

The Birds of the Phoenix Park, County Dublin: Results of a Repeat Breeding Bird Survey in 2015



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Executive Summary

The Phoenix Park in Dublin City is over 700 hectares in size, and is among the largest enclosed urban parks in Europe. A survey of the breeding and wintering birds of the Phoenix Park was carried out between 2007 and 2008 and the results formed a baseline for future surveys. During spring and summer 2015 a repeat breeding bird survey was undertaken, and this aimed to quantify the current abundance and distribution of birds in the park, and to examine changes that have taken place since the baseline data were collected in 2007. Of importance was to assess whether changes in bird numbers and densities could give an indication of the success of the implementation of conservation actions set out in the Conservation Management Plan.

The survey methods used were identical to those used during 2007. Bird data were recorded for 29 sections, each manageable within a survey session. Each section was visited twice, once in the early breeding season and once in the late breeding season. Observers mapped all birds seen or heard whilst walking along a survey route which took them to within 50m of every part of the section.

A total of 58 species was recorded, which included 49 residents, seven summer migrants, and one species derived from released/ ornamental stock. 35 species were estimated to be breeding within the park, an increase on 2007.

Jackdaw *Corvus monedula* was the most abundant bird species, while Woodpigeon *Columba palumbus*, Starling *Sturnus vulgaris*, Blue Tit *Cyanistes caeruleus* and Blackbird *Turdus merula* were also abundant and widespread across the park. The total density of birds within the park peaked at 8.3 birds per hectare during the late season visit and represents an increase on the peak density recorded in 2007.

There was considerable variation in bird species richness and abundance throughout the Phoenix Park. Both species richness and bird densities peaked in the two zoo sections (NE11 and NE13), consistent with results from 2007. Overall, sections in the eastern margins of the site (zoo sections NE11 and NE13, plus NE14) as well as sections in the south of the park (SW12, SW13, SW14 and SW15) were the most diverse, likely related to their relative large size and diversity of habitats including waterbodies (lakes or ponds).

Species richness was lowest in the relatively small and open grassland section SW7, and this section exhibited the greatest drop in species richness, and the greatest proportion of species showing declines in density. Total bird density in this section however, has not declined since 2007 due to large increases in the density of Jackdaw and Starling. Similar declines in density are noted for the adjacent section SW6, and with little change in habitat management practices within these sections, there is little to explain these differences. Sections NE8 and NE3 have also seen notable declines in species density.

More positively, an impressive 19 sections recorded the same or an increased number of bird species during 2015 compared to 2007. Large increases in species richness were recorded for several sections including NE6, SW9 and SW14. NE6 recorded one of the highest increases in species richness and the highest overall increase in bird density, while 85% of species recorded in SW14 have increased in density since 2007. Also of note is SW9 (Fifteen Acres) that recorded nearly double the number of species in 2015 compared to 2007 and a large increase in bird densities, while remaining the most important section for the ground-nesting Skylark.

The results overall show that species richness has remained stable or increased in two-thirds of the sections surveyed, while the overall density of bird within the park has increased in comparison with 2007. Nearly two-thirds of species have increased in total density across the park, while over half of the sections show increasing densities. Certain sections of the park have remained very stable over time, and in particular the zoo sections, while some sections (e.g. SW9) have seen considerable changes. As bird densities have increased into several areas this has resulted in some degree of change to overall bird distribution.

Introduction

The Phoenix Park in Dublin City is over 700 hectares in area, and is among the largest enclosed urban parks in Europe. It includes a number of significant features such as the residences of both the President of Ireland and the American Ambassador, a number of monuments, including the Papal Cross and the Wellington Monument. It also includes many facilities, including the Phoenix Park Visitor Centre, Zoological Gardens, St. Mary's Hospital, Ordnance Survey Ireland offices and shop and several sports grounds for Gaelic football, soccer, cricket and polo. Thus, the park is well visited by the public throughout the year.

The park offers a broad diversity of habitats for birds and other wildlife, including large areas of grassland, (c.398ha), including species-rich calcareous grassland, and a relatively high proportion of deciduous woodland (31% equivalent to 220ha) (OPW, 2011), as well as a number of lakes and ponds. Previous observations have shown that the park supports a variety of bird species throughout the year, and a total of 88 species has been recorded in recent years (S. Geraty *in litt.*); 49 of which occur regularly. A thorough survey of the birds of the Phoenix Park was undertaken during the breeding season in 2007 and in winter 2007/08 as part of a wider stock-take of biodiversity. During that survey, a total of 72 species was recorded, including 62 species during the breeding season and 58 species in winter (Crowe 2011). Following these surveys, the Conservation Management Plan for the park was updated (OPW 2011), and this defined a series of over-arching objectives as well as an extensive list of management actions to be put in place, including the planting of native woodland, creation of habitats such as scrub and wetlands, and late cutting of grasslands; all of which would specifically help bird species, as well as being measures to protect and enhance biodiversity as a whole.

A repeat winter bird survey was undertaken during winter 2014/2015 during which a total of 63 bird species was recorded (Crowe *et al.* 2015). Although bird densities were higher overall than the baseline survey of 2007/08, it was noted that flocks in winter tend to be variable, transitory and less consistent than during the breeding season when pairs are holding territories and movements are much more restricted. In this way, breeding season surveys tend to give a better indication of habitat quality. In early 2015 therefore, the Office of Public Works contracted BirdWatch Ireland to carry out a repeat breeding bird survey of the birds in the Phoenix Park. The aims of this survey were to examine the distribution and abundance of birds within the park, and to assess any changes since the previous breeding season survey of 2007. Of importance was to assess whether changes in bird numbers and densities could give an indication of the success of the implementation of conservation actions set out in the Conservation Management Plan. This report presents these findings.

Methods

The scientific names of all bird species mentioned in the text are presented in Table 1.

Survey design

The methodology used to survey the park during 2015 was the same as that used during 2007, and included the survey of the same 29 sections of the park (Fig. 1), each manageable during a survey session in order to minimise duplication of counts of the same birds. Sections were labeled according to whether they were northeast (e.g. NE1) or southwest (e.g. SW1) of the main park road. Divisions were roughly based on the discrete areas within the park, such as the Ordnance Survey grounds (section SW3 in Fig. 1) and/or habitat type, such as the large grassland section known as the Fifteen Acres (section SW9 in Fig. 1). Sections ranged from 5.5ha (NE8, a long linear stretch along the northern edge of the park) to 97.9ha (SW9) in size.



Figure 1. Bird survey sections.

All sections of the park were visited two times, once during the early breeding season (1st May to 20th May) and a second visit during the late breeding season (21st May to 30th June). This timing is designed to maximize recording of residents and early migrants, which tend to be more easily detected on the first visit, and later migrants, which are more abundant in the second visit. Most survey work was carried out between 06:00 and 09:00 hours to coincide with maximum bird activity, but to avoid concentrated song activity at dawn.

Field methods

The field methods closely follow a method set out by Chamberlain *et al.* (2007). During each visit, observers walked along a survey route which took them to within 50m of every point in all sections. Playing fields (or similar areas of short grass) were surveyed from a greater distance (within 100m of every point). A field-map of each section was provided, with a grid, 50m x 50m overlain (e.g. Fig. 2). All species seen and heard were recorded directly onto the maps, and bird totals were later summarised. Birds flying over and obviously not interacting with the park were recorded separately. Observers also searched for owl pellets under suitable trees.



Figure 2. An example of a survey section (SW1) with the 50m grid overlain.

Data analysis & interpretation

Data are presented for each of the 29 sections and for the overall park combined. Species richness, a measure of diversity was assessed at site and section level, and is simply the total number of species recorded (Magurran 2004). Bird densities were estimated for each visit in each season as the total number recorded per hectare, and in each case the peak of each visit is presented. The results of this census were compared with those of the breeding bird census in 2007 to measure changes in bird populations that may have taken place in the intervening period.

Results

Species diversity and abundance

In total, 58 species were recorded during this survey (Table 1). This included 38 residents, a further 11 resident species which have a winter migratory component, seven summer migrants, and one feral species derived from released/ ornamental stock (Mandarin Duck).

The species list includes 26 species that are on the *Birds of Conservation Concern in Ireland* lists (Colhoun and Cummins 2013), including five (Tufted Duck, Black-headed Gull, Herring Gull, Meadow Pipit and Grey Wagtail) that are Red-listed and are of highest concern, and a further 21 species that are Amber-listed. The Amber-listed species Cormorant was recorded in flight only, and not necessarily interacting with the park features.

Jackdaw was the most abundant bird species with over 1,000 individuals recorded during both early and late visits. Woodpigeon, Starling, Blue Tit and Blackbird were also abundant and widespread across the park (Table 1). Magpie, Wren, Robin and Chaffinch were also relatively abundant (>200 individuals) and widely distributed.

Of the 58 total species, 40 are confirmed as *breeding* species within the park, eight are considered to be *probable breeding* birds, four are considered to be *possible breeding* birds, and six are *non-breeding* birds (Table 1). The non-breeding birds are four gull species, Cormorant and Sand Martin.

The species recorded during the breeding season can be described within the following 14 bird groups:

- Waterbirds – 13 species were recorded, including four gull species. The majority of these are resident species whose numbers are augmented by winter visitors. Mallard dominate the group with a total 216 individuals recorded during the late visit.
- Birds of prey – Two species were recorded (Sparrowhawk and Buzzard) in small numbers (<5 individuals).
- Gamebirds – Just Pheasant was recorded with one individual recorded in four sections during the early visits only.
- Pigeons & doves – Four species were recorded. Woodpigeon was the most numerous and widespread, and was present in all 29 sections during the early visits. Feral Pigeon and Collared Dove were much less prevalent, present in relatively few sections. Stock Dove was recorded during the late visits only with one individual recorded from two sections.
- Crows – A total of six species was recorded with Magpie, Jackdaw and Hooded Crow being the most prevalent among the group. Jackdaw was the most abundant species overall throughout the 2015 survey with over 1,000 recorded within the park, and occurring in all 29 sections during both early and late visits. Up to 250 Magpies were recorded across the park together with a maximum count of 145 Hooded Crows, both species also being relatively widespread.
- Kinglets – Goldcrest was widespread, present in 22 sections during both early and late visits, and highly consistent with results from the 2007 survey (also 22 sections) and a maximum 148 individuals were recorded during the late visits.

- Tits – All four regularly occurring tit species in Ireland are resident, and were relatively widespread and abundant throughout the park during this survey. Blue Tit was most abundant with over 300 individuals recorded during both early and late visits.
- Larks – Skylark was present in up to five sections and a maximum 44 individuals were recorded during late visits.
- Warblers – Blackcap, Chiffchaff and Willow Warbler were recorded and all are summer migrants. Blackcap was the most abundant and widespread.
- Treecreepers – Treecreeper is a resident species, and was widespread and abundant throughout the park, especially where Cypress trees were present. A peak number of 59 individuals was recorded.
- Starling, Chats & thrushes – Starling was the most abundant bird within this grouping and the second most abundant species overall, after Jackdaw. Robin and Blackbird however, were the most widespread and abundant species in this group. Mistle Thrush was more numerous and widespread than Song Thrush across the park.
- Sparrows – House Sparrow was present in relatively low numbers and concentrated within the zoo section NE13 only.
- Pipits & Wagtails – Grey Wagtail, Pied Wagtail and Meadow Pipit were recorded in relatively few sections and in low numbers.
- Finches – Six species were recorded with Chaffinch being the most abundant and widespread. Greenfinch and Goldfinch were less widespread and occurred in 17 and 18 sections, and with peak numbers of 31 and 29 respectively. Siskin was most scarce and three individuals occurred in three sections during the late visits only (SW3, SW6 and SW10).

Comparison of species diversity and abundance between surveys

The total of 58 species recorded during 2015 was lower than that recorded during the breeding survey of 2007 (62 species). Some differences are explained below.

Eight species recorded in 2007, were not recorded in 2015, namely:

- Shoveler (*Anas clypeata*) and Pochard (*Aythya ferina*): Reliant on waterbodies, these ducks were recorded in association with the lake in the zoo section (NE11) during 2007. Scarce and localized breeding birds in Ireland, they were recorded in low numbers during 2007.
- Kestrel (*Falco tinnunculus*): This bird of prey was recorded in low numbers during 2007 and considered to be possibly breeding within the park (Crowe 2008).
- Common Gull (*Larus canus*): Just one individual was recorded from one section during summer 2007.
- Stonechat (*Saxicola torquatus*) and Wheatear (*Oenanthe oenanthe*): Both of these species were scarce during the 2007 breeding survey and neither would be considered typical park/woodland birds.
- Sedge Warbler (*Acrocephalus schoenobaenus*): This migrant warbler was recorded from seven sections during the 2007 breeding season and they were classified as 'probable breeders' (Crowe 2008).
- Lesser Redpoll (*Carduelis cabaret*): This species occurred in low numbers within four sections of the park during summer 2007 and was considered unlikely to be breeding.

Table 1. Species recorded in the Phoenix Park during the 2015 breeding season (BR = breeding, PR = probable breeding, PO = possible breeding, NB = non-breeding), plus the total number of sections in which each species was recorded, the species' status (Resident, Feral (released), Winter migrant, Summer migrant) and an indication of conservation concern in Ireland (BoCCI, Red or Amber-listed).

Common name	Latin name	Status	BoCCI	Breeding Status	Number sections		Totals recorded*	
					Early	Late	Early	Late
Mute Swan	<i>Cygnus olor</i>	R	A	BR	2	3	3	5
Mandarin	<i>Aix galericulata</i>	F		PO		3	0	4
Mallard	<i>Anas platyrhynchos</i>	WR		BR	16	12	143	216 (13)
Tufted Duck	<i>Aythya fuligula</i>	WR	R	BR	4	4	48	66
Pheasant	<i>Phasianus colchicus</i>	R		PO	4		4	0
**Cormorant	<i>Phalacrocorax carbo</i>	WR	A	NB		2	0	0 (2)
Grey Heron	<i>Ardea cinerea</i>	WR		BR	10	8	17	24 (8)
Little Grebe	<i>Tachybaptus ruficollis</i>	WR	A	BR	6	8	9	18 (2)
Sparrowhawk	<i>Accipiter nisus</i>	R	A	BR	1	3	2	3
Buzzard	<i>Buteo buteo</i>	R		BR	2	3	2 (1)	4 (1)
Moorhen	<i>Gallinula chloropus</i>	WR		BR	6	7	24	31
Coot	<i>Fulica atra</i>	WR	A	BR	7	7	47	50
Black-headed Gull	<i>Chroicocephalus ridibundus</i>	WR	R	NB		2	0	2 (1)
Lesser Black-backed Gull	<i>Larus fuscus</i>	WR	A	NB	5	13	38 (1)	26 (17)
Herring Gull	<i>Larus argentatus</i>	WR	R	NB	15	14	69 (11)	60 (18)
Great Black-backed Gull	<i>Larus marinus</i>	R	A	NB		2	0	3 (2)
Feral pigeon	<i>Columba livia</i>	R		BR	4	7	23	143 (114)
Stock Dove	<i>Columba oenas</i>	R	A	BR		2	0	2
Woodpigeon	<i>Columba palumbus</i>	R		BR	29	28	427	476 (21)
Collared Dove	<i>Streptopelia decaocto</i>	R		BR	5	5	9	12
Swift	<i>Apus apus</i>	S	A	PO	6	11	17 (1)	51 (5)
Skylark	<i>Alauda arvensis</i>	R	A	BR	2	5	21	44 (1)
Sand Martin	<i>Riparia riparia</i>	S	A	NB	2	5	21	18
Barn Swallow	<i>Hirundo rustica</i>	S	A	PR	10	18	57	182 (40)
House Martin	<i>Delichon urbicum</i>	S	A	PR	4	5	9	19
Meadow Pipit	<i>Anthus pratensis</i>	R	R	BR	1		1	0
Grey Wagtail	<i>Motacilla cinerea</i>	R	R	PR		2	0	2
Pied Wagtail	<i>Motacilla alba</i>	R		BR	2	7	2	8
Wren	<i>Troglodytes troglodytes</i>	R		BR	23	26	245	290 (1)
Dunnock	<i>Prunella modularis</i>	R		BR	11	9	25	24
Robin	<i>Erithacus rubecula</i>	R	A	BR	26	26	216	162
Blackbird	<i>Turdus merula</i>	R		BR	24	27	343	347
Song Thrush	<i>Turdus philomelos</i>	R		BR	15	21	39	58
Mistle Thrush	<i>Turdus viscivorus</i>	R	A	BR	23	21	85	119
Blackcap	<i>Sylvia atricapilla</i>	SW		BR	16	19	26	47
Chiffchaff	<i>Phylloscopus collybita</i>	S		PR		5	0	5
Willow Warbler	<i>Phylloscopus trochilus</i>	S		PR	1	3	1	3
Goldcrest	<i>Regulus regulus</i>	R	A	BR	22	22	74	148
Spotted Flycatcher	<i>Muscicapa striata</i>	R	A	PR	1	3	1	3
Long-tailed Tit	<i>Aegithalos caudatus</i>	R		BR	15	13	53	33
Coal Tit	<i>Periparus ater</i>	R		BR	21	23	81	85
Blue Tit	<i>Cyanistes caeruleus</i>	R		BR	29	29	367	374
Great Tit	<i>Parus major</i>	R		BR	28	25	128	100 (3)
Treecreeper	<i>Certhia familiaris</i>	R		BR	24	21	59	48
Jay	<i>Garrulus glandarius</i>	R		BR	10	10	14	15
Magpie	<i>Pica pica</i>	R		BR	28	26	209 (2)	250 (5)
Jackdaw	<i>Corvus monedula</i>	R		BR	29	29	1009 (10)	1260 (75)
Rook	<i>Corvus frugilegus</i>	R		BR	14	13	62	56 (5)
Hooded Crow	<i>Corvus corone cornix</i>	R		BR	27	23	121	145 (6)
Raven	<i>Corvus corax</i>	R		PR		3	0	4 (3)
Starling	<i>Sturnus vulgaris</i>	WR	A	BR	24	17	336 (10)	538 (20)
House Sparrow	<i>Passer domesticus</i>	R	A	BR	1	1	14	20
Chaffinch	<i>Fringilla coelebs</i>	R		BR	26	28	199	231 (1)
Greenfinch	<i>Chloris chloris</i>	R	A	BR	11	14	17	31
Goldfinch	<i>Carduelis carduelis</i>	R		BR	14	12	28	29 (1)
Siskin	<i>Carduelis spinus</i>	R		PR		3	0	3
Linnet	<i>Carduelis cannabina</i>	R	A	PO	6	1	6 (3)	2
Bullfinch	<i>Pyrrhula pyrrhula</i>	R		BR	8	6	17	12

* Totals recorded with birds recorded in flight presented in parentheses.

** Species recorded in flight only during the survey.

Four species were recorded during 2015 but not recorded during the 2007 breeding survey, namely:

- Mandarin Duck: Reliant on waterbodies and recorded in NE2, NE14 and SW4, this species does not naturally occur in Ireland and is from released/ ornamental stock. This species is possibly breeding within the park.
- Buzzard: Buzzards were not recorded during the 2007 breeding season so were a new addition during 2015, when a peak number of four was recorded. The observed behavior of a pair of Buzzards confirmed this species to now be breeding within the park.
- Grey Wagtail: Two individuals were recorded during the late visits in NE11 and NE13, both zoo sections, and both containing water bodies.
- Siskin: three individuals were recorded during the late visits in SW3, SW6 and SW10. Siskin is a relatively widespread breeding bird in Ireland although somewhat favouring coniferous woodland.

While 35 species were estimated to be breeding during 2007, a total of 40 species were considered to be breeding during 2015. Of note is Mute Swan that was not breeding during 2007, but was confirmed as breeding during 2015. Five species (Stock Dove, Skylark, Meadow Pipit, Pied Wagtail, and Blackcap) were estimated to be probably or possibly breeding during 2007, and were confirmed to be breeding during this census.

Comparing overall peak abundance between the 2015 survey and earlier 2007 breeding season survey, reveals notable increases for a number of species including Mute Swan (five individuals compared to just one in 2007), and Lesser Black-backed Gull and Herring Gull that increased from less than ten individuals in 2007, to peaks of 38 and 69 respectively in 2015. Feral Pigeons increased by more than 50%, while Swallows increased by more than 100% (87 in 2007 compared to 182 in 2015). While the ground-nesting species Meadow Pipit has declined by nearly 100% with just one individual observed during 2015, numbers of Skylark have more than doubled in number since 2007. Swift, Sand Martin and House Martin all decreased in overall numbers by over 30%. Notable increases in overall abundance are also seen for Goldcrest (>200%), Wren (86%), Robin (61%) and Chaffinch (71%).

Overall the peak numbers during 2015 showed large (>100% increases) for 11 species; moderate (50%-100%) increases for six species, and small (0-50%) increases for eleven species. In contrast, 15 species exhibited moderate decreases in overall numbers and nine showed small decreases (Table 2), with no species showing large decreases.

The overall density of bird recorded during 2015 was calculated at 6.7 and 8.3 birds per hectare during the early and late visits respectively. This represents an increase when compared with the survey in 2007 when total bird densities were 6.0 and 6.2 birds per hectare during the early and late visits.

Of the 58 total species recorded during 2015, 33 species exhibited an increase in overall density across the park, compared to 2007, while some 24 species showed an overall decline in density. Of the 48 species confirmed as 'breeding' or 'probably breeding' within the park, 30 species (62.5%) showed an increase in density overall (Figure 3).

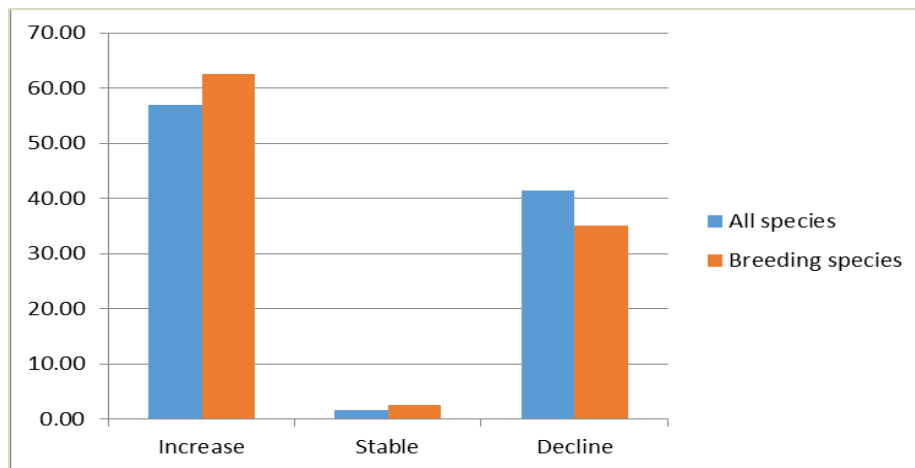


Figure 3. Proportions of species that showed increase, decline or stable trends when their densities were compared with those in 2007, illustrating change for all 58 species (blue bars) and for the 40 species confirmed as breeding (orange bars).

Distribution of birds across Phoenix Park

Species distribution varied greatly and 16 species, less than 30% of the total recorded, were observed in 20 or more sections (Table 1). Jackdaw and Blue Tit were the only two species to occur within all 29 sections during both visits. The other most widely distributed species were Woodpigeon, Blackbird, Great Tit, Magpie, Hooded Crow and Chaffinch.

Maximum species richness per section during 2015 ranged from nine species (SW7) to 42 species recorded in the zoo section NE13. Some 17 sections recorded 25 or more species overall. Sections in the eastern margins of the site (NE11, NE13 and NE14) were the most diverse, followed by sections SW10 to SW15 inclusive, in the south of the site (Table 3). There is a positive relationship (linear line of best fit) between section area and species richness (maximum number of bird species recorded during 2015) (Fig. 4).

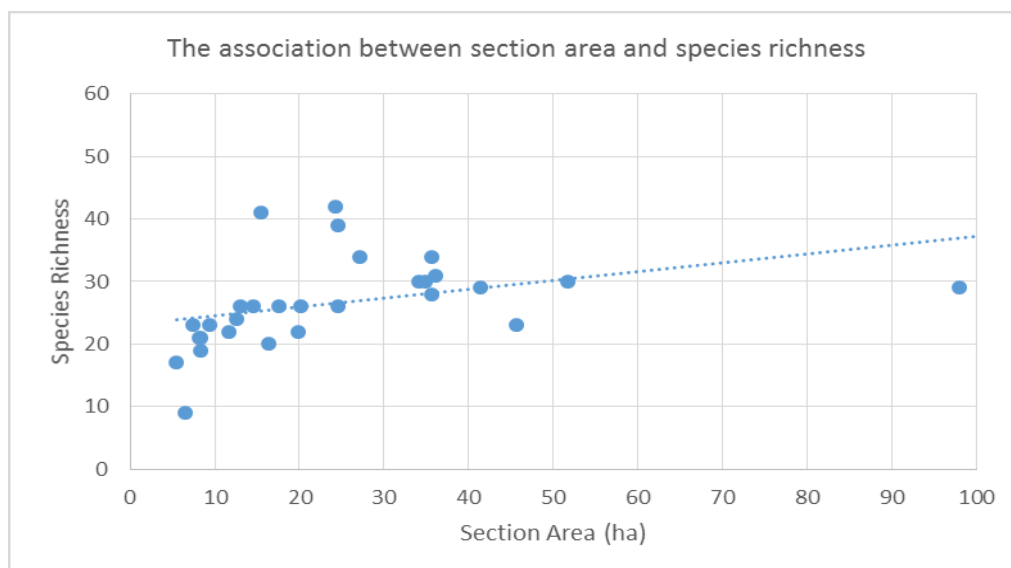


Figure 4. Relationship between section area and species richness.

Table 2. Total abundance of bird species recorded in the Phoenix Park during the 2007 and 2015 breeding seasons, with the change in numbers shown as Small (0-50%), Moderate (50-100%) and Large (100%+) declines or increases between the two surveys; with new or absent species also highlighted.

Common name	Latin name	Peak Numbers		Change
		2007	2015	
Mute Swan	<i>Cygnus olor</i>	1	5	L (Increase)
Mandarin	<i>Aix galericulata</i>	0	4	New 2015
Mallard	<i>Anas platyrhynchos</i>	209	216	S (Increase)
Tufted Duck	<i>Aythya fuligula</i>	155	66	M (Decrease)
Pheasant	<i>Phasianus colchicus</i>	20	4	M (Decrease)
Cormorant	<i>Phalacrocorax carbo</i>	2	4	M (Decrease)
Grey Heron	<i>Ardea cinerea</i>	24	31	S (Decrease)
Little Grebe	<i>Tachybaptus ruficollis</i>	14	18	S (Increase)
Sparrowhawk	<i>Accipiter nisus</i>	5	3	M (Decrease)
Buzzard	<i>Buteo buteo</i>	0	4	New 2015
Moorhen	<i>Gallinula chloropus</i>	40	31	M (Decrease)
Coot	<i>Fulica atra</i>	56	50	S (Decrease)
Black-headed Gull	<i>Chroicocephalus ridibundus</i>	35	2	M (Decrease)
Lesser Black-backed Gull	<i>Larus fuscus</i>	3	38	L (Increase)
Herring Gull	<i>Larus argentatus</i>	7	69	L (Increase)
Great Black-backed Gull	<i>Larus marinus</i>	10	3	M (Decrease)
Feral pigeon	<i>Columba livia</i>	93	143	M (Increase)
Stock Dove	<i>Columba oenas</i>	2	2	Stable
Woodpigeon	<i>Columba palumbus</i>	408	476	S (Increase)
Collared Dove	<i>Streptopelia decaocto</i>	34	12	M (Decrease)
Swift	<i>Apus apus</i>	104	51	M (Decrease)
Skylark	<i>Alauda arvensis</i>	18	44	L (Increase)
Sand Martin	<i>Riparia riparia</i>	34	21	S (Decrease)
Barn Swallow	<i>Hirundo rustica</i>	87	182	L (Increase)
House Martin	<i>Delichon urbicum</i>	38	19	M (Decrease)
Meadow Pipit	<i>Anthus pratensis</i>	45	1	M (Decrease)
Grey Wagtail	<i>Motacilla cinerea</i>	0	2	New 2015
Pied Wagtail	<i>Motacilla alba</i>	1	8	L (Increase)
Wren	<i>Troglodytes troglodytes</i>	156	290	M (Increase)
Dunnock	<i>Prunella modularis</i>	58	25	M (Decrease)
Robin	<i>Erithacus rubecula</i>	134	216	M (Increase)
Blackbird	<i>Turdus merula</i>	267	347	S (Increase)
Song Thrush	<i>Turdus philomelos</i>	53	58	S (Increase)
Mistle Thrush	<i>Turdus viscivorus</i>	89	119	S (Increase)
Blackcap	<i>Sylvia atricapilla</i>	30	47	M (Increase)
Chiffchaff	<i>Phylloscopus collybita</i>	7	5	S (Decrease)
Willow Warbler	<i>Phylloscopus trochilus</i>	8	3	M (Decrease)
Goldcrest	<i>Regulus regulus</i>	38	148	L (Increase)
Spotted Flycatcher	<i>Muscicapa striata</i>	1	3	L (Increase)
Long-tailed Tit	<i>Aegithalos caudatus</i>	43	53	S (Increase)
Coal Tit	<i>Parus ater</i>	91	85	S (Decrease)
Blue Tit	<i>Cyanistes caeruleus</i>	467	374	S (Decrease)
Great Tit	<i>Parus major</i>	213	128	S (Decrease)
Treecreeper	<i>Certhia familiaris</i>	42	59	S (Increase)
Jay	<i>Garrulus glandarius</i>	14	15	S (Increase)
Magpie	<i>Pica pica</i>	247	250	S (Increase)
Jackdaw	<i>Corvus monedula</i>	788	1260	M (Increase)
Rook	<i>Corvus frugilegus</i>	170	62	M (Decrease)
Hooded Crow	<i>Corvus corone cornix</i>	89	145	M (Increase)
Raven	<i>Corvus corax</i>	1	4	L (Increase)
Starling	<i>Sturnus vulgaris</i>	121	538	L (Increase)
House Sparrow	<i>Passer domesticus</i>	36	20	M (Decrease)
Chaffinch	<i>Fringilla coelebs</i>	132	231	M (Increase)
Greenfinch	<i>Chloris chloris</i>	40	31	S (Decrease)
Goldfinch	<i>Carduelis carduelis</i>	11	29	L (Increase)
Siskin	<i>Carduelis spinus</i>	0	3	New 2015
Linnet	<i>Carduelis cannabina</i>	8	6	S (Decrease)
Bullfinch	<i>Pyrrhula pyrrhula</i>	13	17	S (Increase)

Density of bird per section ranged from 2.2 birds ha⁻¹ (SW9) to 25.7 birds ha⁻¹ (NE11) (Table 3). Ten sections supported greater than 12 birds ha⁻¹ and highest densities were recorded in the two zoo sections (NE11 and NE13), the only sections to support greater than 20 birds ha⁻¹. Densities were lowest in three relatively open grassland sections SW9, SW12 and NE2.

Table 3. Diversity and density of birds throughout the park sections.

	Total species	Density (Early)	Density (Late)
NE1	21	11.9	12.5
NE2	23	4.1	4.3
NE3	21	11.8	13.4
NE4	26	8.1	10.4
NE5	19	10.8	5.5
NE6	26	9.8	12.0
NE7	23	10.4	14.2
NE8	17	5.6	11.8
NE9	28	7.1	8.4
NE10	23	4.7	12.2
NE11	41	16.4	25.7
NE12	20	6.6	8.0
NE13	42	12.7	24.2
NE14	39	10.4	10.2
SW1	22	4.4	5.1
SW2	24	8.3	7.0
SW3	26	9.2	9.0
SW4	29	5.0	5.7
SW5	26	9.0	12.4
SW6	26	7.7	6.5
SW7	9	4.8	10.9
SW8	22	11.5	12.6
SW9	29	2.2	4.3
SW10	34	9.6	8.8
SW11	31	4.0	
SW12	30	2.9	5.0
SW13	30	10.1	10.5
SW14	34	7.6	12.4
SW15	30	5.7	6.1

Comparison of species distribution between surveys

Overall, the peak number of species recorded per section showed an increase, when compared with 2007, for 14 sections, while a further five sections were stable (Fig. 5a & b). There was a decline in species richness in nine sections. Of note were sections NE3 and SW7 that recorded the greatest drop in species richness. Largest increases in species richness were recorded for SW9, NE6, and SW14.

A comparison of total bird densities at section level between 2007 and 2015, found that increases were evident for 17 sections, the largest of these occurring within NE6, NE10, SW9 and SW14. Decreases were shown for ten sections of which the largest (-48% decrease) was found for section NE8 (Figure 6).

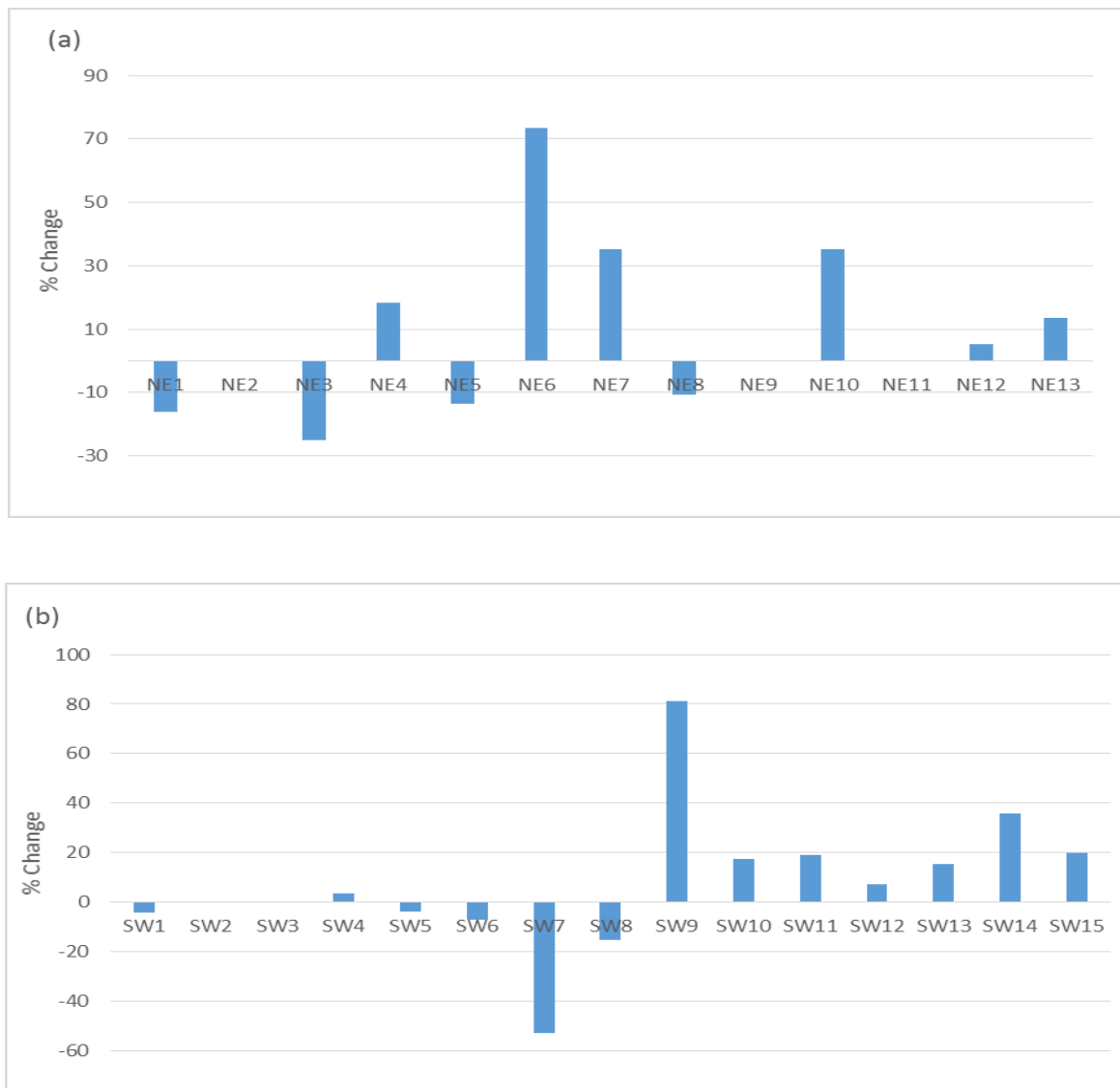


Figure 5. Percentage change in peak species richness (maximum diversity recorded in any one survey) recorded in each of the park sections between breeding surveys of 2007 and 2015, illustrating changes in NE sections (5a) and SW sections (5b).

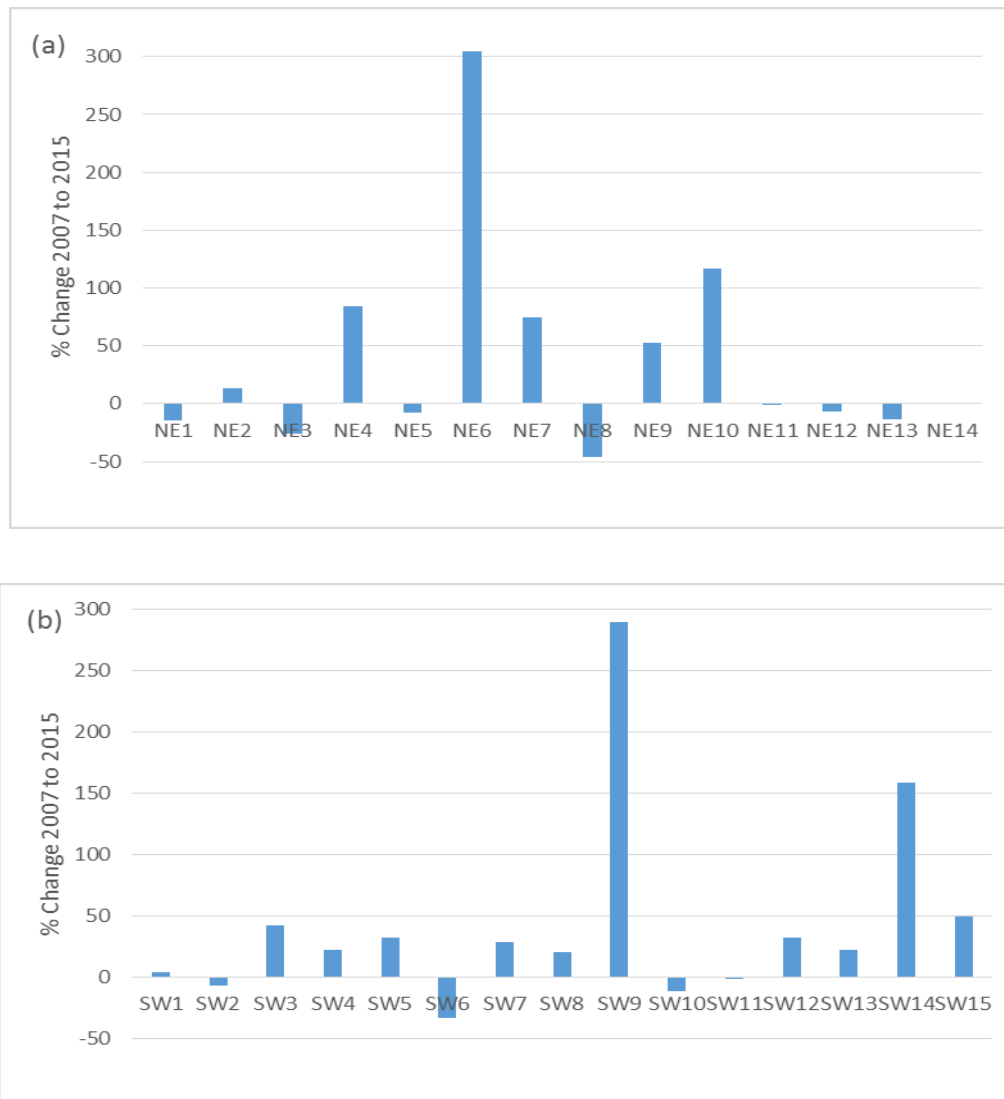


Figure 6. Percentage change in the total densities of birds recorded in each of the park sections between breeding surveys of 2007 and 2015, illustrating changes in NE sections (top graph) and SW sections (bottom graph).

16 sections recorded a greater proportion of species showing increases in species density (Figure 7 a & b). Of note was NE6 and SW14 where 85% of species recorded had higher densities in 2015 compared with 2007. 78% of species that have been recorded in SW9 had higher densities in 2015 compared to 2007. 13 sections recorded higher densities in 2015 for more than 50% of species recorded.

Nine sections have seen a reduction in species densities since 2007. The largest proportional decreases in species density were recorded for sections NE8, SW6, SW7 and SW11, the largest of which was SW7.

Table 4 shows the number of species per section that have increased, decreased or are stable in terms of density at section level, while the full species list is given in Appendix 1.

Changes in species densities were examined for a selection of species to determine if any patterns were obvious. The following observations were noted:

- Skylark – were notably absent from SW4, SW7, SW11, SW15 during 2015, however these sections had held relatively few birds during 2007 (maximum four birds) and some of these sections e.g. SW7 would not be considered suitable Skylark habitat. However, significantly greater densities were held by SW9 and SW12 during 2015 with numbers more than three times higher.

- Wren – densities are higher or stable, compared to 2007, in 19 sections (66% of total). However, densities have decreased in the north of the site (three adjacent sections NE1, NE2, NE3) and are also clustered around sections SW2, SW6 and SW7. A large increase in density has occurred in NE6.
- Dunnock – densities are low throughout the park but 65% of sections have lower densities during 2015 than recorded during 2007 including 12 sections that did not record the species at all during 2015 (NE2, NE3, NE5, NE6, NE9, NE12, SW1, SW3, SW7, SW8, SW11, SW12). The species has increased into adjacent sections SW13 and SW14, as well as NE7, NE14 and SW5.
- Robin - 79% of sections have higher or the same densities during 2015 as recorded during 2007. There are no obvious patterns with regards the six sections where densities are lower. A large relative increase in density has occurred for NE3.
- Blackbird – 69% of sections have higher or the same densities during 2015 as recorded during 2007. There are no obvious patterns with regards the nine sections where densities are lower. SW10 held peak densities during 2015 with a higher density than recorded during 2007. NE3 has consistently held good densities of this species ranked as second and third highest for 2015 and 2007 respectively. NE6 has seen the largest increase in density of Blackbird.
- Mistle Thrush – this species was absent in sections NE8, NE10 and NE11 during 2015, while declines in densities are apparent in a further six sections and highest in NE9, SW2 and SW15. There has been a large increase in density into SW9.
- Goldcrest – have increased widely with 72% of sections having higher or the same densities during 2015 as recorded during 2007. Densities are lower during 2015 in the large sections below the main park road (SW11 and SW15) and in SW6.
- Blue Tit – a larger proportion of sections have lower densities compared to 2007 (55% of the total). The south western corner of the park in particular (SW2, SW4, SW5, SW6, SW7, SW8) have lower densities during 2015.
- Great Tit – 72% of sections have lower densities during 2015 than recorded during 2007. Declines are widespread, but like Blue Tit, densities are lower in the south western corner of the park in particular (SW2, SW4, SW6, SW7, SW8) have lower densities during 2015.
- House Sparrow – this species occurs exclusively in NE13, and densities in 2015 are 39% lower in 2015 than recorded in 2007.
- Chaffinch – the majority of sections recorded higher densities during 2015; with only three sections recording lower densities (NE4, SW6 and SW11). Largest increase in density occurred in NE10.

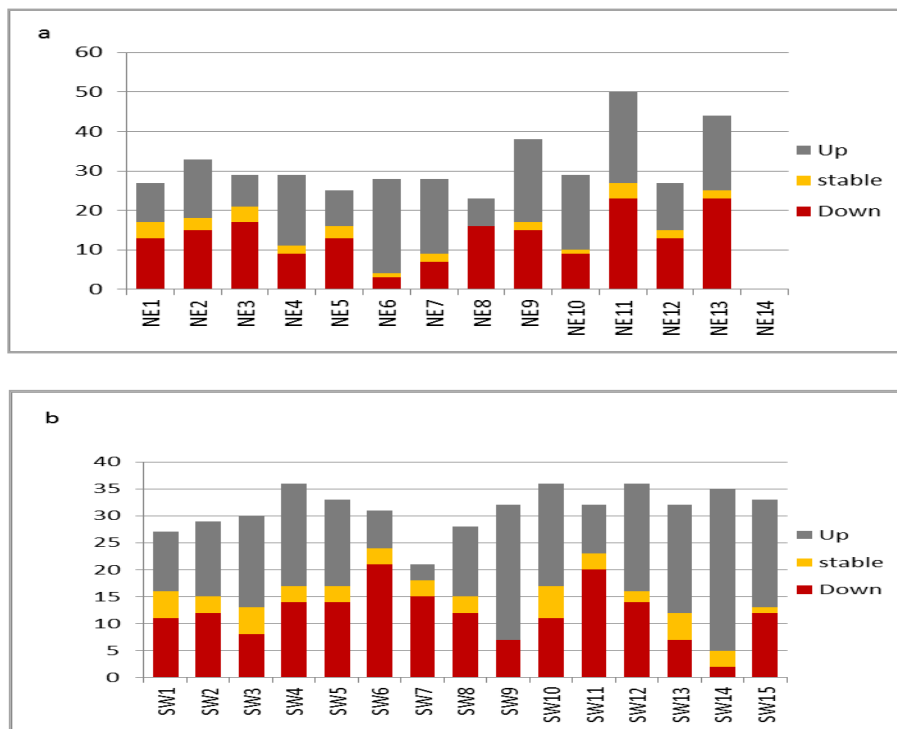


Figure 7. Numbers of species showing increased (up), stable or decreased (down) section densities since the breeding survey of 2007, for NE sections (7a) and SW sections (7b). Note no comparison is made for NW14 as this section was not surveyed in 2007.

Table 4. The number of species showing increased, decrease or stable densities of birds in 2015 when compared to densities recorded in 2007. Numbers in brackets are those species confirmed as breeding or probably breeding.

	Increase	Decrease	Stable
NE1	10 (9)	13 (11)	4 (4)
NE2	15 (12)	15 (12)	3 (3)
NE3	8 (8)	17 (15)	4 (4)
NE4	18 (18)	9 (8)	2 (2)
NE5	9 (7)	13 (12)	3 (3)
NE6	24 (23)	3 (3)	1 (1)
NE7	19 (18)	7 (6)	2 (2)
NE8	7 (7)	16 (16)	0 (0)
NE9	21 (19)	15 (12)	2 (2)
NE10	19 (18)	9 (8)	1
NE11	23 (19)	23 (17)	4
NE12	12 (9)	13 (12)	2
NE13	19 (16)	22 (20)	2
NE14*	-	-	-
SW1	11 (10)	11 (9)	5 (5)
SW2	14 (14)	12 (11)	3
SW3	17 (16)	8 (7)	5 (5)
SW4	19 (18)	14 (12)	3 (3)
SW5	16 (15)	14 (11)	3 (2)
SW6	7 (7)	21 (19)	3 (3)
SW7	3 (3)	15 (13)	3 (3)
SW8	13 (13)	12 (9)	3 (3)
SW9	25 (23)	7 (4)	0
SW10	19 (17)	11 (10)	6 (6)
SW11	9 (7)	20 (17)	3 (3)
SW12	20 (16)	14 (10)	2 (2)
SW13	20 (19)	7 (5)	5 (5)
SW14	30 (27)	2 (1)	3 (3)
SW15	20 (18)	12 (10)	1 91)

* no comparison made for NW14 as this section was not surveyed in 2007.

A plot of the percentage change in densities between 2007 and 2015 against the peak density recorded in 2007 (Figure 8) shows that those sections with largest increases in density were those with the lowest density in 2007. This is an example of the buffer effect, where birds occupy the best quality habitat areas first, then as these fill to capacity, they spread increasingly to poorer areas as numbers rise (e.g. Brown, 1969; Gill *et al.* 2001), leading to the observed pattern of largest increases in the 'poorer' sites as observed in Figure 8.

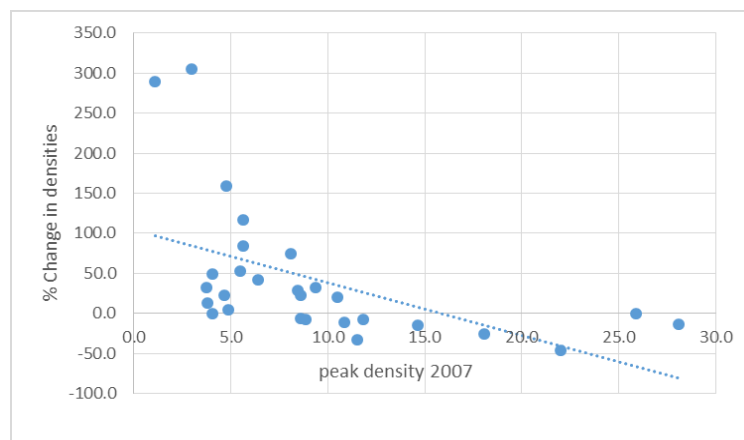


Figure 8. A plot of the percentage change in densities between 2007 and 2017 against the peak density recorded in 2007.

Discussion

The bird species of Phoenix Park

The 2015 breeding bird survey has shown that the Phoenix Park continues to support large numbers and a good diversity of birds, including a variety of residents and summer migrants. The total number of species recorded (58) was only slightly lower than the total number (62) recorded in 2007. Of the 58 total species, 40 were confirmed to be breeding within the park while a further eight species are probably breeding. This is an increase on the 35 recorded breeding species of 2007.

While seven species were recorded during 2007 that were absent during 2015, none of these losses are considered particularly worrying. For instance, Stonechat, Wheatear, and Sedge Warbler while recorded in low numbers during 2007, are not considered to be typical park or woodland birds, so their absence during 2015 is not considered unusual.

Four species were new to the breeding species list during 2015 of which perhaps the Buzzard is the most notable. The presence of Buzzard during 2015 is not surprising given the rapid and successful expansion in distribution exhibited by this species since its re-colonisation of Ireland, and given the habitats present in the park, and abundance of deciduous trees favoured for nesting (Nagle *et al.* 2014). Breeding within the park in future is considered likely based on the behavior of a pair within a quiet section of the Áras an Uachtaráin. However, the increase in numbers of Buzzard may be responsible for the absence of Kestrel as there is some evidence from other places that increased predation from Buzzards may be partially responsible for Kestrel declines. Among other species, Mute Swan was also confirmed to be breeding within the park during 2015, as were Stock Dove, Skylark, Meadow Pipit, Pied Wagtail and Blackcap.

On the whole, peak abundance of birds within the park has increased, with 28 species increasing in overall abundance compared to 22 species that have exhibited declines since 2007. Mute Swans have increased and (as above) are now breeding within the site. Peak numbers of Skylark have more than doubled since 2007 yet another ground-nesting bird with similar habitat requirements, the Meadow Pipit, has declined by almost 100%. Gulls have increased by large numbers within the park as have all of the corvid species, with the exception of Rook. In line with increased abundances, the overall density of bird recorded during 2015 was higher than 2007, with 57% of the total species, and 62.5% of the breeding species showing increases in overall density across the park.

Birds of conservation concern in Ireland and Europe

Based on 2015 survey results, the Phoenix Park supports five Red-listed species and a further 21 Amber-listed species. The Red-listed species are largely waterbirds, including two gull species, while the two terrestrial species, Meadow Pipit and Grey Wagtail, have been red-listed because of unusually steep rates of decline since 2008 (Crowe *et al.* 2014) caused by the exceptionally cold winters between 2009/ 10 and 2011/12 inclusive.

Variation and changes in bird diversity and abundance across the park

Birds are unlikely to be uniformly distributed across the Phoenix Park, and a number of factors including habitat patch size, the type of adjacent or surrounding habitat, proximity of similar patches and connectivity between patches are likely to influence species diversity and abundance. Assessing numbers and densities at section level is key to understanding changes over time, and in exploring how various sections of the park may be experiencing different trends, and may give an indication of the success of the implementation of conservation actions set out in the Conservation Management Plan.

As with the former surveys undertaken, there was considerable variation in bird species richness and abundance throughout the Phoenix Park. Both species richness and bird densities peaked in the two Dublin Zoo sections (NE11 and NE13) which is the same result as found during 2007. Overall, sections in the

eastern margins of the site (zoo sections NE11 and NE13, plus NE14) as well as sections in the south of the park (SW12, SW13, SW14 and SW15) were the most diverse, likely related to their relative large size and diversity of habitats including waterbodies (lakes or ponds).

Consistent with the 2007 breeding bird survey, species richness was lowest in the relatively small section SW7 and this section exhibited the greatest drop in species richness, and the greatest proportion of species showing declines in density. However, the total bird density in this section has not declined since 2007, and while the density of 15 bird species in this section has declined since 2007, and for a range of common and widespread species including Wren, Blackbird, Mistle Thrush, Magpie, Rook and others, this has been compensated by increases in the density of Jackdaw and Starling. At species level, we found a large proportion of species to show declines in density in the adjacent section SW6. Both SW6 and SW7 are within an area of the park managed especially for biodiversity and while a small amount of understorey has been removed in SW6 for safety reasons, there have been no other changes in management practices in these sections, so there is nothing obvious to explain these results. Other sections within the biodiversity area (SW1, SW3, SW4, SW5, SW7 and SW8) have all seen an increase in total bird density since 2007.

Relatively low species diversity was recorded for NE8, a long linear stretch along the northern edge of the park. While species richness in this section has only dropped a little since 2007, this section did see one of the largest drops in species density, and an examination of habitat management practices may elucidate these changes. The second largest drop in species richness was for NE3 (28 vs 21 species), and over 50% of species in this section have also declined in density since 2007, in line with a drop in the density of total birds.

On a more positive note, an impressive 19 sections recorded the same or an increased number of bird species during 2015 compared to 2007. Large increases in species richness were recorded for several sections including NE6, SW9 and SW14, these sections having been highlighted as relatively species-poor during 2007. NE6 recorded one of the highest increases in species richness and the highest overall increase in bird density. This improvement may be due to habitat measures aimed to address the lack of woodland understorey, as highlighted by Crowe (2008). 85% of species recorded in SW14 have increased in density since 2007,

Also of note is SW9 'Fifteen Acres' that recorded nearly double the number of species in 2015 compared to 2007 and a large increase in bird densities. SW9 represents the largest area of open grassland within the park yet recorded a moderate species diversity, with 81% more species recorded during 2015 than during 2007. The grassland is classified as the semi-natural habitat type *dry calcareous and neutral grassland* (GS2) (OPW 2011) as per the habitat classification of Ireland (Fossitt 2000), and with a variety of grasses and herbs is inherently more biodiversity rich and important to birdlife than amenity grassland or improved agricultural grassland that dominate other parts of the park. Consistent with the previous survey SW9 remains the most important section for Skylark, a ground-nesting bird that has undergone steep population declines across Europe in recent decades.

An impressive 85% of species in NE6 and SW14 had larger densities in 2015 compared to 2007. These are the same two sections that saw the largest increases in species richness, which suggests that these areas had 'spare room' to support more species and higher numbers.

Overall, species richness has remained stable or increased in two-thirds of the sections surveyed while the overall density of bird within the park has also increased in comparison with 2007. Nearly two-thirds of species have increased in total density across the park, while over half of the sections show increasing densities. It therefore appears that while certain sections of the park have remained very stable over time, and in particular the zoo sections, some sections (e.g. SW9) have seen considerable changes. As bird densities have increased into several areas this has resulted in some degree of change to overall bird distribution.

Woodland and tree-dominated areas cover 220 ha of the Phoenix Park (OPW 2011) and it is pleasing to see such an abundance of woodland, particularly broad-leaved, within a city park. However, a general observation was the lack of understorey in many areas of woodland, with very little field or shrub layer. This is clearly the result of intensive grazing/browsing by deer. Low numbers or complete absence of some birds such as Dunnock, Wren and Robin was very evident in these areas. In some fenced-off sections, such

as the US Ambassador's Residence and the Áras an Uachtaráin, there is a considerable shrub layer and better numbers of those species that rely on this habitats. In addition, Grey Squirrels (*Sciurus carolinensis*) are very obvious throughout the park and recorded from most sections with up to ten or more in some sections. While there is no direct evidence, this non-native species could be exerting a pressure on some of the smaller passerine species in the form of predating nests.

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American Ambassador's Residence
Áras an Uachtaráin
Garda Depot
Ordnance Survey Ireland
Secretary Lodge
St Mary's Hospital
Zoological Gardens

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Appendix 1

Species densities by section

Showing changes in species density by section (2007 – 2015)

Section	Increase	Decrease	Stable
NE1	Sparrowhawk, Woodpigeon Robin, Mistle Thrush, Blackcap, Goldcrest, Long-tailed Tit, Coal Tit, Treetreeper, Jay	Swift, House Martin, Wren, Dunnock, Blackbird, Song Thrush, Sedge Warbler, Great Tit, Magpie, Rook, Starling, Greenfinch, Goldfinch	Blue Tit, Jackdaw, Hooded Crow Chaffinch
NE2	Mandarin, Herring Gull, Great Black- backed Gull, Woodpigeon, Collared Dove, Robin, Mistle Thrush, Blackcap, Goldcrest, Coal Tit, Jay, Jackdaw, Hooded Crow, Starling, Goldfinch	Grey Heron, Pheasant, Moorhen, Black-headed Gull, Common Gull, Swallow, Meadow Pipit, Wren, Dunnock, Blue Tit, Great Tit, Treetreeper, Magpie, Rook, Greenfinch	Mallard, Blackbird, Long-tailed Tit
NE3	Woodpigeon, Robin, Goldcrest, Long- tailed Tit, Treetreeper, Rook, Hooded Crow, Goldfinch	Mallard, Swift, House Martin, Wren, Dunnock, Song Thrush, Mistle Thrush, Sedge Warbler, Blackcap, Chiffchaff, Coal Tit, Blue Tit, Great Tit, Jay, Jackdaw, Starling, Greenfinch	Collared Dove, Blackbird, Magpie, Chaffinch
NE4	Mallard, Feral pigeon, Woodpigeon Wren, Robin, Blackbird, Song Thrush Mistle Thrush, Blackcap, Willow Warbler Goldcrest, Blue Tit, Treetreeper, Magpie Jackdaw, Starling, Goldfinch, Bullfinch	Collared Dove, Sedge Warbler, Spotted Flycatcher, Coal Tit, Great Tit, Rook, Hooded Crow, Chaffinch, Greenfinch	Dunnock, Jay
NE5	Herring Gull, Stock Dove, Swift, Mistle Thrush, Coal Tit, Jackdaw, Starling, Chaffinch, Goldfinch	Woodpigeon, Dunnock, Robin, Blackbird Song Thrush, Sedge Warbler, Chiffchaff Goldcrest, Blue Tit, Great Tit, Treetreeper Magpie, Rook	Wren, Hooded Crow, Greenfinch
NE6	Buzzard, Pheasant, Woodpigeon, Swallow, Wren, Robin, Blackbird, Song Thrush, Mistle Thrush, Blackcap Chiffchaff, Goldcrest, Spotted Flycatcher Coal Tit, Blue Tit, Great Tit, Treetreeper, Magpie, Jackdaw, Hooded Crow, Starling Chaffinch, Greenfinch, Bullfinch	Dunnock, Long-tailed Tit, Rook	Jay
NE7	Woodpigeon, Swift, Swallow, Wren, Dunnock, Robin, Blackbird, Song Thrush Blackcap, Goldcrest, Spotted Flycatcher Long-tailed Tit, Coal Tit, Treetreeper Jackdaw, Rook, Hooded Crow, Starling Chaffinch	Grey Heron, Sedge Warbler, Chiffchaff, Great Tit, Jay, Magpie, Greenfinch	Mistle Thrush, Blue Tit
NE8	Swallow, Blackcap, Coal Tit, Treetreeper Hooded Crow, Chaffinch, Goldfinch	Woodpigeon, Collared Dove, Wren, Dunnock, Robin, Blackbird, Song Thrush, Mistle Thrush, Blue Tit, Great Tit, Magpie, Jackdaw, Rook, Starling, Greenfinch, Bullfinch	
NE9	Little Grebe, Mallard, Moorhen, Coot, Lesser Black-backed Gull, Herring Gull, Feral pigeon, Woodpigeon, Swift, Wren Robin, Blackbird, Blackcap, Goldcrest Spotted Flycatcher, Coal Tit, Treetreeper Magpie, Hooded Crow, Chaffinch Goldfinch	Pheasant, Great Black-backed Gull, Collared Dove, Swallow, Dunnock, Stonechat Mistle Thrush, Willow Warbler, Long-tailed Tit, Blue Tit, Great Tit, Jay, Jackdaw, Starling, Greenfinch	Song Thrush, Bullfinch
NE10	Grey Heron, Collared Dove, Swift, Pied Wagtail, Wren, Robin, Blackbird, Song Thrush, Blackcap, Goldcrest, Coal Tit, Blue Tit, Treetreeper, Magpie, Jackdaw, Hooded Crow, Starling, Chaffinch, Bullfinch	Mallard, Great Black-backed Gull, Woodpigeon, Swallow, Mistle Thrush, Willow Warbler, Long-tailed Tit, Great Tit, House Sparrow	Rook

Section	Increase	Decrease	Stable
NE11	Mute Swan, Mallard, Sparrowhawk, Buzzard, Coot, Lesser Black-backed Gull, Herring Gull, Feral pigeon, Sand Martin, Swallow, Grey Wagtail, Wren, Blackbird, Blackcap, Willow Warbler, Long-tailed Tit, Coal Tit, Treecreeper, Jackdaw, Hooded Crow, Raven, Goldfinch, Bullfinch	Little Grebe, Grey Heron, Shoveler, Pochard, Tufted Duck, Pheasant, Moorhen, Black-headed Gull, Woodpigeon, Collared Dove, Swift, House Martin, Dunnock, Song Thrush, Mistle Thrush, Sedge Warbler, Chiffchaff, Blue Tit, Great Tit, Jay, Rook, Starling, Greenfinch	Robin, Goldcrest, Magpie, Chaffinch
NE12	Herring Gull, Swift, Sand Martin, Blackbird, Song Thrush, Blackcap, Treecreeper, Magpie, Hooded Crow, Starling, Chaffinch, Goldfinch	Grey Heron, Mallard, Black-headed Gull, Woodpigeon, Swallow, Wren, Dunnock, Robin, Goldcrest, Blue Tit, Great Tit, Jackdaw, Rook	Mistle Thrush, Greenfinch
NE13	Mute Swan, Lesser Black-backed Gull, Herring Gull, Woodpigeon, Swift, Swallow, Grey Wagtail, Wren, Blackcap, Goldcrest, Blue Tit, Treecreeper, Jay, Jackdaw, Hooded Crow, Starling, Chaffinch, Goldfinch, Bullfinch	Little Grebe, Grey Heron, Mallard, Tufted Duck, Moorhen, Coot, Feral pigeon, Collared Dove, Sand Martin, House Martin, Dunnock, Robin, Blackbird, Song Thrush, Sedge Warbler, Willow Warbler, Long-tailed Tit, Coal Tit, Great Tit, Magpie, Rook, House Sparrow, Greenfinch	Pied Wagtail, Mistle Thrush
NE14	Little Grebe, Mute Swan, Mandarin, Mallard, Tufted Duck, Moorhen, Coot, Herring Gull, Feral pigeon, Stock Dove, Woodpigeon, Collared Dove, Swift, Swallow, House Martin, Pied Wagtail, Wren, Dunnock, Robin, Blackbird, Song Thrush, Mistle Thrush, Blackcap, Willow Warbler, Goldcrest, Long-tailed Tit, Coal Tit, Blue Tit, Great Tit, Treecreeper, Jay, Magpie, Jackdaw, Rook, Hooded Crow, Starling, Chaffinch, Greenfinch, Goldfinch		
SW1	Herring Gull, Blackbird, Mistle Thrush, Blackcap, Coal Tit, Treecreeper, Jay, Jackdaw, Starling, Chaffinch, Goldfinch	Mallard, Pheasant, Woodpigeon, Swift, Swallow, Dunnock, Goldcrest, Great Tit, Magpie, Hooded Crow, Greenfinch	Wren, Robin, Song Thrush, Long-tailed Tit, Blue Tit
SW2	Grey Heron, Mallard, Woodpigeon, Robin, Blackbird, Blackcap, Willow Warbler, Goldcrest, Treecreeper, Magpie, Jackdaw, Hooded Crow, Chaffinch, Bullfinch	Pheasant, Swallow, House Martin, Wren, Song Thrush, Mistle Thrush, Coal Tit, Blue Tit, Great Tit, Jay, Rook, Greenfinch	Dunnock, Chiffchaff, Long-tailed Tit
SW3	Sparrowhawk, Pied Wagtail, Wren, Blackbird, Song Thrush, Mistle Thrush, Goldcrest, Coal Tit, Blue Tit, Great Tit, Jay, Jackdaw, Hooded Crow, Starling, Chaffinch, Greenfinch, Siskin	Mallard, Pheasant, Dunnock, Blackcap, Long-tailed Tit, Magpie, Goldfinch, Bullfinch	Woodpigeon, Swallow, Robin, Treecreeper, Rook
SW4	Mandarin, Moorhen, Woodpigeon, Swallow, Robin, Song Thrush, Mistle Thrush, Blackcap, Goldcrest, Long-tailed Tit, Treecreeper, Jay, Magpie, Jackdaw, Rook, Hooded Crow, Starling, Chaffinch, Bullfinch	Mallard, Tufted Duck, Kestrel, Pheasant, Skylark, Meadow pipit, Wren, Blackbird, Willow Warbler, Coal Tit, Blue Tit, Great Tit, Goldfinch, Linnet	Little Grebe, Coot, Dunnock
SW5	Mallard, Tufted Duck, Herring Gull, Dunnock, Robin, Blackbird, Song Thrush, Mistle Thrush, Blackcap, Chiffchaff, Goldcrest, Great Tit, Jackdaw, Rook, Starling, Chaffinch	Cormorant, Grey Heron, Sparrowhawk, Stock Dove, Woodpigeon, Willow Warbler, Long-tailed Tit, Coal Tit, Blue Tit, Treecreeper, Jay, Hooded Crow, Lesser Redpoll, Bullfinch	Pheasant, Wren, Magpie
SW6	Mallard, Coot, Blackcap, Jackdaw, Hooded Crow, Greenfinch, Siskin	Pheasant, Moorhen, Woodpigeon, Wren, Dunnock, Robin, Blackbird, Song Thrush, Mistle Thrush, Willow Warbler, Goldcrest, Long-tailed Tit, Coal Tit, Blue Tit, Great Tit, Treecreeper, Jay, Magpie, Rook, Chaffinch, Lesser Redpoll	Little Grebe, Grey Heron, Bullfinch
SW7	Robin, Jackdaw, Starling	Pheasant, Swift, Skylark, Swallow, Wren, Dunnock, Blackbird, Mistle Thrush, Coal Tit, Blue Tit, Treecreeper, Magpie,, Rook, Hooded	Woodpigeon, Great Tit, Chaffinch

		Crow, Greenfinch	
Section	Increase	Decrease	Stable
SW8	Mallard, Woodpigeon, Wren, Robin, Blackbird, Song Thrush, Mistle Thrush, Goldcrest, Treecreeper, Jay, Hooded Crow, Chaffinch, Greenfinch	Sparrowhawk, Pheasant, Swift, Swallow, Dunnock, Chiffchaff, Coal Tit, Blue Tit, Great Tit, Magpie, Starling, Goldfinch	Blackcap, Long-tailed Tit, Jackdaw
SW9	Little Grebe, Grey Heron, Lesser Black-backed Gull, Herring Gull, Woodpigeon, Skylark, Swallow, House Martin, Wren, Robin, Song Thrush, Mistle Thrush, Blackcap, Chiffchaff, Goldcrest, Coal Tit, Blue Tit, Great Tit, Treecreeper, Magpie, Jackdaw, Hooded Crow, Starling, Chaffinch, Goldfinch	Mallard, Kestrel, Great Black-backed Gull, Meadow pipit, Wheatear, Blackbird, Rook	
SW10	Herring Gull, Woodpigeon, Swift, Swallow, House Martin, Pied Wagtail, Robin, Blackbird, Song Thrush, Mistle Thrush, Blackcap, Goldcrest, Spotted Flycatcher, Coal Tit, Rook, Starling, Chaffinch, Goldfinch, Siskin	Grey Heron, Mallard, Pheasant, Chiffchaff, Long-tailed Tit, Blue Tit, Jay, Jackdaw, Hooded Crow, Greenfinch, Bullfinch	Skylark, Wren, Dunnock, Great Tit, Treecreeper, Magpie
SW11	Grey Heron, Mallard, Lesser Black-backed Gull, Herring Gull, Robin, Coal Tit, Jay, Starling, Goldfinch	Kestrel, Pheasant, Woodpigeon, Collared Dove, Swift, Skylark, Swallow, Meadow pipit, Wren, Dunnock, Blackbird, Mistle Thrush, Blackcap, Goldcrest, Blue Tit, Great Tit, Treecreeper, Magpie, Chaffinch, Greenfinch	Jackdaw, Rook, Hooded Crow
SW12	Little Grebe, Grey Heron, Sparrowhawk, Lesser Black-backed Gull, Herring Gull, Feral pigeon, Swift, Skylark, Pied Wagtail, Wren, Robin, Blackbird, Mistle Thrush, Blue Tit, Great Tit, Magpie, Hooded Crow, Starling, Chaffinch, Goldfinch	Mallard, Pheasant, Black-headed Gull, Great Black-backed Gull, Woodpigeon, Sand Martin, Swallow, Meadow pipit, Dunnock, Song Thrush, Coal Tit, Jackdaw, Rook, Linnet	Goldcrest, Treecreeper
SW13	Grey Heron, Mallard, Herring Gull, Feral pigeon, Woodpigeon, Wren, Dunnock, Robin, Blackbird, Song Thrush, Mistle Thrush, Blackcap, Goldcrest, Long-tailed Tit, Treecreeper, Hooded Crow, Starling, Chaffinch, Greenfinch, Goldfinch	Pheasant, Swift, Swallow, Coal Tit, Blue Tit, Magpie, Rook	Collared Dove, Pied Wagtail, Great Tit, Jay, Jackdaw
SW14	Mallard, Black-headed Gull, Herring Gull, Woodpigeon, Sand Martin, Swallow, House Martin, Pied Wagtail, Wren, Dunnock, Robin, Blackbird, Song Thrush, Mistle Thrush, Blackcap, Chiffchaff, Goldcrest, Long-tailed Tit, Blue Tit, Treecreeper, Magpie, Jackdaw, Rook, Hooded Crow, Starling, Chaffinch, Greenfinch, Goldfinch, Linnet, Bullfinch	Swift, Great Tit	Skylark, Coal Tit, Jay
SW15	Grey Heron, Moorhen, Lesser Black-backed Gull, Herring Gull, House Martin, Wren, Blackbird, Song Thrush, Blackcap, Long-tailed Tit, Blue Tit, Treecreeper, Magpie, Jackdaw, Rook, Hooded Crow, Starling, Chaffinch, Greenfinch, Goldfinch	Little Grebe, Pheasant, Coot, Woodpigeon, Swift, Skylark, Swallow, Robin, Mistle Thrush, Goldcrest, Coal Tit, Great Tit	Mallard