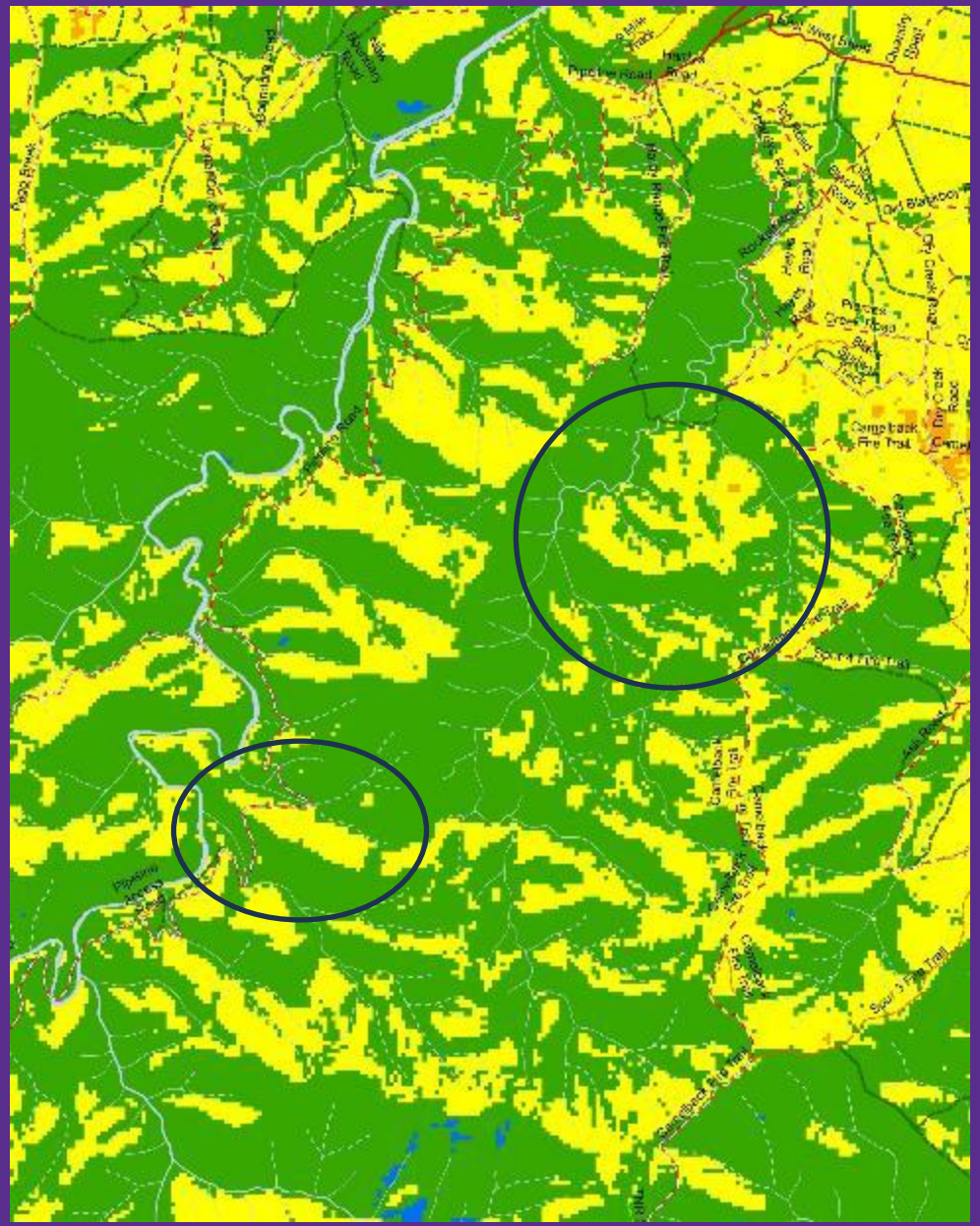
Day 2:
Aerial incendiary of the southern containment

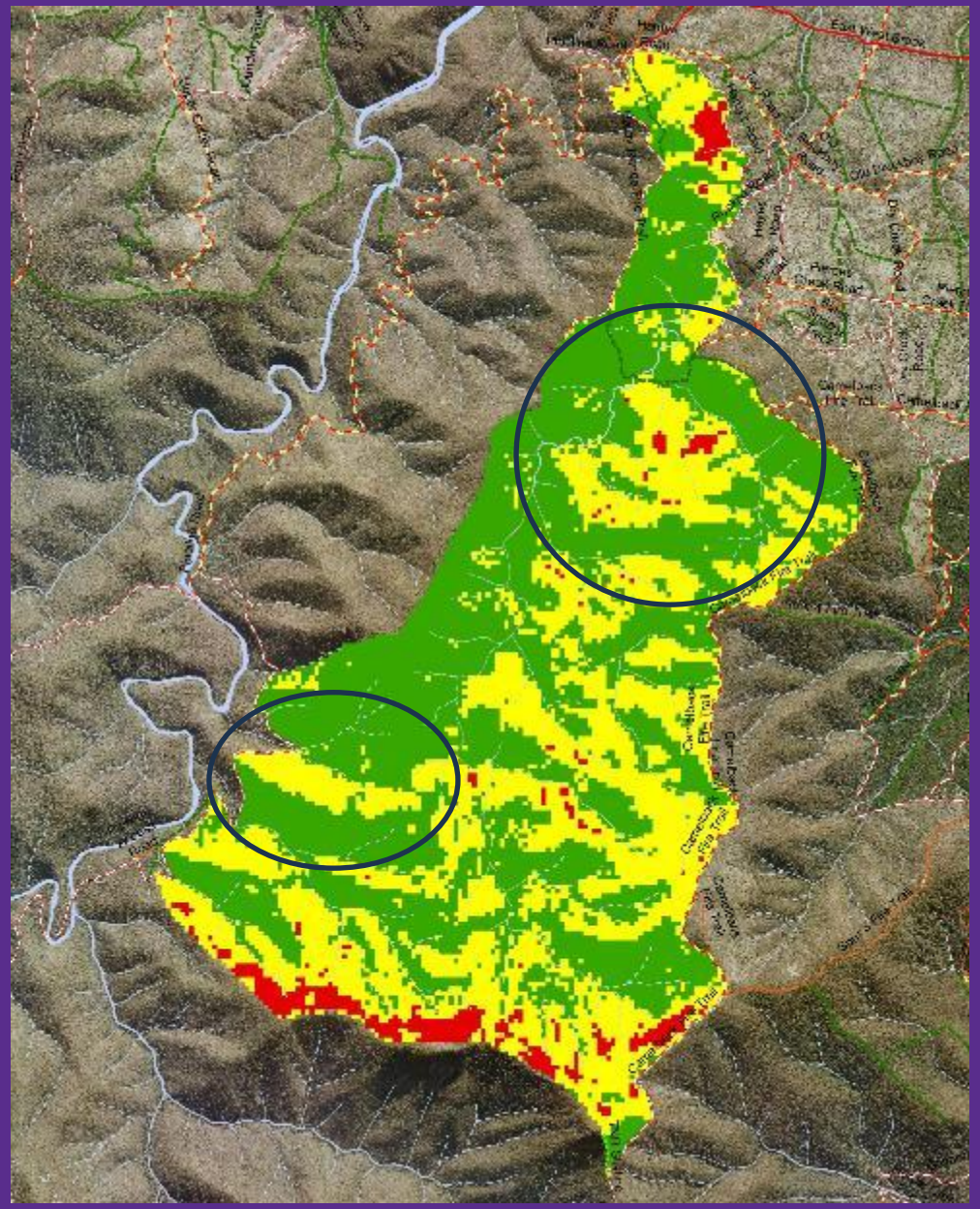
Cotter Hill, Implementation

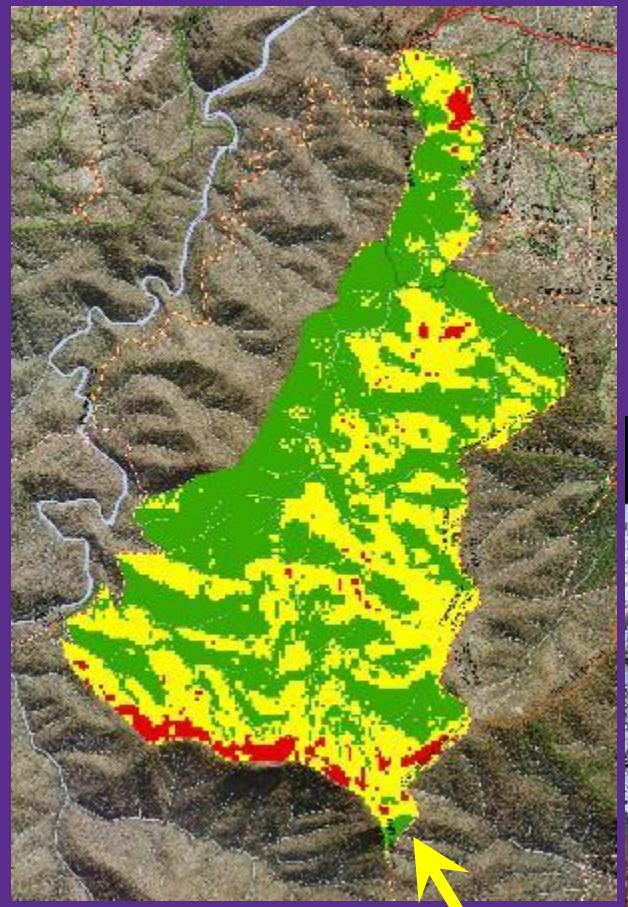
Day 2:
Aerial incendiary of the southern containment

Cotter Hill, Implementation

Day 2:
Aerial incendiary of the southern containment

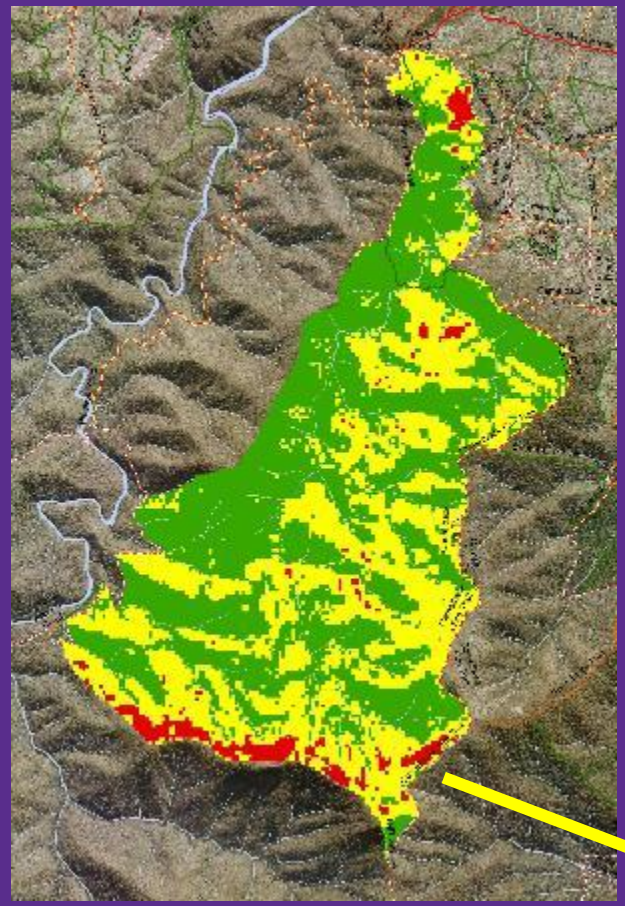







55H
0671986mE
6079115mN
DIRECTION
North-East
35° 24.992' S
148° 53.657' E
ACCURACY 3m
SM-S916B
ID: 1781180285
FB870 Cotter Hill
3 Apr 2024
15:17:19 (AEDT)


55H
0672008mE
6079092mN
DIRECTION
North
35° 25.004' S
148° 53.672' E
ACCURACY 4m
Christian Bihlmaier
ID: 1373348011
FB870 Cotter Hill
3 Apr 2024
14:30:30 (GMT+11)

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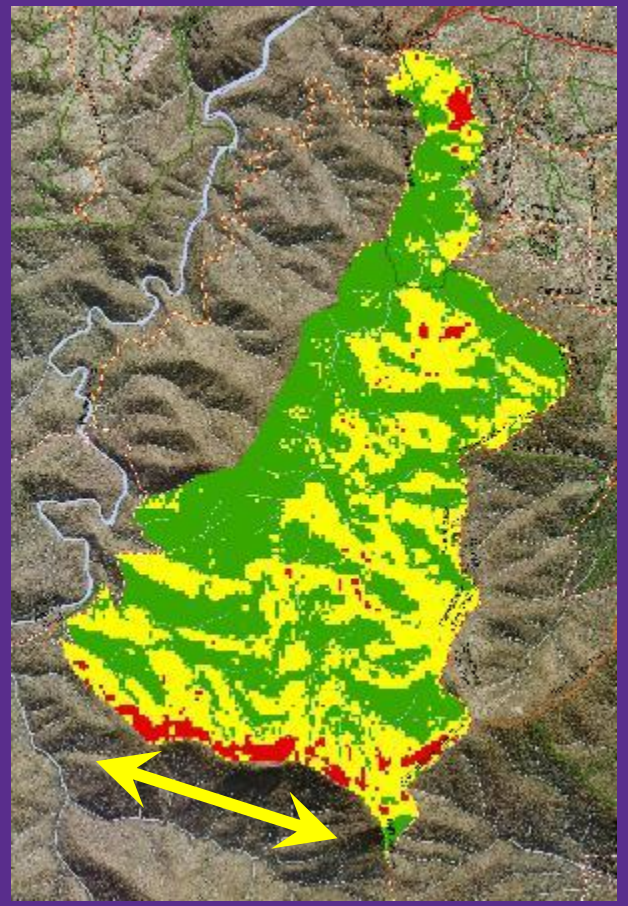
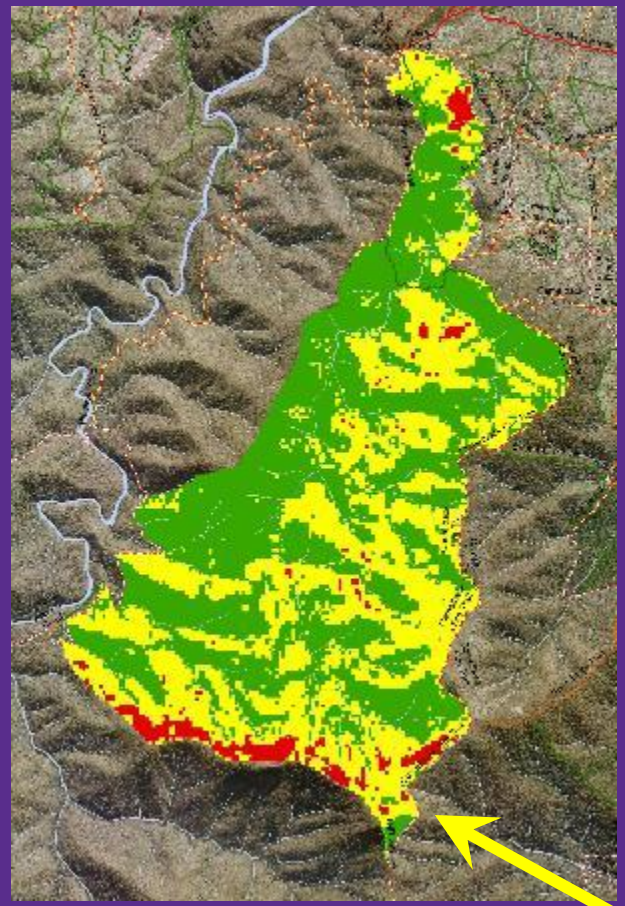
35.40856°S
148.89699°E
ACCURACY 4 m
DATUM WGS84
2024-06-16
11:54:59+10:00



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DATUM WGS84
2024-06-16
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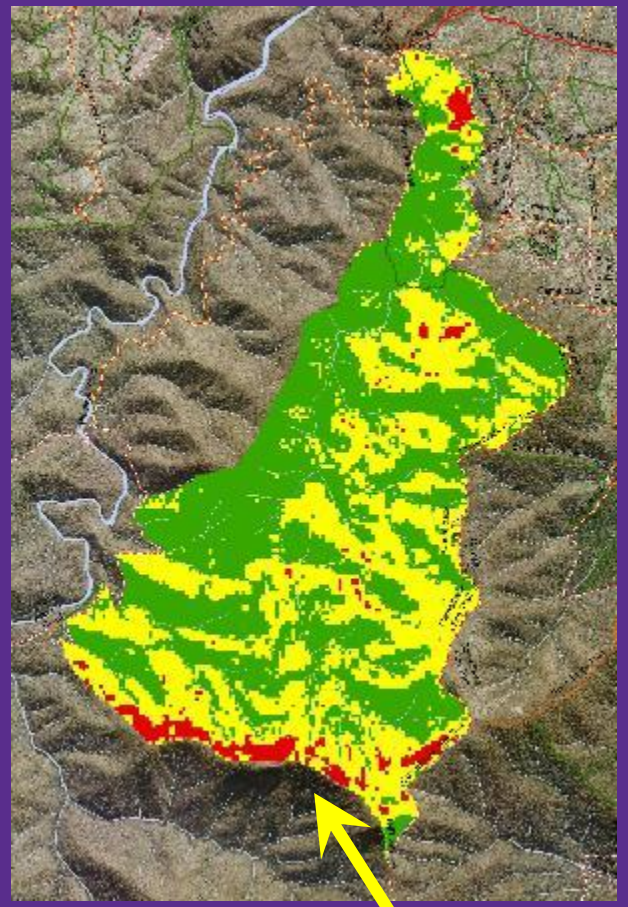


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DATUM WGS84
2024-06-16
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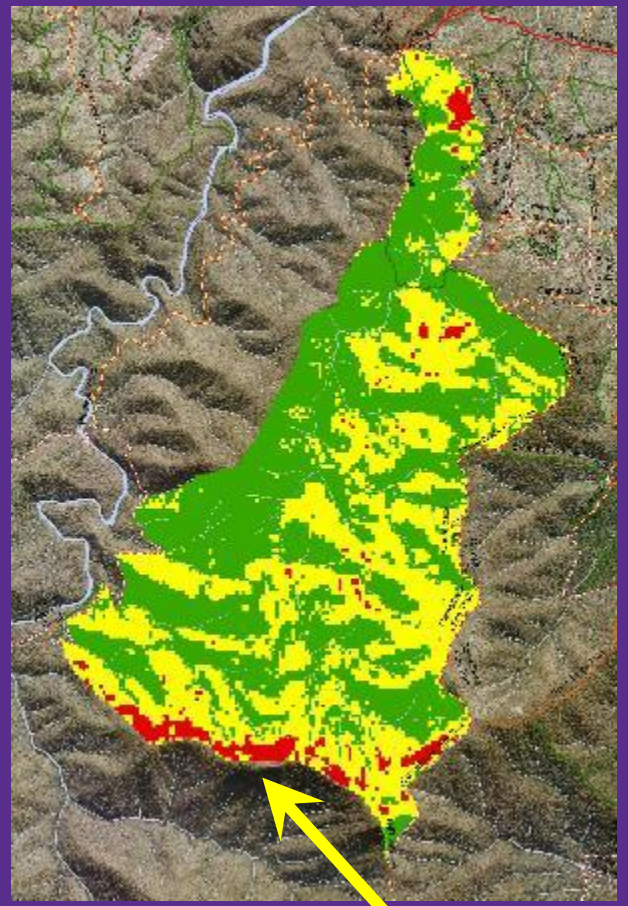

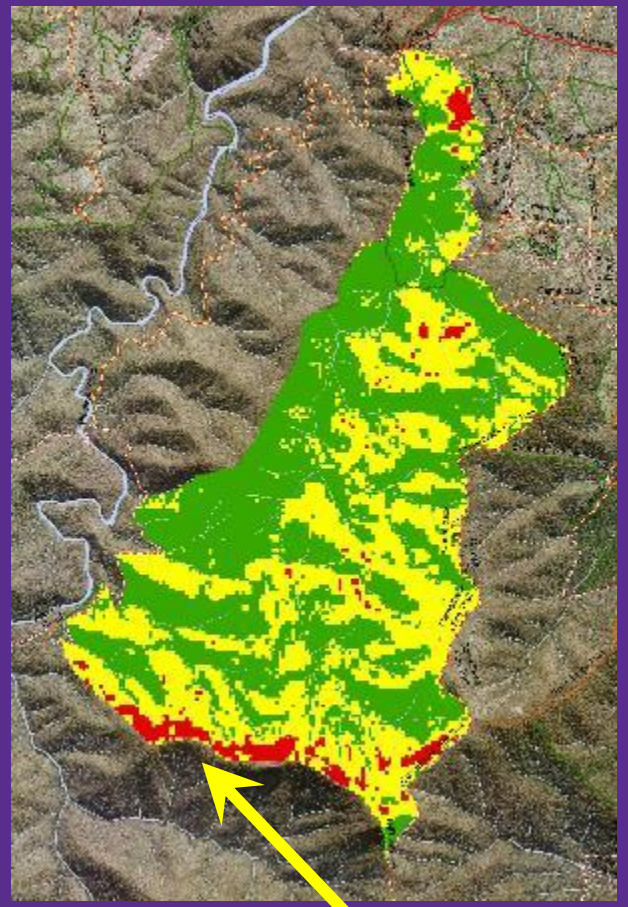


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DATUM WGS84
2024-06-16
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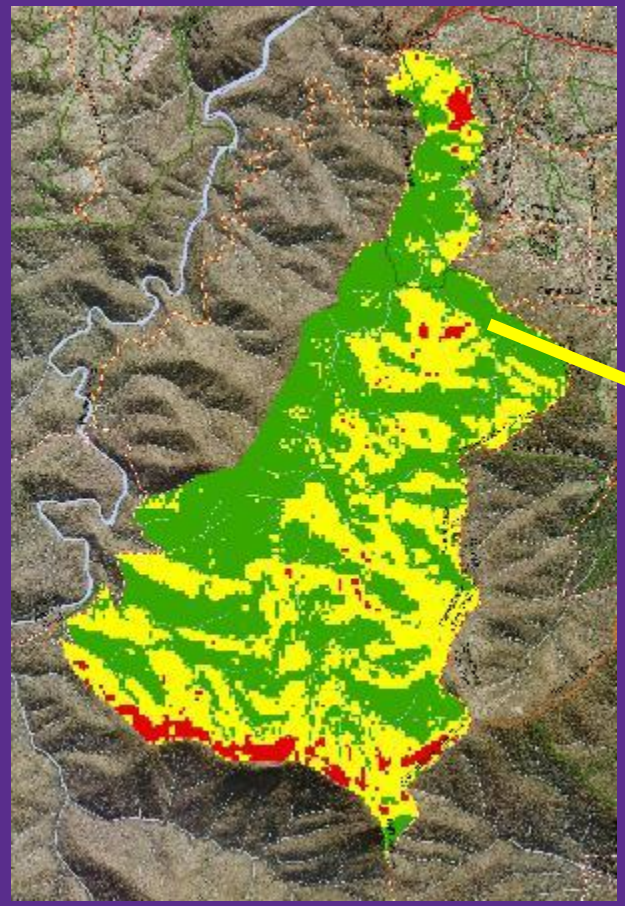

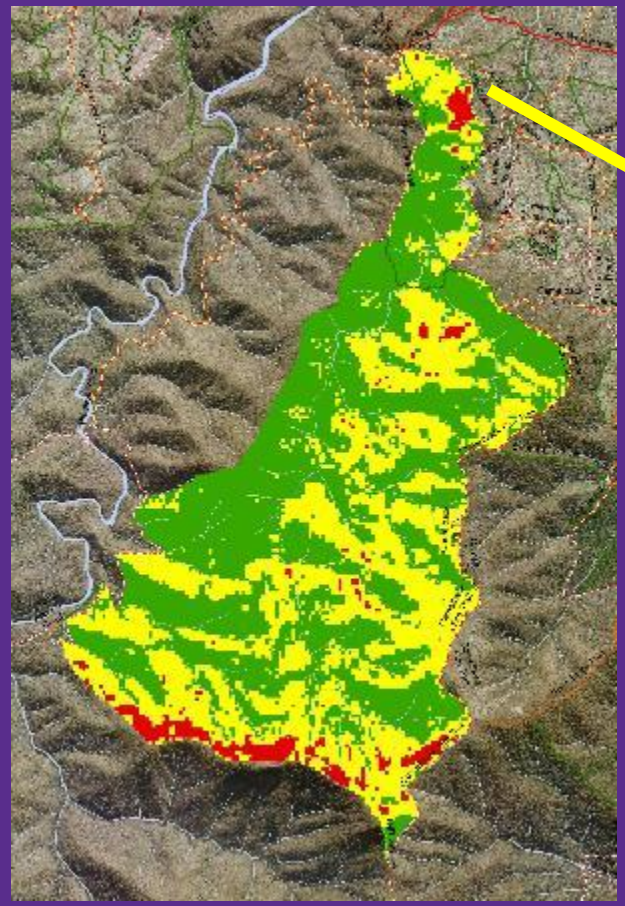

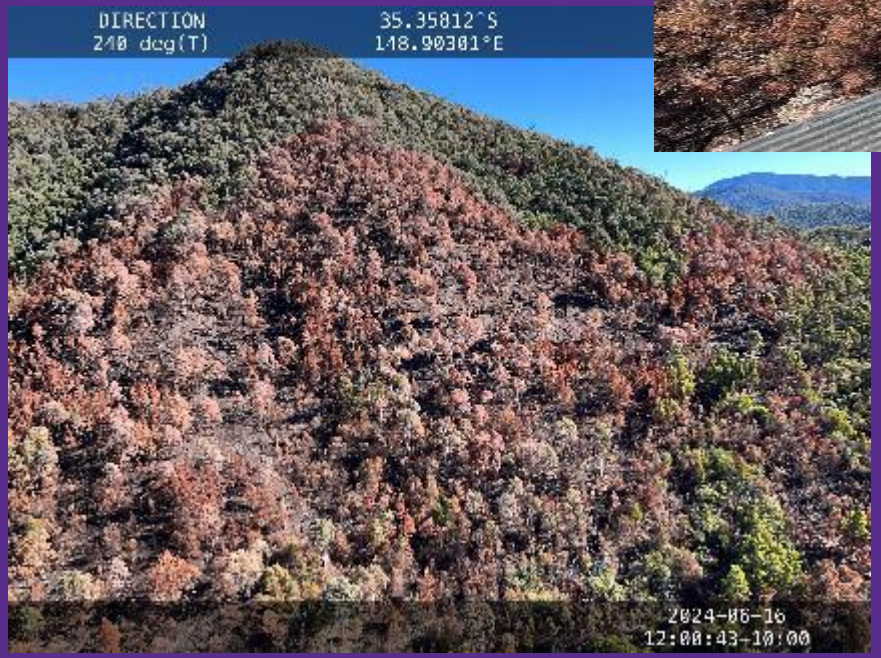
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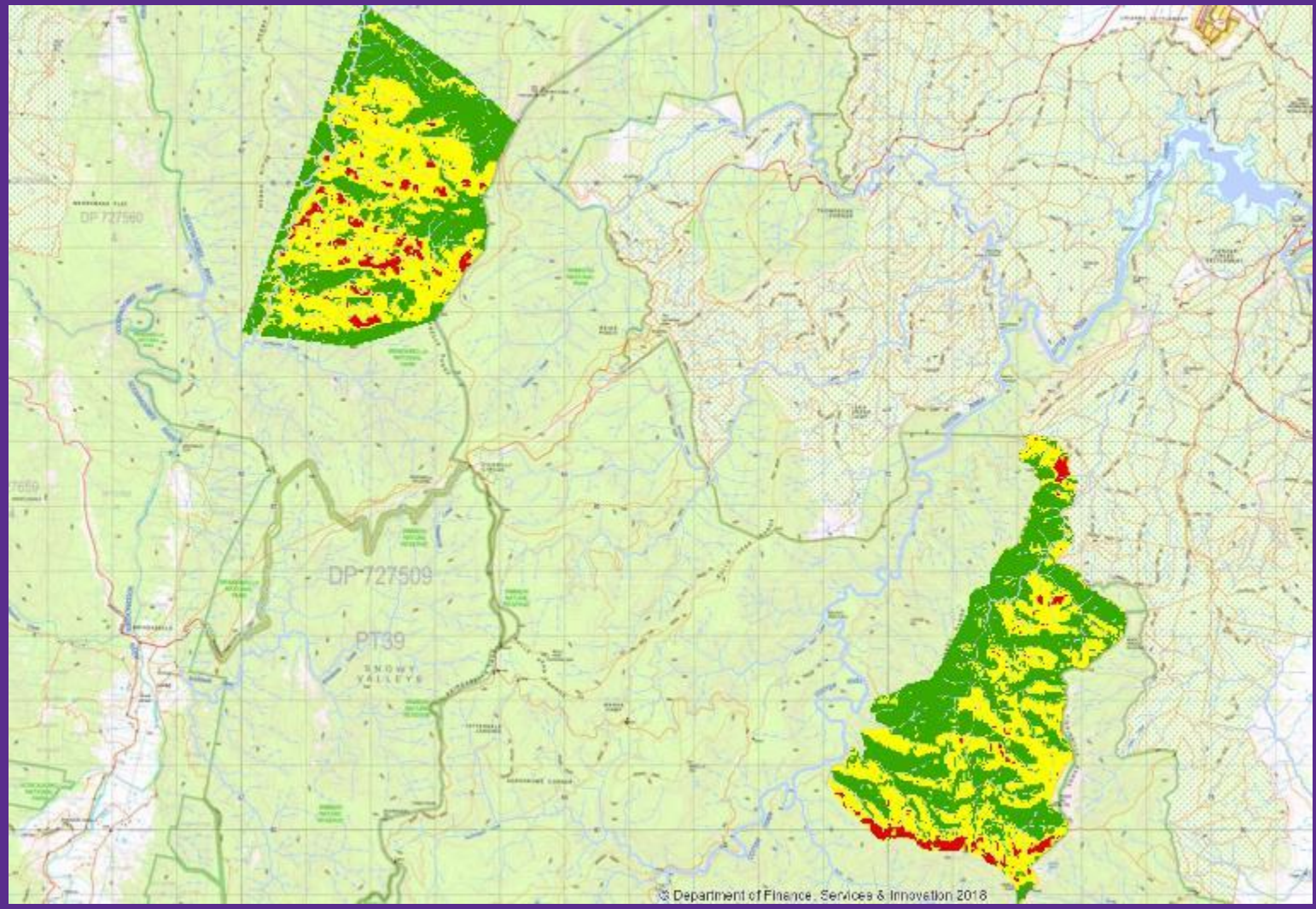
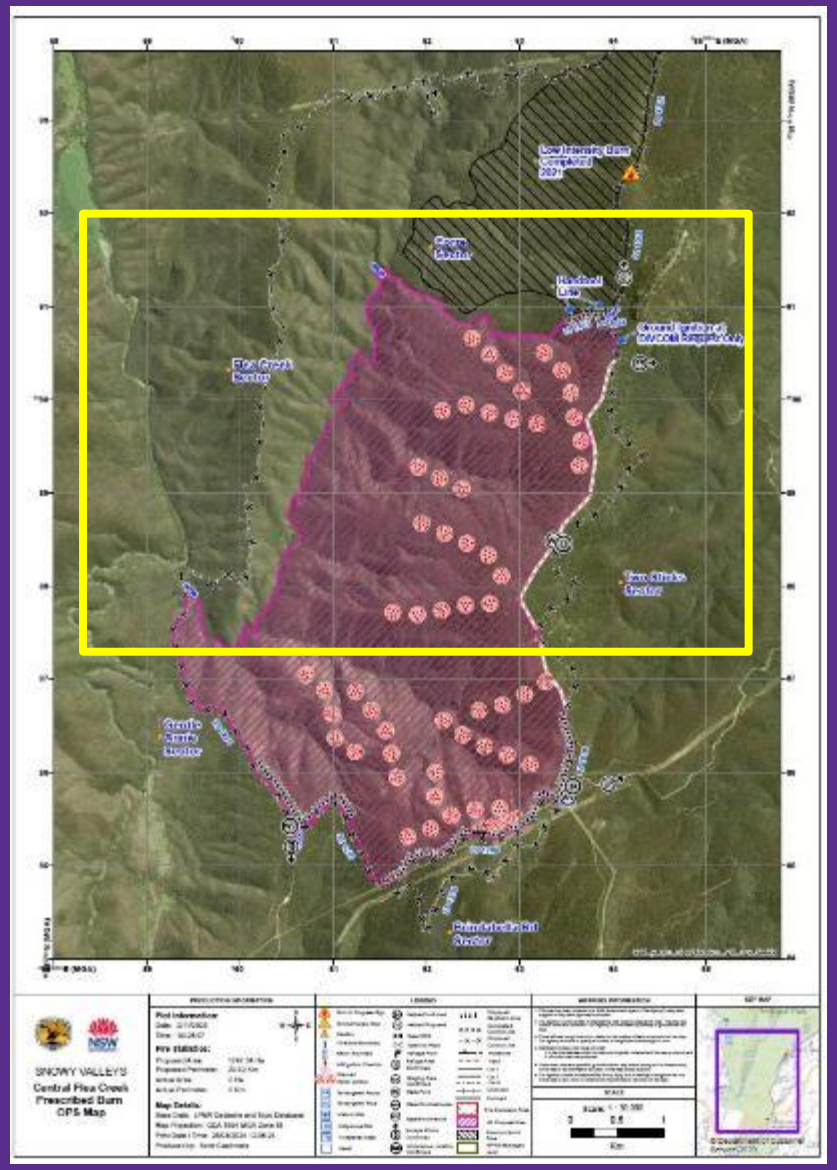
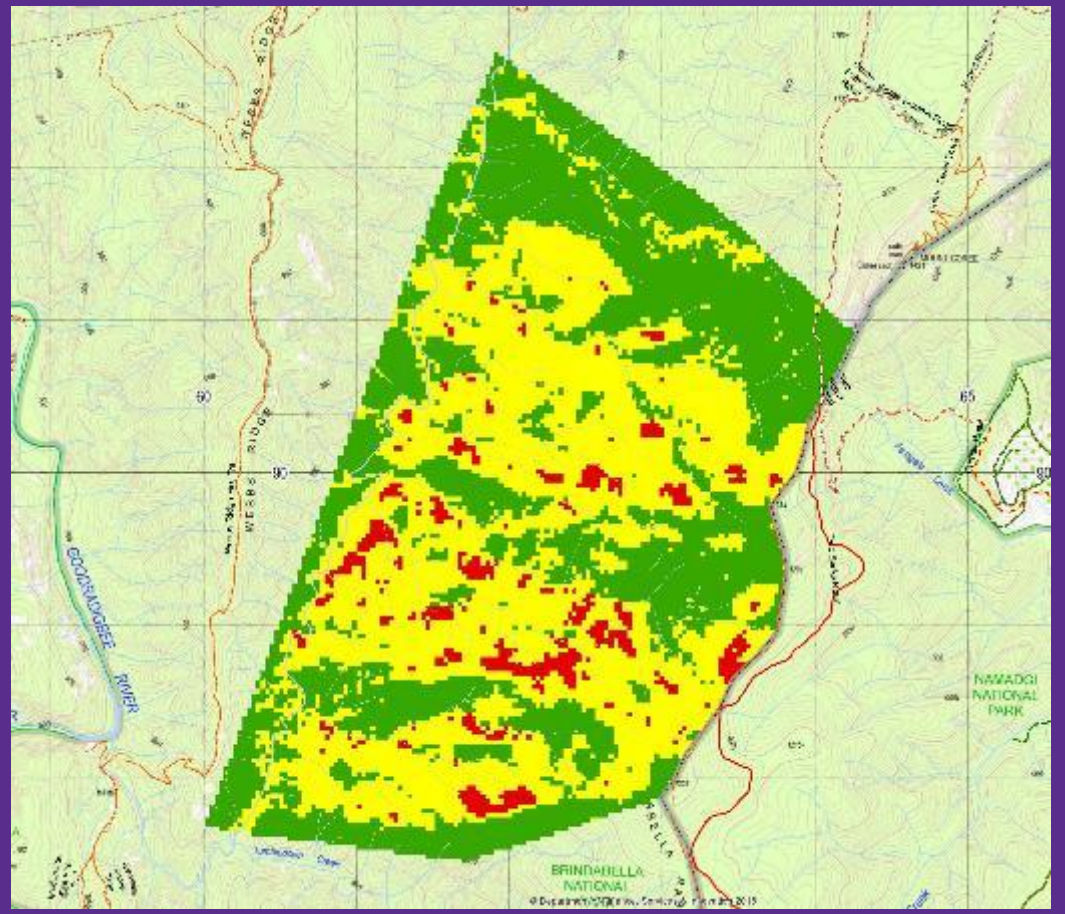
Flea Creek Burn, NSW. Area 1747ha, Ignition: 18 March 2024 using aerial driptorch

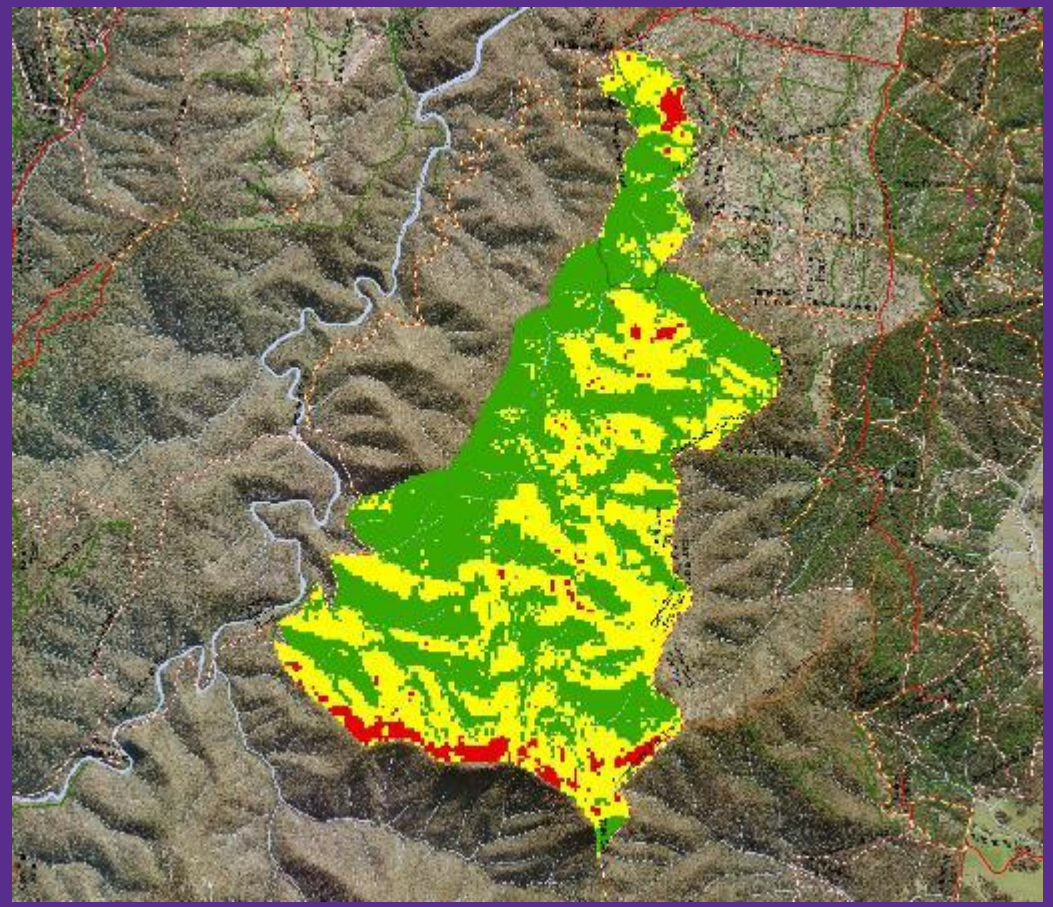


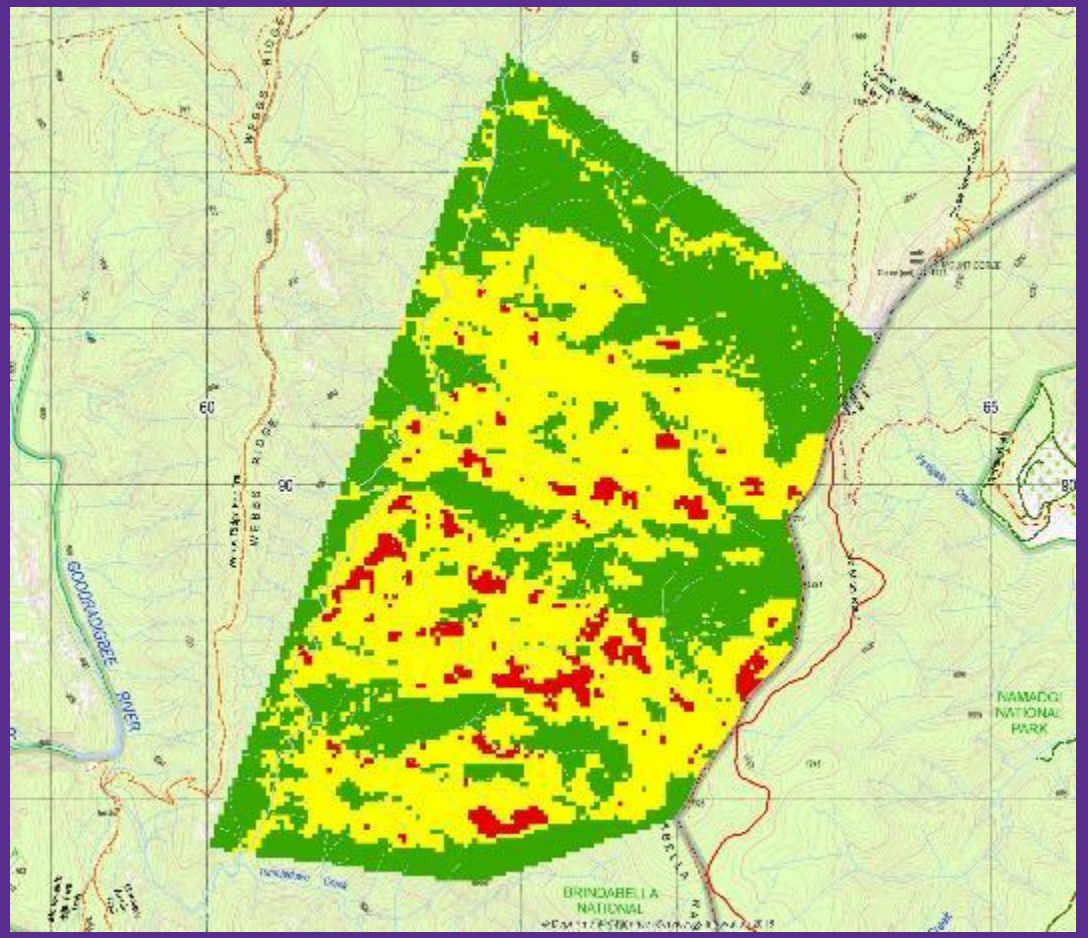
Cotter Hill Burn, ACT. Area 2212ha, Ignition: 3 April 2024, aerial incendiaries

Flea Creek Ignition Map and Severity Map



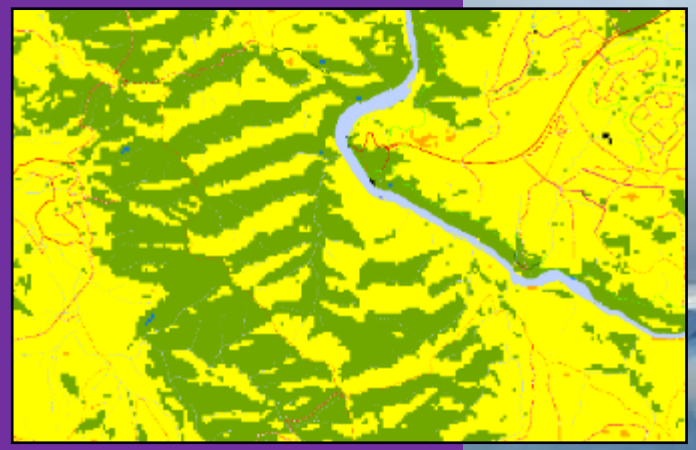





WEBBS RIDGE
GOOMBUNGEE RIVER
NAMADGI NATIONAL PARK
BRINDABELLA NATIONAL

GLOBAL WILDFIRE INFORMATION SYSTEM, MILAN, ITALY, SEPTEMBER 2024

Remotely-sensed Evaluation of Prescribed Burning



Adam Leavesley, Tony Scherl

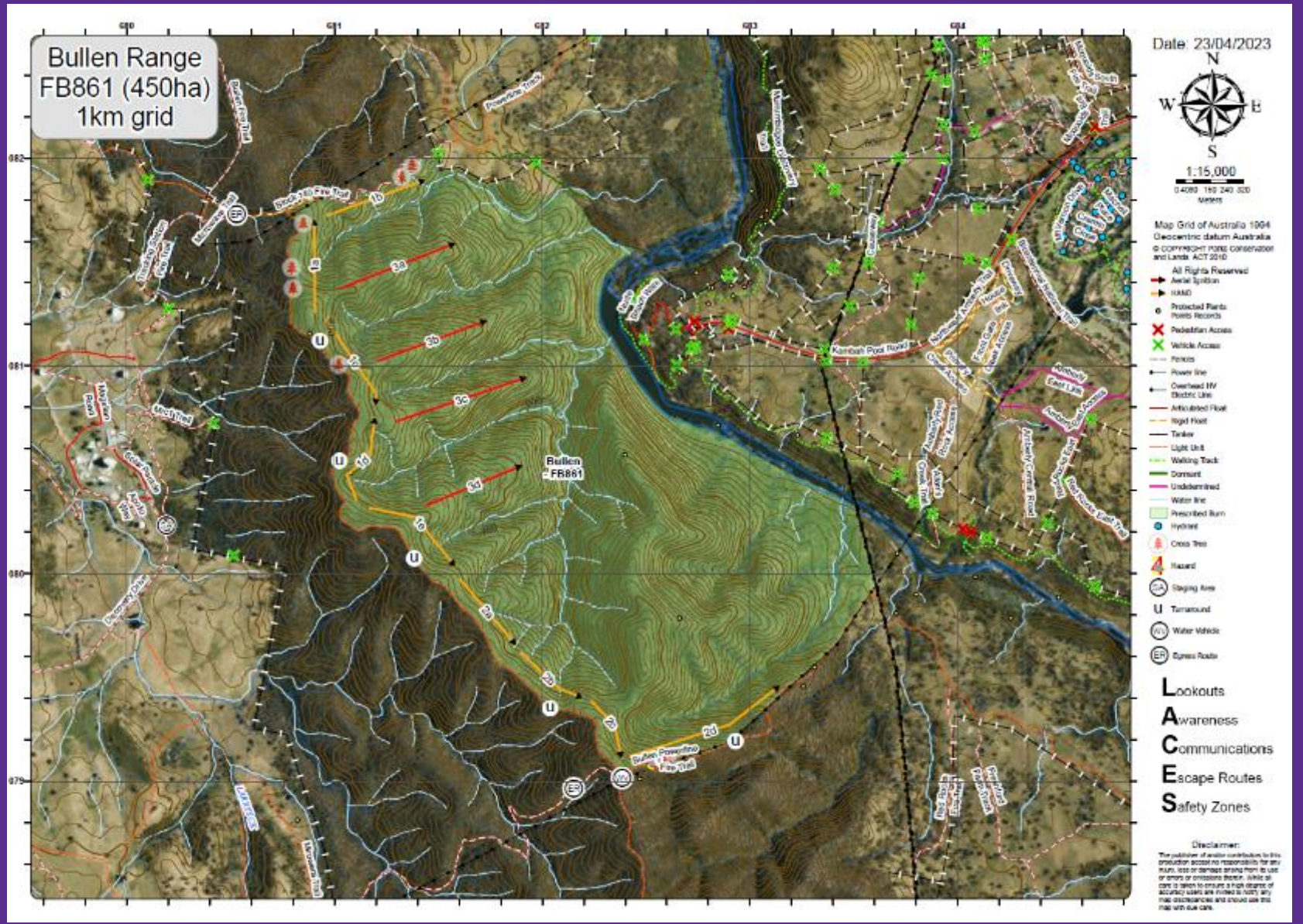
Planning, Evaluation and Innovation

Bullen Range Burn

- Size: 450ha
- Date: April 2023

Aims:

1. Reduce fuels along the main ridge fire trail
2. Minimise erosion and sedimentation



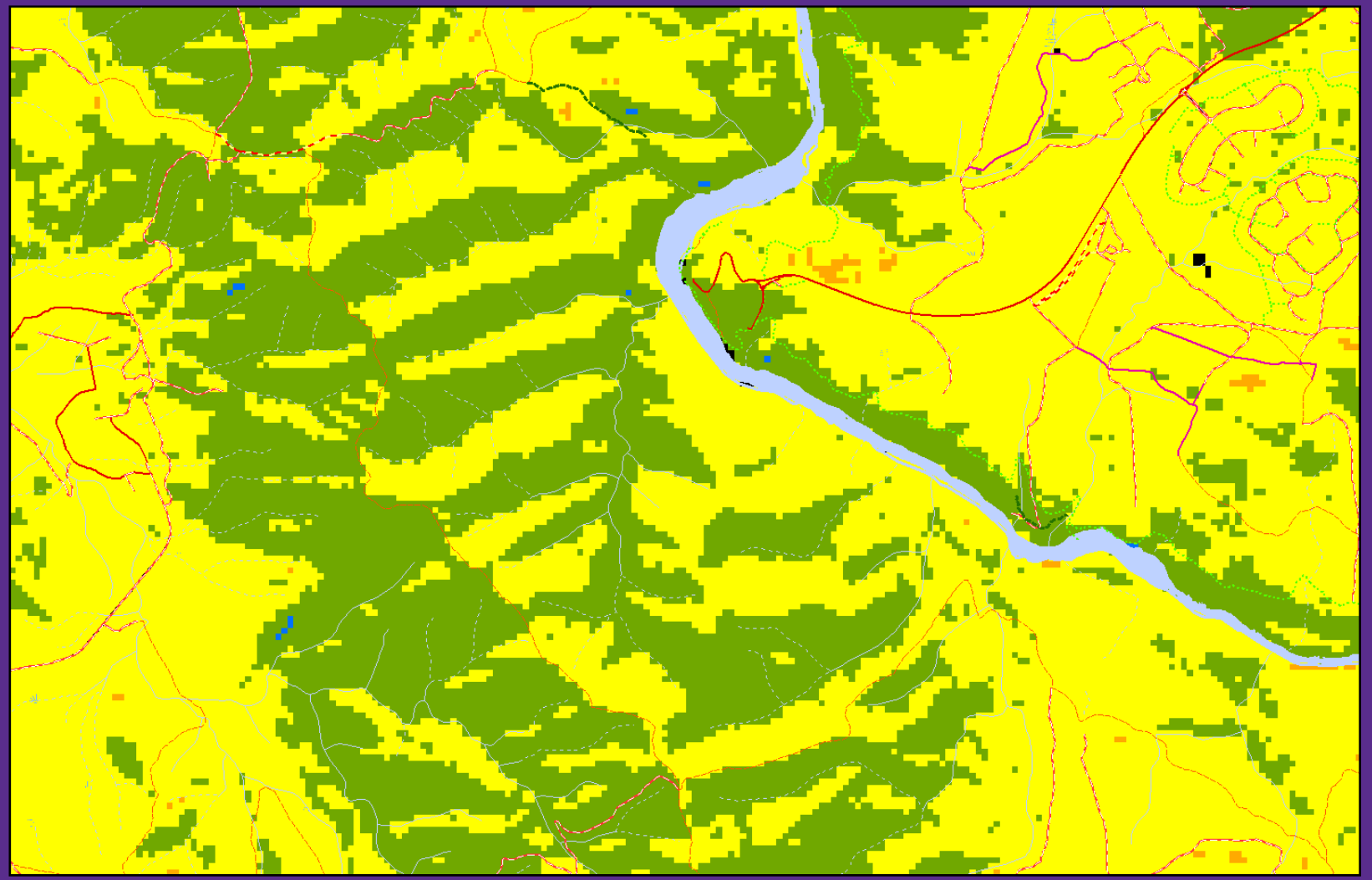
Planning, Evaluation and Innovation

Sub-canopy micro-climate model*

(Estimate of flammability across the landscape derived from net radiation and mean rainfall)

Yellow = flammable,
Green = not flammable

*Nyman *et al*. 2018



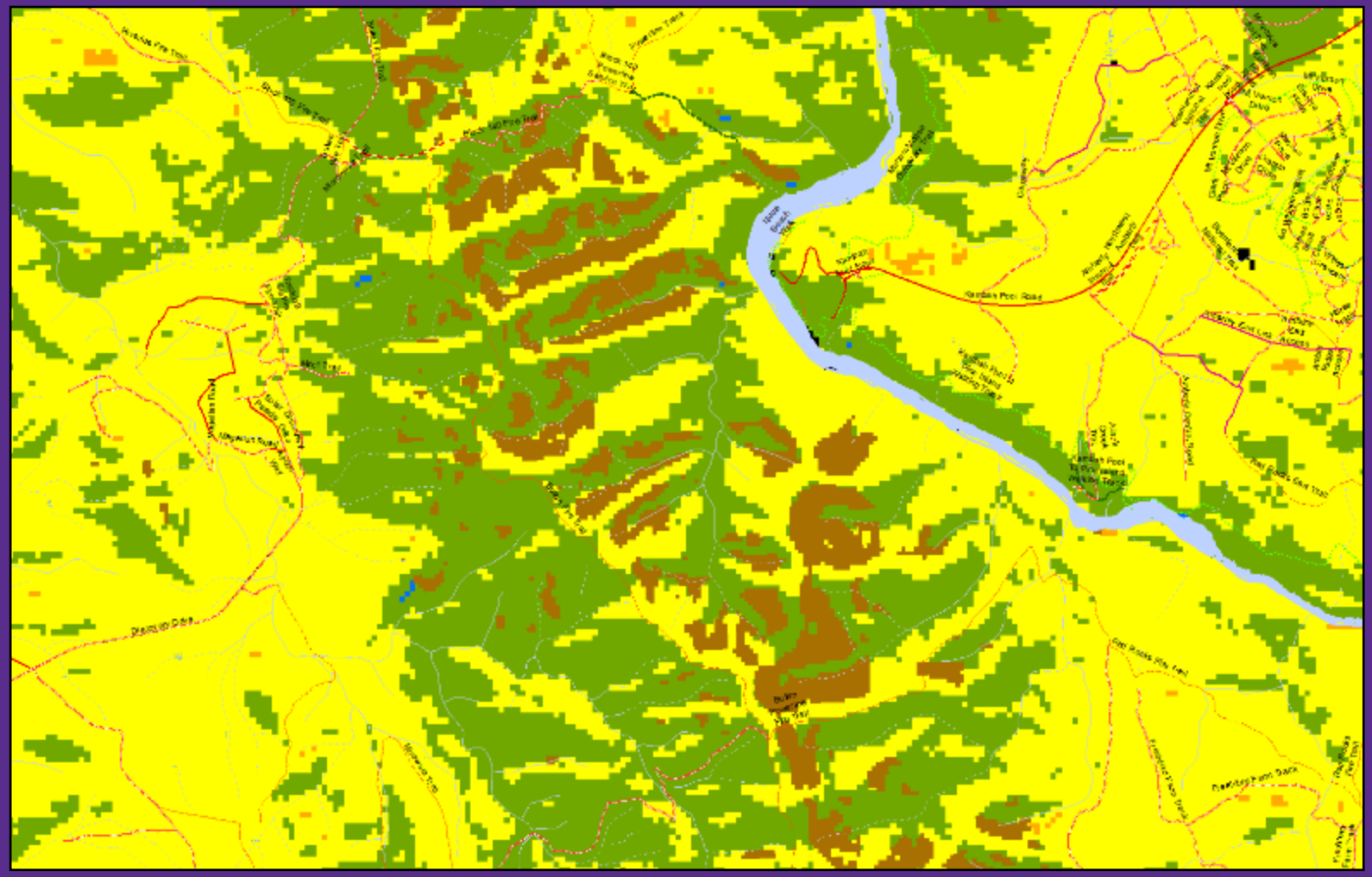
Planning, Evaluation and Innovation

Sub-canopy micro-climate model[1]

Overlaid with…

Erosion risk model[2]

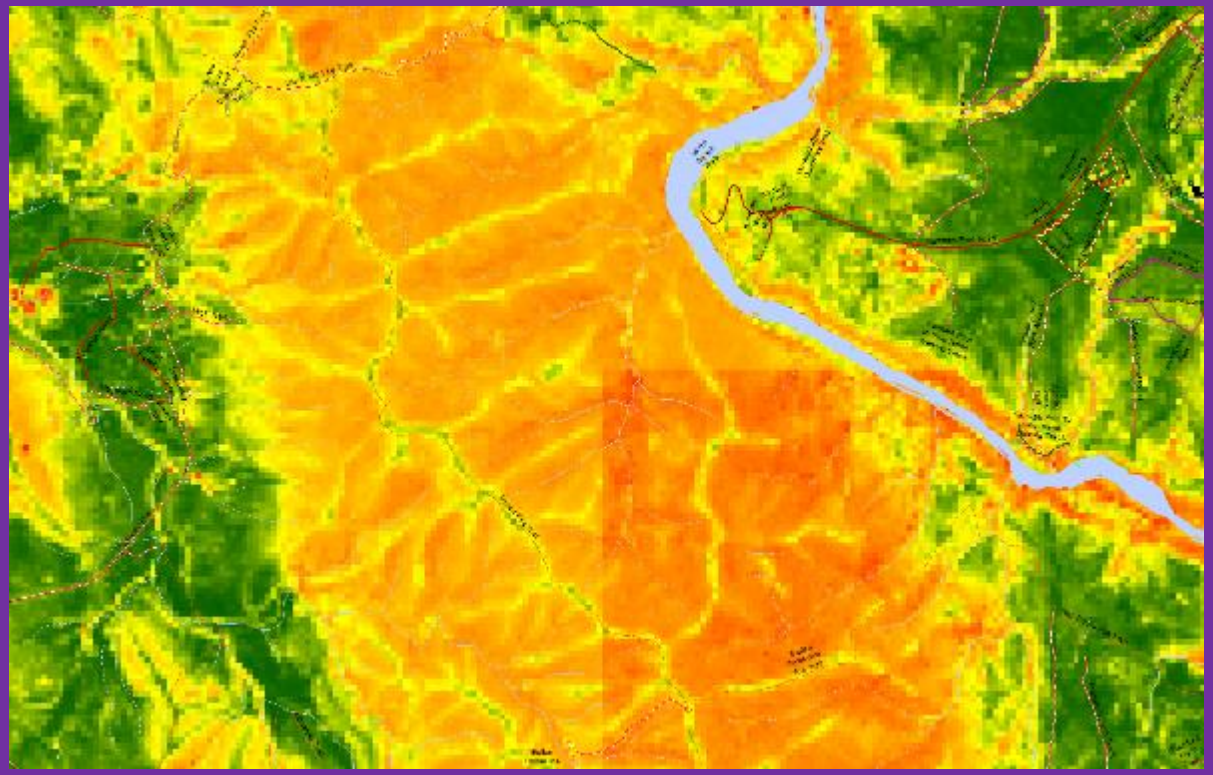
Yellow = flammable,
Green = not flammable
Brown = erosion source



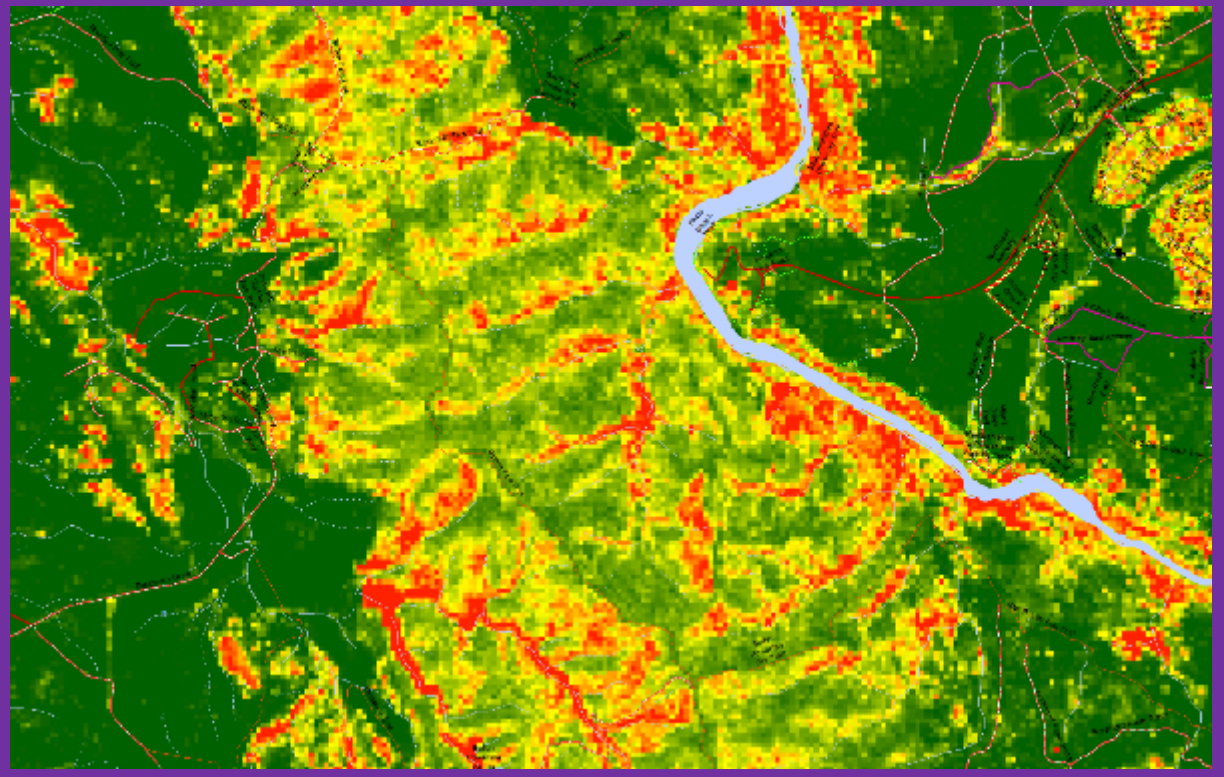
1. Nyman *et al*. 2018
2. Nyman et al. 2015

Planning, Evaluation and Innovation

Near-surface fuel



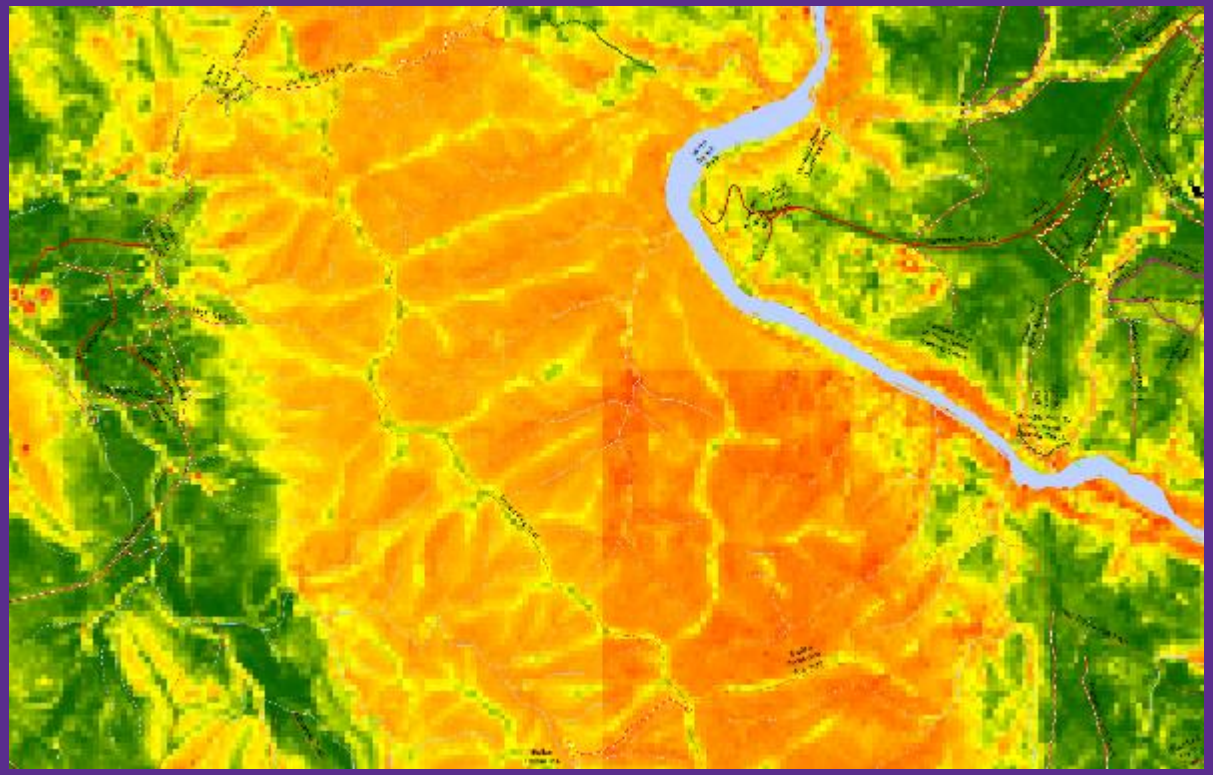
Elevated fuel



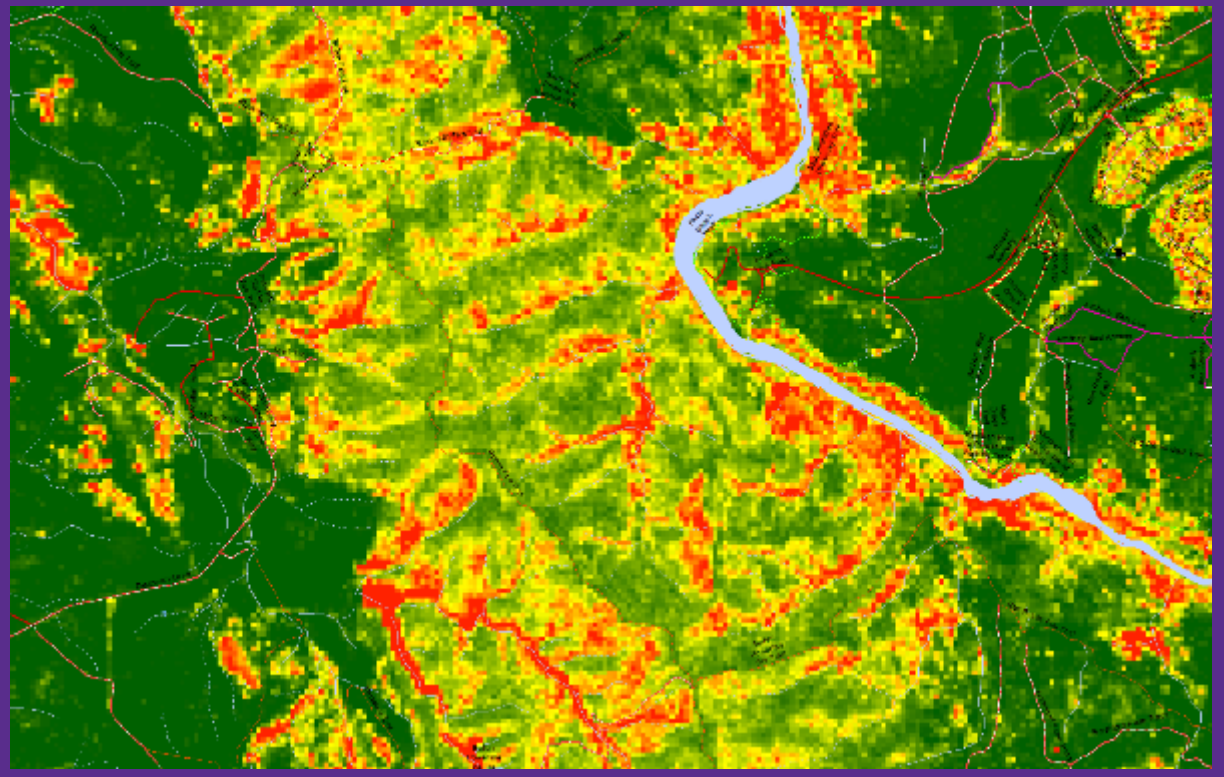
Cover of fuel derived from airborne LiDAR; Red-green colour gradient, red indicates greater cover.

Planning, Evaluation and Innovation

Near-surface fuel



Elevated fuel



Cover of fuel derived from airborne LiDAR; Red-green colour gradient, red indicates greater cover.

Planning, Evaluation and Innovation

Live Fuel Moisture Content

Australian Flammability
Monitoring System

Yellow = Moderate flammability
Green = Less flammable

1. Yebra and Shokirov, 2022

Planning, Evaluation and Innovation

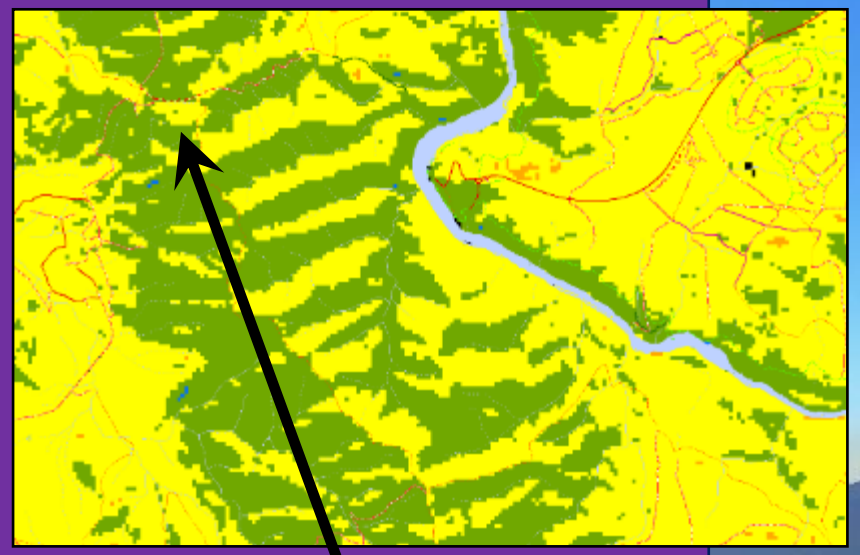
Bullen Range Burn

- Size: 450ha
- Date: April 2023

Aims:

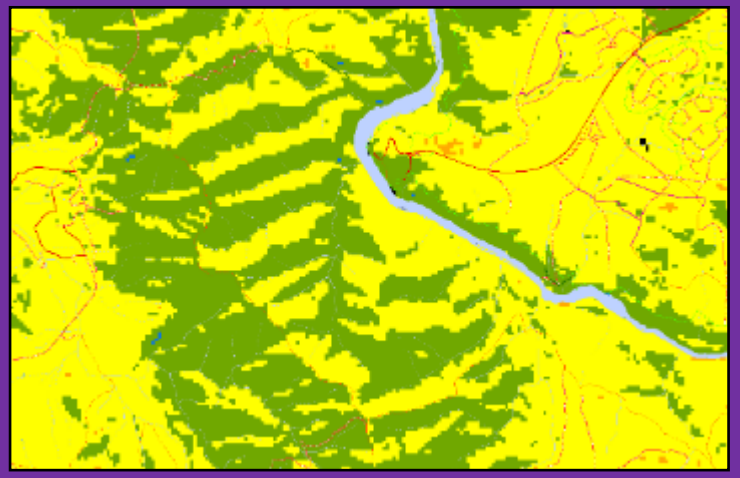
1. Reduce fuels along the main ridge fire trail
2. Minimise erosion and sedimentation

Implementation

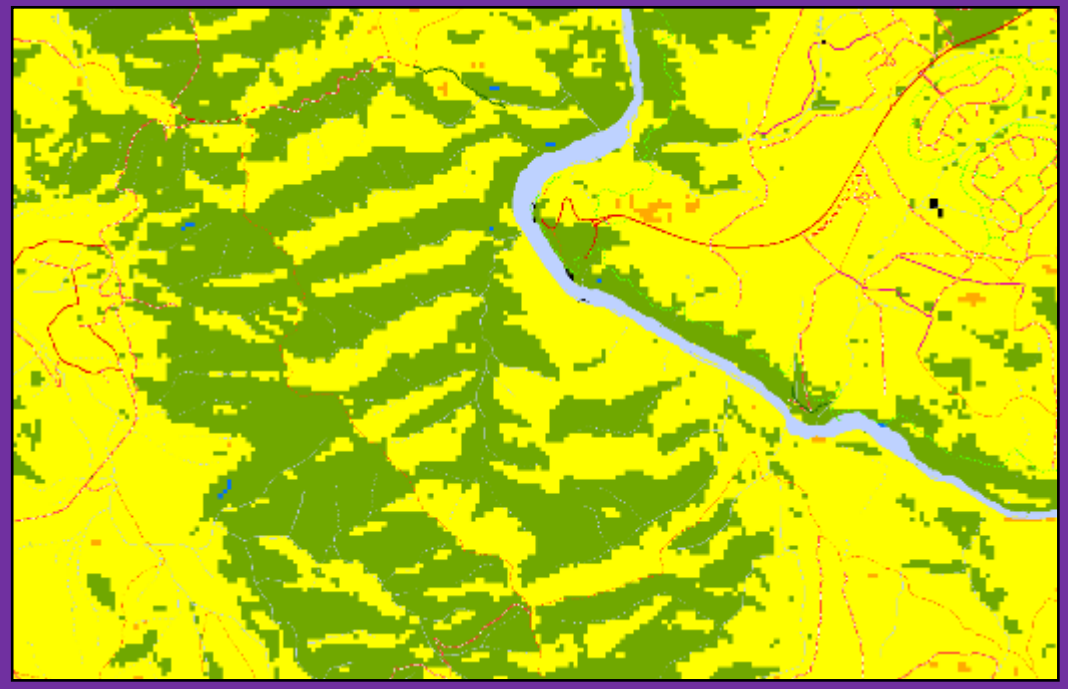


Same spot

Implementation

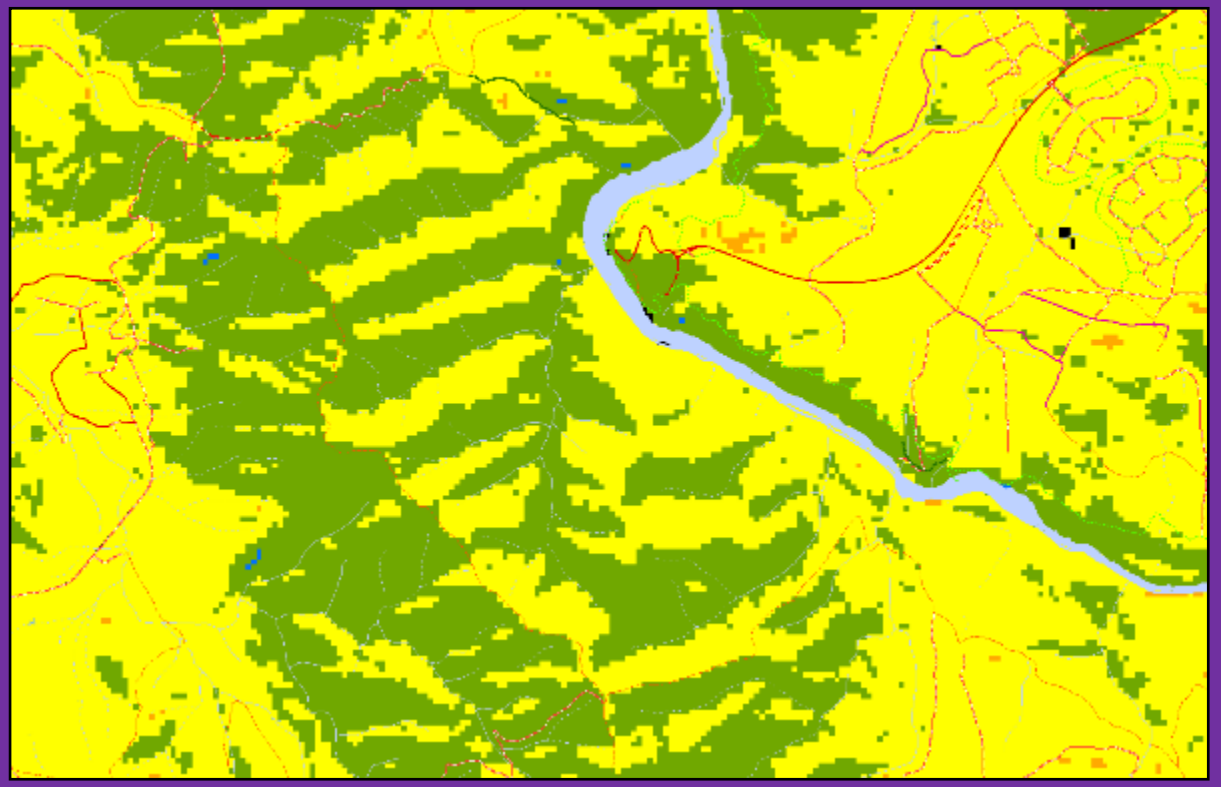


Implementation



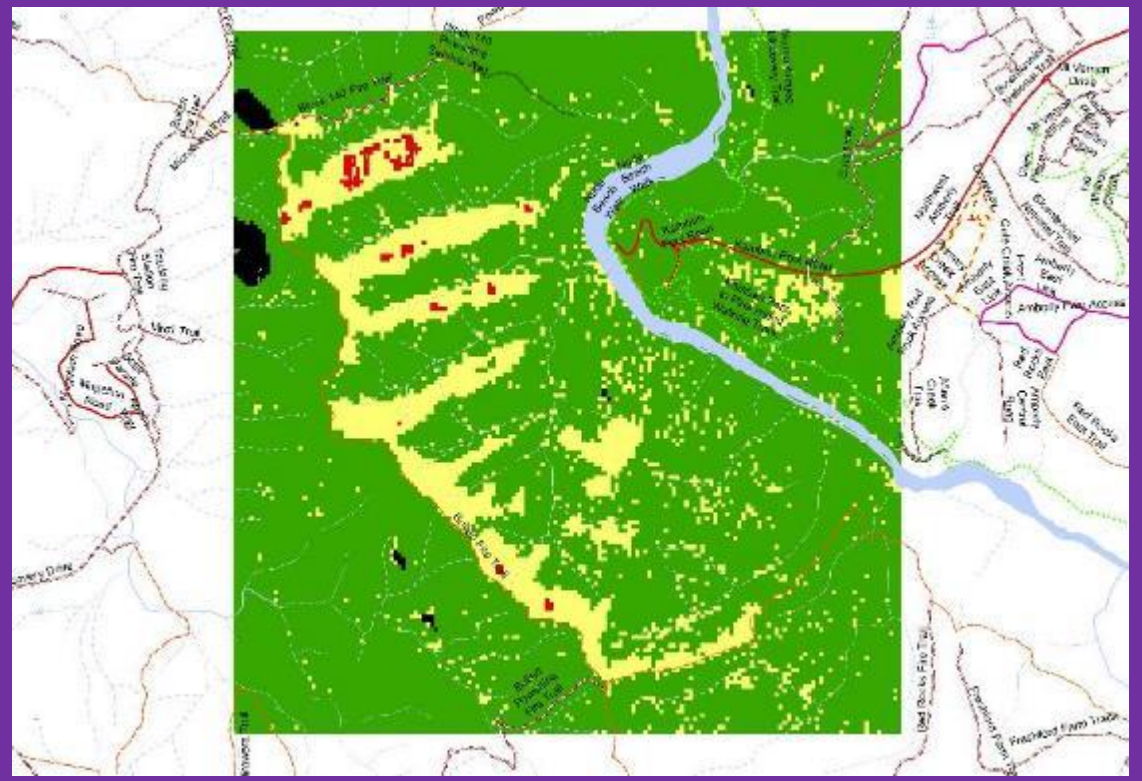
Planning, **Evaluation** and Innovation

Flammability map



Yellow = flammable, green = not flammable

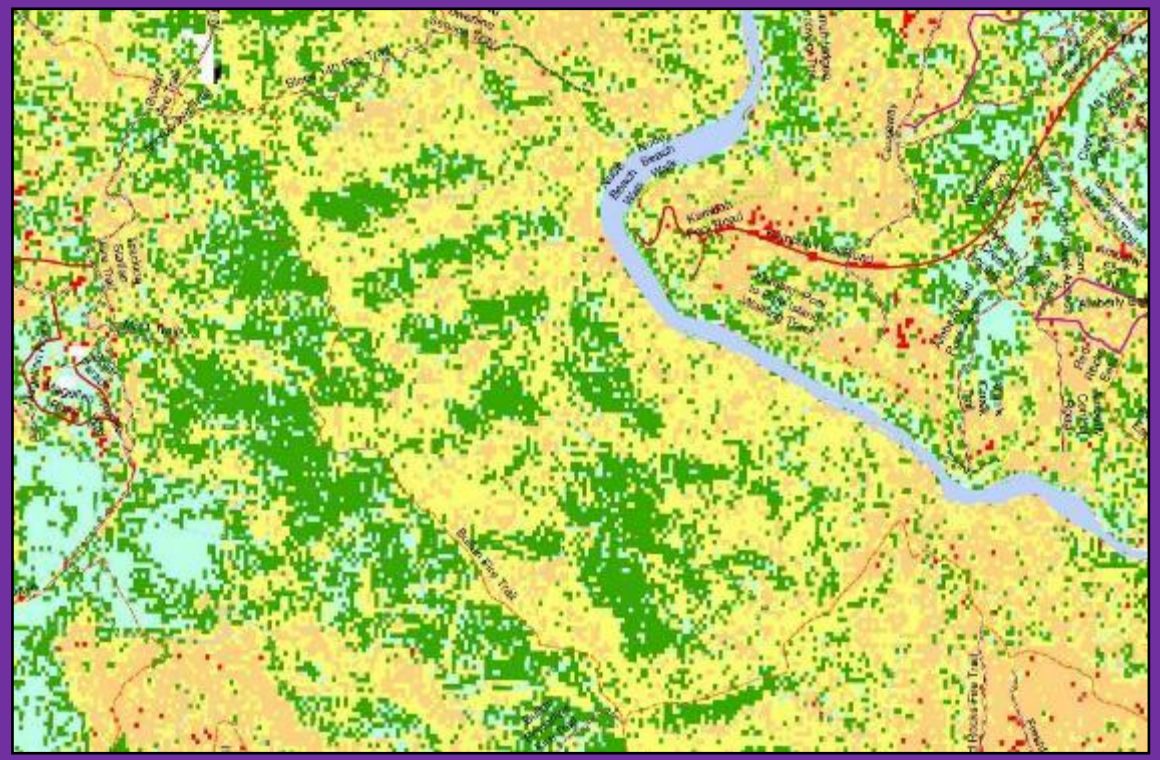
Burn severity map



Green = Unburnt, Yellow = Low severity, Red = High severity

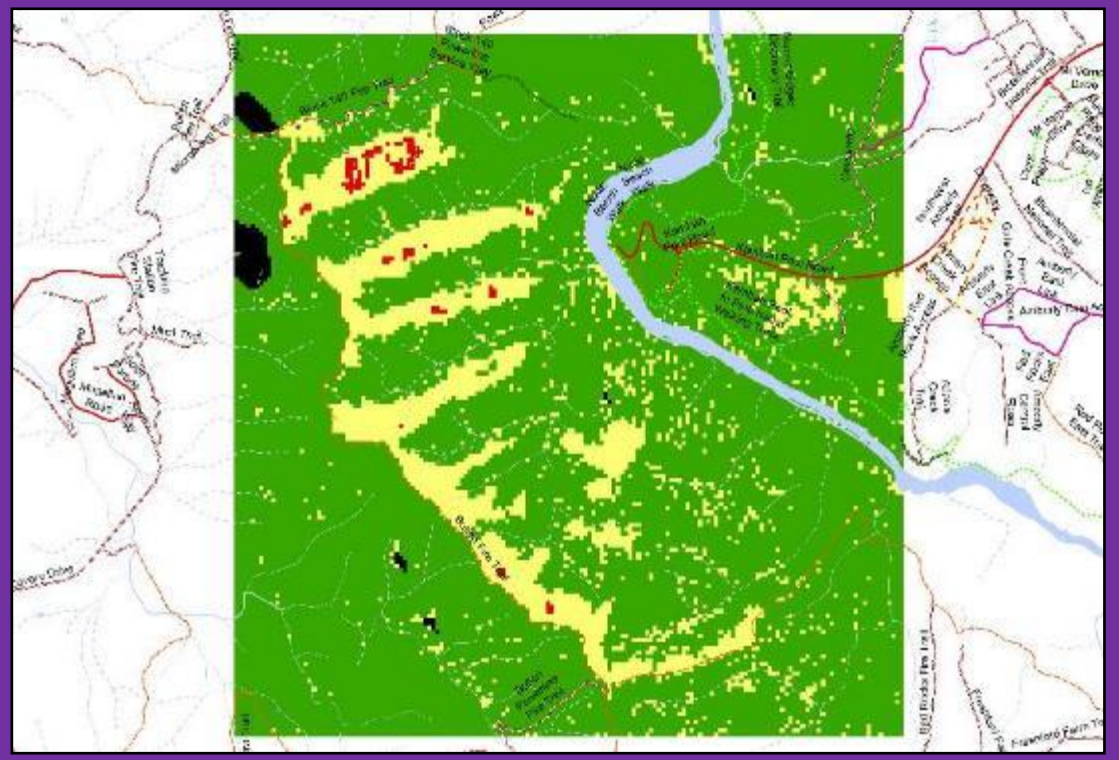
Planning, **Evaluation** and Innovation

Live FMC map



Yellow = Moderate flammability
Green = Less flammable

Burn severity map

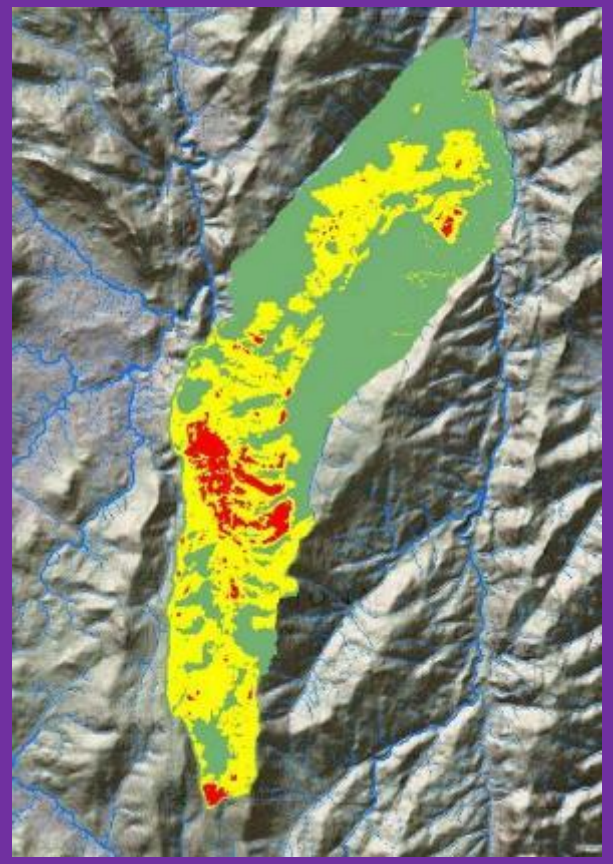


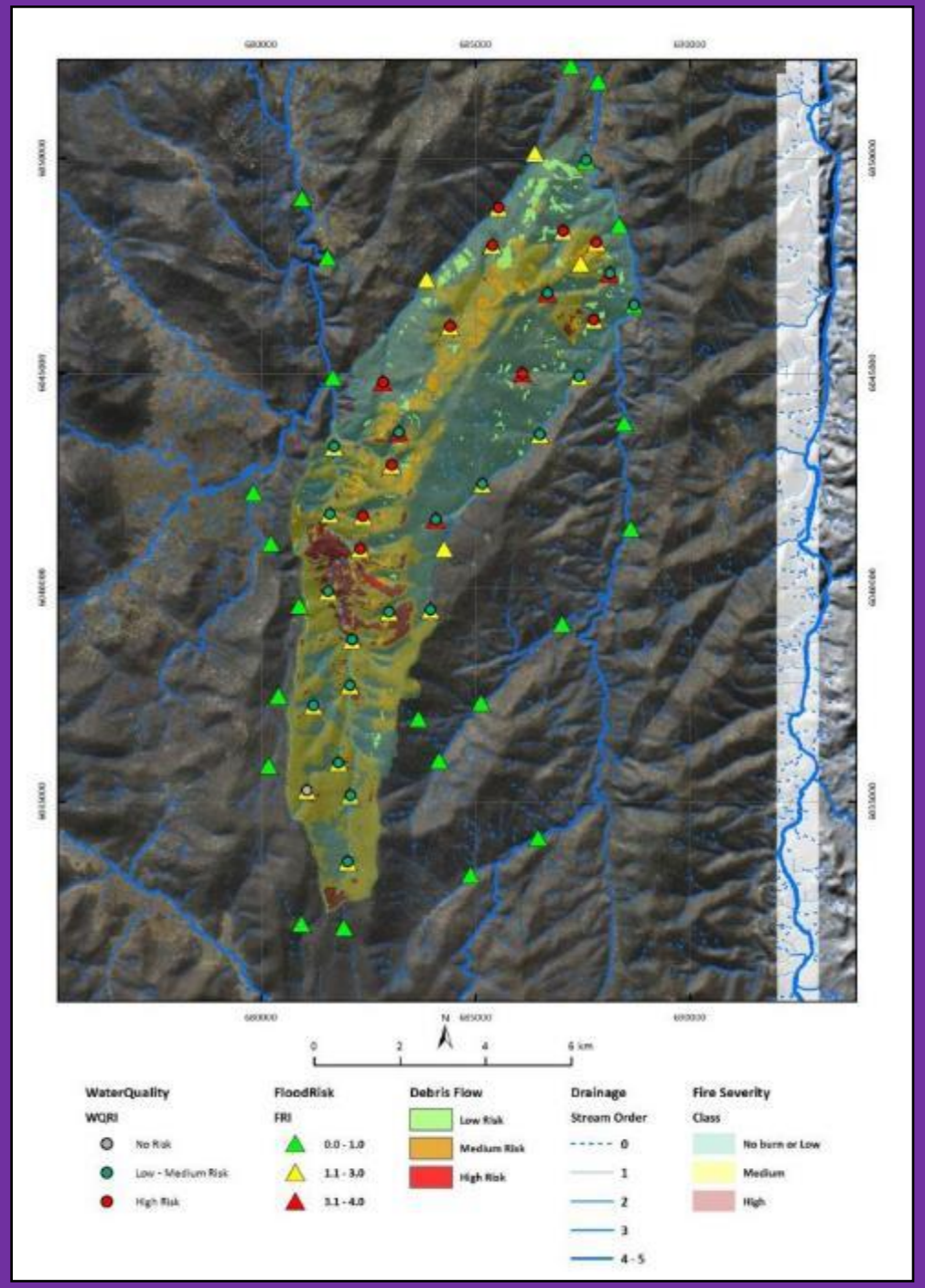
Green = Unburnt, Yellow = Low severity, Red = High severity

Planning, Evaluation and Innovation

Post-fire hydrological risk tools

Debris flow
Water quality
Flood





Planning, Evaluation and Innovation

Empirical model of flammability compiled from burn severity mapping

Use AFMS to trigger burns

Build a dynamic sub-canopy micro-climate model

Fireline intensity?

Improved smoke management / forecasting?

Carbon monitoring

Satellite LiDAR for fuel mapping