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A new perspective on Brampton Wood: Using drones to track our habitat improvement work

Drones are an incredibly useful new tool in conservation. The Wildlife Trust BCN are investigating how we can use drones to help with our conservation and research work. This report describes how they are being used at Brampton Wood, Cambs.

The kit

We currently use a quadcopter (four propellers) drone with a built in camera. The model we use is a DJI Phantom 3 that enables us to take detailed 12 megapixel photos and High Definition (HD) video.

Creating aerial photos



Figure 1 Aerial photograph (orthomosaic) of conifer clearance areas at Brampton Wood, December 2017 (Wildlife Trust BCN drone)

The main use of the drone is to create accurate aerial photographs or orthomosaics. The drone flies automatically and takes hundreds of photographs of the area to be mapped. Each photo has a GPS reference, and computer software is then able to stitch the photos together to produce a single GPS referenced image (fig.1). This image can then be dropped into our mapping software (GIS) along with any other maps or aerial photos for comparison.

This mapping software allows us to map changes in habitat and see the results of our practical conservation work.



Using drone photos to support our work

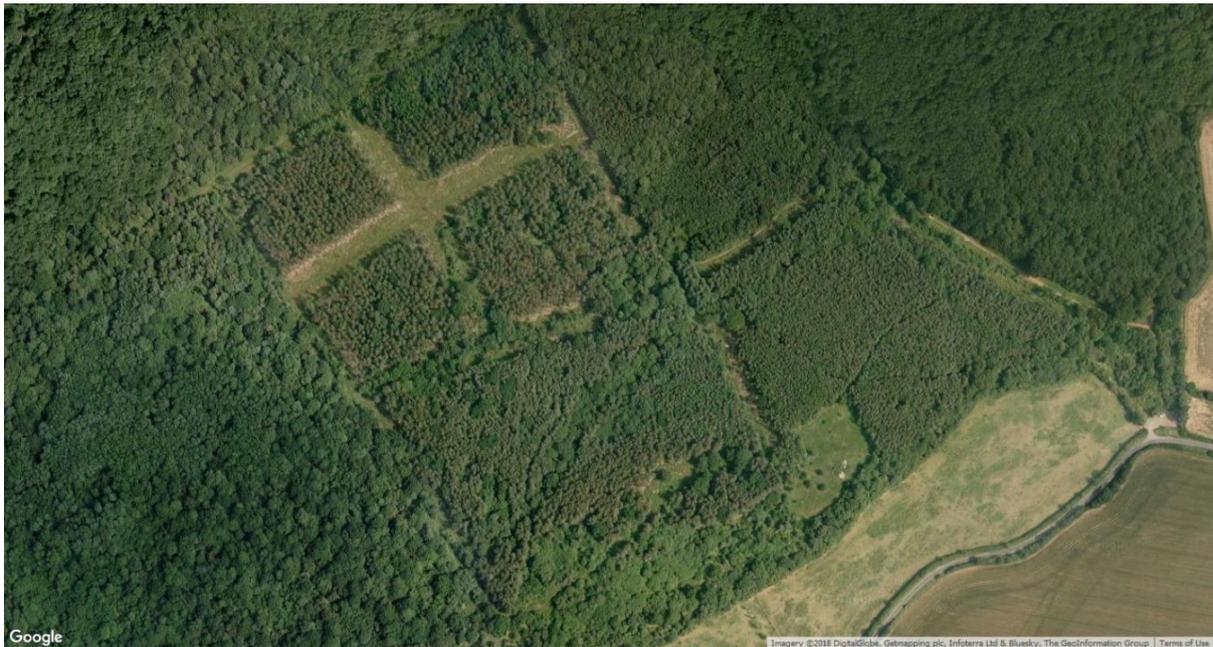


Figure 2 Google aerial image of same area in 2006 (© Google 2018)

This image (fig 2) shows the Google aerial image of the south-eastern area of Brampton Wood in 2006. There is an ongoing conifer removal and habitat improvement scheme in this area. The aim is to remove most of the dense conifer plantation and replace with a more diverse assemblage of native broad-leaved trees, rides and glades. The drone image from 2017 (fig 1) shows the current habitat. It is clearly very different – but requires a closer look.

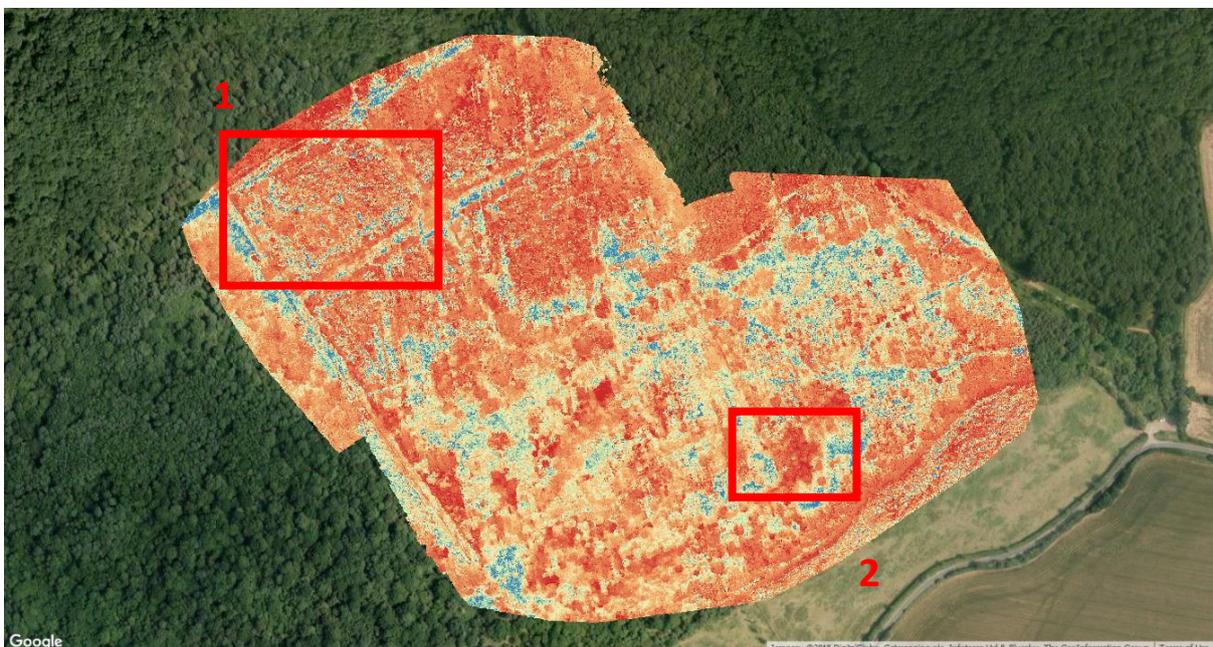


Figure 3 Visual Normalized Difference Vegetation Index (NDVI) image of same area (Wildlife Trust BCN drone)

This image (fig 3) shows the same area run through a specific image analysis (NDVI). In this case the analysis detects 'greenness' – showing the greener areas of live vegetation in yellow or blue. The



image was taken in winter, so broadleaf trees and areas of scrub are not in leaf – therefore they show up as orange or red.



Figure 4 Google aerial image of area 1 from 2006 – showing conifer plantation (© Google 2018)



Figure 5 Aerial photograph (orthomosaic) of same area, December 2017 – following conifer removal (Wildlife Trust BCN drone)

A closer look at area 1 (from fig 3) shows the difference in detail between the available Google images (fig 4) and the drone image (fig 5). This also dramatically illustrates the habitat changes that have occurred in the area known as ‘conifer cross’ between 2006 and now. The conifers have been completely removed from this area, with other tree species starting to establish.



Figure 6 Google aerial image of area 2 from 2006 (© Google 2018)



Figure 7 Aerial photograph (orthomosaic) of same area, December 2017 (Wildlife Trust BCN drone)

The two images above (figs 6 & 7) show area 2 in detail (from fig 3) - the glade is surrounded by a variety of tree species. The drone image again allows us to see these in much more detail – with deciduous trees showing as brown, and conifers green. NDVI analysis makes this difference even clearer:

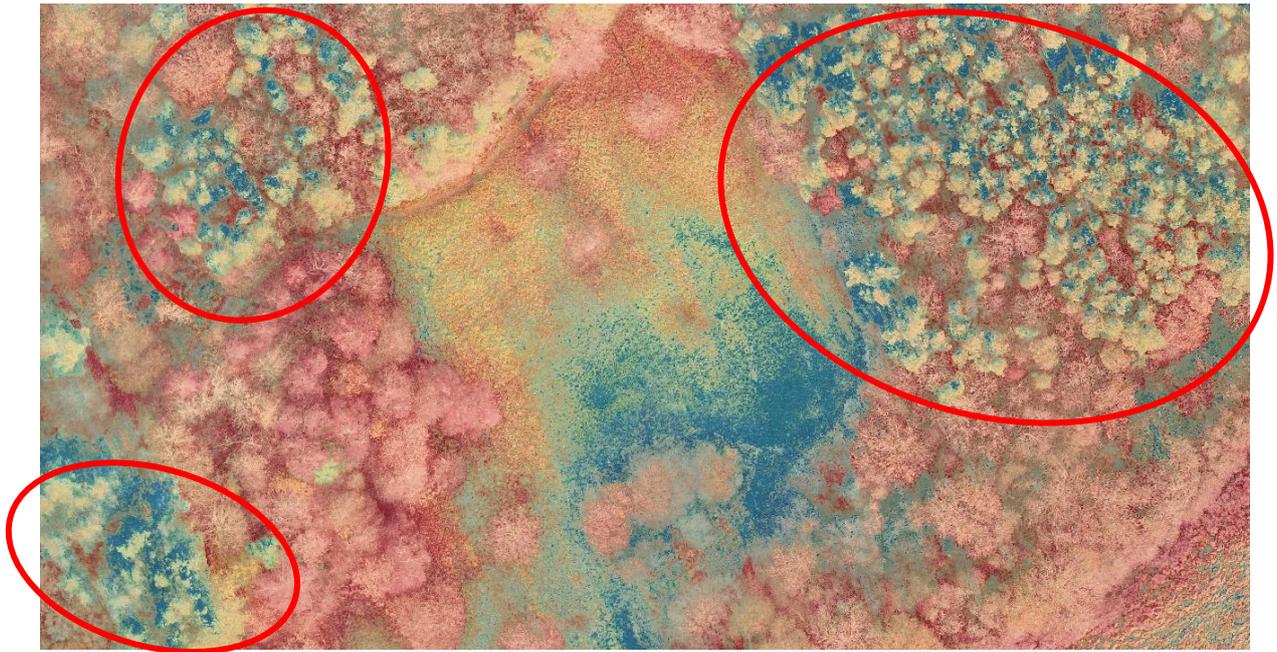


Figure 8 Visual Normalized Difference Vegetation Index (NDVI) image of same area. Remaining areas of conifers marked by red oval (Wildlife Trust BCN drone)

This image (fig 8) shows that mapping of the conifer is now possible even in dense, mixed areas of woodland. We can use the mapping software to draw around these and work out the total area:



Figure 9 GIS layer of drone survey area showing conifer in dark green

This information allows us to measure our progress and to plan future work in real detail.



What else can we do?



Figure 10 Panorama of Brampton Wood (December 2017) stitched from multiple flat images using spherical projection (Wildlife Trust BCN drone)

This image (fig 10) shows a panorama of Brampton Wood taken using the drone. To create this picture, the drone hovers at 200ft and rotates 360 degrees, taking multiple photos as it does so. We then use software to stitch these images together into a single photo. To create an attractive image, we use a *projection* that distorts the image but straightens the horizon as seen above.

These images are used to provide an overview that allows people to see much more of the reserve than they could from a single photo. These take a very short time to do, and are usually taken when we have finished doing the aerial photos of the reserve.

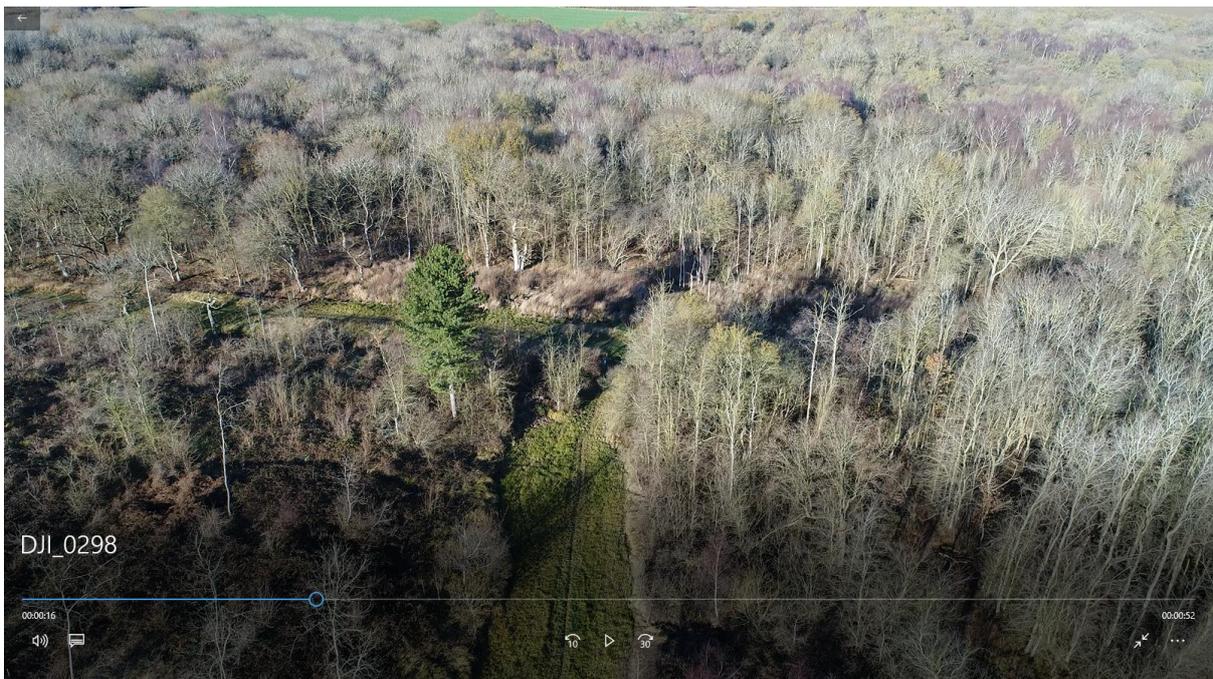


Figure 11 Still image from video footage - Brampton Wood Dec 2017 (Wildlife Trust BCN drone)

This image (fig 11) shows a still from video footage taken on the same day. We usually take some footage for future use once we have completed the aerial mapping. These videos have proved very popular with people who want experience our reserves from a new perspective.