

Bird Control for Air Safety in Belfast

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Introduction

Aerodromes subject to the UK Civil Aviation Authority's (CAA) national aerodrome licencing requirements use the guidance material presented in CAP772: Wildlife Hazard Management at Aerodromes (CAA 2017) to demonstrate a means of compliance to requirements stated in CAP 168: Licensing of Aerodromes (CAA 2019). The content of CAP772 is provided as information, specialist advice and supplementary guidance material in support of EC Regulation 139/2014 and associated (EASA) Acceptable Means of Compliance and Guidance Material.

All sites chosen for airfields have associated air safety risks due to local bird populations and their movements. The area occupied by the airfield will attract a range of bird species, depending on the habitat types present both on the airfield and nearby. On-airfield conditions will determine which species use the immediate areas around the runways and are carefully managed. Birdstrike risks in the airspace above and the flightlines around the airfield are affected by the distribution of habitats on a broader scale. On-airfield, birds can be controlled by a range of methods including habitat management and disturbance. The measures employed at George Best Belfast City Airport (BCA) to control birds visiting the airfield are presented in the Wildlife Control Management Plan (WCMP). The plan is reviewed annually to include recommendations made in the annual Wildlife Hazard Assessment (WHA) and to incorporate new control methods as they become available.

The aim of the WHA is to identify sources of risk and to assess the relative severity of those risks. Risk assessment is difficult with low frequency events and, for birdstrike risk, factors such as size and flocking behaviour may be more significant than simple frequency of occurrence. The acceptability of an individual risk is therefore assessed using the probability/severity matrix in fig.1 (reproduced from CAP 772) which takes into account the likelihood of a Birdstrike involving any particular species ("Probability") and the likely damage that would result ("Severity").

Figure 1: Risk Assessment Matrix

		PROBABILITY				
		Very High	High	Moderate	Low	Very Low
SEVERITY	Very High					
	High					
	Moderate					
	Low					
	Very Low					

Red: high risk – additional management actions should be implemented for this species as soon as possible.

Yellow/amber: medium risk – current risk management strategies for this species should be reviewed and additional steps taken if appropriate.

Green: low risk – no additional action above that already being implemented for this species is currently necessary.

Each likelihood is scaled numerically (see figs 2 & 3 below) with severity ratings drawn from an extensive national databank.

Figure 2: Probability Ratings (Birdstrikes over a 5-year period)

	Very High	High	Moderate	Low	Very Low
Number of strikes	>10	3.0 - 10	1.0 - 2.9	0.3 - 0.9	0 - 0.2

Figure 3: Severity (probability of damage to aircraft engines)

	Very High	High	Moderate	Low	Very Low
Number of strikes	>20%	10 - 20%	6.0 - 9.9	2.0 - 5.9	0 - 1.9

Severity rates are not published for all species. However, some example species are listed in CAP772 (Fig. 4) and many of the species involved in Birdstrikes at BCA were covered in an assessment of Cliffe Marshes (Bell *et al.* 2003) in which the severity ranks for each species are presented. Where species were not listed in that study, severity is estimated by calculation of mean mass for the species x 0.014 (Allan 2006).

Figure 4: Examples of species and their damage probabilities percentages

Species	Damage Percentage	Species	Damage Percentage
Mute swan	42.5%	Feral pigeon	6.5%
Canada goose	26.7%	Black-headed gull	4.6%
Herring gull	13.0%	Kestrel	2.6%
Buzzard	11.4%	Starling	2.6%
Lapwing	8.3%	Swift	1.2%
Woodpigeon	6.6%	Skylark	0.7%

Apart from the risk presented by individuals of each bird species, the likelihood and actual frequency of multiple Birdstrikes (where more than 2 birds are struck and more than 10 birds are seen, or when more than 10 birds are struck) must also be taken into account. CAP772 recommends that where a multiple strike occurs in a species in the “High” severity category, this should be increased to “Very High”. For species in the “Moderate” or “Low” severity categories, they should be increased one level if 3 or more multiple strikes occurred.

The individual risk presented by all bird species at BCA, and recommended actions for each species, are assessed and reviewed annually. The results for the species discussed in this document are presented in Figure 5.

Figure 5: Species of significance to air safety at Belfast City Airport (as identified by the most recent Wildlife Hazard Assessment).

Species	Risk assessment	Existing management	Actions requested from BCC	Permissions sought from BCC
Greylag Goose	Medium	Use of signage at Victoria Park to reduce supplementary feeding. Control of population by egg “pricking”.	Maintenance of signs in Victoria Park	Permission to continue “pricking” eggs in Victoria Park
Mute Swan	Medium	Use of signage at Victoria Park to reduce supplementary feeding.	Maintenance of signs in Victoria Park	None
Mallard	Medium	Use of signage at Victoria Park to reduce supplementary feeding.	Maintenance of signs in Victoria Park	None
Lesser Black-backed Gull	High	Monitoring of breeding population. Surveys of feeding sites and flightlines (BCA)	BCC should investigate options to manage urban gulls within the planning system	None
Herring Gull	Medium	Monitoring of breeding population. Surveys of feeding sites and flightlines (BCA)	BCC should investigate options to manage urban gulls within the planning system	None
Black-headed Gull	Low	Monitoring of breeding population. Surveys of feeding sites and flightlines (BCA)	None	None
Grey Heron	Medium	Monitoring of the impact of structural pruning in 2018 on nesting	None	None
Rook	Low	Control of new Rookery to prevent the formation of a large colony. Monitoring of the impact of recent pruning and some nest removal on nesting	None	None

The following are made by the airport's highly-experienced consultant and take into account potential biodiversity impacts, likelihood of success, public sensitivity and legal constraints.

Species

1. Greylag Goose

Geese present a serious risk to aircraft as a result of their large size, high mobility and habit of flying in (often large) groups (presenting a risk of a multiple collision). Greylag geese using Victoria Park are from an introduced, feral population and so do not contribute to the native biodiversity of the park or the wider area. Apart from being a threat to air safety, geese can cause fouling, damage to lawns/pitches, reduction in native flora and the spread of disease. Control measures have been employed in Victoria Park for several years and the reduction in numbers in the park is reflected in the numbers observed flying across the airfield (Fig. 2)

Figure 2: Numbers of Greylag Goose observed on-airfield 2014-19

Year	No. of individuals	No. of records
2014	2,426	179
2015	1,530	117
2016	5,786	234
2017	957	85
2018	318	49
2019	474	47

The steady decline in numbers is the result of a staged control strategy aimed at making the site less attractive to geese. The use of fencing has reduced the impact of supplementary feeding by the public, especially in the car park area. This fencing has been extended and replaced with permanent fences that further reduce the feeding opportunities for geese on adjoining lawns etc. The fencing has also been supported by signage dissuading the public from feeding the wildfowl in Victoria Park and this, combined with the general public perception that feeding wildfowl with bread is bad for them, appears to have had the desired effect. Egg "pricking" has taken place since 2007 and involves making a small hole in the shell which renders it non-viable. It should be noted that this success in controlling numbers is set against a backdrop of a recent rapid increase in numbers in this introduced, feral, problematic population.

Impact of Egg Control at Victoria Park – a long-term strategy of reducing bird strike risk to aircraft.

Most of Ireland's resident greylag population originates from captive breeding and release of birds during the twentieth century. There is little data to support a remnant breeding population in Ireland hence this population is usually regarded as "feral". The population is thought to be in excess of 2,000 (Bird Watch Ireland 2017) and from a small number of original release sites, is now widespread throughout the country. The present overall status of feral Greylags in Northern Ireland is poorly understood. However, it is clear that in some areas they have increased significantly since the last national census undertaken by Boland et al in 2008. The numbers of greylag in the North Down area for example have increased from 150 geese in 2008 to almost 600 in 2019. (BCA Report, K.Mackie)

Greylag management was initiated in 2007 at Victoria Park when monthly goose counts averaged over 80 geese. Egg control was a preferred alternative to the less palatable measure of culling, complemented with other measures to reduce easy access to - and frequency of - supplementary feeding by park users . This combination of actions initially led to a 60% reduction to the annual average

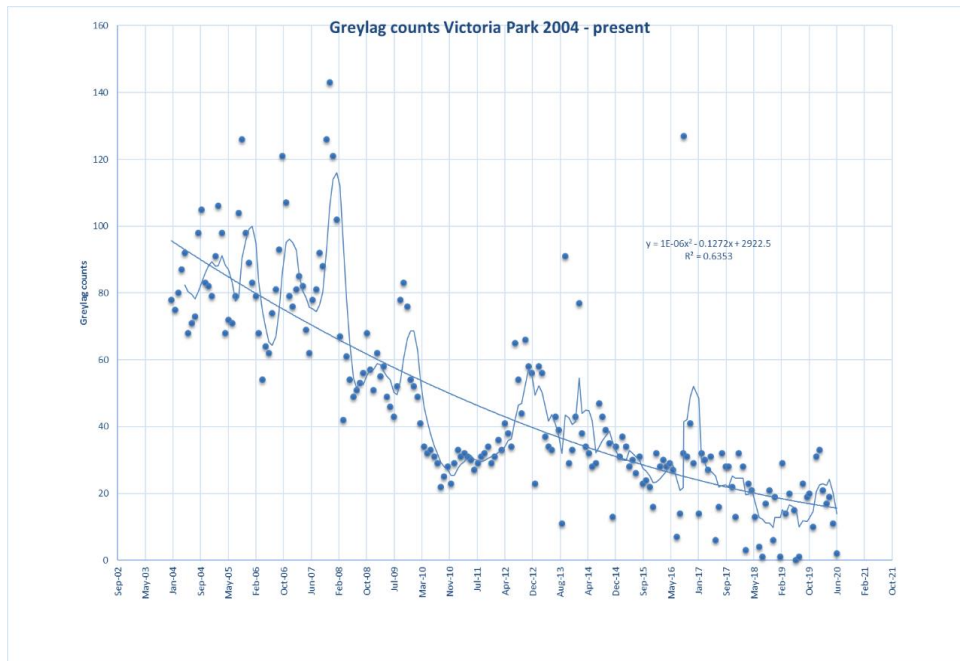
count (March-February) over the the first 3 years. The 50% drop in the number of eggs controlled between the first year and the second year of intervention is indicative of breeding relocation - a response to a change in breeding/food security and the availability of alternative breeding/feeding sites elsewhere. The number of eggs controlled annually was relatively constant between 2008 and 2016 (av.113 pa) from which point there has been a further reduction to a low of 64 in 2020 (Fig 6). BCA funded a research project in 2015 to capture and tag a sample from the Victoria Park flock and verified links with other sites in the Greater Belfast area and a strong site fidelity among individual geese using the Park. It is likely the combination of both site fidelity and the species' longevity, that we are only now starting to see the benefit of a long-term egg control program as the age profile of the resident flock reaches a level of senescence and minimal recruitment has eventually reduced the breeding flock size.

The number of goose days per annum at Victoria Park have been reduced substantially from a three year average of **34,000** goose days in 2007 to **2200** in 2019 representing a reduction of over 90 % of goose use - and associated risk to aircraft (Fig. 7). Short term influxes of geese in the area are still being observed during the Autumn season as flocks from other locations redistribute to seasonal feeding locations. The reduced probability of "Victoria Park" reared or "Victoria Park" acquainted geese within these transient flocks, as well as a smaller flock on the ground to decoy in geese, both help reduce short term influxes of larger flocks within the airspace of the airport's western approach.

Fig 6. Numbers of Greylag Goose and eggs controlled in Victoria Park 2005-present



Fig.7. Greylag Goose counts for Victoria Park 2004-present



Moulting Geese within the 13km airport safety exclusion zone.

Greylag go into a 3-week flightless moulting period between early June and early August (depending on age and breeding success) and moulting locations provide both easy access to food and close proximity to a water body for refuge. As can be seen in Fig 8. below both Victoria Park and Belfast Water Works provided these goose essentials until 2007 at which point the implementation of control measures made Victoria Park less attractive. Although some geese changed allegiance to Belfast Water Works, a remnant flock of c. 30 geese continued to moult at Victoria park indicative of a strong tie to the site and a trait which has – like the number of active breeding pairs - only recently been reduced to a marginal level in the last few years. If the status of other sites such as Belfast Water works were to change in any way that might increase the mobility of geese from those sites, it will be necessary to assess any potential impact from this dispersal on other sites such as Victoria Park and flight safety.

Fig 8. Greylag Goose moult counts 2002-2019



Reducing geese by way of egg control is known to be a slow process. Although the reduction of greylag overwintering, breeding and moulting at Victoria park has been successful it has taken the average lifespan of a feral goose, to achieve. It is envisaged that this situation could easily be reversed if greylag were allowed once again to rear young and reassert a lifelong association with this site (clutches range from 5-7 eggs which could result in the population trebling in size in a single season).

Are there any alternative methods to those currently practised? Although supplementary feeding has been reduced at the park through signage and well-positioned fencing, geese can always resort to the sports fields (maintained at an ideal sward height), as a food source. There are few alternative ways to curb nesting success unless access to natural predators such as foxes could somehow be facilitated as a more natural intervention. However, even if this was feasible, there would be no guarantee of absolute control and if partial, options to rectify the situation humanely, might be limited.

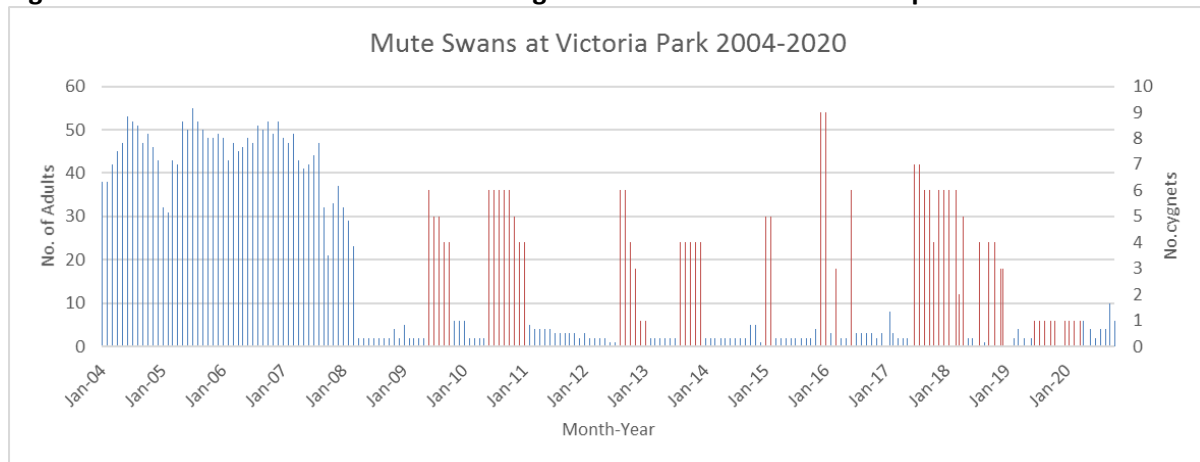
2. Mute Swan

Long-term monitoring in Victoria Park showed that around 40-50 Mute swans (NI's heaviest bird) were usually present and on-airfield observations showed that they regularly flew across the airfield. As part of the revisions to BCA's Bird Control Management Plan, changes to the management of swans were made in 2008. Breeding by swans was previously controlled (by the humane method of coating the eggs in paraffin oil to prevent their development), so breeding pairs abandoned their territories when nesting efforts were unsuccessful. Breeding birds are fiercely territorial and exclude all other swans. Because there were no territorial birds, non-territorial birds were attracted in large numbers to Victoria Park. By allowing a small number of swans to breed, the numbers of birds using the park decreased significantly.

Counts between 2004 and 2008 record an average flock of 40 non-breeding mute swans at Victoria Park after which there was a sudden drop to one or two breeding pairs (Fig.9.). Whereas geese can move on to playing fields to forage, swans tend to feed predominantly from the water. As supplementary feeding was curtailed swans were therefore more likely to disperse from the site. Alternatively, the establishment of a dominant pair of swans at the site was coincidental to management intervention and was the main driver for dispersal of both non-breeding swans and a portion of the greylag flock. With a breeding pair now established any swans that attempted to return would have been dissuaded. Mute swans have bred at Victoria Park ever since rearing up to 6 cygnets most

years. The number of cygnets produced has reduced gradually over the last few years, possibly due to senescence and in 2020 the regular pair were replaced by two new pairs. Both pairs attempted to nest but were unsuccessful - a common occurrence with new (less experienced) breeding pairs as they become established.

Fig 9. Numbers of Mute Swans and breeding success in Victoria Park 2004-present



The presence of one or two established breeding pairs of Mute swans at Victoria park is to be encouraged as they are regarded as low risk, they prevent the re-establishment of a non-breeding swan flock and are an additional deterrent to greylag geese during the breeding season.

3. Mallard

Mallards is a widespread and common species and is the duck most often associated with feeding by the public. This supplementary feeding supports a larger population in Victoria Park than would be expected if the only food available was natural. To reduce this excess population, signs have been placed around the park to dissuade the public from feeding wild birds. While there is some evidence that this has worked, the effectiveness of this approach and the existing signage should be assessed and monitored.

4. Gulls

The need for control

Numbers of urban-nesting gulls have increased rapidly since roof-nesting was first recorded around 50 years ago. Limited numbers of predators and the availability of inaccessible breeding areas (roof-tops, chimneys etc.) have led to high levels of breeding success, as has the gulls' ability to exploit a wide range of feeding opportunities over a wide area (usually up to 40km from the nest site) and within the urban environment (Huig et al. 2016).

Gulls around airports present a significant problem to air safety through the risk of birdstrikes. The large size of some gulls and their habit of flying in flocks (presenting a multiple strike risk) is reflected in their hazard rating ("High") in the "Wildlife hazard management at aerodromes" guidelines document CAP772 (CAA2017). This also recommends that no developments likely to cause an increase in numbers of gulls (e.g. landfills and large waterbodies) within the 13km safeguarding zone around airports, should be approved. For existing problem species, it stipulates "priority should be given to reducing the presence of large and/or flocking birds and, where practicable, to managing other congregations of birds that present a threat to aircraft safety whether on or off-aerodrome".

Following recent increases in the numbers of gulls observed at George Best Belfast City Airport (BCA), numbers of strikes have also increased, leading to the risk assessment for one species (Lesser

Black-backed Gull) being classed as “high”. This means that “additional management actions should be implemented for this species as soon as possible” (CAA2017). Although neither has been involved in a collision in the past 5 years (the review period used to form the risk assessment), two other species (Herring and Great Black-backed Gull) are assessed as “medium” risk, requiring “current risk management strategies for this species should be reviewed and additional steps taken if appropriate”. Of these, only Herring Gull nests in the vicinity of BCA and so is included in this plan.

The current situation

Lesser Black-backed Gull

Numbers of breeding pairs are increasing rapidly in Belfast. The Seabird 2000 surveys in 1998-2000 recorded 63 nests on rooftops in Belfast city centre and harbour area (Mitchell et al. 2004) “In 2018 and 2019, vantage-point surveys provided updated figures.....at least 221 nests were observed” (Booth Jones et al 2019). The authors state that this count is limited and that the true population is likely to be larger (“Due to the complexity of the roof-scape and the limited number of vantages, observed Lesser Black-backed Gull AON (Apparently Occupied Nests) are likely to be a distinct underestimate of the total number present in central Belfast”).

Annual surveys commissioned by BCA have also recorded an increase. The most recent Wildlife Hazard Assessment states “Breeding season visits (July) in 2019 and 2020 revealed apparently increasing numbers of breeding birds (adults alarm calling and appearing to feed chicks) and actual breeding (chicks or recent fledglings observed) at a number of sites around the harbour estate

While accurately assessing the true population size is not currently possible, it is clear that the Belfast population of this species is rapidly expanding. Observations in July 2019 and 2020 suggest that breeding productivity is high, with many broods of 3 chicks observed (the maximum brood size). High productivity leads to rapid population growth not only through recruitment of those chicks in subsequent years, but also through immigration of adults. The presence of a successful breeding population with established “core” areas and apparently unlimited breeding sites is likely to produce further, perhaps rapid, population growth in Belfast.

Large breeding populations are present away from Belfast but within the regular foraging distance for this species (usually around 40km – Figure 11).

Figure 11: Numbers of breeding Lesser black-backed gulls in the vicinity of Belfast (reproduced from Booth Jones et al. 2019)

	2015	2016	2017	2018	2019
Belfast Harbour	*	*	*	1	1
Belfast City Centre	*	*	*	101	221
Copeland Islands	*	*	*	365	547
Strangford Lough	433	298	343	310	316
Antrim town	*	600	*	*	*

* No counts available

Herring Gull

Herring gulls are very similar to Lesser black-backed gulls and present the same risk to aircraft (“high” severity). Numbers of urban-breeding Herring gulls have also increased around the same time as Lesser black-backed gulls and numbers breeding in Belfast have mirrored the trend seen in that species (Figure 12).

Away from Belfast, significant breeding populations are found on the Copeland Islands, Strangford Lough and Outer Ards (Table 2). This species also uses the flightline between Belfast and areas to the North-East which could indicate the movement of birds breeding on the Copeland Islands into Belfast to feed, or birds breeding in Belfast moving to feeding areas.

Figure 12: Numbers of breeding herring gulls in the vicinity of Belfast (reproduced from Booth Jones et al. 2019)

	2015	2016	2017	2018	2019
Outer Ards	*	*	*	187	199
Belfast City Centre	*	*	*	16	39
Copeland Islands	*	*	*	483	483
Strangford Lough	679	1177	1070	1061	1273

* No counts available

Observations of Herring gulls around BCA have shown a very similar pattern of movements and nesting distribution albeit involving smaller numbers.

Likely future conditions

It appears very likely that populations of both Herring and Lesser Black-backed gull will continue to increase (especially as a “nucleus” breeding population is now well-established) unless remedial action is taken. Colony growth can be very rapid as result of both breeding productivity and immigration to successful colonies. Over the past 3 breeding seasons, many of the broods observed had 3 chicks (the maximum possible). This clearly indicates that breeding conditions are very good and are likely to attract further breeding adults as well as returning chicks (after 3-4 years).

Recommended management

The true level of nesting and feeding in the city needs to be established both to assess the scale of the problem.

Survey nesting gulls

Surveying urban gulls is difficult as nests are often highly dispersed and difficult to see from ground level. Existing monitoring programmes should be supplemented by records from BCA annual monitoring.

Survey feeding gulls

A survey of the use of different feeding areas in the breeding season should identify key food sources that have fuelled the rapid population growth.

Analysis of flightlines

As it has been demonstrated that gulls foraging in urban areas can comprise both urban-nesting gulls and birds “commuting” from colonies up to 60km away, it is important to establish which populations are using the Belfast area. Analysis of movements along flightlines may allow some assessment of this as breeding birds will usually return to the nest at dusk in the early stages of the breeding season and depart for feeding areas at the start of the following day. For example, if most gulls are moving from the city at dawn and heading North-East, this would indicate that they are foraging to the North-East of Belfast but breeding in the city. If the opposite is observed, it would suggest that birds breeding on the Copeland Islands etc. are commuting into the city to forage but not to breed. Control measures for these birds would depend on preventing access to food sources rather than prevention of breeding.

Planning control

BCC should investigate options to manage urban gulls within the planning system.

5. Grey Heron

Grey Herons nest, roost and loaf in trees on islands in Victoria Park. Structural pruning and some ivy control was carried out during routine tree surgery in 2018 as an experimental prescription to restrict any expansion of the heronry directly under the landing approach. The efficacy of this work is currently being monitored.

6. Rook

In the most recent Wildlife Hazard Assessment, the risk presented by Rooks was calculated as “low” and no birdstrikes involving this species were reported in the 5-year review period. However, this species is of concern as a small colony has formed in trees in Victoria Park (at least 11 nests in 2020) and numbers observed at BCA have increased rapidly over the past 5 years (Figure 8).

Figure 8: Numbers of Rooks observed at BCA 2014-19

Year	No. of individuals	No. of records
2014	9,903	1,402
2015	6,770	1,030
2016	6,082	1,011
2017	8,798	1,149
2018	18,589	1,998
2019	24,484	2,762

Rooks nest colonially, often in large numbers. They are highly social and colonies (Rookeries) are the focus of many aerial displays both during the breeding season (March-June) and during the autumn when they rebuild their nests for the following spring. When foraging away from the nest, Rooks often travel in loose groups along regular flightlines. Where these lines cross areas used by aircraft there can be a risk of a multiple strike and remedial action may be required. Suitable feeding areas (pasture and arable land) are located close by to the East and this may result in flightlines crossing the Southern end of the airport. Rooks are known to avoid nesting in areas where they are persecuted (they are widely controlled on farmland) and Victoria Park may prove a safe, attractive nesting site for Rooks in the absence of control measures.

Under Committee approval, some old nests and some vegetation thought to be attractive to nesting Rooks (Ivy etc.) were recently removed. The effect of this on nesting behaviour and the size of the nesting population will be closely monitored.

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