• RESTORING GONDWANA •

- Stories from the land -

CUTTING EDGE CONSERVATION

- USING DRONE TECHNOLOGY TO MONITOR REVEGETATION SUCCESS -

LANDHOLDER PROFILE

NAME: Bush Heritage Australia
LOCATION: Boxwood Hill, WA
ENTERPRISE: Conservation
PROPERTY SIZE: 400 hectares

It is a glorious afternoon on the South Coast as Peter Banyard from Airborne Maps manoeuvres a drone over the restoring ecosystems at Bush Heritage Australia's Monjebup reserve.

The drone is capturing high resolution imagery in swathes, along 100m transects. The data it collects will be analysed to determine if drone technology is a new and valuable tool for monitoring the progress of restoration from paddock back to natural vegetation.

RESTORING THE LAND

Since the 1970's, there has been an increasing focus on revegetation within agricultural regions to restore natural values. Reconnection of natural habitat across landscapes through replanting of strategic corridors between remnant vegetation plays a major part in nature conservation efforts.

Traditional methods of monitoring the success of revegetation involve on ground assessments of vegetation survival, species mix and abundance. These methods can be time consuming and can also include elements of subjectivity due to differences in the on ground conditions of the day and even the experience of the assessor.

THE TRIAL

In autumn 2016 a pilot project was undertaken to capture monitoring data with drones along 12 vegetation transects in Bush Heritage Australia's Monjebup Reserve, near Boxwood Hill in Western Australia. The idea was to test whether it would be possible to get accurate and repeatable information regarding the extent of cover, height of the canopy and number of plants occurring within set plots in a way that would provide non-subjective and repeatable monitoring data.

The plots corresponded to existing monitoring transect lines occurring within revegetation of various ages so that we could compare the drone captured data with on ground monitoring previously undertaken.

Location of Transect plots at Monjebup North

FLYING THE PLOTS

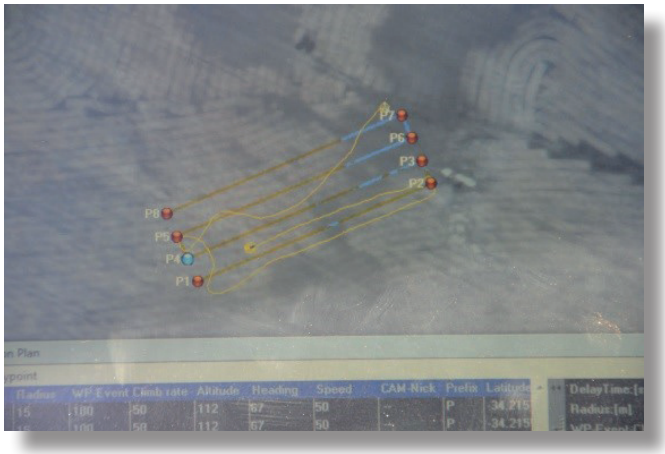
The 12 transects were firstly marked in the field with GPS coordinates for flight planning purposes. Each of these transects was then buffered by 25 metres, resulting in a 0.7 ha "bean-shaped" polygon. These 12 boundaries were then used as the defined plot for each transect (transect plot).

Within each transect plot five aerial photo targets were placed on the ground and surveyed with high precision technology to control position and height measurements.

The start and end points of each transect were also recorded using high precision (RTK) positioning systems that provided accurate locations so that the monitoring could be precisely repeated in the future.

It was a perfect day for flying – blue skies and only a slight breeze. With everything in place, the drone was activated and manually flown to a height of 112m, before following pre-programmed flight paths within each transect plot.

Setting up the targets



Flight paths of drone

The drone takes off

WHAT WE LEARNED

The data captured by the drone provided a great deal of information including canopy cover, vegetation height, bare ground and stocking numbers. As well as this, very high resolution images were created. Some of the profiles created included:

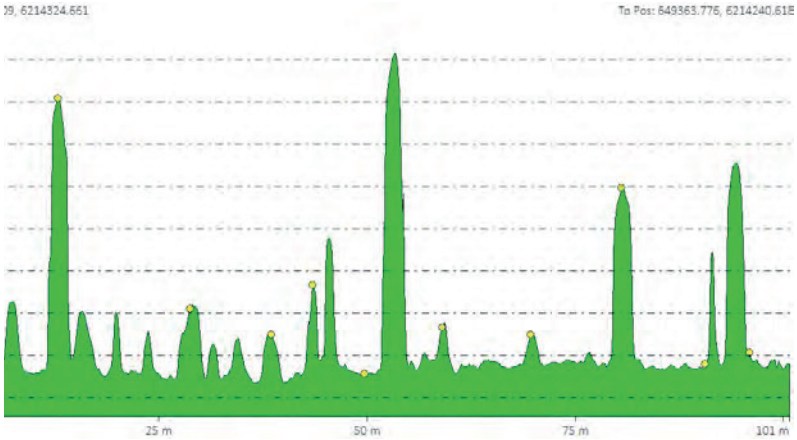
1. Vegetation profiles for each of the plots that show the height of the vegetation (above sea level) across the transect line, which will allow the growth of vegetation to be tracked over time.

2. Extent of cover of vegetation within the transect plot – the percentage of cover will increase as vegetation grows.

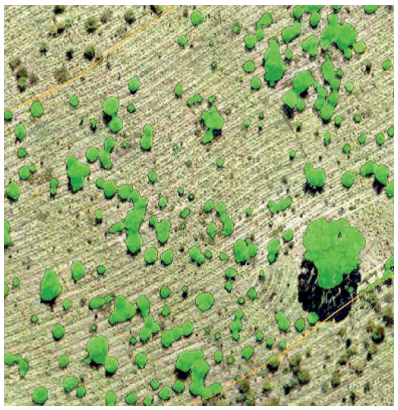
3. Canopy height models – these illustrate the distribution and height of individual plants occurring within the plot.

4. A stocking count model to identify the individual native plants in the plot, which can then be used to calculate the number of stems per hectare.

The data that the drone was able to supply was not limited to the profiles shown. The drone was able to provide information in a number of different formats, which allows the data to be further manipulated with mapping programs such as ArcGIS™.

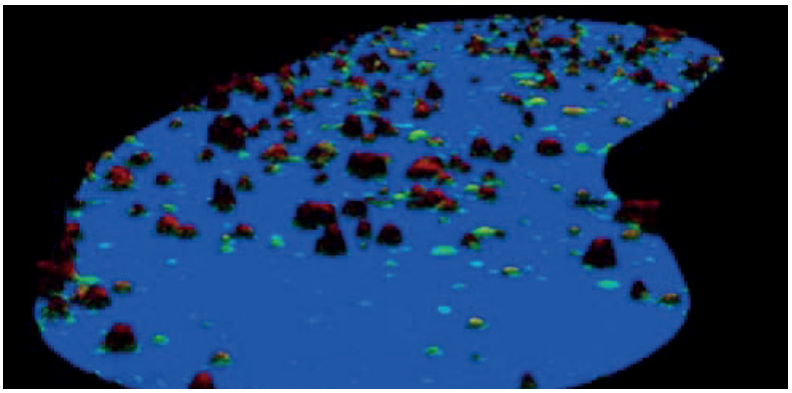


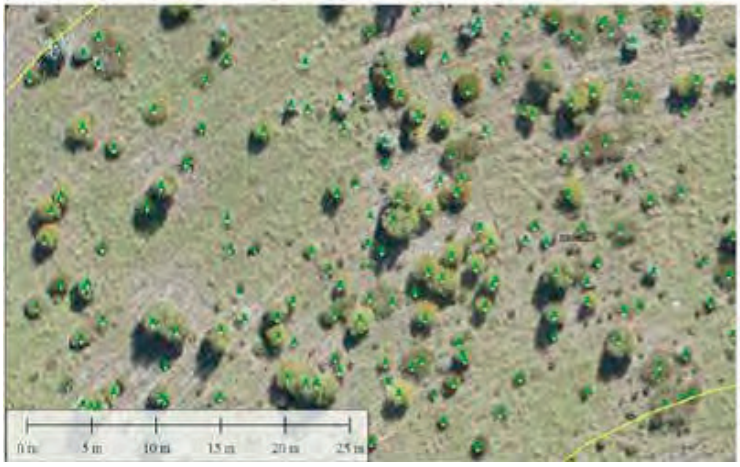
Name	EoC_Percentage
mon22	64
mon23	25
mon24	44
mon25	3
mon26	9
mon27	20
mon28	18
mon29	19
mon30	14
mon31	7
mon32	4
mon33	1



LIMITATIONS

While the data profiles created by the drone captured information are highly precise, it should be noted that some level of subjectivity did remain. For example, where it was necessary to define boundaries within the software applications, such as classifying ground points against vegetation, some criteria needed to be set.





	A	B	C	D	E
1	Plot ID	Plot Area (Ha	Stocking	EoC %	Stems/Ha
2	Mon 23	0.691	1036	25	1499
3	Mon 22	0.685	2315	64	3380
4	Mon 24	0.699	1177	44	1684
5	Mon 26	0.704	410	9	582
6	Mon 27	0.748	779	20	1041
7	Mon 28	0.699	1189	18	1701
8	Mon 29	0.719	1229	19	1709
9	Mon 30	0.69	1486	14	2153
10	Mon 31	0.68	908	7	1335
11	Mon 25	0.701	91	3	130
12	Mon 32	0.685	85	4	124
13	Mon 33	0.689	N/A	1	N/A

Cutting edge conservation

THE FUTURE

The pilot study indicated that drones do have the potential to be a valuable tool for measuring the successful restoration of paddock lands back to native bush. They are able to capture highly precise and repeatable data that can be assessed and monitored over time as the vegetation matures.

ACKNOWLEDGEMENTS

South Coast NRM would like to thank Simon Smale and Angela Sanders of Bush Heritage Australia for their assistance and enthusiasm in undertaking this project and case study.

FURTHER INFORMATION

For information regarding revegetation projects including drone monitoring in the South Coast NRM region please contact the Biodiversity Program Leader at South Coast NRM on 9845 8537 info@southcoastnrm.com.au or visit the website www.southcoastnrm.com.au

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