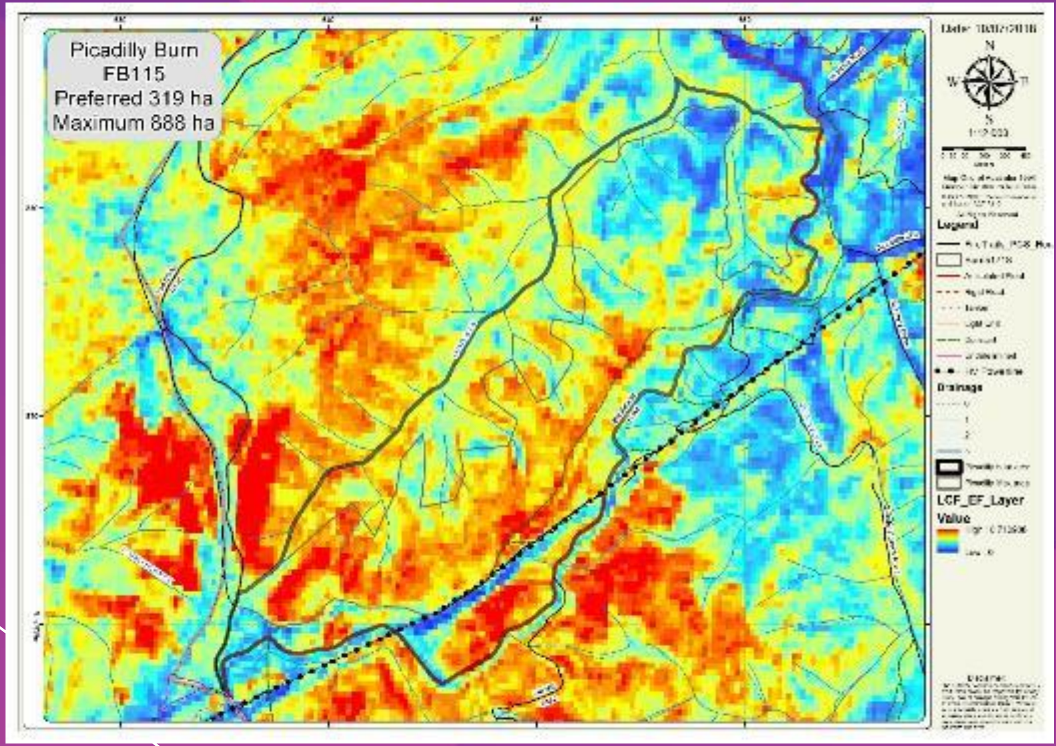
ACT GOVERNMENT

A LiDAR-derived Fuel Map for the ACT



Adam Leavesley, Albert Van Dijk and Marta Yebra

ACT Government

Australian National University

bushfire&natural HAZARDS CRC

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I'M GOING TO TALK ABOUT:

1. Value of LiDAR
2. ACT acquisition
3. Contractor processing
4. Experimental processing
5. Qualitative truthing
6. Next steps

Why invest in LiDAR for fuel mapping?

1. Inadequate knowledge of fuels and fuel condition was implicated in the Margaret River (Keelty, 2012) and Lancefield escapes (Carter *et al*. 2015).

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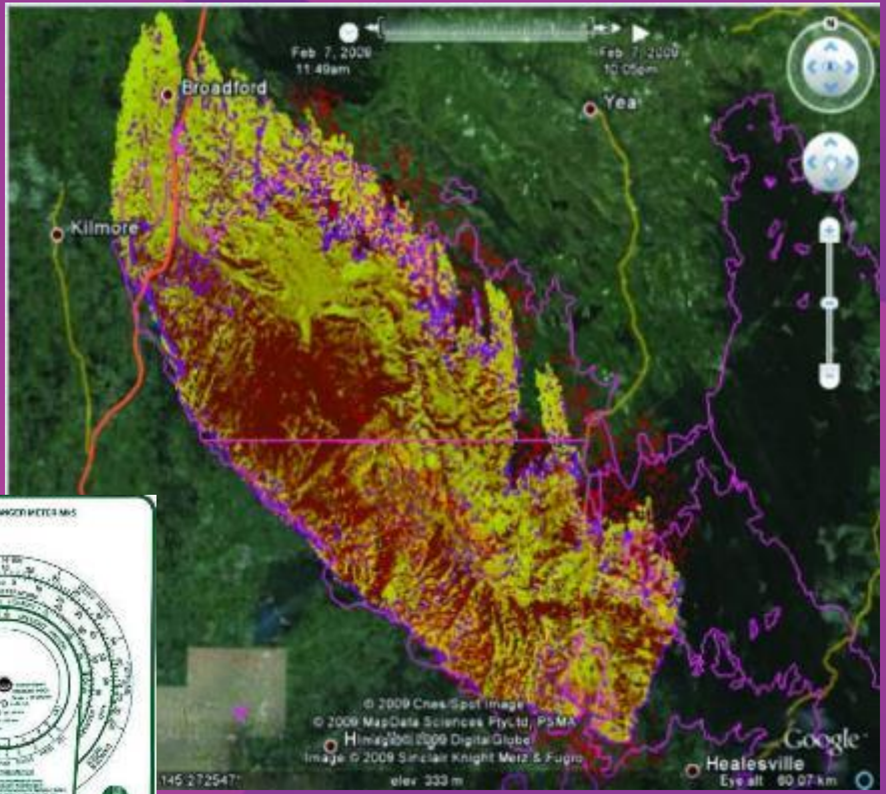
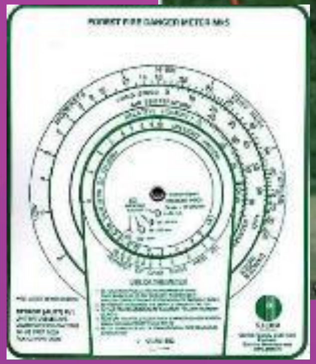
Why invest in LiDAR for fuel mapping?

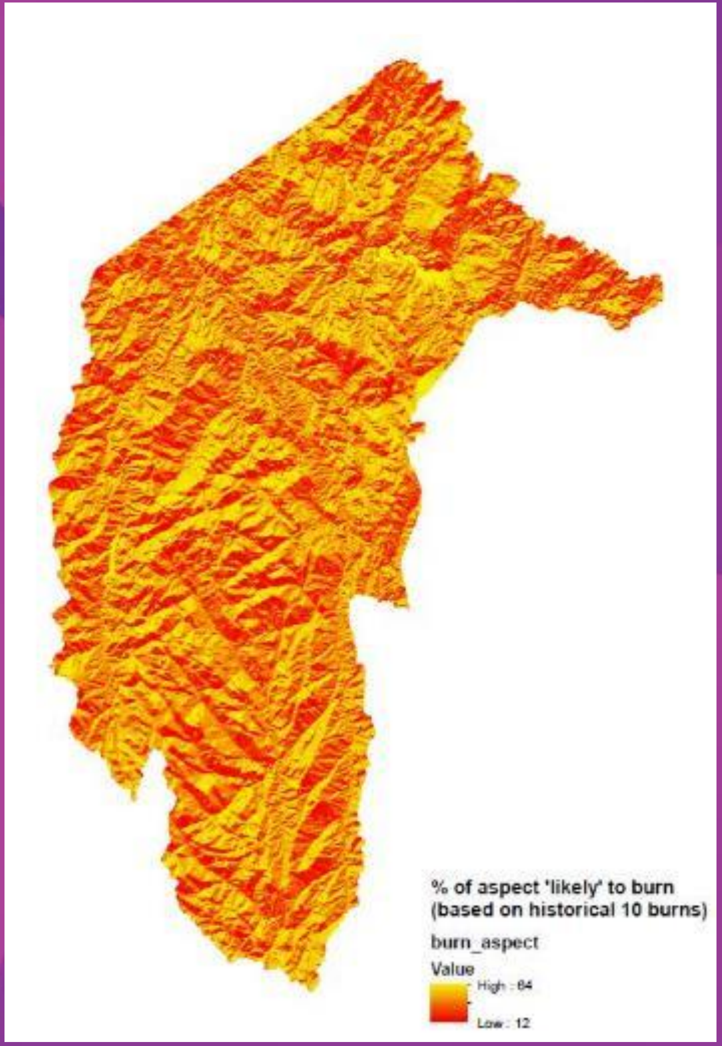
2. Spatially-explicit knowledge of the variation in the distribution of fuels may reduce some of the unpredictability of wildfire behaviour.





Why invest in LiDAR for fuel mapping?

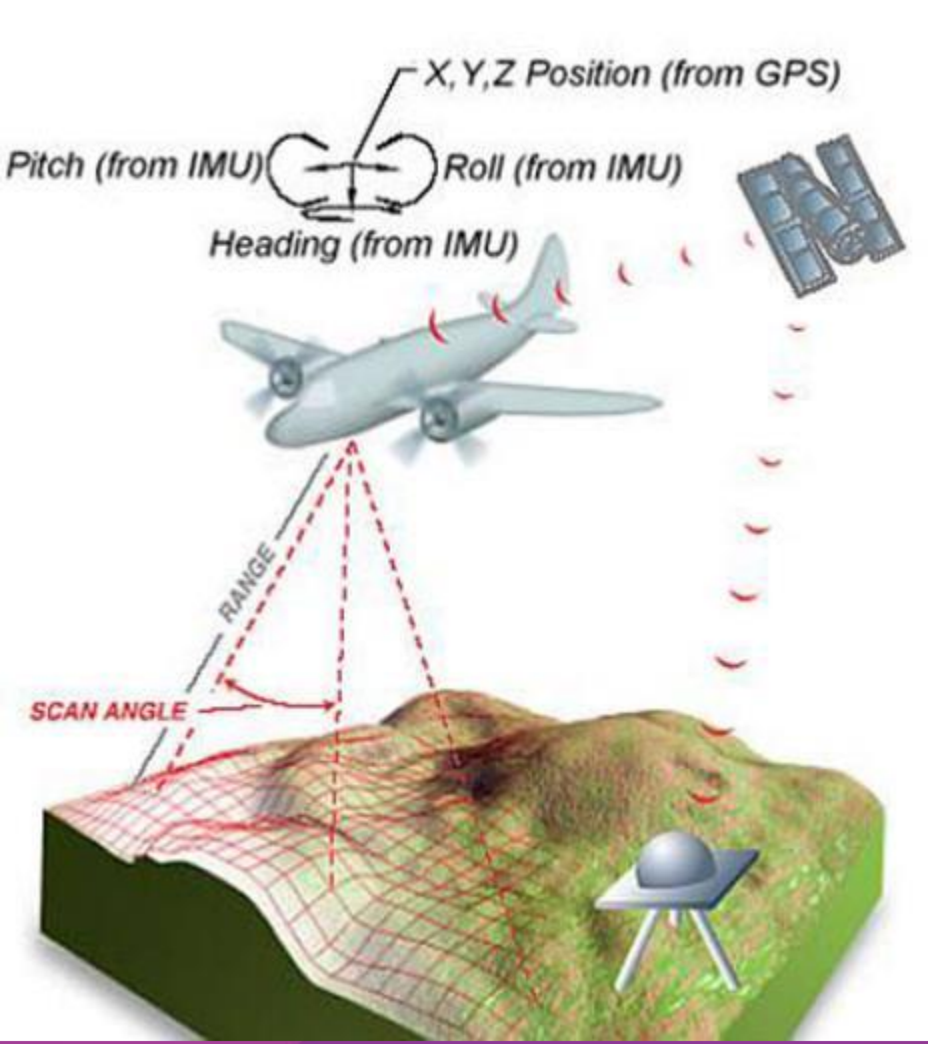
3. LiDAR-derived vegetation models can be combined with DEMs to estimate solar radiation and flammability of surface fuels (Nyman et al. 2018).



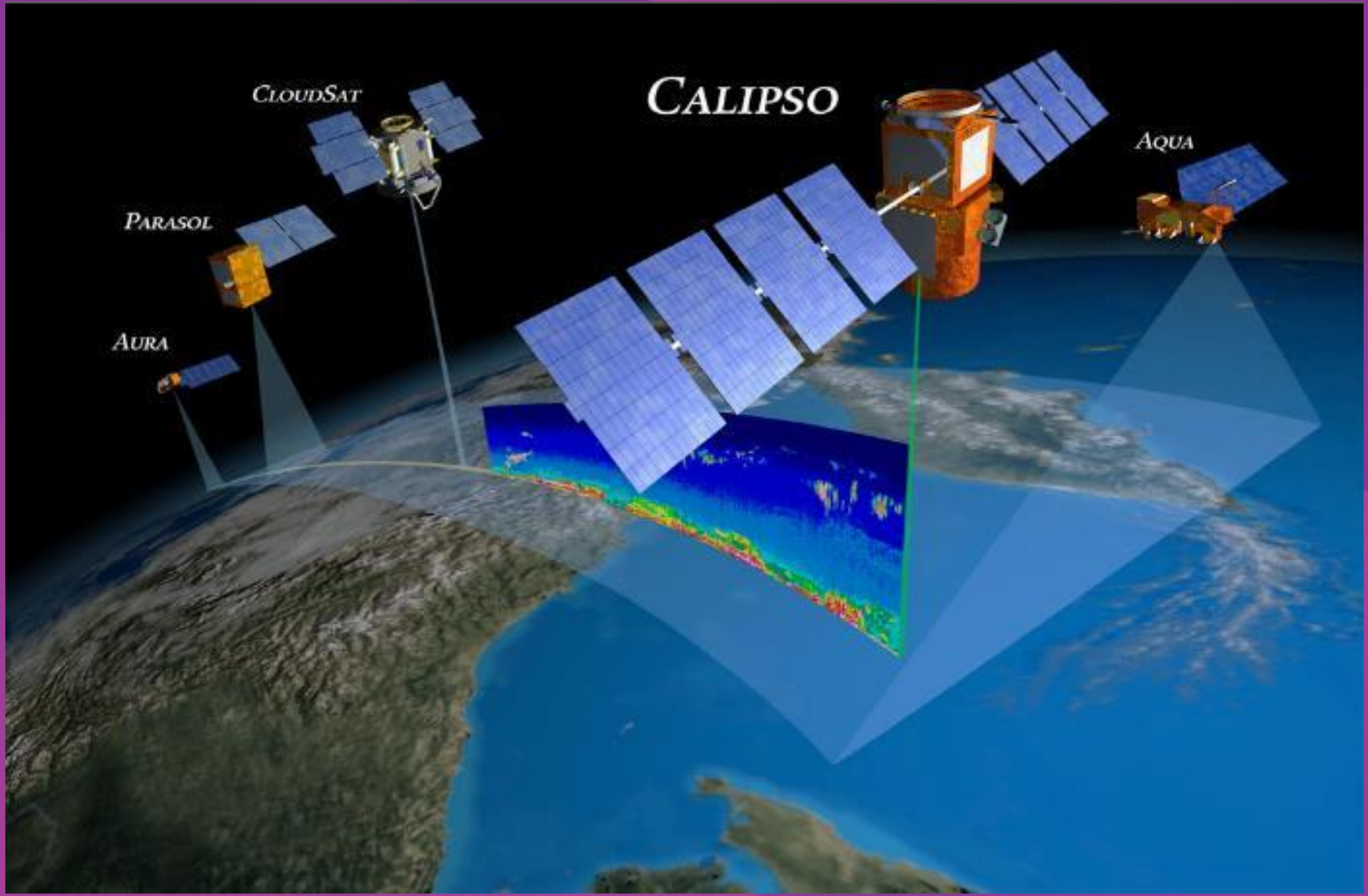
What is LiDAR?

LiDAR:
Light Detection and Ranging

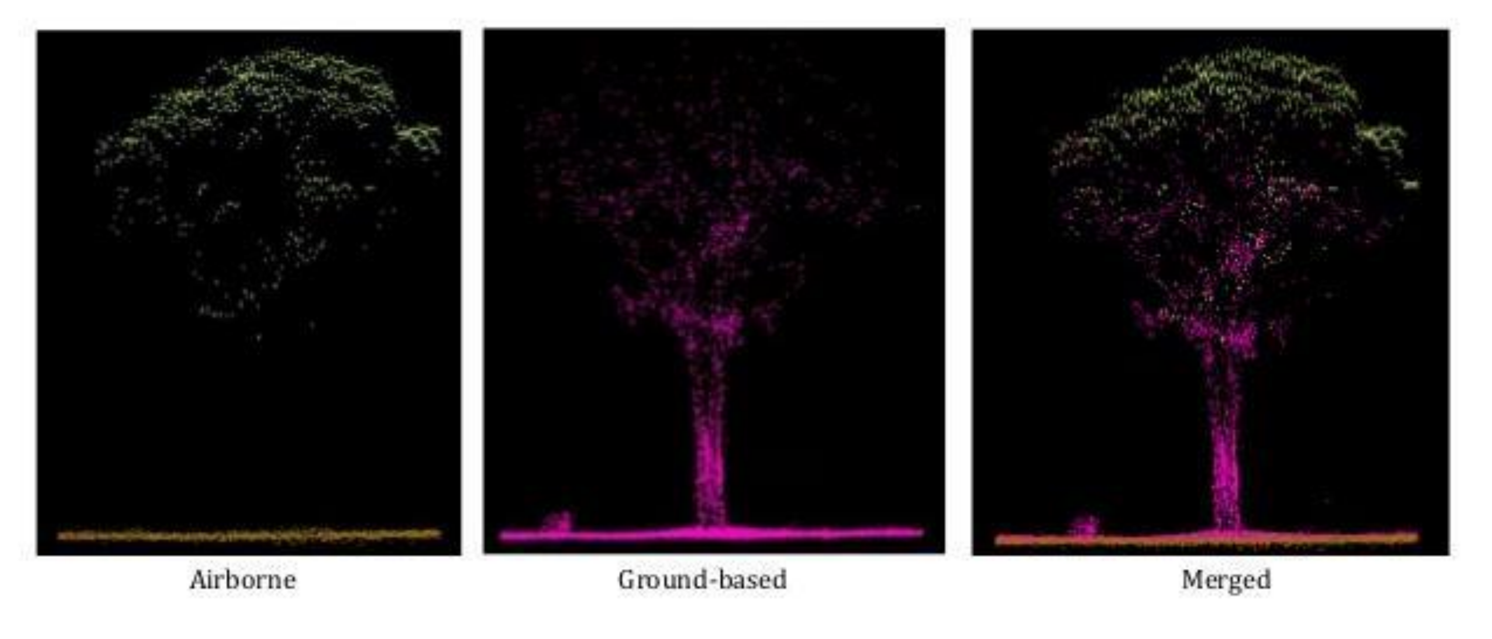
LiDAR is a remote sensing method that uses light in the form of a pulsed laser to measure distances to the Earth.

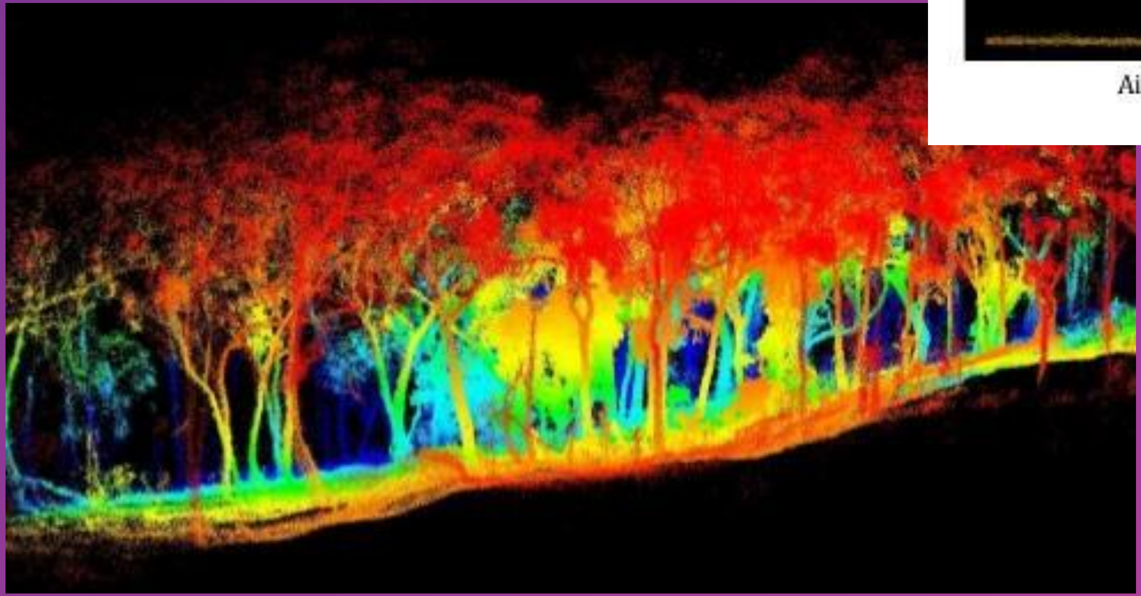


What is LiDAR?



What is LiDAR?



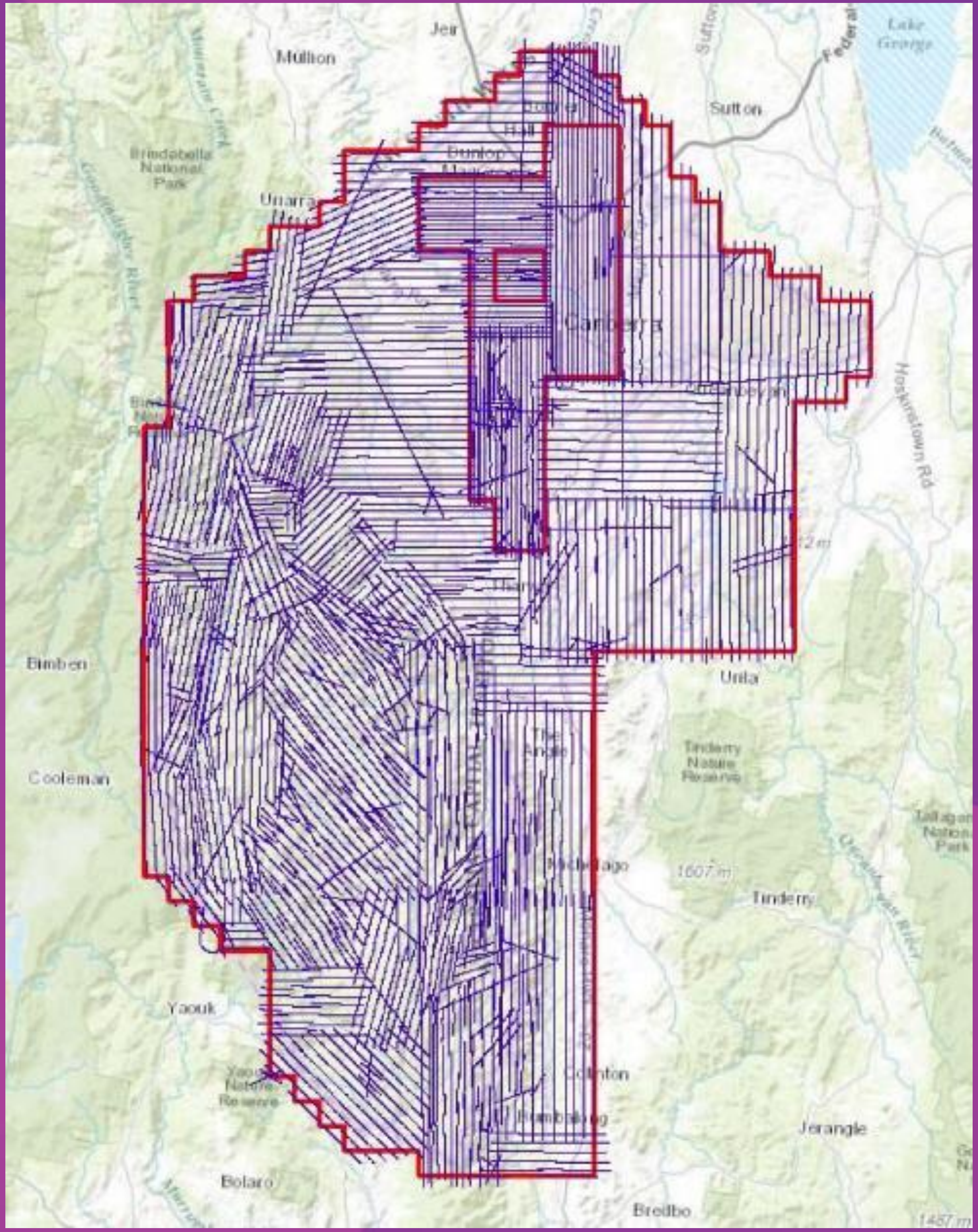


(Marselis, 2014)

Acquisition in the ACT

Area: 3272km^2
Date: 18 May – 29 July 2015
Pulse density:
Urban = 8ppm
Rural = 4ppm
Average pulse density = 7.9ppm
Vertical accuracy = 0.20m
Cost = $250,000

(RFS Mapping, 2016)



Flight trajectories

Acquisition in the ACT

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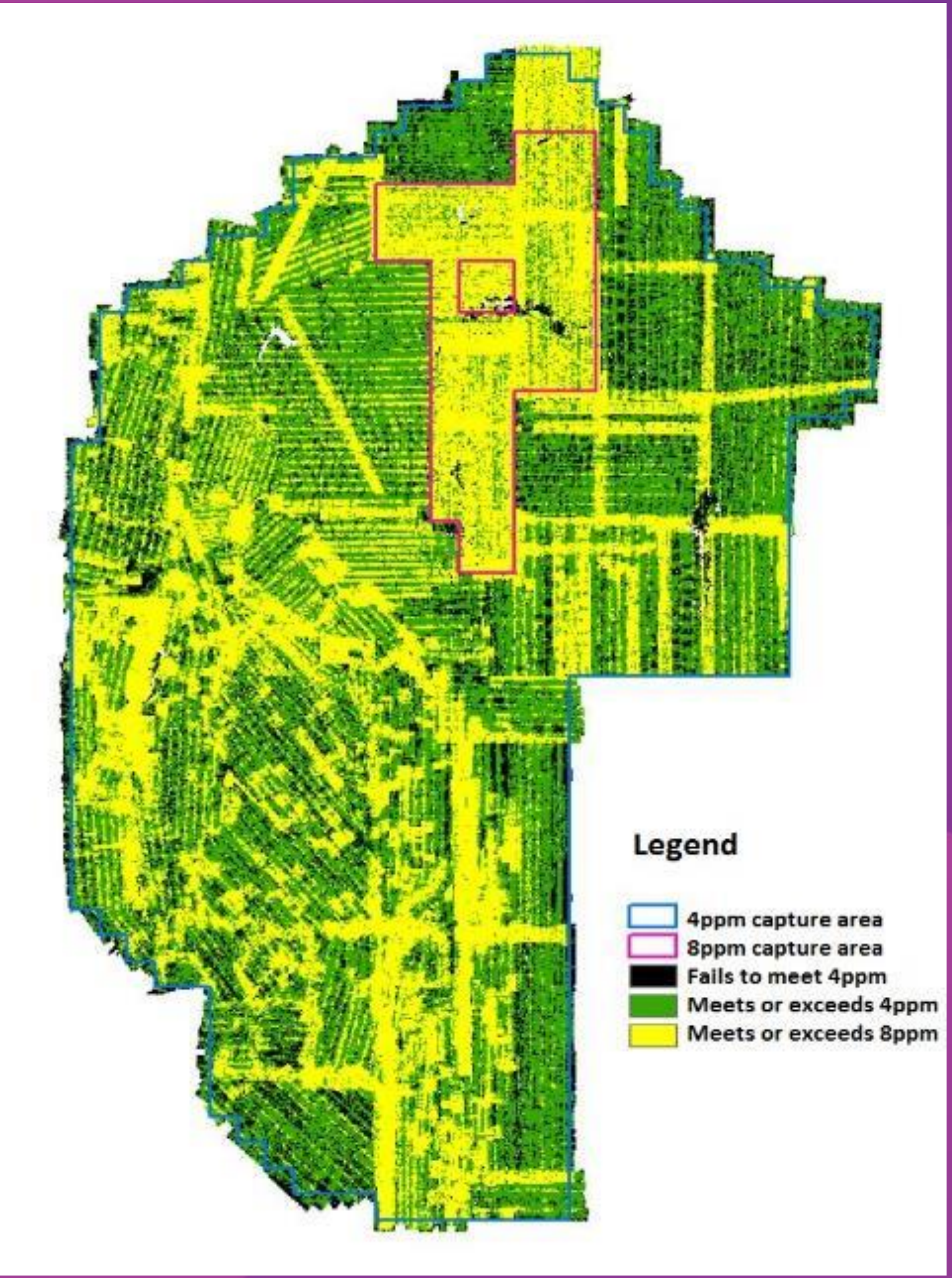
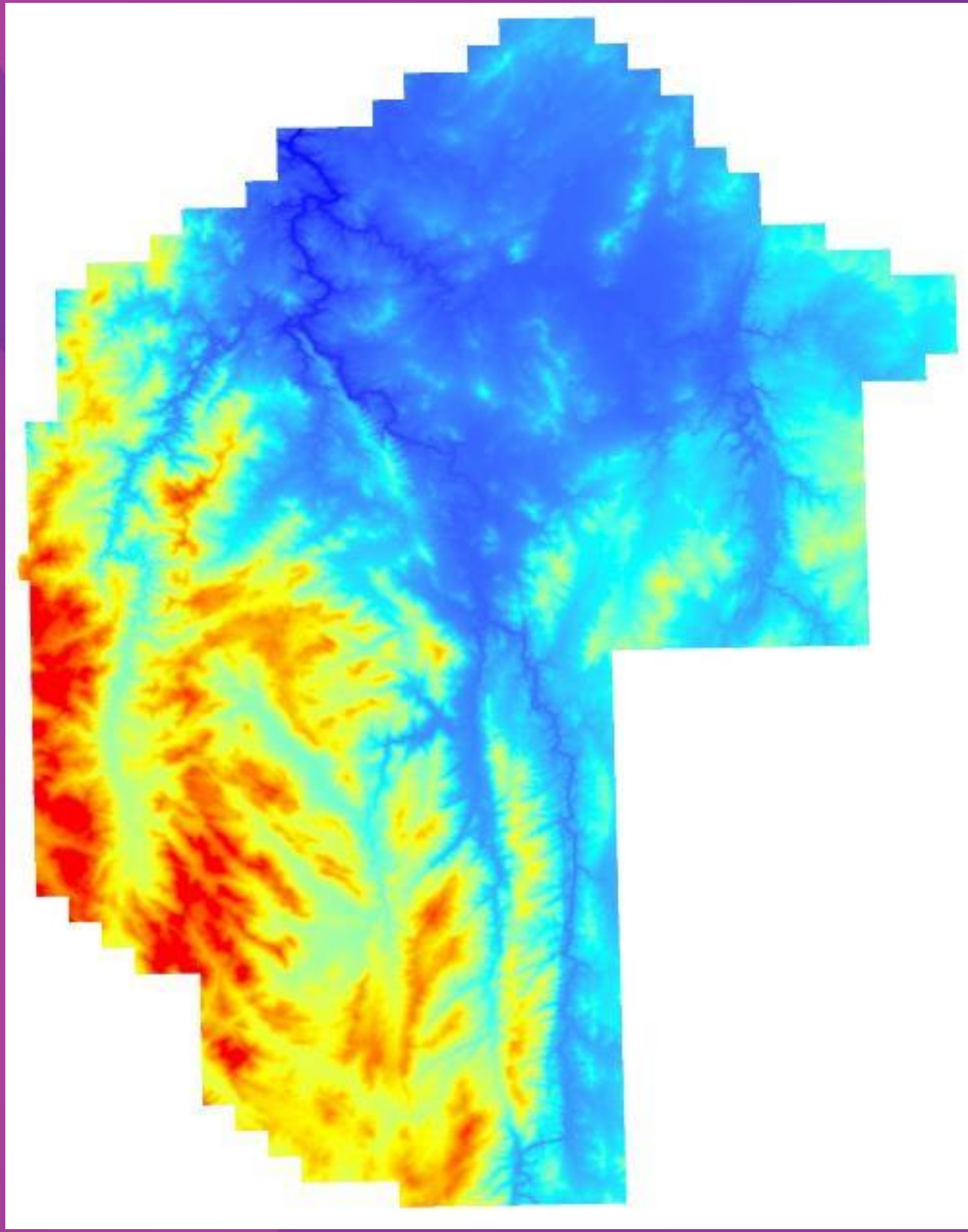


Pulse density

Contractor processing

Ground classification (ICSM Level 3)
Low vegetation (Level 1)
Medium vegetation (Level 1)
High vegetation (Level 1)
Buildings (Level 3)
Water (Level 1)

ICSM = Intergovernmental Committee on Surveying and Mapping



LiDAR-derived DEM

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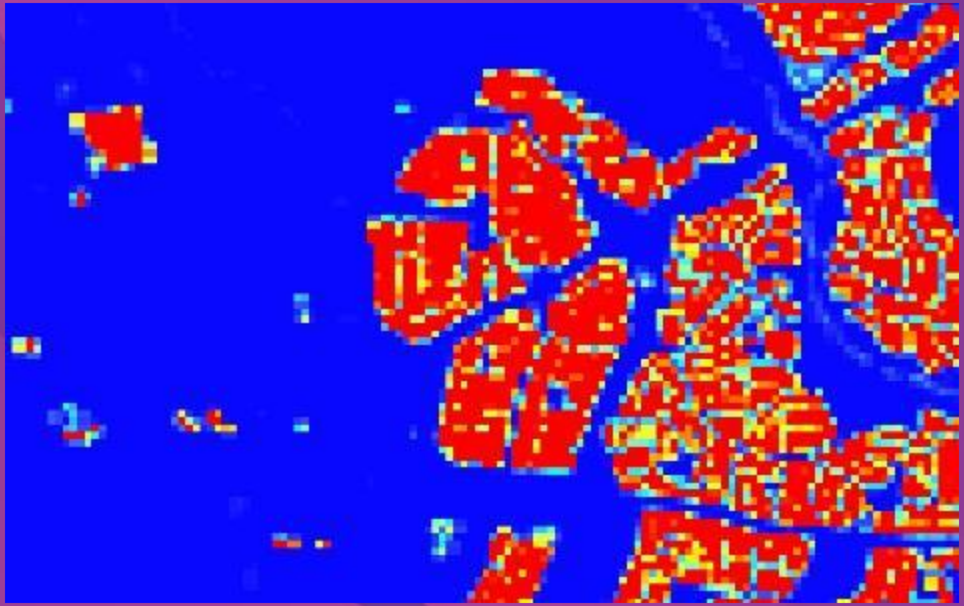
Contractor processing

ICSM = Intergovernmental Panel on Surveying and Mapping

Level 0 = Unclassified
Level 1 = Automated
Level 2 = Ground improved
Level 3 = Ground corrected
Level 4 = Detailed correction

Applied to Bushfire Attack Levels (Lhuede et al. 2017)



Fraction Building Footprint

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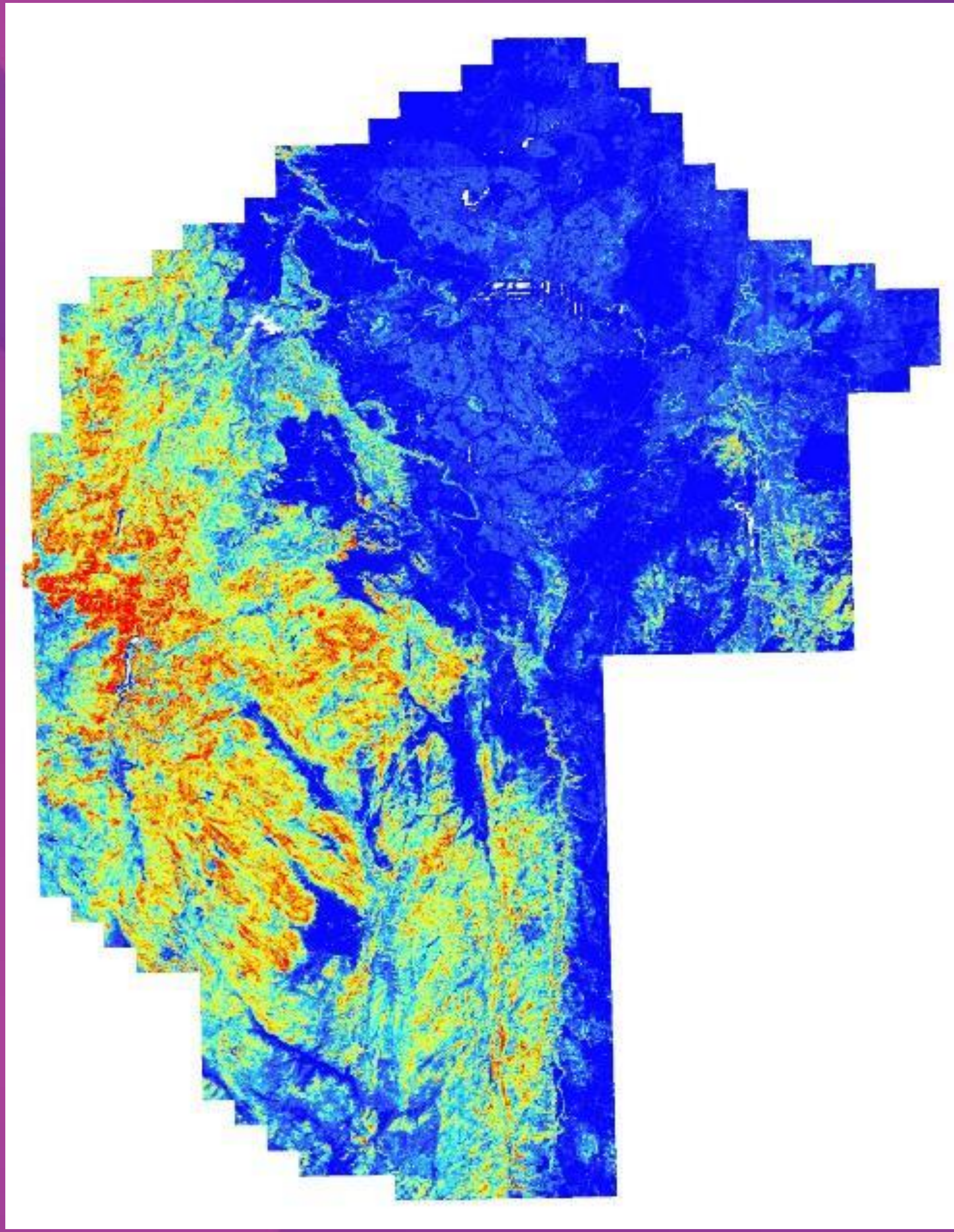
TERN-ANU Processing

AIMS:

1. Develop easily-derived experimental products for land managers.
2. Develop prototype processes and specifications.

OFHA and Project Vesta inputs

(Van Dijk, 2017; Hines et al. 2010; Gould et al. 2007)



LiDAR-derived estimate of Elevated Fuel

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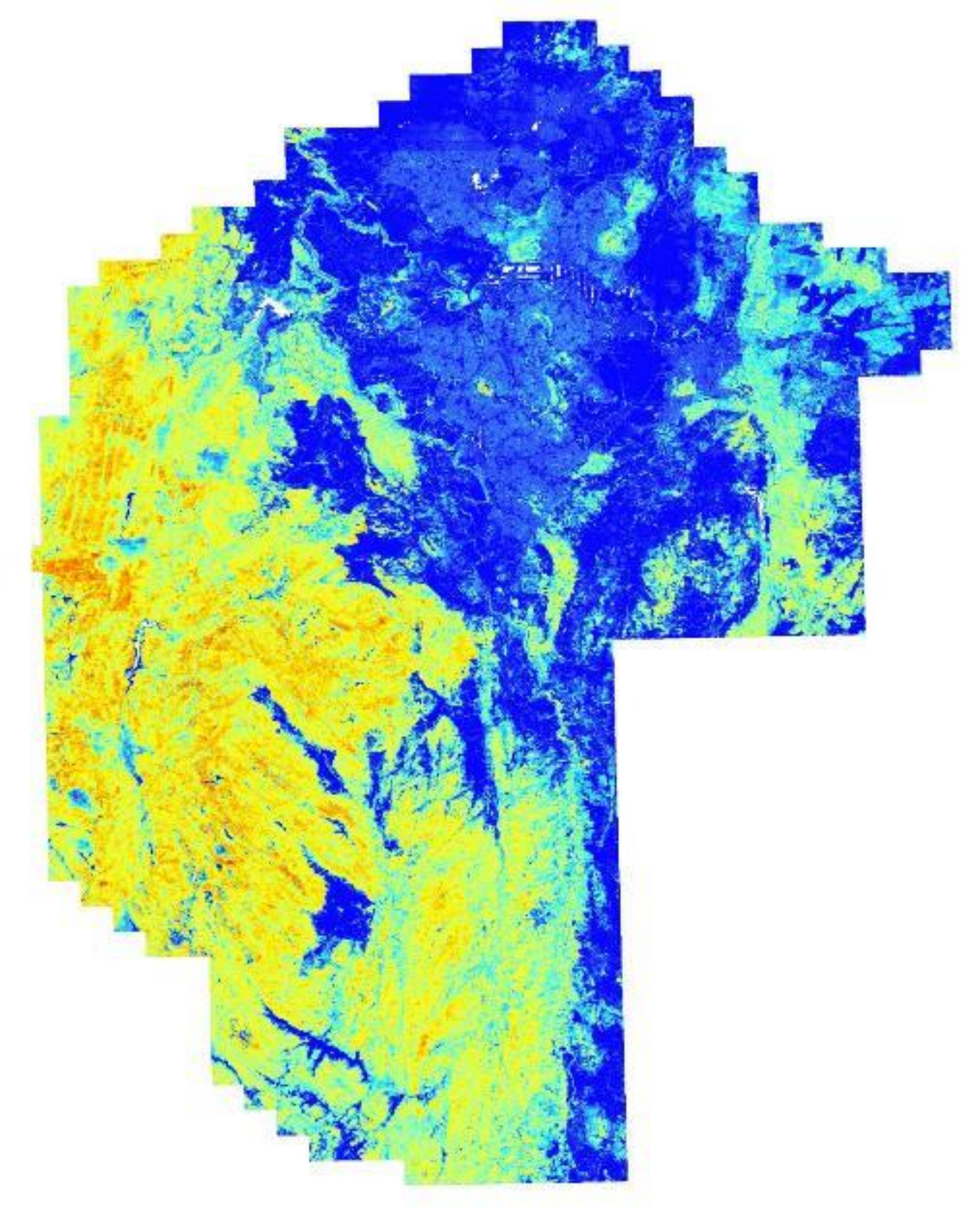
TERN-ANU Processing

Bushfire layers

- Canopy: top and base height
- Elevated fuel – LCF
- Near-surface fuel – LCF
- Overstorey – LCF
- Understorey – LCF

LCF = leaf cover fraction

(Van Dijk, 2017; Hines et al. 2010; Gould et al. 2007)



LiDAR-derived estimate of Near-surface Fuel

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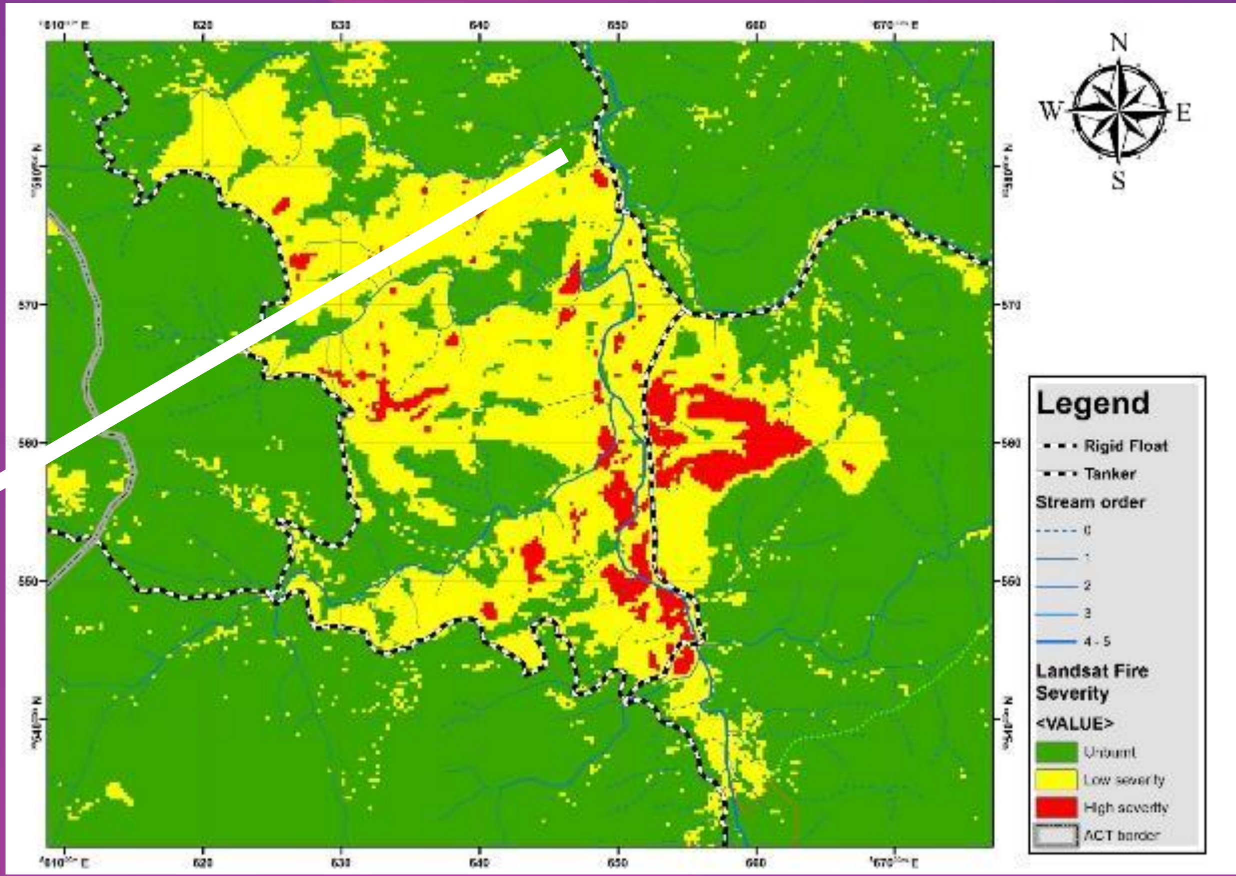
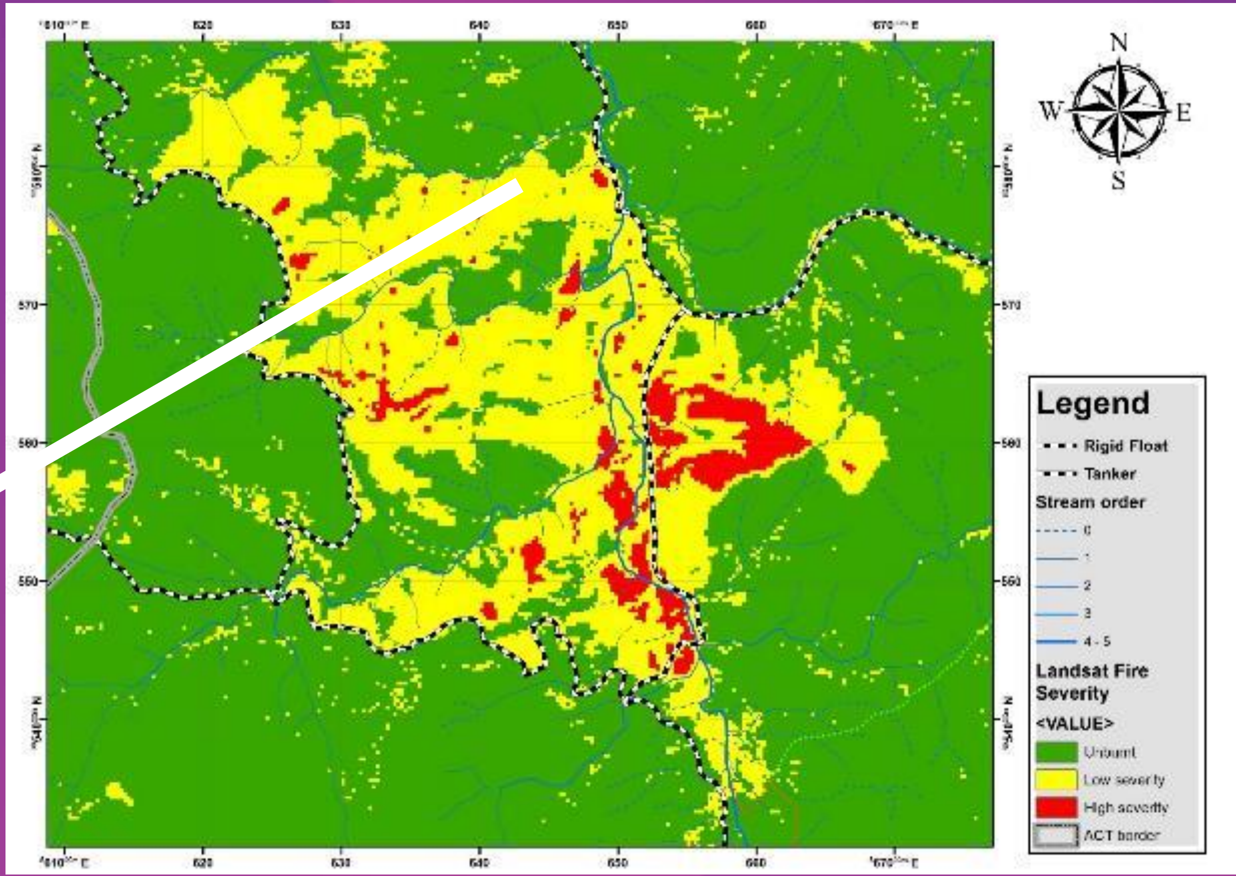
Qualitative truthing



Fire severity analysis of the Cotter River Burn, April 2015

(Leavesley et al. 2015)

Qualitative truthing



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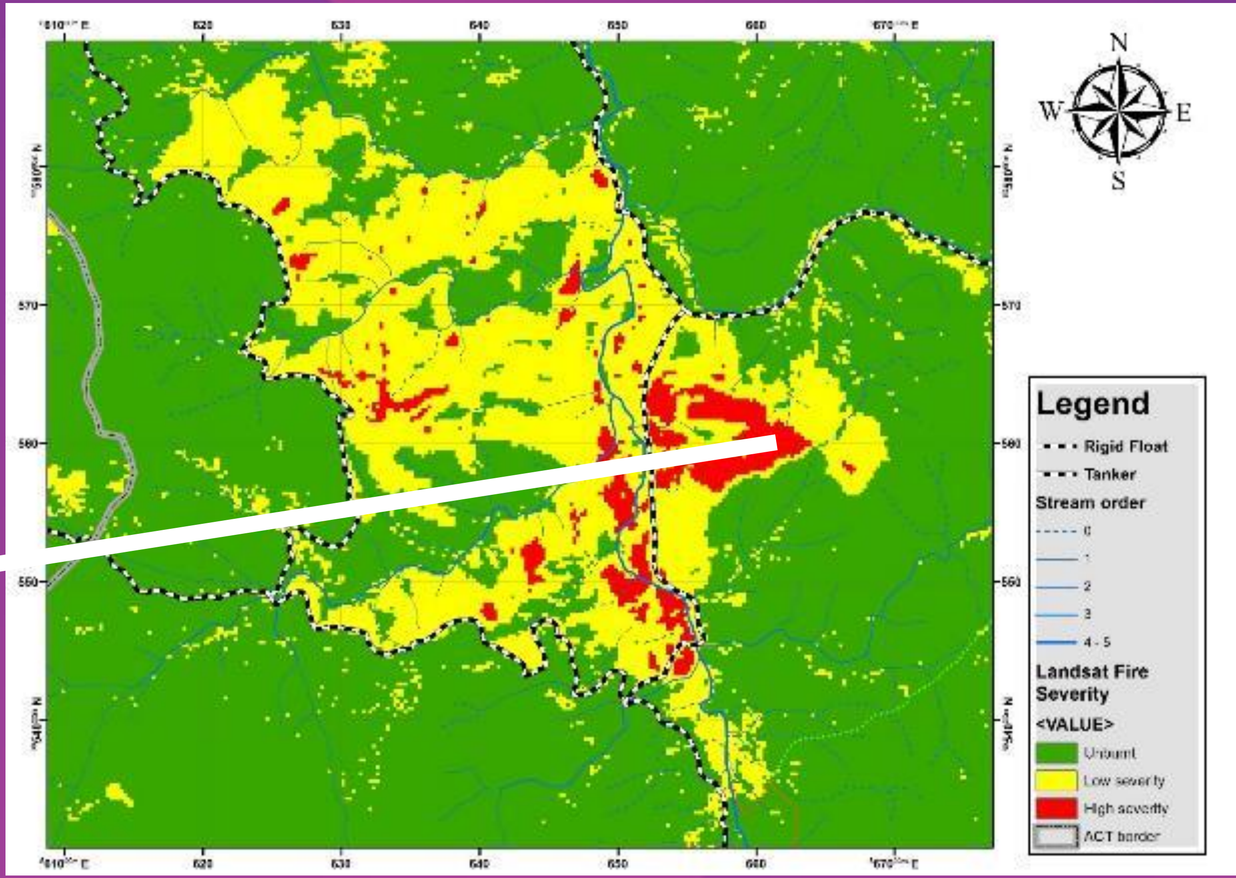

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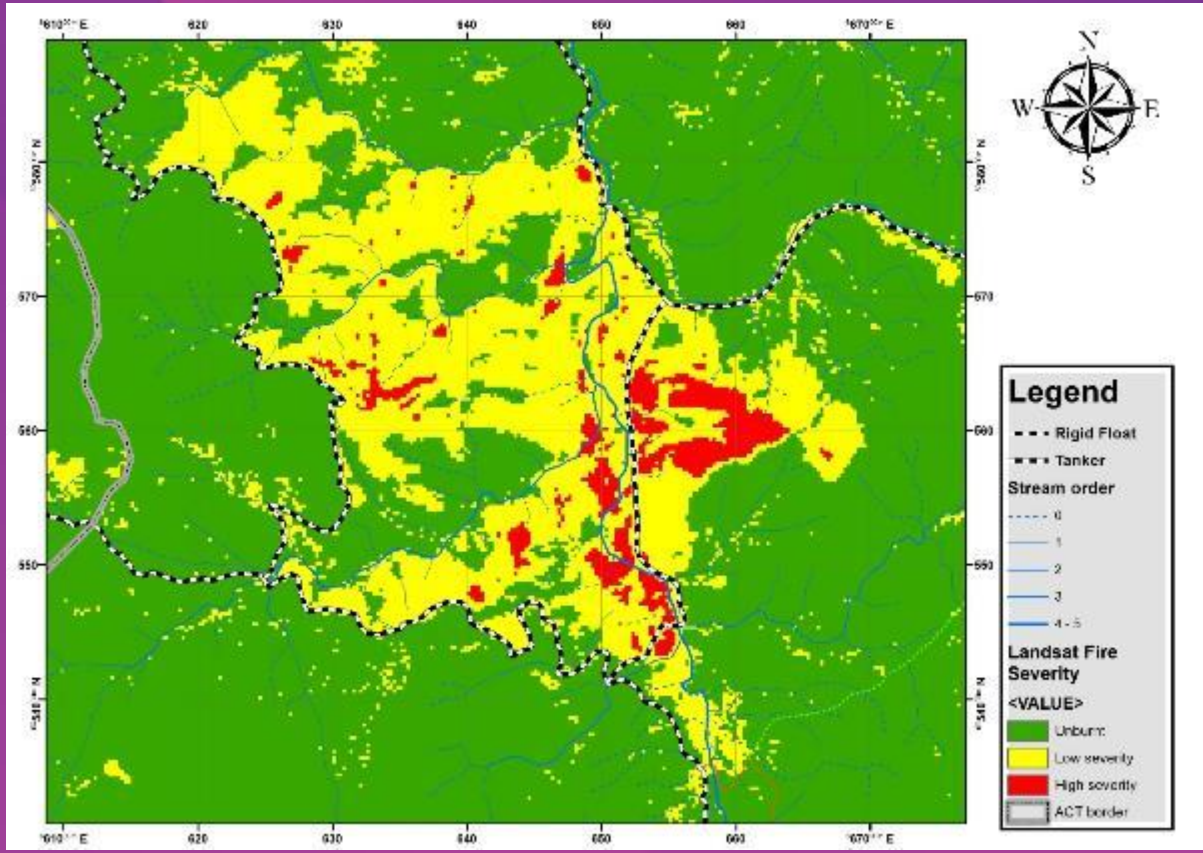
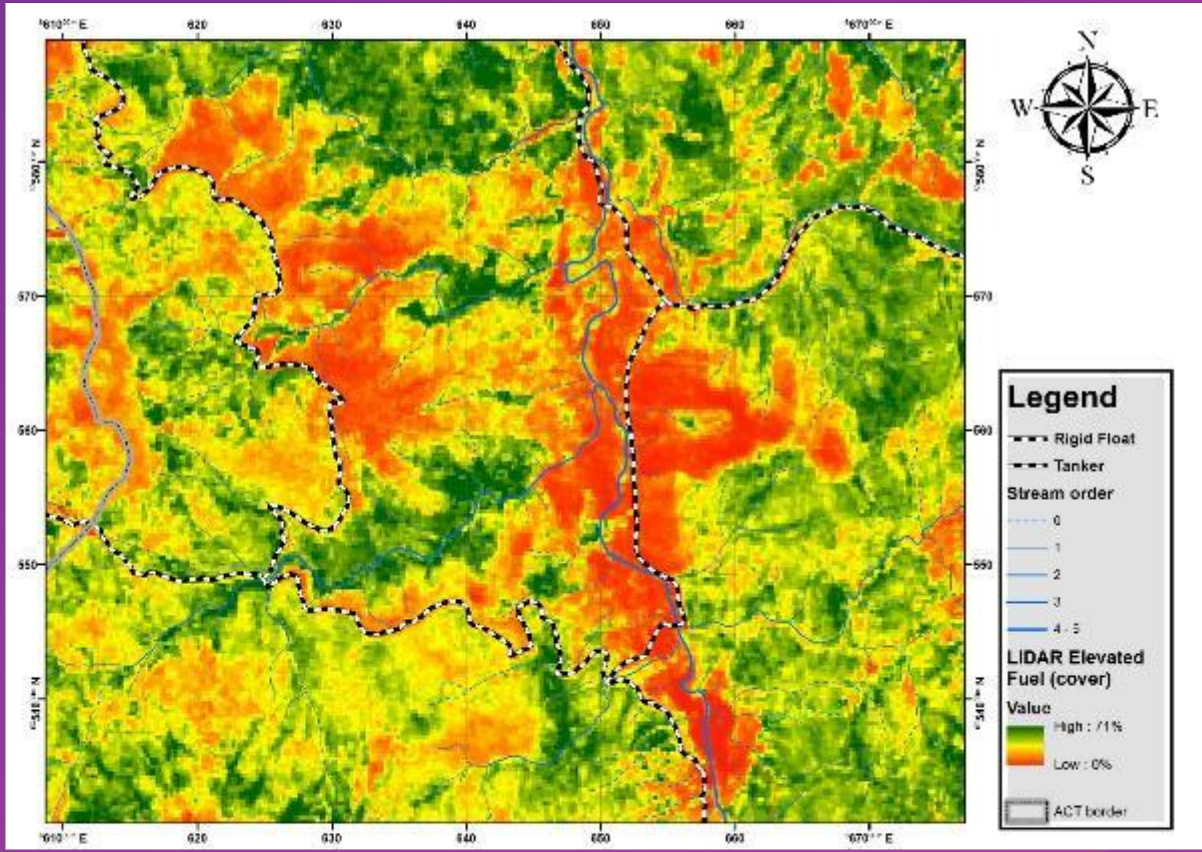
Qualitative truthing



Fire severity analysis, April 2015



LiDAR-derived Elevated Fuel, May-June 2015

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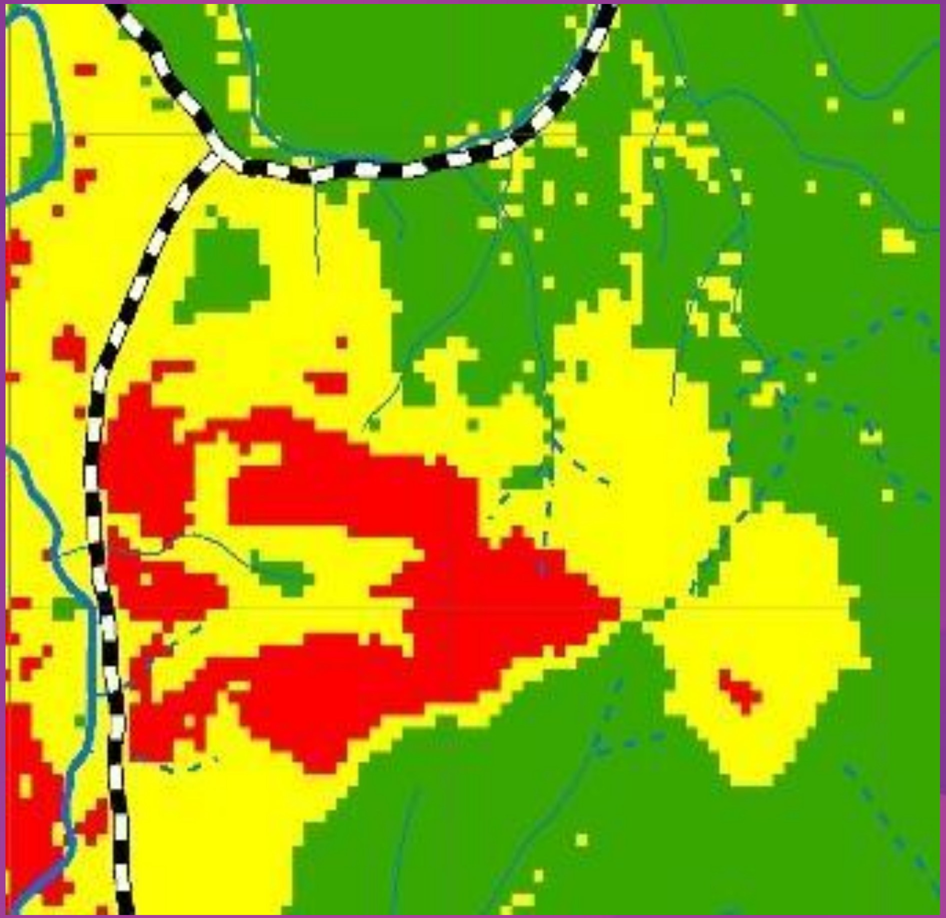
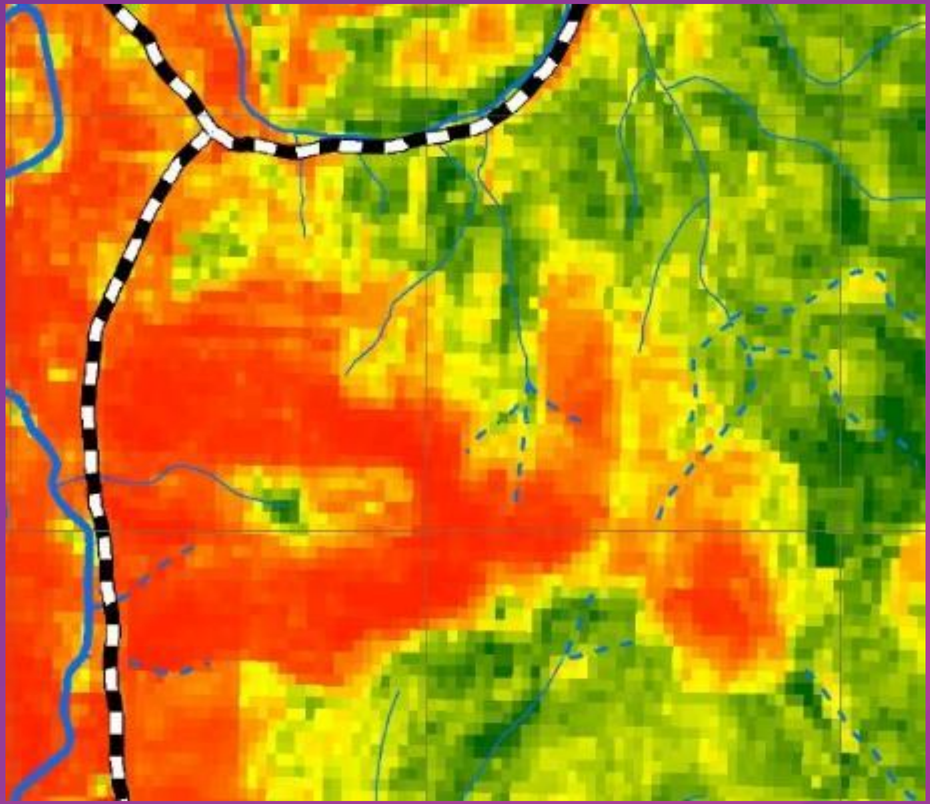
Qualitative truthing



Fire severity analysis, April 2015



LiDAR-derived Elevated Fuel, May-June 2015

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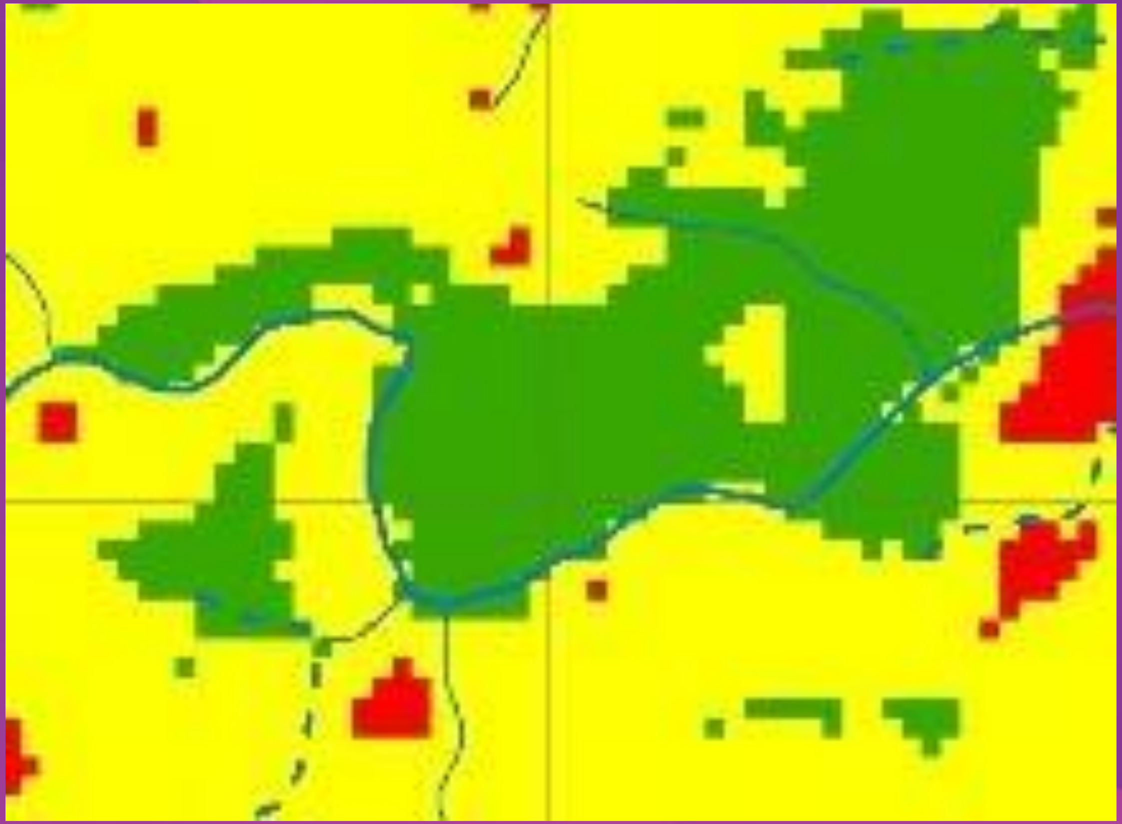
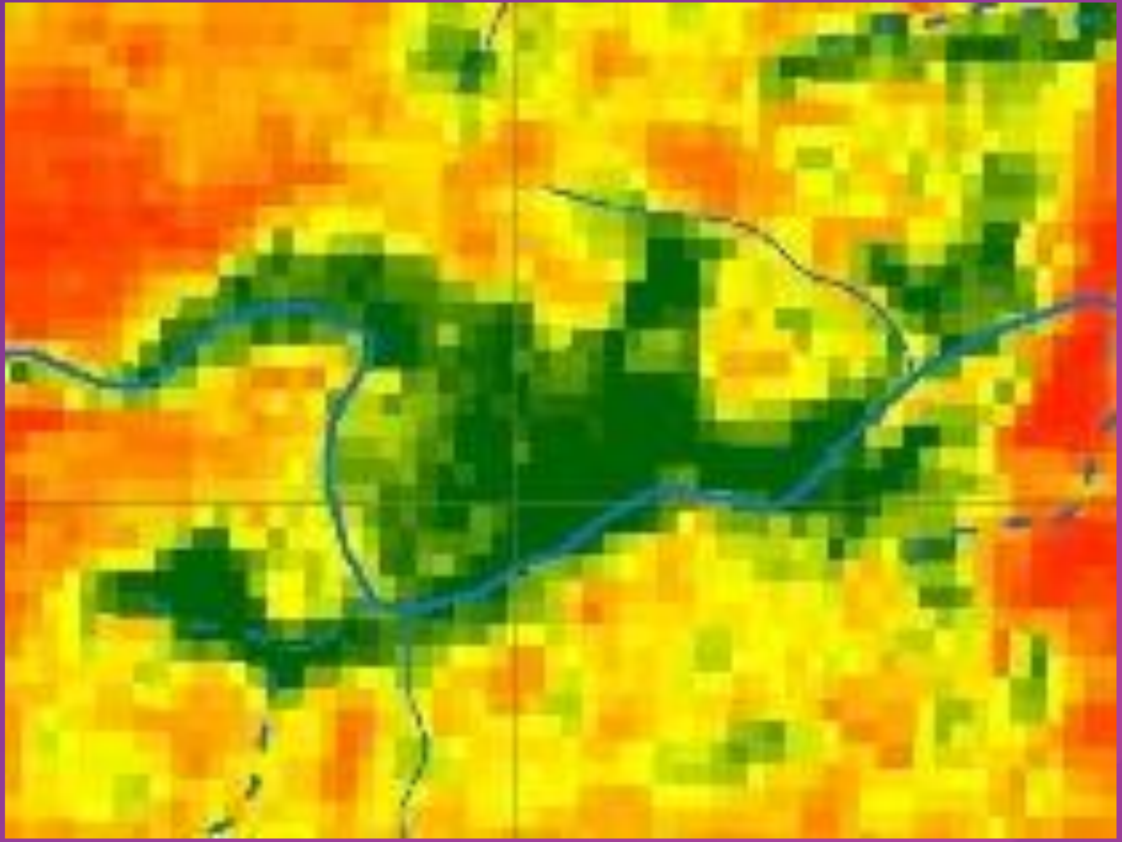


Fire severity analysis, April 2015



LiDAR-derived Elevated Fuel, May-June 2015

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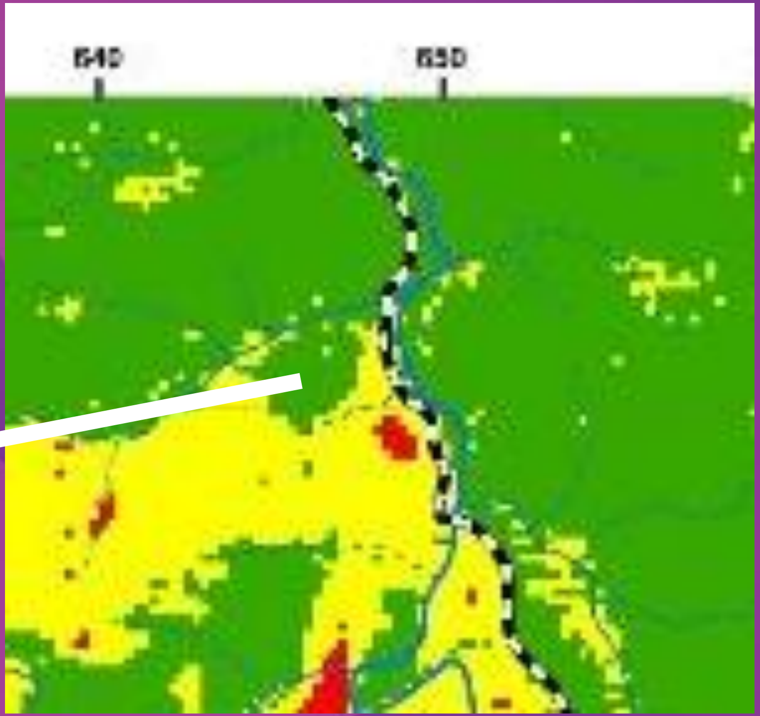
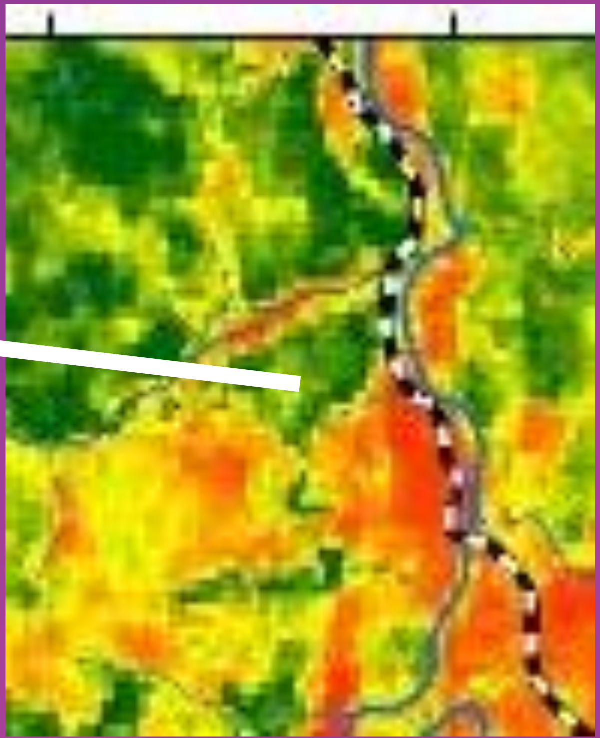
Qualitative truthing



Fire severity analysis of the Cotter River Burn, April 2015



LiDAR-Derived fuel map, May-June 2015

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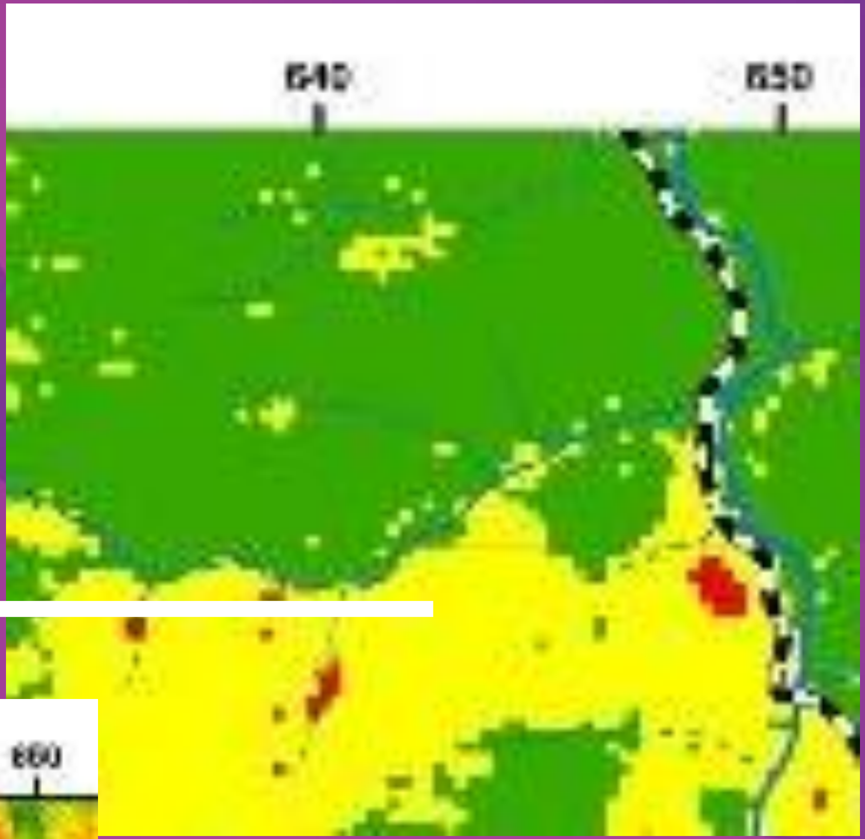
Qualitative truthing



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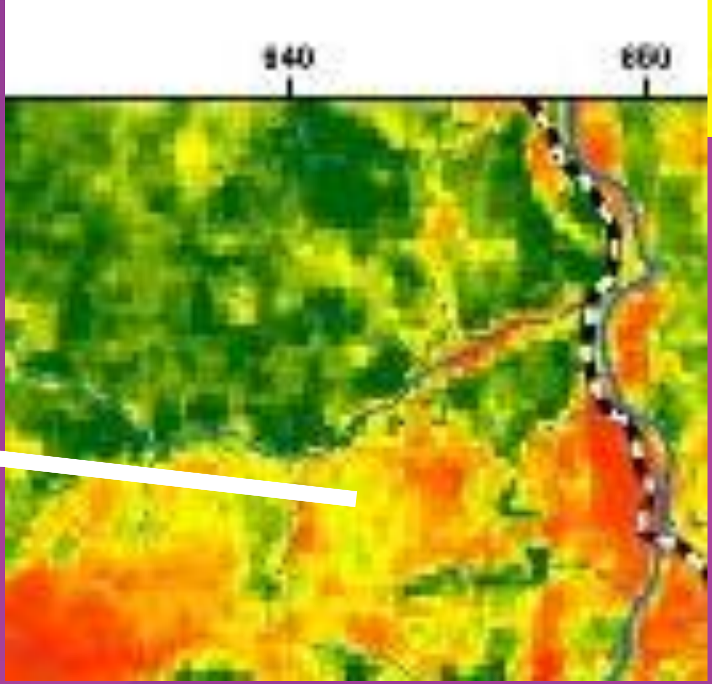

LiDAR-derived fuel map , May-June 2015

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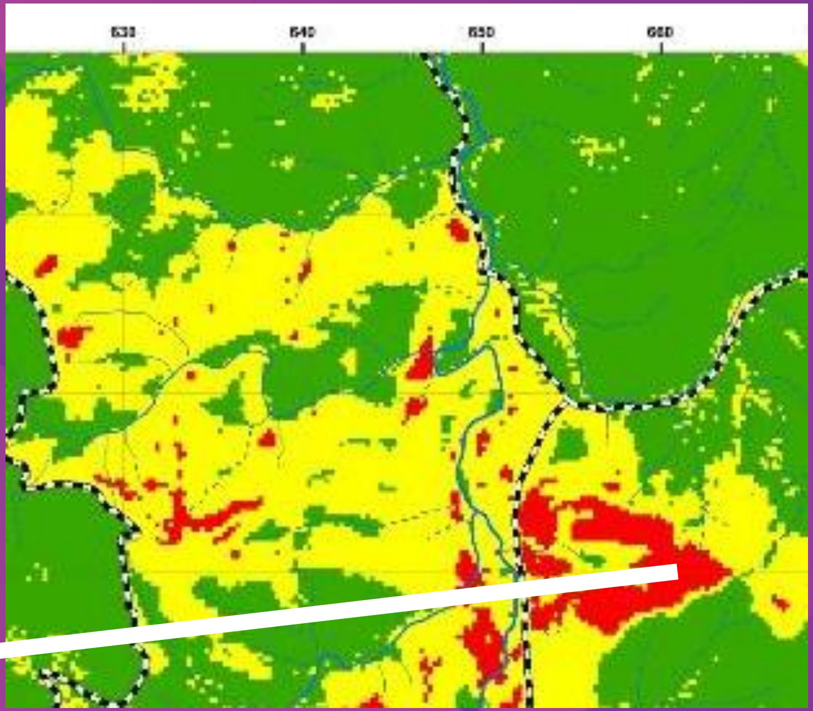
Qualitative truthing



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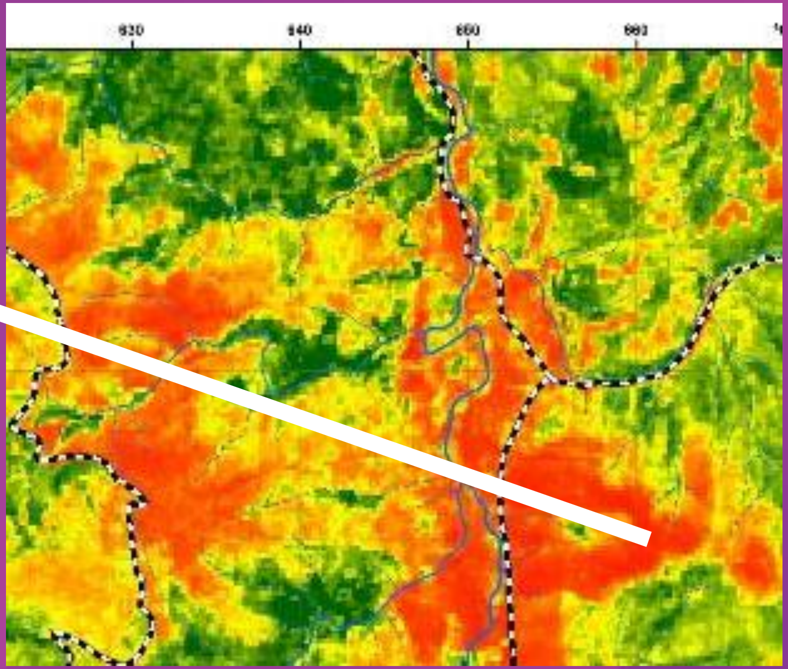
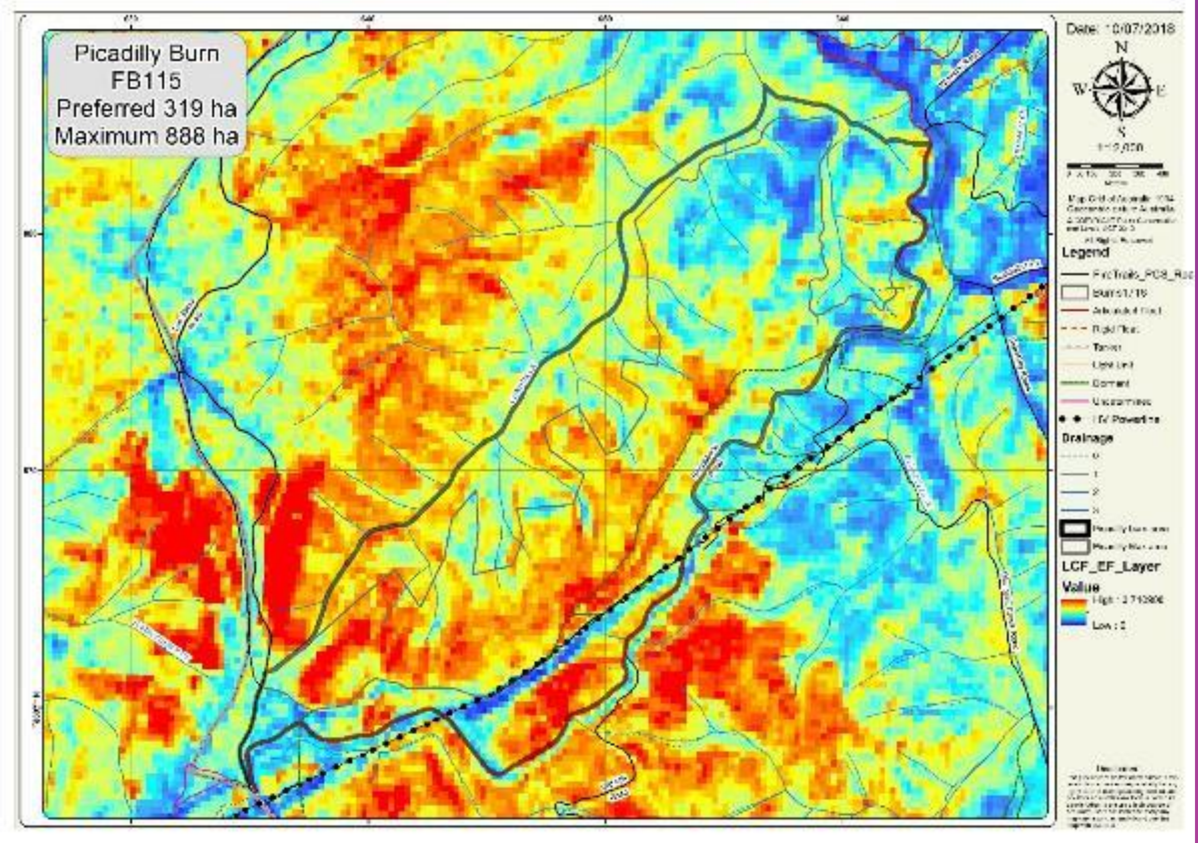
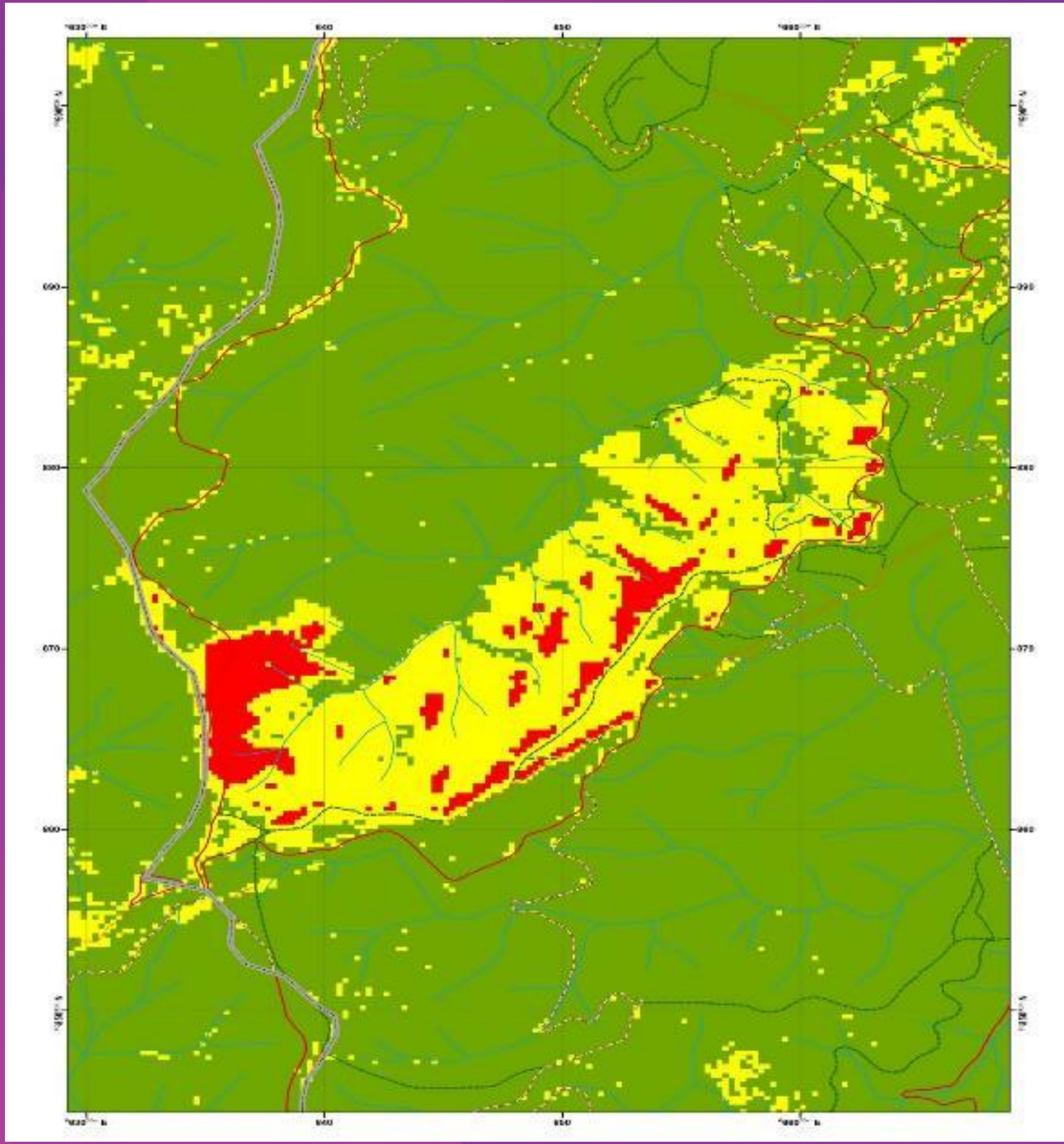


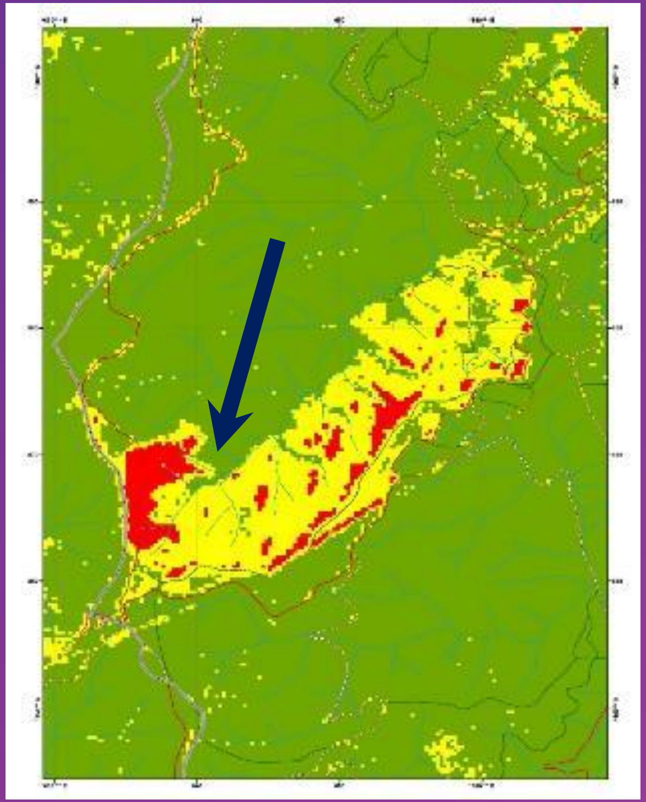
LiDAR-derived fuel map, May-June 2015

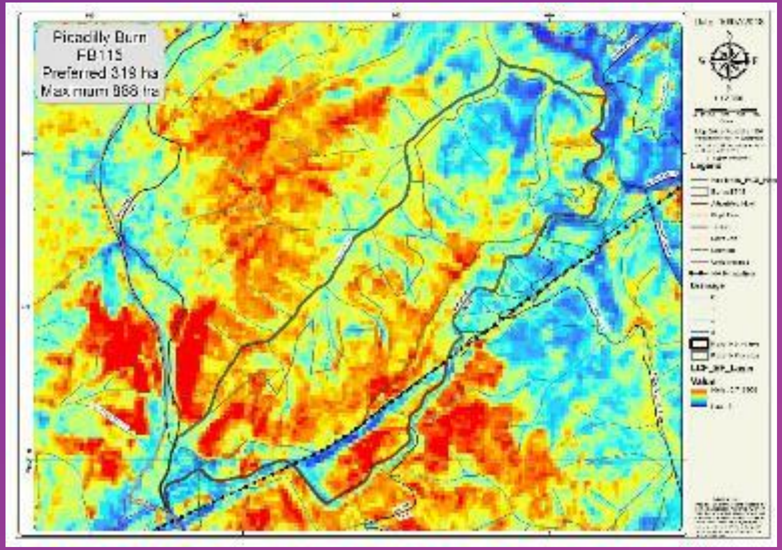


Piccadilly burn, LiDAR-derived Elevated Fuel



dNBR Fire Seveirty Assessment, Piccadilly




Picadilly Burn
FB115
Preferred 319 ha
Maximum 868 ha


DIRECTION
190 deg(T)
55H FA
63870 87290
ACCURACY 5 m
DATUM WGS84
Fire severity…
2018-06-19
11:54:14+10:00

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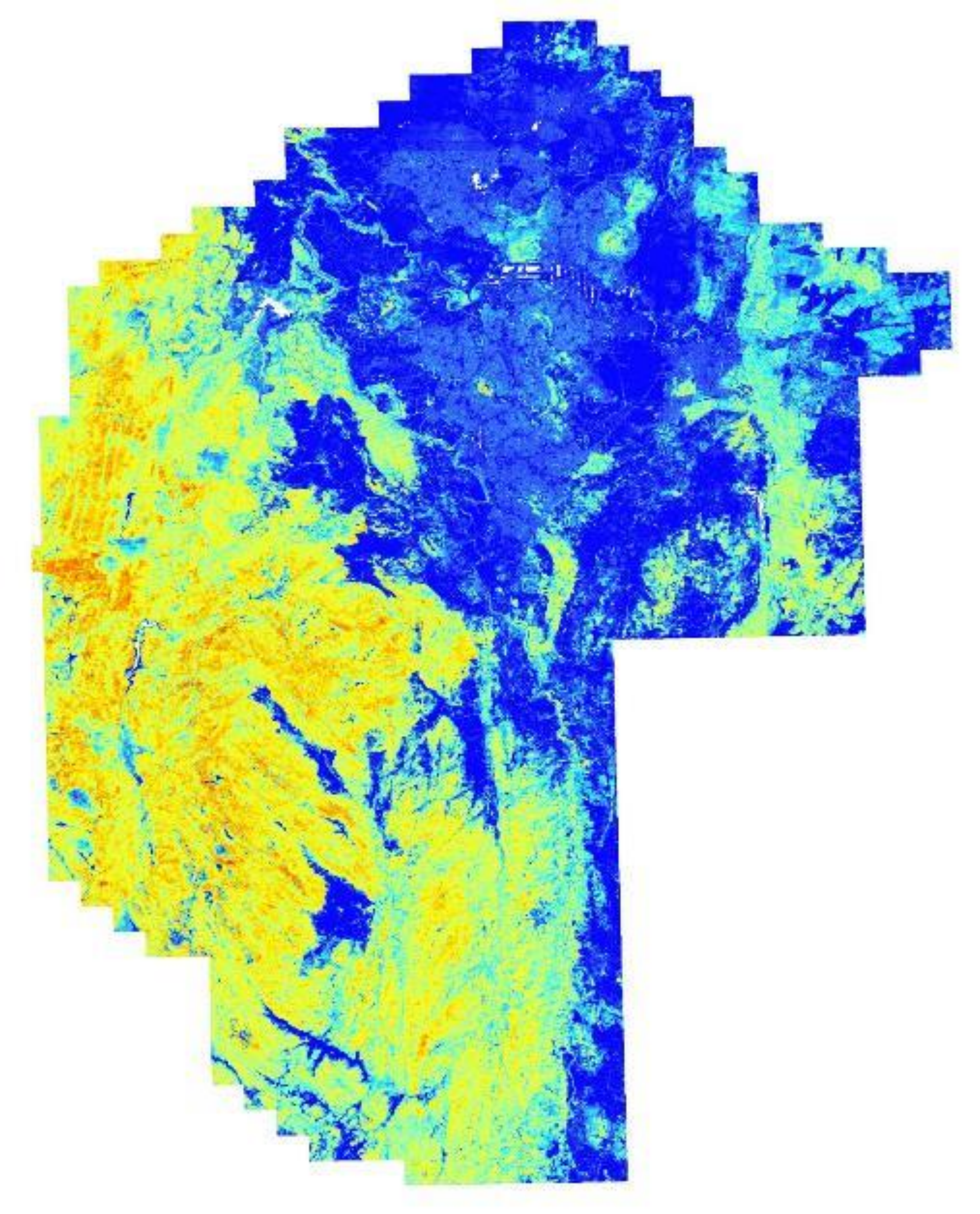
Wrap up

1. Generally suitable for fuel mapping, but…
2. … issues with bark and litter.
3. Suitable for fuel, carbon and post-burn hydrology
4. Low frequency suitable for burn planning?

5. Move to "remote-sensing enabled systems"



LiDAR-derived estimate of Near-surface Fuel