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Bird Census News reports developments in census and atlas work in Europe, from the local to the continental scale, and provides a forum for discussion on methodological issues.

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Preface

The production of the special volume of Bird Census News with part of the proceedings of the last EBCC conference in Cáceres -which you received in July-, caused some delay in the production of this first issue of 2011. However, you can expect the second issue on time, at the end of this year, in December.

In this BCN Derek Pomeroy and Thomas Gottschalk tell us more about interpreting census data, with an analysis of fieldwork in England, Cyprus and Uganda. Jean-Yves Paquet and Jean-Paul Jacob, both co-authors of the recently published Breeding Bird Atlas of Wallonia (Belgium), present the main results of this important inventory that ran between 2001 and 2007. Finally, you find the minutes of the Annual General Meeting of EBCC in Cáceres and a short book review.

I hope you will enjoy this issue!

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Interpreting census data: the significance of birds heard but not seen in multi-species counts

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Abstract
The reliability of bird data depends, amongst other things, upon the observer's knowledge of birds' sounds as well as their appearance. Multi-species counts in a range of habitats in England, Cyprus and Uganda show that on average at least 20% of registrations depend upon sound, rising to 60% or more in woodland and forest. The proportions vary seasonally, with the proportion of birds seen being lower in spring in Europe (there is no 'spring' in Uganda). There are marked differences between species, where the proportions seen in Cyprus in a spring sample ranged from 1.0 in Barn Swallow to 0.0 in Black Francolins. Counts made later in the breeding season increasingly under-record birds detected mainly by sound, whilst other species may become more vocal. We also found that up to 8% of birds were unidentified, suggesting the likelihood of less common species being under-recorded too. More of those were of birds glimpsed fleetingly or otherwise seen, than those whose calls or songs were not recognised. We suggest that the proportion of unidentified birds could usefully be noted with all census data. Ideally, records should also distinguish birds seen from those heard.

Introduction

In a wide-ranging article, Buckland *et al.* (2008) discuss distance-based approaches for 'making methods work'. We certainly need good methods, and we also need good, reliable data of birds identified correctly. Interpreting the results of bird censuses necessitates an understanding of the nature of the data. Most bird watcher who are quite confident of identifications of the birds that has been seen may feel a little less so for birds only heard. Furthermore, many bird species (e.g. Tits, Starling in Europe, Robin Chats in Africa) are known to imitate songs and calls of other birds, and therefore a species seen is a more reliable observation than one just heard. Our competence at recognising sounds can clearly affect the results of censuses, particularly for less experienced observers (Jiguet 2009). Accordingly we set out to establish how many of the birds that we were recording depended upon sound, rather than sight. These preliminary results have a built-in bias, since we were unable to get an independent check of our own accuracy, but the data presented here are from places with whose birds we have been reasonably familiar for at least ten years; and a few counts were made with

experienced colleagues. There will have been errors, but we believe the general picture to be quite accurate, since birds heard were often seen soon afterwards, allowing their identifications to be verified. Birds were counted in three different and contrasting countries: England, Cyprus and Uganda. As well as noting the method of detection, we also kept a note of birds that were seen, or heard, but not identified.

It is our hope that a better understanding of the nature of census data can help to improve the design of census programmes, and the interpretation of the data obtained. What is our main recommendation? I think the documentation of unidentified birds could be one recommendation.

Methods

Counts of birds were made during routine monitoring work in Cyprus and Uganda, the former involving standard transect counts (Bibby *et al.* 2000) in different habitats, and the latter Timed Species Counts (TSCs, Freeman *et al.* 2003), which are based upon ordered species lists. Additional Ugandan data came from Point Counts in the Bwindi Impenetrable forest. In Sussex, England, the counts were made as part of the field work for a new bird atlas (Balmer 2008). Counts in both Uganda and England each lasted one hour, except for Point Counts, which took 10 minutes each. Transect counts in Cyprus varied between about 40 and 80 minutes. Winter counts in England were made in December, and breeding season counts in April and June. Similarly in Cyprus, counts from April to June, but mostly in May, covered the main breeding season; and there were also counts in the autumn (mainly October). Much of Uganda is relatively aseasonal, with protracted and variable breeding seasons (Pomeroy 1992); counts were made in various months throughout the year. There were four sites in England, 15 in Uganda and 40 in Cyprus.

The main habitats surveyed, and the numbers of observations in each, are summarised in Table 1. Counts in Sussex, England, were in the east of the county, a few kilometres north east of Rye, whilst those in Cyprus were in the west of the country, mainly in Pafos District. Counts in Uganda were in the south, between Jinja in the east and Queen Elizabeth and Bwindi Impenetrable National Parks in the west.

During all of the counts, a note was made as to how each individual was registered; and in some cases there were further categories for birds seen (by age and sex) and heard (whether song or other calls). Except where otherwise mentioned, all types of vocalisations were considered as ‘sounds’. Birds heard and then seen shortly afterwards were recorded as seen. In most data sets, note was also made of the number of birds seen or heard but not identified. For a bird seen, failure to identify is mainly because it was a small bird diving into a bush, or just glimpsed before flying behind a tree, or seen out of the corner of the eye whilst identifying something else. Failure to identify sounds occurs for various reasons. Birds’ vocabularies are

surprisingly large, and related species often have similar calls, especially alarm calls. Or it may be that there was just a brief call, or two notes from a song - many species sing less enthusiastically as the breeding season progresses and song later in the day can also be brief, sometimes just a note or two.

Table 1. Categories of land-use censused in three countries.

Category	Uganda	Cyprus	England
Natural forest and woodland	Rainforest	Pine forest	Mixed woodland
Grazing lands	Savannas	'Uncultivated'[a]	Improved pastures[b]
		Grass/phrygana[c]	
Permanent crops and agricultural	Small-holder farms[d]	Vines, fruit trees	[Absent from areas surveyed]
		Arable	Arable[b]
Built-up	[Not sampled]	Towns and villages	Suburban[e]
Total observations	1422	5354	1409

Notes: a mainly spiny shrubs and sub-shrubs, but also includes areas where agriculture was abandoned; often with some trees
b mixed arable and pastures
c 'phrygana' refers to shrubs, typically thorny and less than 1 metre high
d permanent crops, seasonal crops and small grazing areas are intermingled on a small scale
e in fact a dormitory village

There are sufficient data for many species to compare results from different habitats and at different seasons, whilst in a few cases, results can be compared geographically, between countries. Counts in Cyprus extended over several weeks, and some data have been separated by date within the breeding season, to assess the extent to which song declines during the season. In birds with a high proportion of detections by sound, this could mean that fewer of the birds present are detected in later counts, which is one reason why the Breeding Bird Surveys of the British Trust for Ornithology use the higher of the two counts of each species (Risely *et al.* 2008). Counts in Cyprus were made at various times between 0600 and 1900, so that effects of time-of-day could also be assessed in relation to the proportions seen or heard.

Results

Variations between habitats and countries

In Sussex, 83.1% of 688 birds recorded in winter were seen, compared to 66.4% of 721 in spring, when most trees had leaves and, one assumes, more males were actively declaring their territories. The proportion detected by sound in spring was almost double that in winter (Table 2). There were considerable differences between the three habitats surveyed, with about 84% of suburban birds seen in winter, but only 30% of woodland birds in spring (Table 2). Overall, nearly 80% of birds in farmland were seen.

Table 2. Numbers and percentages of birds seen and heard in three habitats in Sussex, winter 2007/8 and spring 2008. The percentages of birds that were not identified (= unident) are also shown.

	Winter				Spring			
	seen	heard	% seen	% unident	seen	heard	% seen	% unident
Woodland	21	24	46.7	2.2	32	74	30.2	4.5
Farmland	330	50	86.8	5.7	273	103	72.6	2,8
Suburban	221	42	84.0	4.0	174	65	72.8	2.8
Overall	572	116	83.1	4.8[a]	479	242	66.4	3,1[b]

Notes: a – of which, 4.0% were of birds seen and 0.8% birds heard
b – 2.0% seen, 1.1% heard

In Uganda, 69.9% of birds in farmland were seen, with the remainder only being heard; of these, ten species were not seen at all, with every registration coming from birds heard. This figure compares quite closely to the 72.6% seen in English farmlands in spring (Tables 2, 3) when, as in Uganda, most trees will have been in leaf.

Table 3. Numbers and percentage of birds seen and heard in four habitats in Uganda during 2008. The overall percentages of birds that were not identified are also shown.

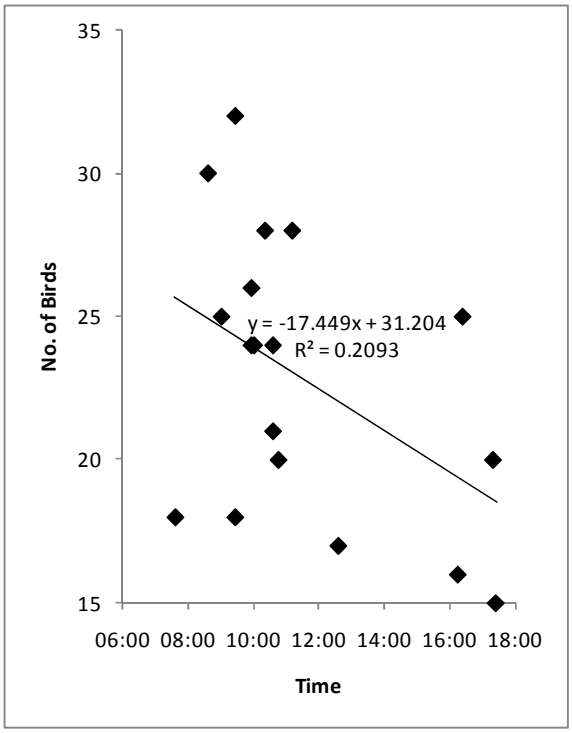
	No. of sites	Seen	Heard	% seen	% unidentified
Forests - Kibale	1	132	308	30.0	5.9
- Bwindi[a]	1	415	864	32.4	-
Wooded savanna	4	392	137	74.1	8.2
Open savanna	4	316	110	74.2	9.9
Farmland	4	320	138	69.9	8.0
Overall, non-forest		1028	385	72.8	8.5[b]

Note: a – data from Phil Shaw (pers. comm.); no record was kept of unidentified birds
b – 4.8% seen and 3.7% heard

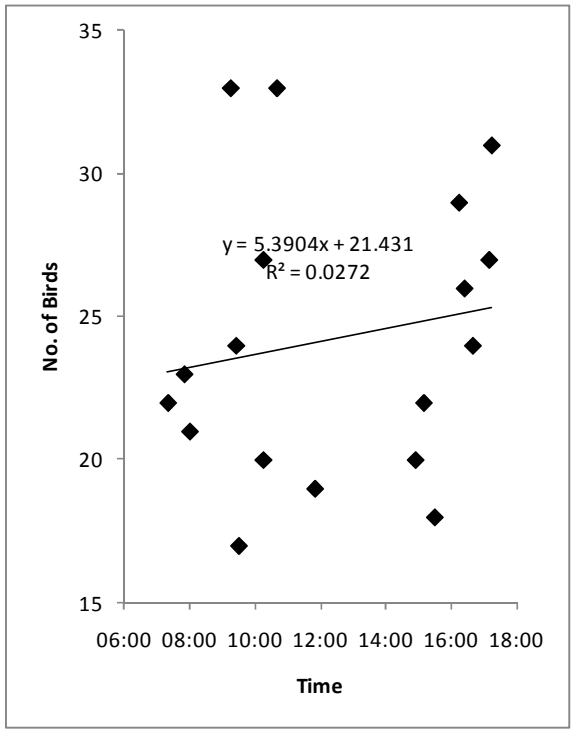
In Cyprus, for 20 of the more common and conspicuous species in spring, detections by sound varied considerably between habitats and species (Appendix 1). Unsurprisingly, sound was the most important factor in forest, with only 39% seen (compared to 30% in English woodland in spring and also 30 to 32% in Ugandan forest, Tables 2 and 3).

Forest in Uganda consists of medium to tall trees of many species, most evergreen, with many creepers and climbers, and lower storeys of smaller trees and shrubs, all of which reduce visibility. In contrast, forest in Cyprus is predominantly made up of a single species of tree, *Pinus brutia*, with fairly low shrub cover and generally rather open ground layers. The canopy cover is also low, typically 20-30%, but smaller birds – and most birds in these forests are smaller passerines – can be remarkably hard to see, partly because of the very large numbers of bird-sized cones.

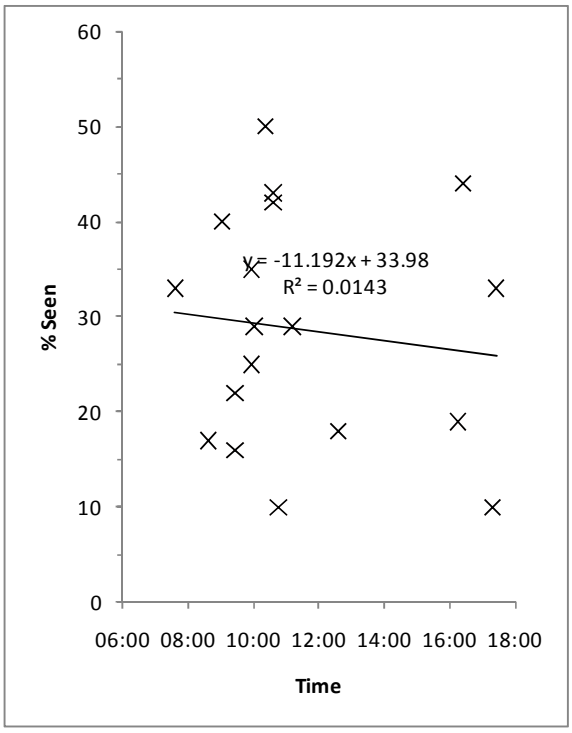
(a) Forest



(b) Uncultivated



(c) Forest



(d) Uncultivated

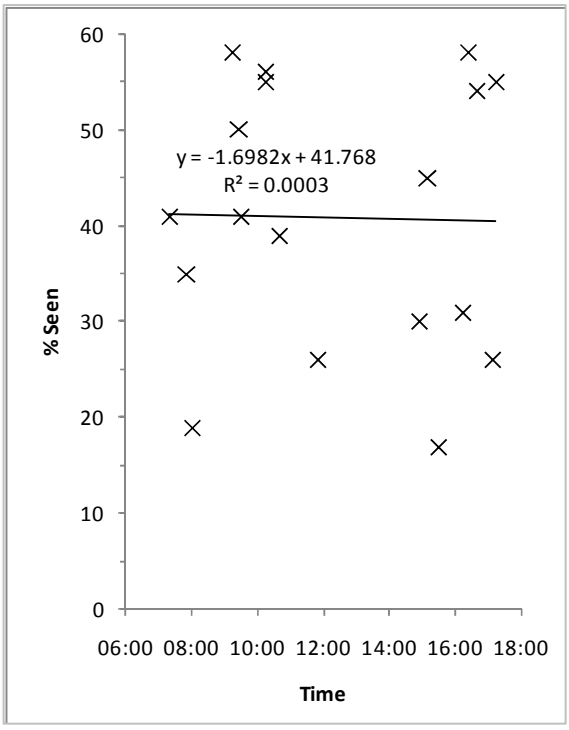


Figure 1. (a) The numbers of birds recorded (either seen or heard) in nine forest sites (with two counts per site) declined during the course of the day, but not quite significantly (0.05<P<0.1) similarly for nine sites in uncultivated areas (b). Neither did the proportions that were seen, which averaged around 30% in forest (c) and 40% in uncultivated areas (d). Data for Cyprus, Spring 2008.

Even in the most open grasslands, where tree cover can be as low as 1%, some species are most commonly heard – for example the Black Francolin and Cetti's Warbler in Cyprus. The latter is in fact a remarkable example of a bird which is quite rarely seen – only about 2% of all registrations were by sight. The tiny Zitting Cisticola sings whilst making aerial displays; trying to see them distracts one's attention from other birds, so many are recorded simply as heard. In contrast, most corvids are seen – 98% in the case of the Jackdaw and 94% for the Magpie - despite both species being quite vocal.

For the seven species with data from both Sussex and Cyprus (Appendix 1), the proportions seen and heard were generally similar. Fewer Collared Doves were seen in Cyprus, where they are almost entirely urban in habitat, and often out of sight behind buildings; but there is no obvious explanation for the higher numbers of Great Tits seen in England.

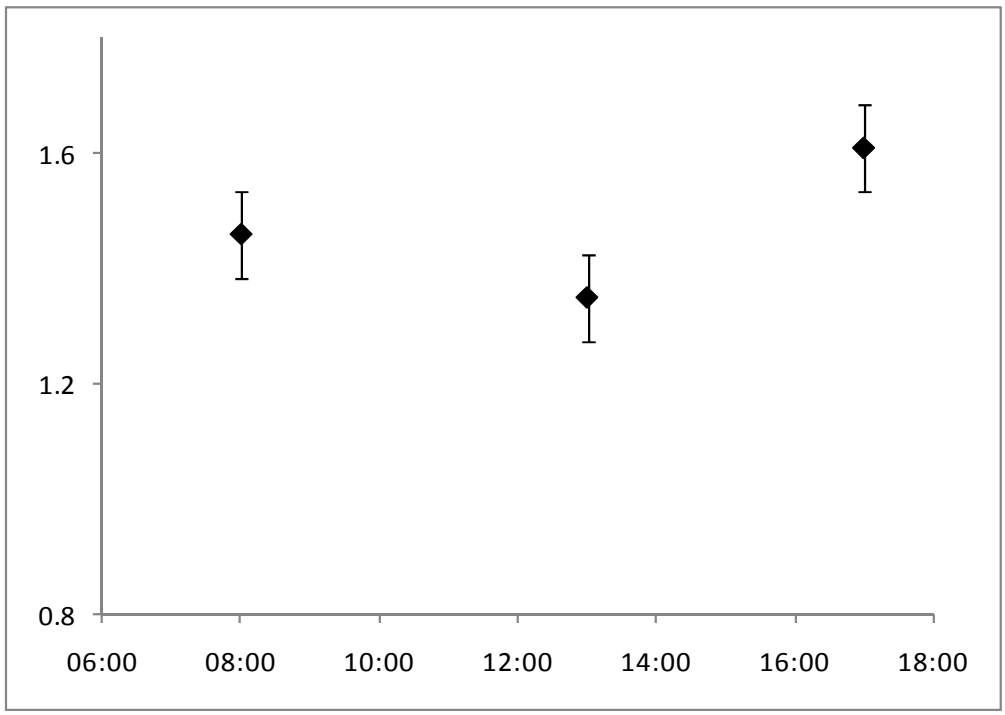


Figure 2. The numbers of Cetti's Warblers recorded varied little with time of day (groups before 1000, 1000-1600 and afew 1600 h; mean ± SE). Data for Cyprus, Spring 2009.

Variations with time of day

During the spring of 2009, data in Cyprus were specifically collected to see whether the output of song varied with time of day. A majority of the counts were made in the morning, but there is no evidence of a decline, or any other change, in numbers of birds recorded, or in the proportion of the birds that were seen, with time of day (Figure 1); although, as already noted, there were much bigger differences between the various land-use categories. Figure 2 shows the same general pattern for Cetti's Warbler which, as already noted, is recorded almost entirely by sound: its song is strident and its calls are also loud. Both are characteristic and the species can, as a rule, be confidently identified after hearing only one or two notes.

Bwindi Impenetrable forest in south-western Uganda is very different from Cyprus, being humid rainforest at an altitude about 2000 metres; typically the nights are cool and often misty, whilst the days are either wet or warm. In a study of the forest birds, using Point Counts, Shaw and Shawry (2002) also found that density estimates – based mainly upon birds heard (Table 3) – were not significantly affected by time of day. Rather less birds were detected in late morning, but this was compensated by greater precision in distance estimates.

Variations with date

Cetti's Warbler also provides a good example of a species whose registrations declined markedly during the course of the season (Table 4). In contrast, other species become more vocal as the season progresses. For example, family parties of tits and warblers make frequent use of contact calls, with the result that, for counts as a whole, the proportion of birds seen in Cyprus in the spring of 2008 was 0.60 in April, 0.57 in the first half of May and 0.60 in the second half of May.

Table 4. The proportion of sites where Cetti's Warbler was recorded declines as the breeding season progresses. Data are only from sites where the species was thought to be resident, defined as being recorded in at least half of the counts. There were few data for April, June and July, and the latter were accordingly pooled, over several years.

Period	Number of observations	Proportion of sites where Cetti's Warbler recorded
April	7	1.00
May 1-10	20	0.85
May 11-20	29	0.79
May 21-31	25	0.60
June-July	24	0.46

Variations in detectability between species

Amongst the commoner birds in Cyprus, for ten species with less than half of the birds detected visually there is a tendency for those that are noisiest to have the greatest Effective Strip Width (ESW) as determined by standard DISTANCE analyses. The Wren, Chaffinch and Black Francolin all have loud voices – but so does Cetti's Warbler, whose ESW is less than 20 metres (Figure 3). The two species in this category which are most frequent in arable areas – Zitting Cisticola and Black Francolin – are at opposite extremes of detectability, whilst species of the relatively open uncultivated areas all have small ESW values. Forest species are intermediate.

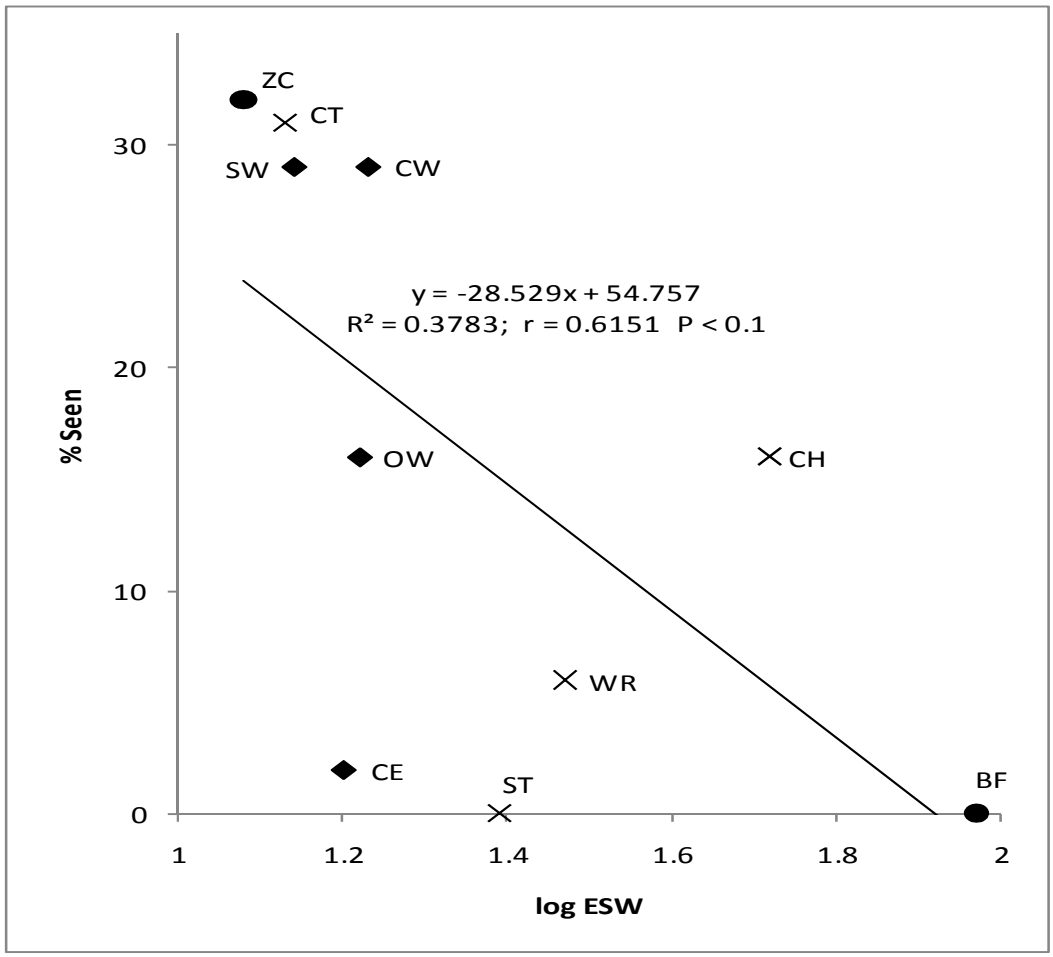


Figure 3. The relationship between detectability, and the proportion of birds seen, for some relatively inconspicuous species in Cyprus. Detectability is recorded as Effective Strip Width (ESW). Species included were all those with >100 registrations (except Wren (32) and Short-toed Treecreeper (40)), and for which less than half were seen. Data for Cyprus, several years combined. Symbols indicate main habitats of the species concerned: x forest, ♦ uncultivated and ● arable. ZC Zitting Cisticola, CT Coal Tit, SW Sardinian Warbler, CW Cyprus Warbler, OW Eastern Olivaceous Warbler, WR Wren, CH Chaffinch, CE Cetti's Warbler, ST Short-toed Treecreeper, BF Black Francolin.

Buckland *et al.* (2008) point out that records from reclusive species – such as Cetti's Warbler in Cyprus, or Dunnocks in England and many forest species in Uganda – fall into two categories: small numbers of sightings at fairly close range, and larger numbers of birds heard, which are usually further away. Phil Shaw (pers. comm.) demonstrated this effect very nicely with data from Bwindi (Figure 4). For those species with adequate data, birds seen were clearly closer to the observer than those that were only heard; in all but one of the 14 species, the median distance for birds seen was less than for those heard; the exception (Red-faced Woodland Warbler *Phylloscopus laetus)* showed virtually no difference between the seen and heard categories.

Unidentified birds

During counts made in 2008, and particularly when there were two or more observers, a record was kept of birds which were not identified. The data are summarised in Tables 2, 3 and 5. Pooling all the data, the percentages of unidentified birds in Cyprus, England and Uganda were 4.0%, 4.0% and 8.5% respectively, which to some extent reflects the numbers of species in

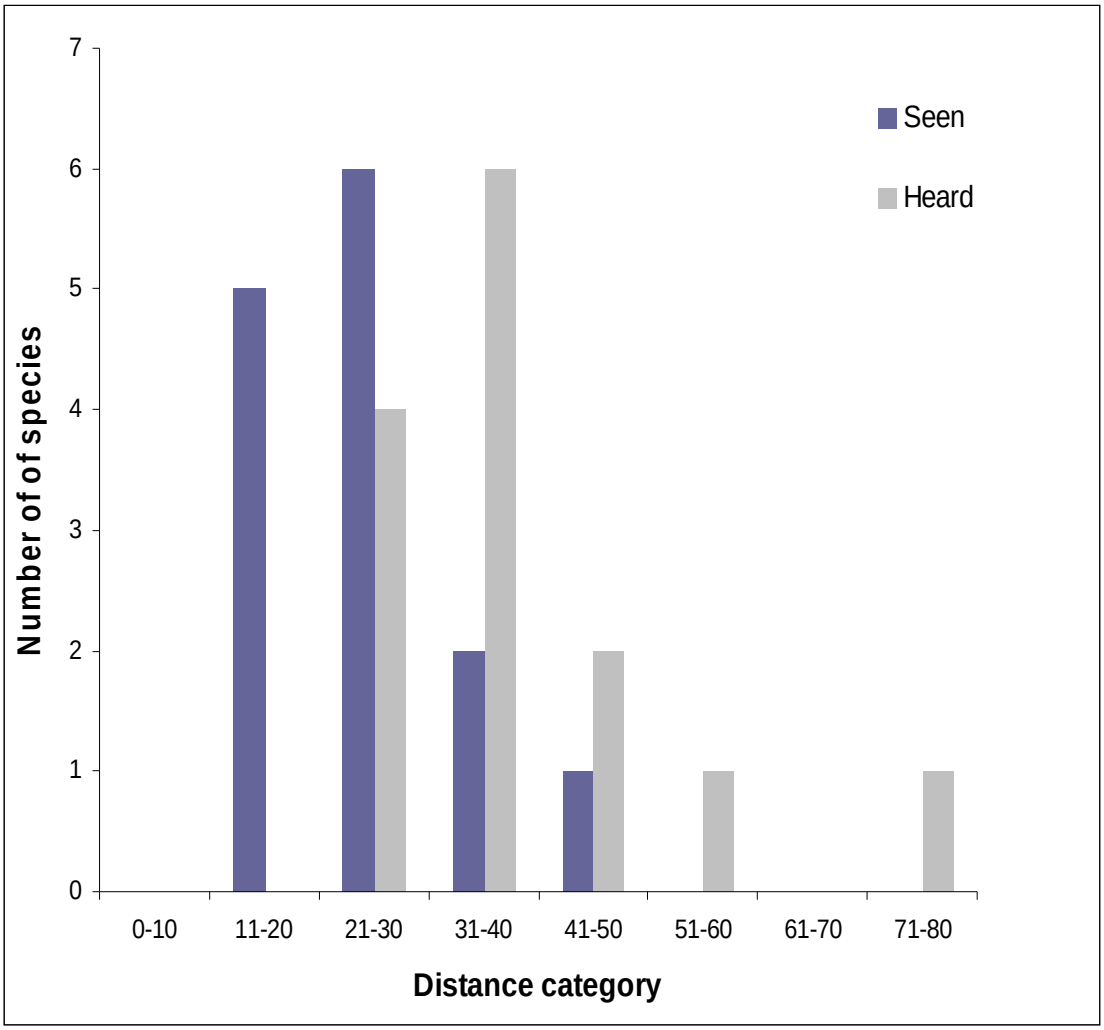


Figure 4. The mean distances at which 14 species were recorded in Bwindi Impenetrable forest. The total of 987 records are for those species with at least 30, including at least four seen (most were heard). Data from P Shaw (pers. comm.), 2008.

the three countries – Uganda has about 800 regularly breeding species, compared to 80 in Cyprus and about 250 in England, so it is not surprising that less were identified in Uganda. In general, there were more unidentified birds seen than heard, reflecting the proportions of those that were identified. In both Cyprus and England, the proportions of unidentified birds were lower in the spring than at other times. Perhaps surprisingly, there were no strong correlations between habitat types and the proportions of unidentified birds.

Table 5. Numbers and percentages of birds seen or heard, but not identified in six habitats in Cyprus, spring and autumn 2008 (unident.= unidentified)

	Spring				Autumn			
	n	seen	heard	% unident	n	seen	heard	% unident
Forest	728	15	11	3.6	215	6	5	5.1
Uncultivated	784	16	6	2.8	289	21	11	11.1
Grass	411	9	0	2.2	215	4	3	3.3
Permanent crops	407	9	2	2.7	315	20	8	8.9
Arable	614	11	3	2.3	431	26	7	7.7
Built-up	414	0	1	0.2	131	5	0	3.8
Overall – numbers	3358	60	23	2.5	1596	82	34	7.3
- %		1.8	0.7			5.1	2.1	

Discussion

All writers on multi-species census methods for non-aquatic habitats expect there to be records of birds by both sight and sound (e.g. Bibby *et al.* 2000). In denser habitats, the proportions that are heard rather than seen can exceed 80%, and in tropical forests with their many species, each capable of a variety of sounds, censusing calls for highly experienced observers. In some individual species (and not only in forests) almost all registrations are of birds heard but not seen. Jiguet (2009) found a clear 'first-time observer effect', particularly attending species whose songs were at lower frequencies. Less experienced counters, hearing a sound that they do not immediately recognise, have to spend more time, listening again, or trying to see the bird. Hence it takes them longer to complete a count.

Shaw and Shawry (2001) found a decline in registrations in the later morning in Bwindi Impenetrable forest, Uganda, but a greater overall precision in density estimates when all of the counts were used in analyses. However, elsewhere in Uganda, as well as in Cyprus, time-of-day had little effect on either the total of birds recorded, or the proportion that was heard. Neither did this proportion change overall as the breeding season progressed, although that may mask a change in the composition of species recorded, since some individual species were heard less, and others more.

Such changes need to be taken into account when interpreting census data. There are various other complications in analysing data based upon sounds.

Laiolo & Tella (2008) found that in Dupont's Lark *Chersophilus duponti*, birds in small patches with one or only a few males sing less (and hence are more easily missed) than in larger patches with more birds. This observation may well apply to other species. A less obvious way in which data for species recorded mainly by sound can be misleading is described by Buckland *et al.* (2008) in relation to population estimates using distance sampling methods. They recommend keeping sight and sound observations distinct in field records, and analysing them separately.

There are several practical problems when recording birds by sound. In denser habitats, particularly forests, it can be difficult to know how many birds of species such as tits and warblers are in a group. Where there is a need to record young separately from adults that too is difficult (or

impossible) when only contact calls are heard. Distance too can be hard to estimate in forests, particularly when using point counts: in contrast, the position of a bird is more easily guessed in transect counts, by 'triangulating' the source of the sound as one moves along.

In East Africa, Derek Pomeroy found in studies of 25 common species, (such as Red-eyed Dove *Streptopelia semitorquata* and African Thrush *Turdus polios*) that song output, even in the presumed breeding season, is low compared to that of birds in temperate areas (Pomeroy 1982, 1992, 1993). This, too, could lead to under-recording of such species.

Whilst we have tried to draw attention to the need for birds heard to be considered more carefully, and preferably recorded separately, other questions remain unanswered.

1. How does weather affect the numbers of birds heard, compared to seen?
2. Where only (or mainly) males are vocal (such as cuckoos and Cetti's Warbler), can one assume a 50:50 sex ratio, and double the count scores in estimating the population?
3. Where distance-based density estimates are being made, does the assumption of 100% detectability along the transect line hold equally for birds seen and heard?
4. Since birds that are mainly heard are often heard at greater distances than those seen, how does the speed of walk in transect counts affect subsequent estimates of density?
5. As Jiquet (2009) and others have shown, observer experience is important, but remains difficult to allow for.

The proportions of birds unidentified were generally below 5%, but reached 7% in Cyprus in autumn, when many birds were 'flying through' and over 8% in species-rich Uganda. When such higher figures occur, they can clearly affect the interpretation of results, since they are most likely to mean that some less common species will be under-represented in the data – particularly those that are less easily detected. And counts made later in the breeding season are likely to under-represent some of the species which are mainly heard rather than being seen. A number of understorey birds in Uganda, such as finches, are always hard to see and rarely call, and for them alternative methods, such as mist-netting, are needed.

The fact that smaller proportions may be recorded of birds that are mainly heard but not seen, compared to those usually seen, can clearly be a source of bias in census data. It can be compounded by a likelihood for less experienced observers being less able to identify all calls and songs, especially in species-rich habitats. The noting of the numbers of birds that were present but not identified can give an indication of the extent of any bias of this kind. Therefore, bird census program organizers should stimulate all participants to document the number of non-identified birds. Only reliable and well documented bird data including documentation of

potential flaws is useable for monitoring schemes or conservation management purposes.

Acknowledgements

Many people participated in the counts in Uganda, but almost all the Cyprus counts, and all of those in England, were made by Derek Pomeroy alone. We thank Phil Shaw for helpful comments, and for the provision of some data.

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APPENDIX 1. Numbers of registrations in Cyprus for 20 common species. Figures are numbers seen and heard (in left and right columns, respectively) in seven broad habitat types for species that also occur there commonly. Numbers of seven species were compared with results of bird census in Sussex.

	Forest		Uncultivated		Grass/ phrygana		Permanent crops				Arable		Built-up		Overall		Percentage seen	
							Vines		Others								Cyprus	Sussex[a]
Common Kestrel *Falco neumanni*	0	2	9	0	5	0	1	0	2	0	5	0	2	0	24	2	92	
Black Francolin *Francolinus francolinus*	-	-	-	-	0	3	-	-	-	-	0	12	-	-	10	15	0	
Common Woodpigeon *Columba palumbus*	37	6	14	2	11	2	5	0	3	0	20	2	-	-	90	12	88	90
Eurasian Collared Dove *Streptopelia decaocto*	-	-	-	-	0	1	-	-	4	1	28	1	55	13	85	16	84	69
European Roller *Coracias garrulus*	-	-	9	1	2	2	-	-	2	0	4	1	4	0	21	4	84	
Crested Lark *Galerida cristata*	-	-	11	0	16	7	-	-	-	-	15	9	-	-	42	16	72	
Barn Swallow *Hirundo rustica*	-	-	23	0	22	1	8	0	11	0	102	0	124	0	290	1	100	
Cyprus Wheatear *Cenantha cypriaca*	33	11	10	3	1	1	4	1	0	1	1	2	12	2	61	21	74	
Cyprus Warbler *Sylvia melanothorax*	6	24	19	34	1	1	2	5	4	9	0	4	-	-	32	77	29	
Sardinian Warbler *Sylvia melanocephala*	6	27	45	105	21	22	4	0	3	15	17	38	1	7	97	214	31	
Eastern Olivaceous Warbler	1	28	7	42	1	3	7	16	0	4	6	17	0	2	22	112	16	

Hippolais pallida																		
Cetti's Warbler *Cettia cetti*	0	14	1	45	1	8	0	15	0	5	1	23	0	8	3	118	2	
Zitting Cisticola *Cisticola juncidis*	-	-	0	4	10	6	1	3	0	2	18	34	0	2	29	51	32	
Great Tit *Perus major*	11	14	21	9	8	9	7	2	19	10	14	7	4	13	84	64	57	70
Western Jackdaw *Corvus monedula*	-	-	6	0	28	0	-	-	-	-	13	0	0	1	47	1	98	98
Eurasian Magpie *Pica pica*	-	-	19	1	42	3	19	1	12	2	44	3	17	0	153	10	94	90
House Sparrow *Passer domesticus*	0	1	9	7	16	5	7	2	6	18	63	4	N[c]	N[c]	101	37	73	70
European Greenfinch *Carduelis chloris*	18	23	24	15	7	3	5	2	1	3	40	2	7	6	102	54	65	63
European Goldfinch *Carduelis carduelis*	34	24	35	8	15	0	7	2	5	3	7	0	-	-	103	37	74	
Black-headed Bunting *Emberiza melanocephala*	-	-	7	4	1	0	11	5	-	-	2	5	-	-	21	14	60	
OVERALL, all species[b]	287	441	459	325	327	84	145	63	110	89	431	183	355	59	2114	1244		
Proportion seen	0.39		0.59		0.80		0.70		0.55		0.70		0.86		0.63			

Notes: a – species that are common in Sussex as well as Cyprus
b – less common species were not included in the table.
c – too numerous to count accurately

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Breeding avifauna in the heart of Europe: the Breeding Bird Atlas of Wallonia (Belgium) 2001-2007

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Abstract
More than 600 volunteers contributed to a seven-year inventory project of breeding birds in Wallonia (the Southern half of Belgium, covering about 16 844 km²). The resulting reference book presents in detail the distribution and abundance of the 175 breeding taxa. High-resolution relative density maps were built using spatial modelling on 1-km square sampling data. Comparison with the previous similar inventory, 30 years ago, offers interesting indications of changes in bird populations. Wetlands and forest species are globally showing a positive evolution, while farmland birds are rather declining. Altogether, species richness increased both at regional and local scale, while total number of birds probably slightly decreased.

Introduction

In the federal state of Belgium, bird population monitoring is organised at the regional level. After the publication of a breeding bird atlas for Flanders in 2004 (Vermeersch *et al.* 2004) and for Brussels in 2007 (Weiserbs & Jacob 2007), Wallonia was the last of the three federated regions without any breeding bird global inventory since the Breeding Bird Atlas of Belgium, whose fieldwork dated from the seventies (Devillers *et al.* 1988). Fieldwork started in spring 2001 and lasted till 2007. The main objectives were to list all breeding species (including exotics), to establish their distribution, to estimate their population, to highlight their variations in abundance and to analyse the observed changes since the last atlas work. This paper intends to summarize the methodology used in the field and in the subsequent analyses, and to present some of the main characteristics of present-day Wallonia breeding avifauna.

The study area: Wallonia

Wallonia covers 16 844 km², which is 55 % of Belgium (Figure 1a). Human density is 204 inhabitants/km², much lower than in neighbouring Flanders (439 inhabitants/km²) and the Netherlands (402 inhabitants/km²). Densely populated areas are concentrated in the historical industrial axes (from

Mons to Liège) and south of Brussels. This situation creates a strong gradient of largely urbanized areas or industrial farmland in the north, contrasting with mostly forested landscape or rural areas in the south. Variations in landscape (influenced both by man and abiotic conditions) define five “ecoregions” that were used in the analyses (Figure 1b). Wallonia is a low-lying country but altitudes increase according to a North-West / South-East axes up to 694 m at Eastern Ardennes.
Globally, main land-uses are agriculture (45.1 % - mostly very intensive practices), forestry (32.8 % - half semi-natural deciduous woodland, half coniferous plantations) and buildings (13.9 %). Very few natural habitat remains: only 250 ha of chalk grassland, less than 2 200 ha of mires and bogs, most of them in unfavourable conservation status (Dufrêne & Delescaille 2007). There is an extensive network of rivers but most ponds and lakes are of human origin.

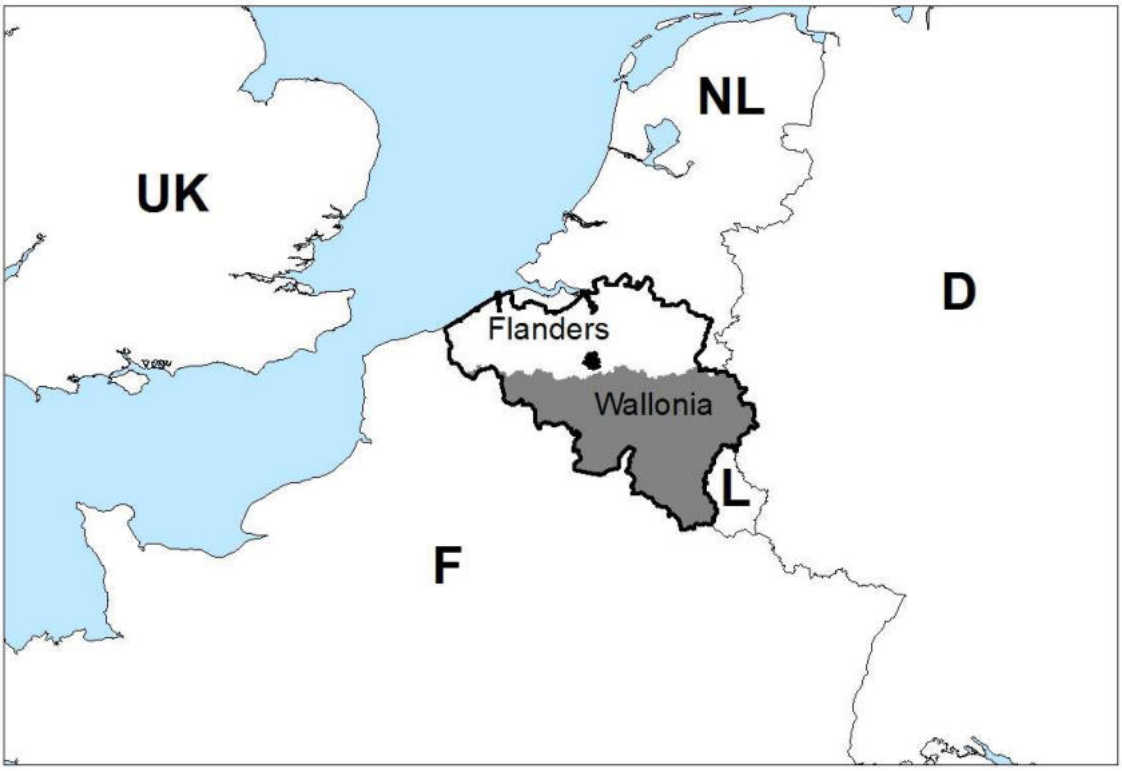


Figure 1a: Belgium with Flanders in the north and Wallonia in the south (Brussels is the black spot), surrounded by France (F), Luxemburg (L), Germany (D) and The Netherlands (NL)

Methodology

The organization of the Atlas was entrusted to Aves within the framework of the program «Inventory and Surveillance of the Biodiversity», set up by the Walloon Region since 1989. This program includes diverse facets among

which a Common Bird Monitoring Scheme launched in 1990. The Atlas benefited from a wide participation of volunteer naturalists (more than 600 co-workers).

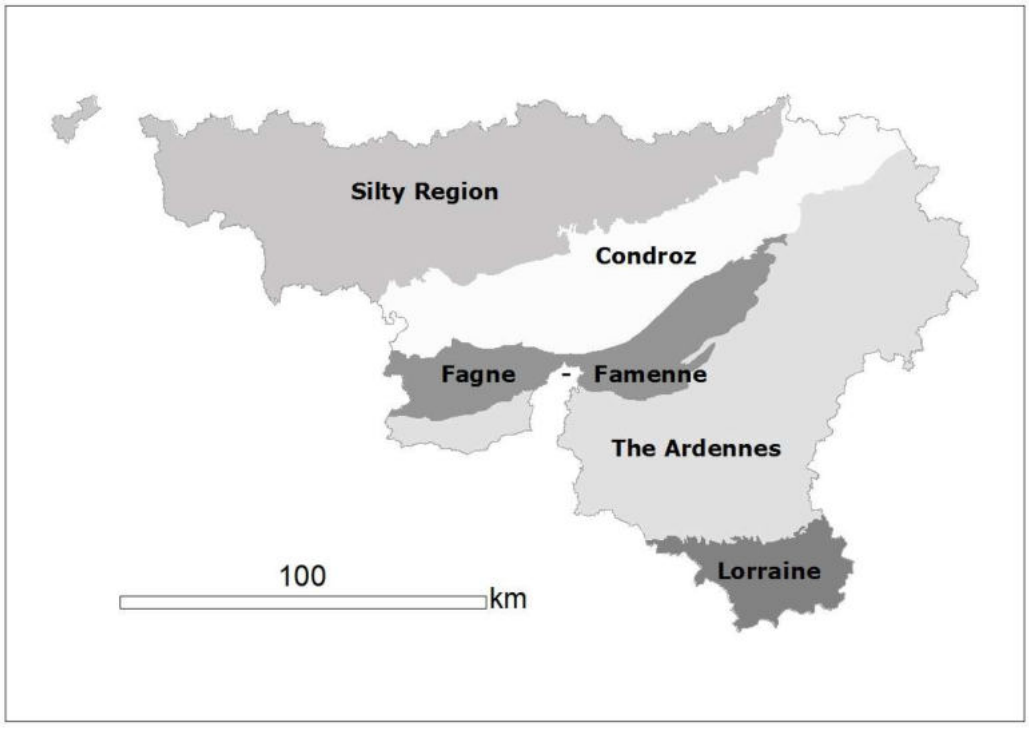


Figure 1b: The five Ecoregions in Wallonia

Field inventories

The chosen grid is based on the National Geographic Institute 1/10 000e topographic maps, this choice allowing direct comparison with the former Belgian Breeding Bird Atlas 1973-1977. Each of the 500 grid units covers 40 km² (8×5 km²). In each grid unit, all the bird species breeding in the wild (including allochtonous species) had to be listed (using the standard EBCC atlas code for assessing reproduction certainty (Hagemeijer & BLAIR 1997)) and their population estimated using a nine-class abundance scale.
In addition to the grid unit inventory, observers were also asked to sample 8 smaller squares of 1×1 km ("sampling square"), systematically delimited inside every 40 km² units. The sampling consisted in recording all birds seen or heard within the square limit, during two count periods of one hour, one early (25th of March to end-April) and a second one later in the season (mid-May to end of June). The sampling took place in the first 5 hours after sunrise. At the end of the fieldwork period, 2 800 squares were sampled, covering 17 % of Wallonia.
In addition to these standard atlas data, locations of approximate centre of bird territories were also collected at a precision of 100 m for a large number of the scarce breeders.

Map building

In the book, data are presented and commented by species regional experts under the form of two different maps for each species, and a third (the relative density map) for 77 of them.
The general map presents the field results at the 40 km² grid resolution. Two main information types are simultaneously shown: highest breeding evidence obtained for the grid unit and corresponding abundance class of the species.
The comparison map shows variation of occurrence and/or abundance of the species at the resolution of the former Belgian atlas grid (one unit of the 1973-1977 covers two units of the 2001-2007 atlas grid). The abundance classes of the present-day atlas were converted in the former atlas abundance classes. In this way, available information is degraded to allow direct comparison, unit per unit, with abundance estimation dating back from 30 years. This rationale was for example already successfully applied in the comparison of two successive atlases from the Netherlands (Van Turnhout *et al.* 2007).
The relative density map is based on the sampling square data, introduced in a spatial distribution modelling procedure taking into account 23 landscape, climatic and environmental variables calculated at the same resolution of 1 km². MaxEnt presence-only modelling tool (Phillips *et al.* 2006) was used to estimate a probability of presence score (for species where only occurrence data were used) or a relative density score (for species where the number of individuals recorded during the sampling was used) for the whole Wallonia at the resolution of the km².

Population estimates

Estimation of a population size at the regional level is a difficult but useful exercise, especially for very common species. In our case, estimates were given by the simple sum of abundance class limits for all occupied grid units (for rarer species) or by the sum of the abundance class central values (for commoner species). In this last case, population estimates have no more ambition than to give a very rough indication of the species abundance. For each species, population estimate is associated with a reliability score, based on expert judgment, in order to encourage readers to keep a critical look on the data presented.

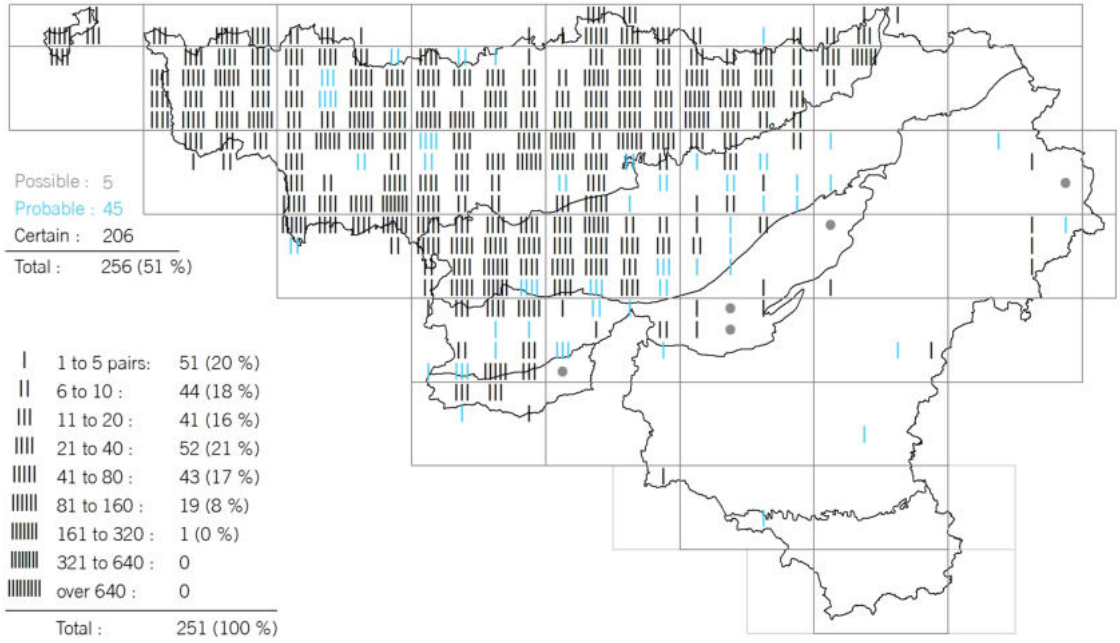
Results

The Walloon breeding avifauna

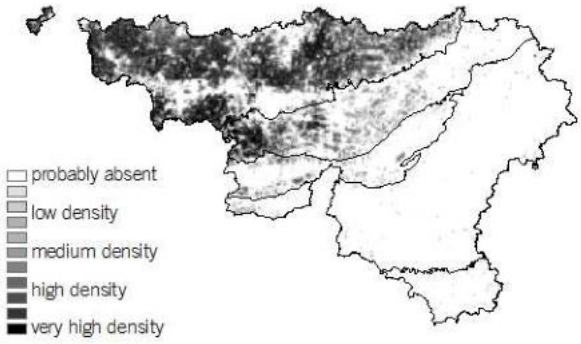
During the atlas period, 160 indigenous species (162 if *Motacilla f. flavissima* and *Motacilla a. yarrellii* are taken into account) have been breeding in Wallonia, most of them (90 %) on an annual basis. This total is close from those of neighbouring regions of similar size (for example 156 species in Rhineland, region of 13629 km² (Wink *et al.* 2005), 170 species in Flanders, region of about 14000 km² (Vermeersch *et al.* 2004)). About 15 species are unique to Wallonia in Belgium: mostly forest species (Hazel Grouse,

Wryneck) or birds linked to a continental context (Ring Ouzel). There are 13 species of allochtonous species breeding regularly in the wild in Wallonia: 9 Anatidae, 2 Pheasants, Feral Pigeon and Ring-Necked Parakeet. Most of them are recent breeders and all of these species are increasing, except the Common Pheasant. While being present in 80 % of the grid units, non-indigenous bird populations only represent 1.2 % of the estimated total of breeding pairs.
Together with the 13 wild-breeding exotic species, the distribution of 175 breeding taxa have been mapped at the grid-level. For 77 species, a high resolution relative density map has also been presented. Some examples are shown in Figure 2.

A)



B)



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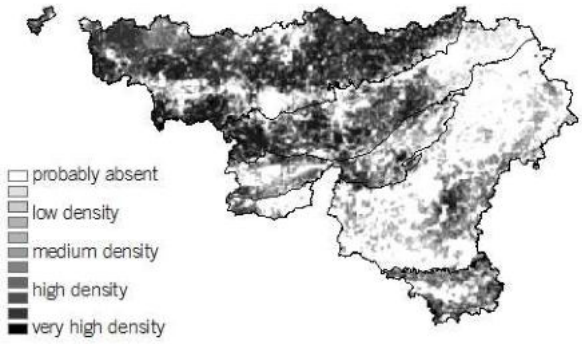

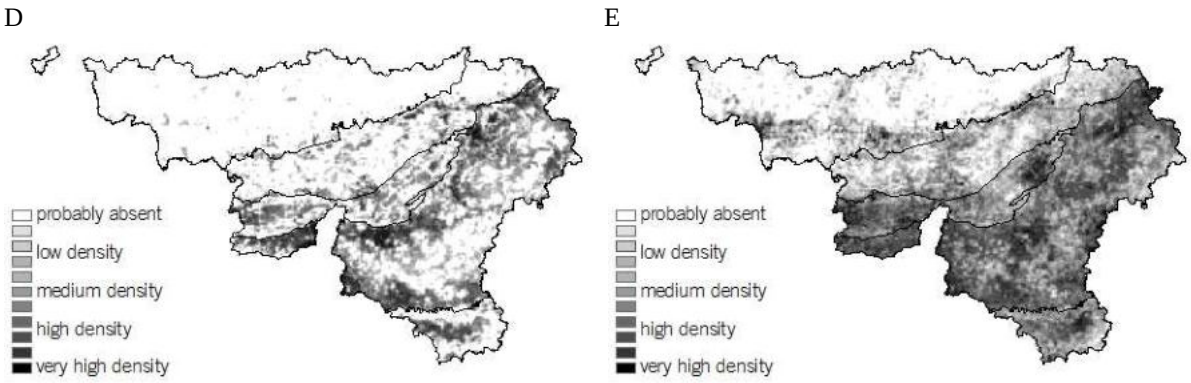

Figure 2 :Examples of maps. A: Result map at the 40-km² for the Yellow Wagtail. Dots stand for "possible" breeding cases, pales bars stand for "probable" and darkers bars for "certain". The number of bars correspond to the abundance class chosen by the observers. B to E are examples of relative density maps produced with the 1-km² sampling. The first two show typical distribution of farmland species (B: Yellow Wagtail, C : Skylark), D is the Wood Warbler and E the Willow Warbler.

Variation in species richness

Species richness per 40 km² grid unit averages 81.5 species, with seven 40-km² units hosting more than 100 species.

At the ecoregion scale, observed differences in species richness are low (Table 1). The longest breeding bird list is not found in the largest ecoregion (the Ardennes), but in the second largest (Silty Region), where several species-rich wetlands are located. However, at the grid unit scale, the picture is very different (Table 1). Average species richness is significantly higher (ANOVA, $p<0.001$) in the Lorraine and Fagne-Famenne ecoregion compared to Condroz and Ardennes, while Silty Region average species richness per unit is significantly lower than for the 4 other ecoregions. This is probably explained by a finer-grain mixing of better-quality habitats (deciduous forest, meadows and smaller-scale agriculture), typical of the two smallest ecoregions. Evidence of this can be found when comparing species richness of a subset of 1-km² sampling square dominated by farmland (meaning more than 75 % of land devoted to agriculture) : in farmland squares from Lorraine and Fagne-Famenne, species richness is on average about 30 % higher than in those sampled in the Silty Region.

Table 1: Comparison of breeding bird species richness, at the global and the grid unit scales, between the 5 ecoregions of Wallonia. All these figures are calculated without accounting for exotic species.

	Wallonia	Silty Region	Condroz	Fagne – Famenne	Ardennes	Lorraine
- Area (km²)	16 844	5 661	3 188	1 615	5 716	838
- Total number of breeding species	162	142	128	128	127	116
- Mean species richness by 40-km² grid unit	81.49	76.55	81.49	90.38	82.50	91.64
- Standard-deviation	8.56	8.95	6.94	7.01	6.02	7.39

Altogether, the shared set of species between ecoregion is rather high (100 species) and few birds are specific to only one ecoregion. The Ardennes, with its continental climate and its large cover of spruce plantations with relictual bogs and mires, is the ecoregion hosting the highest number of specific species (such as Black Grouse, Spotted Nutcracker…).

Abundances

Table 2 presents population estimates for all breeding species, associated with their reliability score. Common to very common species are probably greatly underestimated, but without more detailed data (like distance-sampling derived estimates), no better estimation can be made. Only 7 % of species are judged very common (more than 5 pairs / km²). Most species (76 %) are present in a density lower than 1 pair/km².

Table 2: List of the 175 breeding taxa in Wallonia, with the estimated population size and reliability of this estimation (A: reliable estimation given by a complete census; B : rather reliable estimation; C : poorly reliable estimation; D : under-estimated estimation, not reliable; E : very fluctant population, estimation not reliable). A star "*" indicates that the estimation was corrected by expert judgement from the raw data, "(E)" points to allochtonous species.

Species	Scientific name	Population size	ER
Black Swan	*Cygnus atratus*	0-3* pairs (E)	A
Mute Swan	*Cygnus olor*	140-180* pairs (E)	B
Greylag Goose	*Anser anser*	10-12* pairs (E)	B
Bar-headed Goose	*Anser indicus*	0-1* pair (E)	A
Barnacle Goose	*Branta leucopsis*	0-2* pair(s) (E)	A
Canada Goose	*Branta canadensis*	670-1 000 pairs (E)	B
Egyptian Goose	*Alopochen aegyptiaca*	330-590 pairs (E)	B
Common Shelduck	*Tadorna tadorna*	48-57 pairs	A
Wood Duck	*Aix sponsa*	0-2* pair(s) (E)	B
Mandarin Duck	*Aix galericulata*	53-71 pairs (E)	C
Eurasian Wigeon	*Anas penelope*	0-1 pair	A
Gadwall	*Anas strepera*	8-39* pairs	A
Eurasian Teal	*Anas crecca*	0-3* pair(s)	B
Mallard	*Anas platyrhynchos*	9 700 pairs	B
Garganey	*Anas querquedula*	1-5* pair(s)	B
Northern Shoveler	*Anas clypeata*	1-9* pair(s)	A
Red-crested Pochard	*Netta rufina*	0-3* pair(s)	A
Common Pochard	*Aythya ferina*	130-210* pairs	B
Ferruginous Duck	*Aythya nyroca*	0-1 pair	A
Tufted Duck	*Aythya fuligula*	200-260* pairs	B
Black Grouse	*Tetrao tetrix*	13-27* coqs	A
Hazel Grouse	*Bonasa bonasia*	48-140 pairs	E
Grey Partridge	*Perdix perdix*	3 900 pairs	B
Common Quail	*Coturnix coturnix*	2 300 territorial males	E
Reeve's Pheasant	*Syrmaticus reevesii*	84-140* cocks (E)	B
Common Pheasant	*Phasianus colchicus*	14 000 cocks (E)	B
Little Grebe	*Tachybaptus ruficollis*	610-860 pairs	B
Great Crested Grebe	*Podiceps cristatus*	410-490 pairs	A
Black-necked Grebe	*Podiceps nigricollis*	6-61* pairs	A
Great Cormorant	*Phalacrocorax carbo*	265-456* pairs	A
Eurasian Bittern	*Botaurus stellaris*	0-1* pair	A
Little Bittern	*Ixobrychus minutus*	1-4* pair(s)	A

Black-crowned Night Heron	*Nycticorax nycticorax*	0-2 pair(s)	A
Little Egret	*Egretta garzetta*	0-3 pair(s)	A
Grey Heron	*Ardea cinerea*	1 400-1 500 pairs	A
White Stork	*Ciconia ciconia*	0-1* pair	A
Black Stork	*Ciconia nigra*	75-95* pairs	B
European Honey-buzzard	*Pernis apivorus*	630-970 pairs	B
Red Kite	*Milvus milvus*	150-180* pairs	A
Black Kite	*Milvus migrans*	59-61* pairs	A
Western Marsh Harrier	*Circus aeruginosus*	1-7* pair(s)	A
Northern Harrier	*Circus cyaneus*	1-5* pair(s)	A
Montagu's Harrier	*Circus pygargus*	2-13* pairs	A
Eurasian Sparrowhawk	*Accipiter nisus*	2 700 pairs	B
Northern Goshawk	*Accipiter gentilis*	475-720 pairs	B
Common Buzzard	*Buteo buteo*	6 100 pairs	B
Common Kestrel	*Falco tinnunculus*	2 700 pairs	B
Eurasian Hobby	*Falco subbuteo*	340-380	B
Peregrine Falcon	*Falco peregrinus*	7-25* pairs	A
Water Rail	*Rallus aquaticus*	220-280 territorial males	C
Corn Crake	*Crex crex*	1-12* territorial males	E
Spotted Crake	*Porzana porzana*	0-1* territorial male	
Common Moorhen	*Gallinula chloropus*	6 000 pairs	B
Common Coot	*Fulica atra*	2 400 pairs	B
Eurasian Oystercatcher	*Haematopus ostralegus*	1-3* pair(s)	A
Pied Avocet	*Recurvirostra avosetta*	1-3* pair(s)	A
Northern Lapwing	*Vanellus vanellus*	6 100 pairs	B
European Golden Plover	*Pluvialis apricaria*	0-1 pair	A
Little Ringed Plover	*Charadrius dubius*	110-140* pairs	B
Eurasian Woodcock	*Scolopax rusticola*	3 000 territorial males	C
Common Snipe	*Gallinago gallinago*	1-4* territorial males	A
Mew Gull	*Larus canus*	82-94* pairs	A
Common Black-headed Gull	*Chroicocephalus ridibundus*	180-400* pairs	A
Common Tern	*Sterna hirundo*	0-1 pair	A
Feral Pigeon	*Columba livia*	19 000 pairs (E)	C
Stock Dove	*Columba oenas*	6 300 pairs	C
Common Wood Pigeon	*Columba palumbus*	100 000 pairs	D
European Turtle Dove	*Streptopelia turtur*	4 200 pairs	B
Eurasian Collared Dove	*Streptopelia decaocto*	43 000 pairs	C
Rose-ringed Parakeet	*Psittacula krameri*	45-60 pairs (E)	B
Common Cuckoo	*Cuculus canorus*	2 800 territorial males	B
Barn Owl	*Tyto alba*	1 400 pairs	B
Eagle Owl	*Bubo bubo*	80-85* pairs	A
Tawny Owl	*Strix aluco*	5 700 pairs	C
Little Owl	*Athene noctua*	3 700 pairs	B
Boreal Owl	*Aegolius funereus*	65-100* pairs	A
Long-eared Owl	*Asio otus*	2 300 pairs	C
Short-eared Owl	*Asio flammeus*	0-1 pair	
European Nightjar	*Caprimulgus europaeus*	50-60* pairs	A
Common Swift	*Apus apus*	23 000 pairs	C
Common Kingfisher	*Alcedo atthis*	450-650* pairs	B
European Bee-eater	*Merops apiaster*	0-3* pair(s)	
Eurasian Wryneck	*Jynx torquilla*	45-58 pairs	B
Lesser Spotted Woodpecker	*Dendrocopos minor*	2 000 pairs	C

Lesser Spotted Woodpecker	*Dendrocopos minor*	2 000 pairs	C
Middle Spotted Woodpecker	*Dendrocopos medius*	4 200 pairs	C
Great Spotted Woodpecker	*Dendrocopos major*	26 000 pairs	B
Black Woodpecker	*Dryocopus martius*	920-1 400 pairs	C
European Green Woodpecker	*Picus viridis*	5 900 pairs	B
Grey-headed Woodpecker	*Picus canus*	33-40* pairs	C
Wood Lark	*Lullula arborea*	200-220* pairs	A
Sky Lark	*Alauda arvensis*	23 000 pairs	B
Sand Martin	*Riparia riparia*	1 700-3 000* pairs	A
Barn Swallow	*Hirundo rustica*	36 000* pairs	C
Common House Martin	*Delichon urbicum*	32 000 pairs	C
White Wagtail	*Motacilla alba*	21 000 pairs	C
Pied Wagtail	*Motacilla alba yarrellii*	0-3* pairs	A
Yellow Wagtail	*Motacilla flava*	7 800 pairs	C
British Yellow Wagtail	*Motacilla flava flavissima*	3-6* pairs	A
Grey Wagtail	*Motacilla cinerea*	3 800 pairs	B
Tree Pipit	*Anthus trivialis*	11 000 pairs	B
Meadow Pipit	*Anthus pratensis*	3 800 pairs	B
White-throated Dipper	*Cinclus cinclus*	890 pairs	B
Winter Wren	*Troglodytes troglodytes*	160 000 pairs	D
Dunnock	*Prunella modularis*	76 000 pairs	D
European Robin	*Erithacus rubecula*	130 000 pairs	D
Common Nightingale	*Luscinia megarhynchos*	1 300 pairs	B
Bluethroat	*Luscinia svecica*	430-600 pairs	B
Black Redstart	*Phoenicurus ochruros*	18 000 pairs	C
Common Redstart	*Phoenicurus phoenicurus*	2 600 pairs	B
Whinchat	*Saxicola rubetra*	230-320 pairs	A
Eurasian Stonechat	*Saxicola torquatus*	2 700 pairs	B
Ring Ouzel	*Turdus torquatus*	9-13 pairs	C
Common Blackbird	*Turdus merula*	206 000* pairs	D
Fieldfare	*Turdus pilaris*	8 900 pairs	B
Song Thrush	*Turdus philomelos*	68 000 pairs	D
Mistle Thrush	*Turdus viscivorus*	19 000 pairs	C
Zitting Cisticola	*Cisticola juncidis*	0-1* pair	A
Cetti's Warbler	*Cettia cetti*	150-190 pairs	B
Common Grasshopper Warbler	*Locustella naevia*	1 900 pairs	C
Savi's Warbler	*Locustella luscinioides*	1-7* pair(s)	A
Sedge Warbler	*Acrocephalus schoenobaenus*	110-140 pairs	B
Eurasian Reed Warbler	*Acrocephalus scirpaceus*	1 500 pairs	B
Marsh Warbler	*Acrocephalus palustris*	7 800 pairs	C
Great Reed Warbler	*Acrocephalus arundinaceus*	0-2 pair(s)	A
Melodious Warbler	*Hippolais polyglotta*	2 100 pairs	B
Icterine Warbler	*Hippolais icterina*	1 100 pairs	B
Willow Warbler	*Phylloscopus trochilus*	38 000 pairs	C
Chiffchaff	*Phylloscopus collybita*	120 000 pairs	C
Wood Warbler	*Phylloscopus sibilatrix*	13 000 pairs	C
Eurasian Blackcap	*Sylvia atricapilla*	130 000 pairs	D
Garden Warbler	*Sylvia borin*	34 000 pairs	D
Common Whitethroat	*Sylvia communis*	29 000 pairs	D
Lesser Whitethroat	*Sylvia curruca*	7 100 pairs	C
Goldcrest	*Regulus regulus*	54 000 pairs	C
Firecrest	*Regulus ignicapilla*	51 000 pairs	C

Spotted Flycatcher	*Muscicapa striata*	3 500 pairs	C
Eurasian Pied Flycatcher	*Ficedula hypoleuca*	840 pairs	C
Bearded Reedling	*Panurus biarmicus*	0-1 pair	A
Long-tailed Bushtit	*Aegithalos caudatus*	12 000 pairs	C
Marsh Tit	*Poecile palustris*	22 000 pairs	C
Willow Tit	*Poecile montanus*	12 000 pairs	C
Coal Tit	*Periparus ater*	41 000 pairs	C
European Crested Tit	*Lophophanes cristatus*	19 000 pairs	C
Great Tit	*Parus major*	150 000 pairs	D
Blue Tit	*Cyanistes caeruleus*	86 000 pairs	D
Eurasian Nuthatch	*Sitta europaea*	39 000 pairs	C
Eurasian Treecreeper	*Certhia familiaris*	6 400 pairs	C
Short-toed Treecreeper	*Certhia brachydactyla*	31 000 pairs	C
Eurasian Golden Oriole	*Oriolus oriolus*	900 pairs	B
Red-backed Shrike	*Lanius collurio*	3 700 pairs	B
Great Grey Shrike	*Lanius excubitor*	270-330* pairs	A
Woodchat Shrike	*Lanius senator*	0-1* pair	A
Eurasian Jay	*Garrulus glandarius*	29 000 pairs	C
Eurasian Magpie	*Pica pica*	30 000 pairs	C
Spotted Nutcracker	*Nucifraga caryocatactes*	450 pairs	C
Western Jackdaw	*Corvus monedula*	15 000 pairs	C
Rook	*Corvus frugilegus*	15 000* pairs	A
Carrion Crow	*Corvus corone*	39 000 pairs	C
Northern Raven	*Corvus corax*	67-87* pairs	B
Common Starling	*Sturnus vulgaris*	88 000 pairs	C
House Sparrow	*Passer domesticus*	180 000 pairs	D
Eurasian Tree Sparrow	*Passer montanus*	12 000 pairs	C
Chaffinch	*Fringilla coelebs*	210 000 pairs	D
Red Crossbill	*Loxia curvirostra*	4 400 pairs	E
European Greenfinch	*Carduelis chloris*	25 000 pairs	C
Lesser Redpoll	*Carduelis flammea cabaret*	66-110 pairs	B
Eurasian Siskin	*Carduelis spinus*	520-1 000 pairs	E
European Goldfinch	*Carduelis carduelis*	6 600 pairs	C
Common Linnet	*Carduelis cannabina*	24 000 pairs	C
European Serin	*Serinus serinus*	1 300 pairs	C
Eurasian Bullfinch	*Pyrrhula pyrrhula*	9 800 pairs	C
Hawfinch	*Coccothraustes coccothraustes*	9 500 pairs	C
Yellowhammer	*Emberiza citrinella*	29 000 pairs	B
Common Reed Bunting	*Emberiza schoeniclus*	1 500 pairs	B
Corn Bunting	*Emberiza calandra*	1 400 pairs	B

When comparing density estimated in Wallonia with estimated density in Europe (using “Birds in Europe 2” for range and population size (BirdLife International 2004)), it appears that a panel of species are showing higher than average density in Wallonia (Table 3). Most of these species are forest-dwellers or raptors. In terms of international bird conservation concerns (Keller & Bollmann 2004), Wallonia shares a particular responsability in regards to these birds.

Table 3: Species showing an average density higher in Wallonia than in the rest of their European range. Bird Directive Annex I species are highlighted in bold.

English Name	Scientific Name	Density ratio (average density in Wallonia divided by average density in Europe)
Woodpigeon	*Columba palumbus*	2.8
Common Kestrel	*Falco tinnunculus*	2.6
Stockdove	*Columba oenas*	2.6
Eurasian Sparrowhawk	*Accipiter nisus*	2.5
Common Buzzard	*Buteo buteo*	2.1
Tawny Owl	*Strix aluco*	2.0
Winter Wren	*Troglodytes troglodytes*	1.7
Middle Spotted Woodpecker	***Dendrocopos medius***	1.6
Common Moorhen	*Gallinula chloropus*	1.5
Grey Heron	*Ardea cinerea*	1.4
Honey Buzzard	***Pernis apivorus***	1.4
Collared Dove	*Streptopelia decaocto*	1.4
Green Woodpecker	*Picus viridis*	1.4
Black Stork	***Ciconia nigra***	1.3
Blackbird	*Turdus merula*	1.2
Barn Owl	*Tyto alba*	1.1
Northern Goshawk	*Accipiter gentilis*	1.1
Eurasian Blackcap	*Sylvia atricapilla*	1.1
Carrion Crow	*Corvus corone*	1.1
Eurasian Hobby	*Falco subbuteo*	1.1

Observed changes in 30 years

Compared to the former atlas period 1973-1977, the list of breeding birds in Wallonia has increased by 16 species. Two species, already at the verge of extinction 30 years ago, disappeared (Crested Lark and Northern Wheatear) while 18 newcomers are now on the list. Most of them present very small or even irregular breeding population (Eurasian Wigeon, Red-Crested Pochard, Little Egret, Night Heron, Golden Plover, Eurasian Oystercatcher, Pied Avocet, Common Tern, Zitting Cisticola, and Bearded Tit). However, some of these newcomers developed long-lasting population, following either a recent expansion of their European range (Great Cormorant, Gadwall, Melodious Warbler) or a come-back after an extinction period: Black Stork, Montagu's Harrier, Peregrine, Eagle Owl and Raven (this last recovery originating from a successful local reintroduction program).

At the local scale, a clear increase of species richness is also observed: there are on average 12.9 more species for each 80-km² comparable grid units (+ 18 %). Moreover, this increase is calculated excluding exotic species. This phenomenon is probably partly explained by the better coverage of the recent Atlas, but not only. Compared frequency distribution of species richness (Figure 3) shows than, although the 2001-2007 distribution is more "bell-shaped", suggesting a better coverage, the median of species richness is

higher. Altogether, there is more species expanding their range than contracting. Excluding newcomers to Wallonia avifauna, 50 % of the species increased their range by at least 10 %, while only 9.5 % have lost more than 10 % of their range (range being calculated in that case by the number of occupied 80-km² units).

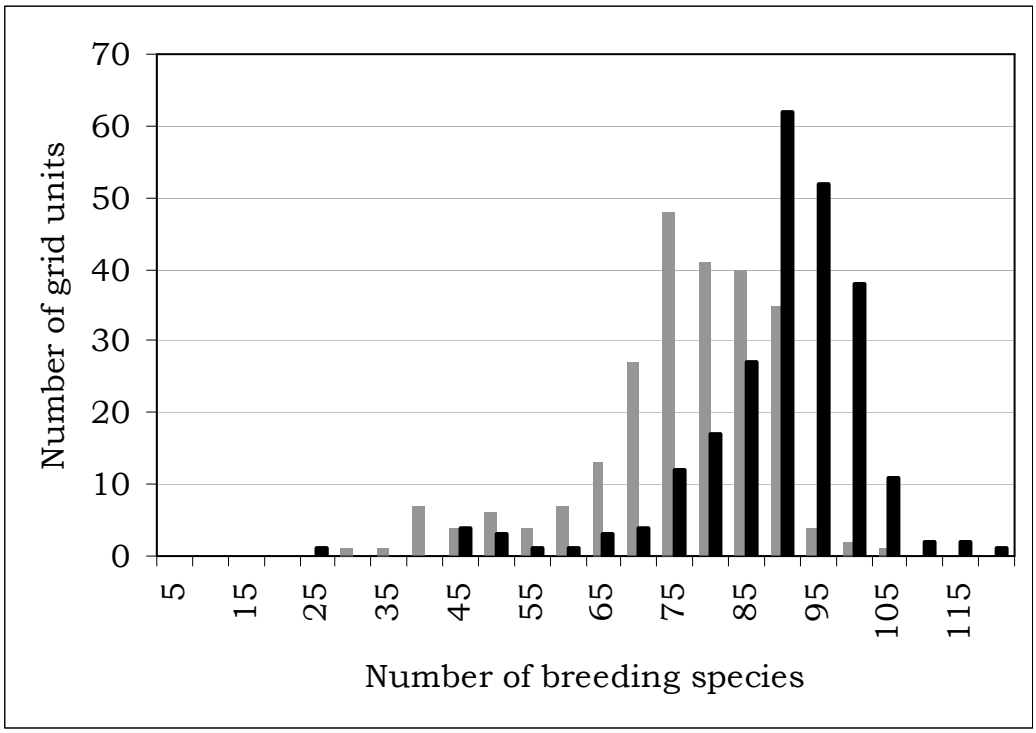

Figure 3: Compared distribution of species richness by 80-km² grid units between the 1973-1977 atlas (in grey) and the 2001-2007 atlas (in black).

Range expansion concerns a majority of species linked to wetlands (Figure 4). Most of the birds using wetlands, lakes and rivers are doing better than 30 years ago, for several reasons. Some of these waterbirds benefited from a diminution of traditional persecution (Great Crested Grebe, Grey Heron, Common Kingfisher), others from the creation of artificial ponds (Tufted Duck, Common Coot…). A few species also adapted to seemingly marginal habitats, like Bluethroat now commonly using ditches in-between intensive crops in Western Wallonia.

However, the landscape evolution having the strongest positive long-term influence on breeding birds in Wallonia probably concerns woodland (Figure 4). Several co-occurring phenomenon, dating back several dozens of years ago, are now reflected in woodland species range changes. These include: transformation of coppice-woodland to high-stand forests, aging of spruce-tree plantations, aging of planted parks and gardens, and legal protection for some species. These changes have in majority a positive effect on forest birds, but in some cases, some specialists are negatively affected, like for the Hazel Grouse, now a critically endangered species in Wallonia, following a long-term reduction of its traditional habitat, coppice-woodland. Very high density of ungulates also may concur to the threat on Hazel Grouse and other ground-nesting populations.

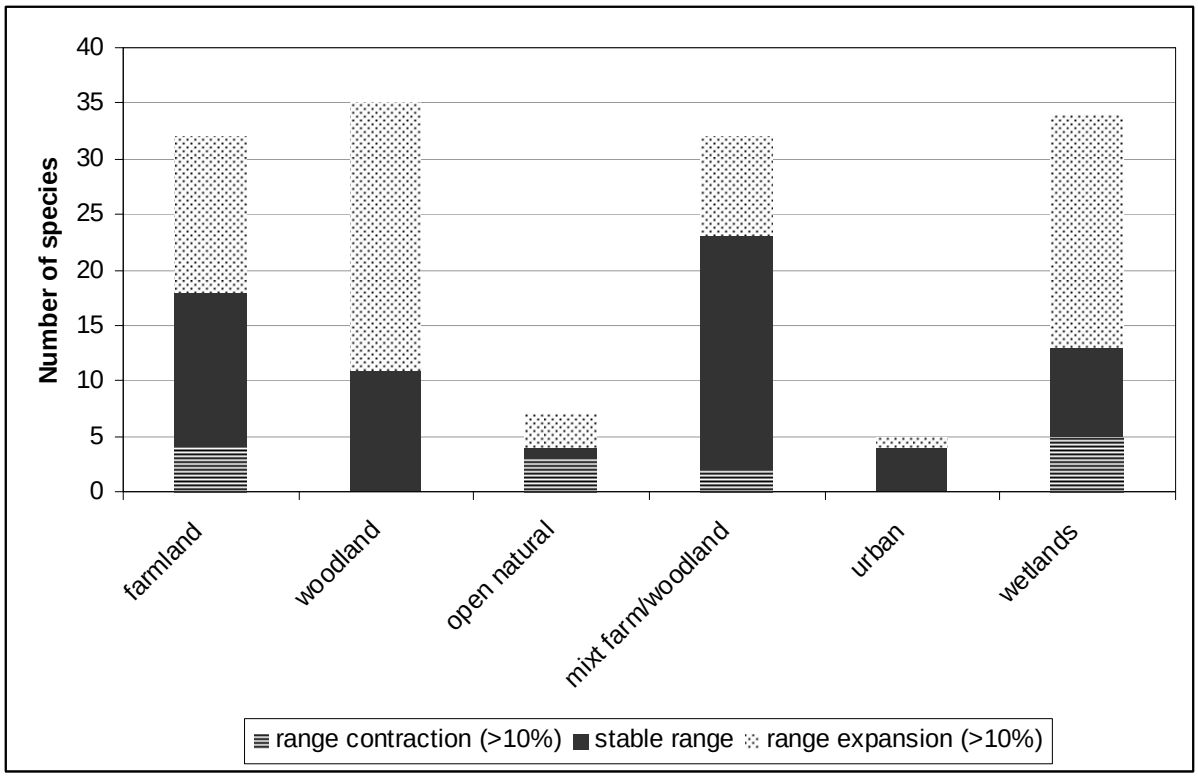

Figure 4: Number of species with increasing, stable or decreasing range, according to simple habitat types (only one habitat type for each species).

As everywhere in Europe (Donald *et al.* 2006), farmland birds are showing a much more negative evolution. Ranges of Whinchat, Grey Partridge and Corn Bunting shrunken dramatically, while a majority of farmland birds decreased in population without necessarily showing (yet ?) a range contraction at the 80-km² scale (Tree Sparrow, Common Linnet…). A few farmland species however benefited from reduction of persecution habits (Rook, farmland raptors…). Some also showed a contrasting pattern during the past 30 years: first a range expansion followed by a rapid range contraction (best examples are Lapwing and Fieldfare). Some unexpected phenomenons were also observed: Red-backed Shrike conquered 62 new grid units and its population was multiplied by 8 since 1973-1977. Yellow Wagtail shifted its breeding habitat, from wet meadows where the population is at the verge of extinction, to winter crop, with an expansion of the range to the South.

When looking at the population changes, a majority (65 %) of species are also increasing. Surprisingly, trends of commoner species tend to be more often negative, compared to the rarer species (Figure 5). As a result, there are more species but perhaps less birds than 30 years ago (an estimated decrease of 4.4 % in pair numbers, globally; however this figure must be taken with great care because of the uncertainties on common species population estimations).

Further investigation is required to test the hypothesis that this pattern is linked to an "homogenization" phenomenon, described for other parts of Europe (Van Turnhout *et al.* 2007; Devictor *et al.* 2008), where generalist species thrive and tend to occupy more and more space, while the specialists are in decrease.

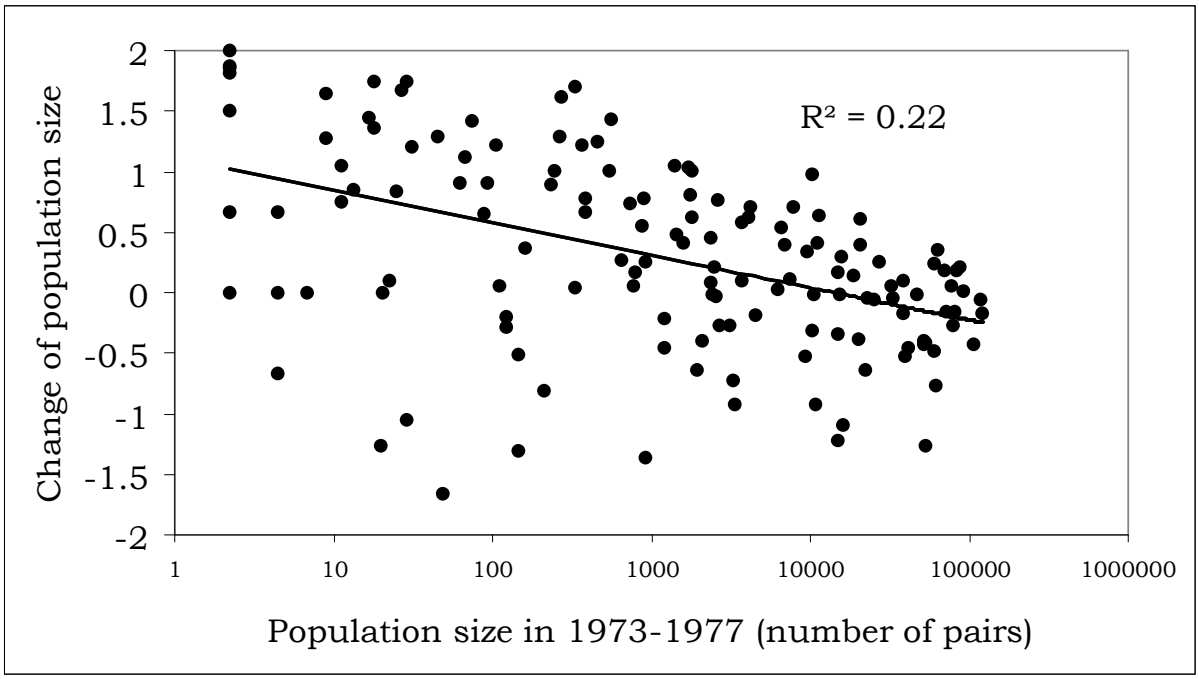

Figure 5: Relation between change in population between the two atlases and the initial population size (in 1973-1977). Change is calculated by the following formula: ($pop_{2001-2007} - pop_{1973-1977}$)/[($pop_{2001-2007} + pop_{1973-1977}$) / 2], which renders increases and decreases symmetrical, the maximum decline (extinction) being -2, and the maximum increase (colonization) being +2.

Conclusions

Thanks to an extensive collaboration with more than 600 volunteers and to the continuous support of the Walloon Region, this project succeeded in giving a thorough inventory of the breeding birds of Wallonia. Initiated at a crucial period where information technologies started changing the conduct of bird monitoring programs, the project did not took yet full advantages of now common online tools, but however took profit of new analysis methods, like relative density map building with spatial modelling.

Beside the reference book, numerous data are valuable for research and conservation, like more than 60 000 pointed locations of breeding territories of scarce species. Using this up-to-date and thorough information on bird distribution to fine-tune long-term bird monitoring scheme is also a challenging prospective. All in all, one of the ultimate goals of such an atlas is certainly to motivate the birdwatching community to pursue further fieldwork, hopefully focused on a better understanding of the described population evolutions.

Acknowledgements

The devoted contributors to this work, both to field work and subsequent analysis and redaction work, are too numerous to be cited *in extenso* here but their names are listed in the book. They all deserve the warmest acknowledgement. This project was supported and financed throughout by the Service Public de Wallonie (SPW- DGO3).

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Bird Census News 2011, 24/1: 37 - 38

Minutes of the Annual General Meeting (AGM) of the European Bird Census Council, Cáceres, Spain, 24th March 2010

Chairman's welcome
Richard Gregory, as current Chairman of the European Bird Census Council (EBCC), formally opened the Annual General Meeting (AGM) at 5:41 p.m. and welcomed all Delegates, Board members and guests to this meeting. An attendance list was circulated. Altogether, 59 people attended the meeting (37 votes could be casted at the elections). The Chairman outlined the agenda of the Board meeting and asked for additions to the agenda. As there were no further items brought forward, the agenda was accepted unchanged.

Apologies for absence
These were received from Juha Tiainen and Dragan Simic.

Minutes of last Annual General Meeting
Full minutes of the last Annual General Meeting were published in Bird Census News (2007) 20, 45-48. They were accepted by the AGM.

Chairman's Report on behalf of EBCC Board (and Observers in Board)
Richard Gregory gave a brief summary of EBCC's work since the Chiavenna conference in April 2007. The complete Chairman's Report is printed along with these minutes in this issue of BCN.

Financial report
Ruud Foppen gave the yearly financial reports for the years 2008 and 2009, since the legal situation of EBCC had changed in 2008. These are the first financial reports of EBCC as an Association under Dutch Law. The Treasurer reported on positive development of EBCC finances in 2008 due to considerable income from data requests, but little income in 2009. The main expenses were due to the costs of the Notary which helped with the new legal status of Association under Dutch law.
The AGM approved the budget of the financial years 2008 and 2009. The financial reports had also been ratified by the Treasury Commission. This Commission, consisting of the delegates Frank Saris and Koen Devos, reported on their task of checking EBCCs finances, which they found correct and flawless. They discharged Board in relation to the responsibilities of both financial years.
A new Treasury Commission has to be elected/appointed at a later stage, as there were no volunteers among the audience for this task.

Election of new national Delegates
Åke Lindström informed all participants about the procedures to elect Delegates. Currently, 82 Delegates represent 42 European countries. The updated list of Delegates can be found on the EBCC homepage. New Delegates can only be elected at the AGMs. They can be proposed by existing Delegates or relevant NGOs in their respective countries.
Nidal Issa, Guido Tellini Florenzano, Dragan Simic are new possible Delegates for France, Italy and Serbia, respectively.
The election of delegates was taken by a show of hands. There were 35 votes in favour of Nidal Issa, 33 votes for Guido Tellini, and 32 votes for Dragan Simic. All three were thus accepted as new Delegates of EBCC.

Election of new Board members
A list of 10 candidates were listed on the Agenda, including four new candidates and six current members which were standing for re-election. It was decided that the election would be carried out by a show of hands, and that Delegates would elect the Board members one by one, with Ian Burfield and David Noble keeping count of the votes. The elections went as follows:
For Ruud Foppen (Netherlands) as Chairman: 36 votes.

For David Noble (Great Britain) as Vice Chairman: 35 votes.
For Hans-Günther Bauer (Germany) as Secretary: 34 votes.
For Åke Lindström (Sweden) as Board Member/Delegate Officer: 35 votes.
For Anny Anselin (Belgium) as Board Member/BCN Officer: 35 votes.
For Lluis Brotons (Spain) as Board Member: 35 votes in favour.
For Henning Hjeldberg (Denmark) as Board Member: 35 votes.
For Mikhail Kalyakin (Russia) as Board Member: 36 votes.
For Oskars Keišs (Latvia) as Board Member: 35 votes.
For Verena Keller (Switzerland) as Board Member: 34 votes.

The roles of EBCC observers were shortly explained by the Chairman. There will be several observers at the Board meetings representing e.g. BirdLife International, the RSPB, ESMOG, and PECMBS. The audience welcomed these participants of Board.

Conference declaration
A short summary statement on behalf of the conference participants had been prepared; the wording of this paper will be finalized at the end of the conference. David Noble promised to see to the finalization of the conference declaration.

EBCC Award
For the second time EBCC presented its Award; this time it was presented to Jeremy Greenwood for his outstanding achievements in raising EBCC's profile and reputation from its installment in 1992, merging the former IBBC and EOAC. The prize was accepted by David Noble on Jeremy's behalf.
David Noble read out the written comment by Jeremy Greenwood on receiving this Award, for which he thanks EBCC very much. He declared that he was very proud of the achievements of EBCC for which he was active from its early days until 2004.

Timing and venue of the next conference
Potential hosts of the 19th conference of EBCC were invited to express their intention. A first proposal comes from Szoltan Szabo to hold the next conference in Cluj (Transylvania / Romania) in spring 2013. The audience was very appreciative of this proposal.

Any other business
Ruud Foppen, the new Chairman, thanked Richard Gregory heartily for his outstanding work and commitment as Chairman of EBCC acknowledging his major involvement in EBCC's scientific output, the installment of PECBMS and other important decisions and achievements of EBCC mentioned earlier. He closed by expressing his hopes that Richard Gregory might still act as an adviser of the Board to continue his involvement and great expertise to the benefit of the Association.

Ruud Foppen thanked the audience for their presence and participation and closed the EBCC's Annual General Meeting at 19h15.

Cáceres, 24 April 2010

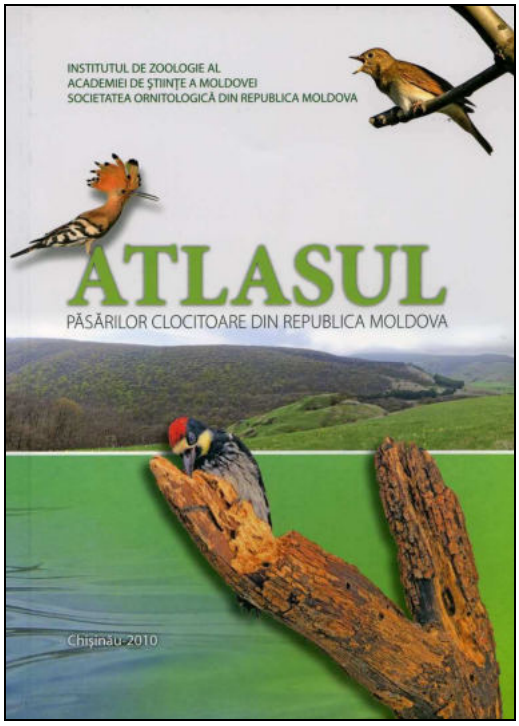
Chairman
Ruud Foppen

Secretary
Hans-Günther Bauer

Books, reports & journals

Munteanu A. (red) 2011. Atlas of the Breeding Birds of the Republic of Moldova. Inst. de Zoologie al Acad. de Ştiinţe a Moldovei, Soc. Ornitologică din Rep. Moldova, Chişinău. 100 pages. (in Romanian-Moldovan: Atlasul Păsărilor clocitoare din Republica Moldova). ISBN 978-9975-106-10-8
Contact: Nicolai Zubcov, email:niczubcov@mail.ru.

This small but interesting booklet presents an update of the breeding status of the Moldovian avifauna. Moldova is a small country, located between Romania to the West and Ukraine to the North, East and South. The largest part lies between two rivers, the Prut (in the west) and the Dniester (in the east). Although bordering the famous Danube delta and very near the Black Sea, the country has no coast. Moldova is hilly, but lacks real mountains. Elevations never exceed 430m and the south consist mainly of lowland. Mixed farmland covers large parts of the country. For each of the 173 breeding species a distribution map is shown, using a scale of 25×25 km UTM squares. Species names are in Romanian-Moldovan and latin. Symbols indicate whether the breeding is confirmed or probable, based on the international accepted standards. Abbreviations (also in english and german) give the status of the bird: resident, summer visitor, winter visitor, passage migrant or partial migrant and with each map goes also a population estimation.



Due to the geographical features of the country, seabirds and mountain species are clearly absent from the list of breeding species, while wetland-marshland and farmland species are in general rather well represented. Species like White Stork (400-600 bp) and Little Bittern (1200-1500) are widespread. Several other heron species have colonies along the main rivers or in the southwestern part of the

country (near the delta). Among the raptors Marsh Harrier (70-100 bp), Kestrel (150-200 bp), Red-footed Falcon (70-90 bp), Buzzard (200-300 bp) and Goshawk (40-70 bp) are the most common. On the other hand Egyptian vulture and Short-toed Eagle are now only probable breeders and Lesser spotted eagle has become very rare. While Bee-eater and Hoopoe are widespread with several thousands breeding pairs, Roller is rare (30-60 bp) and is declining. Although present in some nearby areas of Romania and/or Ukraine, Paddyfield Warbler, Spanish Sparrow and Bullfinch are not in the list of breeding species for Moldova. To follow the development of the breeding birds of Moldova, it is the intention to repeat an overall national atlas inventory every ten years.

Jacob, J-P et al. 2011. Atlas of the Breeding Birds of Wallonia 2011. Aves-Natagora & Département de l'Etude du milieu Naturel et Agricole (DEMNA – Service public de Wallonie), Série Faune-Flore-Habitats n°5, 524 pages. (in French with English summary: Atlas des oiseaux nicheurs de Wallonie). ISBN: 978-280560027-2

Order: Boutique Verte, tel + 32 04 250 95 90 or *www.boutique-verte.be*. Price: 39,9 Euro (mailing costs: 8,7)

See article in this issue

The next EBCC conference will be held
in Cluj, Romania, organised by the
Societatea Ornitologica Romana (BirdLife
in Romania).
The conference days are 17-20 September 2013
with suggested arrival
on Monday 16th and departure on Saturday 21st September.
The venue will be a new
University building, with room and
accommodation for about 250 people.

Your text in the next issue?

Bird Census is meant as a forum for everybody involved in bird census, monitoring and atlas studies. Therefore we invite you to use it for publishing articles and short reviews on your own activities within this field such as (preliminary) results of a regional or national atlas or a monitoring scheme, species-specific inventories, reviews or activity news of your country (as a delegate: see also below)

Instructions to authors
- Text in MS-Word.
- Author name should be with full first name. Add address and email address.
- Figures, pictures and tables should not be incorporated in the text but attached as separate files.
- Provide illustrations and figures both in colour and black and white. Figures and tables in colour will be shown in colour in the PDF version on our EBCC website: www.ebcc.info.
- The lenght of the papers is not fixed but should preferably not exceed more than 15 pages A4, font size 12 pt, line spacing single (figures and tables included).
- Papers should include an abstract of maximum 100 words.
- Authors will receive proofs that must be corrected and returned as soon as possible.
- Authors will receive a pdf-file of the paper.

References:
- In the text: Aunins (2009); Barova (1990a, 2003), Gregory & Foppen (1999), Flade *et al.* (2006), (Chylarecki 2008), (Buckland, Anderson & Laake 2001)
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All contributions in digital form:
by email to: anny.anselin@inbo.be

by mail on CD to: Anny Anselin, Research Institute for Nature and Forest, Kliniekstraat 25, B-1070 Brussel, Belgium

National delegates are also invited to send a summary of the status of monitoring and atlas work for publication on the website of EBCC, see www.ebcc.info/country.html.
Contact David Noble, British Trust for Ornithology, The Nunnery, Thetford, Norfolk IP24 2PU, United Kingdom, +44 1842 750050, email: david.noble@bto.org.

Please send short national news for the Delegates Newsletter to EBCC's Delegates Officer: Åke Lindström, Dept. of Animal Ecology, Lund University, Ecology Building, S-223 62 Lund, Sweden,+46-46-2224968,Mobile: +46-70-6975931, email: ake.lindstrom@zooekol.lu.se

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