ESTIMATING SURFACE FUEL LOADS FOR BUSHFIRE MANAGEMENT USING FOUR-BAND IMAGERY

JACKSON PARKER

A CASE STUDY OF THE GREAT VICTORIAN DESERT

SEMI-ARID MALLEE WOODLANDS

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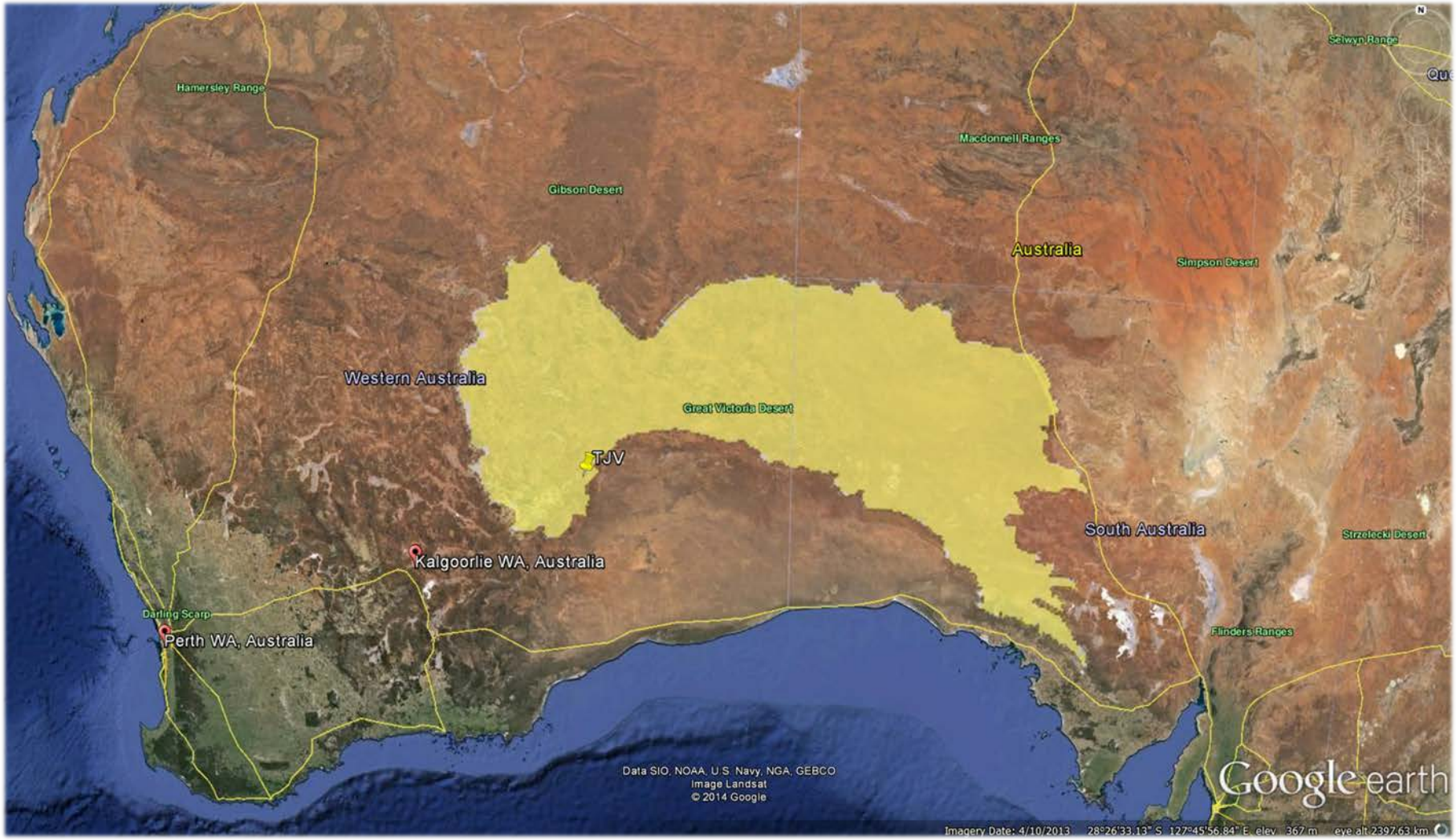
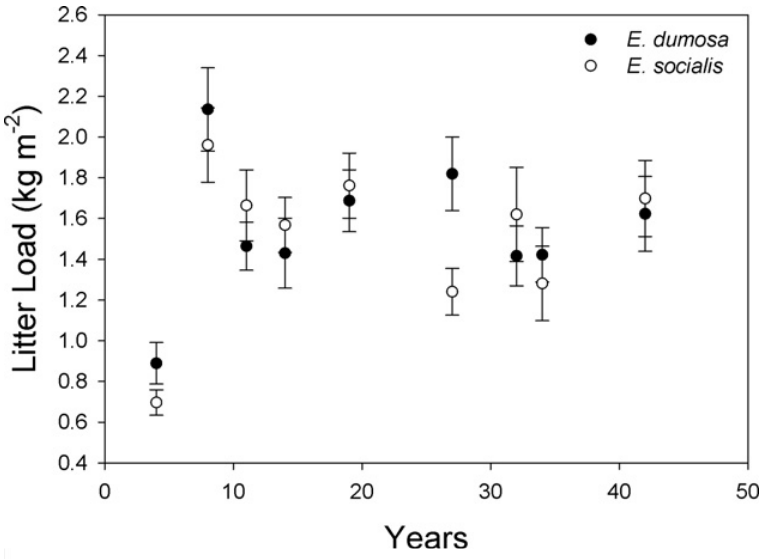
Research Objective

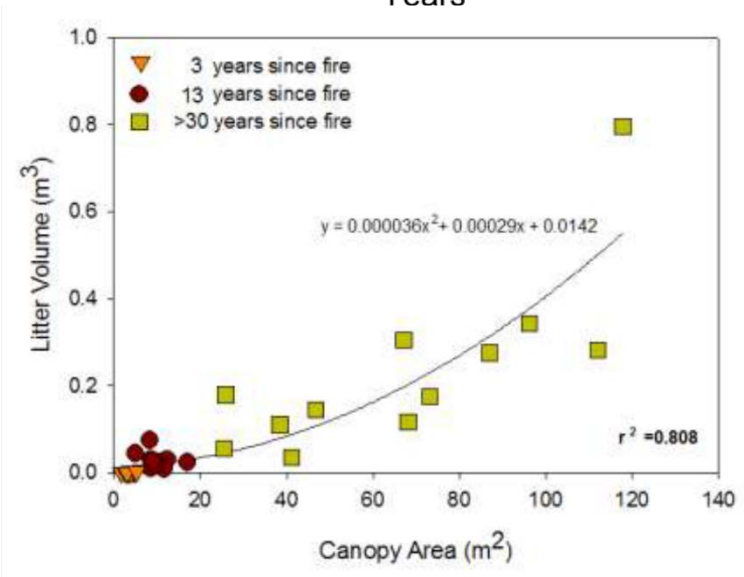
Develop knowledge and tools for estimating bushfire fuel loads within semi-arid woodlands at the landscape and local scale through vegetation cover and fuel load relationships for the assessment and management of potential bushfire threats by land managers and fire practitioners

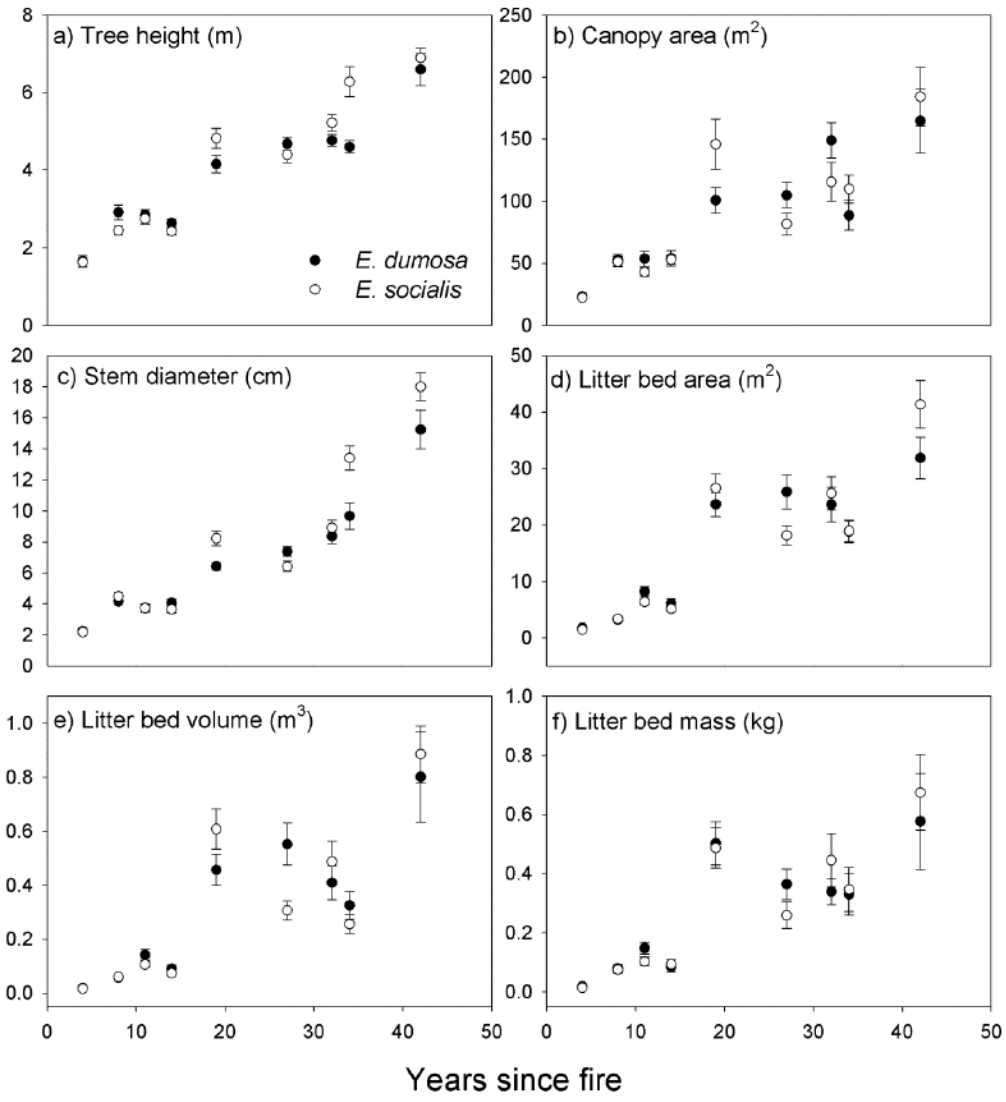
Study Area


Hamersley Range
Gibson Desert
Macdonnell Ranges
Selwyn Range
Australia
Simpson Desert
Western Australia
Great Victoria Desert
TJV
South Australia
Strzelecki Desert
Kalgoorlie WA, Australia
Darling Scarp
Perth WA, Australia
Flinders Ranges
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image Landsat
© 2014 Google
Google earth
Imagery Date: 4/10/2013 28°26'33.13" S 127°45'56.84" E elev 367 m eye alt 2397.63 km

Literature Review (Samantha Travers and Angie Haslem)

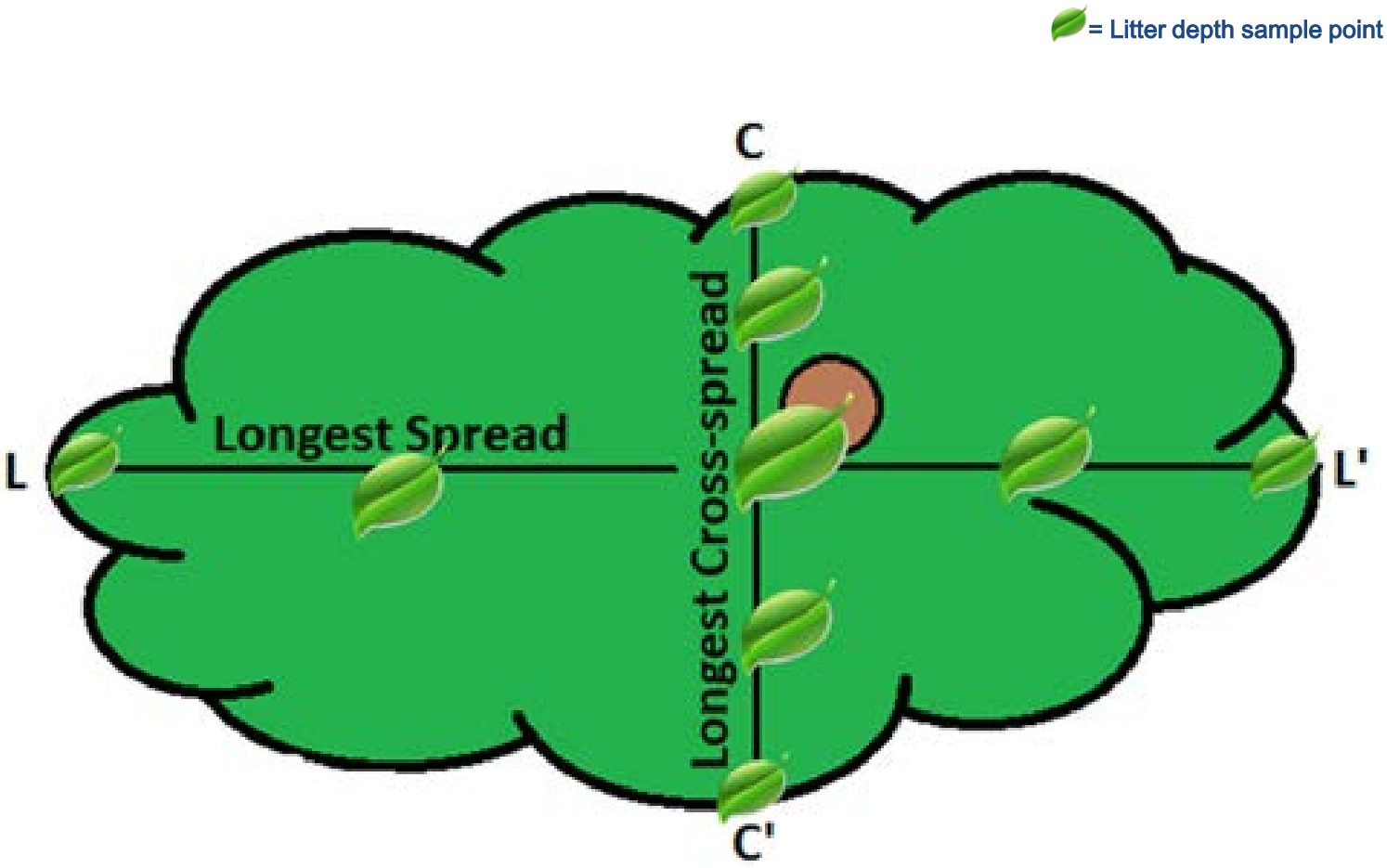




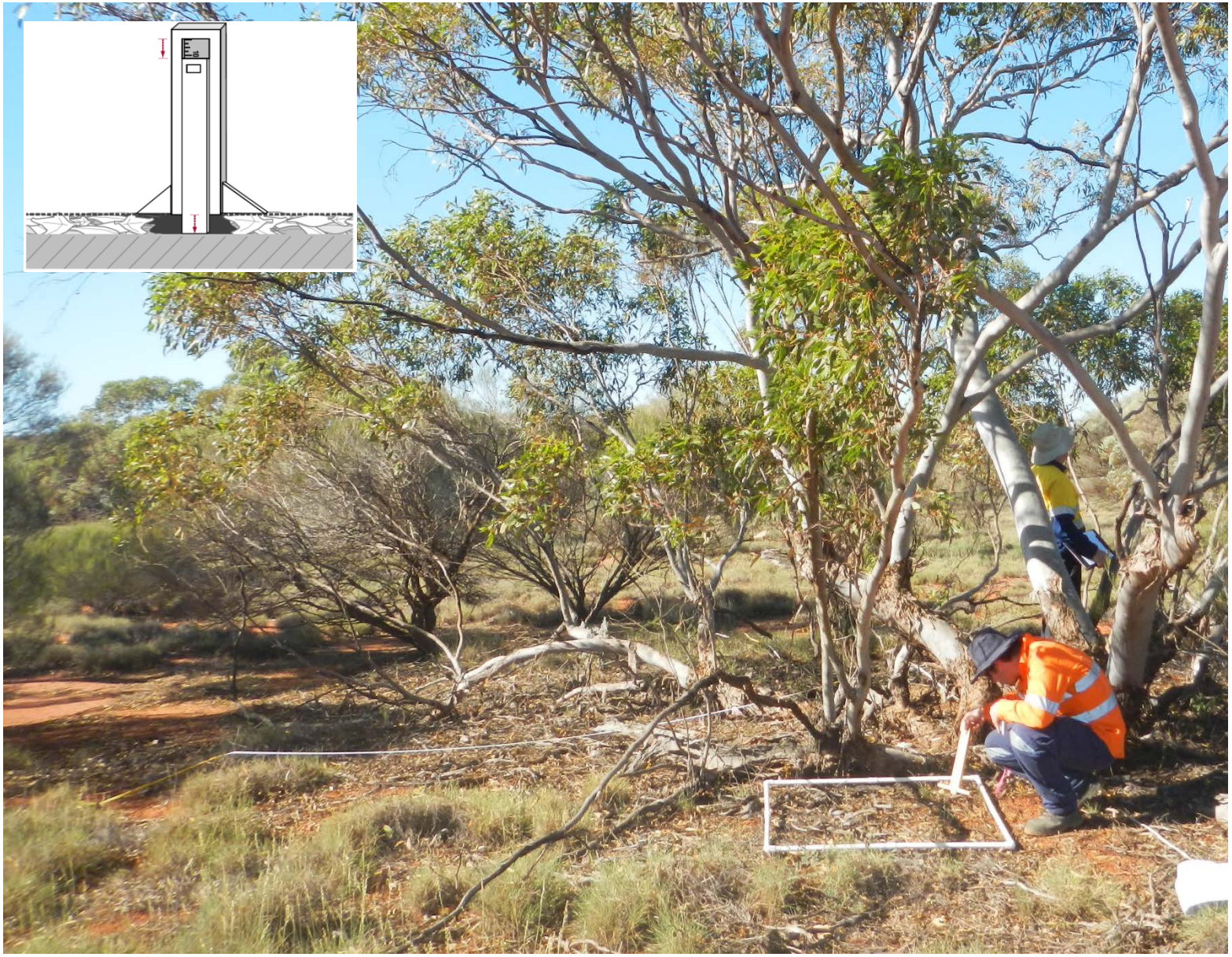


Litter Bed Measurement

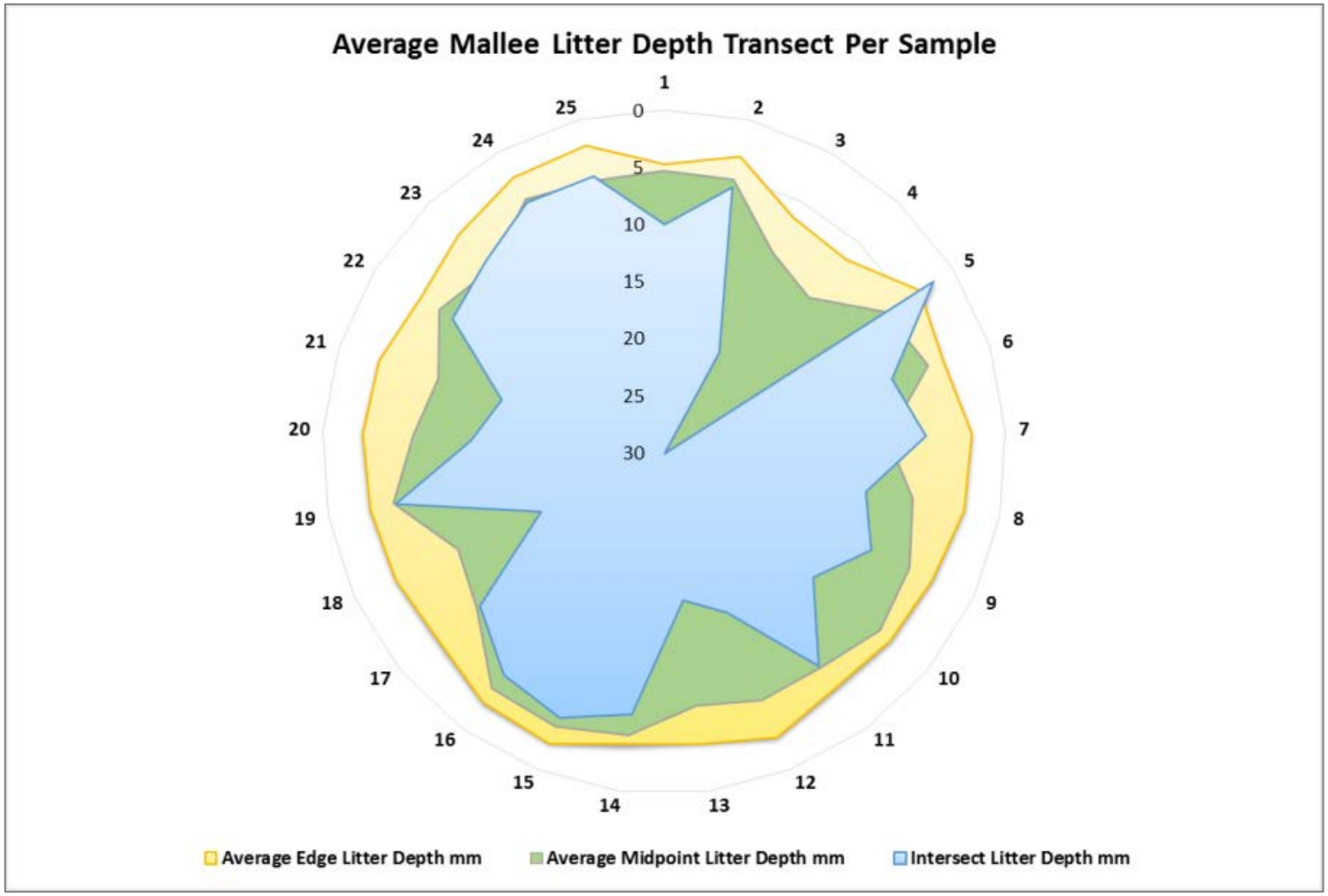
Litter Bed Measurement



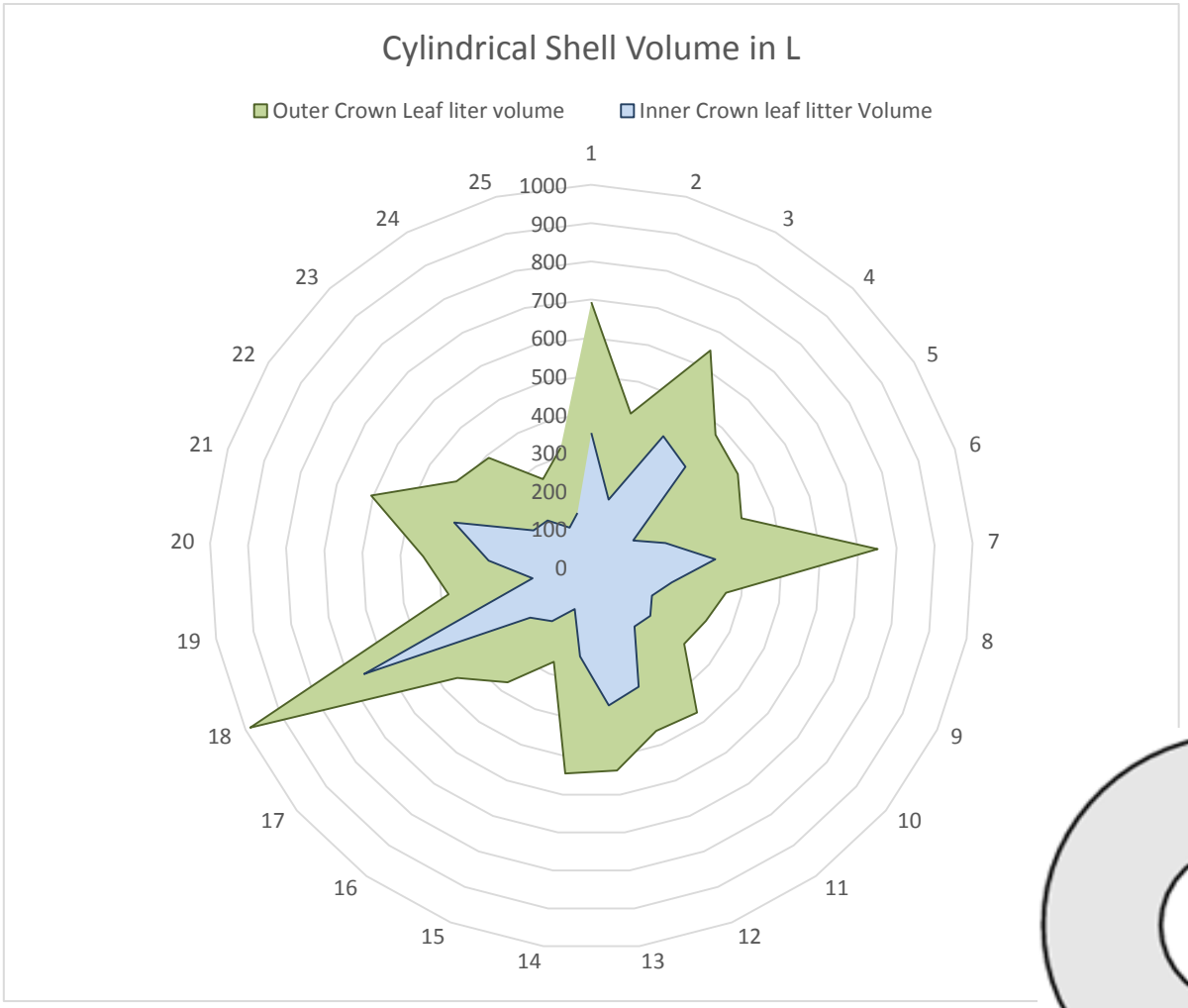
Litter Bed Measurement

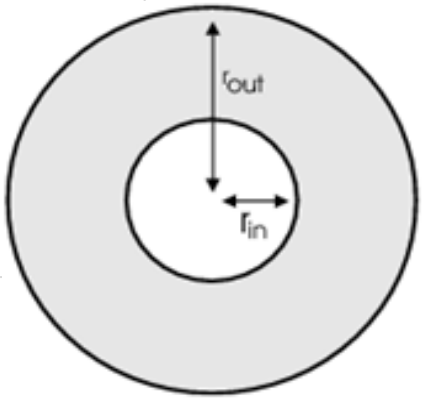


Litter Bed Measurement



Litter Bed Measurement





Litter Bulk Density

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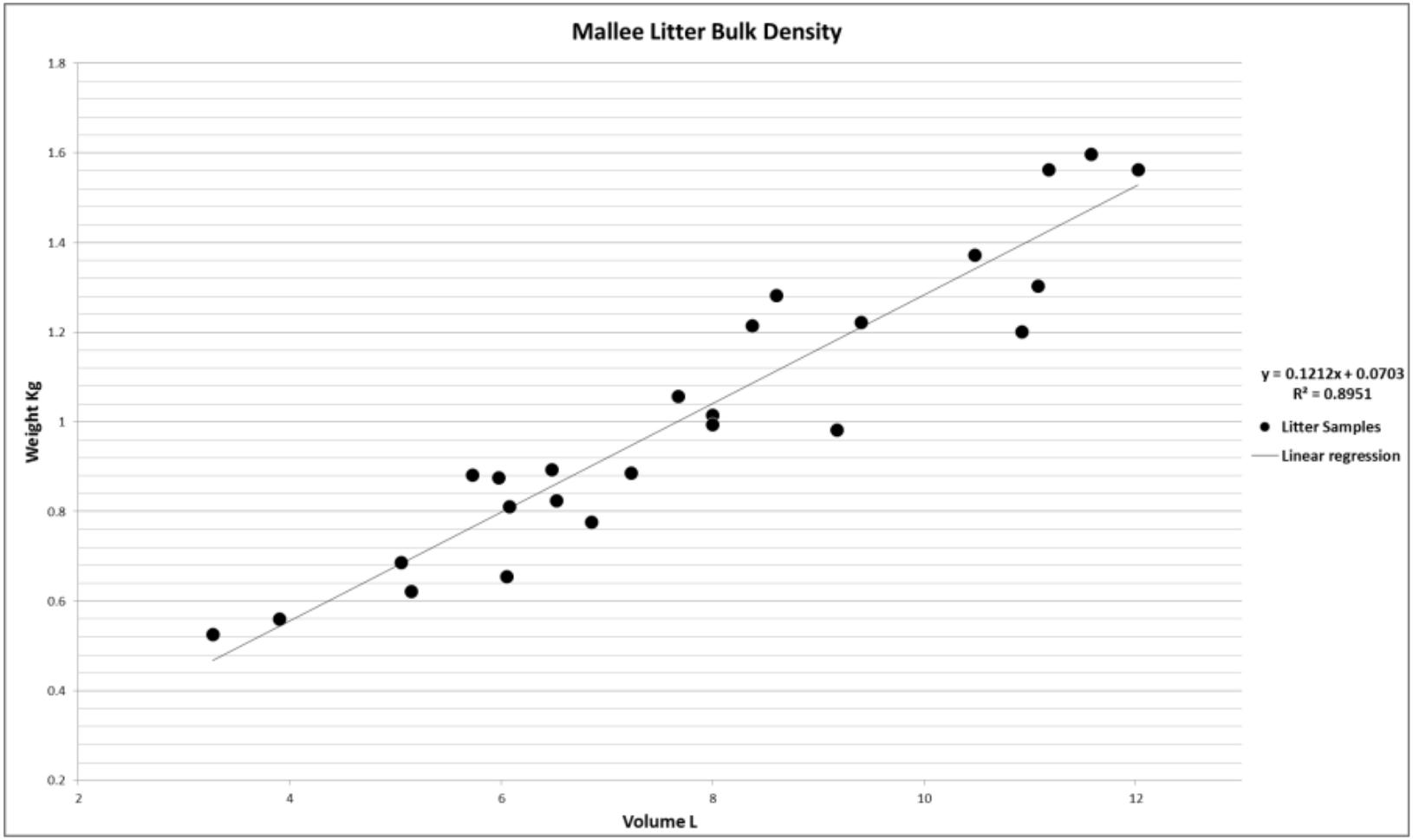
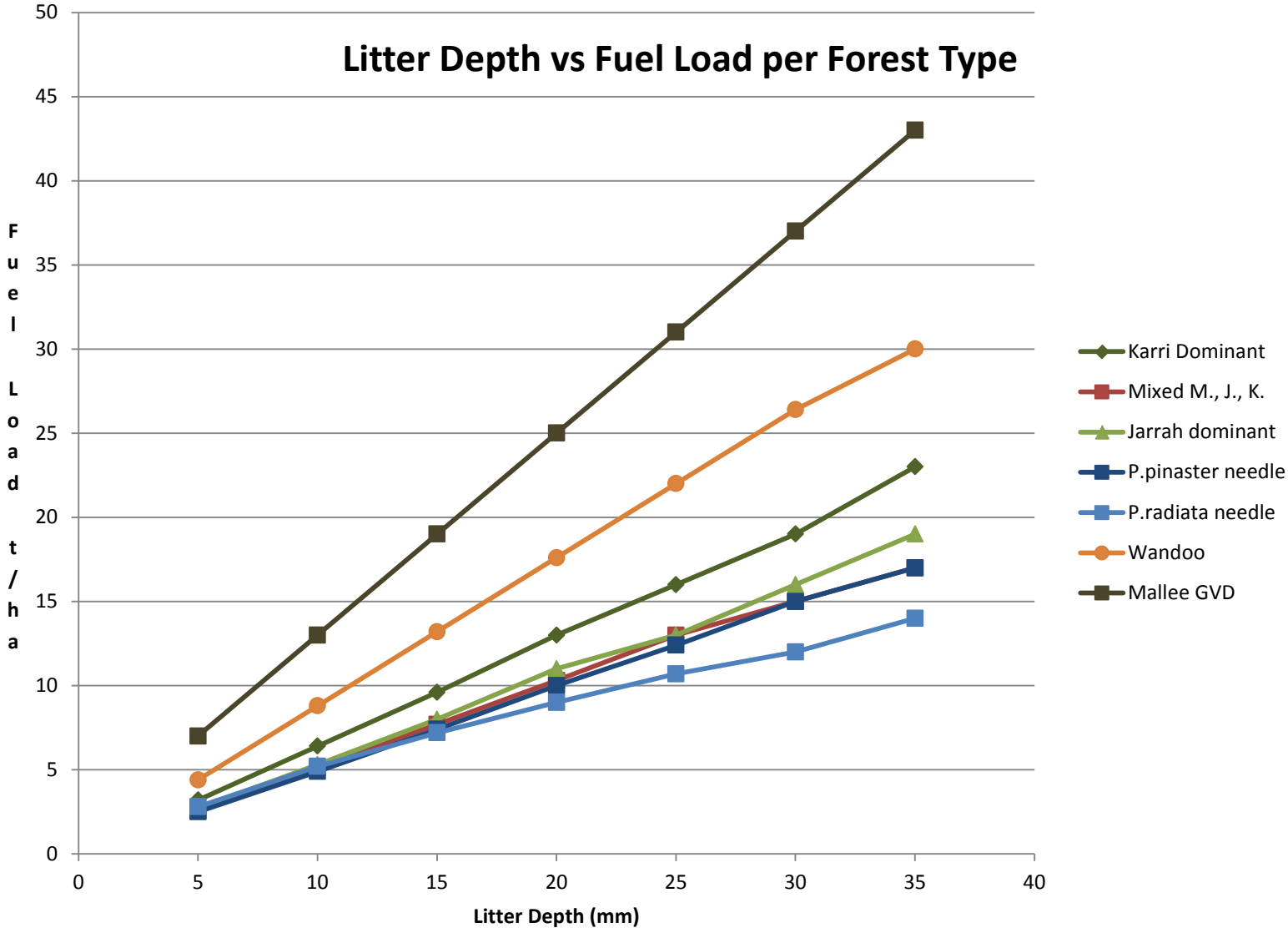


Litter bulk density is the oven dry weight of the sample in Kg divided by the total volume in liters (ave = 0.13 Kg/L)

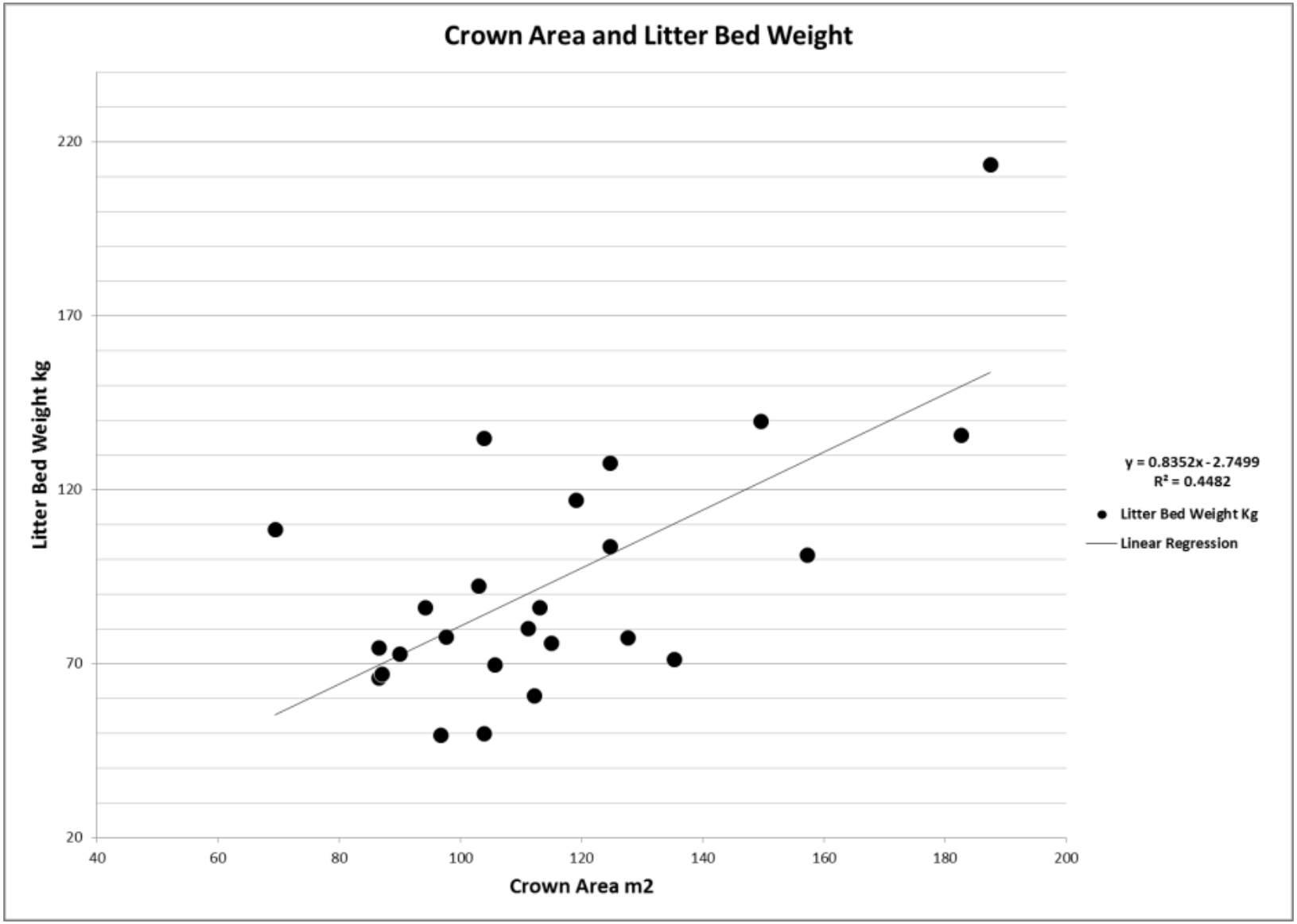
Litter Depth to Weight Ratio

Litter depth (mm)	Forest Type						
	Karri Dominant	Mixed M., J., K.	Jarrah dominant	P. pinaster needle	P. radiata needle	Wandoo	Mallee GVD
	Litter weight (tonnes/ha)						
5	3.2	2.6	2.7	2.5	2.8	4.4	7.0
10	6.4	5.1	5.3	4.9	5.2	8.8	13.0
15	9.6	7.7	8.0	7.4	7.2	13.2	19.0
20	13.0	10.3	11.0	10.0	9.0	17.6	25.0
25	16.0	13.0	13.0	12.4	10.7	22.0	31.0
30	19.0	15.0	16.0	15.0	12.0	26.4	37.0
35	23.0	17.0	19.0	17.0	14.0	30.0	43.0
40	26.0	19.0	21.0	20.0	16.0		
45	29.0	22.0	24.0	22.0	18.0		
50	32.0	25.0	27.0	25.0	20.0		
55	35.0	27.0	29.0	27.0	22.0		
60	39.0			29.0	24.0		
65	42.0			31.0	26.0		
70	45.0			33.0	28.0		
80	51.0			37.0	31.0		
90	58.0			41.0	34.0		
100	64.0			45.0	37.0		

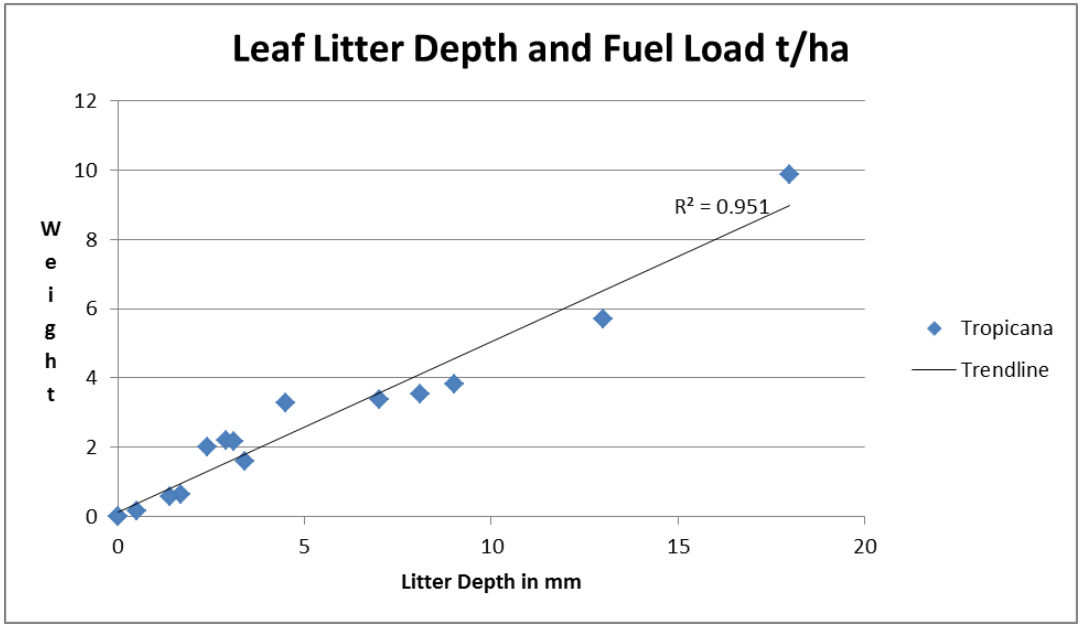
Litter Depth to Weight Ratio



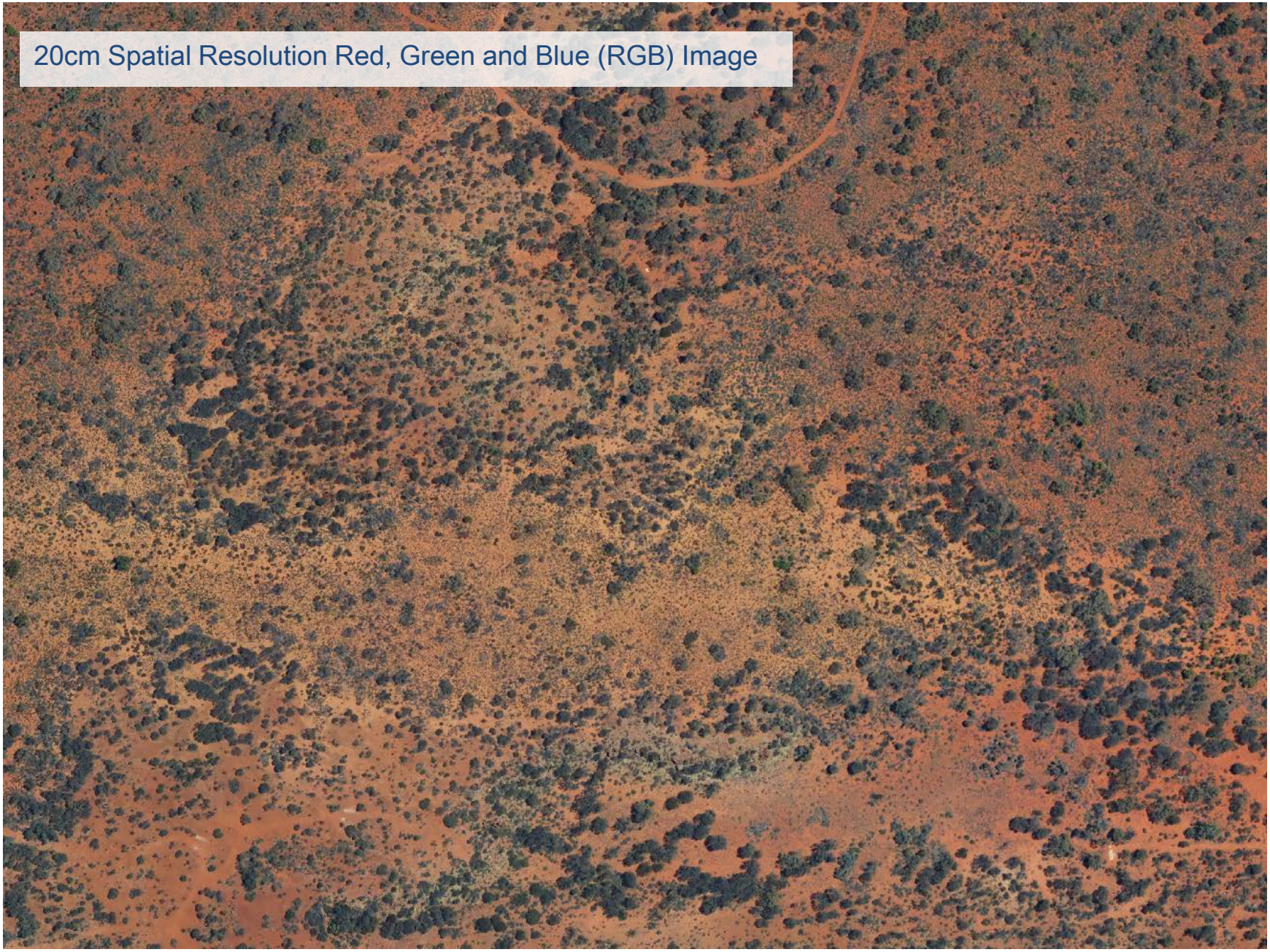
Crown Area and Litter Bed Weight



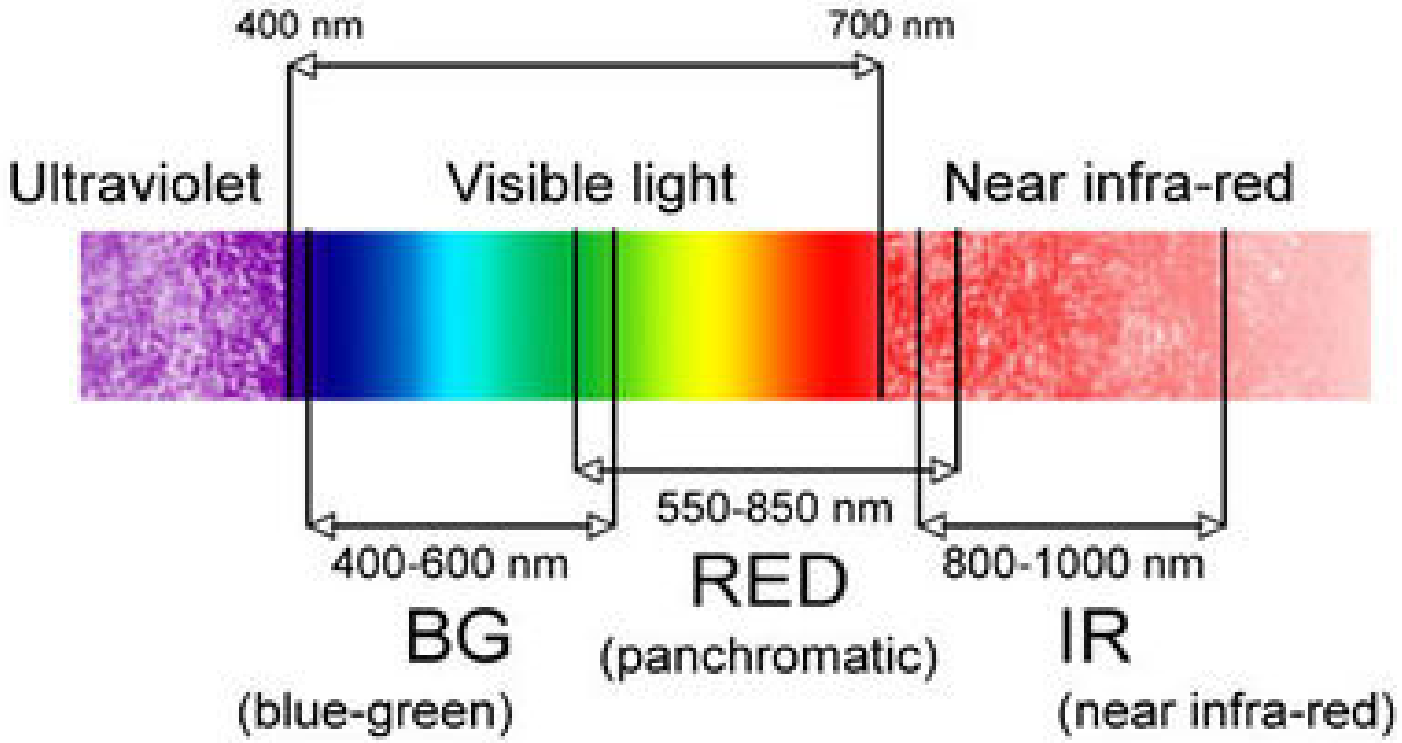
Fuel load Outside the Crown Area



- Fuel load accumulation rates are unknown for the GVD.
- Rainfall is the key driver of growth and highly variable, fuel accumulation is likely to be highly variable and closely linked with past rainfall as well as time since fire.

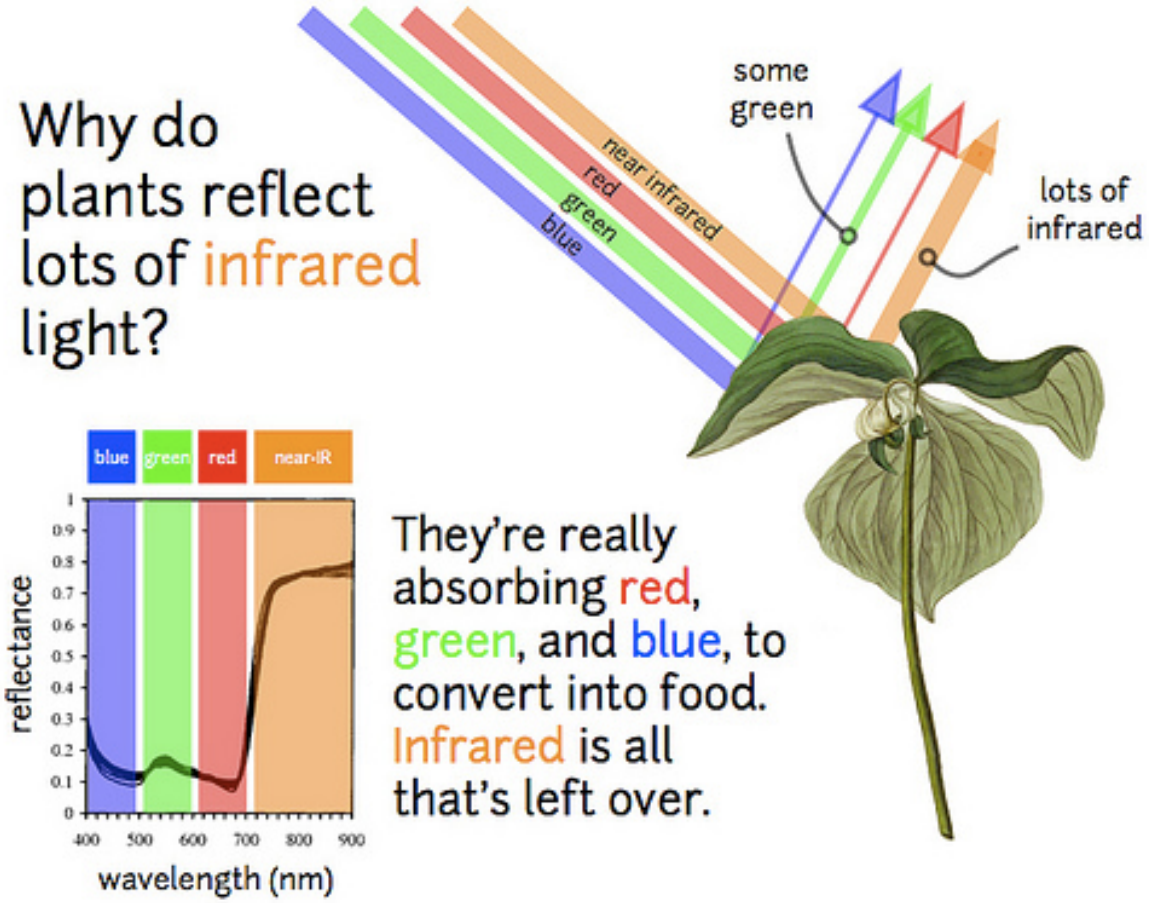

20cm Spatial Resolution Red, Green and Blue (RGB) Image

Spectral Reflectance



Sunlight reflects in both the visible and non visible wavelengths of light

The Four Bands



The level and range of the reflectance 'signature' across the four bands distinguishes vegetation from soil, rock, water and infrastructure. It can also distinguish vegetation type and health

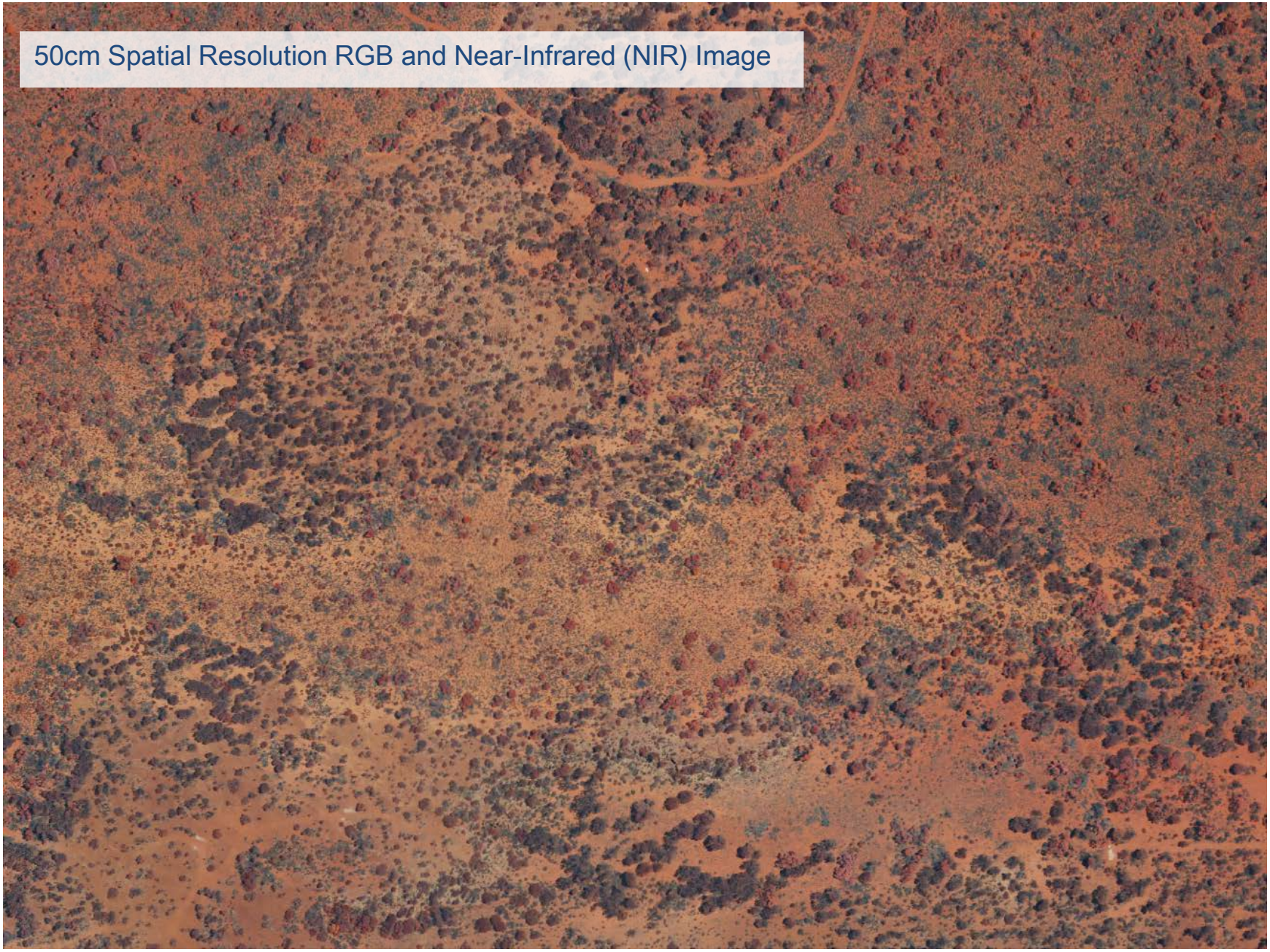
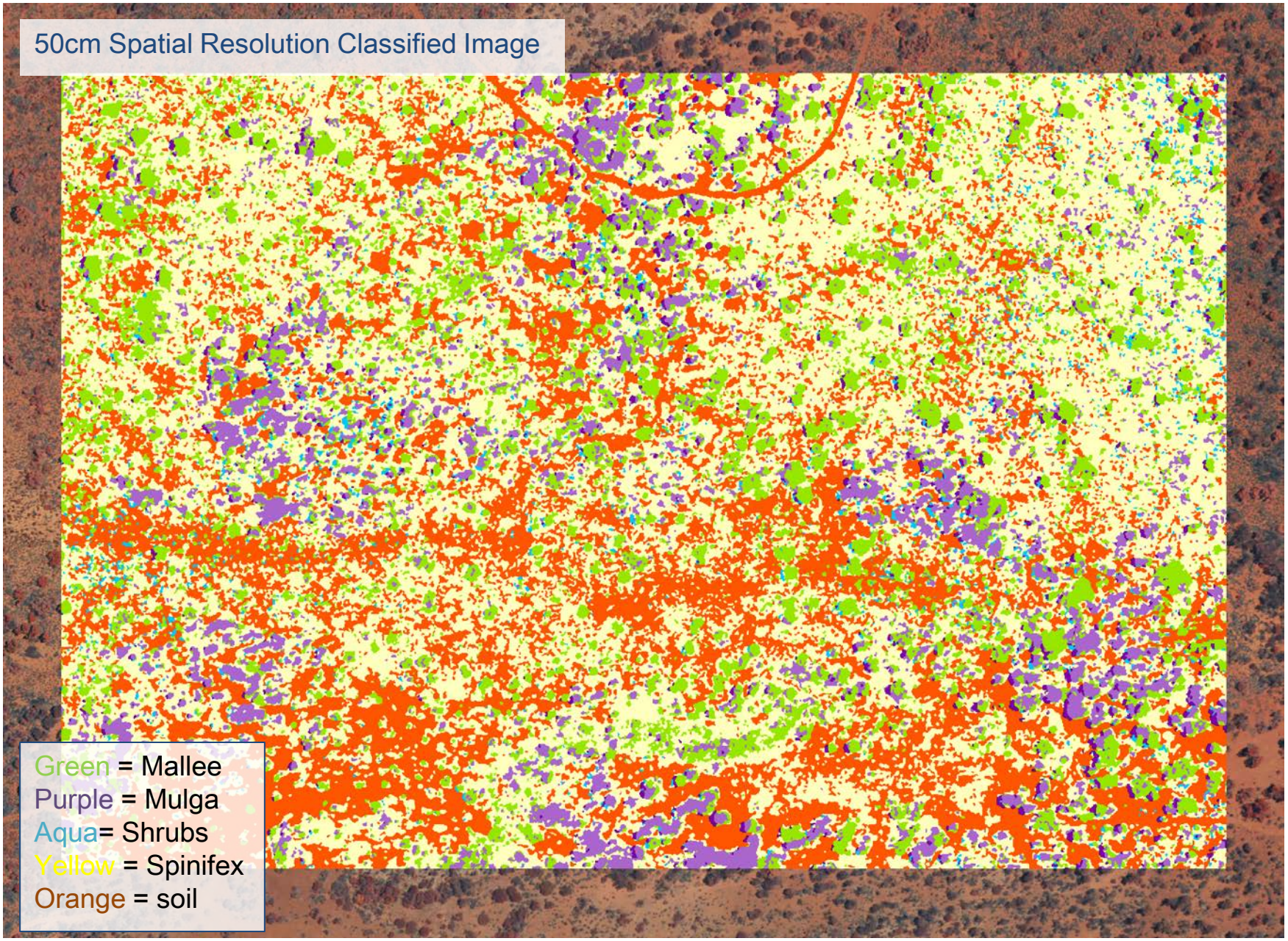
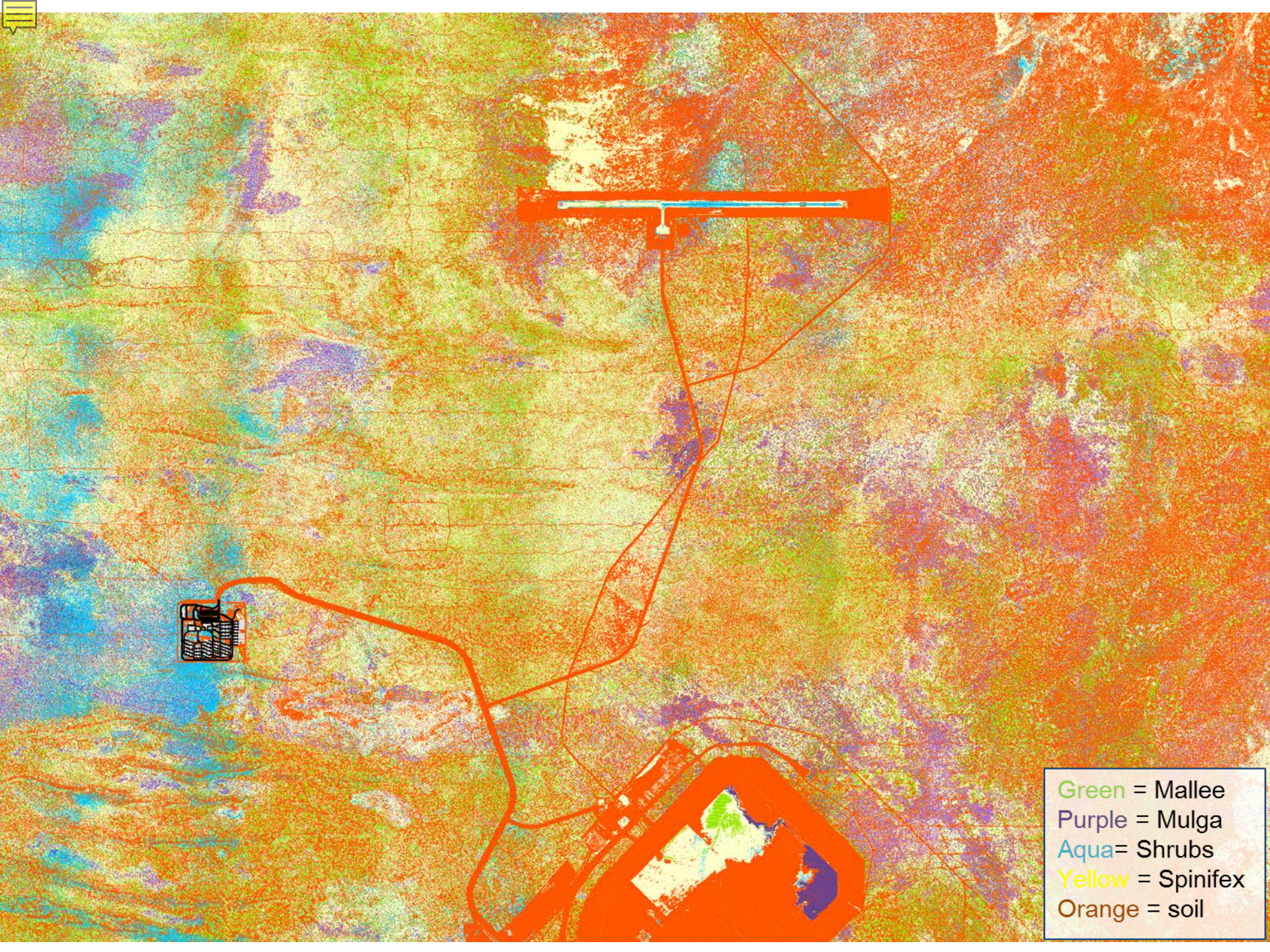

50cm Spatial Resolution RGB and Near-Infrared (NIR) Image

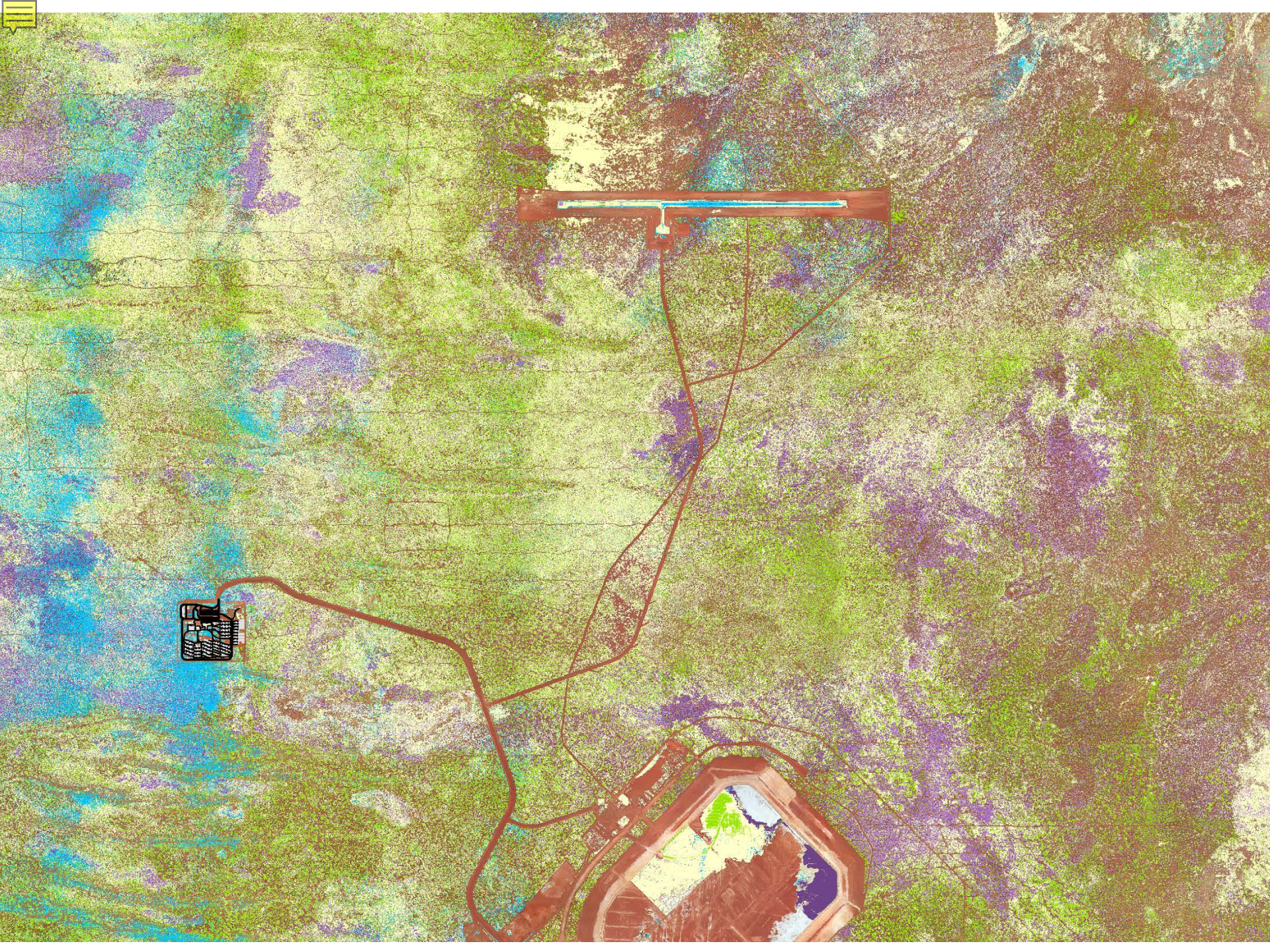
Image Classification

Regions of Interest (ROI's) are used in programs such as ENVI to train the software to undertake supervised classification of images

50cm Spatial Resolution Classified Image




Green = Mallee
Purple = Mulga
Aqua= Shrubs
Yellow = Spinifex
Orange = soil



QUESTIONS?

JACKSON PARKER

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