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Bird Census News is the Journal of the European Bird Census Council or EBCC. The EBCC exists to promote the organisation and development of atlas, census work and population studies in all European countries; it promotes communication and arranges contacts between organisations and individuals interested in census and atlas work, primarily (but not exclusively) in Europe.

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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Bird Census News
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EDITORIAL

In 2016 we published a special volume of Bird Census News on *Winter land bird Monitoring* presenting contributions from across the whole of Europe and dealing with a variety of winter monitoring schemes. Unfortunately we received few articles on garden bird surveys. However, these counts often provide important data of winter birds in urban areas and form a valuable counterpart to the more scientific monitoring schemes and research programmes. Combined with more standardised schemes, they could help to obtain a better understanding of issues such as bird winter phenology and spatial range changes, role of gardens as winter resources, impact of garden management on bird abundance in winter, winter bird community dynamics or impact of landscape on bird communities in winter. Furthermore, winter garden counts are an excellent example of a citizen science activity and are often a starting point for deeper involvement into bird observation.

Enough reasons to produce a special volume on this interesting subject that could not be treated sufficiently in the *Winter land bird Monitoring* special. What does the winter garden counts tell us about wintering birds? We started with a fair number of potential contributions, but several authors could not keep their promise due to work overload, and we ended up with a rather slimmed down -but not less interesting- version of this *Winter Garden Birds* volume. We obtained contributions from Finland, France, Germany, Austria and Belgium.

Tero Toivanen presents the situation in Finland, where results of their *Garden Birdwatch* already show some interesting changes in the abundance and distribution of the winter bird populations in the country, most of them being also consistent with other bird monitoring programmes. The scheme can be considered as an important complement to the monitoring of Finnish bird populations. The Garden Birdwatch may also prove particularly valuable in providing additional data on species that are scarce in other bird counts.

In France, Romain Lorrillière and co-authors describe two complementary citizen science schemes that focus on birds in gardens, the *French garden Birdwatch* and the *BirdLab*, and encourage observers to implement both protocols. In particular the latter one, using a special app on a Smartphone is really innovative. They discuss the interest of both schemes in regards with conservation and ecological issues that can be addressed. Results confirm that bird feeding in winter is not only of recreational value but can probably improve the survival rate of birds in winter, mainly in intensive agricultural landscapes which fail to meet food demand for birds in the cold season.

In Germany, the scheme is called *Hour of the Winter Birds* and its basic method is rather similar to the point counts scheme, with the difference that most participants are only active in gardens. Lars Lachman gives an extensive overview of the project and discusses the participation, the most interesting quantitative results, and compares them with another national similar breeding bird scheme in Spring. The project is Germany's largest citizen science activity in terms of participation.

In their article about ten years of *Winter Garden Birdwatch* in Austria, authors Katharina Loupal and Norbert Teufelbauer confirm that the results of this counts complement other national monitoring programmes by helping to assess the state of winter birds. Another important aspect is the fact that the wide public attention leads to new target audiences which have different views, demands and

interests. They need to be taken seriously in order to maintain this new power for birds and nature conservation.

Gerald Driessens, author of the contribution on *Winter Garden Counts* in the northern part of Belgium (Flemish Region) shows that although some reliable trends can be produced for the very common species, for most of the others, this is yet not possible and comparison with other winter monitoring schemes is therefore still tricky. The permanent training of new participants and the communication to the larger public are essential parts of this citizen science project.

And now something more personal. At the Evora conference in April 2019 I stepped down from the EBCC Board. This puts an end to my 25 year long Bird Census News activities as Editor (since 2014 as Chief-Editor with an editorial board). I started in 1993 (volume 6) and produced my last volume in 2018 (31). A quarter of a century with hundreds of contributions by many, many authors, from across the whole of Europe. Interesting enough to make an nice historical overview on what happened in this period. This is something I will certainly do, and completing this with information on BCN's very early years, when Rob Bijlsma, then working at SOVON, was editor.

I wish to thank all the authors for their involvement and interest in Bird Census News. Special thanks go the editorial team: since 2014 Henning Heldbjerg and Mark Eaton assisted me with the editorial tasks and Olga Voltzit took care of the lay-out. We formed a good team! From now on, Aleksi Lehikoinen will take over the task of Chief-Editor of Bird Census News. I wish him all the best with this new challenge!

Anny Anselin

Bird Census Editor

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What does the Garden Birdwatch tell about the wintering birds in Finland?

Tero Toivanen

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Abstract. The Garden Birdwatch has been organized in Finland in the last weekend of January since year 2006. In the Garden Birdwatch, the observers report the highest number of each bird species recorded within one hour. During the last years, the number of sites covered has been almost 15.000. The results already show some interesting changes in the abundance and distribution of the winter bird populations in Finland, most of the results being also consistent with other bird monitoring schemes. The Garden Birdwatch may prove particularly valuable in providing additional data on species that are scarce in other bird counts.

Introduction

The first Garden Birdwatch of BirdLife Finland was organized in the year 2006 (Toivanen 2015), and has since been repeated each year. The concept is based on the Big Garden Birdwatch of the British Isles, which has been organized by the RSBP in each January since 1979. During the 21th century, the concept has been adopted in several European countries, such as France, Germany, Austria, Netherlands, Belgium, Norway, Sweden and Estonia. The Garden Birdwatch is an excellent example on the power of citizen science: a high number of people providing data which can be used to reveal the trends of wintering or resident bird populations and the changes in the winter bird communities. In addition, Garden Birdwatch is a useful tool to recruit members and financial supporters. In 2019, BirdLife Finland gained more than 500 new supporters.

Methods

In Finland, the Garden Birdwatch takes place during the last weekend of January. Since 2017, also schools have been able to participate during the weekdays preceding the main event. The people attending are free to select the site, but the majority submits records from their own yard (in which there is usually a bird feeder). The time spent on counting the birds is fixed as one hour during the weekend. The observers are asked to report the highest number of each species that is recorded at the same time.

The vast majority of the observers report the results using an online form. All the observation data submitted is saved into the bird database Tiira of BirdLife Finland. All the records submitted include exact geographical coordinates.

The majority of the persons involved in the Garden Birdwatch are not skilled birdwatchers, but as a rule they are familiar with the common birds visiting their feeders. However, the records are checked by the regional data administrators and the experts of BirdLife Finland, who remove obvious misidentifications (such as Grey-headed Woodpeckers misidentified as Green Woodpeckers which is a true rarity in Finland) and suspicious counts from the dataset. Given the quantity of the data, the few remaining mistakes can be considered as redundant and they do not have an effect on the quality of the data. The records submitted by the schools are treated as separate and they are not included in the year-to year comparisons.

Results

Descriptive figures

In the first Garden Birdwatch in January 2006, BirdLife Finland received records from 4 600 sites. After that, the event has grown steadily, and during the last few years, records have been received from almost 15 000 sites (Table 1). Although Southern Finland is slightly overrepresented in the data, the geographical coverage is fairly good: even in the sparsely populated Finn-

Table 1. The number of sites covered by the Garden Birdwatch in Finland in years 2006–2018.

Region	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Southern Finland	1856	2791	2842	3124	3605	3380	3254	4382	4149	4818	3958	4724	4524
Eastern Finland	643	1274	1320	1566	1373	1458	1523	1928	2224	2603	2127	2601	2450
Western Finland	448	1011	970	1106	1139	1193	1296	1345	1393	1554	1330	1412	1489
Northern Finland	550	974	1114	1477	1213	1248	1268	1470	1523	1952	1436	1695	1904
Central Finland	1149	2331	2164	2522	2752	2545	2737	3198	3258	3961	3267	4104	4151
Total	4646	8381	8410	9795	10082	9824	10078	12323	12547	14888	12118	14536	14518

ish Lapland there were almost 500 sites covered in 2018.

The abundance of winter birds in Finland varies a lot according to e.g. the severity of the winter and the crop size of rowanberry or birch trees. In the year 2015, on average 53 individuals per site (in total, over 780.000 birds) were recorded, while the next year the corresponding numbers were 36 individuals per site and 440.000 birds in total. The average number of species recorded at one site is 7–8 species with little between-year variation. The total number of species recorded in the Garden Birdwatch has varied between 89 (year 2014) and 109 (2015). In total 139 species have been recorded in years 2006–2018 including also rarities such as Fox Sparrow *Passerella iliaca*, Black-Throated Accentor *Prunella atrogularis*, Dark-throated Thrush *Turdus atrogularis*, Pine Bunting *Emberiza leucocephalos* and Oriental Turtle Dove *Streptopelia orientalis*.

The common species

The list of the most widespread species (measured as the number of sites the species has been recorded) has remained quite stable in Finland during the 13 years. Each year Great Tit *Parus major*, Blue Tit *Cyanistes caeruleus* and Magpie *Pica pica* are the top three, while Great Spotted Woodpecker *Dendrocopos major*, Willow Tit *Poecile montanus* and Yellowhammer *Emberiza citrinella* have constantly retained their position in the top ten. However, also some obvious changes have taken place: for example, Greenfinch *Chloris chloris* was one of the most widespread birds during the first years but has not made it to top ten in the recent years due to the epidemic of *Trichomonas* parasite (Lehikoinen et al. 2013). The populations of Tree Sparrow *Passer montanus* and Blackbird *Turdus merula* are increasing in Finland (Lehikoinen & Väisänen 2014, Väisänen et al. 2018), and they have started to appear in the top ten more and more often (Table 2).

The list of the most abundant species (measured as the average number of individuals recorded per site) varies much more from winter to winter. In most years, the winner has been Great Tit or Yellowhammer, but in some exceptional years, also Redpoll *Acanthis flammea* which does not normally appear in the top ten has been the most abundant species. The years of high crop size of rowanberry make a great difference and in such years, species that can be very scarce in another year may score high. For example, in the year 2015, Waxwing *Bombycilla garrulus* held the third place and Fieldfare *Turdus pilaris* the sixth.

Table 2. The common species of the Garden Birdwatch in Finland. The number presented is the yearly rank of the species on the list of the most widespread species. Only those species that have appeared in the top 10 in at least one year have been included in the table. The sliding background colour is used to emphasize the rank: deep red represents a low rank and deep blue a high rank.

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Great tit	1	1	1	1	1	1	1	1	1	1	1	1	1
Blue tit	2	2	2	2	2	2	2	2	2	2	2	2	2
Magpie	3	3	3	3	3	3	3	3	3	3	3	3	3
Greenfinch	4	5	4	4	7	5	8	10	9	12	11	8	13
Yellowhammer	5	6	6	6	4	4	4	8	5	5	5	9	9
Willow tit	6	7	7	7	6	6	6	7	8	7	7	5	10
Great spotted Woodpecker	7	8	5	5	5	7	5	6	4	6	4	4	5
Hooded Crow	8	12	8	8	10	10	10	13	10	11	6	12	11
Eurasian Jay	9	13	10	12	8	8	7	12	6	10	10	11	12
House Sparrow	10	11	9	9	12	12	13	14	12	14	14	14	15
Blackbird	11	10	13	11	11	15	12	11	11	4	8	7	4
Bullfinch	12	9	11	13	9	9	11	5	13	9	12	10	6
Tree Sparrow	15	15	12	14	13	11	9	9	7	8	9	6	8
Redpoll	17	4	18	10	17	14	18	4	20	24	24	17	7

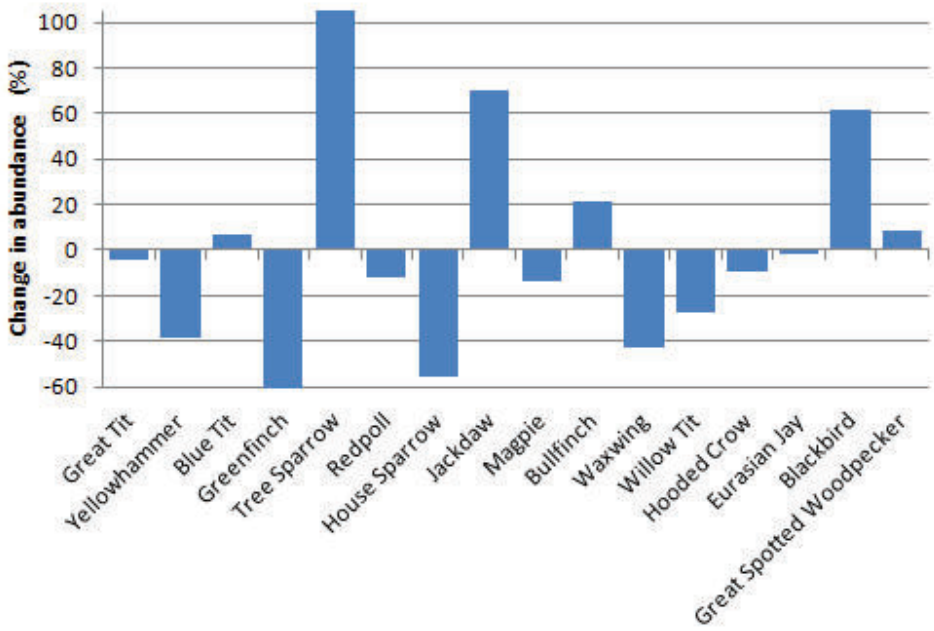

Figure 1. The change in the abundance (%) of the common birds of the Garden Birdwatch between years 2006–2008 and 2016–2018.

Winners and losers

Although the period covered is still fairly short, the results of the Garden Birdwatch are starting to reveal some interesting changes in the abundance of the common birds (Figure 1). For example, Tree sparrow increased 114% from the years 2006–2008 to the years 2016–2018 (the difference in the mean abundance between the two periods; a three-year period selected in order to smooth yearly fluctuations), while Goldfinch *Carduelis carduelis* increased astonishing 323%, Grey-headed Woodpecker *Picus canus* 139%, and Blackbird 62%! Of the declining species in Finland (Lehikoinen & Väisänen 2014, Väisänen et al. 2018), Greenfinch declined 65%, House Sparrow *Passer domesticus* 56% and Willow Tit 26 % between the periods. Also the abundance of Yellowhammer declined 38%. Regarding these species, the difference cannot be attributed to exceptional peak years during either of the periods. On the contrary, the "decline" of the Waxwing between the periods is most likely due to normal fluctuations.

Yearly fluctuations

The results of the Garden Birdwatch also tell about large yearly fluctuations that are characteristic for the wintering bird communities in Finland. In some years, Waxwing and Fieldfare belong to the most abundant birds observed, in other years, they are almost absent. The abundance of Redpoll has varied between 0.2 and 7.9 individuals per site. In the winter of 2018 there was an exceptional abundance of finches, in particular Chaffinch *Fringilla coelebs* and Brambling *Fringilla montifringilla* (Figure 2). The reason for the unusually large wintering populations was most likely the high number of unharvested fields that provided food for the finches during early winter. The summer 2017 was very cold and rainy and thus the fields could not be harvested in time.

Regional variation

The large dataset collected in the Garden Birdwatch also allows to compare the regional trends in Finland. According to the results, for example Willow Tit and Crested Tit *Lophophanes cristatus* show a particularly steep decline in Southern Finland, while in Northern Finland the populations tend to be more stable. Due to the warming climate, some species with a southern distribution in Finland such as Blackbird are expanding their wintering ranges and they are increasing particularly fast in central and northern parts of the country. The recent expansion of Grey-headed Woodpecker has been particularly evident in Central and Eastern Finland (Figure 3).

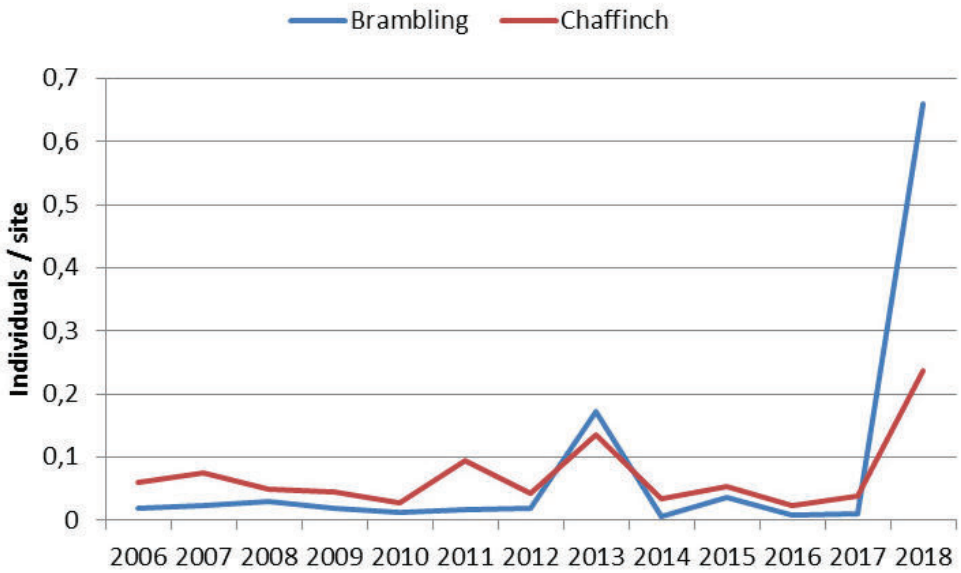

Figure 2. The abundance of Chaffinch and Brambling (individuals / site) in the Garden Birdwatch in the years 2006–2018.

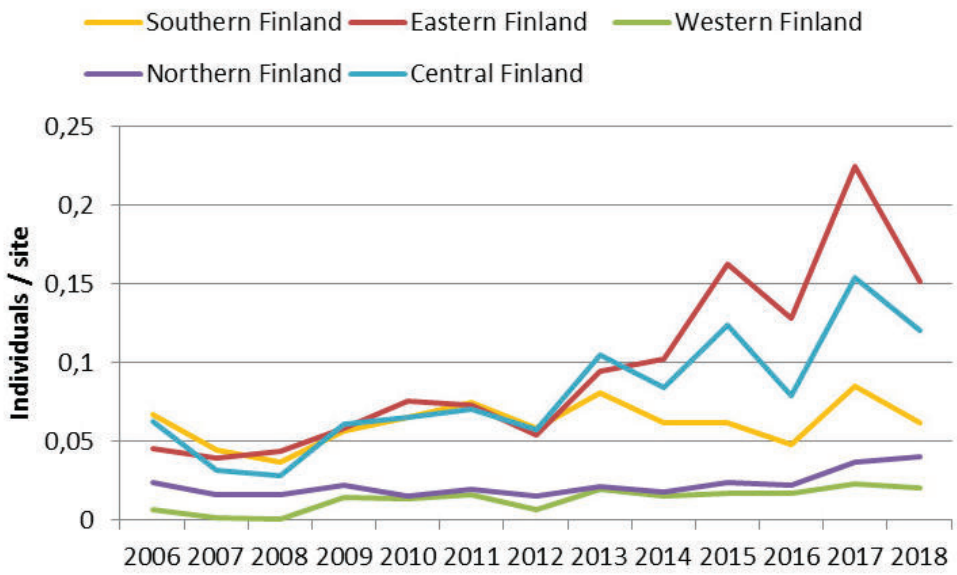

Figure 3. The abundance of the Grey-headed Woodpecker (individuals/site) in the Garden Birdwatch in the years 2006–2018.

The results of the Garden Birdwatch also show that some species with a northern distribution are declining: Siberian Jay *Perisoreus infaustus* has declined 26% and Siberian Tit *Poecile cinctus* 46% in Northern Finland between years 2006–2008 and 2016–2018.

How do the results compare with winter bird counts?

The national winter bird count has been organized by the Natural History Museum of the University of Helsinki already since the 1950s. In this survey, volunteer birdwatchers count birds along ca. 10 km route three times during the winter (November – early March). Today, more than 500 routes are surveyed yearly (Luonnontieteellinen keskusmuseo 2019).

The comparison between the two monitoring programs shows that the majority of the common species show uniform trends between the two. For example, the increase of Goldfinch (Lehikoinen et al. 2014) (Figure 4) and the decline of

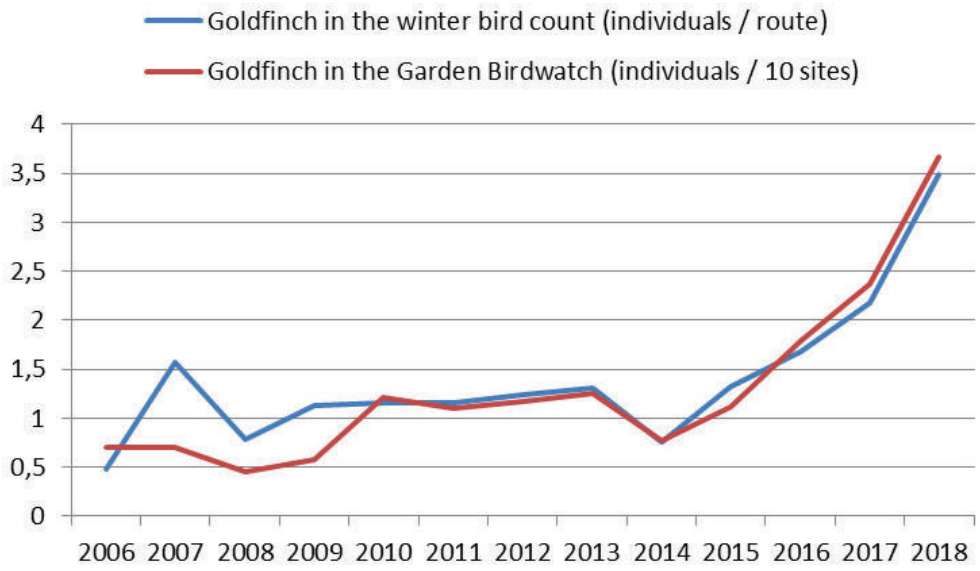

Figure 4. The abundance of Goldfinch in the Finnish winter bird count (late December-early January) and in the Garden Birdwatch (late January) in the years 2006–2018.

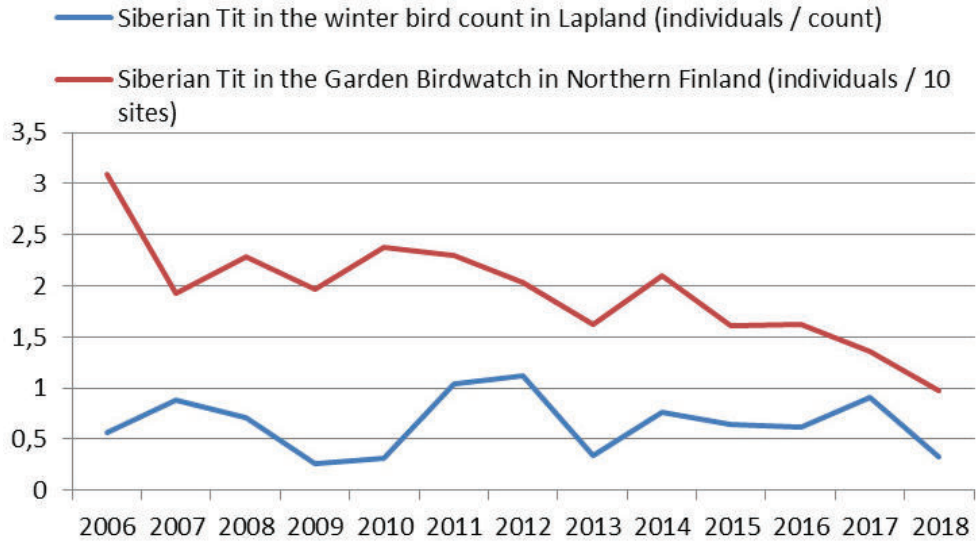

Figure 5. The abundance of Siberian Tit in the Finnish winter bird count (late December-early January) and in the Garden Birdwatch (late January) in the years 2006–2018 in Northern Finland.

Crested and Willow Tits (Lehikoinen et al. 2014, Väisänen et al.2018), appear very similar in both of the datasets.

The tendency of some bird species to visit the feeders varies according to the severity of the winter. For example, Treecreeper *Certhia familiaris* (as well as some other "true" forest birds) visits the feeders more frequently during cold periods. In mild winters such as 2007–2008 and 2014–2015, the abundance of Treecreeper was relatively low in the Garden Birdwatch compared to the results of the national winter bird count. It is likely that the abundance of Treecreeper is underestimated in the Garden Birdwatch during mild winters.

The results of the Garden Birdwatch might prove particularly valuable considering species that are too scarce to be frequently observed in the winter bird count, but regularly visit the feeders. For example, the number of Siberian Tits observed in the Garden Birdwatch is tenfold compared to the winter bird count. While the results of the winter

bird count show large variation which does not allow for detecting any trend, the results of The Garden Birdwatch show a steady declining trend in Northern Finland (Figure 5).

Conclusion

The Garden Birdwatch provides extensive data on the wintering birds in Finland, and the quantity of the data is not met by any other monitoring program. However, there is much variation in the data quality (due to e.g. factors affecting detectability), and thus the results are most suitable for analyzing the trends of the common species and of those scarce species that regularly visit bird feeders. As a rule, the results of the Garden Birdwatch are consistent with other monitoring programs and therefore the Garden Birdwatch can be considered as an important compliment to the monitoring of the Finnish bird populations.

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Winter bird survey in French gardens, two complementary schemes for a wide array of questions

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Abstract. In France, two citizen science schemes focus on birds in gardens: namely the popular French Garden Birdwatch (FGB, "Oiseaux des Jardins" in French) and the innovative BirdLab. Here, we describe both schemes and discuss their interest in regards with conservation and ecological questions that can be addressed. We highlight and discuss differences and synergies between the participation of these two surveys. They are very complementary and we encourage observers to implement both protocols. We suggest that BirdLab could be implemented in other European countries.

Introduction

Butchart et al. in 2010 noted that the "rate of biodiversity loss does not seem to be slowing down" in recent decades and — almost 10 years after — this point of view remains actual (Ceballos, Ehrlich & Dirzo 2017; Harrison et al. 2014). For birds, this continuing decline is well-documented thanks to several breeding bird surveys across Europe (Pan-European Common Bird Monitoring Scheme 2017). In European countries, this decline is particularly worrying for farmland (EBCC 2018) and urban birds (for French trends see CESCO and UMS Patrinat, 2018). For France, overall bird abundance declined by 33% between 1989 and 2017 (French Breeding Bird Survey, CESCO and UMS Patrinat, 2018).

Although undisputable, these trends are assessed during the breeding season and we ignore most of the spatial and temporal variation of bird abundance during winter. The lack of knowledge on winter birds is mostly due to data deficiency. In France, the first monitoring scheme focusing on winter birds started in 2006 (with the French Winter Bird Survey, see http://www.vigienature.fr/fr/suivi-hivernal-des-oiseaux-communs-shoc), compared to 1989 for breeding birds. Furthermore, during winter, bird ecology substantially differs from during the breeding season: after breeding, bird home range often rapidly expand beyond the breeding season territory boundaries. Most birds become much more mobile and their presence in a given area much more unpredictable.

To cope with harsh weather conditions and depletion of food resources in winter, birds have contrasted strategies that may be classified into long-distance migrant, short-distance migrant and sedentary. These strategies are the result of bird evolutionary histories. They are mainly driven by the necessity to find enough food to survive during winter (Robb et al. 2008a), to come back to breeding grounds early in spring in good body condition (Robb et al. 2008b) and according to the local weather (Salewski, Hochachka & Fiedler 2013). In Europe, short-distance migrants and sedentary birds have to find their resources in human-dominated landscapes, such as urban areas and intensive agriculture landscapes. Gar-

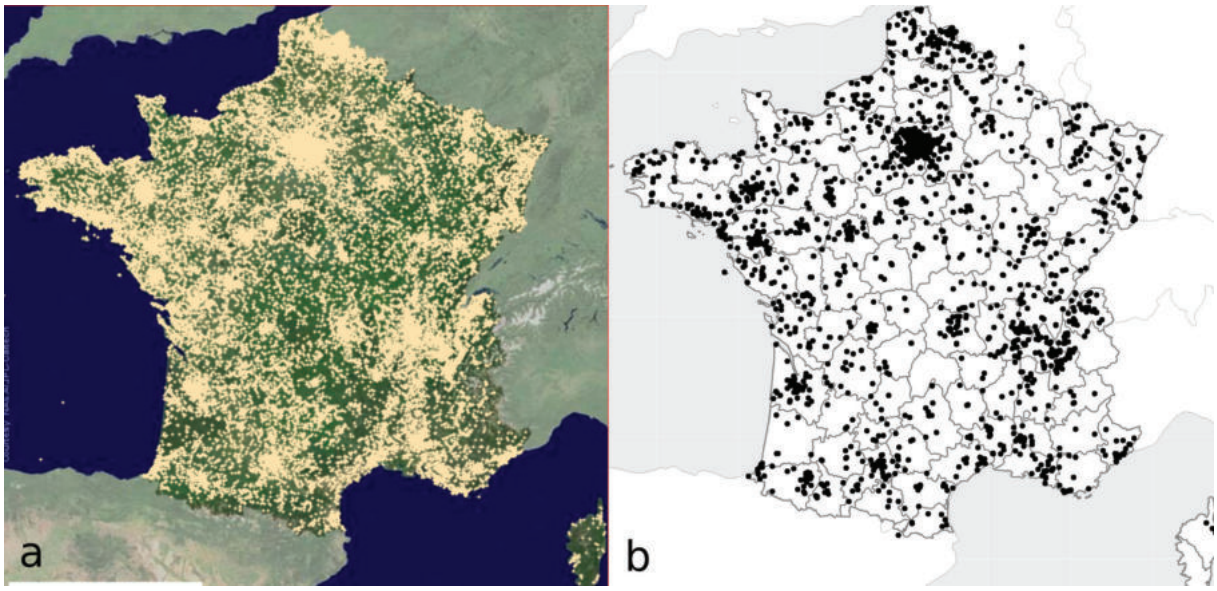

Figure 1. Locations of (a) gardens of the French Garden Birdwatch, and (b) feeder stations of BirdLab.

den feeders can provide a non-negligible amount of supplementary food, mostly seeds (Ask Your Target Market & Wild Bird Feeding Industry 2015; Cowie & Hinsley 1988; Rohwer & Rohwer 2013). Bird feeding activities are rapidly spreading (Plummer et al. 2018; Robb et al. 2008a), thanks to the enthusiasm of people for watching and taking care of birds.

Domestic gardens represent a large proportion of green areas in cities (Goddard, Dougill & Benton 2009), however access to these for research purposes is uneasy at a large scale, since they are privately owned. Recruiting people to monitor birds in their gardens (i.e. citizen science) is thus a good way to overcome this issue. Participatory surveys are designed to collect standardized data at large spatial scale (Figure 1). In parallel, volunteers learn about conservation issues and might be encouraged to implement conservation actions (Lewandowski & Oberhauser 2017).

In France, two citizen sciences schemes focusing on birds in gardens have been implemented, namely the French Garden Birdwatch (FGB, "Oiseaux des Jardins") and BirdLab. Here, we describe them and discuss their interest in regard to conservation and ecological questions, such as role of gardens as refuges for birds in winter, depending on species, time of year and landscape context. Other issues such as factors driving bird arrival in gardens, impact of feeding activity on birds and drivers of bird communities compositions during winter may also be addressed through the data collected by these schemes.

The winter garden bird schemes

French Garden Birdwatch

The French Garden Birdwatch (FGB; www.oiseauxdesjardins.fr) is a citizen science program managed by the Ligue pour la Protection des Oiseaux (LPO; a NGO involved in biodiversity conservation) and the French National Museum of Natural History (MNHN), and open to everybody. The objective of this program is to record species abundance in private backyards throughout the year at the national scale. During a session, participants record the maximum number of different individuals observed for each species in the garden. The duration of the session is free but is recorded to allow for observation pressure assessment. The number and dates of sessions are free. Online resources are provided to help participants to properly identify garden birds. These resources include forms, description of species with pictures, as well as warnings about common misidentifications. Data are validated by skilled birders according to the likelihood of the presence of the species at a given time and place.

The FGB started in spring 2012. Overall, 28,967 participants sent data at least once, covering the whole country (Figure 1a). Since the beginning, the number of participants increased every year by 20% (Figure 2). The majority of them sent data only during one year (69%), 16% during two years and 15% for more than two years (Figure 3).

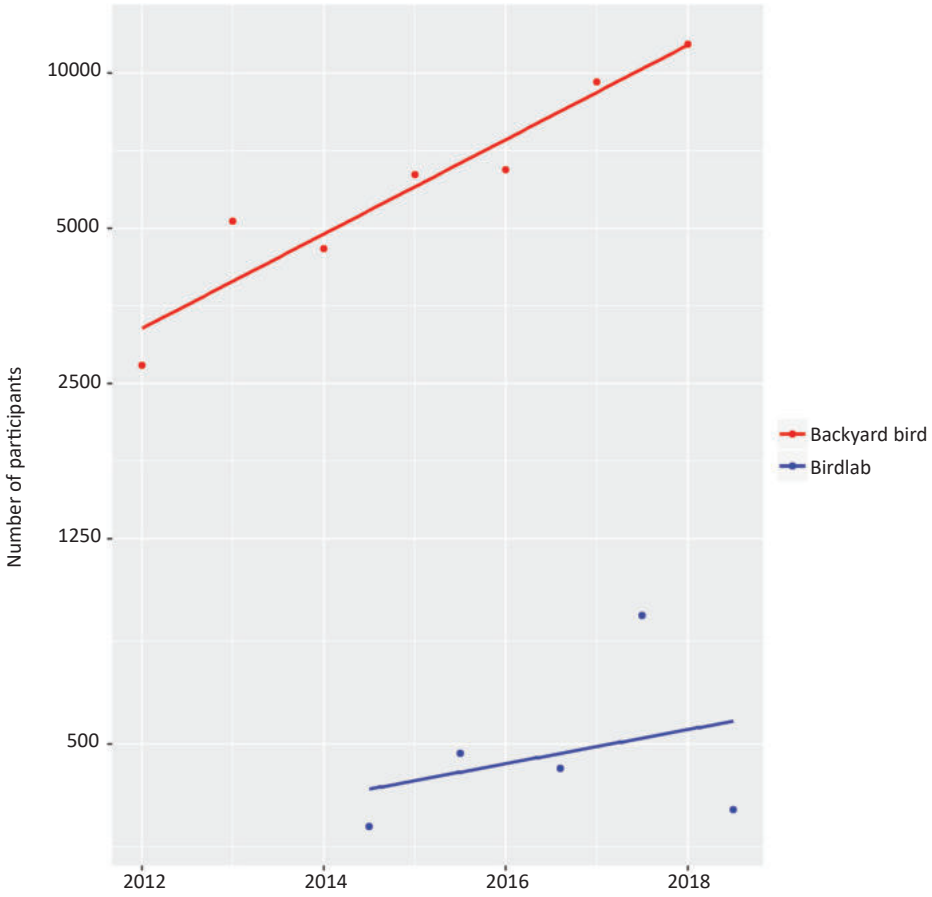

Figure 2. Number of participants per year, for the French Garden Birdwatch (red) and for BirdLab (blue).

BirdLab, a serious game for understanding bird interactions at feeders

BirdLab is the first citizen science scheme that couples a serious game and bird observation on a smartphone. It aims at gathering information about foraging social behaviours of birds during winter, using a standardized protocol. Data provided are species abundance and interactions at feeders. The participants set up two identical feeders 1–2 meters apart and filled with sunflower seeds. They can record up to 27 species among the most common and easily identified ones at bird-feeders. A user-friendly app (available for tablet and smartphone on Android and iOS) represents the two feeders, as well as icons of the 27 species. During exactly five minutes, the participant will drag and drop these icons between the feeders to mimic bird movements they see (Figure 4). Hence, bird arrivals, departures and switch between feeders are recorded in real time. Participants can repeat this 5 minutes protocol any time they want during winter season (from November 15th to March 31th).

After four and a half winters (since the 15th November 2014), ca. 31,000 5 minutes sessions have been performed covering the whole country (Figure 1b). The participation increased by 10% (Figure 2) year after year and 2,072 participants sent data at least once. 81% of the participants were involved one winter only. The proportion of volunteers who participated during two winters is equivalent to those for FGB (13%), and 6% participated for more than two winters (Figure 3).

Differences and synergies

Participation in these two schemes shows some differences. There are ten times more participants in the FGB than in BirdLab, and the annual number of participants increases faster for FGB. Moreover, the proportion of participants who take part in multiple year observations is smaller in BirdLab (20%) than in FGB (30%). These differences may be explained by the fact that LPO communicated with its members and the media about the regular survey and the yearly garden bird watch since the beginning of FBG. At the be-

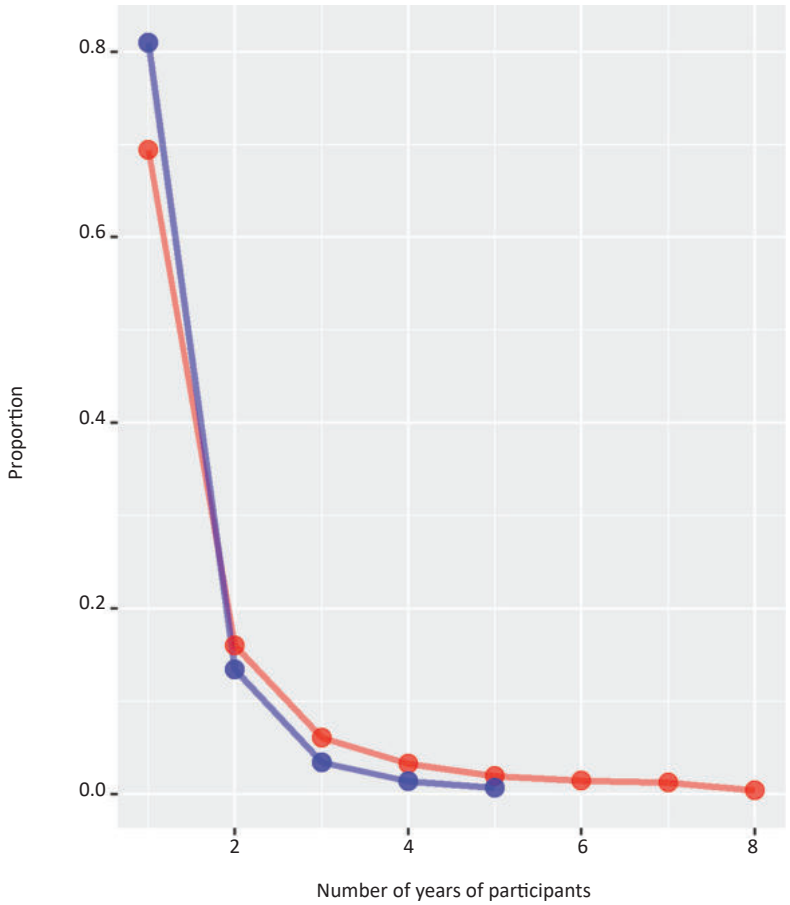

Figure 3. Distribution of the longevity of participants in the French Garden Birdwatch (red) and BirdLab (blue).

ginning of 2017–2018 winter, BirdLab received very good media coverage and the effect was immediate on the number of participants. Furthermore, one can participate to BirdLab during 5 months per year only, whereas FGB is available year round. This seasonal stop could be a reason for the more important loss of participants in BirdLab from one year to another.

260 participants took part in both schemes, representing a small proportion of FBG participants (1%), but a larger for BirdLab (13%). These volunteers participated during more years than those participating in a single protocol. Finally, since the launching of Birdlab (2014), half of the participants to both protocols started them the same year. Participation to both schemes would benefit from media coverage and advertising in general media and nature-lover networks.

Scientific outputs

Both schemes are relatively young, and have not produced many published results yet. However, the data they provide are currently analysed, and may bring results on several issues, such as bird winter phenology and spatial range changes, role of gardens as winter resources, impact of garden management on bird abundance in winter, winter bird community dynamics or impact of landscape on bird communities in winter.

The French Garden Birdwatch

Pierret & Jiguet (2018) analysed the spatiotemporal trends of 30 species in more than 1180 backyards during four winters (September 2012 — March 2016). The gardens were distributed along a gradient of agriculture intensification. Although farmland birds were less abundant at feeders than generalist ones, feeders located within the most intensively cultivated landscapes attracted more birds. Moreover, in more intensive landscapes, the increase of farmland specialist abundance at feeders along the winter was steeper than in less intensive landscapes. This result confirms that intensive agricultural habitats fail to meet food demand for birds along the winter and supports the theory of a temporal dimension of food depletion together with a spatial hetero-

Figure 4. Screenshot of app during a sample, the 27 available species are in a scrolling banner at the bottom of the screen.

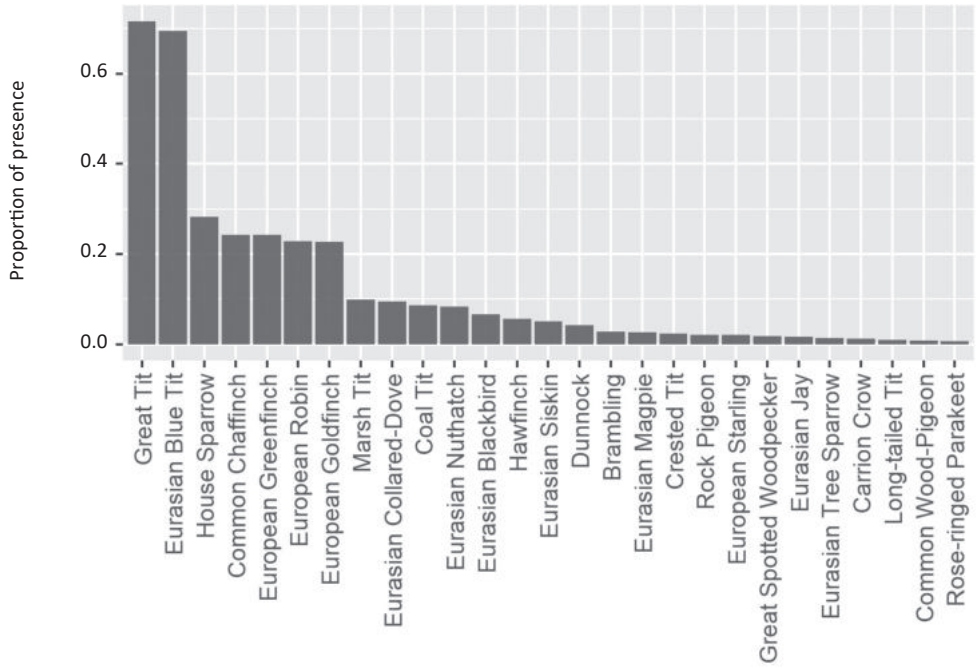

Figure 5. Proportion of presence in BirdLab samples.

geneity component linked to farmland intensity (Siriwardena, Calbrade & Vickery 2008).

Finally, these results confirm that bird feeding in winter is not only of recreational value but can probably improve the survival rate of birds in winter, mainly in intensive agricultural landscapes, and especially for agricultural birds which populations display dramatic temporal decline on a European scale.

BirdLab

Birdlab has not yet produced results which have been published in peer-reviewed journals. In a recent analysis, we found that the diversity of species coming to feeders increases with the diversity of landscape composition and decreases with the proportion of urban area. There was a redistribution of farmland bird abundance during the second half of winter in landscape that can

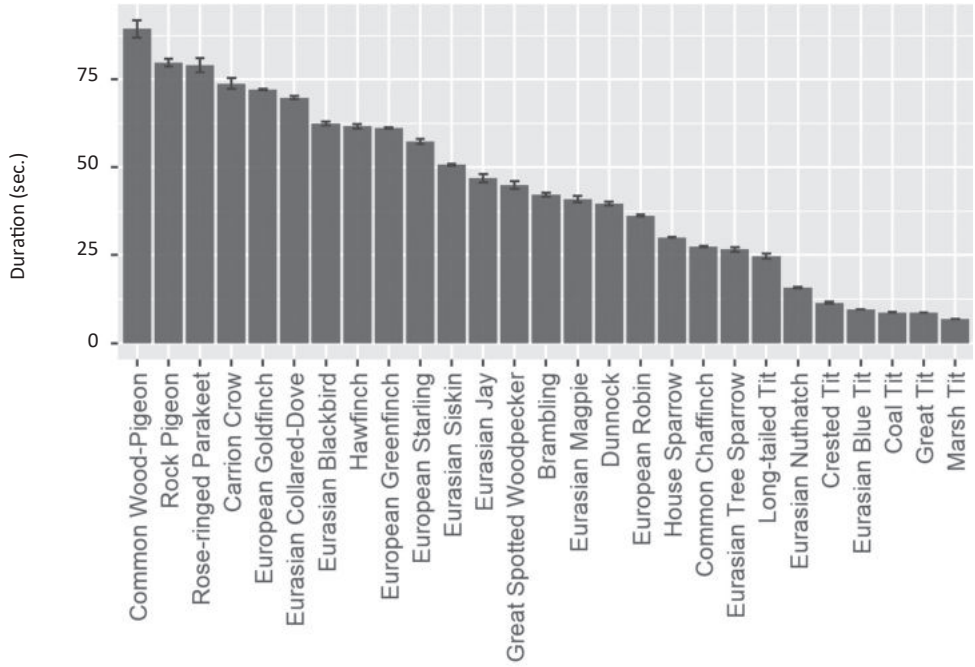

Figure 6. Duration of the bird's presence at the feeder station in BirdLab data.

provide enough food for birds. After four and a half years, more than 30,000 samples (5 minutes protocols) were collected. Among the 27 species, Great Tit *Parus major* and Blue Tit *Cyanistes caeruleus* were the commonest. They occurred in more than 60% of the samples (Figure 5), followed by five other species present in more than 20% of the samples (House Sparrow *Passer domesticus*, Chaffinch *Fringilla coelebs*, Greenfinch *Chloris chloris*, Robin *Erithacus rubecula* and Goldfinch *Carduelis carduelis*).

Since bird activity is recorded in real time, duration of presence at feeder can be measured (Figure 6), informing about foraging behaviour of species. Time spent seems to be correlated to species body mass, large birds such as Wood Pigeon *Columba palumbus* or Eurasian Jay *Garrulus glandarius* staying longer than the smaller ones such as tits. This preliminary result is in agreement with the theoretical framework of resource preemptive competition (Maurer 1984; Schoener 1983).

Conclusion

In France, the French Garden Birdwatch (FGB) and BirdLab are two citizen science schemes aiming at surveying communities and behaviours of birds in gardens. These schemes bring together a large number of observers, and as, Cosquer *et al.* (2012) showed with another citizen science project (the French Garden Butterfly Scheme — OPJ), the increase in observation frequency could increase the participant knowledge on biodiversity. Hence, we hope that volunteer birdwatchers may change their gardening practices and increase their conservation engagement (Lewandowski & Oberhauser 2017). The FGB is the most popular bird watching scheme in France, providing researchers with bird abundance and phenology of occurrence all year round. Although BirdLab has ten times fewer participants than FGB, it provides relevant and unique data to question bird foraging behaviour during winter.

From a scientific point of view, the FGB and BirdLab are complementary (Figure 6). Each one focuses on its own key questions but they also could feed each other to improve analysis quality. For instance, FGB could help estimate the ratio of species that locally use BirdLab feeders by reporting the occurrence of species during winter in gardens engaged in the two schemes. Conversely, BirdLab observations could be used to estimate a new index of foraging activity at species and community level that could enrich analyses of spatial and temporal bird distribution monitored by the FGB.

We kindly encourage observers to implement both protocols to further improve the information gained from each. In the upcoming years, we wish to develop new collaborations, for example within the EBCC frameworks, for adapt-

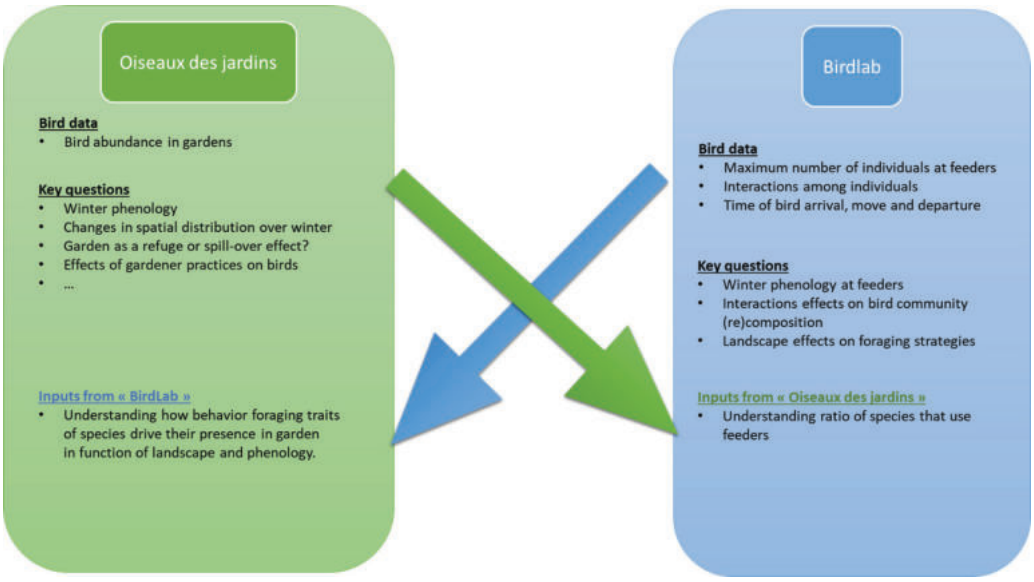

Figure 7. The two French schemes about the French Garden Birdwatch bird during the winter and their connexion.

ing and spreading BirdLab over other European countries.

Acknowledgements

We wish to thank the tens of thousands of volunteers involved in counting birds in their backyards and the two of thousands of participants of BirdLab experiment, who provide high-quality data for the study of birds in France. We also thank the LPO for its commitment on both schemes.

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The "Hour of the Winter Birds": Germany's largest Citizen Science programme

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Abstract. Since 2011, NABU (BirdLife in Germany) is implementing an annual citizen-science winter garden bird count called "Hour of the Winter Birds" (Stunde der Wintervögel, SdW). With an average of 98,000 participants per year during a single weekend, the Hour of the Winter Birds is Germany's largest Citizen Science activity in terms of participation. The popularity of the programme keeps growing, reaching a new record level in 2019 with over 137,000 participants. This winter bird count builds on the methodology and experience of its sister programme, the "Hour of the Garden Birds" (Stunde der Gartenvögel, SdG), implemented each May since 2005. Participants count the maximum numbers of each bird species seen simultaneously within one hour during a certain weekend. The average number of individuals per sample and the share of gardens in which a species has been recorded are the two principal index values produced. The aim of these bird counts is twofold: In addition to generating valuable data on bird numbers, they are an important tool to engage the public in nature conservation. Before final analysis raw data have to be corrected for changing regional distribution of samples and for an increasing share of more experienced observers. In average 39.8 birds of 9.1 different bird species have been recorded from each sample point (garden). The average number of bird species recorded from each garden during SdW has not shown any significant trend to date. But the number of individuals recorded has shown a significant declining trend between 2011 and 2019 of 2.6% per year related to the long-term average. The House Sparrow (*Passer domesticus*) is the most abundant winter garden bird in Germany ahead of the Great Tit (*Parus major*). But in terms of distribution (share of samples), the Great Tit (*Parus major*) leads the table ahead of the Blackbird (*Turdus merula*). Of the 40 most common species, 4 show significantly increasing, and 4 show significantly decreasing trends, with the Greenfinch (*Chloris chloris*) showing the biggest decline with –13.2%/year, and the Starling (*Sturnus vulgaris*) showing the biggest increase with 12.9 %/year.

Introduction

Through the course of each year, NABU (Nature and Biodiversity Conservation Union — BirdLife in Germany) and its regional partner organisation in Bavaria, LBV (Landesbund für Vogelschutz in Bayern), are implementing two major national bird counting programmes in Germany: the "Hour of the Garden Birds" (Stunde der Gartenvögel, SdG) in the middle of May each year since 2005, and its younger sister programme, the "Hour of the Winter Birds" (Stunde der Wintervögel, SdW) in early January since 2011. With an average of 98,000 participants and 67,000 garden samples (a count in one garden can be done jointly by several people) per year during a single weekend, the Hour of the Winter Birds is Germany's largest Citizen Science activity in terms of participation. The popularity of the programme keeps growing, reaching a new record level in 2019 with over 137,000 participants from almost 95,000 counting points (Figure 1). The breeding bird count in May regularly attracts numbers about a third lower than those of the winter bird count.

Bird monitoring as Citizen Science

NABU's garden bird counts follow a long tradition in other countries, especially the successful "Big Garden Birdwatch"implemented by the RSPB (BirdLife in the UK) since 1979. Each year, about half a million people take part in this activity (RSPB 2019). A citizen-science bird count with an even longer tradition is the "Christmas Bird

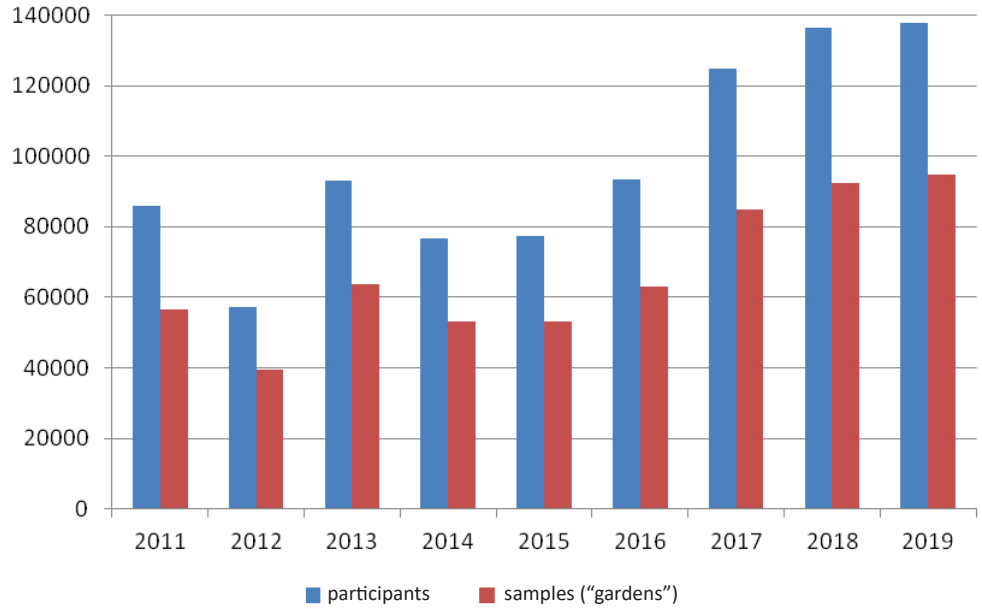

Figure 1. The number of samples („gardens“) and participants in the „Hour of the Winter Birds“ (SdW) 2011–2019.

Count“ in the US. It dates back to the year 1900 (National Audubon 2019).

Within circles of traditional scientists, results derived from data collected by laymen have often been viewed very critically. Growing experience with such kinds of programmes, however, is contributing to better acceptance today. Publications with convincing results are of course necessary to show that the results of NABU's citizen science bird counts do provide solid scientific results despite the fact that the data collected is prone to possible individual mistakes, as long as any data analysis takes into account systematic biases and the data-specific limits of interpretation.

The NABU garden bird counts are only one part of a wide spectrum of bird monitoring activities based on citizen science in Germany. Even the official bird monitoring programmes, seen as professional programmes, are essentially based entirely on data collected by hobby birdwatchers. The various programmes differ in the complexity of the method employed. The more complicated the method, the smaller the number of participants of each programme. In Germany, the spectrum ranges from the “Common Breeding Bird Monitoring Programme” (MhB) coordinated by Dachverband Deutscher Avifaunisten (DDA), the organisation representing Germany in the European Bird Census Council (EBCC), with about 1,500 participants, via the mapping work for the latest German Breeding Bird Atlas (ADEBAR) of 2015 with about 4,000 volunteers and the online bird observation database ornitho.de with about 20,000 users (both also run by DDA) to the NABU garden bird counts with over 100,000 participants during a single weekend.

With the number of participants, the number of samples contributing to the final results is growing. The trade-off is that the methodology has to be kept as simple as possible to maximise the number of samples. Also, the probability of individual mistakes in the raw data is growing the further the range of participants reaches outside the limited group of more or less experienced birdwatchers. Thus, each of these programmes has its individual strengths and weaknesses.

Method and aims

Since 2011, the SdW takes place during the first weekend in January (Friday to Sunday) of which the Friday is not earlier than 4 January. This date ensures sufficient distance from the New Year's fireworks that are perceived by many to heavily disturb bird occurrence in gardens, but in most cases is still covered by the end of Christmas school holidays. Thus, the date falls into the period with the lowest rate of general media news of the whole year, which is a factor contributing to the big media attention the programme attracts.

The aim of the SdG and SdW programmes is to obtain a national snapshot of bird distribution and numbers in the settled areas of the country, its gardens and parks, towns and villages. While

the May count focuses on the breeding birds, the January count of the SdW informs about mid winter bird populations.
The counting methodology of both programmes is identical: As many participants as possible spend one hour watching birds at any point within settled areas. Usually that is their own garden, or in lieu of that, terrace, balcony, windows or the park around the corner. They note down all species identified and the maximum number of each species seen simultaneously during that hour. Birds only heard, flying over or noted and identified in the distance can also be included. The basic method therefore equals the point count method used in many professional bird monitoring programmes.
Most records (over 90% and growing) are being entered directly on the programme's websites of NABU and LBV (*www.stundederwintervoegel.de*). The build-up of the results can be followed in real time on the website, which also provides distribution maps and basic raw results for each region and county. Records can also be submitted via a telephone hotline, by postcard, e-mail or paper form.
The key result is the species abundance expressed as average number of individuals of each species per sample ("garden"). This index figure can be compared between species, between different regions, and — especially interesting — between different years over a longer period of time. This way, over time, population trends for birds in settled areas can be identified. The second important result is the rate of occurrence of a species, i.e. the share of samples that include a certain species.
A number of additional questions asked about the circumstances of the count and the counting location complement the dataset and allow for interesting additional analyses. These include information about the type of habitat (degree of urbanization) or the frequency of cat observations.
It is, however, contrary to common misconceptions, neither possible nor intended to use the counting results to extrapolate the total number of birds in Germany's gardens. The main reason for that is the unknown share of birds present but not recorded — a restriction that also applies to most other monitoring methodologies.
Two aspects are unique to the NABU garden bird counts and justify their place next to other existing bird monitoring programmes in Germany. The basic results of the counts are available already within only a few days from the counting weekend, while the results of other programmes only get published with a delay of around two years. Thus, the programme can act as a kind of early-warning system for new developments regarding bird populations. The second aspect is that the extremely high number of samples provides a high geographical resolution of the results.
When judging the results of the garden bird count programmes it is also important to remember that they are not designed solely as scientific programmes in which information is collected from participants to provide scientists with data for analyses. At least equally important is the aspect of active involvement of the participants. These are being motivated to develop an interest in the nature of their own gardens. With the help of information provided, they learn to identify the different species and how to protect them by creating nature-friendly gardens for them — in order to be able to count even more birds next year.

Promotion of the programme

Reaching as many people as possible is important for both aims of the garden bird count programmes, to achieve a high sample of locations and to reach out with the conservation message to as many people as possible.
Information about the programme can easily be found on *www.stundederwintervoegel.de*, where the methodology is being explained (including a short comic-type video clip), key species are being portrayed and previous results featured. During the counting weekend, the data entry form is accessible on the site. It will stay open until about nine days after the end of the weekend to allow for late entries. The online data form features twelve of the most common species with pictures, all other species can be entered from a closed list of birds occurring in Germany. Any changes to the set of species featured with a picture on the form have repercussions on the results and would have to be corrected as they would create systematic biases — so they are better avoided.
There is also a leaflet with a paper recording form that is being widely distributed through the regional and local chapters of NABU and LBV. Another supporting form to help recording maximum numbers of each species in the field can be downloaded from the website. It features 15 spe-

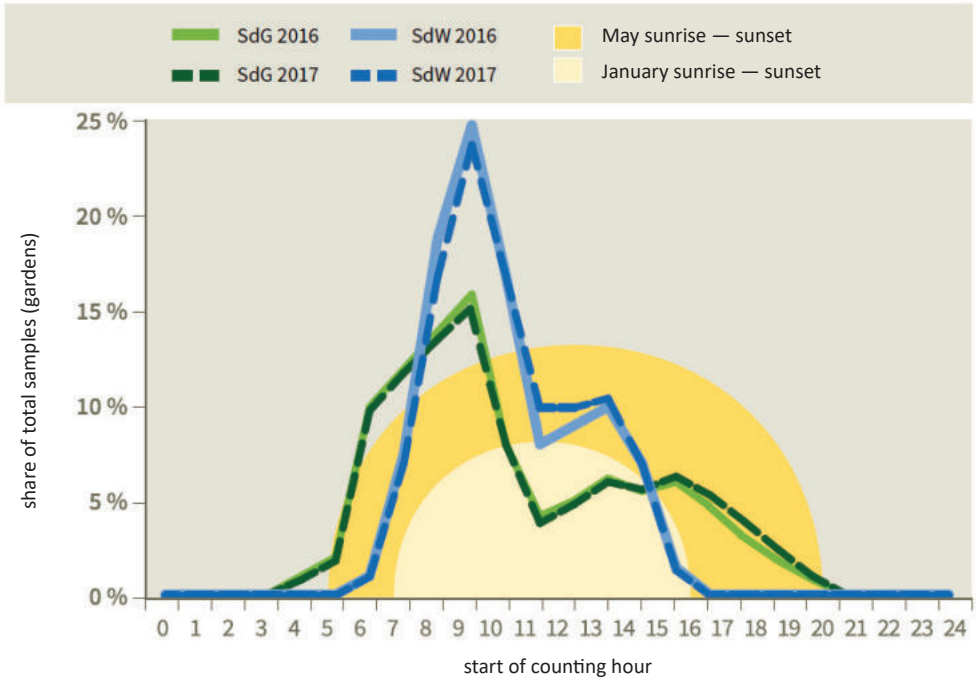

Figure 2. Distribution of the counting hours across the day for two NABU garden bird counts in 2016 and 2017 each in January (SdW) and May (SdG). For each hour of the day, the share of the total counts started during that hours is shown. Winter and breeding season counts differ primarily in the length of the day between sunrise and sunset, but variation between years is minimal, a specific correction of data not necessary.

cies with pictures (the 12 of the online form and 3 additional ones). A promotional poster with new graphics every year is also produced and used by the local groups to advertise the event.

The main way of promoting the programme is through the media, which by now have marked the NABU garden bird counts in their annual schedule of recurring events. The programmes are featured in most printed media and many regional and national radio stations, recently also regularly on national TV. A review of online media coverage of the latest SdW of January 2019 has resulted in over 1100 articles with a nominal reach of 785 million people — theoretically subjecting every German to an average of 10 articles about the Hour of the Winter Birds.

About half the participants are between 46 and 65 years old, another 30 percent over 65 years, leaving just 20% to people under 45. Of course, for groups of people doing a count together, only one age has been asked for, which is likely to be the age of the parent or grandparent entering the data, so that probably some of the younger participants go unnoticed by the statistics. In average, each count is done by 1,5 participants. In many cases therefore, participation in the garden bird counts is a group activity with the potential of bringing different generations together.

Data quality and data correction

Over the years, the data collected during the NABU garden bird counts allow for interesting analyses about the state of our birds. Many of them have recently been done on the basis of the May counts of the SdG programme, which in 2019 will be done for the 15th time (Lachmann & Adrion 2019). With only nine years, the winter bird counts cover only a much shorter period. Therefore, only preliminary results can be presented for this programme, while at the same time making a case for necessary data corrections based on the experience of the SdG data analysis.

One criticism voiced many times refers to the fact, that there are no prescriptions about the time of the day, when the counting hour should take place. This is a difference to typical monitoring programmes that require recording to take place in the early morning during the time of biggest bird activity. This is why, since 2016 an additional question in the recording form asks about the beginning of the counting hour. From this it was possible to judge the distribution of the counting hours over the day. It occurred, that each year the distribution is exactly the same. The actual counting hours are spread between sunrise and sunset with a clear peak around 10 am, a low point dur-

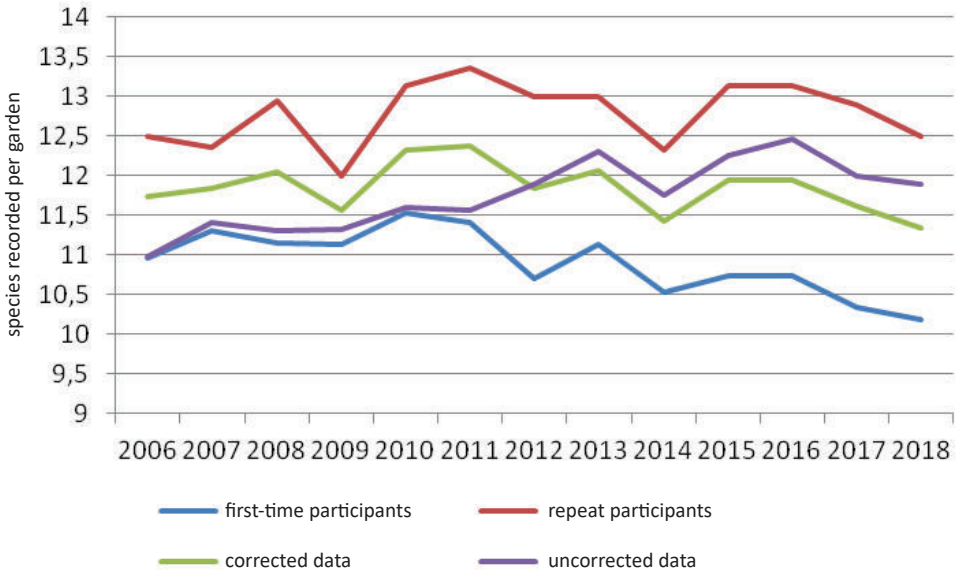

Figure 3. Development of the number of species recorded per garden in the May garden bird count (SdG) from 2006 to 2018: Trendlines are shown for uncorrected raw data, then separately for first-time and repeat participants and finally for the corrected data that are now independent of the change in the share of repeat participants. The apparent increase in the raw data turns into a stable trend after correction.

ing lunch time and a second smaller peak during tea time in the afternoon (Figure 2). Of course, more birds will go unnoticed during counting hours later in the day, but this effect is the same every year and in any sub-set of the sample. A correction of the results for counting hours differing between years is therefore not necessary.

As a principle, all possible sources of errors in the data only need to be taken into account, if the size of the error varies with time (when looking at population trends of species), between different regions (when comparing regions) or between different species (when comparing species), thus creating a bias.

All errors that are constant over the variable in question (time, regions or species) do not need to be corrected. Thus, confusion between similar species or the ratio of birds gone unrecorded are not relevant for comparisons between years, as long as they are constant. They would be very relevant, though, if trying to deduct any absolute numbers for population sizes. The latter, however, is not an aim of the garden bird counts, and cannot be achieved with the simple recording method employed.

Systematic biases

The most common criticism refers to the fact that not every participant is able to identify each species in his garden, so that some birds get misidentified or overlooked. As it is not the aim of the programme to calculate absolute numbers for bird populations, this would not spell a problem, as long as it can be confirmed that this error is not changing in size between the years. If, however, theoretically, the rate of confusion of say Tree Sparrows (*Passer montanus*) as House Sparrows (*Passer domesticus*) decreased from 20% in one year to 10% in another year, this would suggest an increase of Tree Sparrow and a decrease of House Sparrows that is not real.

Therefore, it was necessary to test, whether the error in identifying species is changing over time. To do this, all records have been split into two groups, those of first-time participants and repeat participants.

For the SdG, it appeared that repeat participants record both, more different bird species (12.8 species/garden as opposed to 11.0 species/garden) as well as more individuals (35,8 as opposed to 33,4 individuals/garden) of most bird species than first-time participants. This only becomes a problem, because with increasing length of the programme duration, the share of repeat participants is strongly increasing. Thus, what looks on first glance of the raw results like an increase in species diversity in Germany's gardens over the years, turns out to be simply an increase of the share of ornithologically more advanced repeat participants.

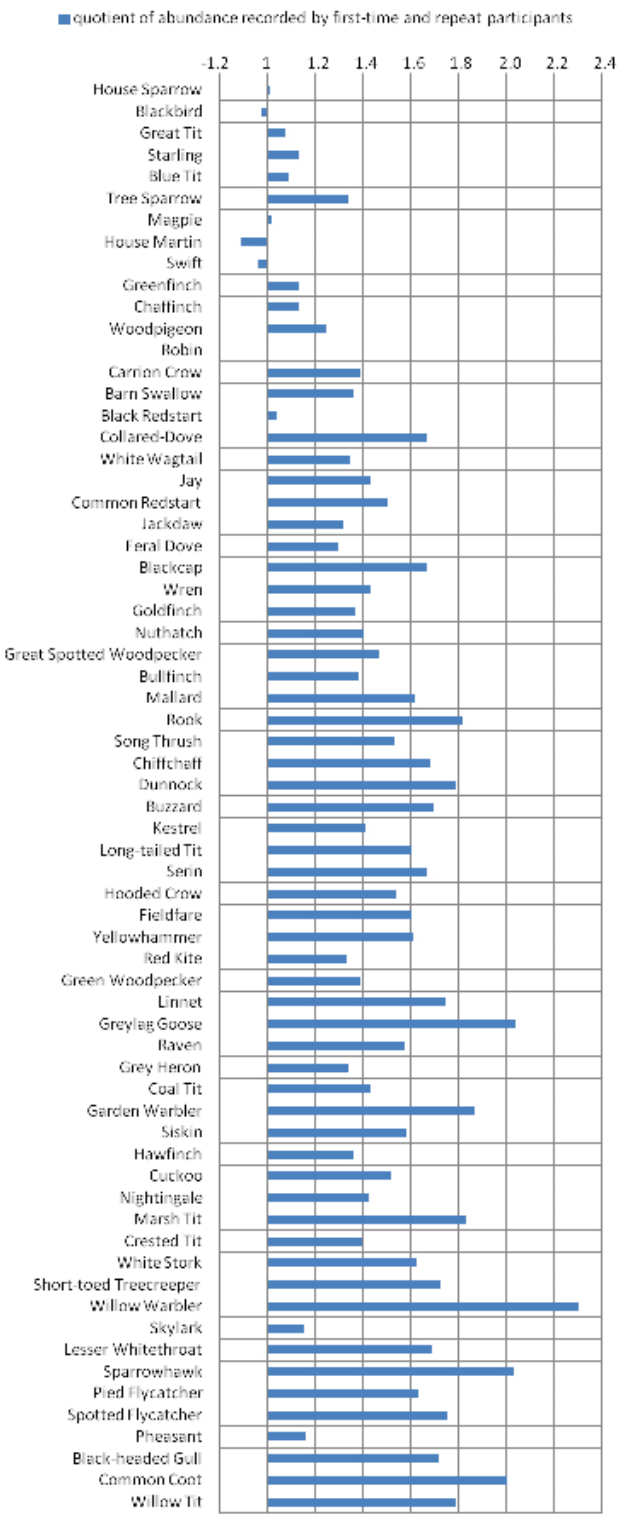

Figure 4. Difference between average number of individuals/species recorded by first-time and repeat participants (May SdG 2012–2016). Values are the quotient (larger: smaller) of the average numbers recorded by first-time and repeat participants. Values are shown to the right, if the average number recorded by repeat participants is larger, to the left if the average number recorded by first-time participants is larger. Species are sorted from top to bottom according to their abundance rank in the results of the SdG, most common species on the top. With increasing rarity of the species, numbers recorded by repeat participants increase relative to those recorded by first-time participants.

This systematic bias can be easily corrected by calculating results separately for first-time and repeat participants and merging their results by giving each group a fixed weight, for example equal weight. Doing this for the data of the May count of SdG shows that the species diversity has actually been stable with small fluctuations around 11.9 species per garden (Figure 3).

This effect of repeat participation is not equally strong for every species. For the most common and best known species the results of the two groups of observers do not differ very much from each other. The rarer and the harder to identify a species is, the stronger is the difference in average numbers recorded by the two groups: Repeat participants notice significantly more birds of such species than first-timers (Figure 4). This effect explains that the raw data suggest an increase in the numbers of almost all of the medium common or rarer species that disappears after the necessary correction.

In contrary to other monitoring programmes, the location of sampling points is not fixed in the garden bird count programmes. Of course, for the best possible comparability of results between years it would be ideal if each year exactly the same gardens were sampled and if these gardens were a representative sample of the nation's settled areas. However, with a high share of repeat participants each year (having reached recently almost 76% in the SdG), it is reasonable to assume, that the majority of locations is being sampled each year and only a minor part of the samples changes or is being added every year.

It is likely, however, that the sampled locations are not representative for the whole of the settled areas of Germany, but at least they can be assumed to be a stable representation of it. Therefore, an extrapolation to calculate overall population sizes for the settled areas is not possible, but a comparison of trends over time is.

There is an exception to this assumption, though, because the regional distribution of the sampled gardens has not been stable, depending on how much the programme had been promoted in the different regions by the regional chapters of NABU. For the SdG, the share of samples from the region of Niedersachsen had

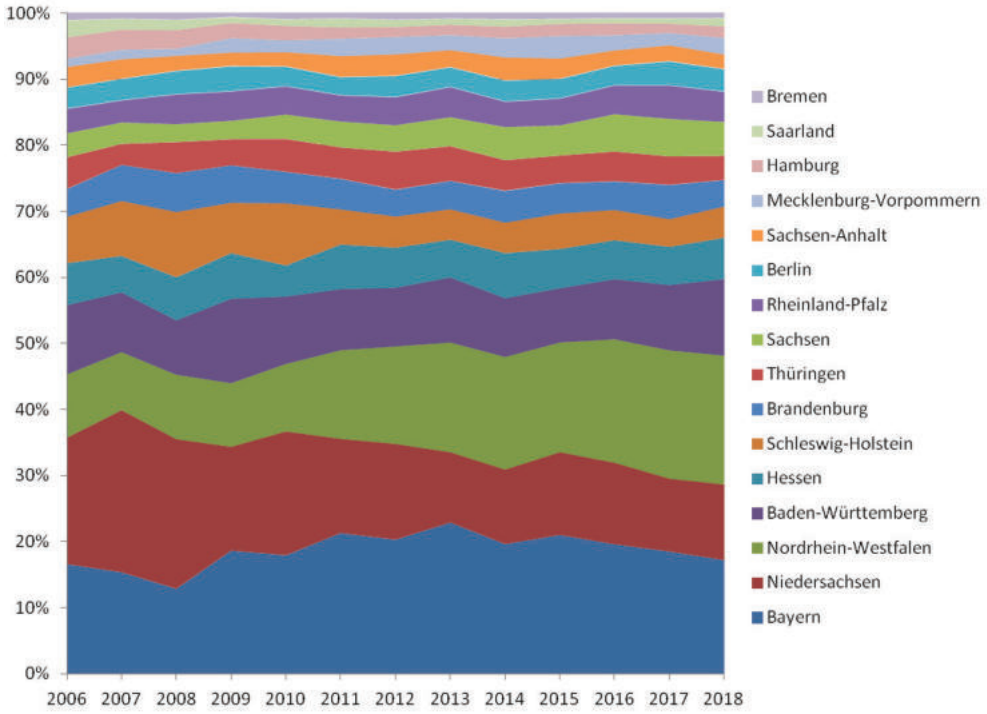

Figure 5. Development of the relative distribution of sample locations across the 16 regions of Germany, based on SdG 2006–2018.

clearly declined between 2006 and 2018, while the share of samples from Nordrhein-Westfalen and Bavaria had increased (Figure 5). For species not distributed equally across the whole of Germany, this can lead to biased trend results. Therefore, for all detailed analyses it is necessary to correct this systematic bias by calculating results separately for all regions and combining them using a fixed weight for the data from each region. For SdG data analyses, each region's weight was attributed according to its share of the overall area of settled land in Germany.

Hence, for detailed analyses, the raw data from the NABU garden bird counts need to be subjected to two bias corrections, one to mitigate the increasing share of repeat participants with better knowledge of birds and one to mitigate the fluctuating regional distribution of sampled gardens.

Quality check of incoming data

To ensure reliable results, scientific bird data usually needs some form of quality control before analysis. This is also done with data submitted during the NABU garden bird counts. Of course, it is impossible to check in every instance whether for example a bird recorded as House Sparrow might not have been a Tree Sparrow. But for species recorded in large numbers, the incidence of such errors can be assumed to be constant and therefore negligible for most purposes of analysis. On the other hand, data of exceptional numbers of common species or records of rare species can have major impacts on the final results. Therefore, a computer algorithm is used to filter out such records using threshold values for each bird species, whereas for very rare species a threshold of zero is applied. Filtered out records are then administered by hand. Obvious recording errors are corrected, and where necessary exceptional records can be checked by NABU staff with the respective recorders. This way, in January 2016, the first German record of a Syrian Woodpecker (*Dendrocopos syriacus*) was discovered and confirmed.

Strength and weaknesses of the data

The more people take part in the garden bird counts, the more exact the results will be in the sense of smaller confidence intervals of the results. Therefore, thanks to the large number of participants, the NABU garden bird counts produce very exact results. Even below the federal level, on regional level (16 regions) and down to county level (just under 300 counties) the number of samples is high enough to obtain reasona-

bly exact results on the development of bird numbers. Only when trying to derive results on the level of single post code areas (of which there are just over 8,000 in Germany), the limits of meaningful results have been reached as confidence limits become too wide and results are too much subject of chance. Thanks to the extremely large number of samples, the high geographical resolution of the data is one of the major strength of the programmes.

On the other hand, exactness does not equal correctness of the data. The probability of errors within the data of each of the samples is rather high compared to data collected by more experienced observers. However, single mistakes are in most cases being absorbed by the mass of other data and do not lead to biases in the results, as long as systematic biases are being corrected, as described above. But it is important to observe the interpretational limits of the underlying data. Thus, single records are not very reliable due to the high probability of individual errors and can only be used after additional effort to confirm the correctness of the records. Therefore, such single records are not the focus of the garden bird count programmes. The verification of exceptional records is left to the relevant authority of the appropriate rarity commissions.

In most cases, the analysis of the NABU garden bird counts is limited to between 30 and 60 of the most common garden bird species, for which a critical mass of records is available. The majority of the 160 to 180 species recorded during a typical winter garden bird count or the 200 to 230 species during the breeding season count are not considered for further analyses.

An important limitation of the data of SdW and SdG is that they only produce results for the settled area, because all sample locations are limited to areas where people live. No results can be obtained at all for species that do not regularly occur in towns and villages. And even for those species that do, the results only cover the part of their population living in settled areas, which allows only limited conclusions regarding their overall population trends. Thus, if the garden counts result in rather stable bird numbers for settled areas, a transfer of this finding to the wider landscape is not possible. As it happens, the dramatic decline of birds in Germany's agricultural landscapes is mirrored only very weakly in the results of the garden bird counts. Hence, the NABU garden bird counts cannot replace other monitoring programmes that cover all the different habitats of the country.

Another weak point of SdW and SdG is, that data are recorded all within a single weekend, so that results are prone to be influenced by the general weather situation before and during the counting weekend. This is especially true for the results of the winter garden bird count, because the movements of birds in winter are much more flexible and weather-dependent than those during breeding season, when most bird species are tied down to their breeding territories. Therefore, it is usually impossible to derive general trends from the results of a single year. Over a number of years, however, trends become evident beyond the annual fluctuations caused by weather.

Results

NABU has recently prepared a detailed review of the results of the SdG, the May garden bird count, that runs since 2005 (Lachmann & Adrion 2017, 2018 and 2019). These analyses included the calculation of population trends and their comparison with trends derived from the national Common Bird Monitoring Scheme (Dachverband Deutscher Avifaunisten 2019). For 52 species, the trend direction derived from both monitoring programmes coincided, only for 7 species, the directions differed. The difference in average numbers of each species in areas with different degrees of urbanisation has been calculated, or the relationship of bird numbers with the occurrence of magpies (*Pica pica*) or cats or the distribution of bird epidemics like the Usutu virus (Tietze et al. 2014, Lühken et al. 2017).

Beyond that, the extensive dataset allows for a multitude of additional analyses that could be done. To this end, NABU is providing an anonymous version of the dataset without personal data of the participants to external scientists interested in particular aspects. Thus, a current project is to analyse the relationship of bird diversity and frequency with health data of the human population or with the economic strength of local communities.

In contrary to the SdG, the data of the winter garden bird count SdW have not yet been subjected to the necessary corrections and more detailed analyses, because until now there are only nine years of data since 2011. Therefore, in the following we are presenting only a limited number of basic results based on uncorrected raw data.

Table 1. **Data recorded from the winter garden counts (SdW) between 2011 and 2019. Columns 1 and 2 show ranking of the 30 most abundant species according to the average number of individuals (Ind) recorded per sample ("garden"), preliminary assessment based on uncorrected raw data. Columns 3 and 4 show the 30 most widely distributed winter garden birds according to the proportion of counting points (gardens) in which a species has been recorded; preliminary assessment based on uncorrected raw data. Values for species not part of the first 30 species in each ranking are indicated with an asterisk*.**

Species	Scientific name	1. Ind/garden, average 2011–2019	2. Rank numbers	3. % Prop in gardens average 2011–2019	4. Rank presence
House Sparrow	*Passer domesticus*	5.89	1	55.3	5
Great Tit	*Parus major*	5.32	2	90.4	1
Blue Tit	*Cyanistes caeruleus*	3.74	3	81.0	3
Tree Sparrow	*Passer montanus*	3.69	4	38.6	9
Blackbird	*Turdus merula*	3.50	5	89.6	2
Greenfinch	*Chloris chloris*	2.17	6	40.8	8
Chaffinch	*Fringilla coelebs*	1.77	7	51.8	7
Magpie	*Pica pica*	1.40	8	53.8	6
Robin	*Erithacus rubecula*	0.97	9	65.3	4
Carrion Crow	*Corvus corone*	0.93	10	17.9	14
Wood-Pigeon	*Columba palumbus*	0.77	11	21.5	13
Nuthatch	*Sitta europaea*	0.67	12	36.5	10
Starling	*Sturnus vulgaris*	0.57	13	4.8	30
Siskin	*Spinus spinus*	0.61	14	9.7	21
Brambling	*Fringilla montifringilla*	0.57	15	6.0	27
Jay	*Glandarius garrulus*	0.56	16	29.0	12
Long-tailed Tit	*Aegithalos caudatus*	0.55	17	10.6	18
Rook	*Corvus frugilegus*	0.52	18	5.1	28
Great Spotted Woodpecker	*Dendrocopos major*	0.50	19	35.7	11
Bullfinch	*Pyrrhula pyrrhula*	0.48	20	15.3	15
Goldfinch	*Carduelis carduelis*	0.40	21	7.3	25
Collared Dove	*Streptopelia decaocto*	0.38	22	12.3	17
Jackdaw	*Coloeus monedula*	0.31	23	3.9*	33*
Fieldfare	*Turdus pilaris*	0.31	24	3.5*	36*
Yellowhammer	*Emberiza citrinella*	0.27	25	5.1	29
Coal Tit	*Periparus ater*	0.25	26	9.7	20
Marsh Tit	*Poecile palustris*	0.24	27	10.2	19
Feral Dove	*Columba livia f. domestica*	0.20	28	*3.7	34*
Wren	*Troglodytes troglodytes*	0.17	29	13.7	16
Greylag-Goose	*Anser anser*	0.17	30	0.4*	56*
Hawfinch	*Coccothraustes coccothraustes*	0.15*	32*	8.2	22
Dunnock	*Prunella modularis*	0.13*	34*	7.6	23
Crested Tit	*Lophophanes cristatus*	0.15*	31*	7.6	24
Green Woodpecker	*Picus viridis*	0.08*	37*	7.2	26

In average 39.8 birds of 9.1 different bird species have been recorded from each sample point (garden) during the winter count. This means more individuals but less species diversity than during the May count, when 34.2 birds of 10.7 species (uncorrected raw data in both cases) have been recorded.

The average number of bird species recorded from each garden during SdW has not shown any significant trend to date. But the number of individuals recorded has shown a significant declining trend between 2011 and 2019 of 2.6% per year related to the long-term average, resp. 2.2% related to the first year. As this declining trend is

Table 2. Species amongst the 40 most commonly reported species during SdW, for which a significant trend in abundance (individuals per garden) can be observed for the period 2011–2019 (preliminary assessment based on uncorrected raw data). The percentage given refers to the annual change in individuals/garden in relation to the long-term average of each species.

Species	Scientific name	Trend/year
Great Tit	*Parus major*	–4.3%
Blue Tit	*Cyanistes caeruleus*	–3.8%
Greenfinch	*Chloris chloris*	–13.2%
Wood-Pigeon	*Columba palumbus*	+2.2 %
Starling	*Sturnus vulgaris*	+12.9%
Marsh Tit	*Poecile palustris*	–6.4%
Feral Dove	*Columba livia f. domestica*	+6.8%
Green Woodpecker	*Picus viridis*	+4,0%

not reflected in the stable trend of overall bird numbers during the breeding season count, a possible explanation of this trend is a series of mild winters in recent years that followed several colder winters during the first years of the programme. During milder winters, inbound migration from birds of northern and eastern Europe is less, at the same time, feeding opportunities outside human settlements are better. Both factors can lead to lower bird numbers in gardens. Of course, this decline will have to be watched closely in future years to detect any underlying signals for a possible wider decline of birds.

Table 1 shows the ranks of the most commonly recorded winter garden bird species, first according to the average number of individuals recorded per garden and second according to the proportion of gardens in which the species has been recorded. The two rankings differ owing to the different social behaviour of the species. Territorial species like Robin (*Erithacus rubecula*) or Blackbird (*Turdus merula*)) occurring in low numbers in most gardens will be scoring higher in the ”proportion ranking”, while species with a tendency to flock together (like Sparrows or Finches) will score higher in the ”individuals/garden ranking”.

Due to the short running time of the SdW (since 2011) and because of the influence of weather fluctuations causing fluctuations in the annual results, there are to date only a few bird species that already show significant trends in the development of their winter numbers in German gardens. According to a preliminary assessment of uncorrected raw data, these are the species shown in Table 2.

Birds and feeders

Since the beginning of the SdW-programme, every participant was asked whether there was supplementary bird feeding at the counting location. This enables interesting analyses about the effect of supplementary feeding on numbers and composition of winter garden bird assemblages.

To do this, data of the first six years of the programme (2011–2016) have been pooled together, resulting in almost 330.000 datasets. All samples have been split into locations with or without supplementary feeding. It appeared that in 89.3% of participating gardens supplementary feeding took place, while only 10.7% of locations did not have feeders. Of course, this is unlikely to be a representative sample of all settled areas or even of all gardens in Germany, as people with feeders are more likely to participate in the programme than others.

For each species their probability of occurrence (share of gardens) and their abundance (number of individuals) in gardens with or without feeders has been calculated. For each species the factor has been calculated by which the respective values differ in the two groups of gardens. The size of this factor indicates the strength of their preference or avoidance of supplementary feeding (Figure 6).

In general, 36% more birds have been recorded in locations with supplementary feeding, 42 birds per garden as opposed to just under 31 in gardens without feeders. The strongest preference for supplementary feeding is shown by the Marsh Tit (*Poecile palustris*). For this species, the probability of occurrence is 3.7 times higher where there are feeders, and its abundance is even 4.4

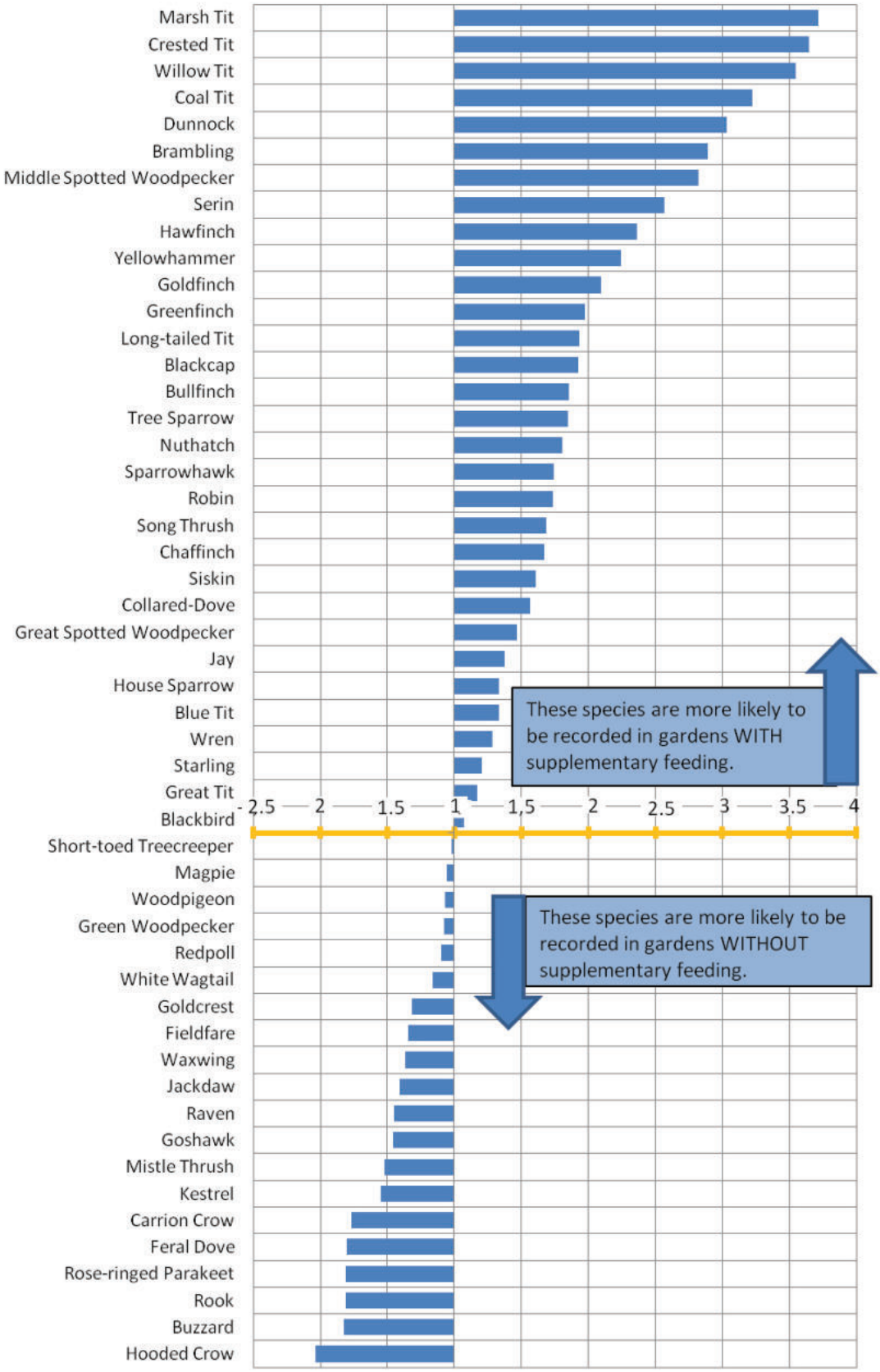

Figure 6. Difference in the likelihood of occurrence of species in gardens with or without supplementary feeding based on data of the SdW of 2011–2016. The graph shows the quotient (the larger value divided by the smaller value) of the shares of gardens with or without supplementary feeding in which each species has been recorded. The quotient is shown to the right, if the share of gardens with feeders is larger, to the left if the share of gardens without feeders is larger. The species are sorted from top to bottom by decreasing preference for gardens with feeders.

times greater. At the other end of the spectrum is the Hooded Crow (*Corvus cornix*), being recorded only half as often in gardens with feeders in numbers three times smaller.

It can be seen clearly, that the rarer species of tits like Marsh, Crested, Willow and Coal Tit (*Poecile palustris*, *Lophophanes cristatus*, *Poecile montanus* and *Periparus ater*) show the biggest preferences for gardens with feeders. These typical forest species are likely to visit gardens especially to make use of the feeders, but would stay in the forest otherwise. This apparent result will be enhanced by the fact, that these less known species will only be identified correctly, when they present themselves at the feeders, while they have a good chance of going unrecorded if they kept to the tops of tall trees as they would if there weren't feeders. The abundant tit species, the Great and the Blue Tit (*Parus major* and *Cyanistes caerulea*) also exhibit a clear preference for gardens with feeders. But because they are likely to occur in almost every garden anyway, their preference is more strongly visible in the significantly higher abundance in gardens with feeders, not so much in a higher probability of occurrence.

In general, all typical visitors of bird feeders show a clear preference for gardens with supplementary feeding, like tits, finches, woodpeckers and sparrows, but also some takers of softfood like Dunnocks (*Prunella modularis*), Robins and Song Thrushes (*Turdus philomelos*). It is also interesting to see, that Blackcaps (*Sylvia atricapilla*) which normally leave Germany for the winter, are twice more likely to be found in feeder gardens if they stay to winter in the country. Also the chance of seeing a Sparrowhawk (*Accipiter nisus*) is 71% higher in gardens with feeders, where it can hunt for smaller birds.

A negative preference for feeder locations can be found with species that do not normally make use of feeders, like Green Woodpecker (*Picus viridis*), White Wagtail (*Motacilla alba*), Goldcrest (*Regulus regulus*), Waxwing (*Bombycilla garrulus*) or various corvids and birds of prey. A good part of the explanation for these findings is probably that these species are more likely to be found in larger parks or at the edge of town, where bird feeders are less common. In most cases, they are unlikely to actively avoid feeder locations, but they are just happening to live further away from people.

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2019 marks the 15th anniversary of NABU's citizen science garden bird counts in Germany. Methods and results of the May and January counts are presented in detail in a German language publication available under *www.NABU.de/15-jahre-sdg*.

Bird Census News 2018, 31/1–2: 30–33

10 years of Winter Garden Birdwatch in Austria

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Abstract. The 10th Austrian winter garden bird watch was conducted in January 2019. The high number of citizen scientists participating provide valuable data on birds within an urban context. The results of this count complement the other monitoring programmes of BirdLife Austria, by helping to assess the state of winter birds. Media coverage is the main reason for the project´s popularity which had almost 13,000 participants in 2019. Beside its scientific impact, the survey engages new target audiences which bring about change within the society and has great potential: It is pointed out how awareness as well as funds can be raised for birds and nature conservation.

Introduction

The Winter Garden Birdwatch has been a regular part of the annual programme of BirdLife Austria since 2010. It takes place annually around January 6th and is Austria´s biggest citizen science project. It follows the idea of the "Big Garden Birdwatch", which was initiated by the RSPB in the UK in 1979 (Royal Society for the Protection of Birds 2019). The Landesbund für Vogelschutz (LBV) in Bavaria assisted with advice and technical support for the structure as well as the website-design for the count in Austria. Basically, no preliminary knowledge on birds is requested — the Winter Garden Birdwatch invites everyone to take part. The participants are called "citizen scientist" — individuals who choose their spare time to contribute to organised research, often with many others, in order to collect data for scientific purposes (Bonney & Dickinson 2012, Greenwood 2007).

Methodology

The methodology of this bird count is kept very simple in order to attract as many people as possible: In a self-chosen hour on one of three prescribed days, citizen scientists count birds at feeding stations, in parks, gardens or balconies and report the highest number of individuals of each bird species that have been observed simultaneously. The counts are restricted to a list of 60 species, and furthermore species-specific maximum numbers are implemented. Both measures have been taken to prevent unexperienced counters from reporting rare species as well as unrealistic high figures. For people needing help with bird identification, a leaflet with pictures of the 16 most common birds in winter is being provided. The results may be recorded on the leaflet itself — and subsequently sent via mail — or reported online. In the last count 78% of the results were reported online via the website — a major increase compared to the 45 % who used the online tool back in the starting year 2010. In the first year the Winter Garden Birdwatch was carried out in the city of Vienna only, whereas in all subsequent years data has been collected across the entire country.

Scientific impact

Despite the simplicity of the bird count´s methodology the collected data is of scientific interest. Besides ordinary ecological questions just like which bird species are most common at feeding stations (Figure 1) or differences between urban areas and the countryside, the scheme provides long-term monitoring. As the survey has now run for 10 years, the data is becoming more valuable for scientific research: for example, the alarming decline of Greenfinches *Chloris chloris* can be identified. Since 2012, Austrian Greenfinches have suffered from the protozoan *Trichomonas gallinae*, a cosmopolitan parasite which is primarily transmitted at feeding stations in summer due to the high density of birds (e. g. Robinson

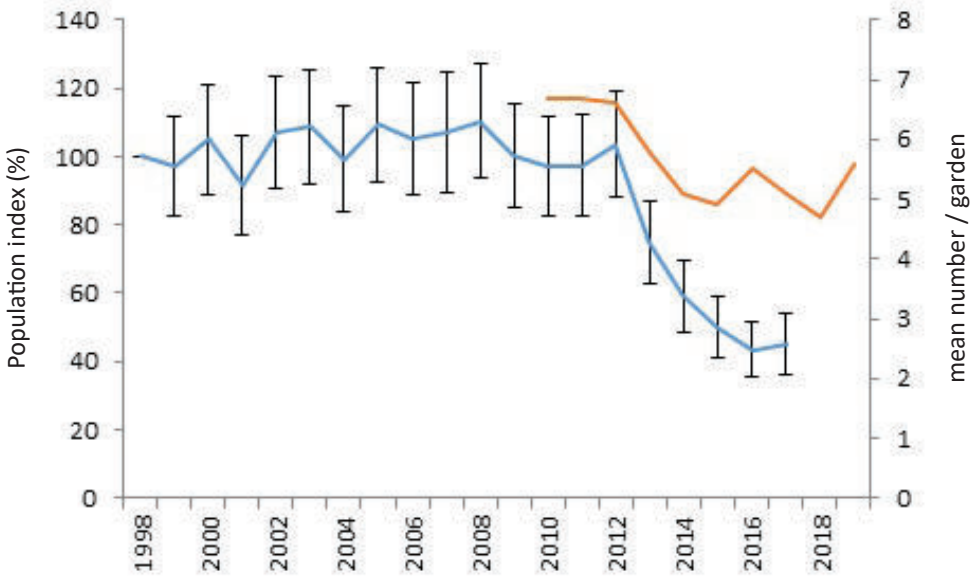

Figure 1. Most common birds on winter feeding stations. Rank is calculated as the proportion of individuals of the given species in relation to the total number of bird individuals counted.

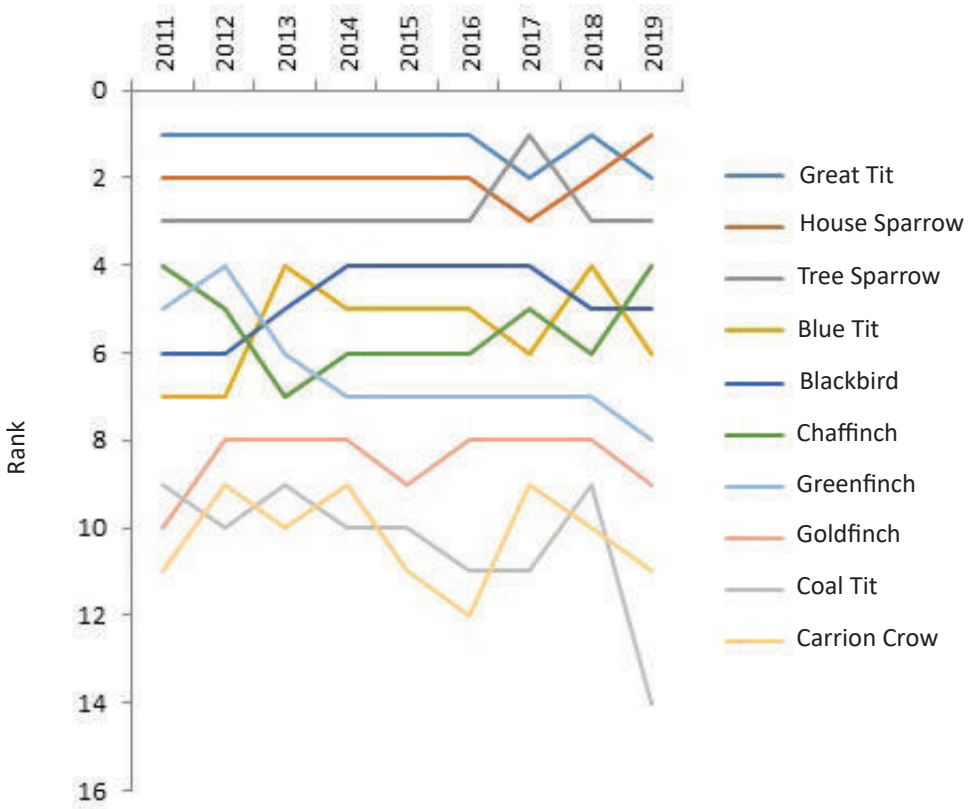

Figure 2. The decline of Greenfinches has been noticed in both the Winter Garden Birdwatch and Common Breeding Bird Monitoring Scheme (population trend from Teufelbauer et al. 2017).

et al. 2010, Lawson et al. 2011; BirdLife Austria 2017). The falling number of Greenfinches has not only been noticed at the Winter Garden Birdwatch, but also coincides with the results of the Common Breeding Bird Monitoring Scheme (Figure 2; Teufelbauer et al. 2017).

Raising awareness for birds and nature

For many people bird feeding stations are among the first touchpoints with nature (Cannon 1999). There, it is easy to observe and learn about the specific characteristics of birds and their lifecy-

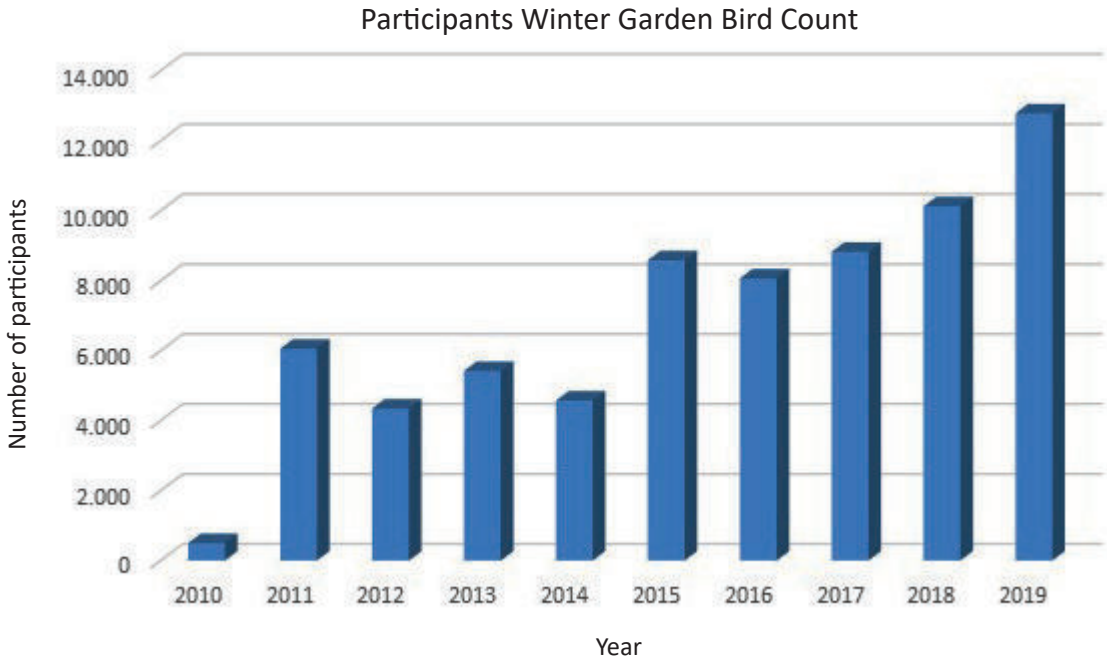

Figure 3. Over the last ten years a rising interest in the Winter Garden Birdwatch has been recorded.

cles throughout the year. Our philosophy is to use the participation in the Winter Garden Birdwatch as a starting point for deeper involvement. Once counting birds at their own bird feeders has sparked interest, people's attention can be widened: this could start with the provision of further information thus encouraging bird friendly gardening or the establishment of nesting boxes, and subsequently might make people get involved in protecting endangered species and caring about the preservation of their habitats (Daniels & Kirkpatrick 2006). Ideally, due to the personal involvement of the Winter Garden Birdwatch participants, these issues become an individual concern, as they also affect their "own" garden birds. Or in a nutshell, as Cannon puts it, "…garden birds are not pets but ambassadors of the wild …" (Cannon 1999).

Successes

Over the last ten years a rising interest in the Winter Garden Birdwatch has been experienced (Figure 3). Almost 13,000 people participated in the latest count in January 2019, an increase of 25% in comparison to the previous year. The main reason for these rising numbers is media coverage. Due to the easy concept, its topicality and civil engagement, the Winter Garden Birdwatch is a highly appreciated topic for online/offline media, radio and television. Through this massive public attention, many people were curious and wanted to make a contribution to this citizen science project. Apart from generating active citizen scientists, the recognition of BirdLife Austria amongst the wider public has been rising ever since the introduction of the count. Furthermore, not only has the number of the association´s members grown but also more people are willing to give donations. Another financial benefit of this high profile is the attraction of companies which support this count as sponsors.

Impact

As a matter of course, the developments portrayed above bring about change in an organisation. This participatory approach to research on the status of winter birds brings about demands from wider public, such as journalists seeking opinions from BirdLife experts, or rising enquiries about birds in general. However more than 40% of the current members of BirdLife Austria derive from participants in the Winter Garden Birdwatch. They can be distinguished from prior members that are more interested in science and conservation work; more recent recruits are often simply "birdlovers" with little scientific background. In order to keep them, it is important to modernise the organisation and adopt issues related to their specific interests.

Conclusion

The Winter Garden Birdwatch in Austria is a successful, well established citizen science project since 2010 that attracts more and more people every year. On one hand, it provides important data of winter birds in urban areas and is a valuable counterpart to the scientific research-programmes such as the Breeding Bird Monitoring Scheme. Furthermore, it helps raise awareness on birds and their protection in the wider public and is therefore a great opportunity for nature conservation. On the other hand, it also brings about change to the organisation itself: the wide public attention leads to new target audiences which have different views, demands and interests. These aspects need to be taken seriously in order to maintain this new power for birds and nature conservation.

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Winter Garden Bird Counts in Flanders (Belgium): increasingly popular but what do they learn us?

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Abstract. In January 2004, Natuurpunt, the Flemish BirdLife Belgium partner, launched the first Flemish Winter Garden Bird Count, 'Vogels Voeren en Beloeren' (Feeding and Watching Birds). From 2012 onwards , the promotion and development of this project, now renamed 'Het Grote Vogelweekend' (The Big Bird Weekend) was intensified. A digital portal was created and posters distributed. This resulted in a significant increase in the number of participants. Besides the counting action itself, we try to launch each year at least one concrete research question related to garden birds. Here, we present some preliminary results from common species. One of the main goals of Natuurpunt is to involve members and citizens in watching and monitoring wildlife. The Winter Garden Bird Count is a first and easy step in that direction. However, the large amount of data collected from Citizen Science-projects is to be treated with care. Reporting on results should focus mainly on easily recognisable species, which deliver the best data.

Introduction

In January 2004, Natuurpunt, the Flemish BirdLife Belgium partner, launched the first Flemish Winter Garden Bird Count, 'Vogels Voeren en Beloeren' (Feeding and Watching Birds). During the first two years, the number of participants remained below 5000.
This changed in the period 2006 to 2012 with each year between 6000 and 8000 participants. From 2012 onwards , Natuurpunt intensified the promotion and development of the Winter Garden Bird Count, now named 'Het Grote Vogelweekend' (The Big Bird Weekend), with a School Count campaign during a whole week and a Citizen Science campaign during the weekend. To promote both to a broader target audience, Flemish 'celebrities' were engaged. At the same time we also improved communication to the wider public. A digital portal was created and posters distributed. This resulted in a significant increase in the number of participants. From that point, their numbers increased with a five-fold (Figure 1).
Besides the counting action itself, we try to launch each year at least one concrete research question related to garden birds.

Methods

Counts preferably last 15 minutes. Counters are allowed to enter multiple counts of 15 minutes from the same address (site) during the entire weekend. In the analysis, we only use the highest number per species per address. Only the birds that are present in the garden are supposed to be counted. Birds flying over high or low, making no attempts to land, or paying no visible attention to the garden are not to be included in the count.
Participants report for each species the highest number of birds seen together. Species or individuals that are individually recognizable, are taken into account. In species showing sexual dimorphism, the highest number of males and females can be added (e.g. Chaffinch *Fringilla coelebs* and Blackbird *Turdus merula)*.

Training New Participants

The training of new counters is an important part of the campaign. An educational package was compiled and is downloadable from https://vogelweekend.natuurpunt.be: simple and clear digital or printed species webpages and leaflets, instructions to cultivate more natural gardens and

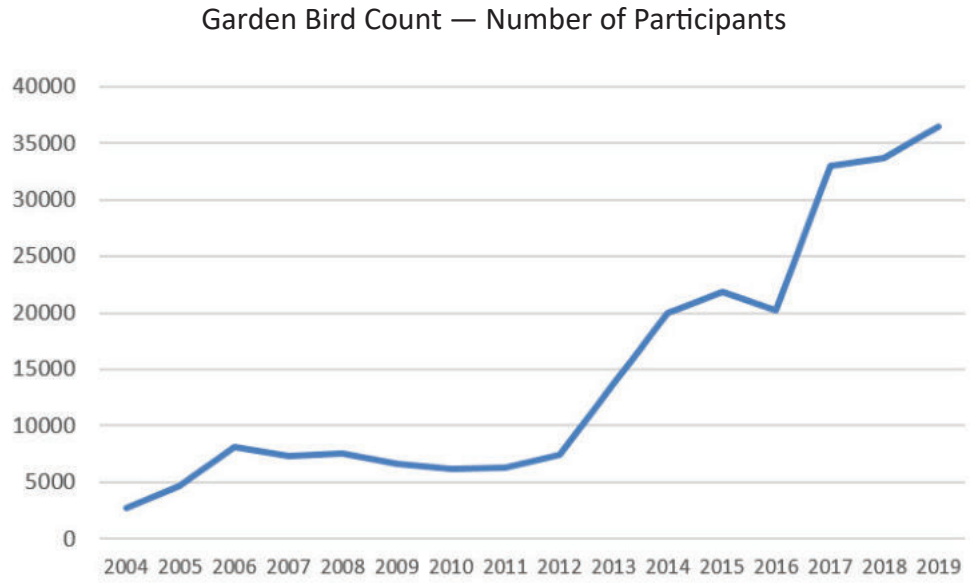

Figure 1. Evolution of the number of participants 2004–2019.

arrange better feeding tables or –places proved to be essential. Currently, these webpages are about the most popular within our website *www.natuurpunt.be*, which offers general information on the whole organisation of Natuurpunt, and Flemish nature in general. We registered 684.304 hits on https://vogelweekend.natuurpunt.be in January 2019. During the 2019 edition, the educational package was downloaded 480 times (396 in 2018), 1935 printed Winter Garden Bird Guides were dispatched (2022 in 2018).

Before, during and after the Garden Bird week, a team of volunteer Garden Bird Experts has been put together to serve participants on many questions about Winter Garden Birds and feeding. For this, a central Garden Bird Expert e-mail address was set up. Questions are heterogeneous but we see a recurrent concern about the high numbers and overall presence of crows and pigeons. An important role of the Garden Bird Expert team is to inform participants objectively.

Despite the increase in the number of participants since the start of the project and a growing popularity of garden birdwatching, we note a clear decrease in the average number of birds per garden over the years (Figure 2). Apart from the obvious declines in some species, certain changes in the profiles of our participants may play an important role in this shift. During the first years of the campaign, participants were drawn much more from our regular Natuurpunt members.

As is to be expected in Citizen Science projects, the number of misidentifications is considerably

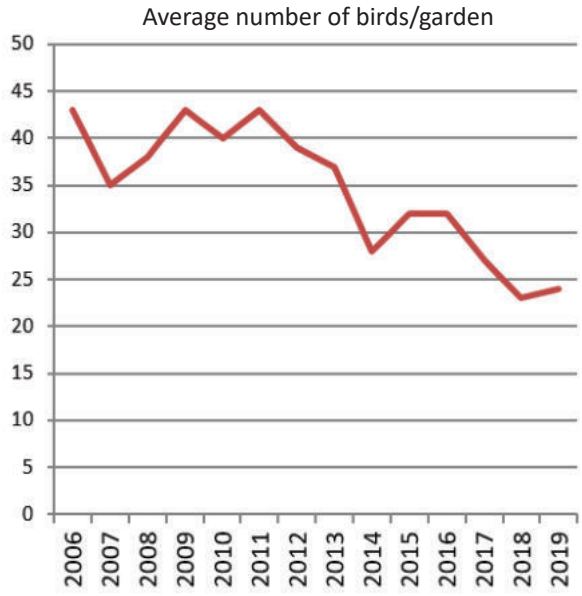

Figure 2. Average number of birds per garden 2006–2019.

higher than in our more advanced data portals like *www.waarnemingen.be*. Particularly in some species, like House Sparrow *Passer domesticus* and Tree Sparrow *P. montanus*, the amount of errors is higher than in straightforward species. Others are tangled by nomenclature, this is especially the case in Dunnock *Prunella modularis* (=Hedge Sparrow in Dutch). To limit the risk of such errors, the entry field for numbers is used as a filter (Passer sparrows generally occur in groups, but Dunnocks not during winter). If counters are warned that 10 Dunnocks is an erroneous number for this species, they feel that something

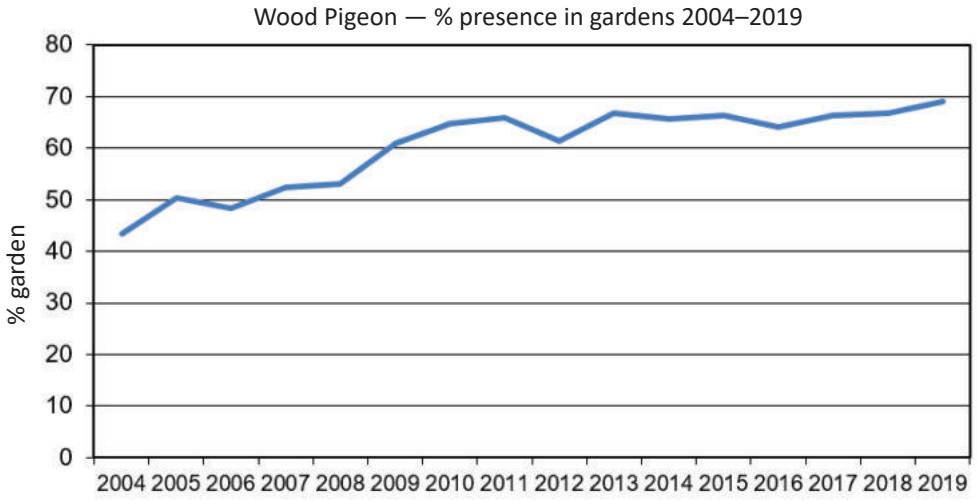

Figure 3. Proportion of gardens from which Wood Pigeon was reported during winter counts 2004–2019.

was wrong in their identification or count. In case of Dunnock, the maximum value is now set at 5 individuals. On the other hand, we believe in a quick improvement of participants and results.

Results

Since 2012, a more citizens participated in the Winter Garden Bird Count. The objective to increase public involvement was a success. But as its popularity grew, results became more difficult to interpret. The proportion of more naturally arranged gardens as well as the field-experience of participants was considerably higher in the first 6 years. As a result, earlier means of 40 to 45 birds/garden in 2006–2007, were perhaps much more a representation of the number of birds in 'more natural gardens', where good and long-term feeding takes place. Currently, the mean numbers originate mostly from less natural gardens.

Public campaigns like a Garden Bird Count yield a lot of data but much of the information is difficult to interpret. With the 2019 edition, a record 773.583 birds were reported. Several factors can influence the results. The number of northern migrants wintering in Western Europe differs every winter. In some years winter birds are abundant and food is plenty, so they do not feel the need to visit garden feeders. Furthermore, also regional distribution and differences in habitat preferences can play an important role. Moreover, not all people feed birds all year round, or sufficiently varied enough.

In our communication on the results, we focus on species that are less affected by these factors. Easy recognition plays certainly an important role to make the results more reliable. For example, data of House Sparrow are far more robust and reliable than those of Tree Sparrow. The latter tends to be more often incorrectly identified. As a consequence, we avoid statements about Tree Sparrow results in our final reports. However, incorrect identifications of Tree Sparrow have hardly any influence on the robust numbers of House Sparrow. In 2019, a total of 2.277 Tree Sparrows was reported, which was only 15% of the number of House Sparrows. The portion of misidentified Tree Sparrows would only have a minor influence on the number of the (still) quite common House Sparrow.

Easy recognizable species such as Black-billed Magpie *Pica pica*, Collared Dove *Streptopelia decaocto*, Wood Pigeon *Columba palumbus*, Blackbird, Song Thrush *T. philomelos*, Ring-necked Parakeet *Psittacula krameri*, Goldfinch *Carduelis carduelis* and Long-tailed Tit *Aegithalos caudatus* are also generating more reliable results.

On the other hand, data from mixed species flocks such as Brambling *F. montifringilla* and Chaffinch, and of gulls, are much more difficult to interpret because of the higher potential of misidentification.

Increasing species

The **Wood Pigeon** has expanded considerably over recent decades. It has shifted its habitat preference from forests to just about everywhere. In 2004 the species was present in about 43% of the gardens counted, nowadays, they are present in 69%, and its numbers are still increasing (Figure 3).

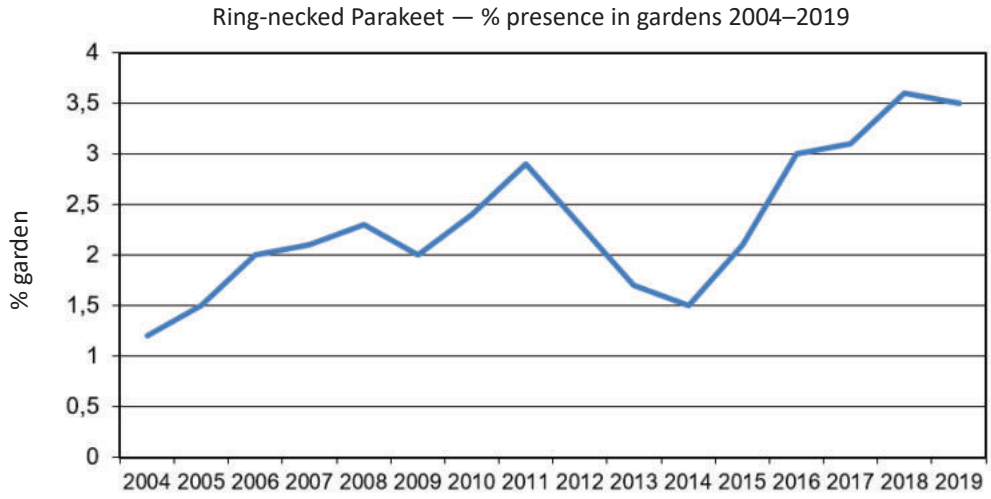

Figure 4. Proportion of gardens from which Ring-necked Parakeet was reported during winter counts 2004–2019.

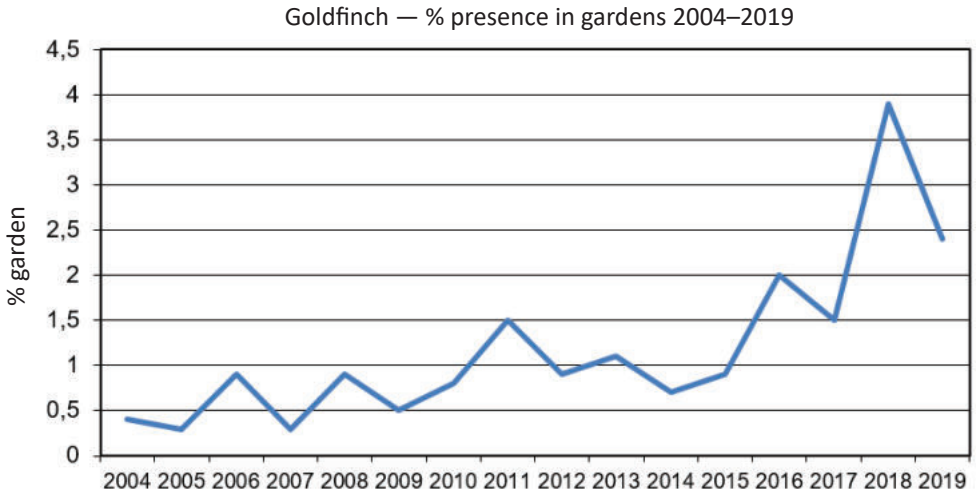

Figure 5. Proportion of gardens from which Goldfinch was reported during winter counts 2004–2019.

For several decades, the **Ring-necked Parakeet** finds its stronghold in the Brussels Region. However, over the past 15 years, the species has expanded its distribution over a large part of Flanders. They have now been observed in 3.5% of the gardens, compared to 1% at the start of the Garden Bird Count (Figure 4).

For a long time, the **Goldfinch** has been virtually absent in large parts of Flanders. It had completely disappeared from urban areas and remained present mainly on wasteland. From 2010 onwards, a clear increase was noted. Although the species is not massively attracted to feeders or gardens, we saw an increase in presence from 0.5 to 2.5 in the early years of the century to 4% in 2018. The species is now even present in most of the larger Flemish cities (Figure 5).

Declining species

In spite of an increasing number of participants, each year fewer **House Sparrows** are seen. Until 2010, the species was present in more than 60% of the counted gardens. In 2018, this fell below 50% and in 2019 we reached a historic low with 45.1%. Also, the size of the flocks is decreasing. In 2004 we registered a median of 6 individuals, whereas the median was only 4 over recent years (Figure 6).

Since 2009, we saw a sharp decline in the occurrence of **Long-tailed Tit** in Flemish gardens, with a presence in less than 10% of the gardens in 2015 as an all-time low. In 2009, an influx-winter, a maximum of 44% was reached. During the last years there is a slight recovery (Figure 7).

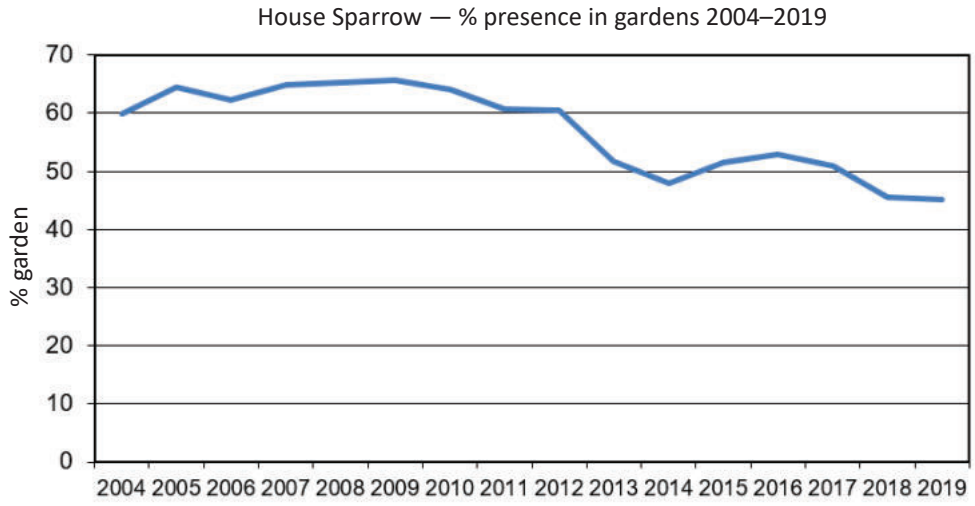

Figure 6. Proportion of gardens from which House Sparrow was reported during winter counts 2004–2019.

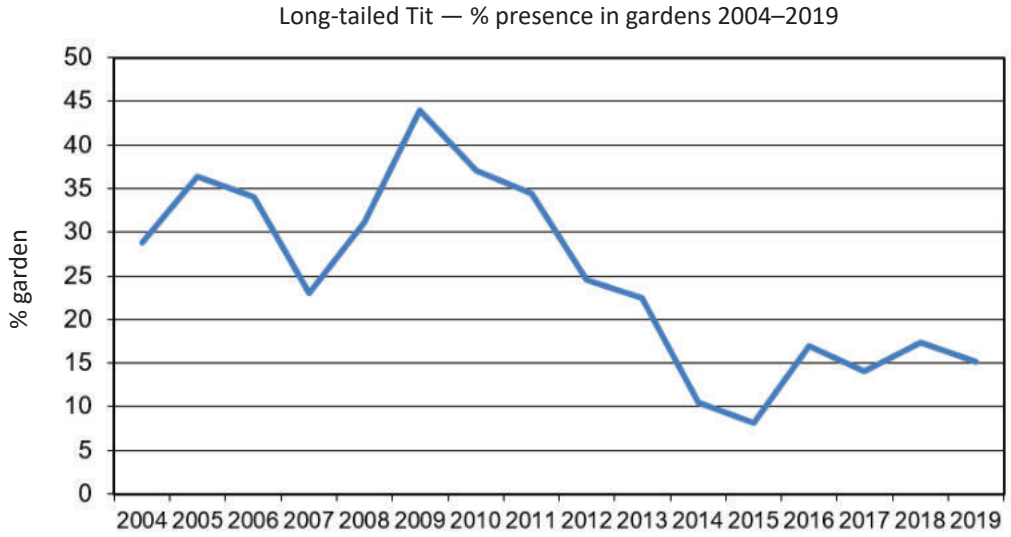

Figure 7. Proportion of gardens from which Long-tailed Tit was reported during winter counts 2004–2019.

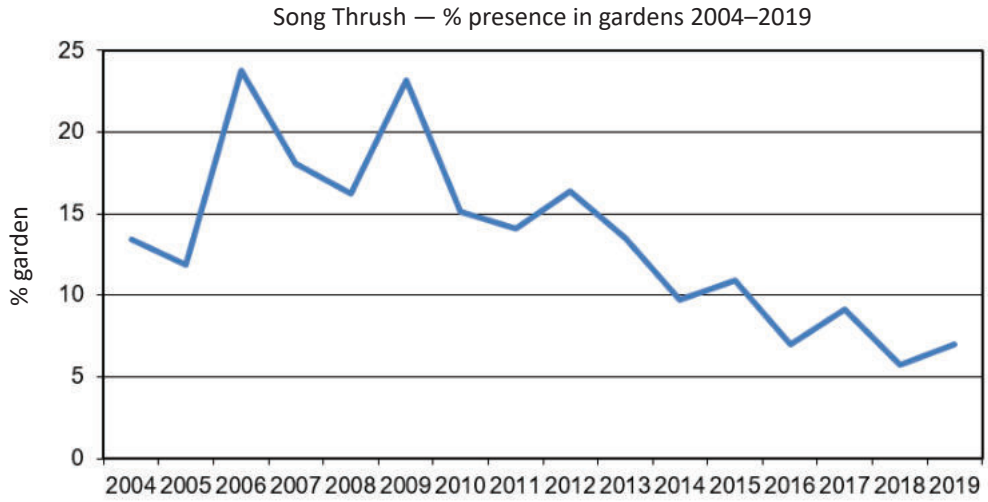

Figure 8. Proportion of gardens from which Song Thrush was reported during winter counts 2004–2019.

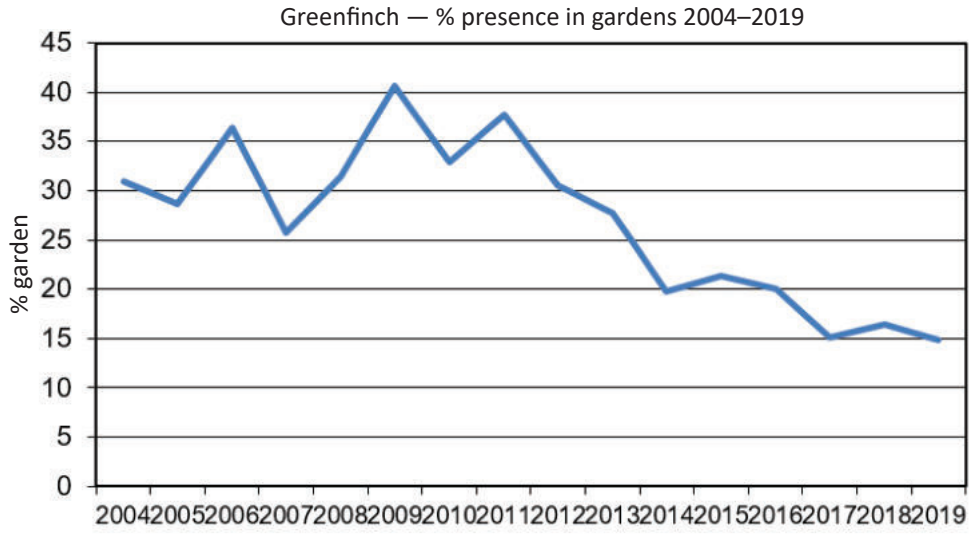

Figure 9. Proportion of gardens from which Greenfinch was reported during winter counts 2004–2019.

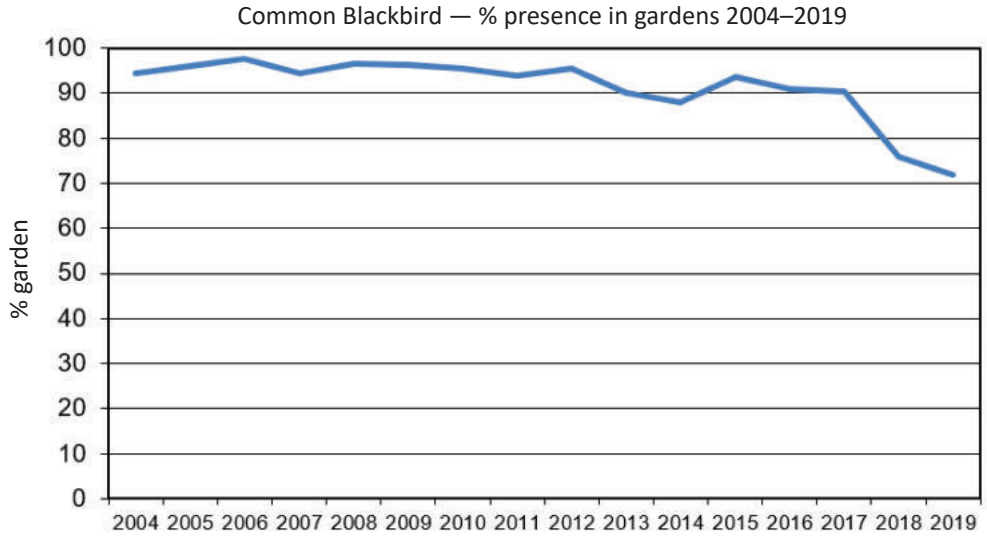

Figure 10. Proportion of gardens from which Blackbird was reported during winter counts 2004–2019.

Song Thrush has a much lower detection rate than most similar-sized passerines, most probably because this species winters more to the south. There are strong similarities between the species' decreasing trend in the Garden Count and its trend in more standardised monitoring schemes (Figure 8).

Since 2010, **Greenfinch** *Chloris chloris* shows a sharp decline in the Flemish region. The Winter Garden Bird Counts show a historical low for 2019. Greenfinches are one of the main victims of the parasite *Trichomonas gallinae*. In the UK Trichomonas has caused a dramatic decline in the species (*https://www.bto.org/volunteer-surveys/gbw/gardens-wildlife/garden-birds/disease/trichomonosis*, Robinson et al. 2010, Lawson et al. 2012). As food can easily infect other individuals, therefore, we recommend participants to replace food on a regular basis and to clean feeding places thoroughly, however, we do not know to what extend this advice is taken into account (Figure 9).

In 2019, **Blackbird** showed the most dramatic decline of all common garden birds. After annual outbreaks of the USUV-virus since 2016, numbers dropped significantly. Provincial patterns perfectly followed the regional, westward expansion of the virus. In 2006, Blackbirds were present in 97.6% of the gardens counted. Now, in 2019, it was seen in less than 72% of the gardens (Figure 10).

Until 2017, Blackbird was the most widespread garden bird in Flanders. In 2019 Great Tit *Parus major* took over, only because of the strong decline of Blackbirds.

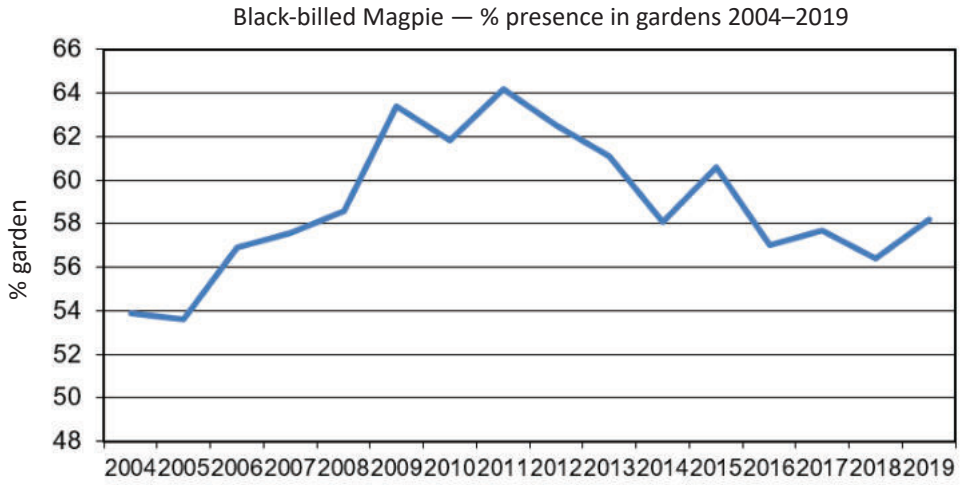

Figure 11. Proportion of gardens from which Black-billed Magpies were reported during winter counts 2004–2019.

Although the **Black-billed Magpie** is known as a very common species, numbers are clearly declining after the peak-years of 2008–2013. This is quite remarkable as nest locations shifted to urban areas (Herremans & Gielen 2017), which should make them more visible for citizens and one would expect an increase of the species in gardens (Figure 11).

Common species with unclear patterns

Chaffinch traditionally scores top 3-rankings, and was the winner in 2019. The influence of winter severity, food availability in forest (Beech crop) and the varying movements of numbers of northern migrants, however, make comparison between different years particularly difficult. Species that are hardly attracted by feeders, such as **Winter Wren** *Troglodytes troglodytes*, have lower detection rates. They produce rather unclear patterns.

Research Topics

Does the presence of dogs and cats have a negative influence on the number of garden birds (2018)?

Participants were asked to provide information on the frequency and numbers of dogs and cats in their garden. This survey yielded surprisingly few patterns.

Possibly, gardens with (large) dogs are often bigger and therefore potentially more attractive for birds. On the other hand, gardens where no cats were reported, may be visited by cats much more than was reported by the owners.

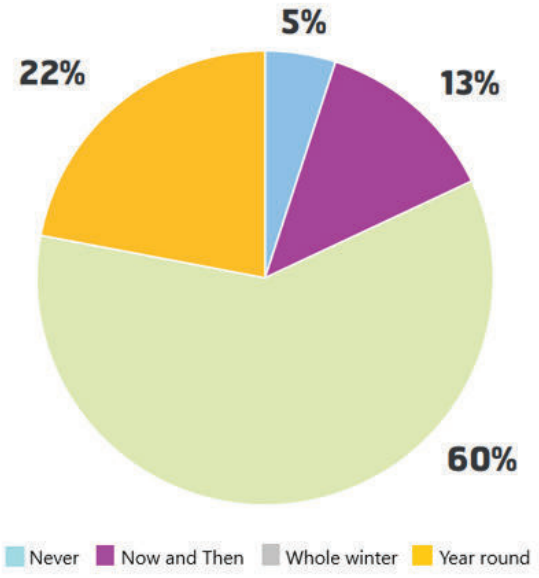

Figure 12. Proportion of frequency of feeding in gardens.

What is the influence of year-round or occasional feeding of garden birds (2018)?

Participants indicated the seasonal frequency of feeding in their garden (Never, Now and then, Whole winter or year-round). The number of birds visiting gardens is clearly influenced by the frequency of feeding. In gardens where feeding takes place on a regular base, there are more birds of more species than in gardens where feeding is sporadic. Gardens where feeding happened year-round attracted most birds: at these locations about 50% more birds were counted compared to gardens where birds are only occasionally fed. In the Natuurpunt Garden Bird Count, 60% of the participants feed birds only in

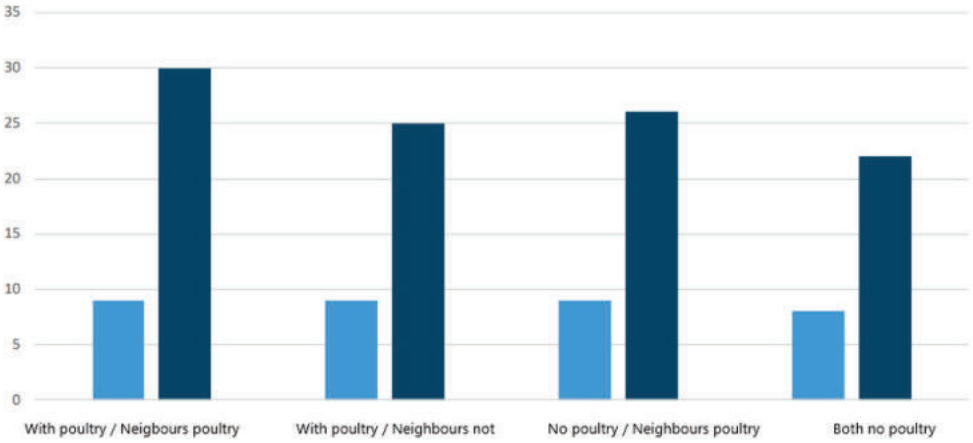

Figure 13. Number of species and individuals in gardens with/without poultry.

winter but on a daily base, 22% feed throughout the year (see Figure 12).

Does poultry attract more garden birds (2019)?

In 2019, participants indicated presence (or absence) of chickens or other poultry in their own and/or in adjacent gardens. Apparently, with poultry present, there are approximately 10 individuals and 1 species more than in gardens without (Figure 13).

Conclusion

Watching and counting winter garden birds is more popular than ever in Flanders. In this densely urbanised region of Belgium, citizens show an increasing willingness to get involved into activities related to nature exploration. Participants are eager to learn more about bird feeding methods and be trained in recognising and counting various species groups in their gardens (e.g. through Butterfly counts). One of the main goals of Natuurpunt is to involve members and citizens in watching and monitoring wildlife. For many people, the Winter Garden Bird Count is a first and easy step in that direction.

However, the large amount of data collected from Citizen Science-projects is to be treated with care. Reporting on results should focus mainly on easily recognisable species, which deliver the best data.

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