THE WINTERING BIRDS OF TWO CONTRASTING FARMING LANDSCAPES IN CENTRAL SCOTLAND

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Summary

The wintering birds of two distinct rural areas in central Scotland were studied by making transect counts from November 1993 to March 1994. One Ir.msect was in a primarily pastoral area and the second where about half the ('.round was in arable production. Buntings, sparrows and certain finches were more frequent in the arable district whilst there were more cover haunting passerine species in the pastoral area, consistent with the abundance of tall hedges and woodland. Lapwings, Golden Plover, Pied Wagtails and Song Thrushes were scarce or absent until the late winter or early spring. Preliminary data was collected on the use of hedges and of different types of fields. Both similarities and some differences occur when comparison is made with other studies in the UK and the reasons for some anomalies are discussed.

Introduction

The Forth Valley to the west of the Kincardine Bridge is an area of mixed farmland situated immediately south of the Ochil Hills and the southern and central Highlands and is a major wintering ground for many species of birds. On the Carses of Stirling and Clackmannan farms are arable with pasture, thus the landscape is generally open with little woodland - for example, between Thornhill and the River Forth. By contrast, in the middle Devon valley between Tillicoultry and Dollar there is very little arable and to the north of the River Devon it is possible to find an extensive route that is purely through lowland grazing land and is characterised by high hedges and parkland with small mixed woods and belts of trees. There is little quantitative information for central Scotland on bird communities in winter related to differerent styles of farming, thus I decided to make a detailed study of the birds of these two areas The main question concerns whether a given species is commoner in one farmland type rather than another. Two secondary questions were also addressed: First, does a species use different field types unequally and /or how important are hedges ?. Second, which species show evidence of a mid-winter absence followed by a marked spring return ?.

Methods

Two transects were set out in November 1993 The Devon transect started along the footpath close to the River Devon then skirted the outskirts of Dollar and returned eastward (8.5 Km, altitude range 15-75m above sea level). A suitable transect on the Carse of Stirling was more difficult to design due to lack of access paths but I set out one that skirted south of Thornhill village and

used minor roads with little traffic to complete a 9.5 Km transect (altitude range 11-30m above sea level). Six initial transects were made in each area between 10 November 1993 and 17 February 1994, two further pairs of transects in early March and March 19 and 20 were done to examine the issue of spring immigration which is marked in several species that are present in mid-winter only in small numbers.

Observations were made by recording sightings and calls of birds within 200m, this distance was chosen since small birds were the main focus of interest and also because beyond this distance the two areas differed in the extent to which trees obscured visibility. Birds flying over in high and steady flight were considered as commuting (not using the area) and not included in the transect data. I used x8 binoculars and maintained a steady pace with pauses to identify and make notes. Transects were done only on days with no appreciable rain and with moderate or light winds, they were alternated between the two areas and successive pairs were on dates as close together as feasable, however, due to other commitments and spells of bad weather this was only successful (spaces of a week or less) for the 12 transects after the New Year and so the "pairing" has not been used in data analysis. Count data were standardised to a 10 Km basis and t-tests performed on the two sets of eight numbers (in cases where there was very high variability amongst counts a log transformation was applied. No specific predictions were made as to whether any species might be expected to be commoner in one of the areas, thus two-tailed probabilities were used).

The relative extents of woodland plus scrub with trees and also of tall, unmanaged hedges were estimated by measuring on 1:10000 maps the distances along the census bands (200m either side of the transect route) in which the habitats were present. In the arable area an analysis of the main field habitats was made by noting the state of each field as either winter wheat, grass, plough (bare soil) or stubble. Then the length of each field boundary on the transect was measured on a 1:2500 map and each category summed to give an estimate of the percentage extent of each field type. Only small sections of a few fields did not extend from the transect line out to or beyond the 200m recording boundary so the linear measure is a good indication of the relative areas relevant to the transect. Very little change in the nature of the fields occurred until March when some stubble was ploughed and crops in what had initially been ploughed fields had sprouted enough to transfer them into the winter wheat category. The net effect of this was to transfer some stubble (down 23%) to winter wheat (up 18.5%); an overall proportion was calculated by weighting the earlier and later results according to the number of transect counts that were appropriate. The grass fieldtype in the arable area is very mixed, ranging from unmanaged pasture to seeded grass plus the grazed fields that had in summer 1993 been grown tall for hayseed. There was also undersown stubble where the distinction betwen grass and stubble is arbitrary in some cases.

Results

All the major field habitats on the Devon transect consist of grassland, much of it old pasture whereas at Thornhill only about half is grassland with about half of that fairly intensively managed. In both areas sheep and cattle are common grazing species with a few horses. Although some type of hedging is found along most of both routes there is far more cover in the form of tall

Table 1. Frequencies of regular species on Devon (pasture with copses) and Thornhill (open arable) areas. Numbers are average recorded per 10 km of transect.

Species	Devon	Thornhill	Probability
Wood pigeon	22.9	9.3	NS(Ln)
Stock Dove	0.0	3.9	••
Skylark	0.4	87.0	• (Ln)
Meadow Pipit	1.0	14.7	•
Pied Wagtail	2.2	1.4	(S)
Wren	5.6	3.4	NS
Hedgesparrow	8.6	4.5	•
Robin	23.8	5.5	••
Blackbird	38.1	12.6	••
Song Thrush	3.4	2.8	(S)
Fieldfare	10.5	19.6	NS(Ln)
Redwing	60.3	l3.7	NS(Ln)
Mistle Thrush	3.0	1.4	NS
Long-tailed Tit	4.6	0.0	••
Coal Tit	4.9	0.0	••
Blue Tit	36.6	5.3	••
Great Tit	24.5	1.8	••
Carrion Crow	87.8	70.7	NS(Ln)
Starling	44.4	74.8	NS
House Sparrow	17.1	30.2	••
Tree Sparrow	0.0	2.8	••
Chaffinch	37.0	64.8	NS
Greenfinch	14.6	8.0	NS
Goldfinch	4.7	2.6	NS
Siskin	l3.9	0.4	••
Linnet	0.0	91.1	••(Ln)
Bullfinch	3.4	0.1	••
Yellowhammer	1.9	8.9	••
Reed Bunting	0.0	3.7	••

NS = no significant difference. * = significant ** = highly significant
(Ln) - T test on log transformed counts due to high variability
(S) - no area comparison due to marked spring arrival
N.b: the total number of records for each area can be found by multiplying the Devon figure by 6.8 and the Thornhill figure by 7.6.

Ocurrence of cover on transects:

	Devon	Thornhill	
Woodland/Scrub + trees	2.3	0.42	Km
Tall hedge	3.0	1.1	Km

hedges and of woodland or scrub plus trees at Devon, see Table 1 for details. Scattered trees were present along part of the Thornhill route and most of the Devon but quantitative estimates were not made.

Table 1 shows the average frequency per transect, standardised to numbers per 10 Km, for those species that occurred on at least six dates on at least one of the areas; Rooks are excluded from this table since, although seen commonly, their flocks often straddled the 200m observation limit and counts were difficult to replicate consistently. The Stock Dove *(Columba oenas)* occurred only in the arable area even though the Devon transect includes a large area of parkland pasture with many mature trees. More surprisingly, the Woodpigeon (C. *palumba)* does not appear as wintering in larger numbers in the arable, indeed it is on average less frequent there although the difference is not significant due to high variability between counts. Clear arable specialists include Skylark *(Alauda arvensis),* Meadow Pipit *(Anthus pratcnsis),* Linnet *(Carduelis cannabina),* House Sparrow *(Passer domesticus),* Tree Sparrow (P. *montanus),* Yellowhammer *(Emberiza citrinella)* and Reed Bunting (£. *schoenidus).* Starling *(Sturnus vulgaris)* and Chaffinch *(Fringilla coelcbs)* show indications of a preference for arable, but not to a significant degree, whilst Carrion Crow *(Corvus cowrie),* Fieldfare *(Turdus pilaris)* and Goldfinch (C. *carduelis)* are notably even handed. Mistle Thrush (T. *viscivorus)* and Greenfinch (C. *chloris)* show no strong differences, nor, and much more surprisingly, does the Wren (T. *troglydytes).* Rooks *(Corvus frugilegus),* Jackdaws *(C. monedula)* and Blackheaded Gulls (Larus ridibundus) were all seen regularly in numbers but often just beyond the census boundaries so that the numbers seen in a given transect depended on the exact feeding site in a very erratic manner; both the corvids were frequent in both areas but the records were not analysed for area comparisons. Pinkfooted Geese *(Anser brachyrhynchus)* were seen on the ground only at Thornhill; although in large numbers they were usually at some distance outwith the censuses. The species that are much more frequent on the Devon transect are no surprise since they are all well known either to feed in trees and bushes or are strongly associated with cover : Hedgesparrow *(Prunella modularis),* Robin *(Erithacus rubecula),* Blackbird *(Turdus merula),* Longtailed Tit *(Aegithalos caudatus),* Coal Tit *(Parus ater),* Blue Tit (P. *caeruleus),* Great Tit (P. *major)* and Siskin *(Carduelis spinus).* There is of course a number of species that occurred too erratically or in numbers that are too small for formal analysis. Of these Sparrowhawk *(Accipiter nisus).* Kestrel *(Falco tinnunculus),* Buzzard (B. *buteo),* Grey Partridge (P. *perdix),* Pheasant *(Phasianus colchicus),* Collared Dove *(Streptopelia decaodo),* Great Spotted Woodpecker *(Dendrocopos major),* Stonechat *(Saxicola torquata)* and Magpie (P. *pica)* were noted on both areas. Two Peregrines *(Falco peregrinus)* and single Merlin *(F. columbarius)* and Twite *(Carduelis flavirostris)* occurred only at Thornhill and Green Woodpecker *(Picus viridis),* Jay *(Garrulus glandarius),* Treecreeper *(Certhia familiaris)* and Goldcrest *(R. regulus)* only on the Devon transect. A Grey Wagtail *(Motacilla cinerea)* wintered by the Devon and one appeared in March on a burn near Thornhill.

There is a difference in the distribution of Fieldfares compared to Redwings although this is not proven in the single species analysis since the higher

number of Redwings on the Devon is not quite statistically significant. Overall Redwings outnumber Fieldfares on the Devon by 4:1 but at Thornhill the ratio is just less than 1:3 and an analysis of the percentages from individual transects shows this is significant (t test, p = 0.012); this probably reflects the Redwing's preference for foraging near cover. The Wren, though on average more frequent on the Devon, shows no significant preference. This is partly due to I ho fact that they use the trimmed hedges on arable land and partly to a series "I low counts on the Devon transect after mid January, including both March > ounts; the reason for this is obscure - there is no similar effect in other small insectivorous birds.

Several species show a marked spring arrival. On the arable both Lapwing *(V. vanellus)* and Golden Plover *(Pluvialis apricaria)* were almost completely .ibsent until a number of flocks of both species appeared on March 2nd and 20th. Common Gulls *(Larus canus)* were usually scarce but there were almost 500 on March 2 whilst the first Lesser Blackbacked Gull (L. *fuscus)* was seen on March 1. Oystercatchers *(Haematopus ostralcgus)* appeared in numbers by the Devon on March 1 whilst there were 60 Curlew *(Numenius arquata)* there (off transect) on the 19th and 8 at Thornhill on the 20th.

Song Thrushes (*Turdus philomelos)* were noted on both transects in small numbers until a sustained increase occurred from February 16, Pied Wagtails *(Motacilla alba)* showed a similar but later arrival on March 18. No such arrival was seen in Meadow Pipits (Anthus pratensis) whose numbers declined markedly after early February. The best indication of spring movement in Skylarks was from the Devon transect on March 1 when a party of 22 flew high and determinedly, with song, toward the Ochil Hills just to the north. Their numbers on the Thornhill carse were difficult to interpret, they were apparently absent in mid and late January and also in mid (but not early) February, however on January 30 I saw 200 on stubble in an area between my study routes; this suggests that Skylarks may undertake marked local movements in midwinter that can both simulate and obscure more general and long distance passage. I suspect that such a local movement produced very few Rooks at Devon on December 24, there was a very hard frost but the opportunity of easy feeding on a rubbish dump within easy flight distance. Carrion Crow records were generally divisible into those involving pairs and those involving flocks, there was always a large flock by the sewage plant near Dollar whilst those on the Thornhill carse seemed more mobile and often included a Hooded Crow. One general problem of interpretation arises since the first Devon count was on November 10 whereas the first Thornhill count was on December 20, however an abortive pilot transect on nearby arable on November 11 showed large numbers of Skylarks and Fieldfares and the presence of Yellowhammer, Tree Sparrow and Reed Bunting, as well as the absence of typical hedge species; thus there is no reason to suppose that the absence of a full count on arable in November affected any major results. Both transects included a small section skirting the edge of a village and this shared feature may slightly reduce the overall differences, but there it would not exaggerate any of the differential frequencies that have been

described.

Habitat selection by field type

This analysis is limited since only a fraction of records could be certainly allocated to a particular habitat -1 had to be sure a bird was actually foraging in a field, not simply perched in a tree at the field edge.

Table 2 shows for a few common open country species the preference (Jacobs Index, as in Tucker 1992) of a species for each fieldtype, taking into account their relative extents; the index varies from zero (no like or dislike) up to 1 for exclusive preference and down to -1 for total avoidance. No statistical analysis was possible but the largest positive index for each species has been highlighted to emphasise the main positive preferences.

Table 2. Preference Indices for various fieldtypes

Species	Total No.	Grass (60)	W.Wheat (19)	Stubble (16)	Plough (5.2)
Skylark	(370)	-.84	+.22	+.70	+.29
Meadow Pipit	(107)	+.81	-1.0	-.47	-1.0
Fieldfare	(69)	+.48	-.01	-1.0	-1.0
Starling	(324)	+.72	-1.0	-.27	-1.0
Rook	(552)	-.48	-.90	+.81	-1.0
Jackdaw	(58)	-.39	-1.0	+.78	-1.0
Carrion Crow	(515)	+.03	-.63	+.32	+.16
Linnet	(367)	-1.0	+.87	-1.0	+.69

Fieldtypes & extents

It is apparent that most species showed at least one marked preference, with stubble being the most often preferred habitat though not for Meadow Pipit, Fieldfare and Starling, which are grassland specialists, and Linnet, whose high ratio for winter wheat is due almost entirely to one flock in one particular field. The liking of Skylarks and Linnets for ploughed ground is due to records from one freshly ploughed field that also attracted Chaffinches and Reed Buntings. On a small sample both Stock Doves and Yellowhammers frequented stubble but for the latter species this underestimates the use of old pasture where the birds were wary and difficult to assign. An attempt was made to assess the importance of hedges as food sources in the arable area by also recording when a bird was sighted foraging in a hedge or initally present there, ie with no reason to suppose it had gone there as a response to disturbance. However, the combined problems of being quite sure of the accuracy of such categorisation and the scarcity of typical hedgerow species meant that few data could be obtained. Not surprisingly, none of the species in Table 2 was ever recorded as foraging in hedges - even Fieldfares and Redwings, since no berries remained. By comparison 60% of Blackbirds foraged in hedges as opposed to open fields, all of the Wrens and Robins and almost all the Hedgesparrows and Blue Tits (one of the former explored the road and one of the latter was in stubble).

Discussion

There are relatively few quantitative studies of the total bird community of farmland in winter, however, the results of this study are broadly consistent with the general remarks of O'Connor and Shrubb (1986) and of Lack (1992) for the UK and of Bryant (1994) for central Scotland. Also the lists of species commonly found on arable areas versus those specially associated with cover in the studies of Arnold (1983) and of Tucker (1992) are similar to the present results. Nevertheless there are some surprising features in this study and some detailed differences from previous work.

Woodpigeons are classically found in large flocks on arable farms (Murton 1965) but were distinctly scarce on my Thornhill counts although I noted 500 only 10 Km away; it is probably significant that these birds were feeding on a leafy crop, possibly oilseed rape, such crops are commonly found on many arable farms and considered important for midwinter survival (Inglis, in Lack 1986), but there were none on my transect. Thus longer transects would be needed to sample Woodpigeons adequately on my arable locality. Tucker found that almost all his species preferences were for permanent grass and not for any stage of tilled land (the one exception being Magpie for stubble). Quite likely there are preferences for permanent grass in my areas, since I could not easily make the distinction from ley grass but informally often noted that birds were on old pasture, which Tucker found to harbour high populations of invertebrates. Rooks in Aberdeenshire use stubble to a marked degree (Feare et ,il 1974) so it may be that Scottish stubbles are a more generous source that those of Buckingham and thus attract corvids, Skylarks and the less common species mentioned previously. Holyoak (1968) found that grain was a predominant food component in corvids with much of it coming from stubbles. Tucker's and this study agree on the preference of Fieldfares and Starlings for grassland, my Meadow Pipits noticeably fed on grass in one particular field amongst grazing sheep but this apparent association with sheep could be a chance effect. Total avoidance of a fieldtype (Jacobs Index -1.0) was not infrequent, 10 instances, and particularly notable in winter wheat and plough, but how far it simply reflects a preference for alternative and easily available habitats is not clear. However, only Skylark and Linnet, which can feed on small seeds, show any liking for winter wheat and plough. Other species may be unable to find suitable food in these intensively worked fields since large grains are absent and, as noted by Tucker, invertebrate food is often very scarce. Hence definite avoidance seems likely in some cases.

In this study the small passerines which were typical of the Devon have similar associations with high hedges and copses in Arnold's work: it is particularly interesting that he also found Wrens quite commonly in arable areas provided there were ditches with hedges, this combination being not uncommon around Thornhill. There were no signs from local transect work near Stirling that this species was scarce in the spring of 1994 and the data in the Atlas of Wintering Birds suggest that my winter data for the Devon was not unusual, hence the relatively uniform distribution of Wrens over widely

different farming areas may be normal. Tucker found that thrushes, the four species also in this study, occurred mainly in fields enclosed by hedges and suggested this was an anti-predator tactic against hawks. This seems plausible but together with my data would predict that Redwings are particularly vulnerable. One final point of difference from the two English studies is that both found Song Thrushes to be commoner (relative to Blackbirds) than I did. Together with my early spring influx this is consistent with the finding (Snow, in Lack 1986) that Scottish Song Thrushes are markedly more migratory than those in southern England. However, since the earlier studies a winter population index for Song Thrushes has declined by 50% (Garden Birds Study, BTO News 194) so the midwinter difference between Scottish and English farms may no longer hold. Arnold noted that the numbers of finches and buntings in a quadrat were correlated with the area of house gardens in the quadrat and its surroundings, this was not true for House Sparrows which correlated with the area of woodland. The last unexpected result is not reflected in this study: on both transects it was noticeable how House Sparrows were common along the fringes of the two villages but otherwise were restricted to the six farms and outlying homesteads in the arable area though not present in five similar sites within the pasture-parkland.

Conclusion

This study has generally confirmed what is widely understood to be the typical community of arable farmland but has also thrown up a number of unexpected features, some of these may be peculiarities of the particular fields investigated but others seem likely to be connected with regional differences.

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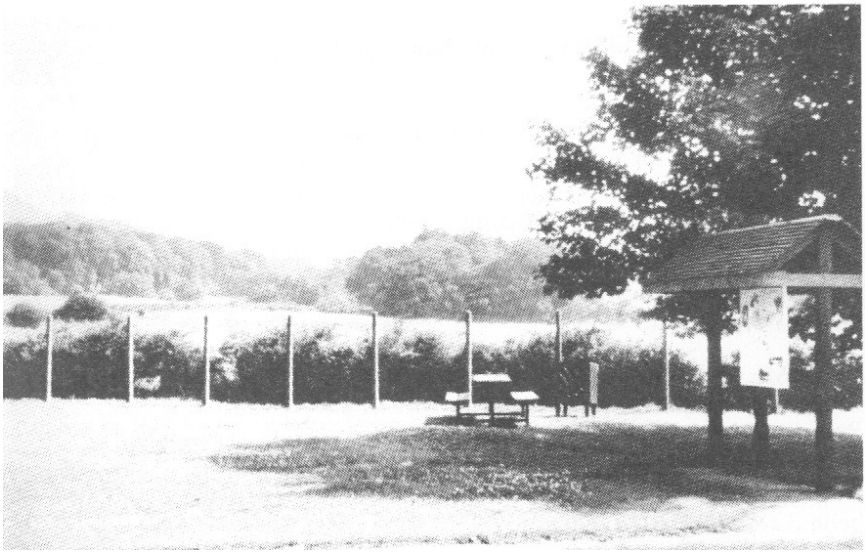

Figure 1 Picture with hedges and copses at Devon Way information site.

Figure 2 Open pasture-arable near Thornhill.

BOOK REVIEWS AND NOTES (Naturalist)

A Scottish Strategy for Environmental Education. Statement of Intent by the Secretary of State for Scotland. Scottish Office. 1995. 36pp.

While this Government response to the Working Party report *Learning for Life* appears positive, emphasizing greater Scottish Office awareness and establishing a subgroup on Education for Sustainable Development, it is disappointing that the basic National Advisory Panel has not been implemented.

"MFMM". Scottish Ornithologists' Club. 1994. 88pp. ISBN 0-9524610-0-5. £4.95 incl. p.&p., cheques payable to SOC Clyde Branch (Available: D. Clugston, 14 Rosewood Avenue, Paisley, PA2 9NJ).

This small publication is a long overdue selection from the thousand plus weekly articles written for the *Glasgow Herald* between 1954-1974 by the man behind the distinctive initials - the late Professor Matthew Fontaine Maury Meiklejohn, *ornithologue extraordinaire.*

On picking-up their Saturday *Herald,* ornithological readers would invariably flick through to MFMM's short piece before ever turning to the newspaper's coverage of national and world affairs. Although most of the articles were devoted to his perambulations in search of birds - which included excursions to Loch Lomonside and the Forth Estuary - it would be a mistake to think that MFMM's humorous pen was confined to this one subject alone. Complete with the original complementary sketches by J.B. Fleming, this is not a book to be read at the one sitting, but to be dipped into for moments of quiet pleasure.

J. Mitchell

Birds of the Endrick Mouth, Loch Lomond: an update of the annotated checklist to January 1990. John Mitchell *in Scottish Naturalist* 106, 1994, part 1, pp 3-30.

The first edition with description and history of the area was in the *Scottish Naturalist* of 1984, 3-47 and summarized known records to January 1980. These next 10 years have sixteen species added, and changes in status of those already recorded - some 230 species have been recorded on one or more occasions.

Old Cornstone Workings in Dunbartonshire and West Stirlingshire, with Notes on their Associated Flora. John Mitchell *in Glasgow Naturalist* 22, part 5, 1995, pp. 485-494.

This paper may interest readers who remember Mackay's "Limestone Working: forgotten Stirlingshire industry" paper in *FNH 2,* 81-105.