Thermal Imaging Deer Drone Landscape Census

West Dorset (Brit Valley)

February 2025

Photo 1: Falllow group, Brit Valley, February 2025

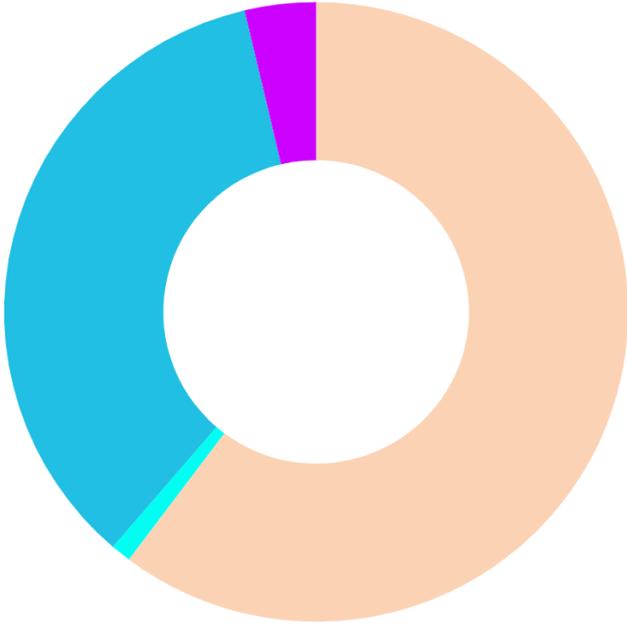## Introduction and background to methodology

This methodology has been formed following several years of wildlife census experience by BH Wildlife Consultancy (BHWC). It has successfully been used on all larger mammal species as well as birds across the UK and Europe. 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 a modern drone platform 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. It is likely 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 provide higher confidence levels on the data/output that are evidenced by photographs that are date/time and location stamped within the images meta data.

To maximise survey coverage, 1 km plots are mapped over the project area with suitable take-off/landing points being identified. This usually requires large clear air space to allow visual line of sight of the drone. Generally, when counting in woodland, the actual counting will be done within the 1 km circle by the drone in a methodical manner. 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 2km away from the plot. One operator can continuously cover sites ranging 500-2,000 hectares depending on the habitat present and the access around the site. BHWC often operate multiple operators/drones simultaneously to cover large landscape scale projects. Our data collection techniques and bespoke wildlife software ensure we collect accurate data and photographic evidence when carrying out all surveys.

During this project, BH Wildlife Consultancy liaised with Katie Read and Millie Forrest to make this project possible. Our thanks extend to all the farmers and landowners who accommodated and supported the team on site.

Project	West Dorset (Brit Valley) – 40.8km^2
Client	Katie Read & Millie Forrest – West Dorset Wilding
Date(s)	2nd February – 7th March 2025
Present on site	Ben Harrower (BHWC), Robert McCreath (BHWC), Glen Poland (BHWC), Jordan Tiernan (BHWC)
Survey Times, Weather and Detection Rate	**27th February 2025 - 6:00 - 14:30 hrs -** A bright, sunny day with almost no cloud cover resulted in some thermal detection limitations present by mid/late morning – particularly on south facing slopes and dense broadleaf woodland blocks. Nonetheless, deer were detected throughout every flight point, and were still quite visible through the thermal camera, especially in shaded areas such as northerly aspects and shaded forest floors.
Species identified and total numbers counted:	

Area km^2	Gross	40.8
	Exclusions	0.2
	Net	40.6
Total counted across survey	All deer	868
	Roe	304
	Sika	32
	Fallow	523
	Muntjac	9
Inside property boundaries	All deer	689
	Roe	255
	Sika	31
	Fallow	394
	Muntjac	9

A minimum of **166** livestock fields/concentrations were recorded inside and on the periphery of the survey area (this can be defined as an enclosed field with any livestock). These livestock areas are defined as a green square on the maps below and are recorded due to the impact livestock can have on deer distribution.

Species breakdown by percentage:	
Fallow deer 60.3% Muntjac deer 1% Roe deer 35% Sika deer 3.7%	

Deer fencing status	Deer fence observed around a small number of pheasant pens.

Survey Specific Observations	• There was confidence that the area the operators were able to survey was sufficiently covered. • Deer were grouped when they were detected within short distances of each other (e.g. <100m). They were recorded from group sizes ranging from **one up to 42** within the survey site • Deer were detected from up to 1km away from the drone from an oblique angle. • The survey was completed in a continuous timeframe and in a methodical manner. There are no concerns about double counting deer and in many cases, we were able to confirm the presence of previously recorded deer between different flight points due to the overlap. • **Flight points -** in total **59** flight points were undertaken to get the coverage required. Flight points are closer together where woodland is present, this is to ensure that Visual Line of Sight is maintained with the drone and that the woodland is covered sufficiently. Where there is open land e.g. agriculture land, the flight points can be further apart.

	• There was increased public activity around Stoke Abbott, with several dog walkers utilising paths on the edges of fields. Fewer deer were recorded in this area – likely due to the public presence. • Livestock fields were observed sporadically across the survey site, primarily consisting of cattle and horse pastures, with sheep detected in close proximity to deer within the same field. This is considered unusual and may be a result of pressure from culling or competition for grazing resources within the survey area. • There were some areas largely devoid of deer but this could be down to the high numbers of livestock fields and active farm activity across some of the sites. This would have, most likely, pressured deer away from these areas. A nocturnal distribution of deer would look very different.
Species Specific Observations	• **Fallow deer** were the most abundant species across the survey site and were recorded on the majority of flight points. The bulk of them were detected in the east of the landscape where there was typically more woodland cover. They were occasionally seen laying up in thick cover or grazing in the open fields and browsing along hedgerows. • **Sika deer** were recorded in small pockets in the east of the landscape and were observed on the move, crossing open fields or in small groups lying up within the thicker parts of the wooded areas located within the survey site. • **Roe deer** were well-established throughout the survey site, observed in a variety of habitats including open fields, hedgerows, and woodlands. They were typically seen in small groups, mostly consisting of one to three in a group. They were the dominant species in the west of the landscape where less Fallow and woodland cover were present. • **Muntjac** were occasionally detected within the survey site, primarily being observed in the dense understory of the wooded areas. These sightings were limited to areas with thick vegetation.
Safety and Access Observations	• No safety or access issues. Good communication with landowners and tenants while on site ensured access of all flight points was straight forward. One stalker was detected at 6am on one of the properties that may have influenced deer detection in that particular area.

• **Imagery** – all imagery is sent via WeTransfer. Any images taken during daylight hours have a thermal image, a wide-angle image, and a zoomed image of each deer group. Sometimes it is not possible to capture every single animal, but the vast majority are recorded on most surveys. Wide angle images will be deleted if any residential housing or people are inadvertently within the photograph frame. The image series below shows an example from the survey:

Fallow deer population breakdown

The sex of all Fallow deer was assigned in the field then subsequently analysed following a review of the imagery captured during the survey. In some cases where deer were detected at a great distance or in cover, an accurate record of the sex was not possible. In these cases, it was recorded as 'unknown'.
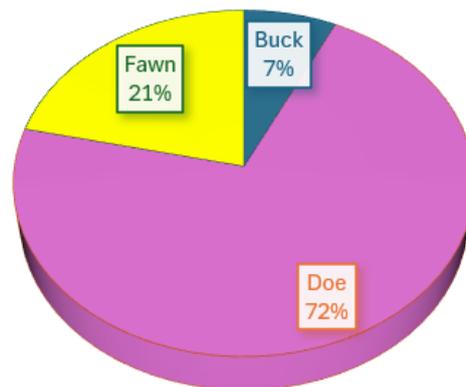

Chart 1: Fallow deer sex ratio across the survey area is shown above.

Out of the **523** Fallow deer recorded at the time of survey, **392** were included for the pie chart above; from this data **280 (72%)** were does, **28 (7%)** were bucks and **84 (21%)** were confirmed last year's fawns. The identification of last year's fawns becomes increasingly difficult at this time of year due to the size difference being minimal so there is a possibility the recruitment/fawn rate is underestimated. These figures point to a recruitment rate of 30%. It is very apparent that the West Dorset Fallow deer population is heavily female dominant.

Results and conclusion

There is confidence that deer were not double counted, therefore the data presented is the minimum population present at the time across the project area. The project area was **40.8km²** in size with **0.2km²** marked as an exclusion zone, with this in mind the following densities can be calculated:

Area km²	Gross	40.8
	Exclusions	0.2
	Net	40.6
Total counted across survey	All deer	868
	Roe	304
	Sika	32
	Fallow	523
	Muntjac	9
Density km²	All deer	17.0
	Roe	6.3
	Sika	0.8
	Fallow	9.7
	Muntjac	0.2

Colour coding densities: this colour coding density range is to help illustrate the density calculated following the TI drone survey. This is an approximate density gauge as there are a number of variables to consider before deciding if the population is low, medium or high. Key factors include food availability, habitat type, and the deer species present.

Low	**<4 .9 deer per km²**
Moderate	**5 – 9.9 deer per km²**
High	**>10 deer per km²**

It should be noted that this census represents an absolute population <u>minimum</u>. The deer densities in some of the areas is high but as Fallow are transient, it is highly likely that these figures could vary dramatically depending on factors such as food availability, pressure and seasonality.

Roe deer were found throughout the site and often increased where there was a decline in livestock and Fallow deer presence whereas Sika have established in small numbers having originated from the Poole Basin population.

This survey has established a minimum density of all four species present at a time of year when the population is near its lowest (close to the end of the culling season and prior to the summer recruitment).

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