

The breeding bird community of Balrath Wood, Co. Meath, 1996: A preliminary investigation

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Summary

During the breeding season of 1996, the birds of Balrath Wood, Co. Meath, were surveyed using the line transect technique. Twenty-four species were found to be present at the site, although four of these were unlikely to rely on the woodland directly. The bird communities of three separate habitats within the woodland, viz. woodland ridelines, completely wooded areas and external woodland edges, were compared. Relative abundance values were calculated for each species for each habitat. The overall abundance estimates for each habitat varied between 15.25 and 19.67 birds/ha. Ridelines with a range of early successional stage vegetation were found to contain the greatest number of species and the highest densities of birds. Wooded areas and external woodland edges both contained the same number of species, although density was higher in the latter. A relatively low number of hole-nesting species were recorded, possibly due to a shortage of suitable nesting sites.

Introduction

Woodland, particularly mature climax broadleaf woodland, is an important habitat for terrestrial birds. The productivity and relative stability of this successional stage should allow for the development of avian communities showing a high diversity of species. Apart from a few core studies, however, there are relatively few data published on Irish woodland bird communities. Consequently, this study, while preliminary in nature, is of interest as it is an example of one particular woodland bird community. The study also briefly investigates how the bird community may vary between the different habitat components within a woodland.

Balrath Wood

Balrath Wood is a 21 ha mixed woodland situated in Co. Meath approximately 40 km north of Dublin city (National Grid reference N 99 64). Donated by Coillte, the site is now managed by the Tree Council of Ireland, the objectives being to create a quality broadleaf woodland and to develop an outdoor educational resource aimed at raising public awareness and knowledge of the forest ecosystem, silviculture and general forest management.

The site once comprised a broadleaf woodland dominated by sessile oak (*Quercus petraea* (Matt.) Liebl.). Subsequent felling has resulted in only a few of these older trees now remaining. In 1969, the Forest Service replanted the site with a conifer-broadleaf mixture made up primarily of Norway spruce (*Picea abies* (L.) Karst.) and oak (*Quercus* spp.). Other species also present include common beech (*Fagus sylvatica* L.), common ash (*Fraxinus excelsior* L.), horse chestnut (*Aesculus hippocastanum* L.), grand fir (*Abies*

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grandis Lindl.), common alder (*Alnus glutinosa* (L.) Gaertn.), silver birch (*Betula pendula* Roth), Spanish chestnut (*Castanea sativa* Mill.) and willow (*Salix* spp.). A particularly important feature of the woodland is its two large (approximately 20 m wide) unplanted ridelines supporting a rich herbaceous field layer and edged with bramble (*Rubus fruticosus*) and early successional stage shrubs such as willow which merge with the woodland canopy. The ridelines, which run diagonally in a north-east and north-west direction to subdivide the site into four, were developed during the early 1970s specifically to create an increased edge effect in the woodland and thereby generate greater diversity. The deliberate orientation of the ridelines allows for maximum daily sunshine throughout the year. The area surrounding the woodland is a mixture of arable and pastoral fields. The external edges of the woodland meet directly with the surrounding fields, although any transitional stage between the woodland canopy and the fields is generally lacking.

Objectives

This paper reports on a study commissioned by the Tree Council of Ireland to survey the breeding bird community of Balrath Wood, Co. Meath. The main objectives were to identify the species breeding at the site and to estimate their abundance. Differences within the bird community at the site were also of interest, particularly given the management history of the woodland and the attempts which have been made to attract a greater diversity of species. For this purpose, the woodland was subdivided into three components, viz. woodland ridelines, completely wooded areas and external woodland edges. A major consideration throughout was the need for standardisation of those methods used, in order to facilitate future comparable studies aimed at assessing changes in the bird community resulting from management decisions.

Methods

Transects

The line transect method described by Bibby *et al.* (1993) was considered to be the most efficient way of meeting the aims of this study. A total of 10 transects were marked out, four along the ridelines (R1, R2, R3 and R4), four through the wooded areas (W1, W2, W3 and W4) and two along the woodland's external edges (E1 and E2). Transects varied in length between 130 m and 530 m, depending on the extent of the section being sampled. Transects were positioned in order to maximise the sampled area of each habitat while minimising overlap with adjoining habitats. This allowed the bird community in each habitat to be recorded separately.

Data collection

Two visits were made to the site during 1996, the first early in the breeding season (17th May) and the second towards the season's end (20th June). This permitted a survey of both early and late breeding birds. All transects were walked on both dates. Birds seen or heard up to 30 m on both sides of the rideline and wooded transects were recorded. In the case of the edge transects, birds were only recorded on the woodland side, as the adjoining fields were considered to be a different habitat type. Birds seen or heard flying overhead or beyond the 30 m limit were also noted, but were not included in the calculation of relative abundance values. Fieldwork was carried out between 0600 and 1100 BST and only during suitable weather conditions, i.e. no rain, light or no wind.

A separate survey was carried out at dusk on two dates (16th May and 19th June) to detect the presence of crepuscular and nocturnal species such as owl. This count was restricted to the rideline transects, due to the difficulty of moving through a densely wooded area in poor light. The analyses of the resulting data were carried out on a presence/absence basis, due to the difficulty in censusing such species accurately.

Data analyses

Relative abundance values for each species were calculated by dividing the number of birds detected by the area of the habitat sampled. In the analyses of data, the higher of the two count values was used to calculate the density for each species, as it is more likely that abundance would be underestimated. It was also possible that certain migrant species would not have arrived before the first census.

In order to quantify the difference in diversity between habitats, Simpson's and Shannon diversity indices were calculated using the overall abundance estimates for each habitat (Begon *et al.*, 1990). Evenness, i.e. how evenly the densities were distributed among the species, was calculated using the corresponding equitability indices.

Results

In total, 24 species were recorded at the site (Table 1). Four of these - jackdaw (*Corvus monedula*), rook (*Corvus frugilegus*), hooded crow (*Corvus corone*) and starling (*Sturnus vulgaris*) - were detected flying over the transects and therefore may not be using the woodland directly. Only three migrant species - blackcap (*Sylvia atricapilla*), chiffchaff (*Phylloscopus collybita*) and willow warbler (*Phylloscopus trochilus*) - were detected, with most of the recordings made on the rideline transects (see Tables 2-5). Fourteen species were detected on the rideline transects and 13 species on the wooded and the edge transects (Tables 3). Both diversity indices found the rideline transects to be the most diverse and also to contain the most even spread of species densities (Table 4). The Shannon index, however, founded the edge habitat to be more diverse than the wooded habitat, whereas Simpson's index found the reverse to be the case.

The overall abundance estimate was greatest on the rideline transect (19.67 birds/ha) (Table 3), although the highest individual density was found on wooded transect W3 (24.33 birds/ha). The edge transects contained the second highest overall abundance estimate, at 17.35 birds/ha. The wooded transects had an overall abundance estimate of 15.25 birds/ha. Within the ridelines, wren (*Troglodytes troglodytes*) appeared to be the most abundant species, followed in descending order by chaffinch, goldcrest (*Regulus regulus*), woodpigeon (*Columba palumbus*) and robin (*Erithacus rubecula*) (Table 5). In the wooded areas, the order of abundance differed, with goldcrest being the most abundant species, followed by chaffinch (*Fringilla coelebs*), woodpigeon, wren and coal tit (*Parus ater*). Edge transects were also slightly different, with the order of descending abundance being wren, woodpigeon, chaffinch, robin and goldcrest.

The dusk census found long-eared owl (*Asio otus*) to be present at the site, with one individual detected on transect R2.

Discussion

Previous studies on the bird communities of Irish woodlands have mainly relied upon the territory mapping method known as the Common Bird Census (CBC) (e.g. Nairn and Farrelly, 1991; Wilson, 1977; Batten, 1976). While providing detailed results, this method

Table 1. *Species list and migratory status (M=Migrant, R=Resident).*

<i>Species</i>	<i>Status</i>
Sparrowhawk (<i>Accipiter nisus</i>)	R
Pheasant (<i>Phasianus colchicus</i>)	R
Woodpigeon (<i>Columba palumbus</i>)	R
Long-eared owl (<i>Asio otus</i>)	R
Wren (<i>Troglodytes troglodytes</i>)	R
Dunnock (<i>Prunella modularis</i>)	R
Robin (<i>Erithacus rubecula</i>)	R
Blackbird (<i>Turdus merula</i>)	R
Song thrush (<i>Turdus philomelos</i>)	R
Blackcap (<i>Sylvia atricapilla</i>)	M
Chiffchaff (<i>Phylloscopus collybita</i>)	M
Willow warbler (<i>Phylloscopus trochilus</i>)	M
Goldcrest (<i>Regulus regulus</i>)	R
Long-tailed tit (<i>Aegithalos caudatus</i>)	R
Coal tit (<i>Parus ater</i>)	R
Blue tit (<i>Parus caeruleus</i>)	R
Great tit (<i>Parus major</i>)	R
Magpie (<i>Pica pica</i>)	R
Jackdaw (<i>Corvus monedula</i>)	R
Rook (<i>Corvus frugilegus</i>)	R
Hooded crow (<i>Corvus corone</i>)	R
Starling (<i>Sturnus vulgaris</i>)	R
Chaffinch (<i>Fringilla coelebs</i>)	R
Bullfinch (<i>Pyrrhula pyrrhula</i>)	R

is time consuming and may require up to 10 site visits (International Bird Census Committee, 1969). Given the aims of this study, the time available and the linear nature of both the rideline and edge habitats, the transect method described above was considered the most suitable. The use of a band system to calculate the detection rates of different species, as proposed by Bibby *et al.* (1993), was discounted, as the distances between adjoining habitats were too small. As a result, the method employed in this study did not compensate for the varying detection rates of different species and it is possible that the number of less conspicuous species may have been underestimated. This effect is, however, likely to have been small at distances of less than 30 m. In any case, comparisons across habitats within the study are not effected.

Overall abundance estimates (15.25-19.67 birds/ha) (Table 3) appear lower than those recorded in previous Irish studies of oak woodland and both Norway and Sitka spruce (*P.*

Table 2. Maximum numbers of birds detected on transects during field visits (R=Rideline, W=Wooded, E=Edge).

<i>Species</i>	<i>R1</i>	<i>R2</i>	<i>R3</i>	<i>R4</i>	<i>W1</i>	<i>W2</i>	<i>W3</i>	<i>W4</i>	<i>E1</i>	<i>E2</i>
Sparrowhawk	0	0	0	0	0	0	0	0	0	1
Pheasant	0	0	0	0	0	0	0	0	0	1
Woodpigeon	4	5	2	2	4	2	1	1	5	4
Long-eared owl	0	1	0	0	0	0	0	0	0	0
Wren	7	7	3	4	2	2	1	2	6	3
Dunnock	0	1	2	1	0	0	1	0	1	0
Robin	4	4	2	2	4	0	2	0	2	5
Blackbird	2	2	3	1	2	1	1	0	3	1
Song thrush	2	3	4	1	1	0	1	3	1	0
Blackcap	1	0	1	4	0	0	0	0	0	0
Chiffchaff	1	1	1	1	0	0	1	0	0	0
Willow warbler	0	1	0	0	0	0	0	0	1	0
Goldcrest	5	4	2	3	6	4	4	1	2	4
Long-tailed tit	0	0	0	0	0	0	2	0	0	0
Coal tit	2	0	2	1	1	1	2	1	1	2
Blue tit	1	0	0	2	2	0	0	2	0	3
Great tit	0	0	0	0	0	0	0	0	0	1
Magpie	0	0	1	0	0	0	0	0	0	1
Chaffinch	5	5	4	5	6	1	2	1	3	4
Bullfinch	0	0	0	0	0	0	1	0	0	0

Table 3. Relative abundance values for each species for each habitat, and overall abundance estimates for each habitat, in birds per ha (R=Rideline, W=Wooded, E=Edge).

<i>Species</i>	<i>R-Mean</i>	<i>W-Mean</i>	<i>E-Mean</i>
Sparrowhawk	0.00	0.00	0.32
Pheasant	0.00	0.00	0.32
Woodpigeon	2.02	1.56	2.90
Wren	3.31	1.52	2.91
Dunnock	0.67	0.32	0.00
Robin	1.88	1.19	2.23
Blackbird	1.27	0.83	1.30
Song thrush	1.58	1.15	0.33
Blackcap	1.11	0.00	0.00
Chiffchaff	0.66	0.32	0.00
Willow warbler	0.14	0.00	0.33
Goldcrest	2.23	3.26	1.92
Long-tailed tit	0.00	0.64	0.00
Coal tit	0.53	1.24	0.96
Blue tit	1.00	0.74	0.95
Great tit	0.00	0.00	0.32
Magpie	0.17	0.00	0.00
Chaffinch	3.10	1.93	2.24
Bullfinch	0.00	0.32	0.00
Total	19.67	15.25	17.35

Table 4. Diversity and equitability indices for each habitat (D =Simpson's diversity index, E =Simpson's equitability index, H =Shannon diversity index, J =Shannon equitability index).

Habitat	D	E	H	J
Rideline	9.45	0.68	47.05	17.83
Wooded	9.16	0.65	35.59	13.88
Edge	8.64	0.62	39.13	15.26

Table 5. Species rank in descending order of abundance.

Rank	Habitat		
	Rideline	Wooded	Edge
1	Wren	Goldcrest	Wren
2	Chaffinch	Chaffinch	Woodpigeon
3	Goldcrest	Woodpigeon	Chaffinch
4	Woodpigeon	Wren	Robin
5	Robin	Coal tit	Goldcrest

sitchensis (Bong.) Carr.) plantations (Batten, 1976; Wilson, 1977; Nairn and Farrelly, 1991), although differences in methodology must be taken into account. The number of species recorded in Balrath Wood compares favourably with previously studied Norway and Sitka spruce plantations (20 likely breeding species in this study, compared to 14 and eight respectively, in Batten (1976)). The number of species is, however, lower than that found in natural oak woodland (21 breeding species and five species present, but not proven to breed, in Nairn and Farrelly (1991)).

Within Balrath Wood, the rideline habitat contained the greatest number of species (14) (Table 3). When analysed by both Simpson's and the Shannon indices, it was also found to be the most diverse of the three habitats studied. The wooded and edge habitats, each containing 13 species, were less diverse than the rideline habitat, but did not differ greatly from each other in terms of species diversity. The Shannon index found the edge habitat to be more diverse than the wooded habitat, whereas Simpson's index found the reverse to be the case. Further discussion of the significance of these differences is precluded and more detailed censusing would be required to resolve the contrasting results.

Although the same basic group of species dominate all three habitats, the order of abundance in which they occur varies (Table 5). For example, wren was the most abundant species in both the rideline and edge habitats where more dense low cover is available, while goldcrest dominated the high canopy of the wooded areas.

Although occurring at low densities, the fact that the three migrant species (blackcap, chiffchaff and willow warbler) are concentrated on the rideline transects suggests that the incorporation of the ridelines and, in particular, the dense early successional stage vegetation lining the edges of this habitat, have succeeded in attracting species which might otherwise not occur. Blackcaps in particular seem to have benefited from this habitat, being found in it at a mean density of 1.11 birds/ha, while being completely absent from the wooded and edge habitats. It is likely that the edge habitat fails to attract such species

due to its abrupt graduation from woodland canopy to open field, and the lack of early successional stage vegetation.

The apparent absence of treecreeper (*Certhia familiaris*) at the site, together with the low number of great tits (*Parus major*) and blue tits (*Parus caeruleus*) observed, might seem unusual. Given, however, that much of the woodland is dominated by Norway spruce planted in 1969, it is possible that there may be a shortage of suitable nesting sites for these hole-nesting species. Such sites, normally provided by cavities in older or dead trees, may be in short supply in a wood of this age.

Management implications

It appears that the provision of ridelines which merge gradually with more mature woodland canopy to create a mixture of both early and late successional stage vegetation, may provide a habitat where both density and diversity are increased. Such habitat management may also serve to attract species not normally present at a woodland site. Conversely, it appears that an abrupt transition from woodland canopy to open field similar to the edge habitat sampled in this study, is not of the same value as the ridelines and is unlikely to attract the same range of species.

The possible absence of suitable natural nesting sites for hole-nesting species could be compensated for by the provision of artificial sites such as nestboxes (Du Feu, 1993). The retention of a number of overmature and dead trees would, however, be of great and long term benefit to the bird community within the woodland.

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