Regional trends amongst Danish specialist farmland breeding birds

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(Med et dansk resumé: Regionale bestandstendenser for danske ynglefuglearter specialiseret i landbrugsområder)

Abstract The mean rates of change in annual abundance for 16 farmland specialist breeding bird species based on point counts from three regions of Denmark (West, Central and East) during 1987-2015 inclusive were analysed to see if grassland and arable specialists were showing regional changes that could be related to their respective specializations. Generally, few species showed differences in regional population trends, despite the increasing concentration of mixed (mainly pastoral) agriculture in the West and predominantly arable cultivation in the East. Most grassland and arable specialists were declining in all regions. Only Mew Gull *Larus canus* showed consistent increases in all regions, Western Marsh Harrier *Circus aeruginosus* and Common Whitethroat *Sylvia communis* showed increases in the East and West while Barn Swallow *Hirundo rustica* showed little change in abundance anywhere during the period. Corn Bunting *Emberiza calandra* showed significant declines in the East of Denmark in contrast to stable trends in the Central and Western regions, but was declining everywhere since 2003. The results underline the need to understand how individual farmland species exploit specific crops and micro-biotopes as well as the combination of different crops.

Introduction

The European Commission has undertaken to halt the loss of biodiversity and ecosystem services throughout the European Union (EU) and where possible reinstate previous losses before 2020 (European Commission 2011). The reformed EU Common Agricultural Policy for 2014-2020 also aims to reduce biodiversity loss, although it has been stated that it comprises 'such diluted environmental prescriptions that they are unlikely to benefit biodiversity' (Pe'er *et al.* 2014). More than 60% (c. 27 000 km^2) of Denmark's total surface area is cultivated, making it the most intensively farmed landscape in Europe (Danmarks Statistik 2009, FAOSTAT 2016). Most of the cultivated areas are given over to winter wheat, grass ley and spring barley, although increasing areas produce maize and oilseed rape (Levin & Normander 2008, Brink & Jensen 2012). Given such a high proportion of the land surface is cultivated, farmland contributes disproportionately to maintaining overall biological diversity in Denmark.

Birds are highly mobile and dispersive, features which make them good indicators of overall habitat quality and disturbance, as they often show rapid and sensitive responses to human-induced changes in their immediate environment. Birds are also well studied and, especially for the commoner species, there exist long term time-series on their distribution and abundance across much of Europe (Gregory & van Strien 2010). As a result, changes in farmland bird populations have come to play an important role in showing the effects of agricultural intensification on wider countryside nature conservation interest, including Denmark where common birds are a conspicuous and well monitored element of Danish biodiversity (e.g. Fox 2004, Eskildsen *et al.* 2013).

A previous analysis of the status and trends of farmland birds in Denmark suggested that, at least some species (e.g. Corn Bunting *Emberiza calandra*) showed more favourable conservation status than was the case in other western European countries, for example Great Britain (Fox 2004). However, more recent analyses based on the BirdLife Denmark's Common Bird Monitoring (CBM) confirm that 16 specialist farmland bird species in Denmark are showing the most rapid declines among 102 common birds associated with a range of other habitats (Heldbjerg *et al.* in print). This new analysis brings into sharp focus the effects that contemporary changes in the Danish agricultural landscape are having on the breeding birds of the country, especially those that are restricted to reproduction in agricultural landscapes. This suggests that current changes in agricultural practice are likely to be affecting bird populations in Denmark. We need to understand what changes in farming that have affected these species and how we can find mechanisms to reduce such adverse effects on their number and distribution.

One way to study this is to adopt a comparative approach to contrast different landscapes to see if specialist farmland bird populations are responding in different ways. Danish farmland can be broadly divided into two major predominant landscape components, an arable type (where tillage predominates, especially autumn sown wheat and rape, as well as spring sown barley) and a mixed farming type (also including permanent, and increasingly, rotational grassland; Brink & Jensen 2012). Since the 1980s, mixed farming has primarily been practiced in the west of Denmark, whilst a more uniform and homogeneous arable practice dominates the landscape in the east (Reenberg 1988). Agricultural intensification has been a feature of both the arable and mixed farming sectors; for instance, arable cropping patterns, the degree of mechanization, use of pesticides and fertilisers have changed over time, often with adverse effects on farmland bird populations in Denmark (Fox 2004) as elsewhere in Europe (Donald *et al.* 2001) and across continents (Reif 2013). Equally, pastoral agriculture has seen increasing numbers of cattle kept indoors throughout the year, a shift from grass and fodder beet to maize and a reduction in permanent pasture, while rotational grassland has increased in extent (Heldbjerg *et al.* 2016, Statistikbanken 2016).

Because we may expect certain specialist farmland birds in Denmark to be either closely associated with features of arable or pastoral agriculture, these patterns offer opportunities to compare regional changes in specialist farmland bird populations to better understand factors affecting their abundance. Hence, we might expect loss of pasture and grazing animals in East to result in a decline for Common Starlings *Sturnus vulgaris*, whereas we would expect a stable trend in West (see Heldbjerg *et al.* 2016). Equally, we may expect a species such as Corn Bunting to be declining in East as a result of intensification of arable agriculture, but show stable trends in West where there remains much spring barley and grassland which are known to be favoured by this species (Fox & Heldbjerg 2008). For this reason, in this analysis, we use data from the BirdLife Denmark's CBM programme (based upon point count census counts undertaken since 1976) to compare trends of specialist farmland species in three Danish regions from west to east to see if we can gain insight from regional patterns in contrasting species.

Materials and methods

Data collection

The CBM programme is based upon a point count census of breeding birds that started in 1976 and is conducted annually within the period 1 May – 15 June. Each route consists of 10-20 marked 'points'. At each point, all birds seen and heard, regardless of distance from the observer, are registered and recorded in a 5-minute observation window (Heldbjerg 2005). All points counted in at least two years by the same observer, at the same time of year (± 7 days), same time of day (± 30 min.) and under comparable weather conditions are included in this analysis. We restricted the time series to 1987-2015 because of the rapid increase in participants in the early years, to ensure robust and comparable data with an equal coverage in all years for the more detailed analysis (Nyegaard *et al.* 2015). Bird species abundance has been sampled annually at > 300 routes since 1987 (mean ± 95% CI 1987-2015 = 340 ± 10, median 346).

Habitats surrounding each count point are ascribed in quarters to one or more of nine predefined habitat categories (coniferous woodland, deciduous woodland,

arable, grassland, heath, dunes/shore, bog/marsh, lake and urban; Heldbjerg 2005, Larsen *et al.* 2011, Eskildsen *et al.* 2013). On this basis, 13.2% of points came from purely arable landscapes and 1.5% from permanent meadows/grassland plots; however, the majority of the surveyed plots are from 'mixed' habitats including extensive areas of farmland, such that a total of 27.8% and 11.1% of all habitat registrations are from arable habitat and grasslands, respectively.

Defining species relative habitat use and comparing across habitats

Many species are habitat generalists in the sense that they are not exclusively found in only one of the nine habitat types. We defined species' habitat associations by their Relative Habitat Use (RHU), calculated as the abundance of a given species in a particular habitat relative to the mean abundance of that species in all other habitats. The number of individuals observed at each point was weighted by the proportion of the given habitat at the point. The sum of the weighted number of individuals of each species in a particular habitat could then be used to calculate a RHU value from the following equation:

$$RHU = \frac{n_i/p_i}{(N - n_i)/(P - p_i)}$$

where n_i is the number of individuals in the i^{th} habitat, p_i is the total number of *i*-habitat points, adjusted according to proportional habitat share at each point, *N* is the total number of individuals and *P* is the total number of points. We use the term Farmland as a combination of arable and grassland habitats. For full details and examples, see Fig. 1 in Larsen *et al.* (2011) and Eskildsen *et al.* (2013).

Heldbjerg *et al.* (in print) used values of RHU > 2 ('high use') to indicate an abundance in the specified habitat at least twice the mean abundance in all other habitats, to select farmland habitat specialists (but omitted those with a Danish breeding population of less than 1000 pairs and species for which less than 50 individuals were registered per year (Heldbjerg *et al.* in print). In this way, we restricted the analysis to only covering 16 common farmland specialists for which there existed high-quality data. In this analysis, we also extend this method to define arable and grassland specialists using the same approach. If the ratio of a species' RHU in arable to that in grassland exceeded 1.5, we considered it an arable species and *vice versa*. Species with 0.67 < Ratio < 1.5 were assigned as farmland generalists as they showed no specialization for arable or grassland (see Tab. 1). Since there was a high degree of consistency between the population trends calculated using habitat-specific point counts and using all point counts irrespective of habitat (Eskildsen *et al.* 2013), we used data from all point counts relating to a given species, not only those from points in their primary habitat.

Species, indices and indicators

In this study, we focus only on avian species associated with farmland, arable and grassland habitats. The habitat defined as 'arable' consists of arable areas such as cultivated fields and fallow land, 'grassland' included meadows, salt marshes, pastures, dry grassland and other grass-dominated areas with or without scattered trees and/or shrubs. The common species names and systematic order follows Fjeldså *et al.* (2016).

Indices and trends were calculated by fitting a log linear regression model to point count data with Poisson error terms using the software TRends and Indices for Monitoring data (TRIM; Pannekoek & van Strien 2004), where the observations at a given site in a given year is assumed to be the result of a site and a year effect. The programme also estimates the dispersion factor, correcting for over-dispersion where this occurs, and takes account of serial correlation between counts at the same site in different years. Standard errors for the indices are generated based on the assumption that the variance is proportional to the mean, and a pattern of serial correlation which declines exponentially with time between counts (Pannekoek & van Strien 2004). The TRIM assessment of rate of change was used in this study to generate species trends, taking the standard errors into account. Trends for the 16 species were calculated for three regions of Denmark representing a mixed farming (with grassland) area (West – west coastal counties; based on 437 routes monitored one or more years) and an arable cultivated area (East – Zealand and Bornholm; 605 routes) plus an intermediate area (Central – eastern coastal parts of Jutland and Funen; 358 routes; Fig. 1).

Results

The mean rates of change in annual abundance (± SE) for the selected 16 farmland specialist bird species in the three regions of Denmark from 1987-2015 inclusive are shown in Tab. 1. The majority of the species-regions combinations are declining. The Mew Gull *Larus canus* is the only species significantly increasing in all three regions, where it forages in, but generally does not specifically nest in, farmland habitats. Western Marsh Harrier *Circus aeruginosus* and Common Whitethroat *Sylvia communis* showed increases in East and West, but no significant change in Central, while Marsh Warbler *Acrocephalus palustris* showed a significant increase in West.

Generally, few species showed radical differences in

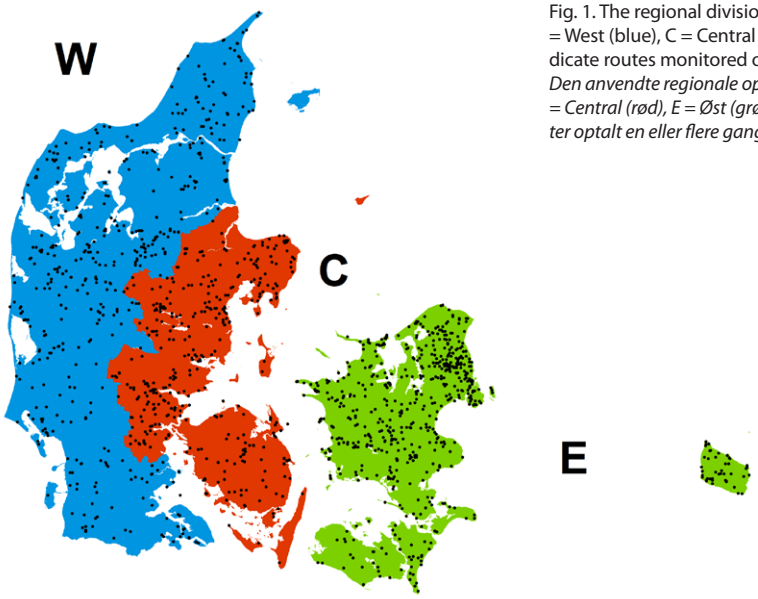

Fig. 1. The regional divisions of Denmark used in this study. W = West (blue), C = Central (red), E = East (green). Black dots indicate routes monitored one or more years during 1987-2015.
Den anvendte regionale opdeling i dette studie. W = Vest (blå), C = Central (rød), E = Øst (grøn). Sorte prikker viser punkttællingsruter optalt en eller flere gange i perioden 1987-2015.

Tab. 1. The 16 Danish farmland specialist species with Relative Habitat Use (RHU) > 2 showing the classification of specialization, the respective RHU values for arable and grassland habitats, the mean number of individuals recorded per year and per region (W = West, C = Central and E = East) of each species (= N) and trends (± 95% CI; **bold** text: p < 0.05, *italics*: p < 0.01)). Species with a ratio of arable RHU to that in grassland which exceeded 1.5 were considered an arable species (identified as A) and *vice versa* (G indicates grassland specialist); species with 0.67 < RHU-ratio < 1.5 we assigned as farmland specialists (F) as they showed no specialization for arable or grassland.
*De 16 danske fuglearter specialiserede i det danske landbrugsland med en Relativ Habitatudnyttelse (RHU; se teksten) på > 2, der endvidere viser specialiserings-klassifikation, RHU-værdier i henholdsvis agerland og enge samt det gennemsnitlige antal registrerede fugle per år og region (W = Vest, C = Central and E = Øst) for hver art (= N) og tendens (± 95% CI; **fed** text: p < 0.05, kursiveret: p < 0.01). Arter med en ratio mellem agerlands-RHU og enge-RHU større end 1,5 anses som agerlandsfugle (A), arter med en ratio mindre end 0,67 som engfugle (G) og de resterende som landbrugslandsfugle (0,67 < RHU-ratio < 1.5; F), da de ikke udviser specialisering for hverken agerland eller enge.*

Species *Art*	**Class.**	**RHU value *RHU-værdi***			**N**			**Trend *Tendens***		
		F	A	G	W	C	E	W	C	E
Grey Partridge *Agerhøne*	A	5.2	4.2	1.6	25	25	36	***-5.80 ± 1.28***	***-4.12 ± 1.51***	***-2.61 ± 0.89***
Eurasian Oystercatcher *Strandskade*	G	3.1	0.7	8.6	101	111	201	**-1.96 ± 0.86**	***-2.68 ± 0.91***	***-4.28 ± 0.43***
Northern Lapwing *Vibe*	F	5.2	2.6	3.8	491	356	529	***-3.63 ± 0.47***	***-4.22 ± 0.52***	***-1.92 ± 0.35***
Common Redshank *Rødben*	G	2.6	0.5	9.0	104	31	100	**-3.21 ± 1.36**	*-4.71 ± 1.41*	-0.12 ± 0.54
Mew Gull *Stormmåge*	F	2.3	2.0	1.6	375	420	669	***3.41 ± 0.75***	***3.22 ± 0.83***	***2.42 ± 0.52***
Western Marsh Harrier *Rørhøg*	G	2.5	1.7	2.6	16	16	31	***4.80 ± 1.68***	0.79 ± 1.33	***3.85 ± 0.89***
Common Kestrel *Tårnfalk*	F	2.8	2.1	2.1	32	32	41	0.48 ± 0.85	***-2.54 ± 0.85***	**-1.51 ± 0.69**
Eurasian Sky Lark *Sanglærke*	A	5.9	5.6	1.0	1604	1220	1588	***-3.10 ± 0.17***	***-2.78 ± 0.21***	***-2.19 ± 0.16***
Marsh Warbler *Kærsanger*	G	3.2	0.4	4.3	50	96	108	**1.36 ± 0.68**	-0.06 ± 0.49	-0.22 ± 0.39
Barn Swallow *Landsvale*	A	2.8	2.5	1.6	1249	1141	1283	-0.25 ± 0.23	0.16 ± 0.33	0.54 ± 0.28
Common Whitethroat *Tornsanger*	F	2.3	1.9	1.6	634	558	780	**0.40 ± 0.19**	0.43 ± 0.24	***0.78 ± 0.18***
Common Starling *Stær*	F	2.3	1.8	1.9	2012	1405	2160	**-1.39 ± 0.34**	***-4.40 ± 0.42***	***-2.39 ± 0.30***
Whinchat *Bynkefugl*	G	2.8	1.2	4.8	58	14	15	***-6.21 ± 0.71***	-1.12 ± 1.70	***-4.57 ± 1.18***
Meadow Pipit *Engpiber*	G	3.1	0.7	8.3	118	24	49	**-2.79 ± 0.76**	0.85 ± 1.41	**-4.70 ± 0.81**
Yellow Wagtail *Gul Vipstjert*	G	3.7	2.0	3.4	21	NA	20	-2.35 ± 2.15	NA	**-7.30 ± 1.32**
Corn Bunting *Bomlærke*	A	11.3	11.0	0.6	196	65	25	0.56 ± 0.41	1.60 ± 1.67	***-6.88 ± 1.78***

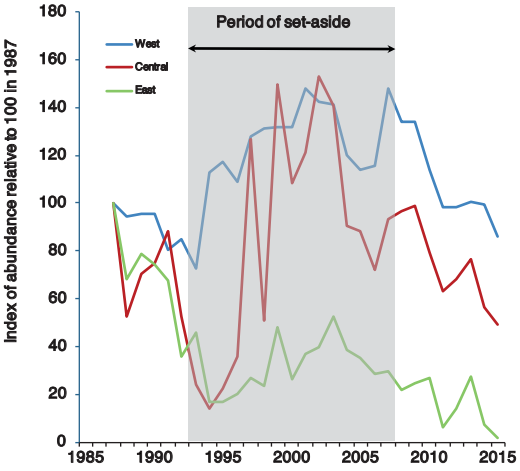

Fig. 2. Indices (Index 100 = 1987) for Corn Bunting *Emberiza calandra* in three regions of Denmark. The set-aside period is indicated by grey shading.
Indeks (Indeks 100 = 1987) for Bomlærke i tre regioner af Danmark. Perioden med brakarealer er vist med grå skygge.

population trends in the different regions of Denmark, despite the increasing concentration of mixed farmland with pastoral agriculture in the west and arable cultivation in the east. The Corn Bunting showed an overall significant decline in the East of Denmark in contrast to a stable trend in the Central and West regions. This species shows quite complex differences in changes in abundance over time and between regions, but basically declined everywhere until the introduction of set-aside in 1993 (Fig. 2). Subsequently, numbers recovered in the West and Central Regions and to a lesser extent in the East, but following the cessation of set-aside in 2007, it has declined in abundance throughout Denmark (Fig. 2); although it seems that it was starting to decline in all regions already from 2003. Barn Swallow *Hirundo rustica* showed no significant trend in any region. The Common Kestrel *Falco tinnunculus* showed declines in the Central and East but was stable in the West. The three wader species, Eurasian Oystercatcher *Haematopus ostralegus*, Northern Lapwing *Vanellus vanellus* and Common Redshank *Tringa totanus* all showed declines across regions (except there was no significant change for Redshank in the East).

Besides the Corn Bunting, the other arable specialists showed similar change across all regions, e.g. Grey Partridge *Perdix perdix* and Eurasian Sky Lark *Alauda arvensis* showing consistent decline. Grassland specialists generally showed declines in all regions, except for Western Marsh Harrier (mentioned above), Marsh Warbler (increasing in West, unchanged in Central and East) and Meadow Pipit *Anthus pratensis*, which was declining in East and West, but showed no change in the Central Region (perhaps due to low sample size in this Region). Common Starling (and Northern Lapwing, mentioned above) showed a consistent decline in all regions.

Discussion

Despite the marked differences between agricultural practices in the West of Denmark compared to the East (more cattle, fodder crops and pasture, and less cereal and other crops in West than in East), we found little convincing evidence for differences between trends in farmland specialist bird populations between regions, suggesting that the general decline of farmland birds is most likely caused by the overall intensification in agriculture. The only major exception was Corn Bunting, which showed unchanged abundance in Central and West, but suffered a significant decline in the East as hypothesized. Although very much an arable specialist, the Corn Bunting requires a mosaic farmland landscape comprising arable fields, but including some grassland (Fox & Heldbjerg, 2008), where it benefits from delayed mowing (Perkins *et al.* 2013). As a result, it especially has benefitted from the increase in the growth of seed grass in Denmark, where single species crops of grass are commercially grown for the production of seed, forming dense grass swards that provide dense cover and are harvested relatively late (late July/early August) compared to hay and silage (A.D. Fox unpubl.). The Corn Bunting has shown major distributional change and numerical decline within Denmark (especially in the East) between the 1970s and 1990s (Grell 1998). These changes continued to the present, presumably due to the continued intensification of arable agriculture in the East region that increasingly removes grassland from the increasingly homogenous farmland landscape. Although the species may have benefitted from the period of set-aside in all regions of Denmark during 1993-2007 inclusive, it shows parallel declines in abundance since 2003, i.e. before the cessation of the set-aside period (Fig. 2), suggesting that also other factors were contributing to the decline.

The Danish population of Mew Gull, the only species significantly increasing in all regions, follows the pattern throughout much of Northern Europe, with increases in the last part of the 20th century followed by more stable trends in more recent times (Birdlife International 2016), indicating that the increase in Denmark probably is related to factors acting on the population at broad spatial scales.

Unfortunately, for most of the farmland specialists featured here, there seems to be continued declines

The Corn Bunting is the only species for which an effect of a higher degree of agricultural intensification in the eastern part of Denmark than in the central and western parts was found. Most other grassland and arable specialists showed similar declines all over the country. Photo: Albert Steen-Hansen.
Bomlærken var den eneste landbrugsart, der gik mere tilbage i Østdanmark end længere vestpå i landet.

amongst species regardless of their association with arable, grassland or general farmland landscapes and that these declines are largely common across regions. This seems to suggest that the adverse changes that are occurring are associated with the increasing intensification of arable as well as pastoral agriculture throughout the country, regardless of whether these are pressures on grassland in predominantly arable areas or tillage practices in predominantly livestock rearing areas.

Because changes in agriculture tend to be gradual, but on a major spatial scale, it is very difficult to understand how they specifically impinge upon breeding bird populations. This is especially the case here, where in spite of major differences in agriculture in different parts of Denmark, there is little sign of contrasting regional trends from which to gain insight about specific impacts of specific change. Farmland practices have changed drastically in Denmark before and during our study period. The first and most important change that occurred in the Danish farming landscape between the early 1980s and the mid-1990s was the change from spring barley (which declined from 1.4 to 0.6 mill. ha) to winter wheat (which increased from 0.18 to 0.7 mill. ha) which undoubtedly affected a number of farmland specialist species at the time (Fox 2004). Subsequently, 150 000-200 000 ha of land were taken out of production as set-aside mostly between 1993 and 2007. Analysis carried out elsewhere suggested very little biodiversity benefit from such land abandonment (e.g. Sotherton 1998). However, effectively managed set-aside with specific management goals has the potential to deliver resource-rich habitat for declining bird species if such management prescriptions form part of its implementation (Sotherton *et al.* 1994). The Corn Bunting population increased from the first year of the set-aside period and has declined since this scheme stopped again. Although field-breeding species such as Corn Bunting and Eurasian Sky Lark may have benefitted locally from the provision of such set-aside, there is generally little evidence that this major change in land use had a major impact on bird populations, although this has never been adequately studied. The last most substantial change in Danish agriculture has occurred after the millennium and is ongoing, namely the increase in the areas of land cultivated for oilseed rape and maize, which have increased from 70 000 and 50 000 ha, respectively, in 2000

to c. 180 000 ha of each in 2015 (Statistikbanken 2016).

In the light of these recent increases in rape and maize, it is interesting to consider the effect of these changes on the bird community. Common Whitethroats prefer rape to other crops in Denmark (Petersen 1996), and it is interesting to speculate whether this species has benefitted from rape becoming increasingly cultivated throughout Denmark, especially in the east and south-east. The Common Whitethroat showed significant increase in East and West while showing a similar tendency (although failing to attain statistical significance) in Central Denmark. This is a species whose abundance crashed across western Europe between the breeding seasons in 1968 and 1969 (Winstanley *et al.* 1974), probably including Denmark (see Berthold 1973), and which has shown relatively little change in abundance since that time (e.g. PECBMS 2014). Results from the Danish CBM suggest a gradual increase in abundance, especially since the mid-1990s. It is important to understand whether such a crop is valuable as breeding habitat, in terms of its ability to support reproductive success comparable or higher than other habitats. Despite the increase in Common Whitethroat abundance at the national level, it is also important to understand, whether rape functions as an ecological trap (by attracting breeding birds from other habitats but failing to support the production of young), as well as the potential threat this poses to the species because of its exposure to agro-chemicals used in relation to this particular crop. Hence, this relationship should be investigated in more detail given that very few other farmland bird specialist species seem to be adapting in a positive way to changes in the contemporary agricultural landscape of Northwest Europe.

Maize generally grows too late and develops above ground biomass too densely to support breeding bird species of any kind in Europe (e.g. Engel *et al.* 2012, Sauerbrei *et al.* 2014), so the 15-fold increase in area of this crop since the 1980s has likely had a dramatic effect on local breeding birds. Unfortunately, we are not aware of any specific Danish studies of the breeding birds of maize fields and this remains an urgent research priority. Hence, one urgent line of enquiry is to better understand the effects of maize and oilseed rape cultivation on breeding birds across Denmark and the consequences for its continued spread in the future.

Although the combination of changes in cropping (cereals, maize and oilseed rape) could have contributed to the long term declines in specialist farmland bird populations, there is no obvious parameter that could account for the overall patterns reported here. Heldbjerg *et al.* (in print) showed that ground nesting farmland specialist species were showing greater rates of decline than those that nested elsewhere, hinting that the changes were in some way linked to nest site as well as foraging areas during the brood rearing period. This supports the assertion of Reif *et al.* (2008) that we should use a finer scale than the classical broad habitat classes as "farmland", "forest" etc. to understand the reasons behind the general decline because habitat is a continuous rather than a categorical variable. In this respect, we need to better understand the effects of the earlier and more vigorous growth of crops (especially early in the season), the increasingly effective weed and insect control, which denies food for birds and the increasing trend to exploit every last piece of productive land that increasingly removes less intensively cultivated biotopes from the increasing homogenous farming landscape. We urgently need to understand far more about how individual farmland species exploit very specific crops and micro-biotopes and the way mosaics of these features are arranged in the landscape during the course of the annual avian and agricultural cycle, not least because within a single habitat the same change can adversely affect one species negatively whilst benefitting another.

Acknowledgements

None of this work could have been undertaken without the annual, selfless contribution of the very many bird-watchers that have contributed data to the CBM. We are very grateful to each and every one of you for making this type of analysis possible through the provision of point count data. Thanks to Jan Drachmann, Thomas Vikstrøm and to two anonymous referees for their comments on an earlier version, Timme Nyegaard for making the map and to The Danish Nature Agency for funding from the project: "Agerlandets almindelige og sjældne fugle". HH acknowledges the support of an industrial PhD stipend awarded by Innovationsfonden, which, together with Aage V. Jensen Naturfond and 15. Juni Fonden also supported this work.

Resumé

Regionale bestandstendenser for danske ynglefuglearter specialiseret i landbrugsområder

Europakommissionen har besluttet at standse tabet af biodiversitet før 2020. Over 60 % af Danmarks areal er landbrugsjord, og dermed er Danmark det mest intensivt dyrkede land i Europa. De arealmæssigt væsentligste afgrøder er vinterhvede, vårbyg, græs og grøntfoder og i de senere år også majs og raps. For at kunne følge udviklingen af biodiversitet i landbrugslandet udgør fuglene en væsentlig gruppe som indikator. En ny undersøgelse af udviklingen for de almindelige danske ynglefugle viser, at det er fuglene i landbrugslandet, der udviser de største bestandsnedgange.

I denne artikel undersøger vi, om udviklingen for de 16 mest specialiserede landbrugslands-arter har været ensartet på tværs af landet. Termen Landbrugsland anvendes som en fælles betegnelse for habitaterne Eng og Agerland. Sammenligningen er baseret på bestandsindeks på baggrund af DOF's punkttællinger, men kun for perioden 1987-2015, da antallet af optalte ruter kun i denne periode vurderes at være tilstrækkeligt stort til at kunne opdele landet i de tre regioner, Vest, Central og Øst (Fig. 1). Den generelle udvikling i landbruget i det seneste halve århundrede har medført, at mælkeproduktionen er flyttet mod vest, så man her har flere køer og mere græs end i den østlige del, hvor der primært er planteproduktion. Udviklingen i begge typer har været markant, og det er vist, at det intensiverede landbrug har haft en betydelig effekt på fuglelivet i Danmark og i Europa generelt.

Vi har endvidere underopdelt de 16 landbrugslandsspecialister i specialister i Enge hhv. Agerland eller arter, der anvender begge habitater i Landbrugsland ligeligt (Tab. 1). Til dette formål er anvendt punkttællingernes naturtype-information til beregning af arternes RHU (Relative Habitatudnyttelse), der udtrykker, hvor ofte en art registreres i en naturtype i forhold til i de øvrige.

Resultaterne viser, at langt hovedparten af arterne er i tilbagegang (Tab. 1). Blot tre arter, Rørhøg, Stormmåge og Tornsanger er i generel fremgang på tværs af landet, hvoraf de to førstnævnte arter fouragerer, men ikke yngler i landbrugslandet.

Generelt er der ret lille forskel på arternes bestandsudvikling i de forskellige regioner af landet, og vi kan konkludere, at trods forskellig udvikling i landbrugspraksis i de tre regioner, ses kun få regionale forskelle i arternes bestandsudvikling. Størst forskel ses hos Bomlærke med en markant signifikant tilbagegang i Øst i modsætning til en stabil udvikling i de to øvrige regioner. I alle regioner sås en tilbagegang frem til 1993, hvor brakordningen introduceredes. Dette synes at have haft en positiv effekt på arten, da der sås fremgang i alle regioner herefter. Tilsvarende sås en tilbagegang i alle regioner fra 2003, dvs. nogle år før brakordningen ophørte i 2007 (Fig. 2).

Tornsangeren er generelt i fremgang (landbrugslandsart), mens Landsvalen ikke udviser nogen signifikant tendens i nogen regioner. Tårnfalken er i tilbagegang i Central og Øst og stabil i Vest. De tre vadefuglearter, Strandskade, Vibe og Rødben er i generel tilbagegang i hele landet.

Ud over Bomlærke viser de øvrige agerlandsspecialister en ensartet udvikling på tværs af landet. Fx er både Agerhøne og Sanglærke i tilbagegang i alle regioner. Eng-arterne er generelt i tilbagegang i alle regioner, men fremgang ses dog for Kærsanger i Vest. Landbrugslandsarterne udviser en tilsvarende udvikling på tværs af regionerne med Vibe og Stær i signifikant tilbagegang i alle regioner.

Den generelle bestandsnedgang hos arter specialiseret til landbrugslandet, hvad enten de forekommer mest i eng eller

The Whinchat was among the farmland species showing the most pronounced decreases. Photo: John Larsen.
Bynkefuglen er gået stærkt tilbage i landbrugslandet.

agerland eller ligeligt i begge, indikerer, at den intensive drift af etårige afgrøder såvel som af enge har en negativ effekt på fuglelivet. De væsentligste ændringer i arealet med etårige afgrøder i undersøgelsesperioden er primært ændringerne i arealet fra vårbyg til vinterhvede, brakarealet, der blev taget ud af driften i 1993-2007 og senest den øgede produktion af raps og majs.

De behandlede arter har stort set kun det tilfælles, at de er specialister i landbrugslandet. Hvis vi skal forstå, hvad der forklarer bestandsudviklingen for den enkelte art og hvordan, de hver især bliver påvirket af de ændringer, der sker i afgrødevalg og driftsformer, er vi nødt til at arbejde mere detaljeret med fokus på de enkelte arter og i de forskellige landbrugstyper.

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