

Urban Gull Case Study 2018/2019 (Developing methods for counting urban gulls)

Title

Developing methods for counting urban gulls

Description and Summary of Results

[This summary is based on the summary from the project report (see publications section, below) which should be referred to for further detail]

The distributions of Herring Gulls *Larus argentatus* and Lesser Black-backed Gulls *Larus fuscus* have changed substantially over the last 50 years, and increasing numbers now breed on rooftops in urban areas, sometimes far inland. Many of these birds may feed exclusively in terrestrial habitats, whilst others nest in towns and cities but make more 'traditional' foraging trips out to sea.

To inform specific policy recommendations and decisions regarding gull conservation, and as part of the national 'Seabirds Count' census of the UK and Ireland, there is a need for robust population estimates of breeding gulls, including those nesting in urban environments. However, methods to estimate populations of urban breeding gulls across large spatial scales were unproven and a national survey based on digital aerial survey was considered prohibitively expensive.

This pilot study aimed to evaluate the potential of ground based, volunteer surveys as a means of determining populations of urban nesting gulls. As the probability of detecting nesting gulls in an urban environment from the ground may be low and variable, the study aimed:

- (i) To attempt to model the degree of and variation in underestimation by ground level surveys, such that counts could be adjusted, as necessary, to enable the generation of breeding population estimates;
- (ii) To consequently produce population estimates with confidence intervals for two study areas; and
- (iii) To evaluate these results in order to assess the feasibility of using ground level counts to produce national population estimates for the study species, as well as the applicability of similar methods to other dispersed bird species.

The study focused on Herring Gull and Lesser Black-backed Gull, with field data collection over two phases in two different areas: (1) Birmingham (in 2018) and (2) North Wales (in 2019).

The original study design aimed to account for the limitations of different survey methodologies by using a two-step approach to provide estimates of the numbers of Apparently Occupied Nests (AONs) within the study areas based on ground level counts. First, ground level counts made by volunteers were compared with counts made by digital aerial surveys; second the aerial survey counts were compared with counts made from vantage points overlooking rooftops which were intended to provide robust ground truthing. However, limited viewpoints and variation in surveyor interpretation of the vantage point protocol meant that comparisons between counts from aerial surveys and vantage point surveys were inconsistent, such that they were unsuitable for use in models. The models therefore directly compared counts of AONs, Apparently Occupied Territories (AOTs) and individual adult birds, made by ground level volunteers, with counts of AONs made by digital aerial surveys undertaken from fixed-wing aircraft.

Therefore the final analyses compared counts carried out by volunteers with counts of the same survey squares produced from digital aerial surveys. Based on previous experience, we knew that observers surveying from ground level would be unable to detect a proportion of the birds nesting on rooftops and that the proportion hidden from view would vary across survey squares. The objective of this project was therefore to quantify detection rates and the variability in detection probability across survey squares.

Survey squares were located within the Birmingham Metropolitan area in 2018 and in North Wales in 2019 (along or near the North Wales coast between Llandudno and Holywell in north-east Wales as well as in the Connah's Quay and Wrexham areas).

Modelling suggested that relationships do exist between ground level counts of adult Herring Gulls and Lesser Black-backed Gulls and counts of AONs from the aerial surveys. However, given the poor fit of the models for Herring Gull, the poor match to expected population estimates for Lesser Black-backed Gull, and the poor predictions for coastal and inland suburban strata for both species, the currently available data were insufficient, especially at high nest densities, to fit models robust enough to produce reliable population estimates for the national survey.

Methods of Data Capture

All urban 1-km squares were stratified into four levels ('mostly industrial', 'mostly urban', 'suburban' and 'industrial/suburban' mix). The stratification used the CORINE dataset rather than the Land Cover Map (2007) dataset. This offers the advantage that it covers the UK and Republic of Ireland and is more up-to-date.

Two survey areas were selected, in Birmingham and North Wales, to represent different habitats (a large inland metropolitan area and a mainly coastal area made up of small to medium-sized towns). Surveys were carried out in Birmingham in spring 2018 and in North Wales in spring 2019. One hundred squares were selected in each survey area.

In both survey areas, the aim was to count gulls using three different survey methods: (1) a ground level survey, with volunteers counting gulls observed from the ground; (2) an aerial survey, carried out by Hi-Def Aerial Surveying Ltd; (3) vantage point Surveys, carried out by Defra and Natural England staff in Birmingham, and by Defra and Natural Resources Wales staff in North Wales; these aimed to record gulls from vantage points overlooking rooftops.

The expectation prior to the survey was that the vantage point surveys would validate and perhaps provide a correction for the aerial surveys, thus accounting for gulls and nests that might be hidden from view or difficult to interpret from the aerial images. In practice, the vantage point data were not used due to a lack of sufficient high quality vantage points, and the analyses were restricted to a comparison of the ground level surveys and aerial surveys only.

Volunteer ground level surveyors were asked to visit all suitable breeding habitat within the square and to record the numbers of adult Herring Gulls and Lesser Black-backed Gulls recorded in each 1-km square, as well as the number of Apparently Occupied Territories (AOTs) and Apparently Occupied Nests (AONs) of each species. In addition, they recorded and mapped the % of the square that was inaccessible and some additional information about the visit (e.g. date, weather conditions).

Aerial surveys were undertaken by a plane which flew several times across each square (in a parallel route). The aerial images were reviewed by experienced image reviewers and ornithologists to pinpoint and identify the numbers of individual gulls and the numbers of AONs. These were then attributed to 1-km squares based on their location so that the data could be compared with the ground level counts.

Purpose of Data Capture

This project was carried out on behalf of the Department of Food and Rural Affairs (Defra), with involvement from Natural Resources Wales and Natural England, with the aim of producing a model which could be used to produce robust population estimates using ground level counts. It was expected that the survey results would help inform urban gull population estimates for the Seabirds Count, co-ordinated by the JNCC (Joint Nature Conservation Committee).

Geographic Coverage

Birmingham City Council Metropolitan District in 2018 and North Wales in 2019 (covering the local authority areas of Conwy, Denbighshire, Flintshire and Wrexham).

Temporal Coverage

Volunteer surveys took place across May-early June 2018 in Birmingham and during May 2019 in North Wales (surveys were aimed to cover the period when gulls were likely to be incubating). Vantage point and aerial surveys took place over a few days and a single day respectively within each survey period.

Other Interested parties

The project was funded by the Department of Food and Rural Affairs (Defra), with staff from Defra, Natural Resources Wales and Natural England being involved in some of the survey work (vantage point surveys). It was expected that the survey results would inform urban gull population estimates for Seabirds Count, which is being co-ordinated by the JNCC (Joint Nature Conservation Committee). Staff from the above four organisations and other interested parties were also involved in the project steering group.

Organiser(s)

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Publications

Woodward, I.D., Austin, G.E., Balmer, D.E., Boersch-Supan, P., Irwin, C.G., Scott, M.S., Thaxter, C., Webb, A. & Burton, N.H.K. 2020. *Improving Methods for Counting Dispersed Bird Populations: Urban Gull Case Study – Final Report*. BTO, Thetford.

The project report was peer-reviewed and has been published on the Defra website: <http://sciencesearch.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&Completed=0&ProjectID=20113>

Two interim reports were also produced (one at the end of each survey). However, these were not published and are not publicly available as they were for internal communication within the project steering group only.

Available from NBN?

No.

Computer data -- location

Count data are currently stored in the project folder on the BTO shared drives.

Original aerial survey imagery are held by Hi-Def Aerial Surveying Ltd.

Computer data -- outline contents

The count data from the various different surveys are stored in spreadsheets in separate folders by location (Birmingham; North Wales) with each folder containing separate spreadsheets for each survey (aerial; ground level; vantage point).

Computer data -- description of contents

The ground level and vantage point count data files contain all the information collected on the respective survey forms (with one row for each 1-km square from the ground level survey, and one row for each vantage point from the vantage point survey). The aerial survey count data files contain one row for each bird/nest identified from the survey images with additional information as recorded by the image reviewers. Summarised aerial survey information for each 1-km square was also produced as part of the initial analysis and spreadsheets containing this information are also held in the project folder.

Information held in BTO Archives

The original paper copies of the completed survey forms are held in the BTO archives (for the ground level and vantage point surveys), along with hard copies of the survey forms and instructions and other supporting documents that were available to survey volunteers.

Notes on Access and Use

Data may be available on request. Note, however, that the data are owned by Defra and therefore access to survey data would be subject to agreement from Defra.

Other information needed

Notes on Survey Design

Specific Issues for Analysis

Data from the ground level surveys were amended to account for incomplete coverage of survey squares due to access restrictions in some squares. It was assumed that the density of gulls in the uncovered portion of each square would have been similar to the density in the surveyed area and hence counts were scaled up proportionally. However, in some cases it was clear that surveyors had recorded parts of the square as inaccessible despite the fact that these areas contained no suitable nesting in habitat. In these cases the survey data were adjusted prior to analysis with the ‘% of square inaccessible’ figure amended accordingly (based on the map showing inaccessible areas which was completed by the surveyors themselves). A column is included in the ground level survey data spreadsheet to provide full details of all adjustments made prior to analysis.

Additionally, the ground level survey methodology was amended slightly between the Birmingham and North Wales surveys. During the North Wales survey, volunteers were asked to count adults recorded outside breeding habitat separately from adults recorded in apparently suitable breeding habitat (i.e. usually on buildings). This followed feedback on a small number of forms from the surveys in Birmingham noting that the majority of birds counted were clearly not breeding where they were observed, e.g. birds resting in a flock on a lake. Some analysis was carried out with non-breeding flocks excluded, but this did not improve the models and the final analysis used the total counts which included birds both within and outside suitable breeding habitat.