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

Romain Lorrillière^{1*}, Carmen Bessa-Gomes¹, Nicolas Deguines¹, Benoit Fontaine², Frédéric Jiguet², Marjorie Poitevin³, Sebastien Turpin² and François Chiron¹

¹ Ecologie Systématique Evolution, AgroParisTech, CNRS, Université Paris-Sud,
Université Paris-Saclay, Orsay

lorrilliere@mnhn.fr, carmen.bessa-gomes@u-psud.fr, nicolas.deguines@u-psud.fr,
francois.chiron@u-psud.fr

² CESCO, UMR 7204, French National Museum of Natural History
benoit.fontaine@mnhn.fr, frederic.jiguet@mnhn.fr, sebastien.turpin@mnhn.fr

³ LPO – Fonderies Royales – CS 90263, 17305 Rochefort CEDEX marjorie.poitevin@lpo.fr

* Corresponding author: Romain Lorrillière lorrilliere@mnhn.fr

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. Garden 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

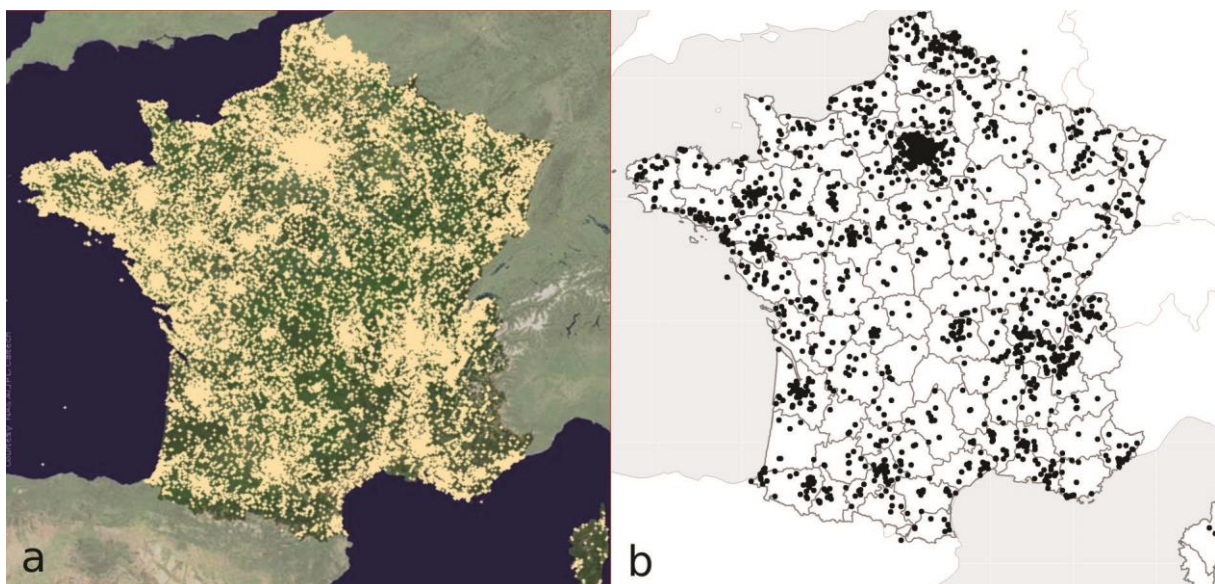


Figure 1. Locations of (a) gardens of the French Garden Birdwatch, and (b) feeder stations of BirdLab.

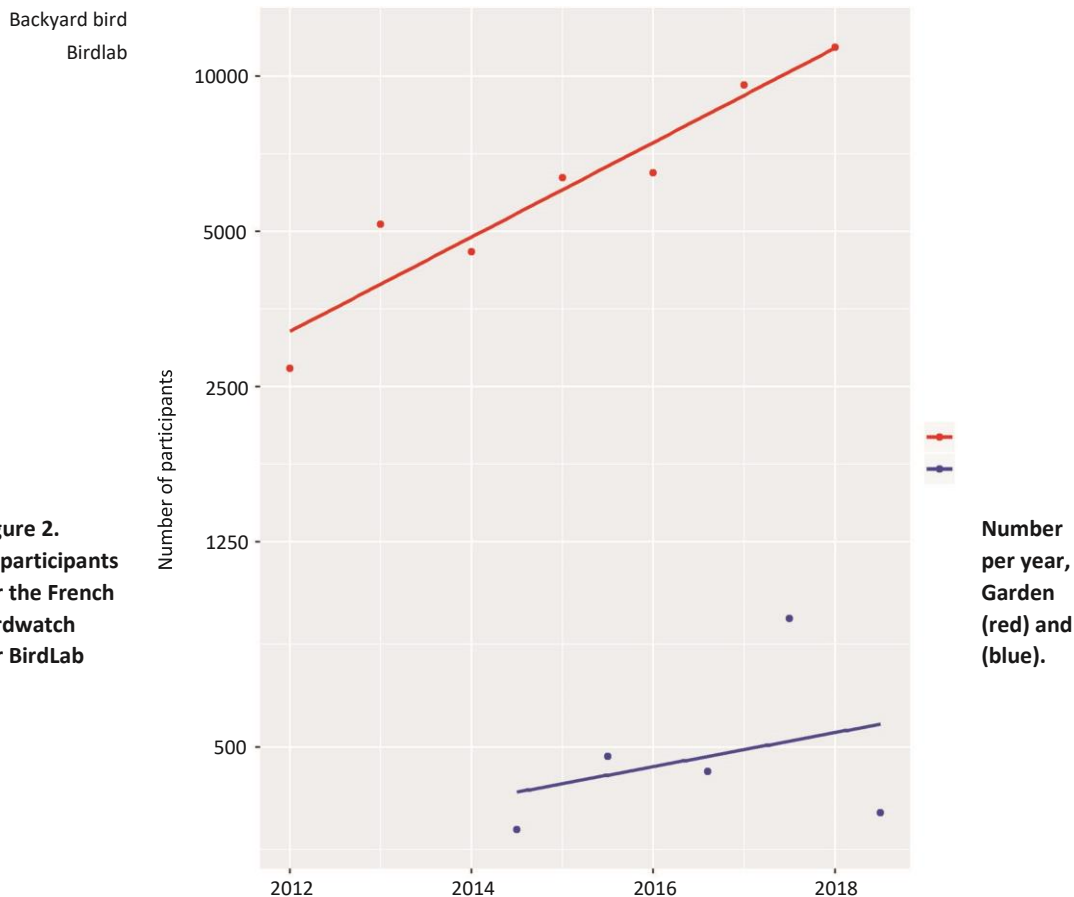


Figure 2.
of participants
for the French
Birdwatch
for BirdLab

Number
per year,
Garden
(red) and
(blue).

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).

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 beginning 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 FGB 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

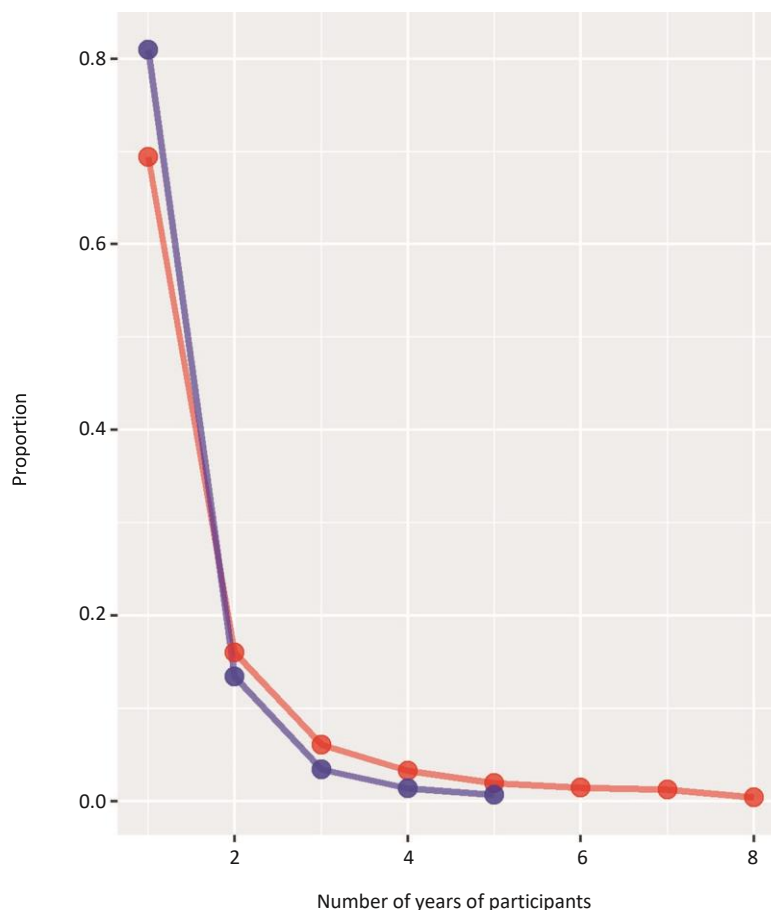
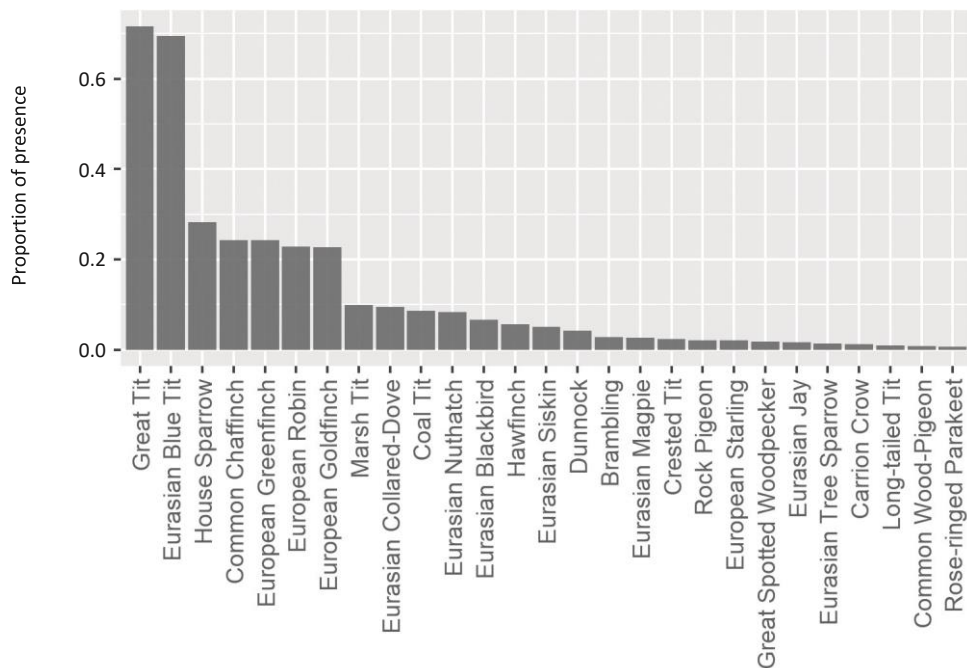


Figure 3. Distribution of the longevity of participants in the French Garden Birdwatch (red) and BirdLab (blue).



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



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 5. Proportion of presence in BirdLab samples.

genicity 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

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.*

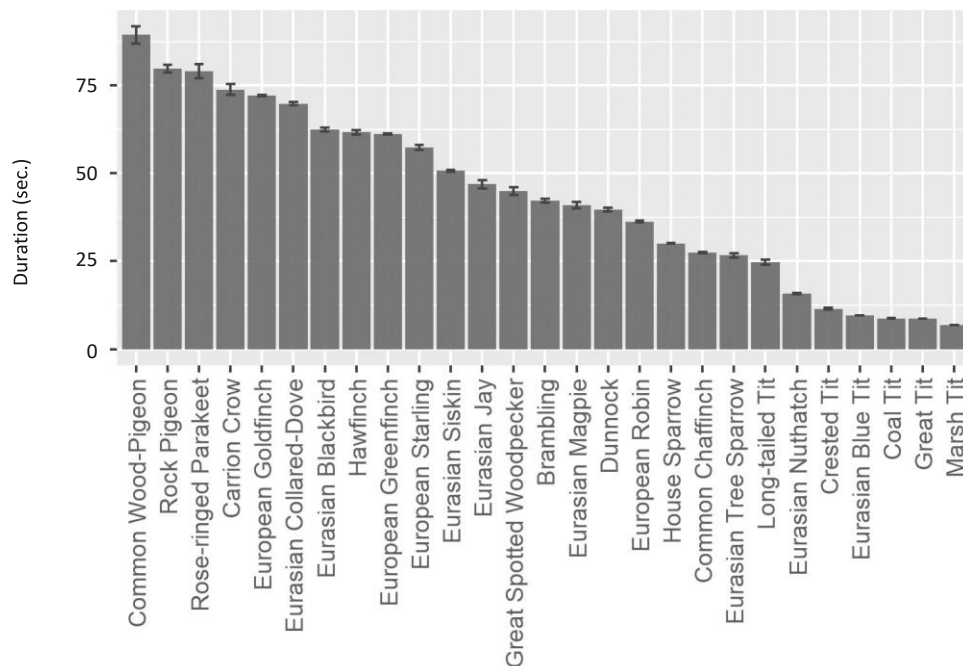


Figure 6. Duration of the bird's presence at the feeder station in BirdLab data.

the second half of winter in landscape that can 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*

(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

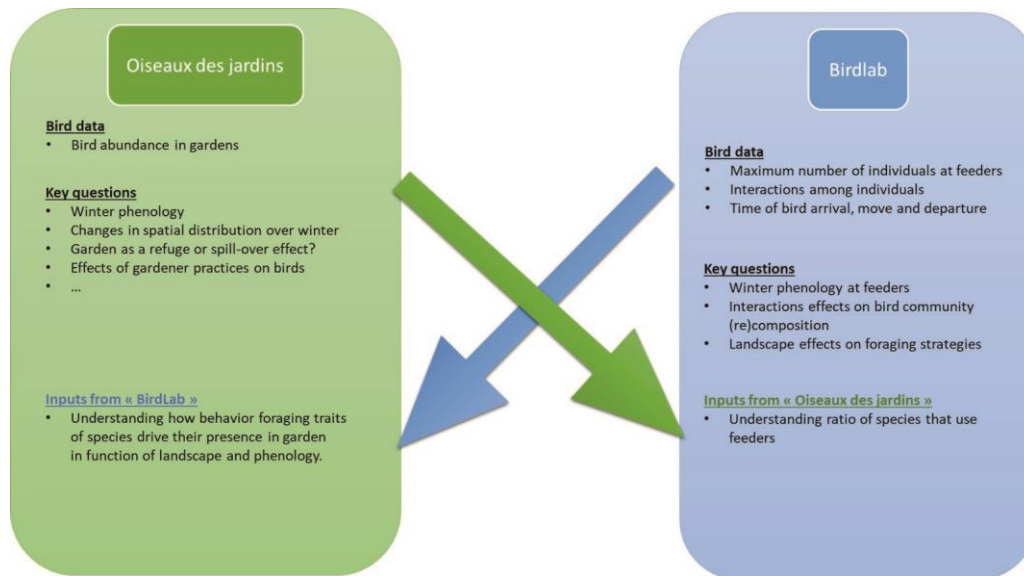


Figure 7. The two French schemes about the French Garden Birdwatch bird during the winter and their connexion.

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

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years, we wish to develop new collaborations, for example within the EBCC frameworks, for adapting and spreading BirdLab over other European countries.

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