Bird Census News 2015, 29/1–2: 23–29

Common bird monitoring scheme in winter in Catalonia (NE Spain): opportunities and constraints to enlarge our view for farmland bird indicators

Sergi Herrando [1], Marc Anton [1], David Garcia [1] & Lluís Brotons [1,2,3]

[1] Catalan Ornithological Institute. Natural History Museum of Barcelona. Pl. Leonardo da Vinci 4–5. 08019 Barcelona, Catalonia, Spain
[2] Forest Sciences Centre of Catalonia (CEMFOR-CTFC). Ctra. antiga St. Llorenç de Morunys km 2, 25280 Solsona, Catalonia, Spain
[3] CREAF-CSIC. 08193 Bellaterra, Catalonia, Spain
ornitologia@ornitologia.org, anuari@ornitologia.org, david.icocells@gmail.com, lluis.brotons@gmail.com

Abstract. The Catalan Common Bird Survey (SOCC) started in 2002 with the aim to monitor both breeding and wintering bird populations in Catalonia. Volunteers have collected data in roughly 275–300 3-km line transects every year, and species population trends have been updated annually for both the wintering and the breeding seasons. A Winter Farmland Bird Index was developed using: i) data from the Catalan Winter Bird Atlas to quantify the habitat preference of bird species in winter and ii) annual population indices from the SOCC surveys carried out in this season. Preliminary research shows that this new multispecies indicator shows a slightly different pattern than its breeding season counterpart.

Introduction

Common birds can inform on the state of ecosystems beyond the breeding season since they are closely related to the environment at any moment of their life cycles. However, indicators on the state of wintering populations have been much less developed and have mainly focussed on waterbirds rather than common widespread species (Gregory & van Strien 2010). Certainly, the poor development of large scale winter bird monitoring projects should be one of the reasons behind this pattern.

The Catalan Common Bird Survey (acronym SOCC in Catalan language) is an ongoing bird monitoring scheme promoted by the Catalan Ornithological Institute and the Government of Catalonia (NE Spain) which was launched in 2002 with the main aim to determine indicators on the state of birds and their habitats. From the very beginning breeding and winter bird monitoring censuses were considered as two parts of the same project. Winter was included because of the known importance of the Mediterranean Basin as an overwintering ground for many species, both resident and short-distance migrants coming from upper latitudes.

SOCC population indices and trends for wintering bird populations are annually updated for almost as many species as in the breeding season and they have proven to be useful tools for understanding species population dynamics thanks to the broad seasonal perspective achieved. However, the development of multi-species indicators capable to track changes in the state of wintering bird populations have been poorly developed compared to those of the breeding season and still remains in an exploratory research phase. Preliminary winter indicators based on the common bird monitoring scheme were firstly generated after the publication of the Catalan Winter Bird Atlas 2006–2009, a project that provided for the first time quantitative information on bird distribution, population, ecology and migratory patterns for all bird species that spend the cold season in the region (Herrando et al. 2011).

During these recent years the development of winter indicators was initiated to focus on multispecies population indices that inform on the general state of birds in their habitats, i.e. farmland, shrubland and woodland, following procedures widely used in PECBMS and at national levels (e.g. Gregory et al. 2005). The information provided for those habitats in winter is probably

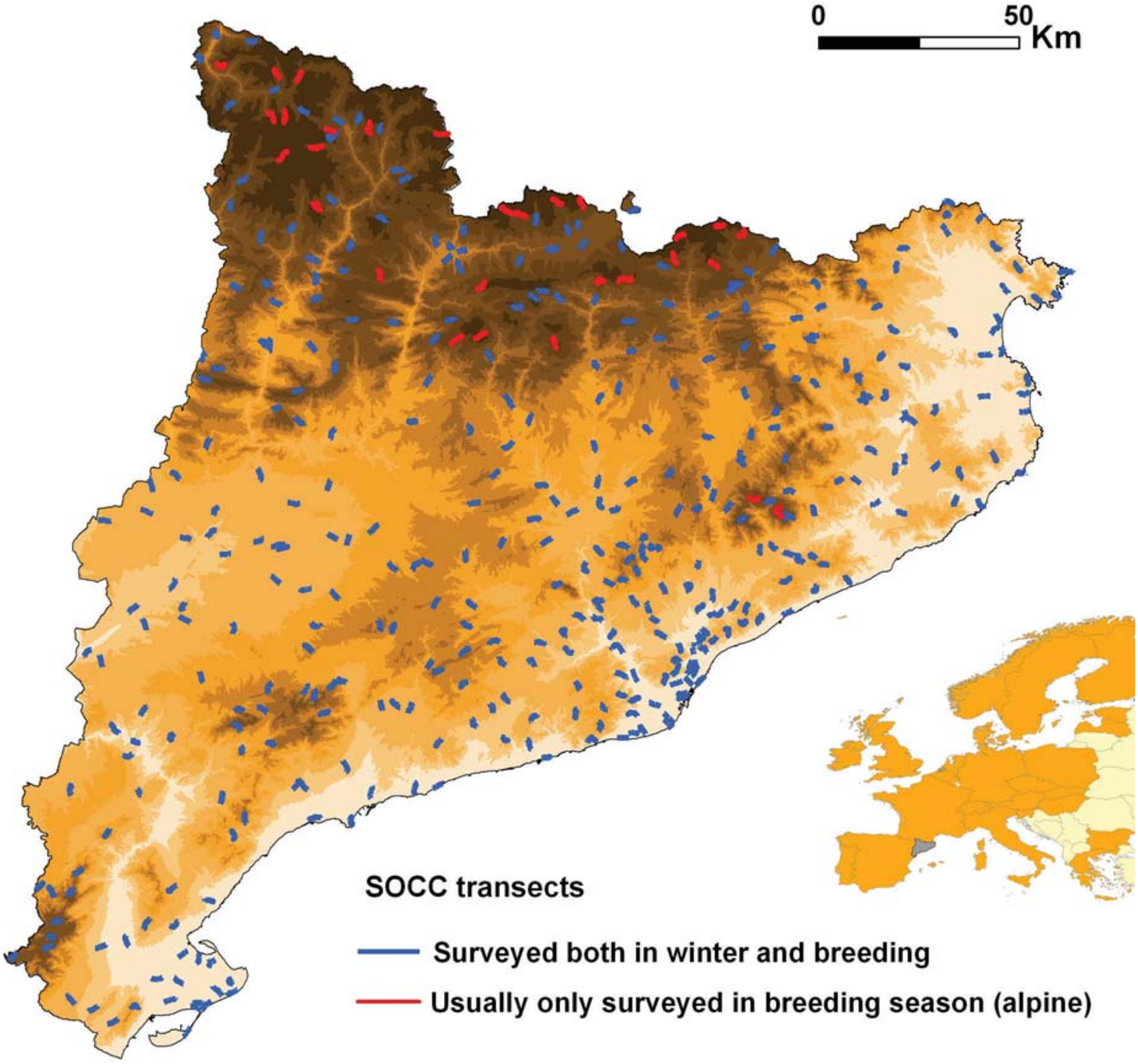

Figure 1. Location of the 400 SOCC sites (3-km transects) that have been surveyed in winter in Catalonia in the period 2002–2014 (each year data refer to December of the reported year and January of the next one). Taking into account data for the winter periods 2002–2014, an average of 278 of these sites are surveyed annually.

complementary to that of the breeding season as a result of seasonal changes in farmland habitats (both natural and human-induced) and the bird species seasonal turnover. In addition, exploratory work has been done for developing indicators of functional processes such as seed dispersal, a very relevant ecological process in which wintering birds play a major role in the Mediterranean ecosystems (Herrera 1984).

The aims of this article are: i) to describe particularities of the winter monitoring in this Mediterranean region, ii) to show the results of the Farmland Bird Indicator (FBI) developed for the winter season using the same methodological approach employed in the breeding season, and iii) to discuss pros and cons for these new potential set of indicators for the winter season.

Winter fieldwork

The SOCC winter fieldwork strategy follows basically the same rules than those carried out in breeding season. In general observers choose one of the line-transects previously selected by stratified random sampling by the central coordination of the project. However, free selection of line-transects is also allowed in some particular cases. For the period Dec 2010/Jan 2011 — Dec 2014/Jan 2015 an average of c. 275 3-km line transects were annually carried out in winter, just slightly fewer than in breeding season (average 293 for the same five years). Similar coverage between seasons suggests that despite the worse weather conditions and lower number of species often detected, monitoring in winter is still attractive enough to ornithologists. The only well-defined exception are alpine areas, where not only weather conditions but also accessibility and risk of being injured in iced or snowed slopes greatly hampers surveying the few birds remaining up there in winter (Figure 1).

Winter censuses are repeated twice in the same walked itinerary, the first in December and the second in January, considered the period when the majority of the birds detected are overwintering in the studied region. It is important to highlight that referring to years for these winter surveys carried out before and after New Year need some clarification. In this study we took the natural year in December as the reference year for a given winter. Thus, for example, the winter censuses done in December 2002 and January 2003 are refereed as year (or winter) 2002.

Winter censuses are exclusively conducted during the morning (as in the breeding season), and despite some initial doubts, a pilot study showed that afternoon censuses yielded fewer detections than morning ones (Herrando et al. 2006). Likewise the breeding period, observers can opt for allocating birds in three counting bands (0–25 m, 25–100 m and >100 m) or not to do this, but most of them actually carry out this distance sampling.

Population analyses

Although the bird surveys are carried out in the two consecutive months (December-January) when residents and short-distance migrants are considered to basically remain in their wintering grounds, some individuals does not stay in the same sites along this survey period and do more or less nomadic movements. However, we consider that winter population trends are not greatly affected by variations in bird counts related to these bird movements within each winter (Herrando et al. 2011). Thus we proceed as for the breeding bird data and take the maximum count between the two visits as the most reliable estimation of bird population at site level and input this value for TRIM population analyses (Pannekoek & van Strien 2005). Further studies are however needed to clarify the potential impact of differences between the two winter counts on their assessed trends, particularly in a context of constant land use change and global warming.

Development of winter indicators

Developing robust multi-species indicators greatly depend on a good alignment between their aims and the methodological approach. One of the aspects that affects this process is the selection of species to be included in the indicator. Species can be selected by means of an expert based panel or quantitative analyses on the specific species traits that are considered for the correct tracking of the process under study. Our experience in Catalonia with winter indicators started with indices capable to track changes in habitats by means of their wintering avifauna. To do that we developed an analytical process based on the quantification of habitat preferences for bird species that was assessed using extensive data collected in the framework of the Catalan Winter Bird Atlas (Herrando et al. 2011). This work provided a very complete and standardised dataset for analysing species relationships with their habitats and the species habitat selection was done by considering the relative abundance/occurrence (depending on available data) of the species in a number of habitats. The same process had been was previously done for the breeding bird indicators using the equivalent information gathered in the Catalan Breeding Bird Atlas (Estrada et al. 2004), which allowed more robust comparisons between the derived set of indicators.

In this article we present the results obtained for the Farmland Bird Index (FBI) for wintering birds. We consider that this represents an interesting topic because of its direct link with agricultural practices and its potential impact on bird populations. Therefore, species were classified as farmland species (either in breeding or wintering seasons) using information on habitat preferences reported in both the winter and the breeding bird atlases mentioned above. We classified a species as a farmland species when the mean abundance/occurrence of the species where higher in 1×1 km squares classified as farmland than in 1×1 km squares classified as other habitats (Table 1). In total 41 species were classified as farmland species in winter, a value very similar to that obtained in the breeding season (42 species). The species list selected for winter only partially matches the PECBMS classification for

Table 1. List of birds included in the Farmland Bird Indicators (FBI) in wintering (W) and breeding (B) seasons. The asterisk means included in PECBMS in the South Europe class. The number of monitoring sites in which the species were recorded (at least two years) during the 13-year study period is shown, together with the trend classification obtained after the TRIM analyses for both seasons. Species winter migratory strategies were classified as mainly Residents (R) or Migrants (M) according data from the winter atlas in the study region. Resident species could be classified as farmland species only on one of the seasons (wintering or breeding) due its different habitat use in these seasons.

Species * Included in PECBMS in South Europe class	Population considered in each FBI: Winter (W), Breeding (B)	No. sites analysed		Trend Class		Winter Migratory strategy
		Winter	Breeding	Winter	Breeding	
*Bubulcus ibis**	W	72	–	Moderate decline	–	R
Circus cyaneus	W	67	–	Moderate decline	–	M
Buteo buteo	W & B	302	236	Moderate increase	Moderate increase	M
*Falco tinnunculus**	W & B	248	267	Stable	Stable	R
Falco columbarius	W	47	–	Uncertain	–	M
*Alectoris rufa**	W & B	193	193	Moderate decline	Moderate decline	R
Coturnix coturnix	B	–	121	–	Stable	–
*Tetrax tetrax**	W & B	12	17	Moderate decline	Moderate decline	R
*Burhinus oedicnemus**	W & B	15	31	Uncertain	Moderate decline	R
*Vanellus vanellus**	W	81	–	Uncertain	–	M
Columba oenas	W & B	40	62	Uncertain	Stable	R
*Streptopelia turtur**	B	–	231	–	Stable	–
Columba palumbus	W	360	–	Stable	–	R
Athene noctua	W & B	61	72	Uncertain	Uncertain	R
Coracias garrulus	B	–	33	–	Moderate increase	–
*Upupa epops**	W & B	125	251	Moderate increase	Stable	R
Jynx torquilla	B	–	143	–	Stable	–
Picus viridis	W & B	305	293	Moderate decline	Moderate decline	R
*Melanocorypha calandra**	W & B	18	13	Uncertain	Moderate increase	R
*Calandrella brachydactyla**	B	–	16	–	Steep decline	–
*Galerida cristata**	W & B	172	152	Stable	Moderate increase	R
*Lullula arborea**	W & B	218	188	Stable	Moderate increase	R
*Alauda arvensis**	W & B	144	66	Stable	Stable	M
Anthus pratensis	W	279	–	Moderate decline	–	M
*Motacilla alba**	W	312	–	Stable	–	M
Phoenicurus ochruros	W	328	–	Moderate increase	–	M
*Luscinia megarhynchos**	B	–	289	–	Moderate increase	–
Saxicola rubetra	B	–	7	–	Uncertain	–
*Saxicola torquata**	W & B	259	241	Moderate decline	Moderate decline	R
*Oenanthe hispanica**	B	–	48	–	Uncertain	–
Turdus viscivorus	B	–	299	–	Stable	–
Turdus philomelos	W	345	–	Stable	–	M
Turdus iliacus	W	156	–	Stable	–	M
*Cettia cetti**	B	–	161	–	Stable	–
*Cisticola juncidis**	B	–	144	–	Moderate increase	–
Hippolais polyglotta	B	–	228	–	Moderate increase	–
Sylvia atricapilla	W	299	–	Moderate increase	–	M
Sylvia hortensis	B	–	70	–	Moderate increase	–
*Lanius collurio**	B	–	67	–	Moderate decline	–
Lanius meridionalis	W & B	112	46	Moderate decline	Moderate decline	R
*Lanius senator**	B	–	158	–	Stable	–

*Pica pica**	W	242	–	Moderate decline	–	R
*Corvus monedula**	W & B	49	44	Strong increase	Moderate increase	R
*Corvus corone**	W & B	228	213	Moderate increase	Moderate increase	R
*Sturnus vulgaris/unicolor**	W	298	–	Strong increase	–	M
*Passer domesticus**	W & B	297	283	Moderate decline	Moderate decline	R
*Passer montanus**	W & B	168	157	Moderate decline	Moderate decline	R
*Petronia petronia**	W & B	76	76	Strong increase	Stable	R
Fringilla coelebs	W	398	–	Stable	–	M
*Serinus serinus**	W & B	311	339	Stable	Moderate decline	M
*Carduelis chloris**	W & B	323	302	Moderate decline	Moderate decline	M
*Carduelis carduelis**	W & B	371	303	Moderate decline	Moderate decline	M
*Carduelis cannabina**	W & B	250	199	Moderate increase	Moderate decline	M
Emberiza citrinella	W & B	80	35	Uncertain	Uncertain	M
*Emberiza cirlus**	W & B	291	259	Stable	Stable	R
*Emberiza calandra**	W & B	123	189	Moderate increase	Moderate increase	R

southern Europe (Table 1), which reflects both the particularities of habitat-bird relation at relatively small geographical scales and, overall, the marked changes in habitat preferences that many species exhibit all year around. In winter, 32% farmland species are decreasing over the period 2002–2014 while 24% are increasing (Table 1).

A Winter Farmland Bird Index

Following the above mentioned procedure for selecting farmland species, the methodology developed in Gregory et al. (2005) to derive multi-species indicators was applied both for the breeding and winter datasets of the SOCC monitoring project. FBI during the breeding season showed a slightly negative trend over the period 2002–2014, more evident during the latest years of the time series, when the 95% confidence interval of the yearly index denoted a significant or marginally significant difference with respect to that of the first year of the study (Figure 2).

The pattern shown by the winter FBI is slightly different. This indicator increased at the beginning of the time series and has remained more or less stable, with values significantly higher than those of the first reference year (2002). From 2008 onwards, however, interannual decreases have become a usual pattern (Figure 2). The reasons that caused a marked increase from 2002 to 2004 and a similar decrease from 2010 to 2012 remained unknown, although variations in weather conditions and land use practices deserve further exploration.

One of the most remarkable differences between the winter and breeding FBI is the degree of uncertainty of the annual indices (Figure 2), which is not associated to the number of species included (roughly the same in both seasons) but probably to the oscillations in their field counts. This variability is much higher in winter than in the breeding season. In winter flocking becomes a typical behaviour for many common birds and that, together with their more usual movements of individuals, produces higher standard errors in species annual indexes than those found in the breeding season. No effort has been done so far to develop a combined FBI for the two seasons, but policy relevant farmland indicators should be as synthetic as possible and exploratory work in that direction should be possibly done. For a different purpose, and after discussions with policy makers in the city of Barcelona, urban bird indicators are currently done averaging two sub–indicators, one for breeding and another for winter bird populations (Barcelona City Council 2013).

Finally, it should be highlighted that state indicators as the presented here do not directly inform on the pressures causing population shifts. Agricultural habitats are highly affected by human management and these have been reported as the main cause of farmland species decline in Europe (Gregory et al. 2005). However, other factors such as climate change may also affect the observed patterns. This could be especially relevant for winter FBI since the occurrence of many bird species do not only depend on habitat quality in the studied sites but on migration

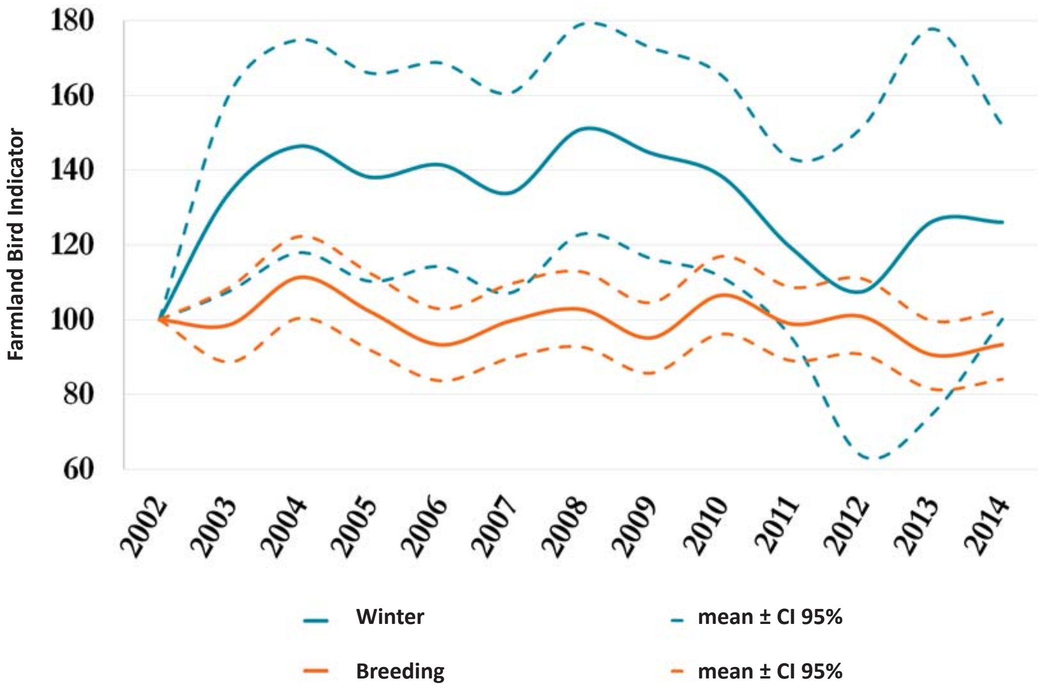

Figure 2. Farmland Bird Indexes for breeding (42 species) and wintering (41 species) bird populations in Catalonia for the period 2002–2014 (in case of winters, it actually refers to December of the reported year and January of the next one). These indices correspond to the geometric mean of yearly population indices for species included in the indicator (Table 1). Mean + IC 95% values are shown.

processes initiated in the previous summer or autumn in areas located at higher latitudes (Gordo 2007). Winters are becoming milder in Europe in recent years and this may affect individual decisions to move southwards in short-distance migrants, thus influencing their occurrence pattern in the Mediterranean winter quarters. In order to explore this issue we split the Winter FBI into two sub-indexes, one for the resident species and one for the short distance migrants overwintering in the Mediterranean but coming from central and northern Europe. This species classification was done using ringing recoveries analysed in the winter atlas (Herrando et al. 2011). A total of 23 and 18 species included in the winter FBI were classified as residents and short distance migrants, respectively, in the study area. We generated the FBI for these two subsets and our results do not show a different trend for the two groups of species (Figure 3). This similar temporal pattern between resident and short distance migrants suggests that the migration strategy does not influence trends of wintering populations and so does not support the hypothesis that recent tendency towards mild winters affects the population trend of short-distance migrants differently from that of resident birds.

Main conclusions

- Our experience with common bird monitoring in winter in Catalonia is positive and suggests that, at least in the Mediterranean Basin, volunteers are happy to participate in such a scheme.
- Multi-species indicators can be easily produced in the same way as those for the breeding season, which allow enlarging our view on the studied patterns.
- The Farmland Bird Index was produced in the study region and the pattern was slightly different than that of the breeding season. Uncertainty in yearly index values and trends was higher in winter.
- We did not find any difference in the responses of overwintering farmland birds when comparing resident species and short-distance migrants.

Acknowledgements

The data analysed in this study was obtained by hundreds of volunteers, without whom bird monitoring in Catalonia would not be possible. The Catalan Common Bird Survey (SOCC) receives

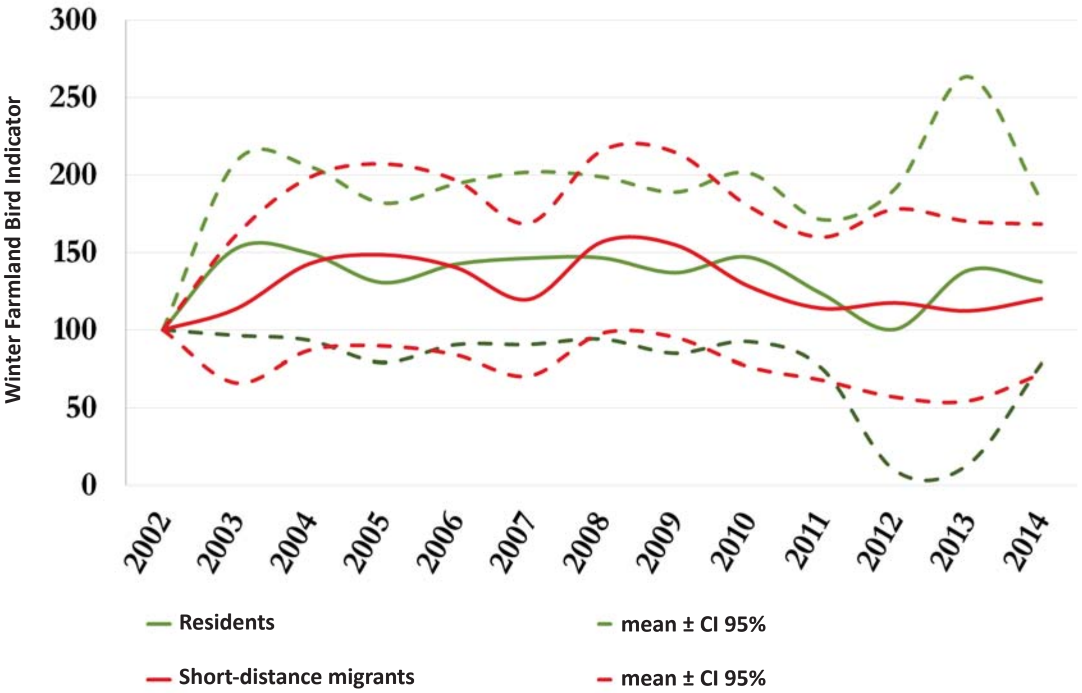

Figure 3. Winter Farmland Bird Indexes for resident (23 species) and short distance migrants (18 species) wintering in Catalonia for the period 2002–2014 (each year data refer to December of the reported year and January of the next one). These indices correspond to the geometric mean of yearly population indices for species which winter populations in Catalonia are considered to be mainly composed by resident individuals or short distance migrants from northern latitudes (Table 1). Mean + IC 95% values are shown.

support from the Catalan Government and is run by the Catalan Ornithological Institute. Partial funding for this study was also received from the EU BON project (308454; FP7-ENV-2012, European Commission) and the TRUSTEE project (RURAGRI ERA-NET 235175).

References

Barcelona City Council. 2013. Indicators 21. Local sustainability indicators in Barcelona (data from 2012). Municipal Council of Environment and Sustainability, Barcelona.

Estrada, J, Pedrocchi, V, Brotons, L, & Herrando, S. (eds.). 2004. Catalan Breeding Bird Atlas 1999–2002. Institut Català d'Ornitologia (ICO)/Lynx Edicions. Barcelona.

Gregory, R.D., van Strien, A., Voříšek, P., Gmelig Meyling, A.W., Noble, D.G., Foppen, R.P.B. & Gibbons, D.W. 2005. Developing indicators for European birds. Philosophical Transactions of the Royal Society B. 360: 269–288.

Gregory, R.D. & van Strien, A. 2010. Wild bird indicators: using composite population trends of birds as measures of environmental health. Ornithological Science 9: 3–22.

Gordo, O. 2007. Why are bird migration dates shifting? A review of weather and climate effects on avian migratory phenology. Climate Research 35: 37–58.

Herrando, S., Estrada, J., Brotons, L. & Guallar, S. 2006. Do common bird winter censuses produce similars results when conducted in the morning and in the afternoon? Revista Catalana d'Ornitologia 22: 14–20.

Herrando, S., Brotons, L., Estrada, J., Guallar, S. & Anton, M. (eds.). 2011. Catalan Winter Bird Atlas 2006–2009. Institut Català d'Ornitologia (ICO)/Lynx Edicions. Barcelona.

Herrera, C. M. 1984. Adaptation to frugivory of Mediterranean avian seed dispersers. Ecology 65: 609–617.

Pannekoek, J. & van Strien, A.J. 2005. TRIM 3 Manual (Trends & Indices for Monitoring data). Statistics Netherlands, Voorburg.

Received: 19 April 2016
Accepted: 25 October 2016