

Feral Wild Boar and Deer in the Forest of Dean

Survey and Population
Projections in the Public
Forest Estate 2015

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Introduction and Methods

The populations of feral wild boar and deer were surveyed in the forest of Dean to assess changes in numbers since 2014. An assessment of the fertility of sows was also carried out to provide information to model future population projections.

The survey was effectively a repetition of previous surveys, with the exception that the survey area was extended to encompass some more outlying parts of the forest. The total forest area surveyed was 75.6 km², in comparison to 66.4 km² in 2014 and 61.6 km² in 2013.

Surveys were carried out at night between the 23rd February and the 15th April 2015. The survey area included the FC woodlands between Mitcheldean and Bream as well as Highmeadow (Figure 3).

The majority of observations were made with a FLIR Recon BF20 thermal imager, although a FLIR AWS thermal imager was also used on occasions. Population densities of Wild Boar were estimated using distance sampling (Buckland *et al* 2001), and distances to each group of animals detected were estimated from apparent body size.

Results

Thermal imaging survey

a) Wild Boar

In total, 76 sounders were detected during the survey, in contrast to 41 in 2014. However mean group size, of 3.33 boar per sounder, was lower than in 2014 (4.49).

The estimated number of boar was 1018 with a 95% confidence interval ranging from 696 to 1486. In comparison, the 2014 estimate was 819. However in view of the fact that the survey area has changed in each survey, changes in population density provide a more appropriate indication of rate of increase. The mean density of wild boar in 2015 was 13.3 Km⁻², an increase of 8.1% since 2014 (12.3 Km⁻²). The central part of the forest (42.6 Km²) has been included in all previous surveys and may therefore yield a more consistent measure of increase. In this area, estimates of boar numbers increased by 6.7%, from 16.3 to 17.4 km⁻² from 2014 to 2015. Trends in the estimated number of boar are indicated in figure 1.

As before, there was considerable variation in numbers in different parts of the survey area (see table 1 below) and some areas show an increase from 2014 whereas others show a decrease. This variation influences precision of the overall estimate: the 95% confidence intervals obtained on the current estimate of 1018 ranged from 696 to 1486, which embraces the 2014 estimate, indicating that it is plausible (although still unlikely) there has been no change in numbers at all. Nonetheless, it is recommended that the 2015 estimate of 1018 should be taken as a basis for management action since this represents the best current estimate of population size.

b) Deer

The number of deer estimated during this survey was 1038 (95% confidence interval 854-1262). The estimates of density, obtained from both the total survey area as well as the central area suggest a decline of round 6-12% in the last year, although the change is within the limits of the 95% confidence intervals (2014: 16.0 deer km⁻²; 95% ci 12.6-20.4; 2015: 13.7 deer km⁻²; 95% ci 11.3-16.7). In the central area, mean density declined from 18.1 deer km⁻² in 2014 to 17.0 in 2015.

Analysis of Wild Boar fertility

We examined a total of 153 reproductive tracts from sows shot between January 2010 and March 2015. The numbers of both corpora lutea and embryos per female increased in relation to body weight and date, with the highest fecundity rate being recorded for animals shot in midwinter. During the late summer/autumn period, many of the sows were not in breeding condition. There were a few animals breeding during the summer, between May-July.

An analysis of both numbers of corpora lutea and numbers of embryos per sow indicated some year-year fluctuation, even after allowing for the effects of body weight and date shot. Fecundity was lower in 2012 than other years. The reasons for this annual variation are as yet unclear, but may be a response to environmental conditions.

After adjusting for differences in body weight and date shot, the mean number of embryos and *corpora lutea* per sow were as follows:

Weight class	20-40	40-60	60+ kg
<i>Corpora lutea</i> per sow	5.5	7.0	8.8
Embryos per sow	4.3	5.1	6.1

These figures have been updated to include data obtained from the 2014-15 season and indicate that sow fecundity is a little higher than previously estimated.

Wild Boar population projections

The fecundity figures (number of embryos per sow) were used to model the population growth over the next 3-4 years. The following additional assumptions were made:

- a The birth sex ratio is 50:50;
- b The sex ratio amongst culled animals is also 50:50;
- c Peri-natal mortality rate is 25%;
- d Adult mortality rate is 19% per year. This figure includes animals killed on roads (RTA's). The RTA data suggest that it amounts to 5-10% of population size. However some additional losses can be expected due to unrecorded mortality.
- e The initial adult population structure was assumed to be the same as the structure of the culled animals.

The sex ratio of 791 animals culled over the last 7 years was 50.2% (% males) and amongst 39 fetuses that were large enough to be sexed, the ratio was 44.3%. Amongst recorded RTA's the proportion of males was 52.5% (261 animals). None of these ratios differ significantly from 50%.

The model was tested to compare the current population estimate obtained from the survey with an estimate obtained from the model based on the previous years' census results and the known mortality data. In 2013-14 and 14-15 the model yielded estimates 16% and 5% above census estimates respectively. These results are within the accuracy of the census estimates and suggest that the assumptions built into the model are realistic. However, they suggest that either population density, fecundity or survival rates (or all three) have been slightly under-estimated, or that some emigration is occurring.

The model indicated that a cull of almost 56.5% of the population is needed to stabilise the population at its current level. This would equate to a cull of 460 animals, if equal numbers of males and females are culled, in addition to RTA's. If the cull is below this, at levels imposed in 2013 (15%) and 2014 (43%), the population is expected to continue to increase (figure 3).

Changes in Distribution

The distribution of observations of wild boar during the 2015 survey are indicated in figure 3. Changes in the areal extent of observations of wild boar were measured by recording the number of 100ha quadrants in which wild boar were detected during survey. This has risen steadily from 6 in 2008 to 30 in 2014 and 43 in 2015, indicating a 25% increase in the last year, after adjusting for variation in survey area.

Comments and Conclusions

The population estimates indicate a further increase in numbers of boar this year although they suggest that the rate of increase has slowed, due to the increased culling effort. However the population appears to be increasing in distribution at a faster rate (25%) than the increase in population density (6-8%). If this trend continues, the management of the population will become increasingly dependent on whatever control efforts are being applied outside the public forest estate.

References

Buckland, S.T. Anderson D.R. Burnham, K.P., Laake, J.L. Borchers, D.L. Thomas, L. (2001) *Introduction to Distance Sampling*. Oxford University Press, Oxford.

Acknowledgements

We would like to thank the staff of the Forest of Dean and the Technical Support Unit (Forest Research), for help with this project.

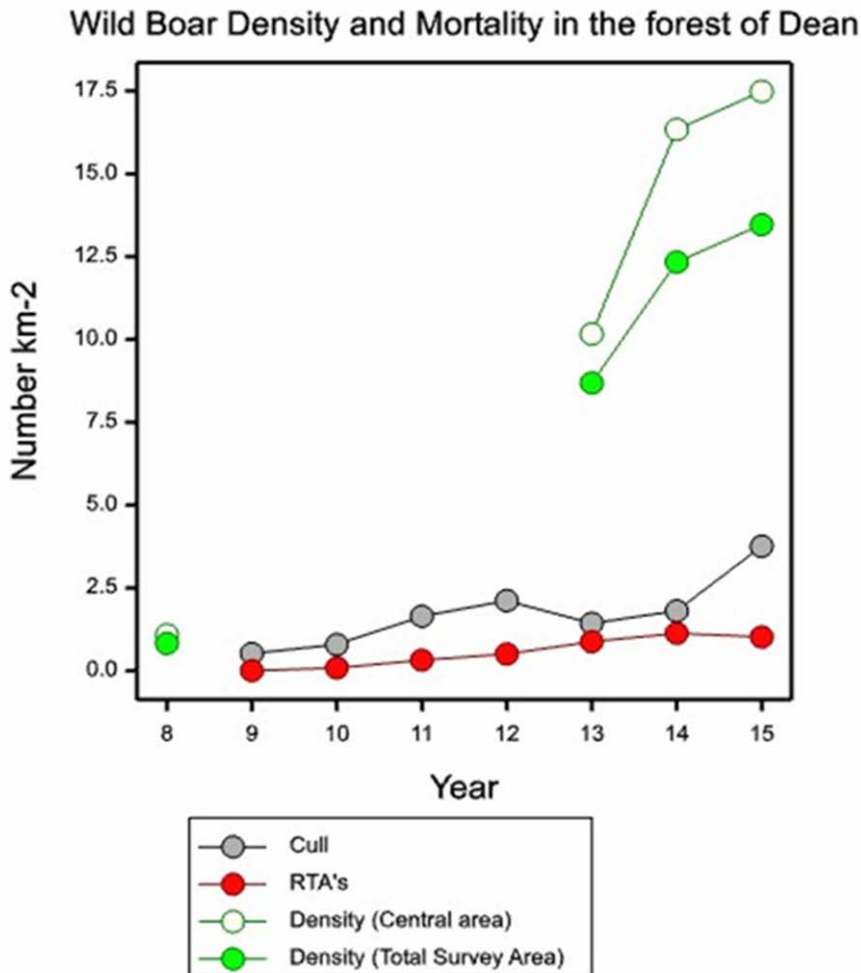


Figure 1. Trends in numbers of wild boar culled, killed on roads (RTA's) and census estimates, 2008-2015.

Table 1. Estimates of the numbers of wild boar for each block in the survey area. Area is expressed in km² and effort refers to the length of transect covered during survey in each block.

			2013			2014			2015		
	Blocks	Area	Effort (m)	Density	No.	Effort (m)	Density	No.	Effort (m)	Density	No.
Blake's Wood	D	1.5	1900	0.0	0	1900	0.0	0	1900	0.0	0
HighMeadow	H	12.0	25000	6.5	78	25000	25.2	303	25750	29.3	351
Huntsham Hill	T	0.9				1900	0.0	0	1900	17.8	15
Lord's Wood	W	0.8				4300	0.0	0	4300	0.0	0
Lea Bailey	X	1.4	3747	29.0	39	2262	0.0	0	2762	0.0	0
Wigpool Common	Z	2.5	4950	0.0	0	5450	8.3	20	5450	0.0	0
Flaxley	F	2.7	10500	3.1	8				10500	2.1	6
Haywood	J	3.3	6300	0.0	0	7550	6.0	20	7550	7.5	25
Lydbrook-Ruardean	L	3.9				5745	0.0	0	10320	9.8	38
Birch Wood	I	0.6	2400	0.0	0	2400	0.0	0	2400	14.1	8
Kensley	K	3.7	11450	5.7	21	10150	54.4	201	12250	1.8	7
Serridge-Crabt	S	4.3	10900	16.0	69	10900	12.4	54	14500	31.0	135
Sallows vallet	A	4.6	12700	6.9	32	11550	3.9	18	13550	4.1	19
Nagshead	N	5.4				11400	6.9	37	13250	3.4	18
Russell's	R	4.0	13900	11.7	46	13900	13.0	51	12600	5.4	21
Staple edge	E	1.0	2400	36.3	36	3150	14.3	14	3150	53.6	54
Blakeney Hill	G	1.6	4650	4.7	7	4650	0.0	0	4650	29.0	45
Middleridge	M	7.8	26000	15.5	121	25800	5.7	44	28200	11.2	87
Blaize Bailey	B	2.4	8900	14.7	34				8900	7.6	18
Church Hill	C	1.2	4050	0.0	0	4050	11.1	13	4050	36.1	42
Oakenhill Wood	O	2.1	5800	0.0	0	5800	19.4	40	6050	26.0	53
Cockshoot	Q	3.4	5200	0.0	0				8800	19.2	65
Noxon Park	8	0.8							2706	0.0	0
Parkend	U	1.9	5820	1.9	4	5550	2.0	4	6700	0.0	0
Kidnall&Norchard	V	2.3				4800	0.0	0	4800	4.7	11

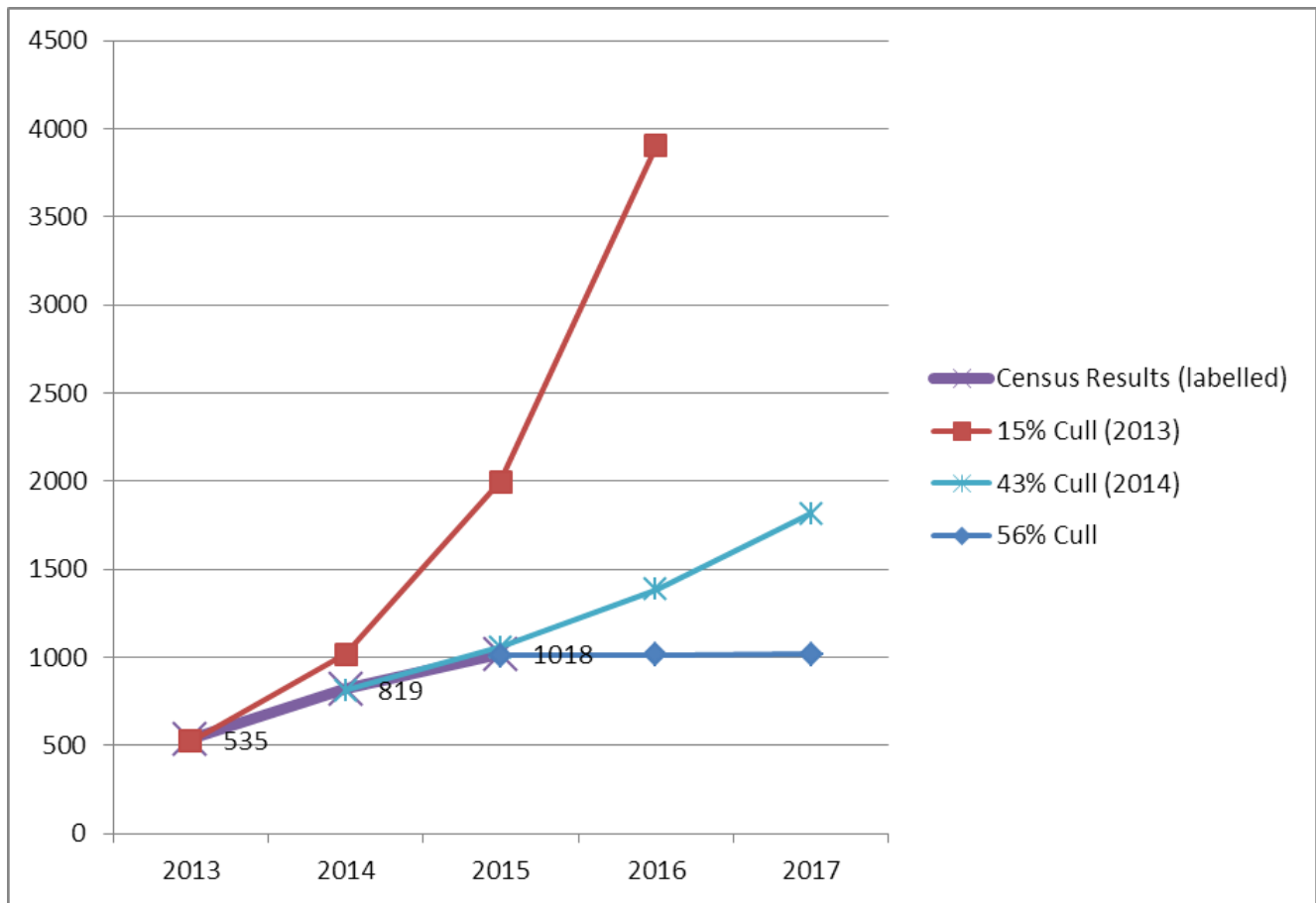


Figure 2. Population projections for wild boar in relation culling effort, expressed as percentage of population size.

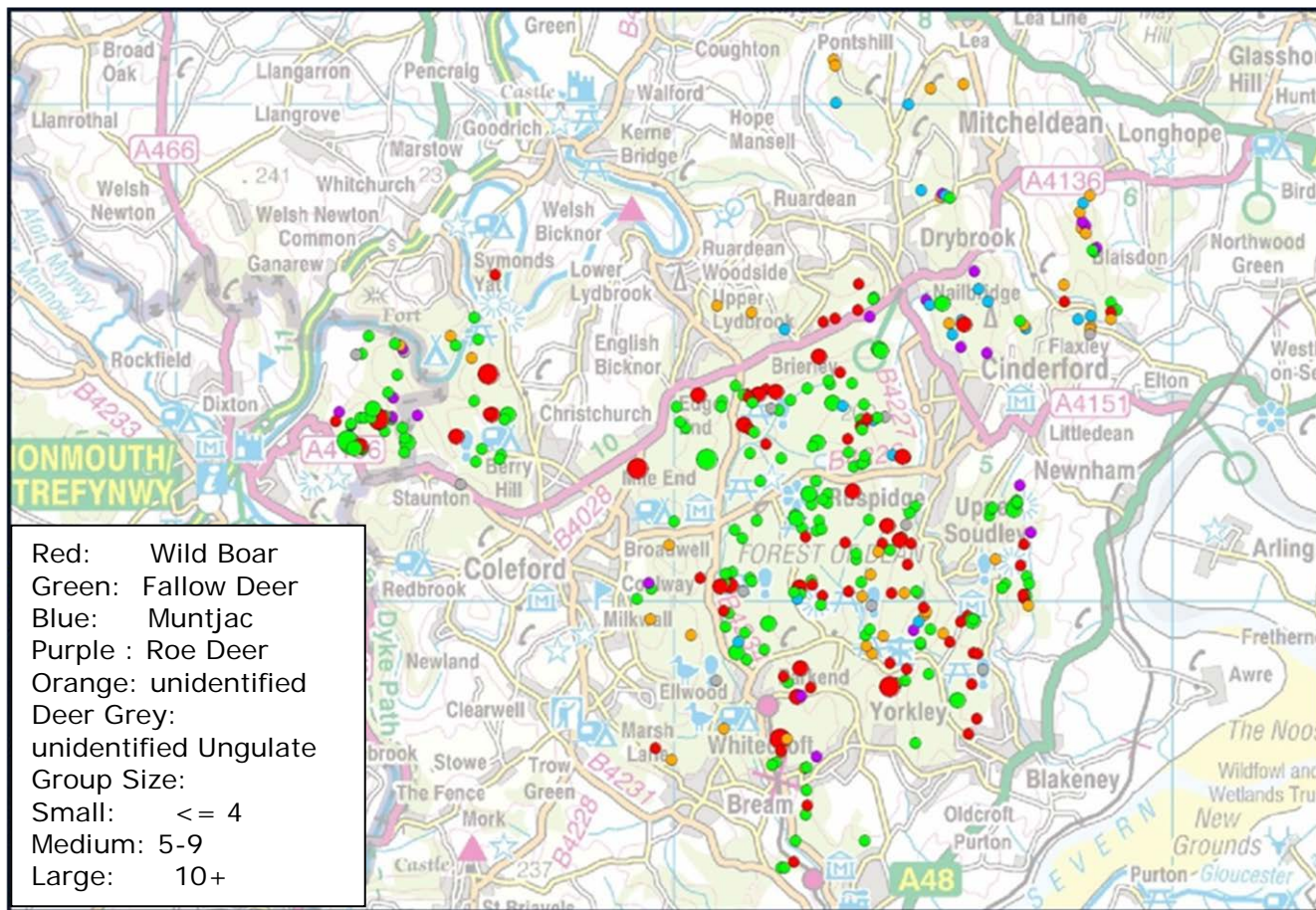


Figure 3. Locations of Wild Boar and Deer observed during the 2015 survey.

