



BTO Research Report 588

**Repeat breeding bird survey  
of The National Forest  
(English Midlands) in 2010**

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*A report to the National Forest Company*

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## EXECUTIVE SUMMARY

- 1 As part of its agenda for sustainable development, the National Forest Company (NFC) commissioned a special survey of breeding birds in The National Forest in 2008, to be undertaken by BTO staff and volunteers. The aim of the 2008 survey was to form a baseline for repeat surveys that would measure population change across The National Forest.
- 2 The 2008 survey employed the standard BTO/JNCC/RSPB Breeding Bird Survey (BBS) method, consisting of two breeding season transect walks in randomly selected 1-km squares of the Ordnance Survey national grid. Birds, habitat and mammals were recorded. In total, 48 squares were surveyed within The National Forest boundary in 2008 – 37 by a professional fieldworker and 11 by volunteers to the national BBS.
- 3 The first repeat breeding bird survey of The National Forest was conducted in spring 2010. This covered ten of the 37 squares that were surveyed professionally in 2008 and volunteers surveyed nine additional BBS squares. This survey was designed as part of a provisional long-term rolling plan for partial and complete repeat bird surveys across The National Forest.
- 4 The 19 squares surveyed in 2010 provided counts for 88 species of bird, including 17 red-listed and 26 amber-listed species. Scarce or rare woodland birds included single Lesser Spotted Woodpeckers on two squares.
- 5 All 19 squares provided comparative data with 2008 but this is too small a number for statistically valid conclusions to be drawn on population change at species level. Overall, however, there was an increase in birds recorded, across a broad range of species.
- 6 The results of species-by-species comparisons with the 2008 survey have been tabulated. In line with the overall plan for the survey, no firm conclusions have been drawn on population change. It is noted, however, that population changes for a number of species that benefit from young woodland growth (Song Thrush, Whitethroat, Willow Warbler and Yellowhammer) appeared to be more positive within The National Forest than in the English Midlands as a whole.
- 7 The third stage of fieldwork should take place in 2012. This would also be an interim survey, ideally covering 14 squares professionally and boosted by the BBS volunteers to around 24 squares.



# 1 INTRODUCTION

## 1.1 Background

The National Forest is an area of about 500 square kilometres, lying across three counties of the English Midlands (Derbyshire, Leicestershire and Staffordshire), which has been selected for the creation of a new, forested landscape. New woodlands will complement ancient woodland, meadows, lakes and rivers, parks, towns and other visitor attractions within the area, for the benefit of local communities, visitors to the area and wildlife. More than 7.5 million trees have already been planted and this has increased woodland cover in the Forest from a starting point of 6% in 1991 to approximately 18% by 2008. The proportion of the designated area that is woodland is set to grow to around 33% over the coming years.

Sustainable development, meeting multiple environmental, economic and social objectives, has been the guiding principle of the Forest's creation since the publication of the first National Forest Strategy in 1994. The National Forest Company (NFC) is a non-departmental public body established by Government in April 1995 to oversee the creation of the Forest, and is sponsored by Defra through grant-in-aid. According to a recent corporate plan (National Forest Company 2008),

*"The purpose of the NFC is to lead the creation of The National Forest in accordance with the aims and objectives set out in the second National Forest Strategy, covering the period 2004 – 2014. It attracts and uses resources for ambitious, sensitive and imaginative Forest creation. It provides the setting for new businesses, recreation, tourism and an improved quality of life. It enhances wildlife and biodiversity. It is acknowledged as a national exemplar of sustainable development."*

NFC therefore has responsibilities to ensure that its activities benefit the conservation of birds and other wildlife within the Forest, while also contributing to Defra's efforts to meet its Public Service Agreements concerning the wider UK environment.

In *The National Forest: an exemplar of sustainable development* (National Forest Company 2007), NFC set out the following four actions with regard to its environmental responsibilities:

*"The National Company will, with and through partners:*

- 1. Continue to drive the creation of the Forest and its effective management to meet the objectives and woodland creation targets of the National Forest Strategy 2004 – 2014.*
- 2. Extend and improve wildlife habitats to meet the Forest's Biodiversity Action Plan targets.*
- 3. Monitor the quality of the habitats and species prioritised in The National Forest's Biodiversity Action Plan.*
- 4. Monitor bird populations, particularly woodland birds."*

The report also proposes 20 environmental, economic and social indicators that represent a balanced contribution to the sustainable development of the Forest area and how to monitor it over time. The sixth of these relates to populations of wild birds.

To further its programme covering issues of forest quality and sustainable management, and to meet its 2007 commitment to a bird population indicator, NFC commissioned a survey of breeding birds across the whole of the Forest area in 2008. The aim of the 2008 survey was to set a baseline from which future surveys could measure bird population change. The survey took a random sample of the 1-km Ordnance Survey grid squares within the Forest boundary, including good representation of each of The National Forest's landscape character areas (Marchant *et al.* 2009). In all, 48 1-km squares were surveyed in 2008, using the methods of the BTO/JNCC/RSPB Breeding Bird Survey (BBS). The strategy of maintaining complete compatibility with the UK-wide BBS allows assessments to be made of population change for relatively small areas, while allowing direct comparison of results with estimates of change at larger geographical scales, up to UK and even European level.

The current corporate plan (National Forest Company 2010) lists

*“Complete an interim breeding bird survey to maintain monitoring between major surveys”*

as a key activity for 2010–11, under NFC's role as a national showcase for research and communication of results in the area of sustainable development.

## **1.2 The present survey**

NFC commissioned the first of a planned series of repeat surveys in 2010. The aim of this survey was for a professional fieldworker to make repeat counts of birds at ten of the 37 1-km squares that had been covered professionally in 2008. As in 2008, the results would be supplemented by results from a further set of squares covered annually by volunteers as part of the ongoing BBS scheme. These numbered 11 squares in 2008. The remaining two thirds of the professionally surveyed squares were reserved for coverage in future partial repeat surveys, on a rolling programme.

This is the second report on breeding bird surveys in The National Forest, following the report on the 2008 survey (Marchant *et al.* 2009). It is the first report of a series planned to provide information on population change as the Forest develops over the longer term. The sample of squares providing data for 2010 is small, however, and conclusions about population change within The National Forest since 2008 are necessarily tentative. The validity and usefulness of the results will improve progressively with future surveys.

A longer series of surveys built up by the rolling programme would allow the generation of population trends, specific to The National Forest, for widespread species of common birds; such trends, when combined into an indicator, would help the Company to assess its environmental performance and measure its progress towards sustainable development.

## 2 METHODS

### 2.1 The 2008 survey

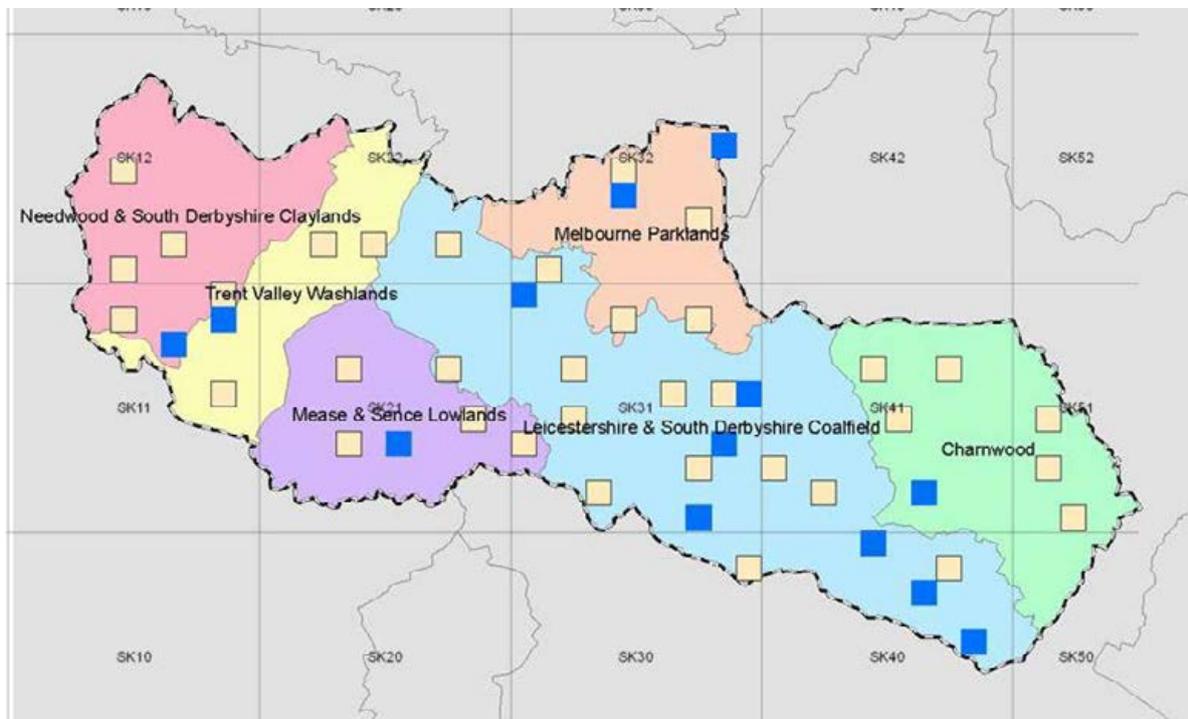
Prior to the start of the first year's fieldwork in the spring of 2008, meetings and discussions were held between NFC and BTO to establish the methodology for the survey. It was decided that the survey would consist of two main parts: a professional survey of a random sample of 1-km squares of the Ordnance Survey (OS) national grid, using BBS methods, would be supplemented with similar data from volunteers contributing from The National Forest to the BBS itself. Results would be drawn from a combination of the two sources (Marchant *et al.* 2009).

Squares for professional coverage were originally selected randomly by NFC from 1-km national grid squares at least 90% within the Forest boundary, with the further constraint that no two squares should be adjacent. The sample, of 37 squares, was created to ensure a relatively even distribution across The National Forest's six landscape character areas: selected squares straddling an internal boundary were allocated to their majority landscape character area. Squares for national BBS coverage are selected randomly by BTO, with none of these constraints, and were considered relevant to the survey if more than 50% of the square lay within the Forest boundary.

Field surveys made by volunteers and by a paid surveyor (Steven Haynes) employed in 2008 covered 48 1-km squares using BBS methods (Figure 1). This approximates to a little over 10% of the total number of 1-km squares within The National Forest. Reconnaissance surveys identified two of NFC's 37 squares where surveys would have been dangerous or difficult and, for these, we substituted two nearby squares that had already been randomly selected for BBS, but not covered previously by volunteers. BBS volunteers surveyed an additional 11 squares from the BBS sample. The 2008 sample therefore comprised 35 squares from the NFC sample and 13 squares from the BTO BBS sample, of which, in the absence of volunteers, two were covered by the professional fieldworker. These two replacement squares have been adopted into the professional sample, to maintain the complement of 37 squares.

The 2008 report recommended that repeat surveys be carried out at intervals no longer than four years, and that more frequent repeats would allow the data needed for trend calculation to amass more quickly (Marchant *et al.* 2009). Discussions between NFC and BTO in the early part of 2010 agreed a plan for fieldwork for a partial repeat survey in 2010 and devised a provisional plan for future surveys.

**Figure 1. Distribution of the 48 squares surveyed in 2008, in relation to The National Forest’s six landscape character areas. Open squares (35, buff) – NFC sample, closed squares (13, blue) – BTO sample.**



## 2.2 Provisional long-term plan

The provisional long-term plan for breeding bird surveys of The National Forest is to make periodic full repeat surveys, interspersed with partial surveys covering one third of the professional sample. This approach allows both short-term and longer-term bird population changes to be identified, at a lower cost than would be incurred by carrying out closely spaced full repeat surveys.

The provisional long-term plan is outlined in Table 1. Estimation of change in the first three repeat surveys (2010, 2012 and 2014) relies on just two data points and on maximum samples of around 20 squares, whereas BBS changes are not normally estimated from fewer than 30 occupied squares (Joys *et al.* 2003, Risely *et al.* 2011). These initial repeat surveys will therefore provide very limited information on trends. An important implication of the plan, therefore, is that there will be little firm indication of population trends in The National Forest until the completion of the first full repeat survey, provisionally in 2016, by when all squares will have been surveyed in at least three breeding seasons, spanning a period of nine years since 2008.

The actual rate at which the plan proceeds will depend on a series of decisions by NFC and on the availability of funding for the professional surveys. Progress and onward plans will need constant assessment to ensure that the programme is proceeding optimally.

**Table 1. Outline plan for breeding bird surveys of The National Forest, using three subsamples of the initial 37 professionally surveyed 1-km squares. Timing and extent of professional surveys are provisional. Volunteer surveys, for which support cannot be predicted accurately, will be conducted every year as part of the national BBS scheme.**

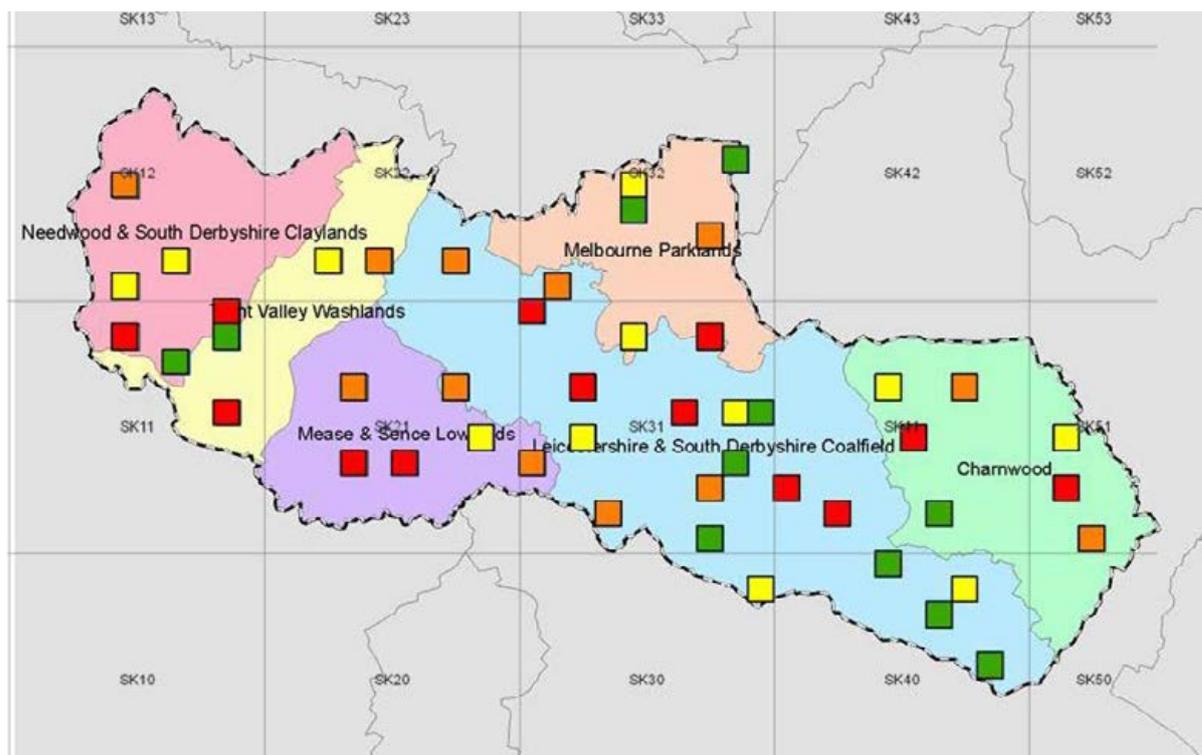
Year	Professional surveys	Volunteer surveys	Scope for assessing population change
2008	37 squares	11	Baseline survey, no trend information available
2010	Subsample A – 12 squares	10?	Tabulations of changes since 2008 on c. 22 squares
2012?	Subsample B – 12 squares	10?	Tabulations of changes since 2008 on c. 22 squares
2014?	Subsample C – 13 squares	10?	Tabulations of changes since 2008 on c. 23 squares
2016?	All 37 squares surveyed, as in 2008	10?	Fuller assessment of trends, with at least three data points for each of c. 47 squares
2018?	Subsample A – 12 squares	10?	Fuller assessment of trends, with a fourth data point for c. 22 squares
2020?	Subsample B – 12 squares	10?	Fuller assessment of trends, with a fourth data point for c. 22 squares
2022?	Subsample C – 13 squares	10?	Fuller assessment of trends, with a fourth data point for c. 23 squares
2024?	All 37 squares surveyed, as in 2008 and 2016	10?	Fuller assessment of trends, with at least five data points for each of c. 47 squares
	...to be continued?	ongoing	

**Table 2. Distribution of sample 1-km squares by subsample and landscape character area. Subsamples A–C are subdivisions of the professional sample of 37 squares. A representative estimate is given of the composition and strength of the expected BTO sample in any year.**

Landscape character area	A	B	C	Estimated BTO sample	Estimated total
Charnwood	2	2	2	1	7
Coalfield	4	5	5	5	19
Mease Lowlands	1	2	2	0	5
Melbourne Parklands	2	1	1	2	6
Needwood	2	1	2	1	6
Trent Valley	1	1	1	1	4
<b>Total</b>	<b>12</b>	<b>12</b>	<b>13</b>	<b>10</b>	<b>47</b>

A first step in establishing the necessary framework was to divide the 37 squares from the NFC sample into three roughly equal groups A–C, with each group containing as far as possible one third of the sample squares in each landscape character area. Squares were allocated to groups randomly, within that constraint (Table 2). Each subsample provides a visually similar pattern of distribution across The National Forest (Figure 2).

**Figure 2. Distribution of potential survey squares, in relation to The National Forest’s six landscape character areas. Yellow – subsample A; gold – subsample B; red – subsample C; green – estimated volunteer BBS sample.**



### 2.3 The 2010 survey

The 2010 survey marked the second element of the provisional long-term plan. Subsample A was selected for coverage, alongside the surveys conducted annually by BBS volunteers. Funding was provided by the National Forest Company for ten squares to be surveyed professionally, which was two squares short of complete coverage of subsample A. The two squares were omitted because funding for the 2010 survey was agreed before the provisional plan for long-term surveys had been drawn up. It is expected that the remaining two squares will be included in the next survey (provisionally 2012), to maintain the integrity of the overall plan.

The professional fieldworker employed for the 2008 survey was Steven Haynes (SH), a highly skilled and experienced field ornithologist with excellent local knowledge of the West Midlands and surrounding areas. We were fortunate that SH was available again for the 2010 survey.

A total of 15 1-km squares within The National Forest have been selected for potential coverage by BBS volunteers. Of these squares, two (SK2513 and SK3019) have been co-opted into the professional sample to replace the two squares, initially selected, that proved to be uncoverable. Both have been assigned to subsample C. Details of the remaining 13 BBS squares are shown in Table 3. Not all of these squares have yet found an observer.

Whether or not a volunteer survey is carried out in a particular year depends on the availability of an observer and is not under the close control of BTO staff. For this reason, the number of volunteer surveys conducted for BBS within the Forest boundary cannot be accurately predicted. We estimate that around ten squares within The National Forest will attract a volunteer each year, with small degrees of turnover of squares and volunteers between years. Those that were actually surveyed in 2008 and 2010 are indicated in Table 3. Nine squares were covered in 2010, all of which had also been surveyed in 2008.

**Table 3. Squares selected for coverage by the national BBS scheme that lie within The National Forest, with observers for surveys completed in 2008 and 2010.**

Square	Landscape area	Place name	2008 observer	2010 observer
SK1218	Needwood	Morrey		
SK1617	Needwood	Wychnor Park	Miss H F Greatorex	Miss H F Greatorex
SK1818	Trent Valley	Barton-under-Needwood	Miss M Holley	Miss M Holley
SK2319	Trent Valley	Walton-on-Trent		
SK3423	Melbourne Parklands	Ticknall a	Mr R M R James	Mr R M R James
SK3710	Coalfield	Swepstone	Mr A Pocock	Mr A Pocock
SK3813	Coalfield	Normanton le Heath a	Mr P A Newton	Mr P A Newton
SK3825	Melbourne Parklands	Melbourne	Miss A Tipping	
SK3915	Coalfield	Coleorton a	Mr R Black	Mr R Black
SK4409	Coalfield	Bagworth Wood	Mr A B Gibney	
SK4607	Coalfield	Thornton a	Mr A Johnson	Mr D Wright
SK4611	Charnwood	Billa Barra	Mr A B Gibney	Mr A B Gibney
SK4805	Coalfield	Botcheston	Mr S E Saunders	Mr S E Saunders
<b>TOTALS (squares)</b>		<b>13</b>	<b>11</b>	<b>9</b>

Volunteers for BBS are in general highly motivated birdwatchers with a high level of fieldwork skills, although these are not formally tested. The national BBS returns are subjected to a range of consistency checks to ensure as far as possible that the data are of high quality throughout. Names of the BBS volunteers contributing data from The National Forest are given in Table 3.

## 2.4 Field methods

The field methods adopted for the professional survey are identical to those used by volunteers in the BBS scheme (Risely *et al.* 2011). In summary, all surveyors were asked to make two visits, one between early April and mid May (termed 'early') and a second between mid May and the end of June ('late'). The combination of these two visits is intended to sample the birds that are active and conspicuous early in the breeding season, along with those summer migrants that arrive to breed in late spring and other species that become more detectable at later stages of the breeding season.

On each BBS visit, surveyors walk two pre-selected 1-km transects through each 1-km square selected for coverage, recording all birds that they see and hear. Routes and transect boundaries are consistent between years. Each transect is divided into five 200-m sections, and birds are recorded at the section level. Individual birds that can be seen or heard from several transect sections are recorded only once, in the section where first observed. The perpendicular distance of each bird from the transect line is also allocated to one of three categories, according to the position at which the bird was first detected (less than 25m, 25–100m and greater than 100m), and birds in flight are recorded separately in a fourth category. The use of distance bands allows data to be resolved at the level of 200m x 50m and 200m x 200m rectangles, if required for more complex analyses.

The standard placement of the two transect lines is parallel, running either north–south or east–west, 500m apart and 250m from the edge of the square. In almost all BBS squares, however, this pattern requires modification according to the nature of the terrain and the constraints of access. Transects may be extended outside the nominal square if necessary. In 2010, SH carried maps of each square showing the transect sections he had laid out in 2008, to ensure that the same routes were followed.

The BBS method requires a simple assessment of habitat for each 200-m section of transect. Up to two habitat types can be coded, using a hierarchical system designed by BTO and employed for all BTO surveys (Crick 1992). The 'first' habitat is defined as the one the observer considers to be the most relevant to birds along the section, and is normally the most extensive. A 'second' habitat can also be described, where present. Each habitat can be described with up to four levels of coding.

BBS observers are also encouraged to record mammals. Most do so, although recording is essentially casual and no special efforts are made to detect species that are difficult to observe. The geographical unit for mammal recording is the whole 1-km square, rather than the transect section. Mammal recording was set as a requirement for the professional surveys.

The BTO's professional fieldworkers are required to follow set health and safety procedures, which include phoning in to a central number at the start and end of each visit. This assists rescue in the event of any debilitating incident, even if the fieldworker is unable to call for help.

## 2.5 Data capture and analysis

After the completion of fieldwork, SH transcribed the data onto a paper summary sheet, as totals for each transect section and distance category. He then input the data into a standard BBS input spreadsheet. All paperwork was then returned to BTO HQ. This included the map of each of the surveyed squares with the route and transect-section boundaries marked on it, as prepared in 2008 but with any useful additions made, to enable the same route to be followed again in subsequent years.

Transcription and input of BBS data are both stages at which errors can be made. To combat such errors, checks were made of the summary sheets for missing or incorrectly transcribed data, and the Excel spreadsheets were subjected to consistency checking, with special attention to unexpected species or counts. Errors found were corrected in the Excel workbook, which remained the top copy of the data.

Processing of the data was aided using a program specially written in SAS (statistical analysis software developed by SAS Institute Inc., Cary, North Carolina) that reads directly from the Excel workbook. The program first sums the counts for each species, square and visit across transect sections and distance categories. The count that is tabulated for each species and square is the higher of these two summed values, from the 'early' and 'late' visits. This higher, summed count is the value that is standardly used in comparisons of BBS bird counts, for example across years to estimate bird population change.

Data from volunteers for the general BBS are captured both on paper summary sheets, that required professional input, and online, using a standard web form and avoiding the need for subsequent processing. Maximum counts per square and species were provided to this project from the BBS database in March 2011 (K. Risely, pers comm), by which time all relevant submissions from volunteers were thought to have been made.

The final stage of the analysis was to compare changes recorded between 2008 and 2010 on BBS squares within The National Forest with those recorded more generally in the Midlands and across England. These data were subject to an embargo set by the BBS project partners and were not available for use by the present project until August 2011.



### 3 RESULTS

#### 3.1 Coverage obtained

A total of 19 squares were surveyed in 2010, all of which had also been surveyed in 2008. The total comprised ten squares surveyed by SH and nine by BBS volunteers. The distribution of these squares among landscape character areas is shown in Table 4. Figure 3 shows the geographical scatter of the 19 squares that were surveyed in 2010.

**Table 4. Numbers of 1-km squares selected for coverage, and surveyed in 2010, by National Forest landscape character area.**

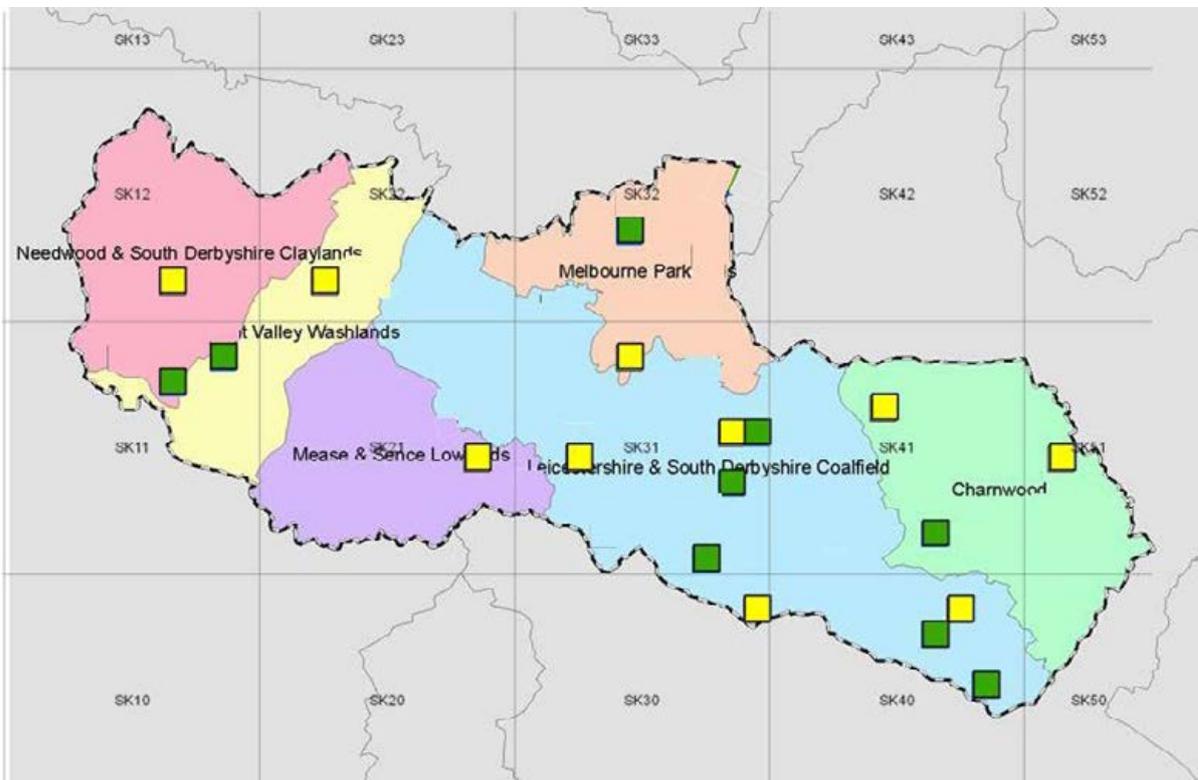
NF landscape character areas	NFC subsample A		BTO sample		Total surveyed in 2010
	Selected	Surveyed in 2010	Selected	Surveyed in 2010	
Charnwood	2	2	1	1	3
Coalfield	4	4	7	5	9
Mease Lowlands	1	1	1	0	1
Melbourne Parklands	2	1	2	1	2
Needwood	2	1	2	1	2
Trent Valley	1	1	2	1	2
<b>Total</b>	<b>12</b>	<b>10</b>	<b>15</b>	<b>9</b>	<b>19</b>

The 2010 survey thus covered a total of 19 squares, all of which had also been surveyed in 2008. These squares are mapped in Figure 3. All but one BBS square (SK4607) were surveyed by the same observer in both years. The squares were well scattered geographically and reasonably representative of the landscape character areas, although the volunteer squares were weighted towards the Coalfield and Trent Valley areas.

The dates on which visits were made to the 19 squares providing a 2008–10 comparison are shown in Tables 5 & 6. Date is one of the factors that may affect the results of BBS surveys, since birds vary in their detectability at different stages of the breeding cycle.

Taking the median date values in each case, the professional surveys tended to be made a little earlier in the season than those made by the volunteers. For the professional surveys, the median dates for both early and late visits were approximately within the same week in 2008 and 2010. The volunteer surveys were more variable in date. Early visits by volunteers were earlier in 2010 and late visits were later: this pattern might have contrasting effects on the counts for different species. Effects of visit date on BBS counts are expected to be small in every case, however, once data have been combined across sites.

**Figure 3. Squares surveyed in 2010, in relation to The National Forest’s six landscape character areas. Yellow – ten squares from subsample A; green – nine squares from volunteer BBS sample.**



**Table 5. Dates of ‘early’ and ‘late’ survey visits on NFC subsample A squares providing comparisons between 2008 and 2010.**

Square	Landscape area	Place name	2008 early	2008 late	2010 early	2010 late
SK1621	Needwood	Needwood	23 Apr	29 May	20 Apr	19 May
SK2221	Trent Valley	Branston	24 Apr	27 May	7 Apr	3 Jun
SK2814	Mease Lowlands	Overseal	28 Apr	4 Jun	22 Apr	4 Jun
SK3214	Coalfield	Donisthorpe Pools	29 Apr	5 Jun	22 Apr	7 Jun
SK3418	Melbourne Parklands	Smisby	30 Apr	10 Jun	11 May	25 Jun
SK3815	Coalfield	Coleorton c	8 May	13 Jun	12 May	10 Jun
SK3908	Coalfield	Odstone	6 May	16 Jun	10 May	9 Jun
SK4416	Charnwood	Whitwick	10 May	14 Jun	13 May	24 Jun
SK4708	Coalfield	Thornton b	17 Apr	28 May	19 Apr	2 Jun
SK5114	Charnwood	Beacon CP	9 May	24 Jun	21 Apr	20 May
<b>Median date</b>			<b>29 Apr</b>	<b>7 Jun</b>	<b>22 Apr</b>	<b>6 Jun</b>

**Table 6. Dates of ‘early’ and ‘late’ survey visits for squares covered by BBS volunteers providing comparisons between 2008 and 2010.**

Square	Landscape area	Place name	2008 early	2008 late	2010 early	2010 late
SK1617	Needwood	Wychnor Park	11 May	28 Jun	24 Apr	20 Jun
SK1818	Trent Valley	Barton-under-Needwood	6 May	15 Jun	5 May	27 Jun
SK3423	Melbourne Parklands	Ticknall a	3 May	6 Jun	15 May	12 Jun
SK3710	Coalfield	Sweepstone	25 Apr	14 Jun	19 Apr	27 Jun
SK3813	Coalfield	Normanton le Heath a	4 May	8 Jun	10 Apr	31 May
SK3915	Coalfield	Coleorton a	7 May	9 Jun	7 May	7 Jun
SK4607	Coalfield	Thornton a	29 May	30 Jul	11 Apr	21 Jun
SK4611	Charnwood	Billa Barra	19 Apr	25 Jun	17 Apr	30 Jun
SK4805	Coalfield	Botcheston	22 Apr	23 May	18 Apr	22 May
<b>Median date</b>			<b>4 May</b>	<b>14 Jun</b>	<b>19 Apr</b>	<b>20 Jun</b>

### 3.2 Birds detected by the 2010 survey

Samples of squares providing paired counts between 2008 and 2010 were small for every species. The maximum sample size, for a species that occurred on every square, was 19 squares, but sample sizes of paired counts, excluding zero counts in both years, were much lower for most species. Since BBS counts owe much to chance, or to conditions during the count, there is often wide variation in estimates of change between squares. For these reasons, no formal calculations were made of confidence intervals around estimates of change. It can be assumed that confidence intervals were wide and that few estimates of change, if any, were statistically significantly different from ‘no change’.

Table 7 shows the paired totals of birds counted for 2008 and 2010 on the professional and volunteer samples of squares. The grand totals for each species are also shown, together with the percentage changes derived from these totals, where sample sizes allow. A percentage change has been included where at least ten squares provided data and where the total of birds counted in 2008 was also at least ten. Species are listed in taxonomic order.

**Table 7. Comparison of birds seen in 2008 and 2010 on 19 squares surveyed in both years. Numbers of birds counted and number of squares contributing to the comparison are given. A percentage change has been calculated where at least ten squares provided data and where the total of birds counted in 2008 was also at least ten. The colour used to present the scientific name indicates the degree of conservation concern – red listed, amber listed, green listed or unlisted – according to Eaton *et al.* (2009).**

Species	Scientific name	Professional		Volunteers		All 19 squares			
		total 2008	total 2010	total 2008	total 2010	total 2008	total 2010	% change 2008–10	n squares
Mute Swan	<i>Cygnus olor</i>	8	6	0	2	8	8		3
Greylag Goose	<i>Anser anser</i>	8	0			8	0		2
Canada Goose	<i>Branta canadensis</i>	26	80	13	15	39	95	+144%	12
Barnacle Goose	<i>Branta leucopsis</i>	0	1			0	1		1
Mallard	<i>Anas platyrhynchos</i>	47	31	25	24	72	55	-24%	16
Pochard	<i>Aythya ferina</i>			2	0	2	0		1
Tufted Duck	<i>Aythya fuligula</i>	27	44	13	13	40	57		6
Red-l Partridge	<i>Alectoris rufa</i>	16	13	4	12	20	25	+25%	13
Grey Partridge	<i>Perdix perdix</i>	1	0			1	0		1
Pheasant	<i>Phasianus colchicus</i>	50	64	23	32	73	96	+32%	18
Cormorant	<i>Phalacrocorax carbo</i>	2	3	3	4	5	7		8
Grey Heron	<i>Ardea cinerea</i>	5	4	5	2	10	6	-40%	10
Little Grebe	<i>Tachybaptus ruficollis</i>	5	8	8	3	13	11		6
Gt Crested Grebe	<i>Podiceps cristatus</i>	3	12			3	12		1
Sparrowhawk	<i>Accipiter nisus</i>	1	4	1	1	2	5		7
Buzzard	<i>Buteo buteo</i>	19	17	4	11	23	28	+22%	17
Kestrel	<i>Falco tinnunculus</i>	19	14	4	5	23	19	-17%	17
Hobby	<i>Falco subbuteo</i>	2	2	0	1	2	3		3
Peregrine	<i>Falco peregrinus</i>	1	0			1	0		1
Moorhen	<i>Gallinula chloropus</i>	12	7	6	5	18	12	-33%	11
Coot	<i>Fulica atra</i>	21	26	6	10	27	36		6
Oystercatcher	<i>Haematopus ostralegus</i>	2	2			2	2		1
Lt Ringed Plover	<i>Charadrius dubius</i>	2	2			2	2		1
Lapwing	<i>Vanellus vanellus</i>	24	12	2	8	26	20		7
Snipe	<i>Gallinago gallinago</i>	0	1			0	1		1
Whimbrel	<i>Numenius phaeopus</i>	1	1			1	1		1
Curlew	<i>Numenius arquata</i>	3	0			3	0		1
Cmn Sandpiper	<i>Actitis hypoleucos</i>	3	1			3	1		2
Redshank	<i>Tringa totanus</i>	2	2			2	2		1
Black-headed Gull	<i>Chroicocephalus ridibundus</i>	12	29	4	5	16	34		8
Lesser B-b Gull	<i>Larus fuscus</i>	24	16	3	1	27	17		7
Herring Gull	<i>Larus argentatus</i>	1	0			1	0		1
Common Tern	<i>Sterna hirundo</i>	4	1			4	1		2
Feral Pigeon	<i>Columba livia</i>	3	2	2	3	5	5		6
Stock Dove	<i>Columba oenas</i>	21	32	6	3	27	35	+30%	15

Species	Scientific name	Professional		Volunteers		All 19 squares			
		total 2008	total 2010	total 2008	total 2010	total 2008	total 2010	% change 2008–10	n squares
Woodpigeon	<i>Columba palumbus</i>	231	284	326	287	557	571	+3%	19
Collared Dove	<i>Streptopelia decaocto</i>	14	17	59	39	73	56	-23%	15
Turtle Dove	<i>Streptopelia turtur</i>			1	0	1	0		1
Cuckoo	<i>Cuculus canorus</i>	3	3	1	6	4	9		11
Little Owl	<i>Athene noctua</i>			1	1	1	1		1
Tawny Owl	<i>Strix aluco</i>	3	2			3	2		4
Swift	<i>Apus apus</i>	114	43	9	5	123	48	-61%	11
Green Woodpkr	<i>Picus viridis</i>	12	14	6	7	18	21	+17%	14
Gt Sp Woodpkr	<i>Dendrocopos major</i>	17	21	3	17	20	38	+90%	17
Lr Sp Woodpkr	<i>Dendrocopos minor</i>	0	1	0	1	0	2		2
Magpie	<i>Pica pica</i>	46	55	41	47	87	102	+17%	19
Jay	<i>Garrulus glandarius</i>	12	11	1	4	13	15	+15%	11
Jackdaw	<i>Corvus monedula</i>	65	103	81	74	146	177	+21%	18
Rook	<i>Corvus frugilegus</i>	44	122	23	9	67	131	+96%	10
Carrion Crow	<i>Corvus corone</i>	108	160	97	83	205	243	+19%	19
Raven	<i>Corvus corax</i>	0	1			0	1		1
Goldcrest	<i>Regulus regulus</i>	9	9	7	4	16	13	-19%	11
Blue Tit	<i>Cyanistes caeruleus</i>	94	172	103	115	197	287	+46%	19
Great Tit	<i>Parus major</i>	73	96	69	65	142	161	+13%	19
Coal Tit	<i>Periparus ater</i>	22	32	3	8	25	40	+60%	11
Willow Tit	<i>Poecile montana</i>	2	1			2	1		3
Marsh Tit	<i>Poecile palustris</i>	2	0			2	0		1
Skylark	<i>Alauda arvensis</i>	80	91	32	48	112	139	+24%	18
Sand Martin	<i>Riparia riparia</i>	4	85	0	1	4	86		4
Swallow	<i>Hirundo rustica</i>	33	85	53	53	86	138	+60%	18
House Martin	<i>Delichon urbicum</i>	40	26	56	33	96	59	-39%	12
Long-tailed Tit	<i>Aegithalos caudatus</i>	35	44	19	50	54	94	+74%	17
Wood Warbler	<i>Phylloscopus sibilatrix</i>	0	1	2	0	2	1		2
Chiffchaff	<i>P. collybita</i>	36	54	23	37	59	91	+54%	18
Willow Warbler	<i>P. trochilus</i>	65	94	9	21	74	115	+55%	17
Blackcap	<i>Sylvia atricapilla</i>	43	67	10	19	53	86	+62%	17
Garden Warbler	<i>Sylvia borin</i>	12	17	1	1	13	18		9
Lr Whitethroat	<i>Sylvia curruca</i>	5	5	5	3	10	8	-20%	11
Whitethroat	<i>Sylvia communis</i>	47	83	21	31	68	114	+68%	17
Grasshopper Wr	<i>Locustella naevia</i>	1	0	1	0	2	0		2
Sedge Warbler	<i>Acrocephalus schoenobaenus</i>	0	1			0	1		1
Nuthatch	<i>Sitta europaea</i>	11	17	0	1	11	18		7
Treecreeper	<i>Certhia familiaris</i>	7	7	1	0	8	7		8
Wren	<i>Troglodytes troglodytes</i>	150	148	87	74	237	222	-6%	19
Starling	<i>Sturnus vulgaris</i>	71	87	91	61	162	148	-9%	15
Blackbird	<i>Turdus merula</i>	185	261	158	157	343	418	+22%	19
Song Thrush	<i>Turdus philomelos</i>	40	87	33	44	73	131	+79%	19
Mistle Thrush	<i>Turdus viscivorus</i>	13	16	6	4	19	20	+5%	14

Species	Scientific name	Professional		Volunteers		All 19 squares			
		total 2008	total 2010	total 2008	total 2010	total 2008	total 2010	% change 2008–10	n squares
Sp Flycatcher	<i>Muscicapa striata</i>	2	4			2	4		2
Robin	<i>Erithacus rubecula</i>	118	160	99	81	217	241	+11%	19
Black Redstart	<i>Phoenicurus ochruros</i>	0	1			0	1		1
Whinchat	<i>Saxicola rubetra</i>	1	0			1	0		1
Wheatear	<i>Oenanthe oenanthe</i>	5	1			5	1		2
Dunnock	<i>Prunella modularis</i>	52	87	69	71	121	158	+31%	19
House Sparrow	<i>Passer domesticus</i>	74	112	71	97	145	209	+44%	13
Tree Sparrow	<i>Passer montanus</i>	25	20	5	4	30	24		9
Yellow Wagtail	<i>Motacilla flava</i>	2	3	2	1	4	4		6
Grey Wagtail	<i>Motacilla cinerea</i>	1	0			1	0		1
Pied Wagtail	<i>Motacilla alba</i>	11	13	4	5	15	18	+20%	13
Tree Pipit	<i>Anthus trivialis</i>	3	10			3	10		2
Meadow Pipit	<i>Anthus pratensis</i>	11	12	12	8	23	20	-13%	8
Chaffinch	<i>Fringilla coelebs</i>	114	194	99	119	213	313	+47%	19
Greenfinch	<i>Carduelis chloris</i>	20	54	140	61	160	115	-28%	20
Goldfinch	<i>Carduelis carduelis</i>	56	83	27	58	83	141	+70%	19
Linnet	<i>Carduelis cannabina</i>	50	63	8	24	58	87	+50%	15
Lesser Redpoll	<i>Carduelis cabaret</i>	0	3			0	3		3
Bullfinch	<i>Pyrrhula pyrrhula</i>	18	24	14	8	32	32	0%	17
Yellowhammer	<i>Emberiza citrinella</i>	47	66	29	36	76	102	+34%	18
Reed Bunting	<i>E. schoeniclus</i>	7	33	3	3	10	36		9
<b>Total (all species)</b>		<b>2741</b>	<b>3803</b>	<b>2155</b>	<b>2146</b>	<b>4896</b>	<b>5949</b>	<b>+22%</b>	<b>19</b>

## 4 DISCUSSION

### 4.1 Birds detected by the 2010 survey

In all, 88 species were located by the 2010 survey. These included the red-listed Lapwing, Whimbrel, Cuckoo, Lesser Spotted Woodpecker, Willow Tit, Skylark, Wood Warbler, Starling, Song Thrush, Spotted Flycatcher, House Sparrow, Tree Sparrow, Yellow Wagtail, Tree Pipit, Linnet, Lesser Redpoll and Yellowhammer. Although the 88 species included these 17 red-listed and a further 26 amber-listed species, not all of these are rare or declining (Eaton *et al.* 2009). For full details of national and regional population trends among British breeding birds, the reader is referred to the BTO's Bird Trends and BBS web pages and to the BBS annual report (Baillie *et al.* 2010, Risely *et al.* 2011).

Seven bird species were observed during the 2010 surveys that had not been recorded on the same squares during the 2008 fieldwork. On the negative side, however, 11 species found in 2008 on the 19 squares surveyed in 2010 were not seen that year. The gains and losses shown in Table 7 are not thought to be of particular biological significance; rather, they related to chance encounters with scarce and mobile species.

The most unusual species observed in 2010 were Whimbrel (a passing migrant), Lesser Spotted Woodpecker (now rare throughout its British range) and Black Redstart (probably a passing migrant, but a species that might nest in the English Midlands on rare occasions).

### 4.2 Population changes between the 2008 and 2010 surveys

Population changes can be estimated for the more abundantly recorded species on the two surveys. In Table 7, they have been presented for the species where the 2008 total was at least ten birds and where at least ten squares provided data for the comparison. Confidence intervals have not been calculated for these changes but, given the relatively small numbers of paired counts for each species and the variation within the counts, would be very wide.

Across all bird species recorded on these squares, an increase of 22% was registered in birds found, all accounted for by extra birds on SH's surveys (Table 7). BBS volunteer totals were very similar in the two years and did not contribute to the overall increase in birds recorded. There is no obvious cause for this increase in bird numbers found on the professional surveys. There is little indication from general BBS data, for example, that bird totals tend to rise as observers become more familiar with the site after the first year (Eglington *et al.* 2010). Comparison between the professional and volunteer data at species level would not be informative, because the wide confidence intervals surrounding each estimate would not allow any differences to be detected between the two sets of data.

The same percentage changes as in Table 7 have been repeated in Table 8, this time ordered from the largest decreases to the strongest increases. In line with the increase in total birds recorded, there are more increases than decreases among the species for which change

estimates can be made. Decreases greater than 25% and the equivalent increases (more than 33%) have been highlighted in the table. Even for percentage changes as large as this, however, the data are inadequate to distinguish between biologically significant trends, short-term fluctuations and changes that may purely be due to chance.

Also shown in Table 8 are the relevant year-to-year changes from the national BBS for the East Midlands and West Midlands government regions. These have also been highlighted (orange for decreases and green for increases) where the change is outside the range +33% to -25%. Because the regional BBS samples are much larger than the 19 squares for which National Forest data were available, it is possible to determine which of the changes recorded are statistically significant. The percentage changes for which the direction of change reaches a 95% level of significance are indicated with an asterisk; generally these are the largest percentage changes but, for the more abundant species, relatively small percentage changes may also be statistically significant.

Each species name is shown in colour, matching its status on the current list of Birds of Conservation Concern (red, amber or green list, or black for introduced species, which are not listed). The main habitats occupied by each species are also summarised.

**Table 8. Comparison of population changes detected within The National Forest with results from the East Midlands and West Midlands government regions, drawn from the national BBS scheme. Main habitats are summarised as follows: M marsh/wetland, F farmland, G gardens/urban, S scrub/young woodland, W mature woodland.**

Species	Main habitats					NF % change 2008–10	East Midlands		West Midlands	
	M	F	G	S	W		2008–09	2009–10	2008–09	2009–10
Swift			●			-61%	-73%	-13%	-24%	+1%
Grey Heron	●				●	-40%	-10%	-42%	+7%	-14%
House Martin			●			-39%	-69%	-18%	-25%	+4%
Moorhen	●	●				-33%	+15%	-35%*	-15%	+17%
Greenfinch			●	●		-28%	+12%	-9%	-9%	+1%
Mallard	●	●				-24%	+24%	-10%	-21%*	+15%
Collared Dove			●			-23%	-13%	-2%	-13%*	-10%
Lr Whitethroat		●		●		-20%	-15%	-3%		
Goldcrest			●		●	-19%			-61%*	+34%
Kestrel		●				-17%	-18%	-5%	-47%*	+11%
Meadow Pipit	●	●		●		-13%	+16%	-18%		
Starling		●	●			-9%	-22%	+2%	-15%	-22%
Wren		●	●	●	●	-6%	-19%*	-3%	-11%*	-1%
Bullfinch				●		0%	+3%	+23%	-13%	+60%*
Woodpigeon		●	●	●	●	+3%	+5%	-10%	+3%	+5%
Mistle Thrush		●	●		●	+5%	-25%	-12%	-5%	+12%
Robin		●	●	●	●	+11%	-13%*	-11%	+1%	-13%*
Great Tit			●		●	+13%	+1%	-4%	-10%*	+21%*
Jay			●	●	●	+15%			-21%	+34%
Green Woodpecker			●		●	+17%	-12%	+51%*	-14%	-18%

Species	Main habitats					NF % change 2008–10	East Midlands		West Midlands	
	M	F	G	S	W		2008–09	2009–10	2008–09	2009–10
Magpie		●	●	●	●	+17%	-15%	+9%	-5%	+7%
Carrion Crow		●			●	+19%	-6%	-12%	+9%	-3%
Pied Wagtail	●	●	●			+20%	+51%	-49%*	-15%	-13%
Jackdaw		●	●		●	+21%	+7%	+6%	-7%	-9%
Buzzard		●			●	+22%			-10%	+11%
Blackbird		●	●	●	●	+22%	+6%	-10%	-2%	+2%
Skylark		●				+24%	+2%	-19%*	-5%	-15%*
Red-l Partridge		●		●		+25%	-5%	+19%	+3%	+1%
Stock Dove		●			●	+30%	0%	-12%	+2%	+15%
Dunnock		●	●	●	●	+31%	-4%	+69%*	+19%*	+12%
Pheasant		●		●	●	+32%	+14%	-14%	+11%	-7%
Yellowhammer		●		●		+34%	+37%	-34%	-3%	+11%
House Sparrow		●	●			+44%	-12%	+5%	-2%	+10%
Blue Tit			●		●	+46%	-31%*	+16%	-5%	+20%*
Chaffinch		●	●	●	●	+47%	+13%*	+6%	+3%	-2%
Linnet		●		●		+50%	+9%	+41%*	+5%	+10%
Chiffchaff				●	●	+54%	+4%	+85%*	-10%	+22%*
Willow Warbler				●		+55%	+16%	-16%	+3%	+6%
Swallow		●				+60%	+20%	-11%	+8%	+5%
Coal Tit			●		●	+60%	+7%	+15%	+28%*	0%
Blackcap			●	●	●	+62%	+20%*	+13%	+18%*	-7%
Whitethroat		●		●		+68%	+27%	+20%*	+26%*	-6%
Goldfinch			●	●		+70%	+23%	+23%	+5%	+6%
Long-tailed Tit			●	●	●	+74%	+27%	+2%	-30%*	+51%*
Song Thrush			●	●	●	+79%	-26%	0%	+6%	-5%
Gt Sp Woodpecker			●		●	+90%	-13%	+19%	+5%	-1%
Rook		●			●	+96%	-24%	+70%	-19%	+26%
Canada Goose	●					+144%	-48%*	+20%	-21%*	+35%*

Five species, Swift, Grey Heron, House Martin, Moorhen and Greenfinch decreased by more than a quarter between these two surveys. Four of these also showed decreases in one or both broader regions in one or other year-to-year comparison. None of the five species was likely to have been influenced by management of the National Forest during 2008–10. Woodland plantings and subsequent growth may reduce habitat availability for Moorhens but not for the other four.

There are 26 species listed in Table 8 that changed relatively little in the National Forest surveys 2008–10. For most of these species, the regional percentage changes were inconsistent between years and regions, suggesting that numbers in the wider Midlands countryside were fluctuating. Among the exceptions was Collared Dove, where all the percentage changes were negative, probably reflecting the depredations of trichomonosis, which has severely affected this species and Greenfinch since 2007. For Lesser Whitethroat and Wren, it was also the case that all the available percentage change estimates were negative. Wren has been affected by recent severe winter weather (Risely *et al.* 2011).

Many of the minor increases (<33%) recorded on the National Forest surveys were for woodland birds, including Dunnock, Stock Dove, Blackbird, Buzzard and Jackdaw. It is not possible to say whether growth of woodland within The National Forest may have influenced these initial results. All of the species concerned also use habitats other than woodland, and some non-woodland species, such as Skylark, also increased.

Seventeen species listed in Table 8 showed increases of more than 33% between the two National Forest surveys. These included four red-listed and two amber-listed species. Nine of the species use woodland habitat and may therefore have benefited from woodland growth within The National Forest. These included Great Spotted Woodpecker, a species that requires older trees for feeding and for nesting, and Song Thrush, which can reach high density in young stages of woodland growth. Although not marked in the table as woodland species, Whitethroat, Willow Warbler, Linnet and Yellowhammer, which have all increased according to the two National Forest surveys, use young plantations for a short period until the ground layer and shrub layer become too dense. These are also species, therefore, that might have benefited directly from new woodland plantings in The National Forest.

For all the species marked as having increased in The National Forest, except possibly for Chiffchaff (which increased strongly in the wider region, especially in the East Midlands), the National Forest population appeared to outperform that in the Midlands as a whole. To some extent, however, this pattern will derive from chance. For species such as Rook and Canada Goose that habitually occur in large flocks, the effects of chance on the counts of birds can be very great. It is unlikely that any of the apparent differences in trends between The National Forest and elsewhere in the Midlands would be statistically significant at the 95% level.

#### **4.3 Recommendations for further work**

We propose that the third stage of fieldwork for the National Forest BBS should take place ideally in 2012. According to the provisional plan for the continuation of the survey (Table 1), this survey would be a repeat of the 12 squares in subsample B and report on changes on these squares between 2008 and 2012. To these 12 squares should ideally be added the two squares placed in subsample A but not covered by the 2010 survey.

The cost of the next survey should therefore be approximately the same as for 2010 but with a small additional amount to cover the costs of the extra four squares.

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