

# Wallaby Survey – Thermal Imagery Drone Project

Ballaugh Curragh, Isle of Man

8<sup>th</sup> - 11<sup>th</sup> of January 2023



*Photo 1: Wallaby, January 2023.*

## **1. Introduction and background to methodology**

This methodology has been formed following three years of drone survey experience by the author ([BH Wildlife Consultancy | Drone services](#)) covering all the larger mammal species in the UK. The survey methodology presents an opportunity to capture the minimum wildlife population present, at a given time, quickly and effectively when compared to other terrestrial techniques available.

Thermal Imagery (TI) has developed rapidly in recent years in terms of image quality, unit size and relative cost. Equipping the latest TI technology onto drones has opened up our understanding of wildlife populations in terms of distribution and density. It has shown efficiencies in many areas, most notably higher detection rates and reductions in operational costs. When comparing this approach to other census methods the drone records actual numbers which are spatially mapped and represent a 'minimum population' on site at that given time. A similar approach can be achieved using helicopters but at high cost, high emissions and associated disturbance. It is possible that not every animal will be counted as this depends on the habitat and structure of the woodland and wider environment. Thermal Imagery relies on line of sight for detection but there are planning considerations that can improve efficiency and confidence when surveying. Planning and experience ultimately provide higher confidence levels on the data/output that is backed up by photographs that are date/time and location stamped within the images meta data. The best way to maximise survey coverage is to lay 1 km diameter circles over the area and identify suitable take-off/landing points. This requires clear air space to always allow visual line of sight of the drone. Generally when counting in woodland, all the counting will be done within the 1 km circle by the drone in a methodical way. Whilst the drone is legally limited to flying within the 1km circle under the CAA operational authorisation, the onboard TI camera can pick up heat sources over 1.5km away from the plot. As a rule of thumb, this methodology works extremely well for woodlands of <1,500 hectares where the area can be covered in a continuous session. Much larger areas can be covered in one continuous session where the habitat is of mixed structure e.g. open hill, agriculture land, woodland creation sites etc.

In the Isle of Man scenario, BH Wildlife Consultancy (BHCW) liaised with Manx Wildlife Trust to offer a survey that would give a baseline figure on the population of wallabies that could be present on the Island. BHCW has experience counting wallabies in two other locations on the mainland so knew what to expect in terms of the thermal signature that wallabies show. What was surprising was the density of the wallabies we found on the initial survey of Ballaugh Curragh, the decision was therefore made to repeat the exact same survey to get two baseline population counts of the core wallaby area on the Island.

## **2. Survey**

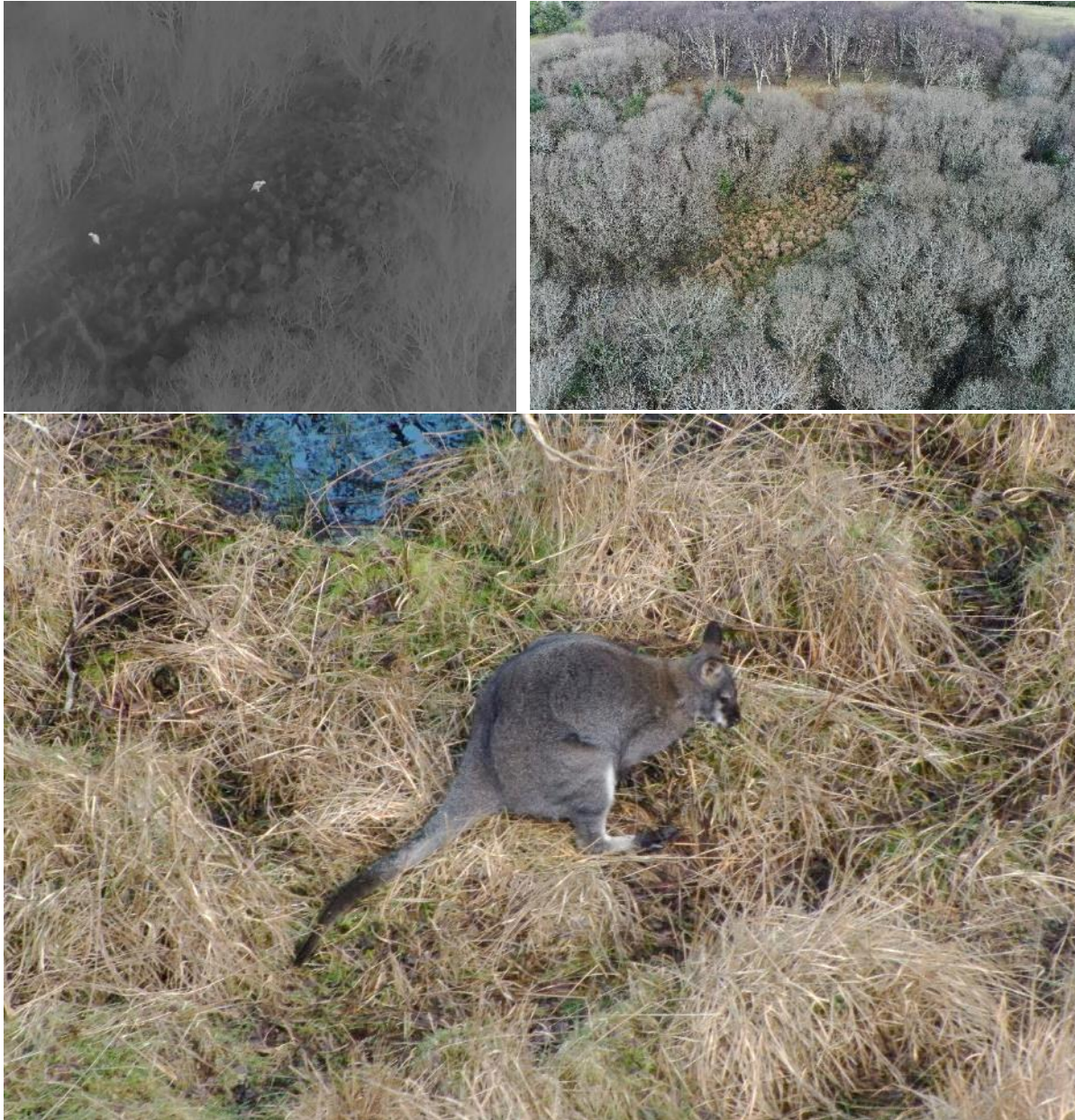
<b>Project</b>	Ballaugh Curraugh, Isle of Man
<b>Client</b>	Isle of Man Wildlife Trust
<b>Date(s)</b>	8 <sup>th</sup> – 11 <sup>th</sup> of January 2023
<b>Weather</b>	Weather was windy and unsettled but sufficient settled weather developed over the three days to allow two full continuous/complete surveys of Ballaugh Curragh. Wind was up to 30mph on both surveys with temperatures averaging 3-5 Celsius.
<b>Equipment used</b>	DJI Matrice M30T was the primary drone used for this survey.
<b>Number counted</b>	<b>Survey 1 – 563 wallabies</b> <b>Survey 2- 572 wallabies</b>

Two surveys of the Ballaugh Curragh were undertaken on the 8<sup>th</sup> of January (20:00-23:50) and the 9<sup>th</sup>/10<sup>th</sup> of January (21:00-01:30). The decision to repeat the count was taken due to the higher than expected figures obtained on the first count. Conditions were very similar on both nights and this meant accurate comparisons could be made. The following observations were recorded during the survey:

- There was high confidence the project area was covered sufficiently and that double counting was not an issue. Care was taken to survey the Area Special Scientific Interest (ASSI) area thoroughly and a mixture of dropped pins (feature on the drone) and locating previously recorded livestock/wallabies between flight points, meant that orientation and checking continually took place as the survey progressed to ensure no double counting.
- We observed that the wallabies did not move great distances over the time we moved between flight points and instead slowly grazed in the fields.
- Detection was excellent on both nights with wallabies, hares/rabbits and livestock all standing out clearly during the survey. Image below is an example – hare to the left of the image and a wallaby to the right of the image.



- Sheep were detected in a number of fields and are shown on the maps below (yellow square indicating sheep presence). Horses and cattle were also seen although to a lesser extent and therefore not recorded.
- Local knowledge allowed us to move around the ASSI and surrounding land quickly and effectively. Both surveys took approximately three hours with five flight points being sufficient to cover the ASSI area.
- TI photographs were taken of every group with some videos recording the largest of groups. There was no concern of mis-identifying species with videos being recorded showing sheep/wallabies and hares in the same video as a comparison.
- Sheep and wallabies were occasionally seen in the same field but typically the wallabies were detected in the highest number where sheep were not present.
- During daylight hours, a few samples were taken to verify the wallabies had returned into the ASSI area after the night survey. This gave an opportunity to get some daylight images.



An example of the image series taken during the daylight within the ASSI. The top left is of the thermal image spotting the wallaby, the top right shows the wide angle and the bottom is a zoomed in image showing the individual animal.

The maps below show the distribution of wallabies recorded between the two surveys. The pink dots represent each group recorded. Grouping took place where multiple wallabies were recorded in close proximity to each other.

## Ballaugh Curragh ASSI - 8th January 2023

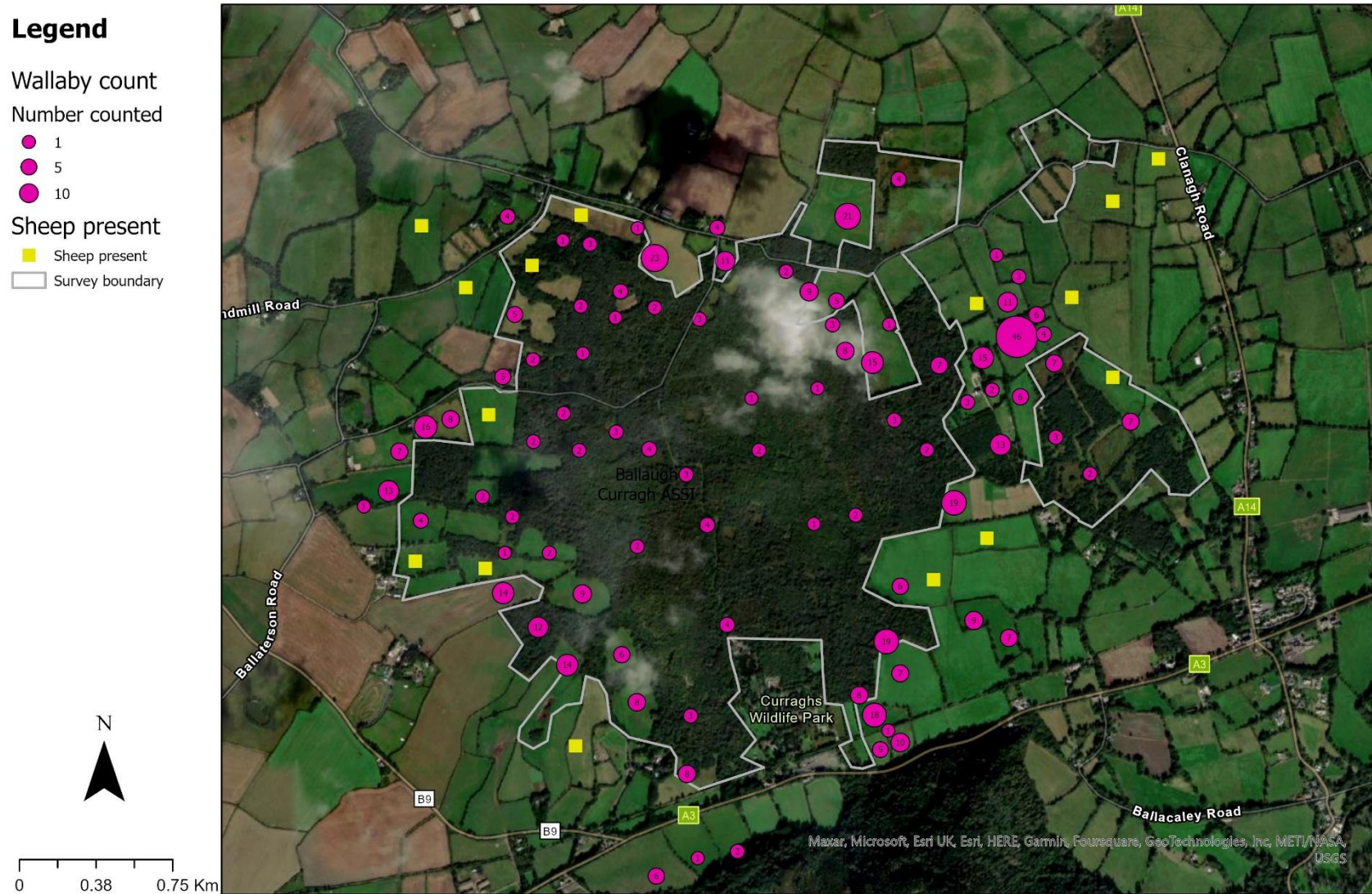
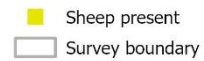
### Legend

Wallaby count

Number counted



Sheep present



## Ballaugh Curragh ASSI - 10th January 2023

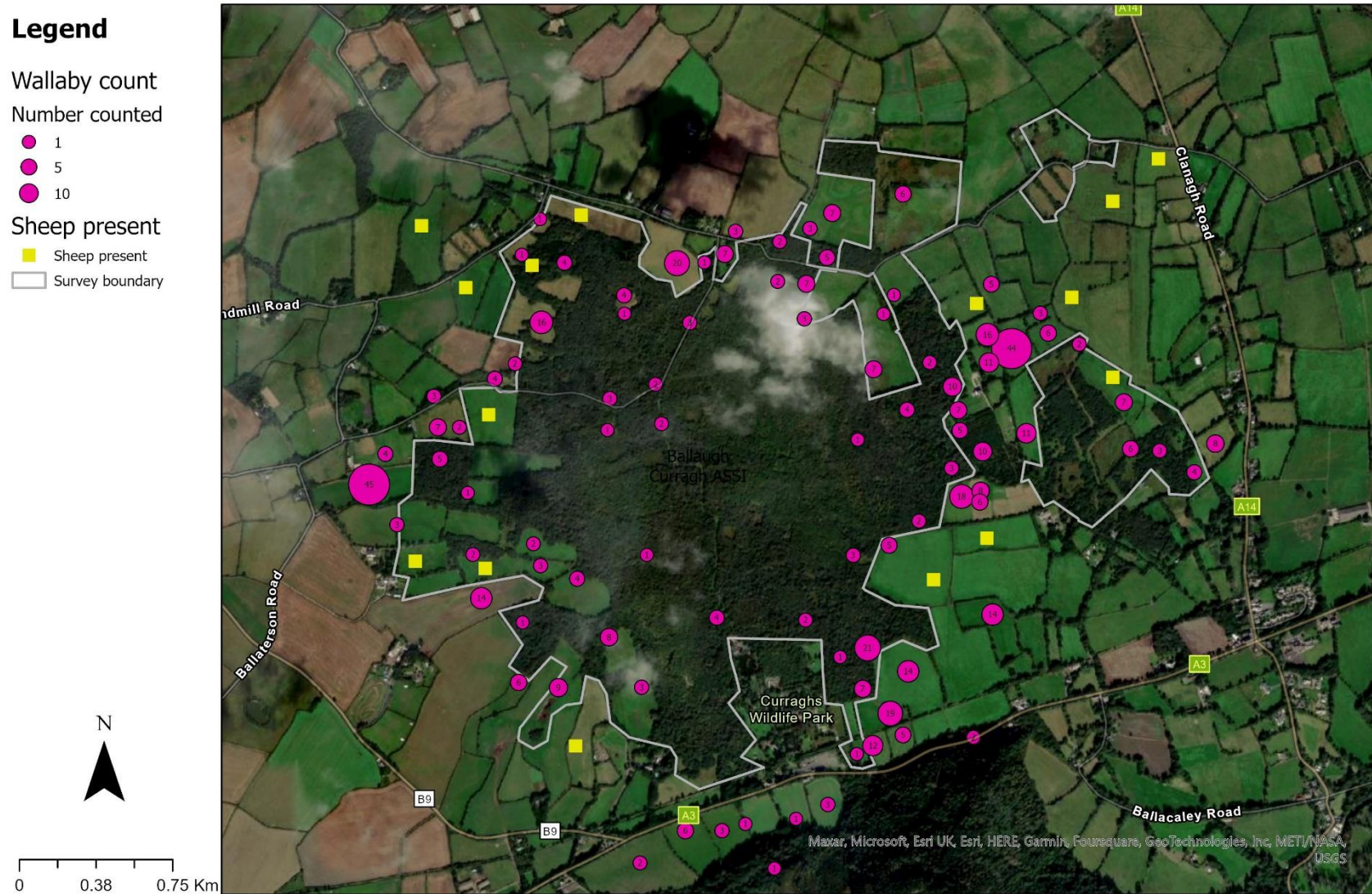
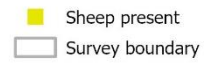
### Legend

Wallaby count

Number counted



Sheep present



### 3. Conclusions

There is high confidence that wallabies were not double counted, therefore the data presented is the minimum wallaby population present at the time within Ballaugh Curragh and the surrounding farmland.

The first survey on the night of January 8<sup>th</sup> totalled **563** wallabies detected across the survey area. The second survey on the 9<sup>th</sup>/10<sup>th</sup> January totalled **572** wallabies. These consecutive counts give strong confidence in the result and from the maps, show how habituated the wallabies are in their movement out of the ASSI to the same fields. In many cases, the exact number of wallabies were counted in the same fields between the two surveys.

The density of wallabies found was remarkable. Having a lack of comparable data in terms of densities and carrying capacity, means there is nothing comparable in the UK making this scenario unique. The ASSI is under 200 hectares and the total extent of the surveyed area (including the agricultural land) was approximately 400 hectares. With this in mind, the density of wallabies at night across the 400 hectares is over **140 per 100 hectares (1km<sup>2</sup>)**. This figure is likely to be higher within the ASSI during the day when the wallabies retreat after grazing at night. BHWC has only ever surveyed one other large mammal species at that density which was recorded with Muntjac in Norfolk.

There is clearly a distinct movement of wallabies from the ASSI area to the agricultural land surrounding the wet woodland. This is not dissimilar behaviour witnessed with other larger mammals such as deer, where the daytime behaviour is spent in cover and after dusk the bulk of the population feed out on to the field margins at night.

### 4. Recommendations

Following the thorough surveys of the Curraugh, it would be valuable to know how far wallabies have spread from this core area to other parts of the Island. This could be done by targeting similar wooded habitat and focussing on where other sightings have been confirmed. By doing so, you could get a more accurate total count across the Isle of Man. There would also be merit in repeating the Curraugh survey during daylight hours to assess the movement of the population back in to the woodland during the day.

Report by: *Ben Harrower MSc MICFor, BH Wildlife Consultancy* [www.bhwildlifeconsultancy.com](http://www.bhwildlifeconsultancy.com)