The study of Woodcock Behaviour, Ecology and their Distribution in the New Forest

New Forest Woodcock Group

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Study Report Edited by
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NFWG Study Report 2014

Since the last Study Report of 2013 the New Forest Woodcock Group has had a highly productive year. Many of the smaller investigations that come under the Group's umbrella of aims are starting to produce preliminary results. Some of these early findings are fascinating with an element of contradiction with the Woodcock (*Scolopax rusticola*) textbook view point. The rigorous scientific methodology we have adopted dictates the need for a few more sampling seasons and so this report will give a flavor of the findings to date.

The winter ringing season again saw large numbers of Woodcock caught on the Forest. It was a particularly wet winter which did hamper ringing activity, but didn't affect the observation of colour-ringed birds and a weekly four-site census of feeding grounds.

With each additional August and September the ringing team are increasing the number of resident Woodcock that are colour-ringed. This pool of birds is highly important for the radio tracking study of breeding Woodcock. To be able to identify a resident Woodcock at distance in late winter when surrounded by migrant birds allows us to target and radio tag local birds long before they commence breeding.

Two sponsors have given substantial financial support to the Group this year. New Forest National Park Authority through their Sustainable Development Fund (SDF), and Paramo outdoor clothing company; have funded the purchase of equipment for the New Forest Woodcock breeding study.

This breeding study over the coming seasons aims to investigate aspects of courtship and nesting behaviour. Some of these aspects were trialed last summer and were reported on in the last Study Report. Updates are included in this report of their progress.

Radio tracking New Forest Woodcock through the breeding season saw a tremendous amount of effort from the Group members involved.

The National Woodcock Census of 2013 covered Britain and here in the New Forest we did our own using the national methodology. In 2014 this was added to. All one kilometer Ordnance Survey grid squares having more than 10% woodland coverage were surveyed for Woodcock roding activity using the national seventy-five minute method at sunset.

This Woodcock abundance survey covering the whole New Forest will take some time to tease out what the data is telling us due to the sheer amount gathered, but some of the early findings are given in this report.

Sponsors and supporters, past and present have put the New Forest Woodcock Group on a firm footing. Their financial input for study equipment along with the voluntary fieldwork from the members is slowly making great inroads into the ecology of our resident Woodcock. Slowly, because the Woodcock is not a bird that gives up its secrets easily.

2013-14 Woodcock Study Sponsors

New Forest National Park · Paramo Directional Clothing Systems · Marden Charitable Trust · British Birds · The Cornell Lab of Ornithology

New Forest Woodcock Adundance

The National Woodcock Census of 2013 was conducted through out Britain, but due to the comparatively poor coverage across the New Forest we carried out our own census using the national methodology. A total of sixty-six one kilometer squares were surveyed across the New Forest.

This coverage was added to in 2014 with all other kilometer squares that had 10% or greater woodland coverage. Each square's woodland area was established as a desk top exercise using detailed maps. Each square was assessed for percentage woodland, heathland, enclosed rough pasture/fields, urban, and road and rail coverage.

The New Forest Woodcock Group works across the New Forest crown lands managed by the Forestry Commission within the National Park. (Figure.1). A total of 286 kilometer squares constitute the Woodcock Group's 'crown lands' study area.

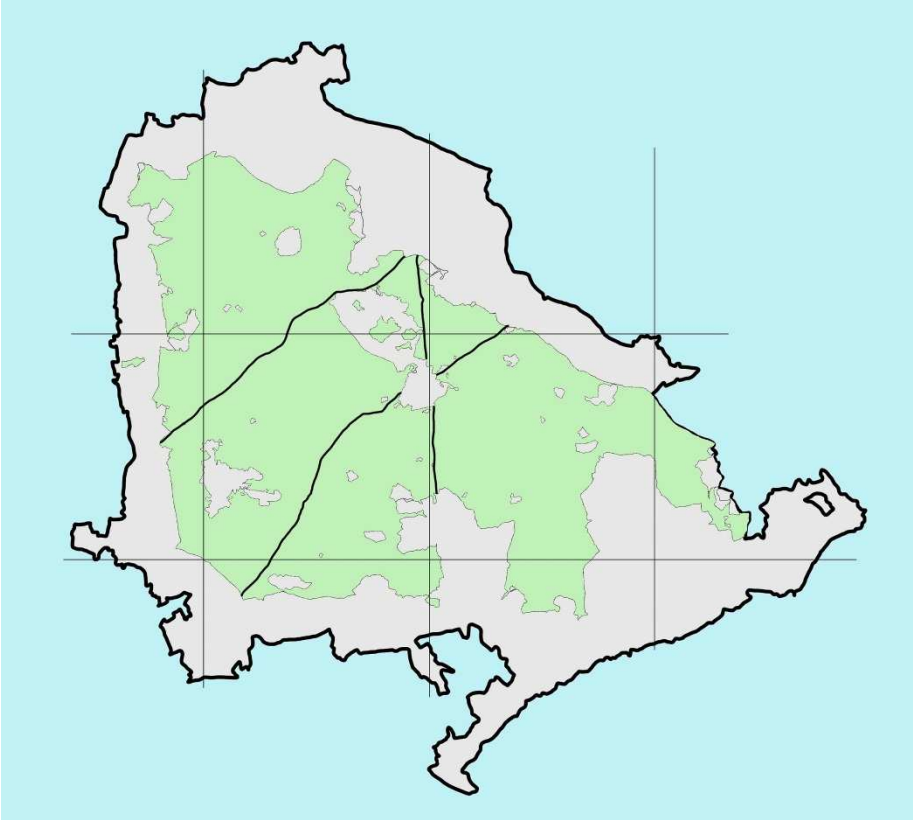

Fig 1. New Forest National Park area (bold line) with the Crown Lands study area (pale green). Major Trunk roads A31, A35 & A337 (black lines). Ten kilometre grid for scale.

Unlike the 2013 census method of three visits to the same square at least one week apart, the 2014 survey relied on one visit only to the new squares identified. In all other respects the method used for a one-day visit was the same as three-day visits and that method was detailed in the 2013 Study Report.

Due to the inherent variation in Woodcock roding activity at the same site, the one-off visits could only estimate relative abundance rather than a census count using the multiple visit method.

Sites with over 50% woodland coverage that returned a zero count in 2014 were revisited with a different observer to see if it was a true zero rather than due to other variables that result from single visit methodology.

Obviously the three-day visit method produced three roding counts so the maximum was taken as the value for that kilometer square when comparing with the one visit method.

Preliminary Results

The number of squares that have 10-100% woodland coverage across the study area was 226 (79%). (Figure.2).

A total of 225 kilometer squares were surveyed between May 1st and June 30th in 2013 and 2014. An additional six squares with less than 10% woodland coverage or are outside the Crown Lands study area are included in this analysis.

The highest count came from a 2013 site with 38 contacts. That site was again visited in 2014 for another study investigation (sound recording individual Woodcock) and attained 41 contacts. This unusually high number of contacts was shown not to be an aberration of 2013 as the high number was repeated in 2014.

The count total from each site (one kilometer square) was classified using five categories. Zero contacts, 1-5, 6-11, 12-20, and 21-38. These classes are termed None, Low, Medium, High and, Very High respectively (Table 1).

A basic analysis was performed and given here. Basic, due to the time available between all counts being returned and the publication of this study report.

The total counts for each class followed a normal one-sided distribution, namely many sites with few contacts and a few sites with many Woodcock contacts.

None	Low	Med	High	Very High
40 (18%)	95 (42%)	50 (22%)	27 (12%)	13 (6%)

Table 1. Total one kilometre squares in each class of Woodcock abundance.

Woodcock Abundance (cont'd)

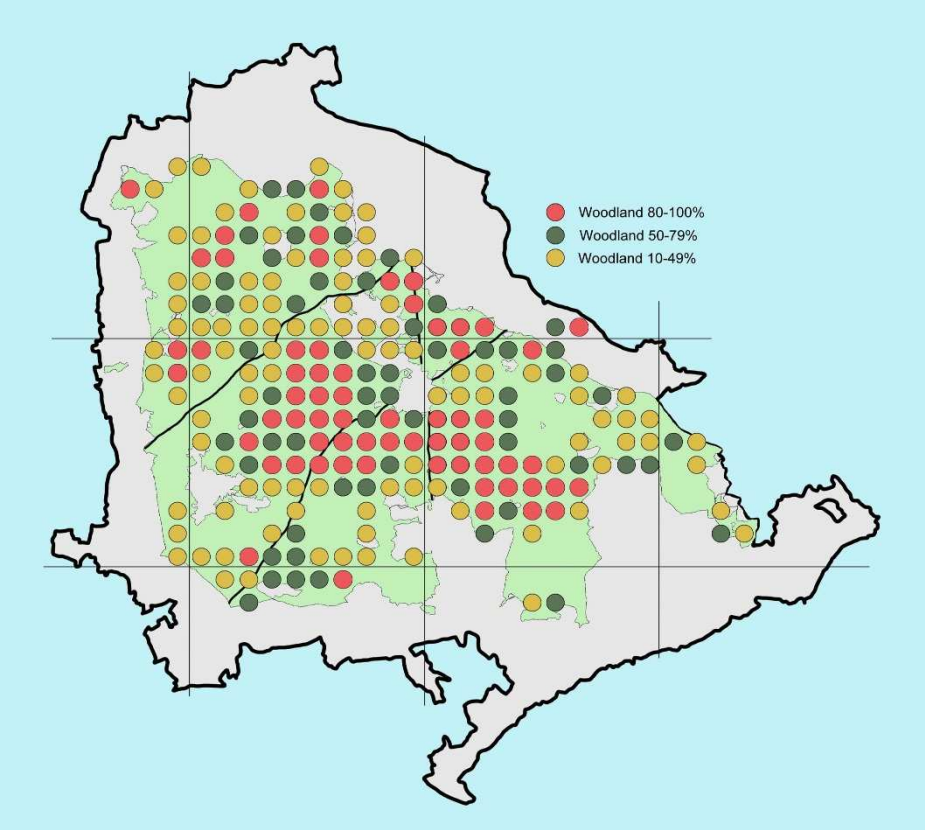

Fig 2. Roding Survey sites surveyed with associated percentage woodland coverage assigned to each kilometre square.

Woodcock were also seen in squares with comparatively small amounts of woodland coverage. The lowest was five contacts in 12% woodland coverage, but not all squares with high proportions of woodland had Woodcock present. Indeed, the highest number of contacts (38) was in a square with only 46% woodland and 56% heathland coverage.

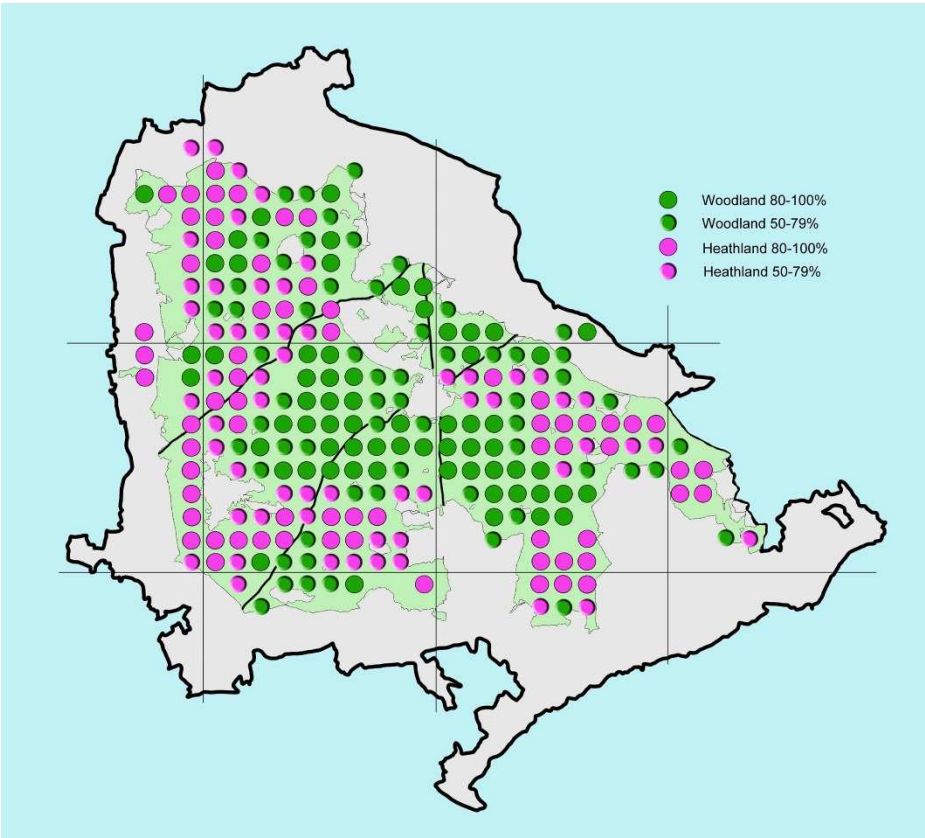

Fig 3. Distribution of woodland and heathland across the New Forest study

Studies elsewhere have stated Woodcock prefer woodland sizes greater than 80 hectares, or 80% of a one kilometer square. However, the New Forest is unique in its mosaic of woodland habitats in southern England which may reflect on the findings when compared with other areas. Early findings here show that Woodcock will accommodate smaller woodland blocks, but further analysis will tease out what it is about a woodland environment that Woodcock seek out.

The New Forest is a patchwork of woodland and heathland (Figure.3) and (NFWG Study Report 2012). It is the heathland and open habitats that the birds utilize for feeding during the winter. This habitat is therefore familiar to resident birds and due to its familiarity may constitute a larger proportion of their spring roding range than areas outside the New Forest where open feeding pastures are more restrictive and consequently woodland coverage in those areas may have greater importance through out the year.

Unfortunately, at this stage of the study the size of roding ranges in the New Forest, to compare with the scientific Woodcock literature, is an investigation in its early stages and therefore too early to report.

In addition the attributes within each square and adjacent squares may have importance which further analysis will tease out.

The distribution of Woodcock across the New Forest appears semi-random at first glance at the

Woodcock Abundance (cont'd)

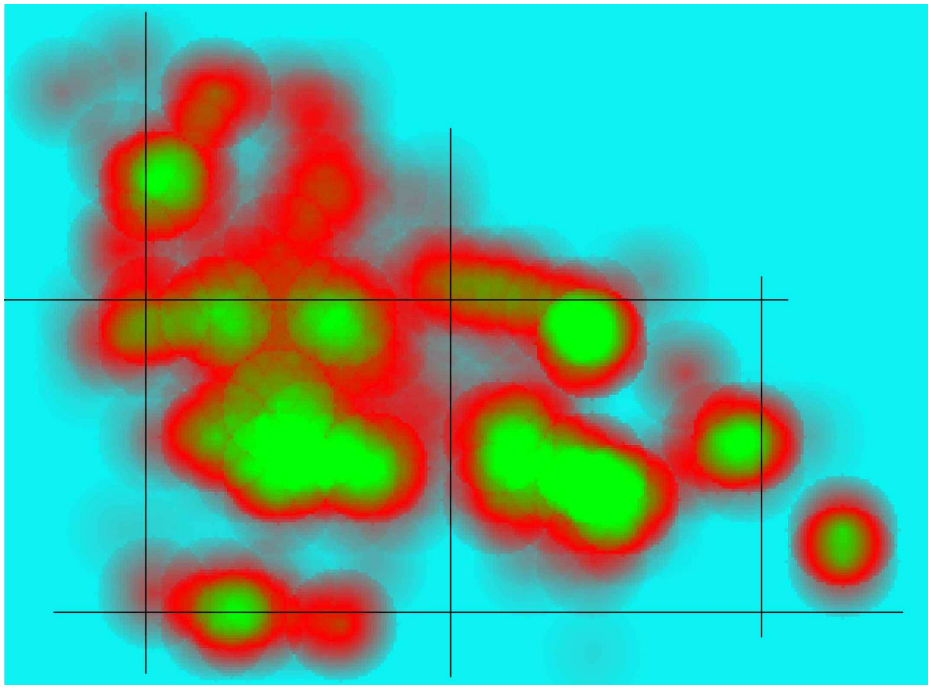

Fig 4. Hotspots of Woodcock abundance across the New Forest. Bright green indicates areas of greatest abundance through red, dark grey to pale grey with the lowest abundance. 10km grid for scale.

raw data. All the abundance classes are scattered across the study area with isolated squares of high abundance next to low and a lack of an associated series of contours of decreasing abundance moving outwards. The hotspots of very high abundance that do occur are not lumped together.

Taking the analysis beyond a simple 'eye ball' of the raw abundance data, we used kernel statistics associated with GIS mapping (Heatmap), so a better picture emerged (Figure.4).

Hotspots can be seen indicated by the vivid green, but they are isolated with solid rings of lower abundance (red) and even fewer Woodcock in the smudges of grey. The two larger hotspots are associated with the two largest blocks of woodland in the New Forest. Smaller 'doughnut' areas are also associated with particular woodland blocks that are not necessarily island blocks of woodland.

Certainly a higher abundance of Woodcock contacts occur in well wooded squares with a few exceptions.

The type of woodland coverage within each square can broadly be put into three categories; predominately conifer, predominately deciduous, and mixed with no overall dominance. These categories can be broken down still further by the type of tree management (commercial or natural) and whether on Open Forest or in enclosed land, but that is not done here for this early analysis of the data.

Using only the squares with greatest woodland coverage of 80% or above, the counts were analysed for each woodland type assigned (conifer, deciduous and mixed).

The average Woodcock count in each of the three basic woodland types suggest the conifer element was preferred and pure deciduous to a lesser extent (Table.2).

	Deciduous	Mixed	Conifer
Mean	6	13.4	10.45
Std.Dev	6.09	8.74	4.97
n	26	14	20

Table 2. Average Woodcock abundance count in three woodland types.

These are preliminary findings and the potential reasons for these observations will need a much more detailed investigation of the data.

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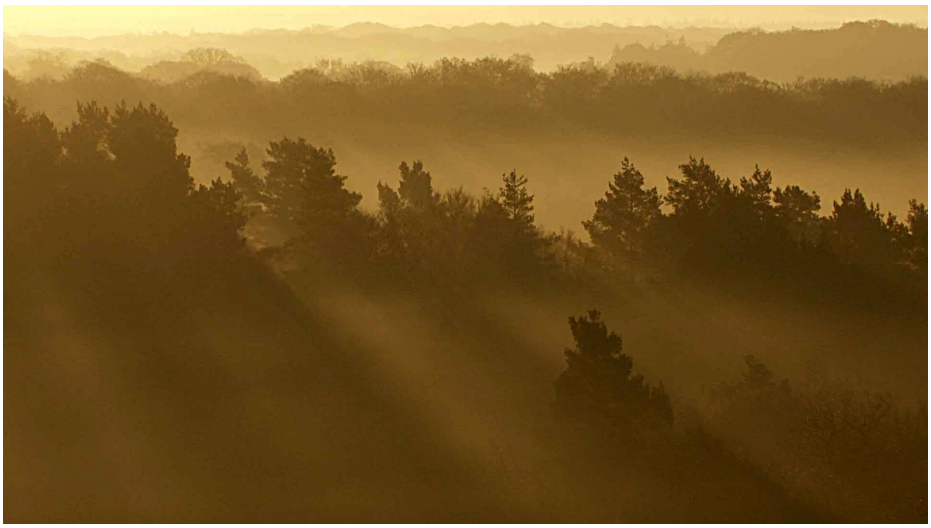

A autumnal view from Acres Down — New Forest

Feeding Site Faithfulness

In order to catch large numbers of Woodcock the ringing team concentrate on the nocturnal feeding grounds. This operation is permissioned and licenced through the Forestry Commission and BTO (British Trust for Ornithology) respectively. Every Woodcock seen or caught was plotted on a GIS map using GPS coordinates to the one metre accuracy. In reality the GPS device was rarely more accurate than three metres.

Woodcock ringed in the New Forest that are shot or found elsewhere and then reported to BTO, provide information on European bird movements. However, many of our Woodcock are recaptured here in the New Forest by ourselves and the information gained can tell us how the bird is surviving through measures of body size, weight, and body condition, but also where it turns up in the New Forest.

It has often been said in the past by Woodcock hunters that if you shoot a population too heavily they will decline and be lost from that area. More importantly, that area may never recover a Woodcock population. This suggests that individual Woodcock return to the same sites year after year and show a strong degree of site faithfulness.

The catching sites this study uses are distributed throughout the New Forest. Some sites are in close proximity, literally joined together, to test whether there is movement of birds between sites. With over 900 Woodcock ringed in the New Forest of which 129 birds have been recaptured one or more times up to March 2014, only four have been caught on a different site in the Forest. All other recaptures have been on the same site as first caught.

This has been backed up by our colour ringing. A certain number of sites are showing increasing proportions of colour ringed birds to non-colour ringed. Our increased ringing effort on these sites is mopping up these site faithful birds with only the newly arrived migrant juveniles and the 'hard to get adults' still to catch.

Recaptured Woodcock can be caught only tens of metres from their first capture location. Using all the recapture data (n=278) the distance between subsequent captures was measured for juvenile and adult Woodcock within the winter ringing season (Table.1) and those who return in following ringing seasons when juveniles become adults on their return. (Table.2).

Despite a high degree of variation shown, adults tend to be re-caught closer to the point of first capture. Returning juveniles who have become adults show greatest distance between captures that may reflect there change in status. Juvenile Woodcock visiting the feeding grounds in their first winter may be uncertain and move around the site, whereas adults have already chosen the area on the site best suited to them.

Further recaptures are needed to increase sample size and allow the study of juveniles who return for a second or third year as adults and thereby see if they settle to one discrete area on the site.

Table 1. Distance between subsequent recaptures in the same winter.

	Mean (m)	Std.Dev	n
Juv-Juv	450	451	49
Ad—Ad	204	178	18

Table 2. Distance between subsequent recaptures for returning Woodcock.

	Mean (m)	Std.Dev	n
Juv-Ad	545	989	17
Ad	265	265	12

Occupancy of winter feeding sites

The New Forest has two populations of Woodcock, the resident birds and the migrants that over-winter. The number that over-winter in Britain is generally considered to out number the residents by 9:1. Whether this is an accurate assessment for the New Forest is debateable, but the accuracy of this factor is part of the aims on how winter Woodcock use the New Forest and to what extent the area acts as a major destination for migrants.

Since the winter of 2011-12 the Group's ringing team have been counting winter Woodcock on the nocturnal feeding grounds. The 'standard' counting technique related to effort required is based primarily on 'man-hours' taken to walk a transect and is a widespread method used across Europe. While this method gives a basic standard, census and catching operations often occur together and the method does not easily take into account the time taken to process captured Woodcock which may be variable from night to night depending on how many are caught. The method used in the New Forest for effort expended is based on distance travelled along the transect to completion and allows flexibility in the time taken.

Modern GPS devices can track the observers transect and a captured bird does not alter the distance assuming the processing of the bird is undertaken at the point of capture. Most Woodcock ringers follow a set nocturnal course on sites that are regularly visited and so a standard distance or area covered was more appropriate.

Occupancy of winter feeding sites (cont'd)

For counting purposes a 50 watt Clulite Clubman 2 hand help lamp with a light-weight lithium battery was used. Woodcock eye shine could be detected at one hundred metres or greater, but a more realistic distance of seventy-five metres was used as a measure. Observing eye shine at a greater distance was achieved by holding the lamp to the bridge of the nose and looking down the beam, the closer the axis of eye and bulb, the better. In open habitats this gives a one hundred and fifty metre wide transect for a total distance recorded by the GPS. Care was taken to avoid overlapping the transects walked on the same site.

During the winter of 2013-14 four sites were selected for census work using a constant effort method. They were counted using a set transect, each week from August to April. Counts made in previous years across many more sites on an 'ad hoc' basis showed that once the migrants had arrived the mid-winter numbers seen on each site did not fluctuate much assuming no adverse weather was encountered. Therefore, from the second week of December to the end of January the weekly counts ceased as the prime objective was to investigate the build up and decline of Woodcock at the start and end of winter.

All four sites were at least five kilometres apart and comprise of rough grassland heavily grazed by livestock and surrounded by heathland.

All birds seen were recorded with a GPS location. In addition it's flushing distance was estimated, presence of colour rings, number of Woodcock in a group (<5m apart), proximity to livestock and proximity to livestock dung. These additional records relate to other studies the Group is conducting.

The actual counts from two sites are shown (Figure.1). Estimates of peak Woodcock density were calculated for the four nocturnal feeding sites and given as birds per 100 hectares — 98, 85, 122, 97. The areas covered were 41, 53, 23 and 35 hectares respectively. These densities are likely to be underestimates as it was highly unlikely that all the birds present were detected. A measure of detection rate does need further investigation along with open sites that offer little opportunity for feeding as a comparison.

Due to the size of each site, double counting may occur where flushed counted birds land further along the transect and are therefore counted a second time. This has been estimated in studies elsewhere and found to be roughly twenty percent. We may find that an underestimate from lack of detection and an overestimate from double counting may cancel each other out. These are variables that need investigation.

The two sites shown are given as examples of the two types of occupancy observed. Site 'M' had a relatively high number of birds from first occupancy in September. These would be resident Woodcock as the overseas migrants were yet to arrive in Britain. Site 'B' which was similar to the other two not shown, had relatively low numbers of resident Woodcock until the big influx of migrants in November. The big influx only increased the numbers on site 'M' by less than two fold, but on 'B' it was four to five fold. Not quite nine as mentioned earlier.

This resident bias on site 'M' was backed up by observations of colour rings during August-October 2013 and 2014.

There also appears to be a tendency seen in site 'B' with numbers declining quickly in March as the migrants depart, yet on the 'resident' site 'M' the drop off in numbers was much less marked. Possibly there were fewer migrants to depart and the residents did not disappear into the breeding woods all in one go.

Further analysis is required to tease out the nuances of the data. The ringing team found waves of birds arriving on migration, often defined by their composition; most being adult or alternatively juvenile birds.

Colour ringed birds were not seen every visit so there must be a turn-over of Woodcock. There may also be a suggestion that Woodcock are passing through the New Forest for sites further west. However, from nearly one thousand Woodcock ringed in the New Forest by this study, only three have been recovered west of the New Forest (Dorset, Hereford, and Portugal). Could it be that the New Forest is a major destination for Woodcock to over-winter?

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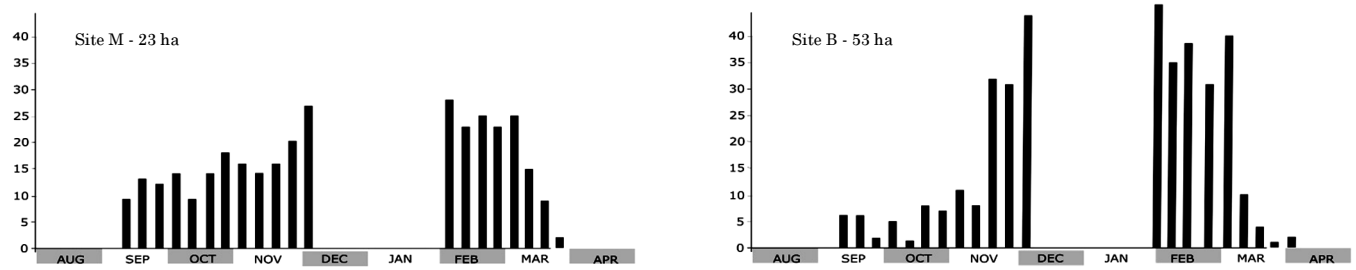
Fig 1. Weekly census of Woodcock on two nocturnal feeding grounds in the New Forest.



Are Calls of Love Drowned Out?

Two major trunk roads cross the New Forest, with the A31 carrying over 50,000 vehicles per day. The noise pollution from these can be immense depending on weather. During the 2013-14 Woodcock count several observers commented on the noise pollution as their squares were close to these major roads and they couldn't hear Woodcock calls easily unless they were overhead.

Woodcock Group member Marcus Hebbes reviews the research undertaken elsewhere on how excess ambient noise affects bird song.

While watching for roding Woodcock near to the A31 this summer, I was mindful of the challenges of hearing roding Woodcock over the road noise, and kept a careful eye out. There were few Woodcock seen, and where they were seen it was in the area furthest away from the road, along the woodland edge. I was also somewhat surprised to hear no Nightjar (*Caprimulgus europaeus*), either at my viewing point, or along the heathy path back to where I was parked. It struck me that for churring Nightjar and roding Woodcock that noisy locations are likely to be sub-optimal habitat, as if I couldn't hear them over the road noise, then other Woodcock and Nightjar would also find it difficult. It may be that the open ground in that square is too generally too wet, with not enough dry heath for Nightjar territories. I have heard plenty of Nightjar on the other side of the A31 in areas of drier heath with more gorse. If considered that if I was a Nightjar, with sound so socially important, I am not sure I would want the acoustic competition of the A31 quite so close, or perhaps they do not start calling there till later when the road quiets down. It is quite possible there were more distant Nightjar there, but the road drowned them out. Similarly for the roding Woodcock, why would they expend energy roding in noisy environments where the return on the investment was likely to be reduced.

Amanda Jobbins (BIOL 862: Plant-Animal Interactions Spring 2008) reviewed studies on effect of habitat on bird song. She reports that "Many studies report both between species and within species bird song divergence correlated with acoustic properties of the habitat. Song divergence can also be related to morphology, physiology, and life history. Research into bird song has found that lower frequencies travel the farthest regardless of habitat (Wiley and Richards 1982)...Related areas of research to the effect of habitat on bird song includes: the AAH (Acoustic Adaptation Hypothesis); the acoustic niche; and the effect of noisy environments on song. AAH states that animal calls should adapt to their environment. Specifically for bird song, AAH predicts that calls should possess rapid calls (trills) in open habitats and low rate calls (whistles) in closed habitats."

I noted that Wiley (1991, The American Naturalist, Vol 138, No 4, p988) states that the effective range of a sound depends both on its attenuation and on the background noise. So the acceptable range of frequencies would depend on the relationship of attenuation and background noise (after Brenowirz 1982, Waser and Brown 1984). In forests, the steeper frequency dependence of attenuation, in comparison to open habitats, would in general result in a lower upper limit of the band of acceptable frequencies, provided background noise levels did not differ markedly" Wiley's analyses found that dominant frequency used by birds had the strongest association with body mass, but that maximal frequency varied convincingly among habitats when body mass was controlled.

From these sources I deduce that Nightjar churring, at a higher rate trill, should perhaps be expected to be adapted to carry across open heath. With regards to Woodcock, it led me to consider whether the low rate grunts and whistles of a Woodcock are intended for different audiences. Perhaps the lower frequency grunt calls are adapted to penetrate the woodland canopy which they frequently overfly when roding, under which the receptive females are likely to be found, and perhaps the higher frequency whistles are adapted to communicate over a longer distance across the canopy and open space to other roding males as a way of maintaining a dominance hierarchy. While the whistles are higher frequency, they are also low rate, so they may also penetrate well through the canopy below. (Hirons (1980,1983) suggested that roding Woodcock establish a dominance hierarchy whereby one or two dominant males rode for longest each evening at a site and obtain most mating with females). Of course the grunts may be significant for dominance also, as logic would suggest that larger individuals may be expected to produce louder and deeper grunts, and this may be how dominance is communicated. I am not aware of any studies exploring how dominance is communicated in Woodcock.

Looking into the potential impacts of background noise further I found an environmental impact assessment for the Clocaenog Forest Wind Farm by the Hayes McKenzie Partnership Ltd which included a "Noise Impact Assessment for Nightjar Communication". This report states "The ability of Nightjars to

Are Calls of Love Drowned Out? (cont'd)

breed relies upon their ability to hear the mating calls of the male Nightjar. This call is commonly known as 'churring'. The introduction of the proposed wind farm will result in an increase in the noise environment amongst known Nightjar territories within Clocaenog Forest. At a certain distance from a wind turbine, this noise source has the potential to mask the churring calls, thereby limiting the communication distance at which a female bird may be able to hear its potential male partner." The report concluded that at "Nightjar territories in close proximity to the proposed turbine locations, i.e. within 150m from a turbine base, there may be a reduction of up to approximately 70-90% in the maximum communication distance" and at "Nightjar territory located at a distance of approximately 400m away from a turbine, there may be a reduction of up to approximately 50-75% in the maximum communication distance.

Henrik Brumm (Journal of Animal Ecology 2004, 73, 434– 440) has studied the impact of environmental background noise on the performance of territorial songs in free-ranging Nightingales (*Luscinia megarhynchos*). He concluded "An analysis of sound pressure levels revealed that males at noisier locations sang with higher sound levels than birds in territories less affected by background sounds. This was the first evidence of a noise-dependent vocal amplitude regulation in the natural environment of an animal. The results yielded demonstrate that the birds tried to mitigate the impairments on their communication caused by masking noise. This behaviour may help to maintain a given transmission distance of songs, which are used in territory defence and mate attraction. At the same time, birds forced to sing with higher amplitudes have to bear the increased costs of singing".

Per Nemeth et al (Proc. R. Soc. B 7 March 2013 vol. 280 no. 1754 20122798) "when animals live in cities, they have to adjust their behaviour and life histories to novel environments. Noise pollution puts a severe constraint on vocal communication by interfering with the detection of acoustic signals. Recent studies show that city birds sing higher-frequency songs than their conspecifics in non-urban habitats. This has been interpreted as an adaptation to counteract masking by traffic noise. However, this notion is debated, for the observed frequency shifts seem to be less efficient at mitigating noise than singing louder, and it has been suggested that city birds might use particularly high-frequency song elements because they can be produced at higher amplitudes" and "If dominant noise frequencies overlap the signal spectrum, the resulting acoustic masking may disrupt information transfer between individuals and communication may break down. In recent years, noise originating from human activity and its detrimental influence on acoustic communication received increasing interest, and several studies investigated whether and how animals can cope with this new man-made impact. Birds use multiple tactics to mitigate acoustic masking by noise originating from human activity. For example, Robins (*Erithacus rubecula*) in cities shift their singing activity more in the night to avoid noisy periods"

Parris, K. M., and A. Schneider (2008. Impacts of traffic noise and traffic volume on birds of roadside habitats. Ecology and Society **14**(1): 29) investigated the impact of traffic noise and traffic volume on two species of birds, the Grey Shrike-thrush (*Colluricincla harmonica*) and the Grey Fantail (*Rhipidura fuliginosa*), at 58 roadside sites on the Mornington Peninsula, south-eastern Australia. They found that "the probability of detecting each species on a visit to a site declined substantially with increasing traffic noise and traffic volume, with several lines of evidence supporting a larger effect of traffic noise" and they suggest that "traffic noise could hamper detection of song by other birds of the same species, making it more difficult for birds to establish and maintain territories, attract mates and maintain pair bonds, and possibly leading to reduced breeding success in noisy roadside habitats. Closing key roads during the breeding season is a potential, but untested, management strategy to protect threatened bird species from traffic noise and collision with vehicles at the time of year when they are most vulnerable to their impacts. Other management options include reducing the speed and/or volume of traffic on such roads to an acceptably low level." Theirs was the first study to investigate the effect of traffic noise on the singing behaviour of birds in the southern hemisphere".

It seems possible therefore that noise may be a factor in choice of location by Woodcock and Nightjar for display and breeding, particularly if the noise levels are high at the times of day key to their display, and the noise levels exceed the degree to which they can compensate for acoustical masking by varying vocal amplitude. Noise may reduce the number of pairs of Woodcock and Nightjar that otherwise suitable habitat can support in areas close to high speed high traffic roads.

It will be interesting to see if data from the New Forest Woodcock Group studies sheds any light on this area.

Woodcock Flight—Speed of Light ?

Those who have seen Woodcock take to the wing, know that from a sitting start they can disappear out of sight very quickly. There are obviously exceptions to the rule, generally their flight behaviour is adapted to their immediate needs.

Take-off is characterised by a powerful leg jump and fast flapping of the wings. By day they quickly adopt level flight through the wood with twists and turns around available cover. By night they adopt a vertical take-off to about 5-10 metres before heading off in level flight. This vertical approach appears to be due to the need to avoid vegetation on dark nights. Vegetation silhouetted against a night sky is more obvious that flying low and level through a wood in all but the brightest moonlight.

Estimates of flight speed have been measured by others, and we to, have had the opportunity to add to this. One radio tagged male would make regular 8km flights back and forth from day roost to night feeding grounds.

An observer with a radio tag receiver at take-off, and one at the distant feeding site, established a flight speed of 49.7 kilometres per hour (31 mph). However this was not a straight flight line as other observations showed it would fly around topographical features to follow valleys. Thus the 49.7 kph is likely to be a very slight underestimate.

An average migration flight speed of 31 kph (19 mph) was found by the GWCT 'Woodcock Watch' project. They also state a speed of 93 kph (58 mph) was achieved. However no details were given whether this high speed was a sustained flight or just short-term.

At the other end of the spectrum, Wikipedia states the American Woodcock (*Scolopax minor*) as the slowest flying bird at 8 kph (5 mph).

Roding flight speed of the European Woodcock appears slower than our winter estimate because the bird is not flying A to B as quickly as possible, rather it is trying to locate a suitable mate below.

Observations made while conducting the roding counts show the pattern to be variable. Roding males have been observed in our study to 'turn-on' the speed when seeing another Woodcock across a wide clearing. One bird was seen to change direction ninety degrees within a few wing beats, accelerate to chase another Woodcock it had seen over 200 metres away. Another was seen to chase a Nightjar (*Caprimulgus europaeus*) into a wood.

Observations also suggest that Woodcock tend to slow down and fly lower with fading light. This is something we are investigating to see if it can be measured.

One could argue that poorer light needs better visual acuity to spot a mate on the ground and so closer and slower may help.

Early in the evening with much better light levels, Woodcock appear to fly higher above the canopy and faster. Two suggestions could be attributed to this. Firstly, not all avian predators have gone to roost. Slower flight could increase the risk of predation.

The European Goshawk (*Accipiter gentilis*) has recently colonised the New Forest (2002—first breeding record) and evidence that they take Woodcock has been seen first hand in this study with a Goshawk seen feeding on a Radio Tagged bird 768 — April 2013).

The second suggestion to earlier faster flights could be due to these flights being more 'territorial' in nature, staking out a range early in the evening which could be patrolled at a slower pace later into twilight. Certainly on roding count sites where few Woodcock are counted, the first observation is generally later in the evening than sites with higher counts. One could argue that fewer birds in an area do not require an initial rapid fly around to stake out a range, unlike areas with a higher density of males.

More observations are needed on this particular topic which may reveal other scenarios.

There also appears to be a different style of flight when roding. Using video to record roding flight and playing back in slow motion an average of 230 full wing beats per minute was observed from early analysis across all birds recorded. The method used was to time ten wing beats along with any successive measures of ten beats while the bird was in sight (videoed). This was easy early in the evening, but later sampling proved more difficult due to video light loss. Infra-red cameras are being trialled to get over this problem.

Two types of wing beat have also been observed in slow motion playback.

One type is what could be considered the standard or full wing beat. Wings passing through the horizontal to about forty-five degrees either side of the horizontal on consecutive wing beats.

The second, is where the up beat stops at the horizontal and starts the down beat again and is alternated with each full beat.

This beat and a half technique increases the number of down beats yet the number of full beats remains around 230 per minute. This type of wing beat may be an adaptation for slower flight while patrolling for potential mates.

Much more investigation into this is needed in 2015.

MH

Game Shooting in the New Forest

Woodcock are classed a game bird with an open season in England from October 1st to January 31st. Part of the Group's Woodcock study is to look for accounts of past hunting pressure.

Forestry Commission Head Keeper, Andy Page, gives here an insight on the game shooting by Licencees of the New Forest.

As with much of the UK, the New Forest has a long sporting tradition. From its designation as a hunting preserve for the king over 1000 years ago the New Forest has seen deer, fox, and hare hunting with hounds, and falconry and rough shooting for feathered and fur game.

Today the land manager of these crown lands is the Forestry Commission and it is they who issue permissions on an annual basis to cover hunting.

Deer hunting with hounds ended in 1997 with the disbanding of the New Forest Buckhounds following the introduction of the Hunting Act, however the Foxhounds continue to this day hunting a false trail as do the Beagles. There are also two falconry clubs who are permissioned to hunt and fly on the Forest during the winter.

While the laws surrounding hunting with hounds have altered dramatically over recent years, those associated with sporting shooting have changed little and mainly in response to changes in legislation around the current or perceived status of certain quarry species.

The bogs heaths and damp woodlands of the Forest have always been a major attraction for wintering Woodcock and Snipe, and hunters have sought them out when conditions are right. Migrant Woodcock "falls" arriving around the time of the full moon in November from the north and east are a well- known fact and were eagerly awaited by the Forest's hunters.

The Forestry Commission permissions rough shooting on the Crown Lands through the New Forest Licencees Association. The licence issued to the association is restricted to twenty-five members, each paying an annual fee for the rights to shoot, and an additional historic honorary licence is given to the official Verderer of the New Forest.

All Licencees must hold a current and valid shotgun licence and currently possess £10 million public liability insurance. The licence also allows fishing in the Forest's rivers.

Quarry species are cock Pheasants, Partridges, Woodcock, Ducks, Canada geese, Rabbits, Woodpigeons, Squirrels, Magpies and Crows. Over the years some species have been added or removed from the quarry list. The old land leases where they relate to sporting rights still mention Black Grouse as a quarry species, although these are long gone from the Forest. Until the 1980's Stoats and Weasels could be shot, but no more. More recently Jays were removed from the list as they were deemed to be beneficial and instrumental in burying acorns and so aiding natural regeneration of the Oak tree. In 1981 all geese were off limits however Canada geese have now been added to the species list and can now be shot.

The decision in 2006 to remove Snipe from the quarry list was much more controversial. This had traditionally been a key quarry species for the New Forest Licencees, but due to the programme of wetland restoration across the Forest it was felt by some senior Forestry Commission staff to be difficult to reconcile when in discussion with restoration stakeholders. Although nearly all Snipe shot on the Forest were migrants from Northern Europe and not local breeding birds, it was still conceived as contradictory to our wetland restoration aims.

The tradition of rough shooting in the Forest is long standing and in the past the New Forest Keepers would rear and release a few pheasants for the sport of Licencees. In recognition of this and to reflect the difficulties of the times, the New Forest Licencees started a Widows and Orphans Fund, solely for the Forest Keepers and their dependants. With the advent of the National Health Service this fund became almost redundant, but still remains today, managed by Trustees and with regular accounts.

In order to monitor more modern sustainability of game species the licence was changed once again. The Forest was split into twenty zones, all marked on a map, and Licencees must phone the office forty-eight hours before their planned outing to reserve the zone they wish to rough shoot.. No zone can be shot more than twice in any week and no Licencee can rough shoot more than three times a week. Some Licencees are allocated a pond which they can feed to attract wildfowl and shoot once every two weeks through the season. A condition of the Licence is that game bag returns must be submitted at the end of each season. There is no limit to numbers shot, but Licencees adopt a voluntary code of sustainable shooting across the New Forest.

There have been varying fortunes of the Woodcock and Snipe population, and no doubt the Licencees, depending on your view, over a 70 year period. (Figure 1).

Although there are twenty-five Licencees, the exercising of the Sporting rights vary from individual to individual with some only go-

Game Shooting in the New Forest (cont'd)

ing out a handful of times in a season. Some would favour going after Pheasant or Woodpigeon and some would pursue the challenge of Woodcock. Some years when weather conditions are harsh the Forest can be almost devoid of birds including Woodcock and Snipe.

Rough shooting has always been challenging in the Forest's wet and wild environs and shooters work hard for the chance of a shot. With modern pressures and the current numbers of recreational users on the Forest, overall bag numbers have fallen in recent years. It is hard to imagine today's Forest yielding over 400 Snipe to shooters, as it did in 1936 and 1937, or the 220 Woodcock it did in1957.

Due to the variations in individual aptitude and resolve it is difficult to draw many conclusions from the bag records illustrated. It is obvious that during the war years many Licencees were otherwise engaged. Widespread drainage during the 50's and 60's may have been partly responsible for lower Snipe numbers during later years, but why so many Woodcock were shot in 1957 or so few Snipe in 1981 is hard to say. Some records may just reflect the determination of a core of fit and keen Licencees who consistently worked Woodcock or Snipe for a period of years, or just a particular season.

The comparatively small annual number of New Forest wintering Woodcock shot in recent years can be put into perspective when one considers the annual bag for Europe is around three million Woodcock with France and Italy combined shooting two-thirds of them.



Licencee C. Dallas with dog handler circa 1920's

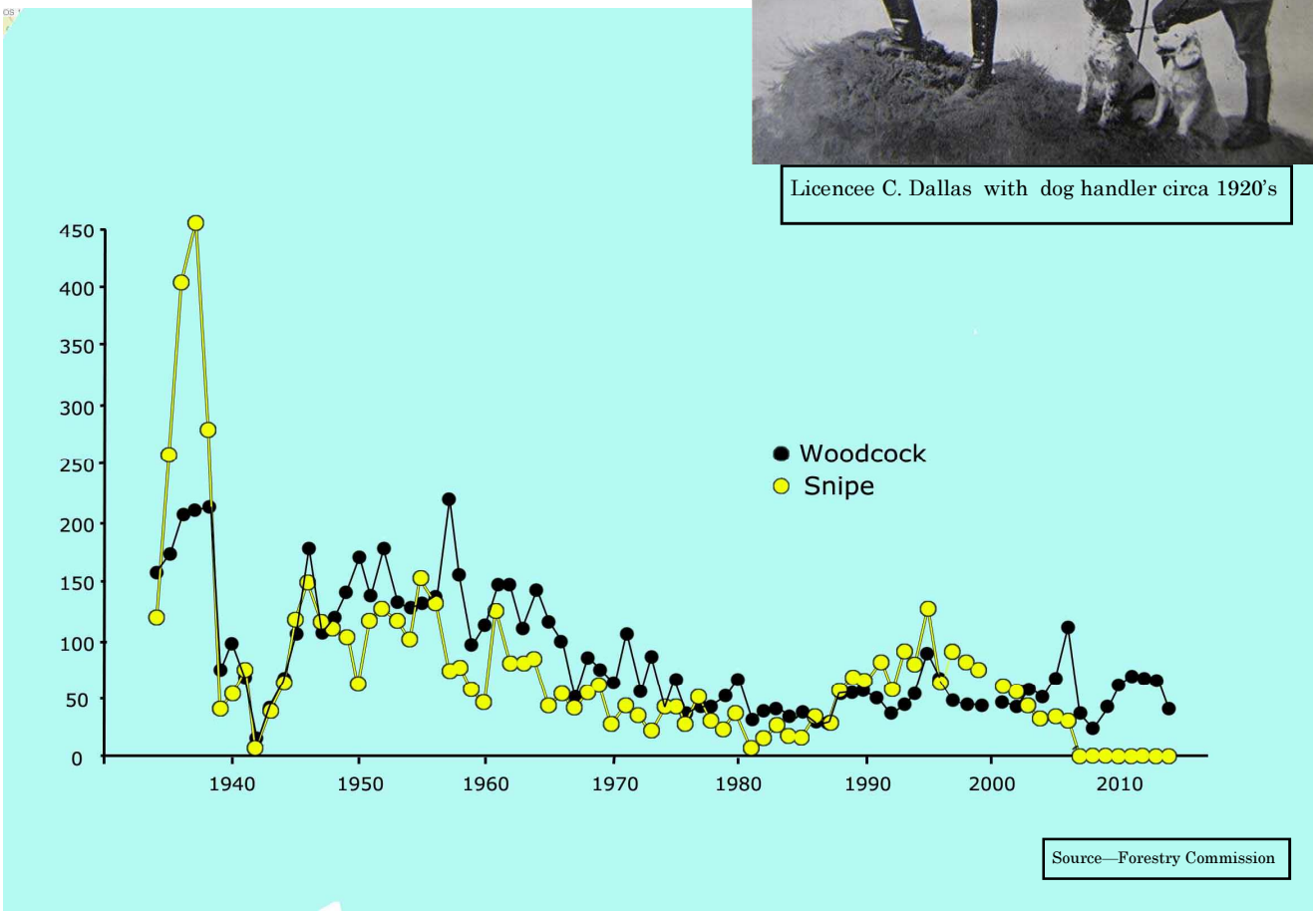


Figure 1. Game bag numbers for Woodcock and Snipe shot on the New Forest since 1934. (1999-2000 season data is missing)

NFWG—Third Ringing Season

This report covers 1st August 2013 to 31st July 2014.

The NFWG continued with the programme of ringing Woodcock, which began in December 2011. We use lamps and long handled nets to catch the Woodcock at night when they are feeding on the heaths and we add a uniquely numbered ring to the leg, with a return address on it, so if shot or found later, we will receive the details. We are also adding a colour ring, with a reflective strip, which allows us to see ringed birds without catching them. For each season we use a new colour.

The winter of 2011/2012 will be remembered as long and cold, while the winter of 2013/2014 will be remembered as the wettest since records began! This produced large pools (sometimes lakes) of water on the heaths which meant that not only were many of the Woodcock having to move off these very wet areas to find food but also that it rendered catching very difficult, as it is awkward trying to sneak up on a Woodcock while each footfall produces a "squelch"! Due to the amount of cloud cover while it rained it also meant the temperature was above average. In the past we have come to expect freezing conditions on the Continent in January and February but as this did not occur this winter we believe that many Russian Woodcock did not make the journey across the North Sea, possibly staying in Germany, Holland and France for this period. The dual conditions of wet heath and higher temperatures contributed to the lower numbers caught for this season.

In this third season we managed to catch 240 new birds and 31 retraps from the previous seasons (compared with 454 and 26 in second season, and 186 and 0 in first season). This retrap rate gives us our second return figure of just 4.8% (compared with 13.9% last season). This low figures supports the theory that few of the adult birds came back to the New Forest heaths to winter due to the mild weather. We shall have to see if the next season provides us with a colder winter and a higher retrap rate. The ratio of juveniles to adults caught was 148 to 92 (1.60 to 1) which compares with 1.1 to 1 in second season, and 1.35 to 1 in first season. This very high figure either meant that 2014 was an excellent breeding season, or the figure is anomalous due to the weather conditions and the arrival of fewer adults.

The graph overleaf shows the three seasons catch rates per month. Caution in the interpretation must be used as it is difficult to compare across years or even between months because the number of Woodcock caught is not expressed or correlated to the effort expended in catching. That data has been collected, but is not presented here. For example February 2013 & January 2014 there was much reduced ringing effort which could cause the apparent dip in numbers. However, broad generalisations can still be made from the graph, but with care.

It can be seen that the main influx is in November with a wave of young birds arriving. Some of these birds we catch in November are (perhaps) passage birds and we now have an interesting set of recoveries building up which shed a picture of movements of our ringed birds. We have so far had no overseas recoveries of birds shot *en route* to Fenno-Scandian breeding grounds – all the recoveries we have had for the April/May period are from Belarus and Russia. The initial conclusion we can draw is that the majority of our wintering population is from Russia. The table below shows the recoveries received in this last 12 month period. The first line gives the bird's ring number, its age (see codes below), and the date and place of ringing. The second (and third) line gives how recovered, the date and the place of recovery, how far it has moved, the direction, and the duration elapsed between ringing and recovery.

A limited amount of hunting occurs within the New Forest and five of the birds above were shot locally – this brings our grand total of birds shot locally to nine - from over 900 birds ringed.

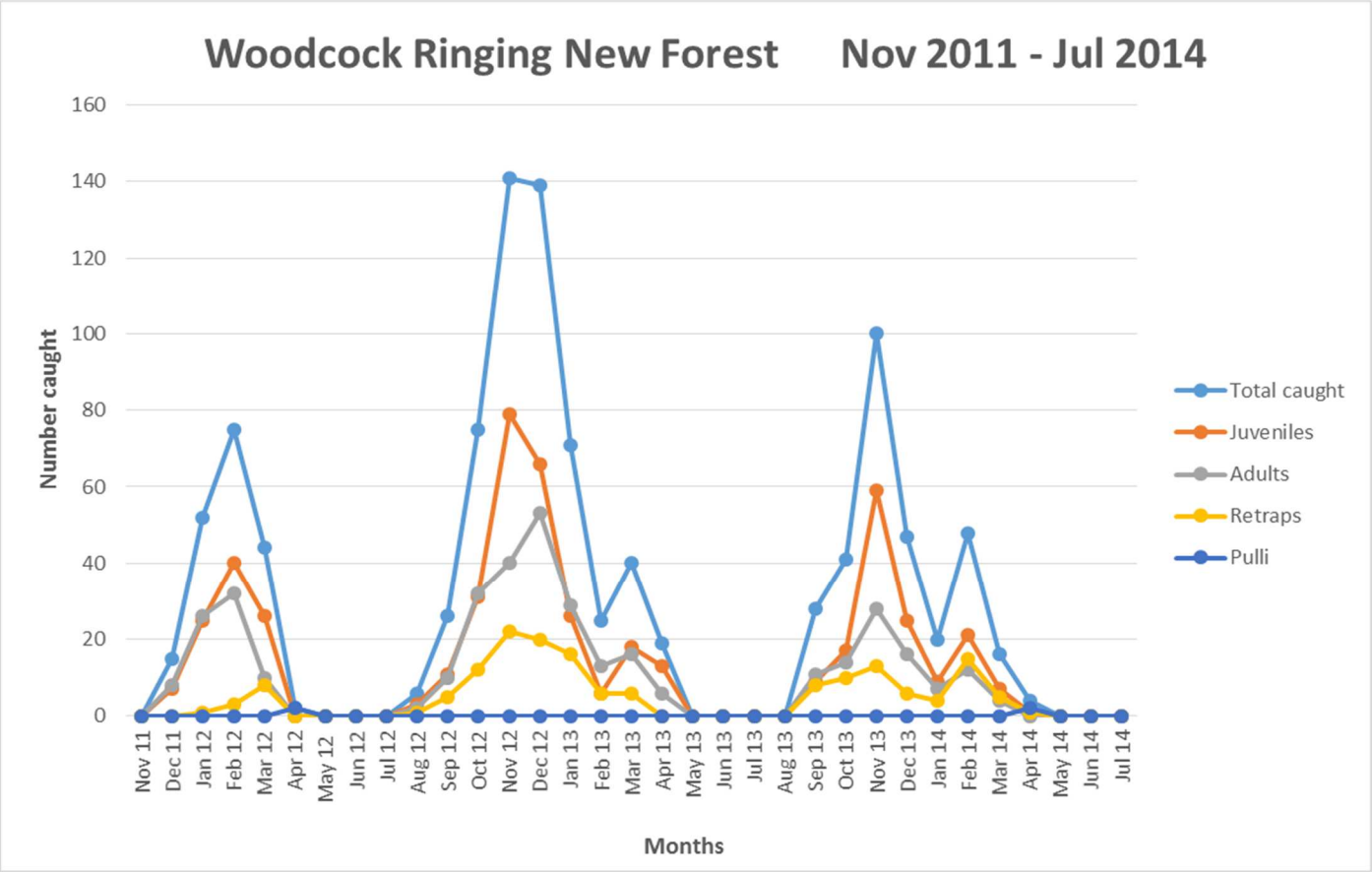
Recoveries (1 & 2) show birds moving out of the New Forest in subsequent winters to other areas relatively close by - perhaps due to local frosts or flooding, or are some birds not faithful to their initial wintering area?

Recovery (3) shows a bird moving to a totally different wintering area. It could have been still on passage when we first caught it?

Recovery (11) was shot in the late Autumn near the coast of France so may have been returning to winter in the New Forest.

Recovery (12) is a fascinating insight into a young bird moving south to Portugal. Caught in early November on the Forest it was recovered 38 days later. This is only the second recovery of a British ringed Woodcock in Portugal in over 100 years of ringing - the last was in 1935 and was a chick ringed in Scotland. This 1935 recovery is the furthest south a British Woodcock has ever been recovered (our bird was recovered a little further north). Was EY38194 (12) also a British bred bird moving south? Could it even be a New Forest bred bird?

As you can see from the recoveries detailed we now know a lot more of about the movements of New Forest Woodcock - but there is still so much more to learn! **NRJ**



NFWG Ring Recoveries

Table of ring recoveries from between 1st August 2013 to 31st July 2014.

The first line for each 6 figure alpha-numeric ring number shows the detail of when and where first caught and subsequent lines show when and where that Woodcock was recaptured or recovered dead.

NFWG UK Recoveries—Long Range

1)	EY10719	3	02/12/2012	Ocknell Plain, New Forest: (SU2412)		
		+F	17/01/2014	Rempstone, Poole Harbour: (SY9985)	36km	1 yr 46days
2)	EY10800	5	08/01/2013	Longcross Plain, New Forest: (SU2415)		
		+F	21/12/2013	Tichborne: (SU5730)	37km	347 days
3)	EY38102	3	28/12/2012	Holmsley, New Forest: (SZ2299)		
		+F	07/12/2013	Copse Wood, Kentchurch: (SO4225) (Herefordshire)	150km	344 days

NFWG UK Recoveries—Local

4)	EX83959	3	20/12/2012	Stockley Cottage, near Beaulieu Heath: (SU3401)		
		R	27/09/2013	Denny Lawn, New Forest: (SU3405)	6km	281 days
5)	EY10721	3	02/12/2012	Ocknell Plain, New Forest: (SU2412)		
		R	23/11/2013	Ocknell Plain, New Forest: (SU2412)		356 days
		+F	27/12/2013	North Bentley, New Forest: (SU2413)	2km	1 yr 25days
6)	EY10570	4	22/08/2012	Ocknell Plain, New Forest: (SU2412)		
		R	17/10/2012	Ocknell Plain, New Forest: (SU2412)		56 days
		+F	06/01/2014	Fawley: (SU4603)	24km	1 yr 137days

NFWG Ring Recoveries (cont'd)

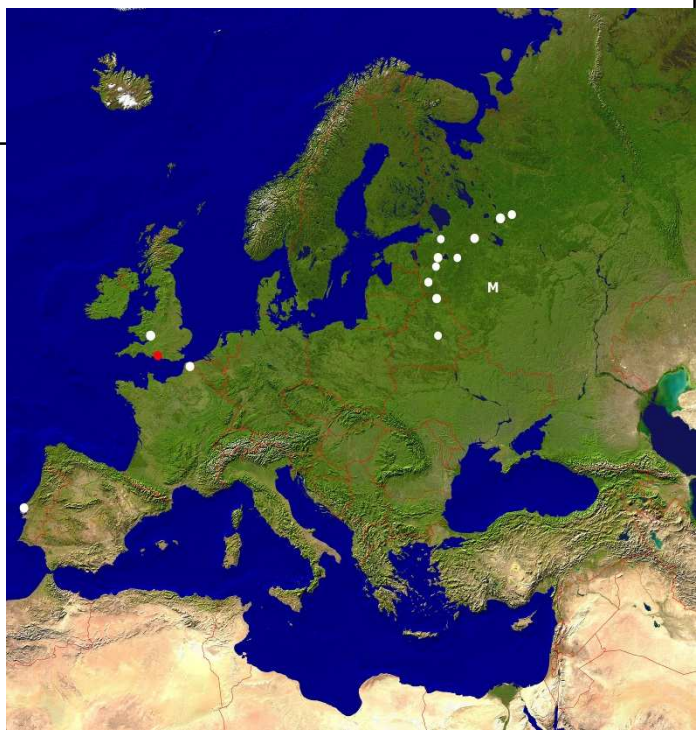
7) EY10612	5	27/02/2012	Ocknell Plain, New Forest: (SU2412)		
	+F	29/01/2014	Holly Hatch, New Forest: (SU2211)	3km	1 yr
8) EY38069	3	21/11/2012	Ocknell Plain, New Forest: (SU2412)		
	+F	31/01/2014	Bisterne, New Forest: (SU1600)	13km	1 yr 71days
9) EY38225	4	24/11/2013	Matley, New Forest: (SU3407)		
	+F	15/01/2014	Denny Wood, New Forest: (SU3207)	2km	52 days

NFWG International Recoveries

10) EY38074	3	25/11/2012	Ocknell Plain, New Forest: (SU2412)		
	+F	16/10/2013	Neklik: 55°46'N 29°27'E (Pskov O.) , Russia Federation,	2131km	325 days
11) EY10684	3	14/11/2012	Ocknell Plain, New Forest: (SU2412)		
	R	05/03/2013	Ocknell Plain, New Forest: (SU2412)		111 days
	+F	28/11/2013	Alembon: 50°46'N 1°51'E (Pas-de-Calais) , France.	247km	1 yr 14days
12) EY38194	3	07/11/2013	Holmsley, New Forest: (SZ2299)		
	+F	15/12/2013	Lourinha: 39°14'N 9°18'W (Lisboa), Portugal.	1415km	38 days
13) EY38054	3	15/11/2012	Acres Down, New Forest: (SU2708)		
	+F	10/04/2014	Pestovskiy district: 58°41'N 35°33'E Russia Federation.	2526km	1yr 146 days
14) EY10842	3	11/11/2013	Ocknell Plain, New Forest: (SU2412)		
	+F	16/04/2014	Doverets: 58°2'N 30°22'E (Novgorod O.), Russia Federation.	2209km	156 days
15) EY10744	4	09/12/2012	Ocknell Plain, New Forest: (SU2412)		
	+F	25/04/2013	Ushaki: 59°29'N 31°3'E (St-Petersburg), Russia Federation.	2274km	37 days
16) EY40288	5	21/01/2014	Stockley Cottage, New Forest: (SU3401)		
	+F	29/04/2014	Between Vologda & Kirillov: 59°35'N 39°0'E Russia Federation.	2737km	98 days

Age codes – 3 = Hatched in current year - considered a juvenile bird
4 = Hatched before current year—considered an adult bird
5 = Hatched in previous year—considered a juvenile bird

Recovery codes - + = Shot/killed by man
F= Freshly killed (accurate date)
R = Caught by ringer



Map to show all Woodcock ringing recoveries further than 50 kilometres from first capture.

All the Woodcock were ringed in the New Forest (red dot).

The majority have been recovered north and west of Moscow (M)

For more recovery detail see this and previous Study reports.

Acoustic Identification Study

The Cornell Lab of Ornithology (USA) and the New Forest National Park Authority have jointly supported the Group's Woodcock acoustic study. Cornell through their licence for Raven Pro, and the NPA (SDF) purchase of four digital recording kits with gun microphones.

This is an ongoing study first trialled in 2013. The aim was to record roding male Woodcock and then use the recording to uniquely identify individual males from the call alone using Raven Pro software. This technique has been used by other researchers in Europe previously and our study hopes to build on their findings.

The roding call comprises two parts, a series of grunts followed by a single 'Tizeek' note. The Tizeek is easily identified on a spectrogram as an inverted 'V' (Figure.1). The average call lasts 1.8 seconds and uttered every 4.2 seconds as the bird flies over the tree canopy searching for potential mates below. Some males have very characteristic calls that can be distinguished by the human ear when the recording was made, others need an analytical approach using computer technology to tease individuals apart with the Raven Pro computer software.

In 2014 two males were radio tagged and had overlapping flight paths. This allowed the method to be tested with known individuals and in 2015 it will hopefully allow further testing with different birds.

Gathering the recordings was comparatively easy, however the analytical teasing apart of each call proved very time consuming even with the computer spectrogram software. It is therefore early days and more analysis is required before reporting any findings.

Once individual males can be identified through their call we then have a technique to measure how many male Woodcock are actually flying over in our 75 minute roding counts. At present a count of twenty could be two birds ten times each, ten birds twice, or any other combination during the 75 minutes.

MH

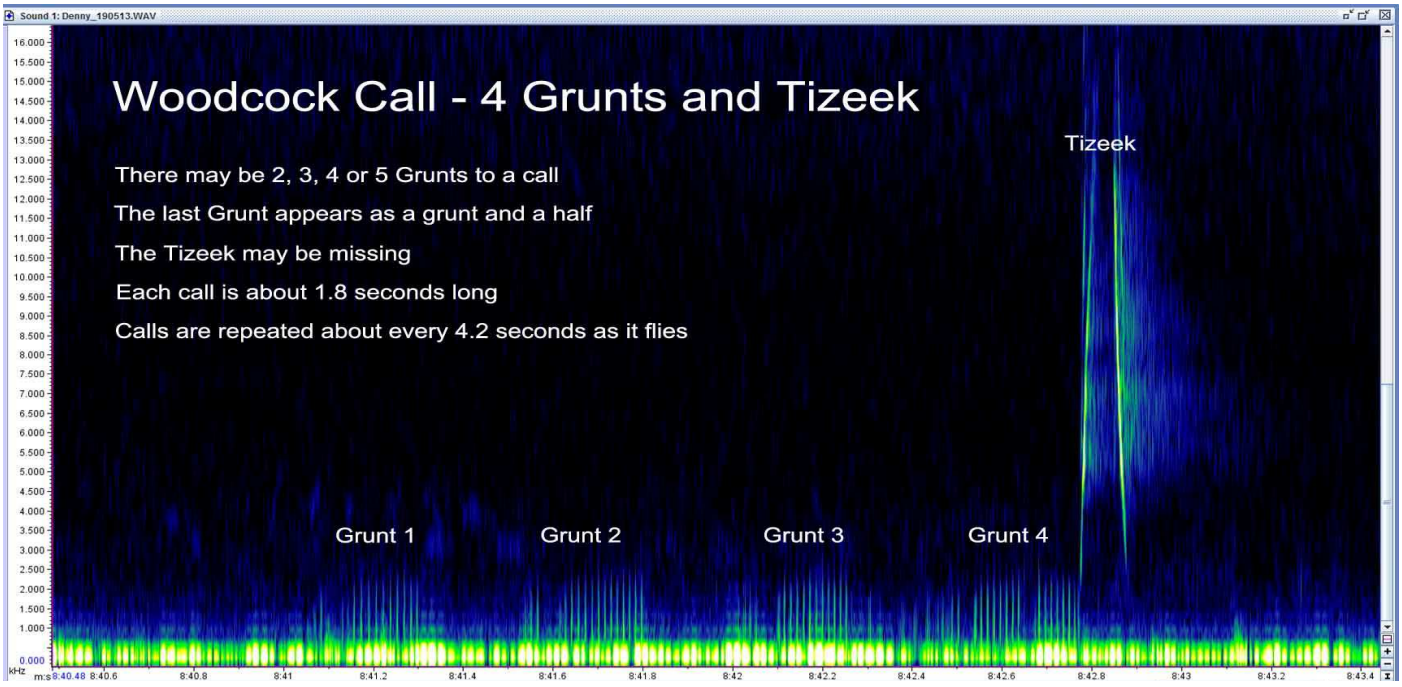


Fig.1 Annotated Raven Pro spectrogram of a single male Woodcock roding call - Frequency (kHz) vs Time (millisecs)

Woodcock Breeding Study

A substantial amount of financial support from the New Forest National Park Authority and Paramo for the 2014 Woodcock breeding study has allowed vital equipment to be purchased to pursue this wide ranging topic.

Pairing up

During the winter ringing season (August to April) there appears to be two periods when Woodcock are seen in pairs, trios or quads. We define a group as birds within five metres of each other. This allows birds to drift apart when feeding, but most nocturnal observations of groups are pairs or to a lesser extent trios sat no more than a metre apart apparently resting.

Breeding Study (cont'd)



Photo 1. Nest three with hen bird returning to incubate after feeding session. Blue colour ring indicates it was ringed as an Adult (right leg) in the winter 2013-14.

These Woodcock groups are generally seen shortly after the influx of migrant Woodcock in November and again in February and March.

The November groupings may be Woodcock travelling on migration in small flocks, possibly family parties and is associated with an increased in vocal activity from both birds flying low overhead, take-off, and those on the ground. The vocalisations appear short range contact calls and cannot be described as a roding type call, more like chicken contact calls.

Late winter grouping appear tighter with a pair often sat next to each other, A third bird may be a metre or two away. It looks very much like mate guarding. Roding calls are heard during this period after dark over the feeding grounds and occasionally a ringed bird when released will leave uttering a roding call until out of earshot.

Unfortunately these groups are viewed with white light which ultimately upsets the grouping through disturbance. The NPA SDF grant has allowed the NF Woodcock Group to purchase an image intensifier (3rd Generation) with a zoom attachment. This piece of kit can be used effectively in moonlight or with the aid of infrared light on moonless nights. A camera attachment will allow behaviour to be recorded and studied at a later date. This project will commence this 2014-15 winter season.

Nests

The finding of Woodcock nests has proved difficult in the absence of a well trained dogs nose. However, three nests were found and studied during the season and all three females had been colour ringed in the past. From this we could establish whether it was the bird's first breeding season (hatched the previous year). Egg weights and nest activity were monitored using the methods described in the 2013 study report.

The second week of March had exceptionally fine warm weather when the first nest clutch was laid. These hatched on the 5th April with four chicks. This female was radio tagged in February (1577 see page 17) which made finding its nest so much easier. The nest was tucked in close to a low Holly (*Ilex aquifolium)* bush with sparse branches over the nest. The tree overstory was Scots Pine (*Pinus sylvestris)* and Beech *(Fagus sylvatica).* Holly was the significant understory tree. Ground flora was absent and replaced by Pine needles and bark flakes. .

The second nest was discovered on the edge of a Bracken (*Pteridium aquilinum)* clearing in a Scots Pine wood 200 metres from the first nest. It to hatched four chicks on 20th May. It had no significant overhead tree canopy, but the nest was inside a clump of dead bracken with a limited field of view for the incubating bird. The growth stage of the Bracken (fronds just starting to unfurl) was insufficient to give good concealment before the eggs hatched.

The third nest (Photo 1) was located in a thinned Oak (*Quercus robur*) plantation with trees aged eighty-five years. There was no significant understorey with ground cover of Moss covered old Oak brashed branches, sparse bluebell (*Hyacinthoides non-scripta*) and various woodland grasses. The nest was under the small lower branches of a two metre high Western Hemlock (*Tsuga heterophylla*) sapling where the top two thirds was dead due to Fallow Deer (*Dama* dama) damage to the trunk. The combination of the lower branches and wood rush made the nest almost undetectable. This sapling was on top of a bank beside a forestry drain and had good all round visibility.

Three of the four eggs hatched on the 16th May. The fourth egg was infertile.

The latter two nests were found using thermal imagery. A thermal kit was borrowed to test the methodology which proved highly successful. Nest three was found using the thermal kit in the dark. In daylight its position would have made it impossible to find as it was hidden from the naked eye due to the foliage of a small tree (Photo 2). The method is likely to be very productive for most ground nesting species not only Woodcock. To pro-

Breeding Study (cont'd)

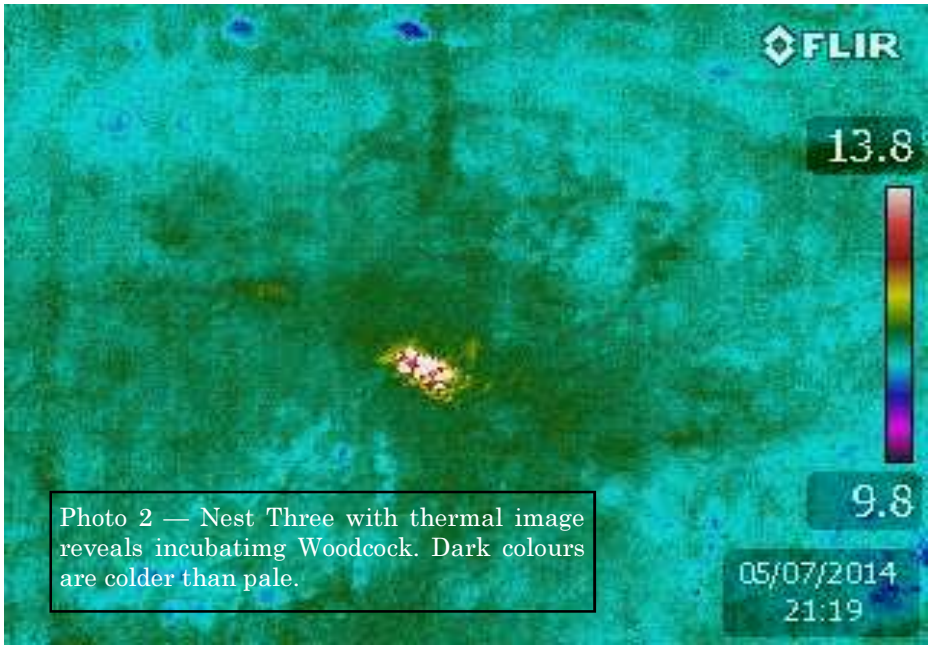


Photo 2 — Nest Three with thermal image reveals incubatimg Woodcock. Dark colours are colder than pale.

gress this method sponsors are needed to help purchase a kit for the Woodcock Group.

Nest Activity

The support from Paramo allowed the purchase of three nest activity monitoring kits. The technique was trialled last year (see study report 2013) which proved very successful.

Small lipstick sized cameras watch the incubating female's activity from very close range. The images were recorded up to 40 metres away from the nest on a 12 volt digital recorder. The video footage has a time-stamp and records all movement with the primary objective to record predation of the nest and the culprit. None of the nests were predated so its secondary objective was to record the females activity, such as leaving the nest for a feeding break and her return (Photo 1). Also recorded was the on-nest behaviour such as preening bouts (Photo 3 scratching chin) and reaction to perceived overhead predators whose identity remained unseen.

Radio tagged female 1577

The targeting of female Woodcock for radio tagging before the breeding season is very difficult. Sexing a caught bird can be attempted on some of the birds biometric measurements, but there is no guaranteed method on a living Woodcock. Only when the birds exhibit roding or nesting can we determine the correct sex of the bird.

1577 showed some early signs of being a female when its ranging behaviour diminished in size from February into early March. Once the radio tag placed it day and night in the same spot it had either fallen off the bird or it was on a nest. The nest as it turned out to be was not approached for the first two weeks and a lipstick camera was moved into position after the bird had gone off to feed.

The recorder videoed all movement and on the 5th April the chicks were recorded leaving the nest.

Post-hatching, each day after sunset **1577** was located using the radio tag. The bird was only seen twice in the 25 days she was located with the chicks. The tag fell away and was recovered. Why the tag fell away we can only guess at, possibly it was pulled off by a copulating male, but who knows.

The ranging behaviour of **1577** and her chicks was followed with single daily locations that showed small movements over the days following hatching. No attempt was made to follow nocturnal movements. The distance between successive day locations, even up to tag loss, did not exceed 30 metres and through out the 25 days she did not go further than 150 metres from the nest, often doubling back. The area she used was identical to her feeding locations in the week leading up to egg laying and during incubation. **MH**



Photo 3. Nest Two with female preening. Ringed as a Juvenile (left leg) when caught in 2012-13 winter.

Radio Tracking Study

One of the aims of the Woodcock Group is to radio tag twelve winter and twelve summer birds to follow their movements around the Forest. These movements will indicate how Woodcock use the New Forest and what habitat types are important to them. That knowledge will then be available to future land managers should it be needed in the future.

So far the Group has tagged about half the number aimed for and through a vast amount of time input from the Tracking Team the study is shedding light on preferred feeding and roosting sites.

Since the last report the Group has had an information update on two of our radio tagged Woodcock, **795** caught as a resident adult in the north of the Forest was shot in the south-east corner of the Forest the following winter. **768** was also caught in the north of the Forest during October as a juvenile migrant as determined by feather isotope analysis. Yet it was still in the Forest the following April. Two members of the public while walking their dog near Lyndhurst came across **768** with a Goshawk (*Accipiter gentillis*) sat eating it. A fresh kill, but surely it should have been well on its way to Russia by the 21st April?

Additional radio tracking equipment and tags was purchased this year with a grant from the National Park Authority's Sustainable Development Fund for our Woodcock Breeding Study.

Five adults were tagged in the late winter with the hope the tags would remain on the birds through the breeding season (Table.1). A Juvenile was also tagged in late spring. Caught as a large chick in April it had reached the body weight of a small adult male when caught again a month later.

The colour ringing scheme in use by the Group meant we could target resident birds for tagging before migrant Woodcock had left the New Forest. Only after initial tracking could the sex of the birds be assessed through their behaviour. Of the adults, three were male, one a female, with the juvenile unknown.

Ideally we were hoping to tag more resident females as so little is known about their breeding behaviour, particularly post-hatching.

The small lightweight tags (six grams) are designed to be stuck on and fall off when the bird moults its feathers. All eventually did fall away before, or during, the birds moult (July-September)..

The tracking technique used was to locate the bird using triangulation to a minimum accuracy of 50 metres. The questions we are asking does not, at this stage, require the tracker to eyeball the bird. A suitable working distance from the bird was required so that the trackers presence did not unduly affect the subsequent movements hours later.

For each bird a nine day tracking regime was implemented which was then repeated while there were birds to locate. For five consecutive days of the nine, each bird was located once by day (diurnal) and once at night (nocturnal). Only diurnal locations were taken on the remaining four days.

From this tracking method a 'standard' five-day range could be established for day and night. In addition by locating the birds each day during daylight hours, the degree of movement between diurnal roosts could be determined.

By tracking all the birds on the same dates, metrological variation between birds was minimised. The volunteer tracking team could only deal effectively with a small number of tagged birds at any one time and so large sample sizes could not be achieved in any one season.

The combining of the diurnal and nocturnal locations to give a five-day 'home range' has a limited use other than a guide to an area the bird over-flies.

It has been documented by others that Woodcock do feed around their diurnal roost, but then at dusk they often fly some distance to open area feeding grounds and probably never setting foot on the ground in between throughout their lives. Also documented by others, some birds do not leave the vicinity of their diurnal roosts and prefer to spend the night feeding there as well. This makes interpretation of Woodcock 'home ranges'

Table 1—Detail of 5 resident Woodcock radio tagged in the New Forest

BIRD	Age	Sex	Month Tagged	Days Tagged	Day Fixes	Night Fixes	Tag Demise
1394	Adult	M	FEB 14	93	79	62	Tag fell off & recovered
1488	Juv	?	MAY 14	22	19	0	Tag fell off & recovered
1577	Adult	F	FEB 14	56	44	17	Tag fell off & recovered
2003	Adult	M	MAR 14	160	149	91	Tag fell off & recovered
8838	Adult	M	MAR 14	218	198	127	Tag fell off & recovered

Radio Tracking (cont'd)

difficult by area alone, but does give a figure for comparison between birds and indicates larger movements.

A bird location accuracy of 50 metres or less does not allow highly detailed analysis of habitat use, but it does give a location to place the birds in the broader habitat categories.

All three tagged males (**1394, 2003 and 8838**) were adult and each showed slightly different ranging behaviours when looked at in detail. This detail will be reported on at a later date when the study aim of twelve winter and twelve summer tagged birds has been completed.

All three were tagged pre-breeding season and two were followed through to Sept/Oct with the third losing its tag mid-breeding season.

The general characteristics of range use has been seen in other studies across Europe. Small daytime roost areas and flight to larger night time feeding sites. **1394** showed a very small day range through late winter but had an enormous night range using two different feeding sites over five kilometres apart. It would alternate their use with a few days at each. During the breeding season **1394** used neither of the two nocturnal sites, but the roding area was located close to the winter day roosting site.

8838 was a bird whose movements early in the breeding season suggested a female. Small movements and range size concentrating on a 'would be' nest site, but later observations of roding placed it securely as a male (Figure.1).

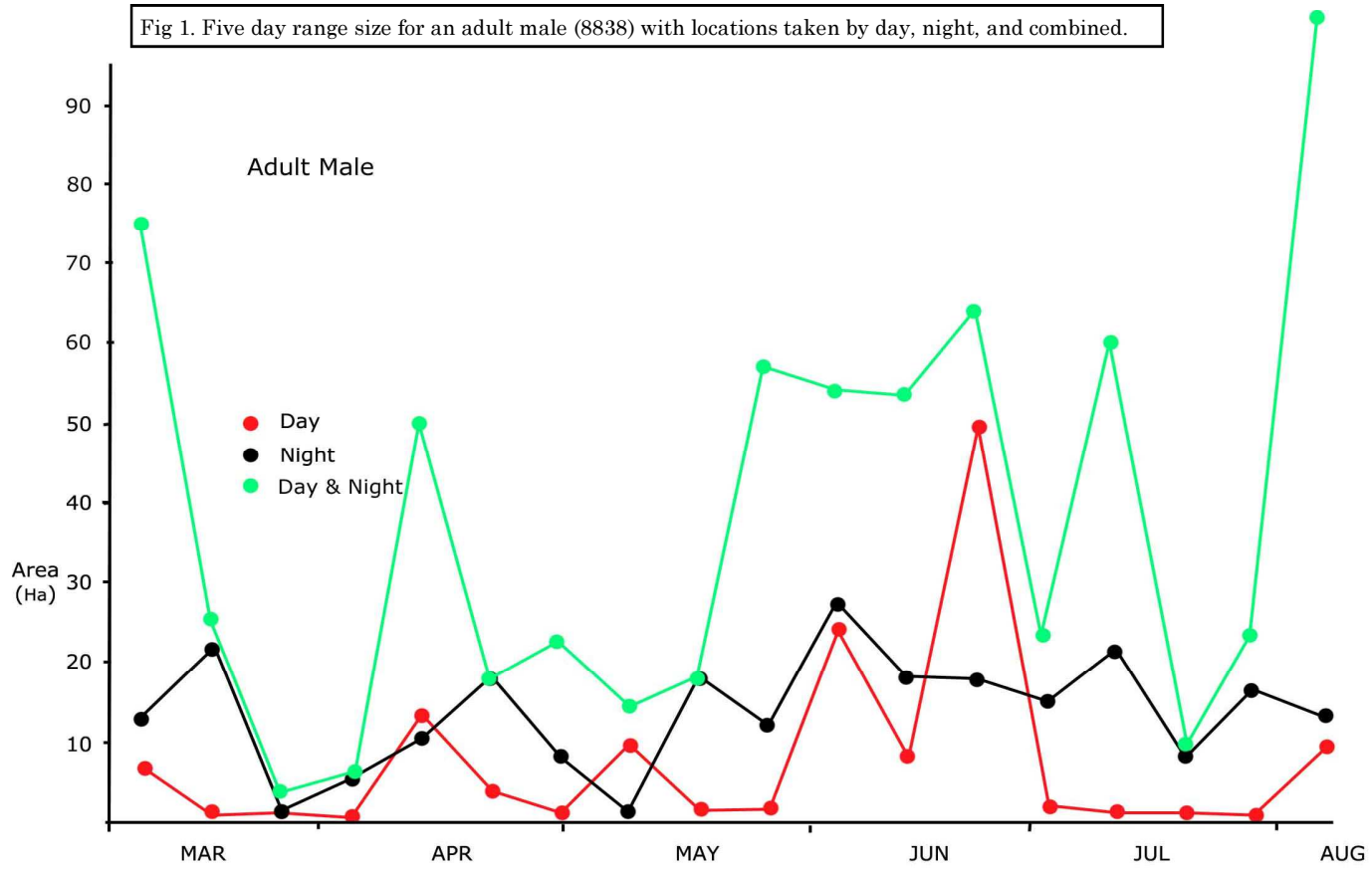
All its day and night movements were less flamboyant than **2003** who overlapped its day and night ranges. Post breeding season, both **8838** & **2003** moved their diurnal ranges away from their breeding ranges and the size diminished to a tight grouping similar to the pre-breeding day ranges. For **8838** the increase in size of the diurnal range occurred in late June when it was choosing between its 'breeding season diurnal range' and its 'post breeding season range'. This change also coincides with the onset of the moult.

It is interesting to speculate that roding behaviour continues into July, but are those birds seen not the 'dominant birds' seen at the peak a month earlier. Could they be young male Woodcock starting to appear after an earlier season of suppression by the dominant birds. Certainly the amount of 'tilting' (inter-male aerial battles) appears to increase just prior to this period.

The individual five-day ranges for **2003** are shown as an example of the variation in range size.

The diurnal five-day range could be less than one hectare in size and these small diurnal ranges could be seen through most of the season

Fig 1. Five day range size for an adult male (8838) with locations taken by day, night, and combined.



Radio Tracking (cont'd)

and not confined to potential copulation that would keep a male close to a nesting female and hence a very small range.

The nocturnal ranges as already indicated were larger, averaging between ten and twenty hectares. The nocturnal location of the bird for each night were recorded when the bird had landed after most of the roding activity had ceased for the evening. The collection of Woodcock roding locations would have surely increased the range size. However, this was not done as it would not have been a true representation of the diurnal roost or nocturnal feeding range size as it covered the in between of day and night. Roding activity and the area it covers will be a topic we hope to study in 2015.

Combining the five-day diurnal and nocturnal ranges show a much larger area. This is mainly due to non-overlapping daytime and night ranges. A potential roding range would likely cover all of the combined area and more, as other studies in Europe have indicated range sizes from 80-120 hectares. Early suggestions coming from the study data is that New Forest Woodcock fly over much bigger areas when roding. How and if those areas are fully used and not just flown over is another question?

A short synopsis on the only adult female (**1577**) tagged during the breeding season has been given in the 'breeding study' section of this study report. It was unfortunate that the tag fell off before any chance for us to see whether double brooding would occur.

1488 was an early chick of the year that was caught a second time as a juvenile. The two captures were close together in distance and it was reasonable to assume the bird had not moved far from its natal area. Indeed subsequent diurnal locations using the radio tag showed it did not move far with a five-day diurnal range of less than a hectare. No nocturnal locations were attempted.

Just prior to the tag falling off, **1488** began to fly several kilometres to a different location each time for one day, but not every day. The following day it would be back at the 'normal' diurnal roost site. The reason behind this behaviour is unknown. Speculation would suggest that those movements are the first longer range flights to investigate new areas for a young bird which recently found independence. With a sample of one bird it is difficult to do anything other than speculate.

MH

You are what you eat

Since the Woodcock project started back in 2011-12 we have been observing and recording what Woodcock do in the New Forest. Now, with a good baseline of observational material and science to work from we need to further investigate the 'why' question.

British Birds magazine have given a sizeable grant to support the New Forest Woodcock study and this grant has been split to investigate two topics broadly based on Woodcock diet.

There are strong indications from the Woodcock study that the New Forest is a 'Mecca' for arriving migrant Woodcock. Birds that would need fuelling up after their long journey. Whether they continue their journey westwards after re-fuelling is still being investigated. However, the New Forest is generally considered food poor when looking at earthworm populations due to the abundance of sandy acid soils. So what are they feeding on?

The New Forest shooting licensees have been, and continue to collect digestive crop samples for the Group's study into diet. These are the birds that have been shot for the table from which the samples are taken before consumption. So far the samples are only being collected and when sufficient in number they will be analysed. This will give a good indication on what the Woodcock are actually consuming in the Forest.

Part of the British Birds (BB) grant will be used to investigate worm and invertebrate larvae abundance. If we do find worm numbers are low, then other invertebrate species must be on offer to feed the large numbers of winter Woodcock using the New Forest.

A good number of nocturnal feeding ground observations have shown Woodcock actually sat on aged, often flattened livestock dung. The likelihood that the birds are feeding on invertebrates associated with livestock dung is high, but we need to tie in what is in the diet and available with what is actually seen in the diet.

The second part of the BB grant refers to 'you are what you eat'. Hydrogen isotopes are built into all cells of living plants and animals. However this isotope has slightly different forms, putting it simplistically, and these different forms occur in various parts of Europe and the world.

By collecting feathers discarded from our caught Woodcock we can send then to a laboratory to have the particular form of Hydrogen isotope identified. The information would tell us which birds are 'local' and which are migrants from Russia.

With that information we can look at when 'foreign' birds actually arrive in the autumn and the proportion of local to migrant Woodcock out on the feeding grounds. Laboratory time is not cheap, but the British Birds grant has helped to start this particular study. **MH**

Woodcock News from the Members

Healing Power



Rain, Rain and more rain—Whilst undertaking more under water *rusticola* ringing last night, I retrapped a woodcock which I had first ringed in November 2012. When I ringed the bird, it was in perfect health. However, I noted that sometime between our first meeting and last night it had suffered a severe leg break. The break had set enough to save the leg but had left the bird with an S-shaped tarsus (see photo right).

I thought about swapping the ring onto the good leg but, as I had seen the woodcock stand up and move a few steps without any obvious limp, I left the ring on the where it was.

Another example of a tough self-mending *rusticola*.

GG

Ballistic Bling Splint

I had just started my evening lamping session for ringing Woodcock on one of my regular New Forest sites. Within two minutes I spotted two birds sat close together. I approached as quietly as possible and soon had the two birds in my net. I was very pleased with this as it was only the second time I had caught a "double". It's interesting to speculate if these twosomes are male and female or just close associations which give a better survival tactic against night time predators. One of the birds already had a ring on, so I processed the new bird which was a first year and quite light in weight, just 285gms. It had probably only just arrived from overseas to winter in Hampshire.



On examining the second bird I was astonished to see the ring was badly misshapen and had obviously been hit by gunshot. It had badly bent the ring and the force had fractured the birds leg. However the ring was so altered in shape that it had acted as a splint and the bone had knitted successfully. As the ring was still pressing on the leg I removed it and made sure the leg was okay. There was some enlargement to the bone but the leg was straight and its coloration was fine, so blood flow seemed unimpeded. A new ring was fitted. The bird had been ringed just over a year ago within 200 metres of the spot where it was re-caught. Its weight was a very healthy 345gms and the bird was in great condition. It is interesting to consider that the ring had possibly saved the bird's life. **NRJ**

Roding Threesome

While radio tracking Woodcock bird No.**2003** when it was roding in May, I also noticed two other birds in-line formation with **2003**. Switching the receiver to hear for another tagged bird in the area (**8838)** I found both in the same group. Both these tagged Woodcock where males and as they were flying fairly close together I could not determine who was leading or trailing. There was no confrontation antics between them and my first thought was "has **2003** and **8838**" found a female together and were making sure no other male would interfere with their 'family get together'. So was one of our birds leading and the other making sure the middle one did not spoil the formation or were both following the leader. I followed them as best I could for quite a while but then lost sight and radio contact so waited for them to settle down somewhere. As darkness had now arrived I started my night tracking session. I went to my normal starting point in the woodland and the only radio tag I could hear was **8838,** so I continued taking radio triangulation bearings of this bird to fix his position. I then proceeded to find **2003** and eventually picked up his signal about 600 metres further away from **8838**. On completion of fixing his position it turned out he was well over 600 metres away from **8838**. So who ended up with the third bird I have to wait to find out which one of **8838** and **2003** was the lucky one or not, time will tell. I wait in anticipation.....

BH

THANK YOU from the NFWG Trustees

to

The Forestry Commission and their staff for access to the New Forest Woodcock sites and their mapping department for the help and advice on GIS habitat mapping

All members of the New Forest Woodcock Group who gave their time willingly

Individual New Forest Licensees for the collection of Woodcock samples for a future diet analysis study

The generosity of funding organisations and individuals who have supported the Group greatly with donations of equipment, loan of equipment or finance to purchase equipment needed to be able to carry out this study on New Forest Woodcock

For further information on becoming a member of New Forest Woodcock Group or a would be sponsor for 2015 Please Contact nfwg@newforestgateway.org

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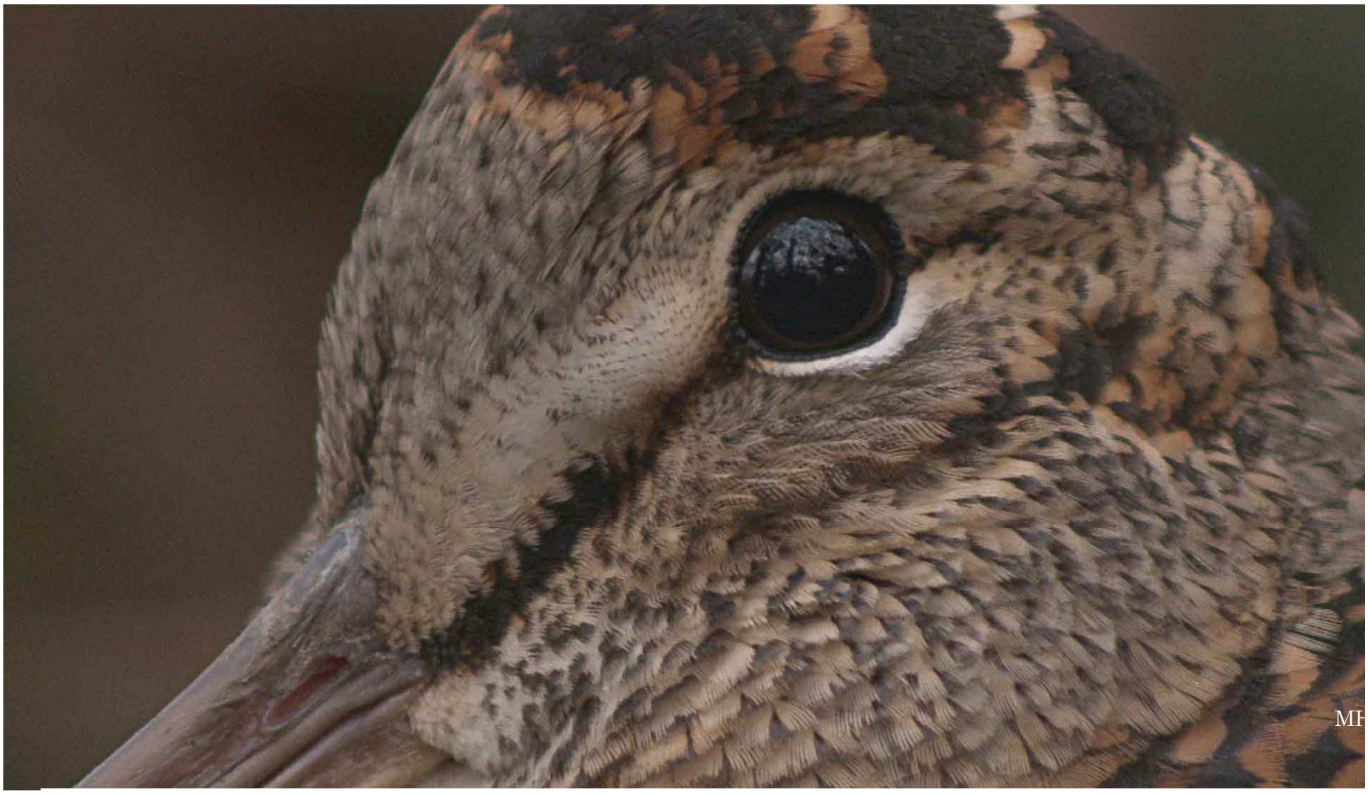
All text, photographs & figures not attributed are MH



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WOODCOCK SEX APPEAL

The New Forest Woodcock Group is looking for sponsors to part-fund an investigation into how male and female Woodcock use the New Forest feeding grounds and whether local or foreign Woodcock use those areas differently.

For more information - Contact - nfwg@newforestgateway.org