

# Project 1 Fuel Hazard Mapping

# Project 2 Fire Surveillance

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**Business**  
Cooperative Research  
Centres Programme



# Fuels3D

**The Problem:** Lack of repeatability and reliability with current field fuel hazard assessments.

**Opportunity:** To bring together off-the-shelf, consumer grade digital cameras with advances in computer vision and photogrammetric techniques.

**Solution:** A tool chain and suite of computer vision and photogrammetric algorithms that use images captured in the field to produce 3D point clouds from which fuel hazard metrics are calculated, and is adaptive to point clouds captured from other technologies.

Criteria	Visual Assessment	Fuels3D	TLS
Easy to use (in-field)	yes	yes	no
Cheap	yes	yes	no
Rapid	yes	yes	no
Repeatable	no	yes	yes
Accurate	no	yes	yes
Quantitative	no	yes	yes
Integrates within existing fire and land management agency protocols and guides	yes	yes	yes

# Fuels3D

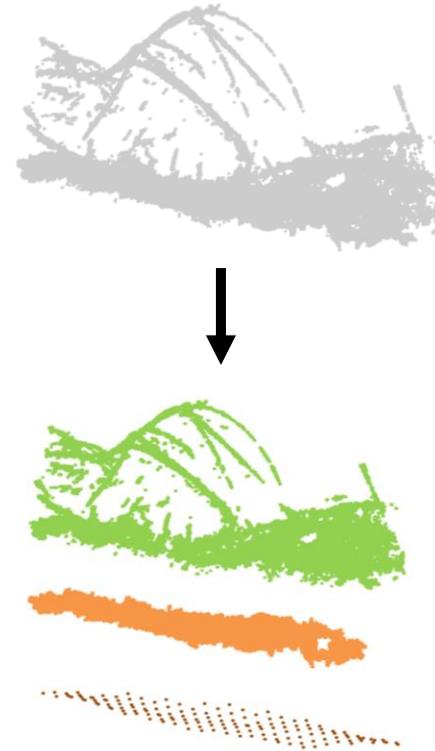
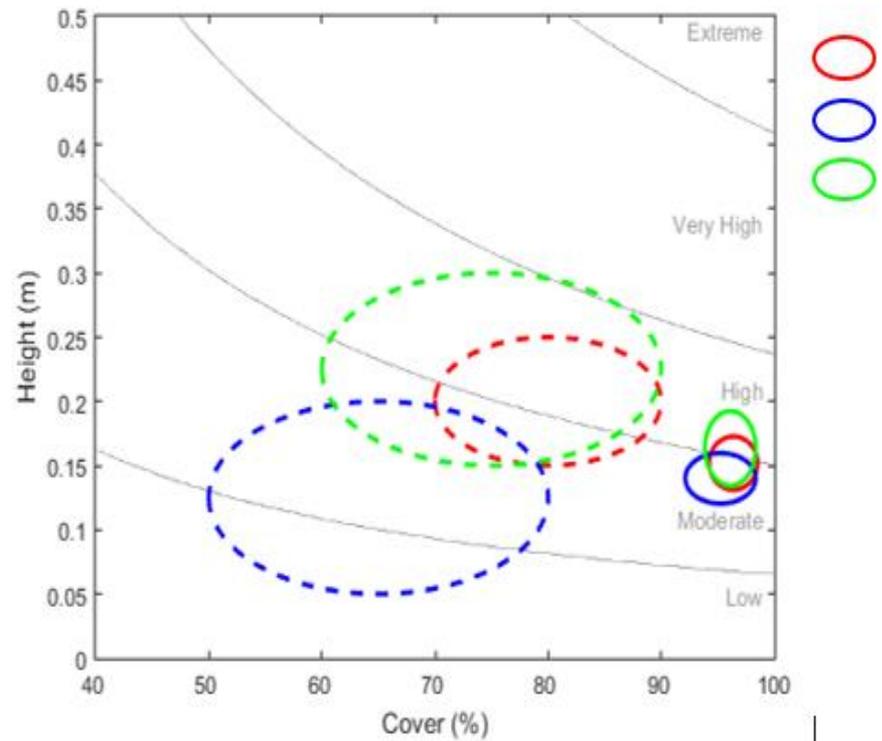


Table 6. Fuel hazard matrix for the Loran Mallee system 2 x 2 in photo collected using TSM, UASRM and TLS technologies. \* - indicates method unable to derive the given metric

Method	Fuel Type	Cover				Mean Weight (kg/ha)				
		TLS	UASRM	TSM	TLS	UASRM	TSM	TLS	UASRM	TSM
0	Surface	2.22	7.79	20.81	0.020102	0.020208	0.019301	0.019401	0.019501	0.019601
0	Non-woody	0.06	4.64	4.06	0.130104	0.130204	0.130304	0.130404	0.130504	0.130604
0	Elevated	10.58	21.05	5.75	0.040102	0.040202	0.040302	0.040402	0.040502	0.040602
0	Intermediate Comp	3.81	9.81	1.00	1.130101	1.130201	1.130301	1.130401	1.130501	1.130601
0	Comp	11.34	10.44	0.00	2.040101	2.040201	2.040301	2.040401	2.040501	2.040601
0	All Fuels	30.27	30.51	11.80	1.840101	1.840201	1.840301	1.840401	1.840501	1.840601
1	Surface	1.96	6.84	27.73	0.020102	0.020208	0.020304	0.020401	0.020501	0.020601
1	Non-woody	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	Elevated	21.76	71.41	14.80	0.130101	0.130201	0.130301	0.130401	0.130501	0.130601
1	Intermediate Comp	5.20	0.00	0.00	1.130101	1.130201	1.130301	1.130401	1.130501	1.130601
1	Comp	1.31	3.47	0.00	0.040101	0.040201	0.040301	0.040401	0.040501	0.040601
1	All Fuels	31.70	75.62	42.48	0.420101	0.420201	0.420301	0.420401	0.420501	0.420601
2	Surface	3.74	4.00	47.28	0.020102	0.020208	0.020304	0.020401	0.020501	0.020601
2	Non-woody	0.06	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	Elevated	1.82	21.80	0.00	0.130101	0.130201	0.130301	0.130401	0.130501	0.130601
2	Intermediate Comp	1.06	3.31	0.00	1.130101	1.130201	1.130301	1.130401	1.130501	1.130601
2	Comp	10.17	11.40	0.00	2.040101	2.040201	2.040301	2.040401	2.040501	2.040601
2	All Fuels	45.68	41.87	42.31	2.430101	2.430201	2.430301	2.430401	2.430501	2.430601
3	Surface	4.00	3.10	18.00	0.040101	0.040201	0.040301	0.040401	0.040501	0.040601
3	Non-woody	0.00	4.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	Elevated	3.00	2.16	0.24	0.130101	0.130201	0.130301	0.130401	0.130501	0.130601
3	Intermediate Comp	0.00	0.00	0.00	1.130101	1.130201	1.130301	1.130401	1.130501	1.130601
3	Comp	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	All Fuels	7.00	7.16	18.24	0.280101	0.280201	0.280301	0.280401	0.280501	0.280601
4	Surface	8.78	11.36	20.81	0.020102	0.020208	0.020304	0.020401	0.020501	0.020601
4	Non-woody	1.06	11.00	1.00	0.130101	0.130201	0.130301	0.130401	0.130501	0.130601
4	Elevated	0.91	11.45	1.32	0.130101	0.130201	0.130301	0.130401	0.130501	0.130601
4	Intermediate Comp	0.11	1.68	0.00	1.130101	1.130201	1.130301	1.130401	1.130501	1.130601
4	Comp	10.14	10.77	0.00	0.040101	0.040201	0.040301	0.040401	0.040501	0.040601
4	All Fuels	22.22	36.51	19.22	0.420101	0.420201	0.420301	0.420401	0.420501	0.420601
5	Surface	1.50	1.10	41.24	0.040101	0.040201	0.040301	0.040401	0.040501	0.040601
5	Non-woody	1.84	0.15	0.54	0.130101	0.130201	0.130301	0.130401	0.130501	0.130601
5	Elevated	0.00	2.14	1.41	0.040101	0.040201	0.040301	0.040401	0.040501	0.040601
5	Intermediate Comp	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	Comp	1.86	0.00	0.00	2.040101	2.040201	2.040301	2.040401	2.040501	2.040601
5	All Fuels	3.34	3.31	44.95	0.330101	0.330201	0.330301	0.330401	0.330501	0.330601

# Fuels3D

Multi-agency utilisation testing and trials



An aerial photograph of a forest landscape. The forest is composed of numerous trees with green and yellowish-green foliage. A prominent feature is a large, irregularly shaped cleared area in the center, where the ground is light brown and appears to be a dirt road or a cleared field. The cleared area is surrounded by dense forest. The overall scene is captured from a high angle, looking down on the terrain.

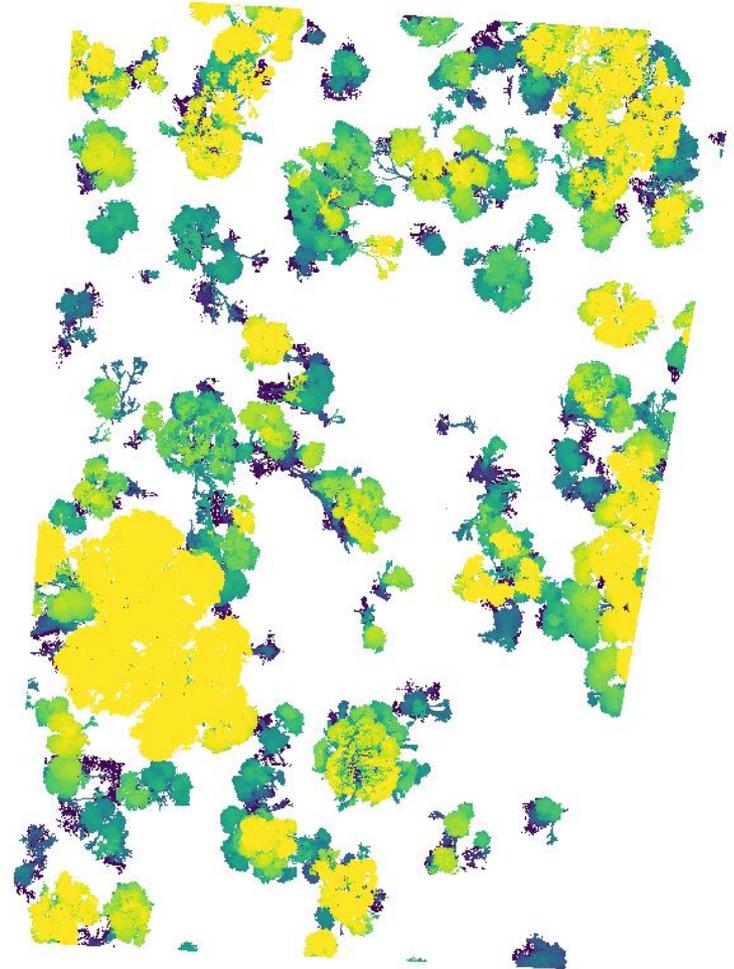
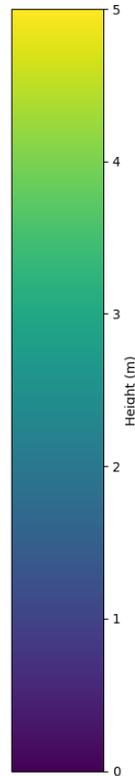
# Fuels3D

Utilisation with DELWP

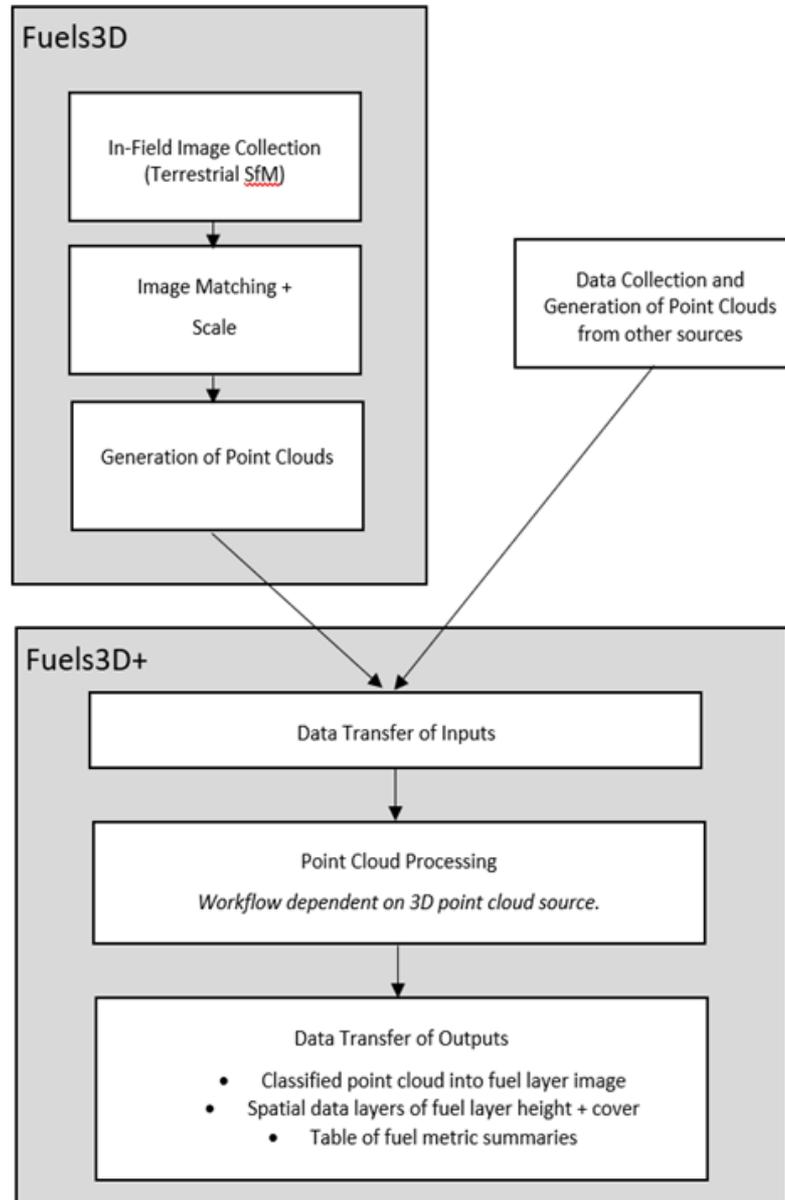


# Fuels3D

Utilisation with DELWP



# Fuels3D+

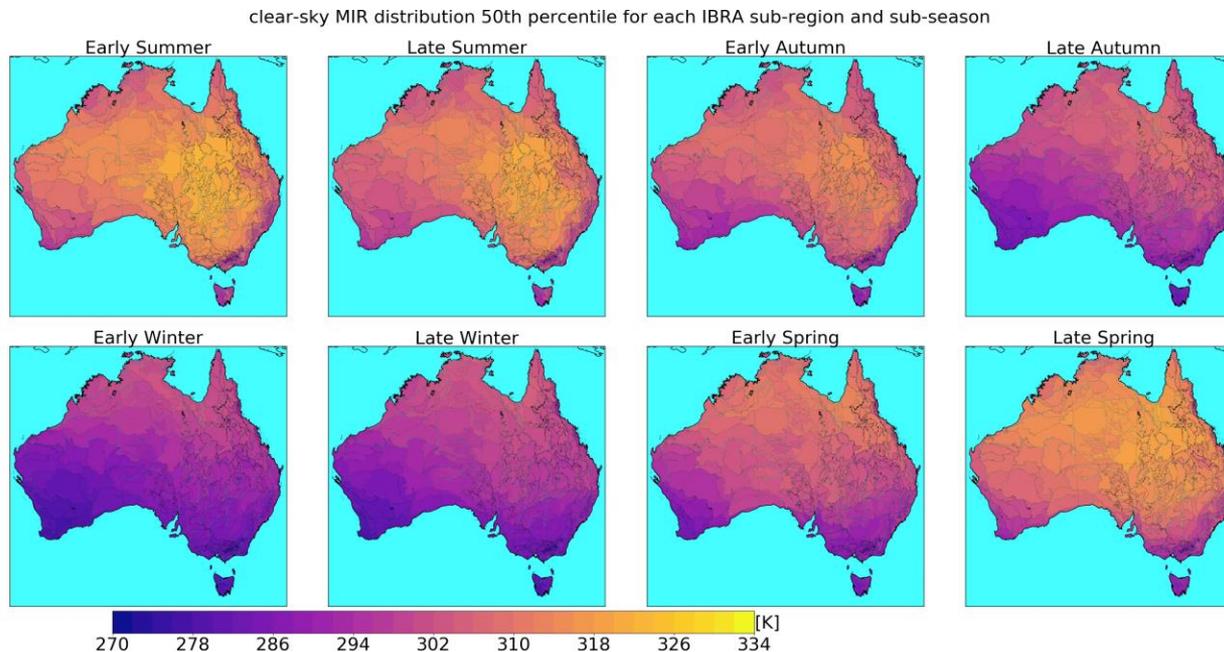


# Fire Surveillance using Himawari-8

**The Problem:** Continuous and timely surveillance of active fire across the Australian continent; old algorithms applied to new data.

**Opportunity:** Launch of Himawari-8, providing 10 minute observations in near-real time.

**Solution:** A near-real time implementation of a robust and dynamic algorithm tailored for varying seasonal and geographical regions across Australia. (Significant improvements compared to WF-ABBA with false detections declining from 50% to less than 10%.)



# Fire Surveillance using Himawari-8

Utilisation with NSW RFS

Himawari-8 image acquisition from BoM

Multi-band + multi-temporal + regional training data

Statistically determined clear-sky observations

Statistical thresholding for fire activity

Hotspots & Other Information

