

# The Garden Bird Survey: monitoring birds of Irish gardens during winters between 1994/95 and 2003/04

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BirdWatch Ireland's Garden Bird Survey (GBS) has been running since the winter of 1994/95. Participants provide the peak count of each species seen in their gardens over a 13-week period, beginning in the first week of December. Data were submitted for a total of 1,648 gardens between 1994/95 and 2003/04. The large majority of these were located in Leinster, and one-third of gardens were located in County Dublin alone. Most gardens were located in suburban (49%) or rural (47%) areas. Almost all participants provided additional food, mostly peanuts (95%). A total of 106 species was recorded during the GBS. Most gardens (65%) supported between 16 and 25 species. The greatest diversity of species and highest numbers overall were found in large rural gardens, and a peak of 50 species was recorded in one such garden in County Wicklow in 2001/02. Urban gardens generally supported fewer birds and fewer species, probably due to more limited diversity of habitats available (fewer trees and shrubs in particular). Robin *Erithacus rubecula*, Blackbird *Turdus merula*, Blue Tit *Parus caeruleus* and Chaffinch *Fringilla coelebs* were the most widespread species recorded, while House Sparrow *Passer domesticus*, Greenfinch *Carduelis chloris*, Starling *Sturnus vulgaris* and Rook *Corvus frugilegus* were the most abundant. The incidences of winter sightings of several species increased over the 10 seasons, and was particularly substantial in Goldfinch, which is also showing dramatic range expansion during the breeding season. Continued increases in sightings of species such as Blackcap *Sylvia atricapilla*, Starling, Siskin *Carduelis spinus* and Redpoll *C. flammea*, were associated with immigration from other countries (mostly the Continent and Scandinavia) during cold weather periods.

## Introduction

Gardens are well known havens of wildlife, and in many cases support a high diversity and large numbers of many species. Among bird groups, many songbird species show strong tendency towards gardens. Gardens provide a wider diversity of habitats than would otherwise be available in their natural environment. Abundance of exotic plant species, such as *Cotoneaster* sp., along with native species such as Rowan *Sorbus aucuparia* and



Hawthorn *Crataegus* spp. provide food (berries), particularly during the winter. Other plant species such as Ivy *Hedera* spp., *Griselinia* and even the highly prevalent *Leylandii* provide nesting habitat during the breeding season and shelter during the winter months. Such plants also serve to attract insects upon which many garden bird species feed. The provision of supplementary food and

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**Plate 112.** Goldfinch (Daragh Owens).

nestboxes provides additional incentive for many resident species in particular to remain local throughout the year.

During the winter, supplemental feeding of birds is especially important in countries with harsh weather conditions. Access to their natural food supplies may be impeded by a range of factors, the most extreme which includes snow cover. Additionally, invertebrate survivorship and plant growth, both which may provide food for birds, are both limited during the winter months.

Many studies have focussed on the monitoring of garden birds (e.g. Cowie and Hinsley 1988, Thompson et al. 1993, Jokimäki et al. 2002, Bland et al. 2004, Chamberlain et al. 2004, Toms 2003). It has been shown that Ireland, along with Scandinavia, has a history of the highest frequency of feeding birds in gardens throughout most of Europe (Thompson et al. 1993). The concern about the welfare of birds during the winter by the Irish public is reflected in the volume of correspondence received by BirdWatch Ireland.

During the winter of 1994/95, the first focussed study on garden birds in Ireland was undertaken. The Garden Bird Survey (GBS) has since been continued on an annual basis, and has proven to be BirdWatch Ireland's most popular bird survey. During the winters between 2000/01 and 2002/03 inclusive, the GBS received additional financial support from the Electricity Supply Board (ESB). Most of this funding was channelled towards increased promotion of the survey via the media, and as expected, it resulted in a substantial increase in interest and participation.

The GBS is primarily focussed on monitoring the numbers and diversity of birds using gardens in Ireland during the mid to late winter period. Annual results are summarised in BirdWatch Ireland's *Wings* magazine. Now ten seasons on, this paper provides a summary of some of the survey's findings.

## Methods

The GBS has been in operation since 1994/95. It is carried out over a 13-week period, between early December and the end of February. GBS Participants are asked to record the peak count of each bird species in each of the 13 weeks. Since the 2000/01 season, additional data have been routinely collated on the types of food provided (seeds, peanuts, fruit, fat or scraps, and whether or not berries are available), on the size of gardens, and whether the participating garden is situated in an urban, suburban or rural area.

The analyses of winter garden bird trends are limited due to the clumped distribution of gardens from which

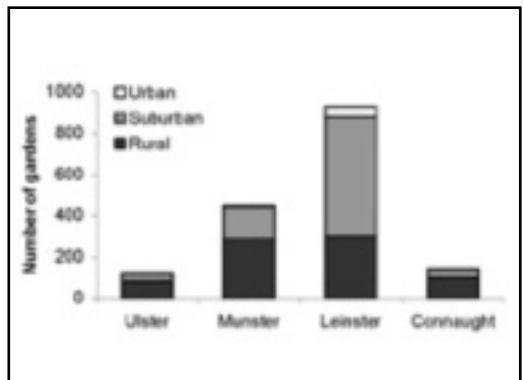
data have been provided. The diversity and abundance of species were measured and compared by province, garden size and environmental setting (i.e. rural, urban or suburban). Diversity was measured as the number of species present per garden in each season. For each garden, the peak number of species per garden over all seasons was used. Abundance was calculated as the total number of birds present over all weeks in all winters.

The mean number of birds and abundance of species per garden were compared between provinces, and gardens of different sizes and environmental setting (rural, urban or suburban) using the Kruskal-Wallis non-parametric test (due to disparate sample sizes of the sampling groups).

The latin names of all species mentioned in the text are given in Appendix 1.

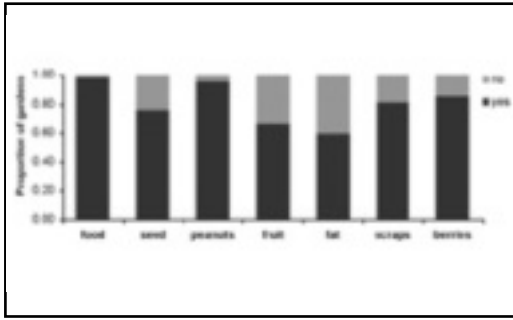
## Results

Data were submitted for a total of 1,648 gardens between 1994/95 and 2003/04. These are predominantly located in the east of the country (Leinster, Fig. 1), with the number of participating gardens in Dublin alone comprising one third of the total gardens overall. The majority of gardens were suburban (49%) or rural (47%) based (Fig. 1), with a very small proportion situated in urban areas, most of which (83%) were located in Dublin.



**Figure 1.** Number of gardens participating in the GBS between 1994/95 and 2003/04, also indicating the proportion of gardens situated in rural, suburban and urban areas.

During recent winters (since 2000/01), almost all participants (98%) indicated that they provided food (Fig. 2). Peanuts were the most popular food, provided in 95% of gardens, while berries were available in 85% of gardens.



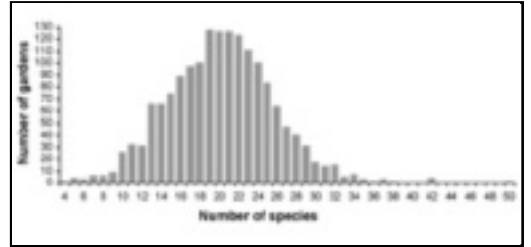
**Figure 2.** Food available in gardens during the GBS.

Considerable variability was shown in the diversity and abundance of bird species present in Irish gardens of different location, size and environmental setting (Table 1). The mean number of bird species recorded per garden (18.9) was relatively constant between provinces (Kruskall-Wallis  $\chi^2=5.77$ , d.f.=4,  $P>0.05$ ) (Table 1), though it appears that gardens in Munster supported marginally more species. This pattern was not reflected in abundance. A mean of 50.3 birds per garden was estimated over all weeks and winters, and abundance was lowest in Leinster and greatest in Connaught ((Kruskall-Wallis  $\chi^2=28.11$ , d.f.=4,  $P<0.001$ ). Large gardens supported a the greatest number of species (Kruskall-Wallis  $\chi^2=54.98$ , d.f.=2,  $P<0.001$ ) and birds overall (Kruskall-Wallis  $\chi^2=65.65$ , d.f.=2,  $P<0.001$ ). Rural gardens supported more species (Kruskall-Wallis  $\chi^2=18.21$ , d.f.=2,  $P<0.001$ ) and birds (Kruskall-Wallis  $\chi^2=74.50$ , d.f.=2,  $P<0.001$ ).

**Table 1.** Mean number and abundance of species per garden, by province, gardens size and environmental setting (urban, suburban or rural).

	Mean no. species	Abundance	n
<b>Province</b>			
Ulster	18.8	51.7	120
Munster	19.3	51.4	453
Leinster	18.7	47.7	931
Connaught	18.6	64.5	145
<b>Garden size</b>			
Small	18.1	42.2	248
Medium	18.6	42.8	303
Large	20.7	60.1	552
<b>Environmental setting</b>			
Rural	19.4	60.6	726
Suburban	18.7	43.0	763
Urban	16.6	29.8	53

In total, 106 bird species were recorded, 43 of which were recorded during all winters. The majority of gardens (65%) supported between 16 and 25 species (Fig. 3). The number of species in each garden ranged from just four species in one Dublin garden to a peak of 50 species in a large rural garden in County Wicklow in 2001/02. This same garden has recorded a total of 59 species over the entire survey.



**Figure 3.** Peak annual count of species per garden between 1994/95 and 2003/04.

A total of 19 species was recorded in at least 50% of gardens, while 32 were present in at least 10%. Robin, Blackbird, Blue Tit, Chaffinch and Great Tit were the most widespread, and the list of top-20 most widespread species (Table 2) was relatively consistent among all provinces.

**Table 2.** Top 20 most widespread species in Ireland and each of the provinces. Numbers reflect percentage of gardens.

Species	Overall	Munster		Connaught	
		Ulster	Leinster		
Robin	0.99	1.00	0.99	0.99	0.99
Blackbird	0.98	0.98	0.98	0.99	0.99
Blue Tit	0.98	0.98	0.98	0.99	0.96
Chaffinch	0.95	0.99	0.97	0.93	0.98
Great Tit	0.92	0.94	0.94	0.90	0.92
Magpie	0.91	0.80	0.91	0.92	0.87
Greenfinch	0.90	0.93	0.94	0.89	0.90
Coal Tit	0.86	0.94	0.85	0.85	0.81
Dunnock	0.80	0.83	0.81	0.79	0.78
Song Thrush	0.80	0.79	0.83	0.78	0.84
House Sparrow	0.80	0.69	0.83	0.82	0.61
Wren	0.78	0.77	0.81	0.76	0.82
Starling	0.71	0.71	0.64	0.75	0.69
Jackdaw	0.71	0.62	0.73	0.70	0.74
Rook	0.63	0.61	0.73	0.59	0.69
Wood Pigeon	0.55	0.38	0.48	0.62	0.39
Collared Dove	0.54	0.47	0.47	0.60	0.36
Siskin	0.52	0.63	0.53	0.50	0.50
Goldfinch	0.51	0.58	0.45	0.53	0.48
Pied Wagtail	0.49	0.72	0.36	0.64	0.66

House Sparrow, Greenfinch, Chaffinch, Starling and Rook were the most numerous species (Table 3). Abundance was generally variable throughout the country (Table 3), and ranged from a peak of just 4 in a small suburban garden in Dublin in 2003/04 to 2,099 in a large rural Waterford garden in 2000/01, though a large flock of 2,000 Starlings predominated this latter peak. The largest mean (990 birds per week) was recorded in a large rural garden in County Mayo. However, this mean was also heavily influenced by large and regular flocks of Starlings (a minimum of 100 birds was recorded in every winter surveyed).

Goldfinch showed the most dramatic increase in range during the course of the survey. It was present in just 6 gardens (4% of total) in 1994/95, and increased to 548 gardens (78% of total) in 2003/04 (Fig. 4a). Considerable concern has been raised in the UK about declines in House Sparrow and Starling. However, their occurrence in gardens in Ireland during the winter has remained relatively stable during the survey (see House Sparrow pattern of occurrence illustrated in Fig. 4a). The House Sparrow appears to have occurred in proportionately fewer gardens in Connaught (Table 2), though it has continued to become increasingly widespread there over the 10 winters. Most garden bird species appear to have become increasingly more widespread (i.e. they have been recorded in increasing number of gardens) during the GBS, and other examples are illustrated in Figure 4a & b.

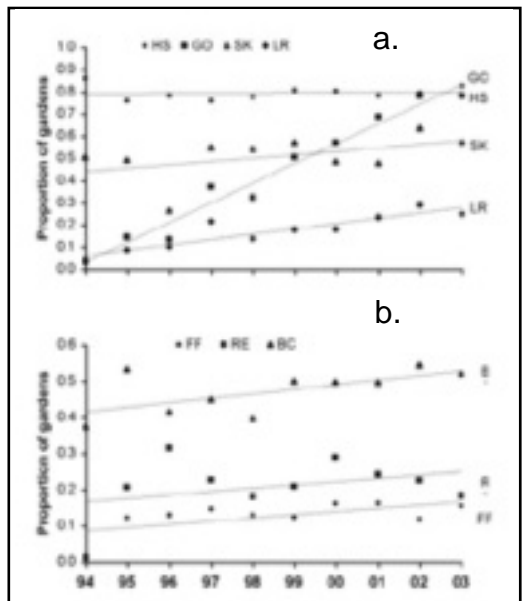
Several species showed consistency in patterns of occurrence in gardens over the 13-week period. Records of Blackcap, Starling, Siskin, Redpoll were all shown to increase continually as the winter progressed, while those of Fieldfare and Redwing increased during the first four to five weeks, into early January, and declined thereafter (Fig. 5a&b).

**Discussion**

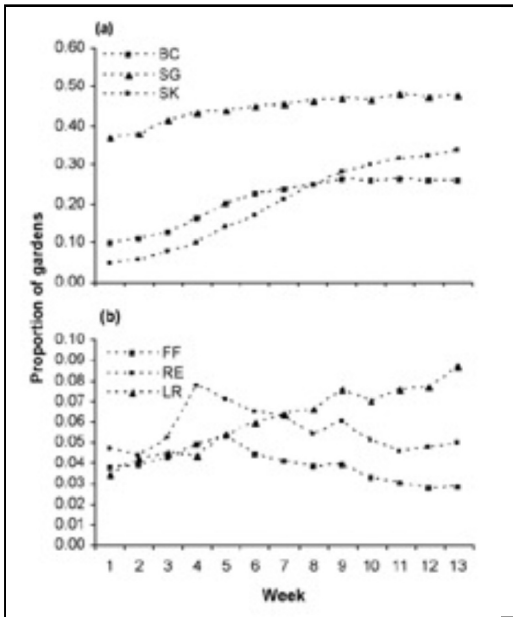
During the winter, birds benefit significantly from additional food provided by humans. Despite the efforts of the Irish public at attracting large numbers of birds into their gardens, the country has been shown to support a low diversity of species relative to other European countries in northwest Europe (Thompson et al. 1993). However, this is probably not surprising given that Ireland generally supports low numbers of birds throughout the year, much lower than our nearest neighbours, Britain. There are many hypotheses, but it seems that species diversity has been constrained by Ireland's milder climate (which allows greater survivorship and earlier nesting in resident species, leaving less resources available for migrants), location at the end of a number of

**Table 3.** Top 20 most abundant species in Ireland and each of the provinces. Figures indicate the mean number of species per garden per week.

Species	Overall	Munster		Connaught	
		Ulster	Leinster	Ulster	Leinster
House Sparrow	5.8	4.1	6.0	6.3	3.6
Greenfinch	5.6	5.0	6.8	5.0	7.5
Chaffinch	5.4	7.9	5.6	4.4	9.3
Starling	4.9	4.9	3.0	5.4	6.4
Rook	3.3	3.2	3.6	2.6	7.1
Blue Tit	2.7	3.0	2.7	2.7	2.4
Jackdaw	2.6	2.9	3.1	2.1	4.4
Blackbird	2.6	2.5	2.2	2.7	2.8
Great Tit	1.9	2.6	2.2	1.6	2.1
Coal Tit	1.8	2.9	1.9	1.6	2.2
Magpie	1.6	1.4	1.3	1.7	1.4
Robin	1.5	1.7	1.6	1.4	2.1
Collared Dove	1.1	0.9	1.0	1.2	0.8
Dunnock	1.0	1.1	1.0	0.9	1.0
Woodpigeon	0.9	0.6	0.8	1.0	0.4
Goldfinch	0.8	1.3	0.7	0.8	0.8
Song Thrush	0.6	0.6	0.7	0.5	0.9
Siskin	0.6	0.9	0.6	0.5	0.8
Wren	0.6	0.6	0.7	0.5	0.7
Redwing	0.5	0.2	0.7	0.4	1.1



**Figure 4.** Proportion of gardens supporting (a) House Sparrow (HS), Goldfinch (GO), Siskin (SK) and Redpoll (LR) and (b) Fieldfare (FF), Redwing (RE) and Blackcap (BC) during the GBS (species were grouped according to the most suitable scale, please note that scales differ).



**Figure 5.** Patterns in occurrence over the 13-week period of (a) Blackcap (BC), Starling (SG) and Siskin (SK) and (b) Fieldfare (FF), Redwing (RE) and Redpoll (LR) during the GBS (species were grouped according to the most suitable scale).

migratory flyways and more limited range of available habitats (Hutchinson 1989). A milder climate allows greater survivorship and earlier nesting in resident species. Thus, less resources are available to migrants. Ireland is situated at the end of a number of migratory flyways. A number of habitats present in Britain are absent from Ireland.

### Survey participation and general patterns of occurrence

The GBS has shown that feeding birds is highly popular in Ireland. Feedback from survey participants has been extremely positive. In recent times, there has been considerable increase shown by members of the public to enhance their gardens for birds and other wildlife. This is possibly reflected in the increased number of books of this nature published (e.g. Beddard 2001, Golley and Moss 2002, Moss and Cottridge 2003, Toms 2003).

The number and diversity of birds that occur in gardens in Ireland during the GBS were shown to be highest in large gardens, and those in rural areas. Such gardens offer a wider variety of habitats, thereby accommodating more species and greater numbers of birds. In

contrast, smaller urban gardens are less likely to include many trees and shrubs. The differences shown above between provinces in both diversity and abundance are likely to be the result of the difference in the proportions of different habitat availability. For example, it is evident that gardens in Connaught support greater numbers of birds per garden, and those in Leinster much less. However, the proportion of participants with rural gardens in the former province is substantially higher, while the proportion with urban gardens (of more limited diversity) in Leinster is much higher.

Regardless of position, the list of the top 20 most widespread garden species was coincident with the most abundant 20 species, with the exception of Pied Wagtail and Redwing, the 20th most widespread and abundant species respectively. Despite the difference in time of year, the list of most widespread species recorded during the GBS is very similar to that reported for the Countryside (breeding) Bird Survey (CBS) (Crowe and Coombes 2005). However, the list of most abundant species was much less consistent. This is to be expected, given that bird behaviour during the breeding season is very different from that during the winter. Other highly abundant species during the breeding season, such as Woodpigeon, Wren and Blackbird, are very vocal, and much more conspicuous. During the winter, the dominance of House Sparrow, Greenfinch and Chaffinch reflects their ability to congregate around peanut and seed feeders.

Considerable declines in the populations of many songbird species over the past 30 years have been attributed to avian predators such as Sparrowhawks and Magpies. Sparrowhawks were the most regular bird of prey species, recorded in 27% of gardens during the GBS, and are probably attracted by the variety of garden birds present in gardens. Magpies are very widespread and noticeable, and were shown to be present in 90% of gardens during this survey. However, contrary to popular belief, it has been proven that neither species significantly impacts on songbird populations (Dix et al. 1998, Thomson et al. 1998), and that the greatest threat is from domestic cats (Churcher and Lawton 1987, Woods et al. 2003).

While the enumeration of trends is beyond the scope of this survey (for reasons outlined above), a number of patterns have emerged. The most remarkable change over the 10 winters has been the increased presence in Goldfinch. This species has only in relatively recent times begun to use food provided in gardens, and was first recorded feeding from hanging containers in 1987 (Glue 1996). However, there was one earlier sighting (in 1964) of a Goldfinch feeding alongside Greenfinch and other tit species on a string of peanuts

(Lawson 1967). This spread in range also coincides with a continued increase in the breeding population during the course of the CBS (Crowe and Coombes 2005).

There has been much concern in western Europe about the recent widespread decline in House Sparrow (Dott and Brown 2000, Summers-Smith 2000, Sanderson 2001, Prowse 2002). Their numbers in Britain declined by 51% since 1973 (Chamberlain and Vickery 2002). Numbers in Ireland also appeared to have declined since the early 1970s (Gibbons et al. 1993). However, in recent years, they have begun to increase once again in the Republic (Crowe and Coombes 2005), Scotland and Wales (Raven et al. 2004). Their occurrence in gardens in Ireland during the past 10 winters has remained relatively stable.

### Patterns in arrival of some winter migrant species

Extensive ringing effort throughout Britain and Ireland has shown that many species have a resident component, and that most have some proportion which migrate much greater distances, while others are exclusively winter visitors. Some examples are given below.

During the winter, Ireland supports Redwings from both the nominate species *Turdus iliacus iliacus*, particularly from the Scandinavian-breeding population, and the Icelandic-breeding population *T. i. coburni* (Milwright 2002). The majority of Redwings from the former population begins to move into Britain and Ireland in November. The Icelandic population departs from its breeding grounds in October, bound for Ireland, Scotland, France and Iberia. Numbers increase in Ireland as the winter progresses (Wernham et al. 2003), which is consistent with the increases shown in Irish gardens during December. Most Redwings from the Icelandic population wintering in Ireland are adults, with first-winter birds known to migrate further, onto northwest Iberia (Wernham et al. 2003). Numbers in Scotland appear to decline as the winter progresses, and it is possible that some may relocate to parts of Ireland (Wernham et al. 2003). It is also possible that there is relocation within Ireland. During one particularly cold winter in Ireland (1981/82), birds were more concentrated in the southern half of the country than during other, milder winters (Lack 1986). In winter, they feed on soil invertebrates, hawthorns and on fruit in gardens (Hutchinson 1989).

Fieldfares wintering in Ireland come mostly from the Norwegian breeding population. Like Redwings, they begin migrating in October, and most arrive from November onwards (Hutchinson 1989). The timing of their movements is dependent on the abundance of the

Rowan fruit crop in Scandinavia, with more delayed arrival associated with good crop (Hutchinson 1989). Their movements from mid-December are generally short-range (Wernham et al. 2003). Fieldfares do not typically move great distances to avoid cold weather. They typically switch to feeding on fruit when the ground is frozen, and access to soil invertebrate is limited, (Milwright 1994). This was possibly demonstrated during the GBS, where the numbers feeding in gardens appeared to increase during the mid-winter period, which is generally the coldest time of the year in northwest Europe. Large coastal flocks are often witnessed in Ireland after periods of such weather (Hutchinson 1989).

Blackcaps breeding in Britain and Ireland migrate south in September to wintering grounds in southern Iberia and northwest Africa, with some making trans-Saharan movements on to Senegal and Nigeria (Wernham et al. 2003). Blackcaps wintering in Ireland and Britain are from a separate population, which usually arrives in October. At this stage of the cycle, this population remains exclusive of the emigrating population, most of which depart in late September (Phillips 1994). These wintering birds come from the population which breeds in southern Germany and Austria (Bearhop et al. 2005), and which formerly wintered exclusively in Iberia. The northward shift in migration of a component of this population to wintering areas in Britain and Ireland in the past 50 years was possibly the result of global warming. It has been shown that this 'subpopulation' now remains exclusive of that which winters in Iberia during the breeding season (Bearhop et al. 2005). Blackcaps from this former population reach their breeding areas up to two weeks earlier (Bearhop et al. 2005). It is thought that these birds begin to migrate earlier than those further south in Iberia due to more dramatic changes in day length. Furthermore, they are closer to their breeding grounds. Consequently, they occupy the most optimal nesting areas and are more productive than the traditional Iberian-wintering population.

While wintering in Britain and Ireland, Blackcaps are found in areas of low altitude, but are also found in more upland areas of southwest and west Ireland where temperatures are quite mild. Their natural winter food supplies (predominantly berries) are of limited availability during the winter in rural areas, particularly during periods of cold weather, when ice and snow may render them inaccessible. It is possible that the enhancement of gardens for wildlife has resulted in the increased incidences of winter sightings of Blackcaps in gardens in Ireland during the course of the Garden Bird Survey. Large fat reserves are required in winter, and conse-

quently their winter weights are higher than in summer (Langslow 1976, Phillips 1994) or than those of birds wintering in Iberia (Leach 1981). They regularly frequent suburban gardens, where they feed on supplementary food (largely bread and fat, Leach 1981). They also feed on the berries of Cordyline trees and Ivy, both prevalent in Irish gardens.

During the winter, Starlings in Ireland are supplemented by a massive immigrating population from the Continent and Scandinavia (Hutchinson 1989, Wernham et al. 2003). There is further movement during particularly cold periods, and this is possibly shown by the increase in records over 13 weeks of the survey. Dense roosts are quite often seen in Ireland, and occasionally these occur in gardens (a peak of 2,000 was recorded in one Waterford garden in 2000/01).

Siskins are commonly found in coniferous forests during the breeding season, where they feed predominantly on cones of *Pinus* sp. During the winter, numbers are supplemented by birds immigrating from the Continent which begin to arrive in mid-September (Wernham et al. 2003). They switch to feeding on the cones of Alder *Alnus glutinosa*, and also on Birch *Betula* spp. (Lack 1986) as their coniferous cone supply becomes depleted. Since 1963, they have been reported feeding in gardens in Britain (Spencer and Gush 1973), and are now regularly recorded on peanut feeders in Ireland and Britain, particularly during the latter part of the winter and early spring, when their natural food source becomes depleted. This pattern of occurrence corroborates the findings of the GBS, where there was a marked increase in usage of gardens over the 13-week period. It has been implied that numbers recorded in winter gardens are inversely related to the success of the season's cone crop (Wernham et al. 2003). Their occurrence in Irish gardens has consistently ranged between 48% and 63% during all GBS seasons, other than in 1996/97, when they were recorded in just 26% of gardens. This range is generally higher than in Britain, where Siskin occurrence has ranged between 15 and 40% of gardens between 1994/95 and 1997/98 (Cannon 1998), which may suggest that the cone crop in Ireland is relatively poor.

The Lesser Redpoll has a relatively widespread breeding distribution in Ireland (Gibbons et al. 1993). A 30% increase between 1998 and 2004 was estimated in the Republic of Ireland, though this was not significant (BirdWatch Ireland unpublished). Little is known of the movements of Irish-breeding or of the Irish-wintering populations. Redpolls breeding in southern Britain *Carduelis cabaret* tend to move south to southeasterly in direction during the winter, and are replaced birds breeding further north (in Britain). Britain also receives

birds from the Scandinavian breeding population *Carduelis flammea* and from that breeding in Greenland *C. f. rostrata*, the latter in particular move into western Scotland and Northern Ireland. The majority of the Greenland-breeding population winters in Iceland, and it is possible that birds arriving into Britain and Ireland have been blown off their normal sea-crossing (Wernham et al. 2003). The continued increase in Irish gardens as the winter progresses possibly reflects the decline in their preferred food (seeds of Birch and Alder), and their willingness to use supplementary food.

Other species such as Waxwings show extreme irruptive patterns. Numbers vary considerably between winters, and more recently, invasions have been more frequent (five winters during the 1990s). Such invasions are most common in October and November (Wernham et al. 2003), when their chief food source (berries, predominantly from Rowan) is in abundance. Flocks then fragment and disperse when this food source becomes depleted. Some migrate onwards, leaving smaller groups remaining to winter (Wernham et al. 2003). The most recent invasion in Ireland occurred in 2004/05, and during the peak period (November), it was estimated that there may have been close to 2,000 birds in the country (R. Coombes pers. comm.).

## Conclusions

The simplicity of the GBS methodology in particular has proven attractive to a wide variety of people, from school children through to the elderly. The increasing popularity of the GBS has thereby helped to develop public interest in birds and the environment. The GBS has also served to recruit participation in other bird surveys.

The GBS has demonstrated that the large variety of habitats available in gardens, particularly those which are large and located in a rural setting, are widely used by many species, and at times very large numbers of birds. This implies that increasing human population and urbanisation may impact on wintering garden birds. It is essential that there is an increasing public awareness of the importance of supplemental feeding and provision of habitats to birds, especially during the winter. Increased participation in the GBS will help us to track major changes in wintering garden birds over time.

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## Appendix 1

### List of bird species mentioned in the text:

Sparrowhawk	<i>Accipiter nisus</i>
Wood Pigeon	<i>Columba palumbus</i>
Collared Dove	<i>Streptopelia decaocto</i>
Pied Wagtail	<i>Motacilla alba</i>
Waxwing	<i>Bombycilla garrulus</i>
Wren	<i>Troglodytes troglodytes</i>
Dunnock	<i>Prunella modularis</i>
Robin	<i>Erithacus rubecula</i>
Blackbird	<i>Turdus merula</i>
Fieldfare	<i>T. pilaris</i>
Song Thrush	<i>T. philomelos</i>
Redwing	<i>T. iliacus</i>
Blackcap	<i>Sylvia atricapilla</i>
Coal Tit	<i>Parus ater</i>
Blue Tit	<i>P. caeruleus</i>
Great Tit	<i>P. major</i>
Magpie	<i>Pica pica</i>
Jackdaw	<i>Corvus monedula</i>
Rook	<i>C. frugilegus</i>
Starling	<i>Sturnus vulgaris</i>
House Sparrow	<i>Passer domesticus</i>
Chaffinch	<i>Fringilla coelebs</i>
Greenfinch	<i>Carduelis chloris</i>
Goldfinch	<i>C. carduelis</i>
Siskin	<i>C. spinus</i>
Common Redpoll	<i>C. flammea</i>
Lesser Redpoll	<i>C. cabaret</i>