

Wild Birds Regulation Unit

Report on a survey of the influx of migratory finches (Common Linnet, Common Chaffinch, European Serin, European Goldfinch, European Greenfinch, Hawfinch and Eurasian Siskin) over the Maltese Islands, conducted between October 2021 and January 2022

Prepared by



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1. Introduction

1.1 Preamble

In February 2021, the Ministry for Gozo (hereafter 'MGOZ') published a call for tenders (reference MGOZ/MPU T 12/2021) titled "*Services - Tender for an independent scientific study on the influx or passage of migratory Common Quail and Turtle Dove in Malta during autumn 2021; and migratory finches, Golden Plover and Song Thrush during autumn/winter season 2021*", on behalf of the Wild Birds Regulation Unit (WBRU).

The Terms of Reference (ToR) specified in the tender document are as follows:

2. Contract Objectives and Expected Results

2.1 Overall Objectives

The overall objective of this contract is:

- To provide an independent study on the influx or passage of the migratory Turtle Dove Streptopelia turtur and Common Quail Coturnix coturnix during the Autumn period, between the 1st of September 2021 to the 31st October 2021, inclusive of both dates; and*
- To provide an independent study on the influx or passage during the Autumn/Winter 2021, between the 15th of October 2021 till the 15th January 2022, inclusive of both dates, of the following species:*
Common Linnet (Linaria cannabina),
Common Chaffinch (Fringilla coelebs),
European Serin (Serinus serinus),
European Goldfinch (Carduelis carduelis),
European Greenfinch (Chloris chloris),
Hawfinch (Coccothraustes coccothraustes),
Eurasian Siskin (Spinus spinus),
Golden Plover (Pluvialis apricaria), and
Song Thrush (Turdus philomelos)

2.2 Specific Objectives

The objectives of this contract are as follows:

- To survey and scientifically monitor the daily influx of Turtle Dove, Common Quail, seven species of finches, Golden Plover and Song Thrush on the respective dates/periods specified above;*
- To estimate the overall presence (influx) of these eleven species per day and for the whole study period for each respective species as specified above, subject to scientifically justified assumptions;*
- To correlate migration data gathered through the present survey with bag data for the relevant species, should any live-capturing derogations be applied during the 2021 autumn season.*

2.3 Results to be Achieved by the Consultant

1. *Daily datasheets with raw counts for seven (7) finch species: (Common Linnet Linaria cannabina, Common Chaffinch Fringilla coelebs, European Serin Serinus serinus, European Goldfinch Carduelis carduelis, European Greenfinch Chloris chloris, Hawfinch Coccothraustes coccothraustes, Eurasian Siskin Spinus spinus)*
2. *Daily datasheets with raw counts for Golden Plover Pluvialis apricaria and Song Thrush Turdus philomelos;*
3. *Daily datasheets with raw counts for the Turtle Dove Streptopelia turtur and Quail Coturnix coturnix; and*
4. *Submission of three (3) monitoring reports for Autumn/Winter 2021: one report comprising the monitoring of the influx of seven species of finches, a separate report comprising the monitoring of the influx of Golden Plover and Song Thrush and another separate report comprising of the monitoring of Turtle Dove and Common Quail. Each of these reports must include:*
 - a) *List of monitoring stations which recorded high/low counts;*
 - b) *Dates which showed high/low peaks in the migration of each of the bird species;*
 - c) *A daily estimate of the influx of each of the bird species for the whole of the Maltese Islands;*
 - d) *The estimated total influx for these species for the whole of the study period, subject to scientifically justified assumptions;*
 - e) *A comparative analysis of the results obtained during the past studies; and*
 - f) *A comparative assessment of the results obtained with the bag data extracted from telephonic reports for 2021, which data shall be provided by the Wild Birds Regulation Unit at the end of each monitoring period, (for Golden Plover, Song Thrush and Finches reports, this would only apply in case relevant derogations permitting live-capturing are applied in 2021).*

3. Assumptions and Risks

3.1 Assumptions Underlying the Project Intervention

For the purposes of this bird migration study, it will be assumed that the contractor shall use the daily counts obtained from the monitoring stations to extrapolate the approximate estimate of the total influx of each of the bird species: Common Linnet Linaria cannabina, Common Chaffinch Fringilla coelebs, European Serin Serinus serinus, European Goldfinch Carduelis carduelis, European Greenfinch Chloris chloris, Hawfinch Coccothraustes coccothraustes, Eurasian Siskin Spinus spinus, Golden Plover Pluvialis apricaria, Song Thrush Turdus philomelos, Turtle Dove Streptopelia turtur and Common Quail Coturnix coturnix over the Maltese Islands.

3.2 Risks

Execution of the bird migration study is dependent on an adequate enrolment of the ornithologists/ field assistants who shall be manning the monitoring stations (at least 21 in number). It shall be the responsibility of the contractor to ensure that the active monitoring stations are manned by a sufficient number of ornithologists and/or field assistants. The number of active stations on any given day shall be six (6) sites manned by at least two ornithologists and/or field assistants and each site has to be surveyed every 4 days. The numbers and location of the monitoring stations, as well as the level of personnel deployed in each station should be consistent with the corresponding parameters deployed in past studies of this nature in Malta which can be accessed on <https://mgoz.gov.mt/en/Pages/WBRU/Reports%20and%20Statistics/Autumn-Live-Capturing->

Derogations%E2%80%8B-.aspx.

The Contractor shall propose strategies to address the identified risks. These proposals shall be included in the tenderer's technical offer.

The Contracting Authority reserves the right to cancel award of the tender at its discretion. The publication of this tender shall in no way be construed or perceived as obliging the Government or any other relevant authority to take any decision in connection with any derogation under the European Union Birds Directive or any other law or regulation

4 Scope of the Work

4.1 General

4.1.1 Project Description

The monitoring of the influx or passage of nine bird species (Common Linnet Linaria cannabina, Common Chaffinch Fringilla coelebs, European Serin Serinus serinus, European Goldfinch Carduelis carduelis, European Greenfinch Chloris chloris, Hawfinch Coccothraustes coccothraustes, Eurasian Siskin Spinus spinus, Golden Plover Pluvialis apricaria, Song Thrush Turdus philomelos) shall take place during the period between the 15th October 2021 and the 15th January 2022 both dates included. The Contractor shall mobilise all staff and equipment for this study by the 24th of September 2021, in preparation for the execution of Autumn/Winter 2021 migration study.

The monitoring of the influx or passage of the Turtle Dove Streptopelia turtur and Common Quail Coturnix coturnix at each station shall take place between the 1st of September 2021 till the 31st of October 2021, both dates included, for at least two hours in the morning (prior to 12:00hrs) for Common Quail and for seven hours starting from 7:00hrs in the case of Turtle Dove. The consultant shall mobilise all staff and equipment for this study by the 17th of August 2021, in preparation for the execution of the Autumn 2021 bird migration study. The bird monitoring phase shall commence on the 1st of September 2021.

The bird migration studies should comprise the on-field surveying and scientific monitoring of the daily influx of migration of all seven (7) finch species, Golden Plover, Song Thrush, Turtle Dove and Common Quail. This would provide an independent verification of the level of presence of the species in Autumn/Winter and the timing of their migration. This shall be achieved by generating a "Migration Count," that is a count of migrant birds of each species in question in the stipulated time span when monitoring is undertaken.

The collection of scientific data to elucidate general population trends for these species is beyond the scope of this bird migration study. The Contractor must submit the daily datasheets with raw counts to the Contracting Authority at the end of each week. The draft monitoring reports and analysis for the Finches and Golden Plover and Song Thrush reports are to be submitted by the 24th of January 2022. The draft monitoring report for Turtle Dove and Quail is to be submitted within five (10) working days from the study phase, that is, by the 15th November 2021.

Once the draft Autumn 2021 study reports have been certified for quality assurance by the Contracting Authority, the final monitoring reports are to be submitted for quality assurance within five (5) working days from such review.

4.1.2 Geographical Area to be covered

The three inhabited islands of the Maltese archipelago, namely Malta, Gozo and Comino.

4.1.3 Target Groups

As appropriate.

4.2 Specific Activities

*The bird migration studies shall monitor the influx of migratory specimens of Common Linnet *Linaria cannabina*, Common Chaffinch *Fringilla coelebs*, European Serin *Serinus serinus*, European Goldfinch *Carduelis carduelis*, European Greenfinch *Chloris chloris*, Hawfinch *Coccothraustes coccothraustes*, Eurasian Siskin *Spinus spinus*, Golden Plover *Pluvialis apricaria*, Song Thrush *Turdus philomelos*, Turtle Dove *Streptopelia turtur* and Common Quail *Coturnix coturnix* bearing in mind any methodological and physical limitations in the monitoring of these species, such as ability to identify or differentiate species of finches on the basis of their call rather than appearance and as identified in the European Union Management Plan for the Common Quail.*

A field protocol of standard operating procedures, which will be used in the same manner from day to day should be designed by the commissioned experts on the basis of best practice procedures. There might be a need to take into consideration however, the flexibility of the techniques used to meet the constraints imposed by local geographical conditions

A network of monitoring stations will need to be set up throughout the three inhabited islands of the Maltese archipelago for the study periods. Such a network would need to comprise of 21 monitoring stations. The number of active stations on any given day shall be six (6) sites manned by at least two ornithologists and/or field assistants. Each site has to be surveyed every 4 days. Monitoring in Malta, Gozo and Comino shall be carried out on a daily basis, however this requirement shall be waived with respect to Comino on those days when access to the Island would not be possible due to adverse weather conditions. The ornithologists and/or field assistants shall be persons with relevant knowledge in bird identification and shall have the capacity to identify all of the eleven (11) bird species visually as well as capable of recognizing the flight calls of finches.

For Golden Plover, Song Thrush and Finches monitoring study, daily monitoring at each station shall be conducted from 09:00hrs to 14:00hrs for the duration of the study (given that this year there will be no changes in the Daylight Saving Time)¹.

For Turtle Dove and Common Quail monitoring study, daily monitoring at each station shall be conducted from at least two hours in the morning (prior to 12:00hrs) for Common Quail and for seven hours starting from 7:00hrs in the case of Turtle Dove at each station during the study period ie. 1st September 2021 till the 31st October 2021, both dates included.

For each day during the bird monitoring phase, at least six (6) monitoring stations must be fully manned. The exact number, location and area of the monitoring stations will be determined in consultation with scientific experts listed by contractor who are commissioned to undertake

¹ To be confirmed closer to the study date

this bird migration study. Such details should be included in the methodology submitted in Section 4 Technical Offer (Organization and Methodology) by the Contractor. Given that the survey is aimed at quantifying the influx or passage of migrating birds, all monitoring stations shall be placed in strategic locations depending on the species being surveyed and the expected geographical occurrence of the species depending on the overall timing of the migration and prevailing weather conditions. The location of the monitoring stations shall be selected with care and shall not include areas where the settlement or sighting of the birds under study cannot in practice occur.

The Project coordinator should be able to co-ordinate a team of scientists and scientific experts and conduct environmental monitoring, nature-related and/or ornithological studies. The role of the scientists accompanying the Project coordinator should also include the ability to conduct environmental monitoring, nature-related and/or ornithological studies.

Each monitoring station should include or encompass a defined 'count area' that has features that are compatible with the chosen count procedures. Moreover, no matter the type of method, the experts should also define the total daily 'count period', as well as the standard daily time periods during which the various component activities of bird counting procedures occur.

Surveys should focus on observations made, and should be coordinated by the Project co-ordinator or/and scientist/s, so as to enable an appropriate scientific determination with ecological statistics and/or models leading to population estimates (possibly through the extrapolation of results, with standard errors being indicated) and should cover, at least, the three main inhabited islands of the Maltese archipelago.

The migration count can include birds counted at a site, observed flying past a fixed point in diurnal migration or alighting onto the ground or trees. For monitoring small landbirds, particular attention should be drawn to birds observed at short-term stopover sites immediately following a migratory flight. There are several options for producing a useful migration count of small landbirds; these options include: visible migration count; area search or route census counts; incidental observations; and daily estimated totals. The commissioned experts should define in the final monitoring report what they will consider as a migration count and what standardised methods will be used.

Nonetheless, in view that Finches, Golden Plover and Song Thrush have a preference for migrating during particular times of day, observations should focus on such peak times. In this respect the monitoring is to be carried out from 09:00hrs to 14:00hrs for the duration of the study (given that this year there will be no changes in Daylight Saving Time)².

In view that the Common Quail has a preference for cover and may be more difficult to observe or be detected, the surveys for this species should focus on area searches. These may include, the use of dogs to flush the birds out and/or through the use of line transects (a method where observers traverse the monitoring area in close parallel lines to search the area). Surveys for the Common Quail should be carried out for at least two hours in the morning (prior to 12:00hrs) at each of the monitoring stations in operation.

The surveys of the Turtle Dove, on the other hand, should focus mainly on observations (which should include both specimens observed in flight as well as those alighting within the study

² To be confirmed closer to the study date

site). The monitoring of this species needs to be carried out during the times of maximum activity/ major influx of the Turtle Dove and for a minimum of seven hours starting from 7:00hrs at each of the monitoring stations in operation.

It is imperative that the observers, or persons deployed by the consultant to man the stations and/or conduct counts or observations for the purpose of this study shall not be directly or indirectly involved with the practice of live-capturing or hunting.

Standardisation of counting methods can make a major contribution to removing extraneous variation derived from variable observer effort and sampling procedures. Nevertheless, migration counts will still be subject to uncontrollable variation from weather, observer differences, and unavoidable changes in the level of effort. Such problems should be addressed by the use of appropriate analytical procedures.

Daily datasheets with raw counts need to be drawn for each of the monitoring stations in use, such that the prevalent meteorological conditions, namely wind direction and speed, the degree of cloud cover; the habitat type; bird counts; the times and locations; and the names of the field assistants, are all recorded.

The count data collected for a pre-defined area and the count period at each study site shall be used to establish the average counts (per day) recorded in a typical monitoring station for each of the eleven (11) bird species. The calculations for such counts also need to include the standard deviation errors. Such mean counts shall then be extrapolated so as to cover the total area where the species may settle / which serves as short-term stopover sites, in order to estimate the total number of birds migrating daily over the Maltese Islands.

The appropriate methodology for extrapolation shall be determined by the scientific experts taking into account the possibility of repeat counting of observed birds; the patchiness of each species' distribution and frequency depending on available appropriate habitat; the seasonal geographical variation in the frequency of sightings dependent on the expected migration flow direction and any assumptions taken for such calculations need to be clearly stated in the monitoring report.

Relevant seasonal, local topographic (e.g. configuration of the coast), climatic and anthropogenic factors (such as degree of local urbanization) shall be duly taken into account in the extrapolation methodology, subject to scientifically justified assumptions.

The methodology shall not involve trapping or any taking of any bird, whether alive or dead.

The field study for Golden Plover, Song Thrush and Finches shall cover 88 full days during the Autumn/Winter migration period, between the 15th October 2021 and the 15th January 2022. The field study for the Turtle Dove and Quail shall cover 61 full days between the 1st September and 31st October 2021. The collection of scientific data to elucidate population trends for each bird species is beyond the scope of this bird migration study. The consultant must submit the daily datasheets with raw counts to the Contracting Authority at the end of each week of each of the bird monitoring periods. The Autumn/Winter 2021 Finches, Golden Plover and Song Thrush Migration monitoring reports and analysis is to be submitted by the 24th January 2022. Once such draft reports have been certified for quality assurance by the Contracting Authority, the Finches Migration 2021 monitoring report and Golden Plover and Song Thrush Migration 2021 monitoring report are to be submitted within 5 working days from such a review. The draft monitoring report and analysis for Turtle Dove and Quail Autumn 2021 study is to be

submitted by the 15th of November 2021. Once such draft report has been certified for quality assurance by the Contracting Authority, the final Autumn 2021 monitoring report is to be submitted within 5 working days from such a review.

These activities will result in:

- 1. Daily datasheets with raw counts for each of the above mentioned bird species.*
- 2. Three monitoring reports for each study period, including comparative analysis.*

4.3 Project Management

4.3.1 Responsible Body

The overall responsibility of the implementation of this contract lies with the Contracting Authority. An official will be appointed to oversee the implementation of the contract.

4.3.2 Management Structure

The Head of the Wild Birds Regulation Unit within the Ministry for the Environment, Sustainable Development and Climate Change is the official responsible for this contract. The Head may delegate various tasks to other officials within the Wild Birds Regulation Unit and may appoint an official to act as a project manager and to monitor the progress of this project.

4.3.3 Facilities to be provided by the Contracting Authority and/or other parties

None

5. Logistics and Timing

5.1 Location

The Republic of Malta. The monitoring stations shall be set up at appropriate locations within the three inhabited Maltese Islands, namely in Malta, Gozo and Comino.

The Contractor, moreover, is expected to compile reports, prepare scientific analysis, and prepare the setup of the administrative framework from his own premises. The contractor should be available during office hours via e-mail and telephone.

5.2 Commencement Date & Period of Execution

The intended commencement date for the monitoring phase for Turtle Dove and Quail study is from the 1st September 2021 and the study of the Golden Plover, Song Thrush and Finches is the 15th October 2021.

Article 18.1 of the Special Conditions will determine the actual commencement date and period of execution.

6. Requirements

6.1 Personnel

6.1.1 Other experts

CVs for experts other than the key experts are not examined prior to the signature of the contract.

The Consultant shall select and hire other experts as required according to the profiles identified in the Organisation & Methodology and these Terms of Reference.

All experts must be independent and free from conflicts of interest in the responsibilities accorded to them.

The selection procedures used by the Consultant to select these other experts shall be transparent, and shall be based on pre-defined criteria, including professional qualifications, language skills and work experience. The findings of the selection panel shall be recorded. The selection of experts shall be subject to approval by the Contracting Authority.

The Service Provider/s must be a natural person, or a legal entity providing the below Key Experts:

A list of the key experts and other staff proposed for the execution of the contract as per Form marked Key Experts to be submitted online through the prescribed tender response format (tender structure).

Key Expert 1

A Project co-ordinator who must be:

In possession of a Ph.D. or equivalent or other academic qualification at MQRIC Level 8 related to natural sciences

Key Expert 2

A Scientist who must be:

In possession of a Masters degree or equivalent or other academic qualification at MQRIC level 7 in natural sciences

The above key expertise can be provided by a single person, provided that he/she has the required qualifications as stipulated above.

6.1.2 Support Staff and Backstopping

- *The bird migration study is to be supported by ornithologists or field assistants with relevant experience in bird identification.*
- *Other support staff should be capable in carrying out statistical analysis, report writing and/or other relevant administration work.*

6.2 Accommodation

Office accommodation of a reasonable standard and of approximately 10 square metres for each expert working on the contract is to be provided by the Consultant.

6.3 Facilities to be provided by the Contractor

The Contractor shall ensure that experts are adequately supported and equipped. In particular it shall ensure that there is sufficient administrative, secretarial and interpreting provision to enable experts to concentrate on their primary responsibilities. It must also transfer funds as necessary to support its activities under the contract and to ensure that its employees are paid regularly and in a timely fashion.

The Contractor shall provide the equipment, software and hardware needed for carrying out surveys, data gathering, storage, analysis and evaluation.

If the Contractor is a consortium, the arrangements should allow for the maximum flexibility in project implementation. Arrangements offering each consortium partner a fixed percentage of the work to be undertaken under the contract should be avoided.

6.4 Equipment

No equipment is to be purchased on behalf of the Contracting Authority/beneficiary country as part of this service contract or transferred to the Contracting Authority/beneficiary country at the end of this contract. Any equipment related to this contract which is to be acquired by the beneficiary country must be purchased by means of a separate supply tender procedure.

The Contractor shall be responsible for establishing his own sources for goods, equipment, materials and software to perform the necessary activities and tasks, which may include:

- *Field Monitoring equipment, as appropriate e.g. binoculars, compass (to measure wind direction), radar equipment etc.*
- *Research equipment*

7. Reports

7.1 Reporting Requirements

Daily data sheets with raw counts need to be drawn for each of the monitoring stations in use, such that the prevalent meteorological conditions, namely wind direction and speed, the degree of cloud cover, the habitat type, bird counts, the times and locations, the names of the field assistants all need to be recorded.

Following the survey/study period a detailed analysis shall be carried out on the data collated which are to be presented in Three separate reports (one concerning Turtle Dove and Common Quail, one concerning seven finch species and a separate report concerning Golden Plover and Song Thrush migration). Such reports are to indicate:

- *the raw counts for the species covered by the corresponding migration report*
- *sampling methodology used*
- *the time schedule for the monitoring taken place*
- *the locations where monitoring was carried out and the estimated area of each site of observation*
- *the peak and low counts for each of the species under study*
- *the locations/ monitoring stations which had peak/low counts*
- *an extrapolation indicating the total influx of each of the relevant species migrating over the Maltese Islands for each day*
- *an estimated total influx of each of the relevant bird species for the whole study period*
- *assumptions taken for such estimates*

- For Turtle Dove and Quail, comparison of the results with hunting bag data for this period
- For Golden Plover, Song Thrush and seven finch species comparison of the results with live-capturing bag data for the species concerned for the current period (this would only apply in case relevant derogations permitting live-capturing are applied in 2021)

These reports should only concern information/data on the influx of the migratory birds and should not include personal opinions of the Contractor.

The Contractor must submit the daily datasheets with raw counts to the Contracting Authority at the end of each week during the bird monitoring phase. The draft Autumn 2021 report and analysis for Turtle Dove and Quail is to be submitted by the 15th November 2021. The draft Autumn/Winter 2021 Migration monitoring Finch report and the Golden Plover and Song Thrush Migration monitoring report analysis are to be submitted by the 24th January 2022.

Draft reports are to be submitted to the Contracting Authority for quality assurance certification. The Contracting Authority reserves the right to request the necessary modifications to bring the reports in line for issuance of quality assurance certification. In this regard, the Contractor is bound to submit his final version for quality assurance certification to the Contracting Authority, five (5) working days after the Contracting Authority reviews the report.

All reports and other forms of written communication must be presented in an editable format using commonly available software. All reports must be approved by the Contracting Authority before these can be considered finalised. All reports will be property of the Contracting Authority and it will have sole copyright.

7.2 Submission & approval of progress reports

The daily data sheets with raw counts, a hard copy and a soft copy of each of the monitoring reports referred to above must be submitted to the Project Manager identified in the contract. The progress reports must be written in English. The Project Manager is responsible for approving the progress reports.

8 Monitoring and Evaluation

8.1 Definition of Indicators

Results	Objectively verifiable indicators	Sources of verifications
<i>Daily datasheets with raw counts of Common Linnet Linaria cannabina, Common Chaffinch Fringilla coelebs, European Serin Serinus serinus, European Goldfinch Carduelis carduelis, European Greenfinch Chloris chloris, Hawfinch Coccothraustes coccothraustes, Eurasian</i>	<i>The original raw datasheets which are to be completed on site during the monitoring process to be submitted by the end of each week of the monitoring phase.</i>	<i>The original datasheets submitted to the Contracting Authority.</i>

<i>Siskin Spinus spinus, Golden Plover Pluvialis apricaria, and Song Thrush Turdus philomelos, Turtle Dove Streptopelia turtur and Common Quail Coturnix coturnix</i>		
<i>Daily datasheets with raw counts of Turtle Dove Streptopelia turtur and Common Quail Coturnix coturnix</i>	<i>The original raw datasheets which are to be completed on site during the monitoring process to be submitted by the end of each week of the monitoring phase.</i>	<i>The original datasheets submitted to the Contracting Authority.</i>
<i>Autumn/Winter 2021 Finches migration monitoring report which presents clear analyses of the monitoring carried out.</i>	<i>The draft monitoring report shall be submitted by the 24th of January 2022.</i> <i>The monitoring report will be finalised by the consultant and approved by the Contracting Authority within five (5) working days of the final submitted report.</i>	<i>The actual monitoring report presented by the contractor.</i>
<i>Autumn/Winter 2021 Golden Plover and Song Thrush migration monitoring report which presents clear analyses of the monitoring carried out.</i>	<i>The draft monitoring report shall be submitted by the 24th of January 2022.</i> <i>The monitoring report will be finalised by the consultant and approved by the Contracting Authority within five working days of the final submitted report.</i>	<i>The actual monitoring report presented by the contractor.</i>
<i>Turtle Dove and Quail Autumn 2021 season monitoring report which presents a clear analyses of the monitoring carried out as well as analysis and comparison with results of past studies</i>	<i>The draft monitoring report shall be completed within the 15th November 2021.</i> <i>The monitoring report will be finalised by the consultant and approved by the Contracting Authority within five working days of the final submitted report.</i>	<i>The actual monitoring report presented by the contractor.</i>

8.2 Special Requirements

As appropriate.

Ecoserv Ltd (hereafter 'Ecoserv') submitted a response to the tender and was subsequently notified that the company's bid was successful. The present submission constitutes Ecoserv's report of the independent scientific study on the influx of migratory finches - Common Linnet *Linaria cannabina*, Common Chaffinch *Fringilla coelebs*, European Serin *Serinus serinus*, European Goldfinch *Carduelis carduelis*, European Greenfinch *Chloris chloris*, Hawfinch *Coccothraustes coccothraustes*, and Eurasian Siskin *Spinus spinus* - in Malta, undertaken by Ecoserv during the period 15 October 2021 to 15 January 2022, and is based on the ToR stated above. The study period overlaps with the 2021 autumn/winter research derogation allowing catch and release of finches (20 October to 20 December). A report on the study of the migratory influx of Turtle Dove *Streptopelia turtur* and Common Quail *Coturnix coturnix* that forms part of the present tender was submitted in 2021 (Ecoserv, 2021d), while another report on the study of the migratory influx of Golden Plover *Pluvialis apricaria* and Song Thrush *Turdus philomelos* that also forms part of the present tender has been submitted separately but in parallel with the present submission (Ecoserv, 2022).

An overview of the migratory behaviour and records for the seven finch species around the Maltese Islands has already been presented in Ecoserv (2015a) and will not be repeated here. The only similar studies on the seven finch species that have been previously undertaken locally are the finch migration surveys conducted by Ecoserv in the autumn/winter of 2014, 2015, 2016, 2017, 2018, 2019 and 2020 (see Ecoserv, 2015a; 2016a; 2017a; 2018a; 2019a; 2020a; 2021a). Records of the number of finch individuals caught by live-catchers between 2002 and 2017 are available in the *Carnet de Chasse*/Game Reporting Data reports for the respective years (reports for 2010–2020 accessible from the Wild Birds Regulation Unit (WBRU) website: <https://mgoz.gov.mt/en/Pages/WBRU/Reports-and-Statistics.aspx>), while records of finch catches made during the 2014–2017 Autumn live-capturing derogations are available at the website of the Wild Birds Regulation Unit (<https://mgoz.gov.mt/en/Pages/WBRU/Reports%20and%20Statistics/Autumn-Live-Capturing-Derogations%E2%80%8B.aspx>).

2. Methodology

Field procedure

The survey design used by Ecoserv during the present autumn/winter 2021 survey was aimed at assessing migratory influx, which entails trend analysis based on data from monitoring carried out regularly over a sufficiently long period comprising subsequent years, and using a similar methodology to that used previously by Ecoserv to monitor the migratory influx of finches (Ecoserv, 2015a; 2016a; 2017a; 2018a; 2019a; 2020a; 2021a) and other species (Ecoserv, 2011; 2012; 2013; 2014a; 2014b; 2015b; 2015c; 2016b; 2016c; 2017b; 2017c; 2017d; 2018b; 2018c; 2018d; 2019b; 2019c; 2019d; 2020b; 2020c; 2020d; 2021b; 2021c; 2021d). During the survey, two individuals - a field assistant capable of identifying finch species and an observer who was responsible for recording data in the field - were stationed at a total of 21 sites (= count stations) distributed over Malta, Comino and Gozo. Prior to enrolment for the survey, the field assistants would have been assessed by Ecoserv's environmental scientists and ecologists to ensure that they are capable of identifying the concerned bird species. The observers were given briefings by Ecoserv's consultants on identification of the seven species of finches, and then received further training in the field on same by the field assistants. Throughout the survey, Ecoserv's environmental scientists and ecologists ensured close monitoring of the activities of the field personnel to ensure that collection of data proceeded as per designated protocol, by carrying out field visits (most of which were 'surprise visits') on a regular basis.

The survey was undertaken over a period of 93 days, between 15 October 2021 and 15 January 2022. During the survey, counts of individuals of the seven species (Common Linnet *Linaria cannabina*, Common Chaffinch *Fringilla coelebs*, European Serin *Serinus serinus*, European Goldfinch *Carduelis carduelis*, European Greenfinch *Chloris chloris*, Hawfinch *Coccothraustes coccothraustes*, and Eurasian Siskin *Spinus spinus*) were made at each of 6 different sites on each day during the monitoring period. Each group of 6 sites was surveyed once every 4 days, such that a total of 21 sites were surveyed over each period of 4 days, as agreed with the Contracting Authority. The study site at Comino was included in the 6 sites surveyed on any one day, such that every attempt was made to survey this site on a daily basis. However, when sea transport services to Comino were unavailable due to inclement weather, count surveys were undertaken at an alternative site instead. The sampling sites used in the present study include ones used in the previous surveys, and are represented by the grid cell reference numbers listed in Table 1, while their locations are shown in Figure 1.

Table 1

List of grid locations where monitoring of influx of migratory birds was carried out.

Location	Day 1	Day 2	Day 3	Day 4
Gozo	3690	3292	2888	3286
Comino	4085	4085	4085	4085
Malta	3881	4079	4077	4073
Malta	4070	4268	4666	5064
Malta	5663	6067	6069	5872
Malta	5277	4878	4480	4283

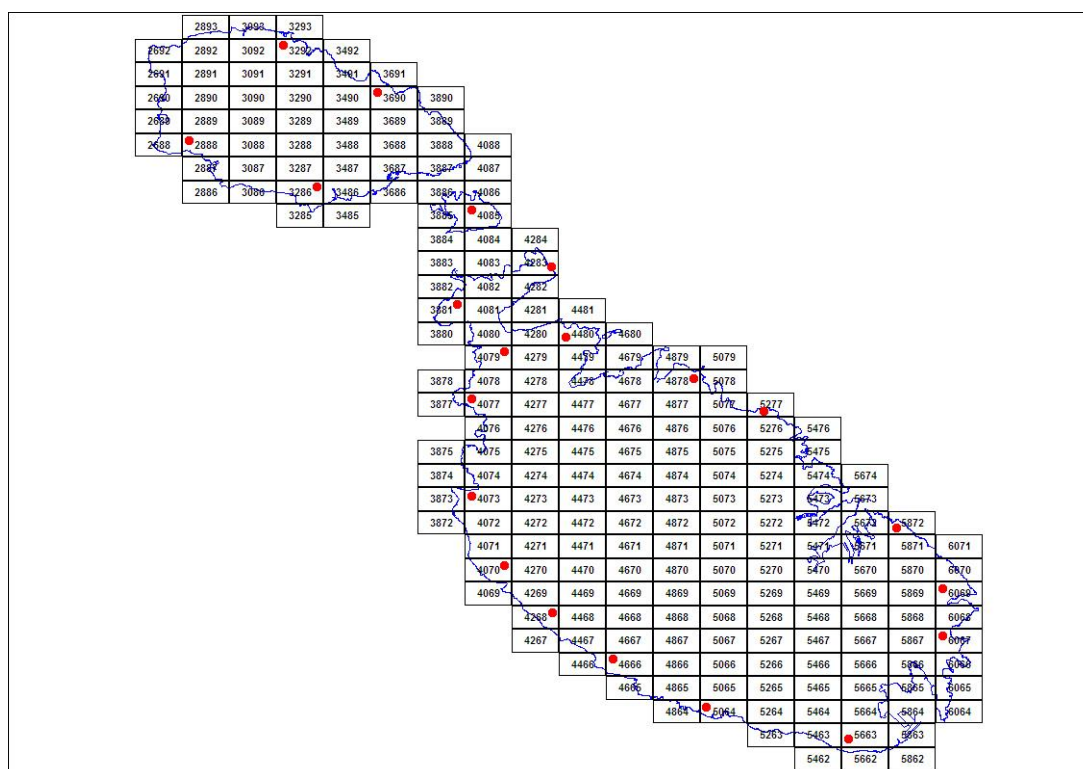


Figure 1. Map of the Maltese Islands showing the localities (grid cells indicated by the red filled circle) where the bird counts were made; see also Table 1.

Since the survey was mainly aimed at quantifying the influx of migrating birds, field sites were sited at strategic locations in coastal areas. For each species, the number of individuals observed flying within each study site was recorded, while the count area was estimated as the area within the observer's field of view when observing horizontally (c. 250m on each side of the observer) and vertically upwards (as far as the birds were detected by sight). Finches are small birds that are difficult to identify when they are flying at a distance, even if binoculars are used. Nonetheless, every effort was made in the present study to identify the species as accurately as possible; to aid the observers detect the birds, field personnel used a pair of binoculars (magnification: 8 x 21). The different species were identified based on their flight pattern and call. When the field personnel had doubt as to the specific identity of a species, a '?' was placed next to the record on the field data sheet to indicate the uncertainty. Afterwards, during data analysis (see below), comparison was made of records marked with a '?' from a particular site with records from other sites for the same day as corroboration procedure. Uncertain records were allotted to the species which the field personnel determined as most probable with respect to species identity and which showed agreement with appreciable records from other sites on the same day for that species.

Monitoring of finches was made between 09:00 and 14:00 during the first ten days of the study (i.e. up to the date when the daylight saving hour was removed) and between 08:00 and 13:00 during the rest of the study period. The count data collected for the pre-defined area and count period at each study site was used to establish the mean number of birds recorded for each day of the survey.

At each study site, the observers also recorded the prevalent weather conditions, namely wind direction and strength, and degree of cloud cover. This information is available on the raw data sheets that have been filled in for each site throughout the survey period, copies of which have been submitted to the Wild Birds Regulation Unit (WBRU). Although it would be interesting to explore potential relationships between weather conditions and migratory influx of the bird species surveyed, this would entail in-depth statistical analyses, while assessment of the influence of local climatic factors on the migratory influx of birds was beyond the scope of the present study. Nevertheless, the weather data collected during the present survey is useful as it will be available for such potential study.

Data analysis

Using the recorded raw data for each of the seven bird species, estimates were made of the mean daily count and total count for the study period (15 October 2021 to 15 January 2022). Values of standard deviation for the respective mean daily counts were also estimated; standard deviation is a measure of variability among counts recorded from the different sites, that is, a low standard deviation implies that very similar counts were recorded at all six sites surveyed during a particular day, whereas dissimilar values would lead to a high standard deviation. Standard deviation is influenced by sample size (i.e. number of study sites); it tends to increase with a decreased sample size.

An estimate of the total influx of the respective bird species was made using the daily counts. Extrapolations were then made to obtain the total number of individuals of each species that migrated over the Maltese Islands on a particular date. However, such an estimate must be treated with utmost caution, given that: (a) migration of finches is not necessarily restricted to that time of the year covered by the present study; (b) a relatively small number of sites were used; and (c) the counts were not made daily at each site. Being small birds, finches are easy to miss or present difficulty to identify if they fly beyond a certain distance from the observer, and especially if they do not call while in flight. Furthermore, passage of birds at different localities is extremely variable, with potential large differences in birds passing at two different localities, even if these are separated by a very small distance.

As already stated, another notable limiting factor is that, on any day of the field survey, recording of data was stopped in the early afternoon and was resumed the following morning, hence potentially missing birds that arrive during that time of the day not covered by the present survey, as these would not have been recorded by the field observers. For example, most of the finch species are known to also migrate between dusk and dawn; hence individuals migrating during this time would not be detected during the survey. Moreover, finches on their way to their wintering grounds appear in Malta from as early as mid-September up to end-January; hence birds migrating outside the current study period would not have been included in the present survey. On the other hand, the estimates given in the present report will be useful when making comparison of data collected from the present study period (autumn/winter 2021) with that collected in previous years, and with data collected from future studies held in autumn in subsequent years, assuming that a similar survey design is adopted; such comparison will enable assessment of whether the trend in influx is increasing or decreasing with time. Since the coastal length surveyed at each site during the present survey is approximately 0.5 km, the mean daily count represents the mean influx of the respective species per 0.5 km coastline. The estimated daily influx was obtained by extrapolating the mean daily values obtained (per 0.5 km) to the total coastline length for the Maltese Islands, which have a perimeter of 271.22 km (Mallia *et al*, 2002)³; that is, the estimated daily influx equals the mean daily count multiplied by an extrapolation factor of 271.22/0.5. Values of estimated daily influx were then summed to obtain an estimate of the total influx of the seven finch species (Common Linnet *Linaria cannabina*, Common Chaffinch *Fringilla coelebs*, European Serin *Serinus serinus*, European Goldfinch *Carduelis carduelis*, European Greenfinch *Chloris chloris*, Hawfinch *Coccothraustes Coccothraustes* and Eurasian Siskin *Spinus spinus*).

3. Results

Ecoserv's laboratory report reference for the present survey is **008-22**. The sample reference codes for the bird count data are **B-117-21** to **B-263-21**.

Where indicated in the following results, a mean count value of '0' recorded for a given bird species on a particular day during the survey period, which would also have been extrapolated to a total influx value of zero for that specific date, is highly unlikely to correspond to actual total absence of migration of the particular species over the Maltese Islands, and should be attributed to an artefact of sampling, resulting from the small sample size.

Common Linnet

Raw daily counts for Linnet recorded from the 21 sites during the present study varied between 0 and a maximum of 29 (see Appendix I), while the mean daily counts ranged between 0 and 11.33 (Table 2). During the present autumn migration, relatively high counts for this species were recorded on some days between 23rd October and 20th November 2021. The total counts, i.e. the total number of Linnet individuals recorded from a given grid location (= study site) during the whole study period (93 days), varied appreciably between the different sites: at the lower end, five individuals were recorded from the sites at grid location 6069 (see Figure 1), while at the higher end, 74 Linnet individuals were recorded from the site at grid location 4070.

Values of mean daily counts and total counts of Linnet recorded during the period 15 October 2021 to 15 January 2022 from the present survey are summarised in Table 2. Values of standard deviation associated with the mean daily counts are also provided (Table 2). Counts of Linnet recorded from the

³ Note, however, that this estimate includes the perimeter of minor islets and rocks.

present survey, along with those made during the autumn 2014, 2015, 2016, 2017, 2018, 2019 and 2020 surveys, are shown graphically in Figure 2. Overall, count values for Linnet from the present (autumn/winter 2021) survey are similar to those made in previous years. A pattern of higher count values made during the period late October to late November is noted for the years 2014 – 2021 (Figure 2).

An estimate of the total influx of Linnet over the Maltese Islands is given in Table 2. Based on the mean daily counts (Table 2), extrapolation translates to an estimated daily influx ranging between 0 and 6,148 individuals, with a total influx over the survey period (15 October 2021 – 15 January 2022; i.e. 93 days) of 54,425 individuals; see Table 2.

Mean count values for Linnet recorded from each of the 21 sites are indicated on the map shown in Figure 3. The highest mean count was recorded from Mtaħleb (Grid 4070), while relatively high counts were also recorded from Fomm ir-Riħ (Grid 4073) and San Tumas (Grid 6067). The lowest mean counts were recorded from Żonqor (Grid 6069) and Għar Ħasan (Grid 5663). Both low and high mean counts were recorded from sites located at various points along the coasts of the Maltese Islands, but counts in northern Malta were overall higher than those recorded from the southern parts of Malta.

Table 2

Values of mean ($\pm$ SD) daily count and daily total count recorded from the six study sites during the present survey, together with total influx of migratory Common Linnet.

Date	Mean daily count	Standard deviation	Total daily count	Estimated daily influx
15-Oct-21	0.00	± 0.00	0	0
16-Oct-21	0.33	± 0.82	2	181
17-Oct-21	0.50	± 0.84	3	271
18-Oct-21	0.67	± 1.21	4	362
19-Oct-21	0.00	± 0.00	0	0
20-Oct-21	1.67	± 1.37	10	904
21-Oct-21	1.33	± 1.63	8	723
22-Oct-21	0.67	± 1.63	4	362
23-Oct-21	2.67	± 4.68	16	1447
24-Oct-21	0.33	± 0.52	2	181
25-Oct-21	0.83	± 1.60	5	452
26-Oct-21	4.00	± 7.46	24	2170
27-Oct-21	0.00	± 0.00	0	0
28-Oct-21	1.67	± 2.66	10	904
29-Oct-21	3.67	± 7.09	22	1989
30-Oct-21	1.17	± 2.04	7	633
31-Oct-21	3.33	± 2.88	20	1808
01-Nov-21	0.67	± 1.63	4	362
02-Nov-21	4.17	± 5.71	25	2260
03-Nov-21	11.33	± 10.44	68	6148
04-Nov-21	2.17	± 1.47	13	1175
05-Nov-21	4.17	± 4.79	25	2260
06-Nov-21	1.00	± 1.67	6	542
07-Nov-21	5.67	± 6.38	34	3074
08-Nov-21	1.33	± 2.42	8	723
09-Nov-21	1.17	± 2.86	7	633
10-Nov-21	0.17	± 0.41	1	90

Date	Mean daily count	Standard deviation	Total daily count	Estimated daily influx
11-Nov-21	3.33	± 8.16	20	1808
12-Nov-21	1.33	± 2.42	8	723
13-Nov-21	5.17	± 5.67	31	2803
14-Nov-21	2.67	± 3.88	16	1447
15-Nov-21	0.00	± 0.00	0	0
16-Nov-21	4.33	± 7.81	26	2351
17-Nov-21	2.00	± 2.90	12	1085
18-Nov-21	0.17	± 0.41	1	90
19-Nov-21	2.67	± 4.84	16	1447
20-Nov-21	6.83	± 11.53	41	3707
21-Nov-21	3.00	± 5.29	18	1627
22-Nov-21	0.67	± 1.21	4	362
23-Nov-21	0.00	± 0.00	0	0
24-Nov-21	0.50	± 0.84	3	271
25-Nov-21	0.00	± 0.00	0	0
26-Nov-21	1.33	± 2.07	8	723
27-Nov-21	0.00	± 0.00	0	0
28-Nov-21	0.00	± 0.00	0	0
29-Nov-21	0.00	± 0.00	0	0
30-Nov-21	0.17	± 0.41	1	90
01-Dec-21	1.00	± 1.55	6	542
02-Dec-21	0.00	± 0.00	0	0
03-Dec-21	0.00	± 0.00	0	0
04-Dec-21	2.00	± 3.35	12	1085
05-Dec-21	1.50	± 3.67	9	814
06-Dec-21	0.00	± 0.00	0	0
07-Dec-21	0.33	± 0.82	2	181
08-Dec-21	0.17	± 0.41	1	90
09-Dec-21	0.00	± 0.00	0	0
10-Dec-21	0.00	± 0.00	0	0
11-Dec-21	2.50	± 6.12	15	1356
12-Dec-21	0.00	± 0.00	0	0
13-Dec-21	0.00	± 0.00	0	0
14-Dec-21	0.00	± 0.00	0	0
15-Dec-21	0.00	± 0.00	0	0
16-Dec-21	0.00	± 0.00	0	0
17-Dec-21	0.00	± 0.00	0	0
18-Dec-21	0.00	± 0.00	0	0
19-Dec-21	0.00	± 0.00	0	0
20-Dec-21	0.67	± 1.63	4	362
21-Dec-21	0.00	± 0.00	0	0
22-Dec-21	0.00	± 0.00	0	0
23-Dec-21	0.50	± 1.22	3	271
24-Dec-21	0.17	± 0.41	1	90
25-Dec-21	0.00	± 0.00	0	0
26-Dec-21	1.17	± 2.86	7	633
27-Dec-21	0.33	± 0.82	2	181
28-Dec-21	0.00	± 0.00	0	0
29-Dec-21	0.00	± 0.00	0	0
30-Dec-21	0.00	± 0.00	0	0
31-Dec-21	0.33	± 0.82	2	181
01-Jan-22	0.00	± 0.00	0	0

Date	Mean daily count	Standard deviation	Total daily count	Estimated daily influx
02-Jan-22	0.00	± 0.00	0	0
03-Jan-22	0.00	± 0.00	0	0
04-Jan-22	0.00	± 0.00	0	0
05-Jan-22	0.17	± 0.41	1	90
06-Jan-22	0.00	± 0.00	0	0
07-Jan-22	0.00	± 0.00	0	0
08-Jan-22	0.00	± 0.00	0	0
09-Jan-22	0.00	± 0.00	0	0
10-Jan-22	0.00	± 0.00	0	0
11-Jan-22	0.00	± 0.00	0	0
12-Jan-22	0.50	± 1.22	3	271
13-Jan-22	0.17	± 0.41	1	90
14-Jan-22	0.00	± 0.00	0	0
15-Jan-22	0.00	± 0.00	0	0
Total Count / Estimated Influx			602	54,425

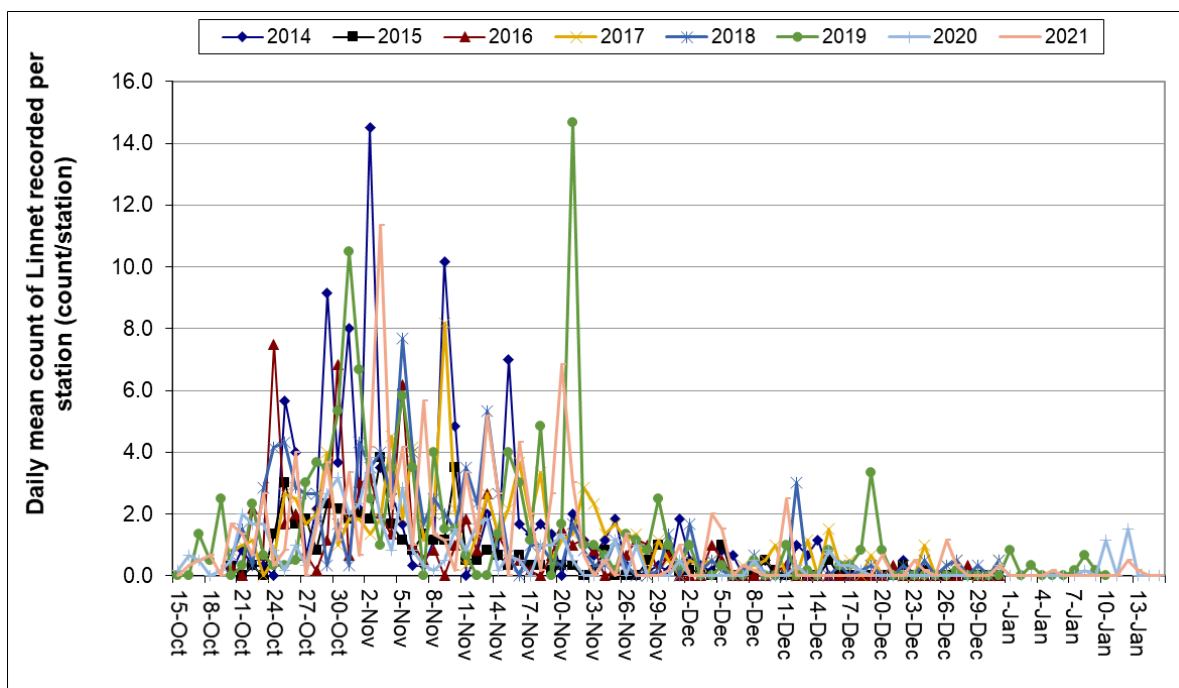


Figure 2. Daily mean counts of Common Linnet per station (= site) recorded between 15 October and 15 January during the present (2021) and 2020 surveys, between 15 October 2019 and 10 January 2020 during the 2019 survey, and between 20 October and 31 December during previous (2014, 2015, 2016, 2017, 2018) surveys.

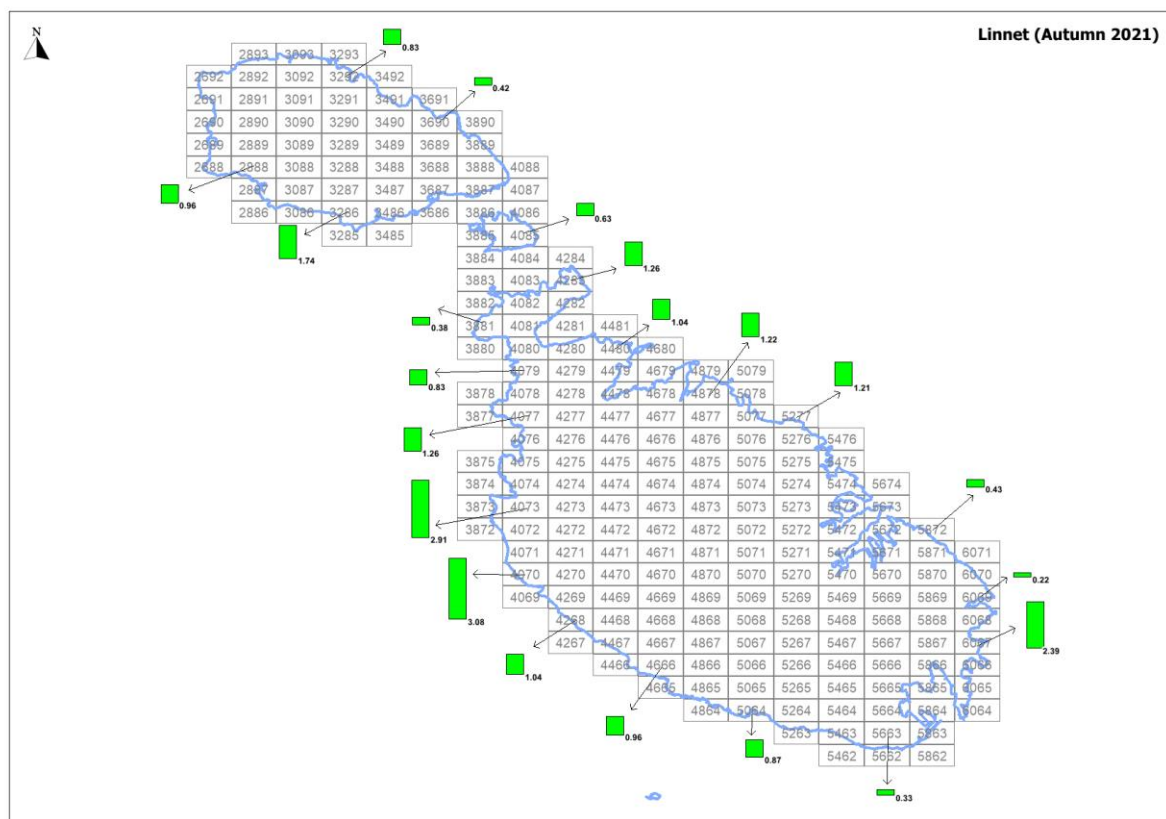


Figure 3. Map of the Maltese Islands showing the standard grid and respective codes, including ones used in the present study. The green bars indicate mean counts of Common Linnet recorded from study sites in the respective cells during the present survey.

Common Chaffinch

Raw daily counts for Chaffinch recorded from the 21 sites during the present study varied between 0 and a maximum of 30 (see Appendix I), while the mean daily counts ranged between 0 and 7.0 (Table 3). Slightly higher counts for this species were recorded on some days between 16th October and 5th November. The total counts, i.e. the total number of Chaffinch individuals recorded from a given grid location (= study site) during the whole study period (93 days), varied appreciably between the different sites: at the lower end, only one individual was recorded throughout the survey period from the site at grid location 5872, while at the higher end 90 Chaffinch individuals were recorded from the site at grid location 3292.

Values of mean daily counts and total counts of Chaffinch recorded during the period 15 October 2021 to 15 January 2022 from the present survey are summarised in Table 3. Values of standard deviation for the mean daily counts are also provided in Table 3. Counts of Chaffinch recorded from the present survey, along with those made during the autumn 2014, 2015, 2016, 2017, 2018, 2019 and 2020 surveys, are shown graphically in Figure 4. Overall, count values for Chaffinch from the present (autumn/winter 2021) survey are similar to those made in previous years, although relatively high peak counts for this species were recorded during the 2014 survey. An overall similar pattern of higher count values is evident from late October to early December for the years 2014 – 2021 (see Figure 4).

Table 3

Values of mean ($\pm$ SD) daily count and daily total count recorded from the six study sites during the present survey, together with total influx of migratory Common Chaffinch.

Date	Mean daily count	Standard deviation	Total daily count	Estimated daily influx
15-Oct-21	1.17	± 1.94	7	633
16-Oct-21	3.67	± 3.98	22	1989
17-Oct-21	0.33	± 0.52	2	181
18-Oct-21	0.83	± 1.60	5	452
19-Oct-21	0.67	± 1.03	4	362
20-Oct-21	1.67	± 1.97	10	904
21-Oct-21	1.00	± 1.26	6	542
22-Oct-21	0.67	± 1.03	4	362
23-Oct-21	0.33	± 0.82	2	181
24-Oct-21	1.67	± 3.20	10	904
25-Oct-21	1.50	± 1.97	9	814
26-Oct-21	1.83	± 3.13	11	994
27-Oct-21	0.67	± 0.82	4	362
28-Oct-21	7.00	± 10.56	42	3797
29-Oct-21	2.83	± 4.07	17	1537
30-Oct-21	1.17	± 1.94	7	633
31-Oct-21	2.33	± 2.66	14	1266
01-Nov-21	4.00	± 4.05	24	2170
02-Nov-21	0.67	± 1.03	4	362
03-Nov-21	6.17	± 12.01	37	3345
04-Nov-21	0.50	± 0.84	3	271
05-Nov-21	3.17	± 4.54	19	1718
06-Nov-21	0.67	± 0.82	4	362
07-Nov-21	1.67	± 3.20	10	904
08-Nov-21	1.83	± 3.60	11	994
09-Nov-21	1.00	± 1.10	6	542
10-Nov-21	0.00	± 0.00	0	0
11-Nov-21	1.17	± 2.86	7	633
12-Nov-21	0.00	± 0.00	0	0
13-Nov-21	1.50	± 2.81	9	814
14-Nov-21	1.83	± 3.25	11	994
15-Nov-21	0.67	± 1.21	4	362
16-Nov-21	1.83	± 2.40	11	994
17-Nov-21	1.17	± 2.04	7	633
18-Nov-21	0.00	± 0.00	0	0
19-Nov-21	0.50	± 1.22	3	271
20-Nov-21	0.17	± 0.41	1	90
21-Nov-21	1.33	± 1.63	8	723
22-Nov-21	1.33	± 1.97	8	723
23-Nov-21	0.33	± 0.82	2	181
24-Nov-21	0.33	± 0.82	2	181
25-Nov-21	0.33	± 0.82	2	181
26-Nov-21	1.00	± 1.67	6	542
27-Nov-21	0.50	± 1.22	3	271
28-Nov-21	0.00	± 0.00	0	0
29-Nov-21	0.17	± 0.41	1	90
30-Nov-21	0.33	± 0.82	2	181

Date	Mean daily count	Standard deviation	Total daily count	Estimated daily influx
01-Dec-21	0.00	± 0.00	0	0
02-Dec-21	0.00	± 0.00	0	0
03-Dec-21	0.17	± 0.41	1	90
04-Dec-21	0.00	± 0.00	0	0
05-Dec-21	0.50	± 1.22	3	271
06-Dec-21	0.00	± 0.00	0	0
07-Dec-21	0.00	± 0.00	0	0
08-Dec-21	0.00	± 0.00	0	0
09-Dec-21	0.00	± 0.00	0	0
10-Dec-21	0.00	± 0.00	0	0
11-Dec-21	0.50	± 0.55	3	271
12-Dec-21	0.50	± 1.22	3	271
13-Dec-21	0.67	± 1.63	4	362
14-Dec-21	0.17	± 0.41	1	90
15-Dec-21	1.17	± 2.40	7	633
16-Dec-21	0.17	± 0.41	1	90
17-Dec-21	0.17	± 0.41	1	90
18-Dec-21	0.00	± 0.00	0	0
19-Dec-21	0.17	± 0.41	1	90
20-Dec-21	0.00	± 0.00	0	0
21-Dec-21	1.83	± 4.02	11	994
22-Dec-21	0.00	± 0.00	0	0
23-Dec-21	0.00	± 0.00	0	0
24-Dec-21	0.00	± 0.00	0	0
25-Dec-21	1.17	± 1.83	7	633
26-Dec-21	0.50	± 1.22	3	271
27-Dec-21	0.00	± 0.00	0	0
28-Dec-21	0.00	± 0.00	0	0
29-Dec-21	0.00	± 0.00	0	0
30-Dec-21	0.00	± 0.00	0	0
31-Dec-21	0.00	± 0.00	0	0
01-Jan-22	0.00	± 0.00	0	0
02-Jan-22	0.00	± 0.00	0	0
03-Jan-22	0.00	± 0.00	0	0
04-Jan-22	0.00	± 0.00	0	0
05-Jan-22	0.00	± 0.00	0	0
06-Jan-22	0.00	± 0.00	0	0
07-Jan-22	0.00	± 0.00	0	0
08-Jan-22	0.00	± 0.00	0	0
09-Jan-22	0.00	± 0.00	0	0
10-Jan-22	0.00	± 0.00	0	0
11-Jan-22	0.00	± 0.00	0	0
12-Jan-22	0.17	± 0.41	1	90
13-Jan-22	0.00	± 0.00	0	0
14-Jan-22	0.00	± 0.00	0	0
15-Jan-22	0.00	± 0.00	0	0
Total Count / Estimated Influx			428	38,691

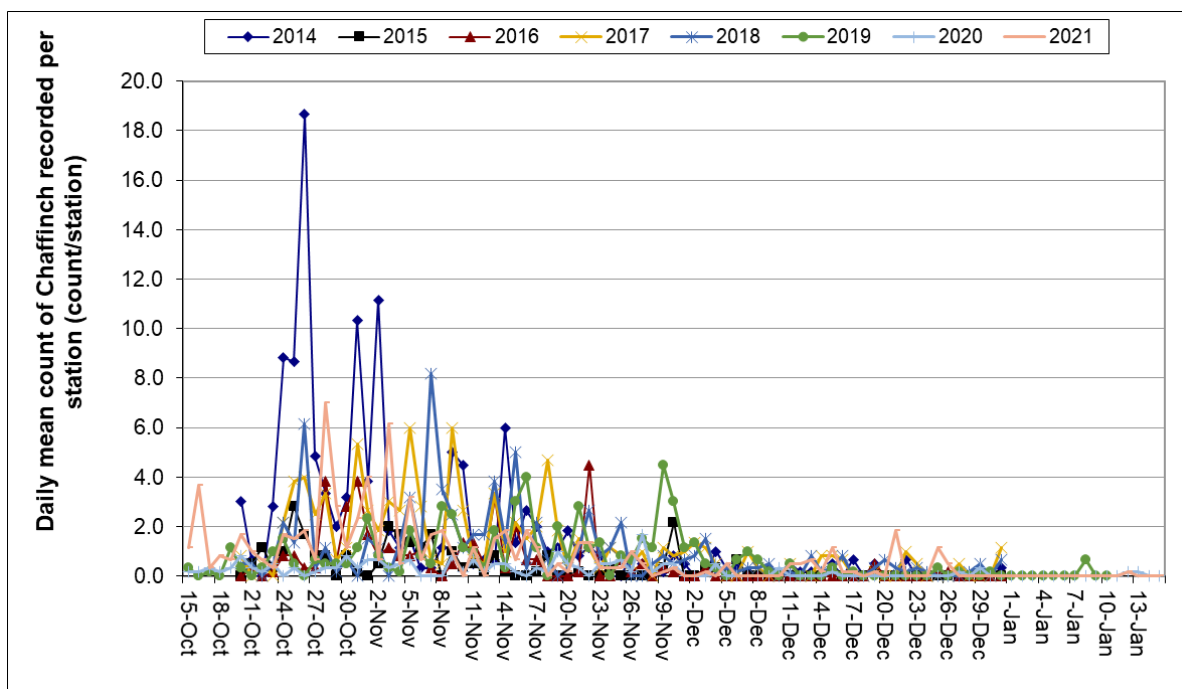


Figure 4. Daily mean counts of Common Chaffinch per station (= site) recorded between 15 October and 15 January during the present (2021) and 2020 surveys, between 15 October 2019 and 10 January 2020 during the 2019 survey, and between 20 October and 31 December during previous (2014, 2015, 2016, 2017, 2018) surveys.

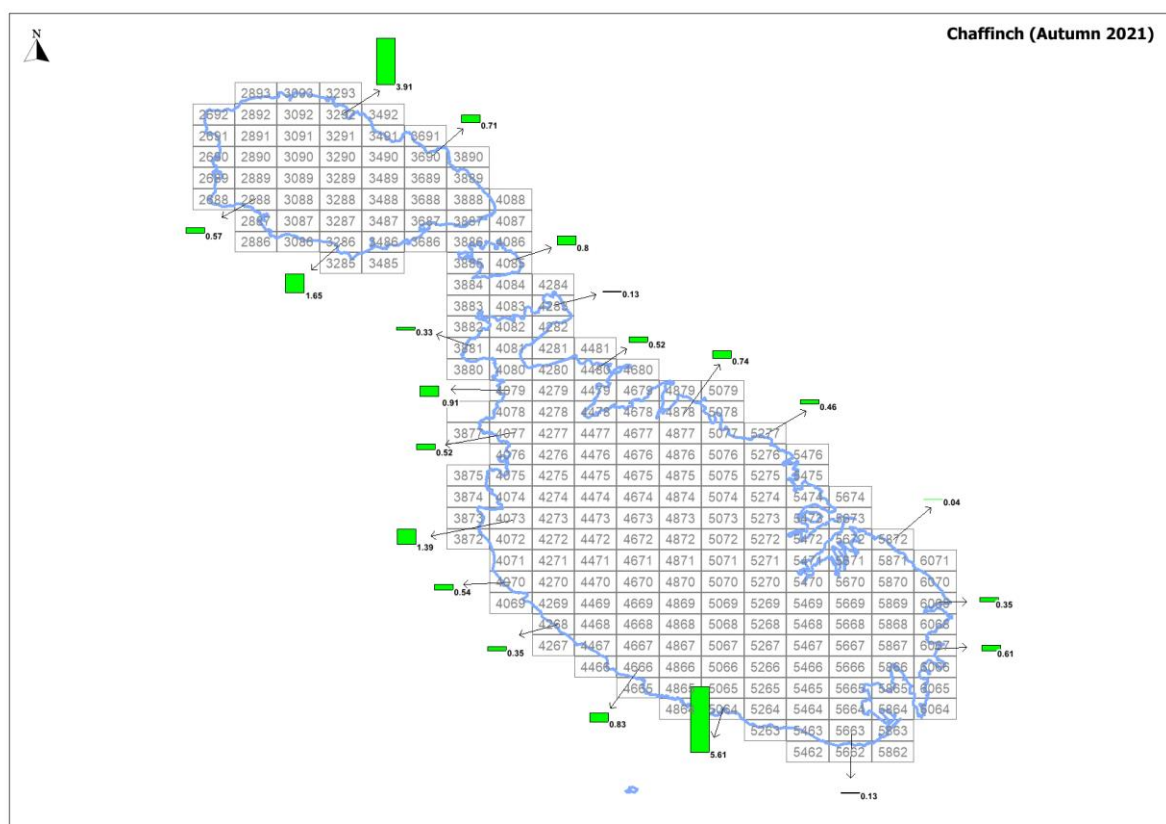


Figure 5. Map of the Maltese Islands showing the standard grid and respective codes, including ones used in the present study. The green bars indicate mean counts of Common Chaffinch recorded from study sites in the respective cells during the present survey.

An estimate of the total influx of Chaffinch over the Maltese Islands is given in Table 3. Based on the mean daily counts (Table 3), extrapolation translates to an estimated daily influx ranging between 0 and 3,797 individuals, with a total influx over the survey period (15 October 2021 – 15 January 2022; i.e. 93 days) of 38,691 individuals; see Table 3.

Mean count values for Chaffinch recorded from each of the 21 sites are indicated on the map shown in Figure 5. The highest mean count was recorded from Marsalforn (Grid 3292) in Gozo, while the lowest mean count was recorded from Rinella (Grid 5872) in southeastern Malta. Overall, slightly higher mean counts were recorded from sites located in the northern parts of Malta and in Gozo.

European Greenfinch

Raw daily counts for Greenfinch recorded from the 21 sites during the present study varied between 0 and a maximum of 15 (see Appendix I), while the mean daily counts ranged between 0 and 4.50 (Table 4). Low or zero counts for this species were recorded throughout most of the survey period, with higher counts on some days between 5th and 24th November. The total counts, i.e. the total number of Greenfinch individuals recorded from a given grid location (= study site) during the whole study period (93 days), did not vary appreciably between the different sites: at the higher end, 16 Greenfinch individuals were recorded throughout the survey period from the site at grid location 4666, while at the lower end no Greenfinch individuals were recorded from the sites at grid locations 5064 and 6069.

Values of mean daily counts and total counts of Greenfinch recorded during the period 15 October 2021 to 15 January 2022 from the present survey are summarised in Table 4. Values of standard deviation associated with the mean daily counts are also provided in Table 4. Counts of Greenfinch recorded from the present survey, along with ones made during the autumn 2014, 2015, 2016, 2017, 2018, 2019 and 2020 surveys, are shown graphically in Figure 6. Overall, count values for Greenfinch from the present (autumn/winter 2021) survey are similar to those recorded during the autumn 2014, 2017 and 2019 surveys, and higher than those recorded from the autumn 2015, 2016, 2018 and 2020 surveys. Individuals of this species were recorded throughout the survey period in all years, with slightly higher counts between late October and mid-December in the 2014, 2017, 2019 and present (2021) surveys, but only sporadic low counts during the 2015, 2016, 2018 and 2020 surveys (see Figure 6).

The estimated total influx of Greenfinch over the Maltese Islands is given in Table 4. Based on the mean daily counts (Table 4), extrapolation translates to an estimated daily influx ranging between 0 and 2,441 individuals, with a total influx over the survey period (15 October 2021 – 15 January 2022; i.e. 93 days) of 13,286 individuals; see Table 4.

Mean count values for Greenfinch recorded from each of the 21 sites are indicated on the map shown in Figure 7. The highest mean count was recorded from Fawwara (Grid 4666) located in western Malta, while the lower mean counts were recorded from Żonqor (Grid 6069) and Lapsi (Grid 5064) in southeastern and southwestern Malta respectively. Mean counts were overall low at all sites.

Table 4

Values of mean ($\pm$ SD) daily count and daily total count recorded from the six study sites during the present survey, together with total influx of migratory European Greenfinch.

Date	Mean daily count	Standard deviation	Total daily count	Estimated daily influx
15-Oct-21	0.00	± 0.00	0	0
16-Oct-21	0.00	± 0.00	0	0
17-Oct-21	0.00	± 0.00	0	0
18-Oct-21	0.00	± 0.00	0	0
19-Oct-21	0.00	± 0.00	0	0
20-Oct-21	0.00	± 0.00	0	0
21-Oct-21	0.00	± 0.00	0	0
22-Oct-21	0.00	± 0.00	0	0
23-Oct-21	0.17	± 0.41	1	90
24-Oct-21	0.00	± 0.00	0	0
25-Oct-21	0.50	± 1.22	3	271
26-Oct-21	0.00	± 0.00	0	0
27-Oct-21	0.00	± 0.00	0	0
28-Oct-21	0.00	± 0.00	0	0
29-Oct-21	0.00	± 0.00	0	0
30-Oct-21	0.00	± 0.00	0	0
31-Oct-21	0.00	± 0.00	0	0
01-Nov-21	0.50	± 0.84	3	271
02-Nov-21	0.50	± 0.84	3	271
03-Nov-21	0.50	± 1.22	3	271
04-Nov-21	0.67	± 1.63	4	362
05-Nov-21	1.33	± 2.42	8	723
06-Nov-21	0.00	± 0.00	0	0
07-Nov-21	0.00	± 0.00	0	0
08-Nov-21	0.00	± 0.00	0	0
09-Nov-21	0.00	± 0.00	0	0
10-Nov-21	0.33	± 0.52	2	181
11-Nov-21	0.00	± 0.00	0	0
12-Nov-21	2.17	± 2.04	13	1175
13-Nov-21	4.50	± 4.97	27	2441
14-Nov-21	1.33	± 2.07	8	723
15-Nov-21	0.83	± 1.33	5	452
16-Nov-21	0.83	± 1.33	5	452
17-Nov-21	0.83	± 1.33	5	452
18-Nov-21	3.00	± 6.00	18	1627
19-Nov-21	0.00	± 0.00	0	0
20-Nov-21	0.83	± 0.98	5	452
21-Nov-21	0.50	± 1.22	3	271
22-Nov-21	0.00	± 0.00	0	0
23-Nov-21	0.00	± 0.00	0	0
24-Nov-21	2.17	± 2.56	13	1175
25-Nov-21	0.00	± 0.00	0	0
26-Nov-21	0.00	± 0.00	0	0
27-Nov-21	0.00	± 0.00	0	0
28-Nov-21	0.00	± 0.00	0	0
29-Nov-21	0.00	± 0.00	0	0
30-Nov-21	0.50	± 0.84	3	271

Date	Mean daily count	Standard deviation	Total daily count	Estimated daily influx
01-Dec-21	0.00	± 0.00	0	0
02-Dec-21	0.33	± 0.82	2	181
03-Dec-21	0.00	± 0.00	0	0
04-Dec-21	0.00	± 0.00	0	0
05-Dec-21	0.33	± 0.52	2	181
06-Dec-21	0.00	± 0.00	0	0
07-Dec-21	0.00	± 0.00	0	0
08-Dec-21	0.00	± 0.00	0	0
09-Dec-21	0.00	± 0.00	0	0
10-Dec-21	0.00	± 0.00	0	0
11-Dec-21	0.00	± 0.00	0	0
12-Dec-21	0.00	± 0.00	0	0
13-Dec-21	0.17	± 0.41	1	90
14-Dec-21	0.00	± 0.00	0	0
15-Dec-21	0.00	± 0.00	0	0
16-Dec-21	0.00	± 0.00	0	0
17-Dec-21	0.00	± 0.00	0	0
18-Dec-21	0.00	± 0.00	0	0
19-Dec-21	0.33	± 0.82	2	181
20-Dec-21	0.00	± 0.00	0	0
21-Dec-21	0.00	± 0.00	0	0
22-Dec-21	0.17	± 0.41	1	90
23-Dec-21	0.00	± 0.00	0	0
24-Dec-21	0.00	± 0.00	0	0
25-Dec-21	0.50	± 1.22	3	271
26-Dec-21	0.00	± 0.00	0	0
27-Dec-21	0.00	± 0.00	0	0
28-Dec-21	0.00	± 0.00	0	0
29-Dec-21	0.00	± 0.00	0	0
30-Dec-21	0.00	± 0.00	0	0
31-Dec-21	0.00	± 0.00	0	0
01-Jan-22	0.00	± 0.00	0	0
02-Jan-22	0.00	± 0.00	0	0
03-Jan-22	0.00	± 0.00	0	0
04-Jan-22	0.17	± 0.41	1	90
05-Jan-22	0.00	± 0.00	0	0
06-Jan-22	0.00	± 0.00	0	0
07-Jan-22	0.00	± 0.00	0	0
08-Jan-22	0.00	± 0.00	0	0
09-Jan-22	0.00	± 0.00	0	0
10-Jan-22	0.00	± 0.00	0	0
11-Jan-22	0.00	± 0.00	0	0
12-Jan-22	0.00	± 0.00	0	0
13-Jan-22	0.50	± 1.22	3	271
14-Jan-22	0.00	± 0.00	0	0
15-Jan-22	0.00	± 0.00	0	0
Total Count / Estimated Influx			147	13,286

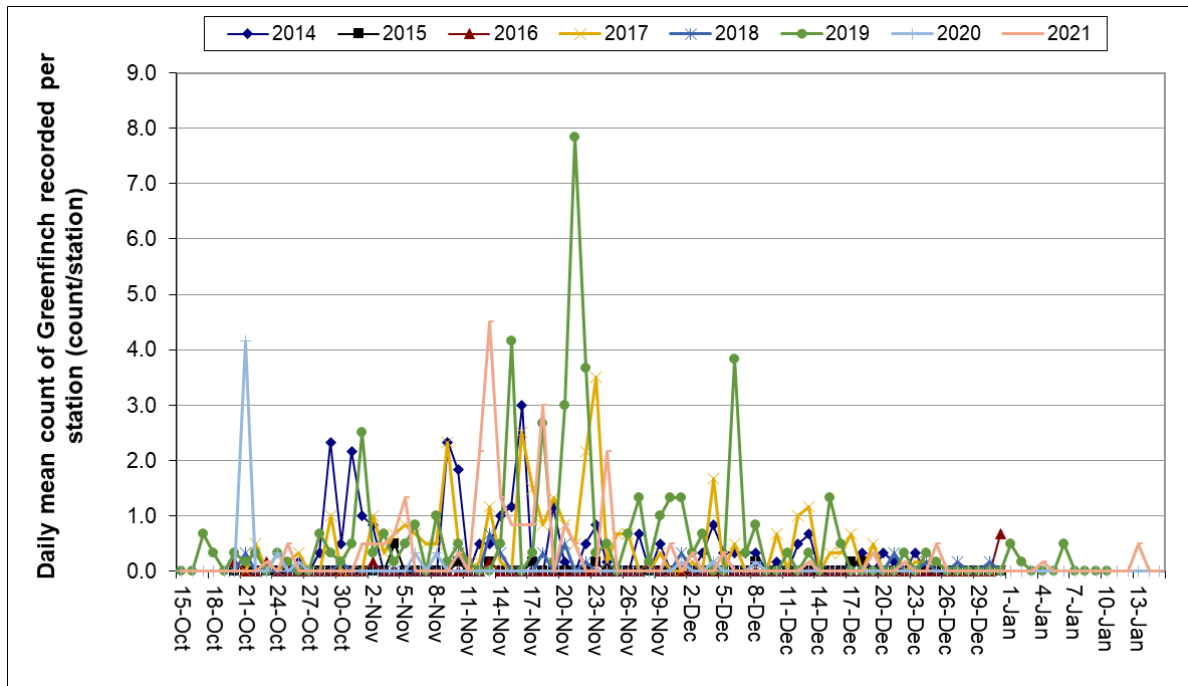


Figure 6. Daily mean counts of European Greenfinch per station (= site) recorded between 15 October and 15 January during the present (2021) and 2020 surveys, between 15 October 2019 and 10 January 2020 during the 2019 survey, and between 20 October and 31 December during previous (2014, 2015, 2016, 2017, 2018) surveys.

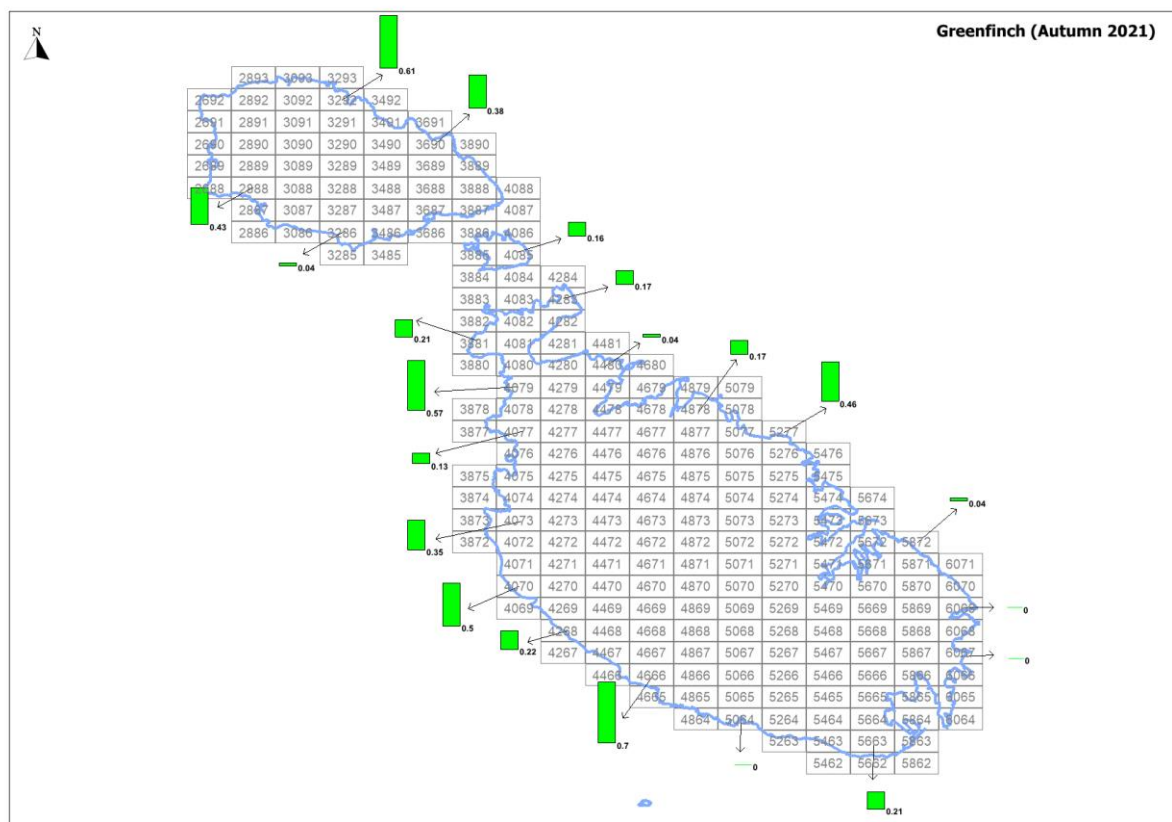


Figure 7. Map of the Maltese Islands showing the standard grid and respective codes, including ones used in the present study. The green bars indicate mean counts of European Greenfinch recorded from study sites in the respective cells during the present survey.

Eurasian Siskin

Raw daily counts for Siskin recorded from the 21 sites during the present study varied between 0 and a maximum of 40 (see Appendix I), while the mean daily counts ranged between 0 and 8.50 (Table 5). Slightly higher counts for this species were recorded on some days between 27th October and 24th November. The total counts, i.e. the total number of Siskin individuals recorded from a given grid location (= study site) during the whole study period (93 days), varied appreciably between the different sites: at the lower end, four Siskin individuals were recorded from the site at grid location 6069, while at the higher end 117 Siskin individuals were recorded from the site at grid location 4085, which was surveyed daily, and 68 individuals were recorded from the site at grid location 4070.

Values of mean daily counts and total counts of Siskin recorded during the period 15 October 2021 to 15 January 2022 from the present survey are summarised in Table 5. Values of standard deviation for the mean daily counts are also provided in Table 5. Counts of Siskin recorded from the present survey, along with ones recorded during the autumn 2014, 2015, 2016, 2017, 2018, 2019 and 2020 surveys, are shown graphically in Figure 8. Overall, count values for Siskin from the present (autumn/winter 2021) survey are similar to those made in the autumn 2015, 2017 and 2019 surveys and higher than those recorded in the autumn 2014, 2016 and 2018 surveys. Counts for this species extended from late October to late December during the autumn 2015, 2016, 2017, 2019 and present (2021) surveys, even if zero counts were recorded on several days in 2016, whereas no Siskin were recorded after mid-December in the 2014, 2018 and 2020 surveys (Figure 8).

The estimated total influx of Siskin over the Maltese Islands is given in Table 5. Based on the mean daily counts (Table 5), extrapolation translates to an estimated daily influx ranging between 0 and 4,611 individuals, with a total influx over the survey period (15 October 2021 – 15 January 2022; i.e. 93 days) of 60,117 individuals; see Table 5.

Table 5

Values of mean ($\pm$ SD) daily count and daily total count recorded from the six study sites during the present survey, together with total influx of migratory Eurasian Siskin.

Date	Mean daily count	Standard deviation	Total daily count	Estimated daily influx
15-Oct-21	1.00	± 1.67	6	542
16-Oct-21	0.33	± 0.82	2	181
17-Oct-21	0.67	± 1.21	4	362
18-Oct-21	0.00	± 0.00	0	0
19-Oct-21	1.17	± 2.04	7	633
20-Oct-21	0.17	± 0.41	1	90
21-Oct-21	0.17	± 0.41	1	90
22-Oct-21	0.17	± 0.41	1	90
23-Oct-21	0.17	± 0.41	1	90
24-Oct-21	1.17	± 2.86	7	633
25-Oct-21	0.50	± 0.84	3	271
26-Oct-21	0.33	± 0.82	2	181
27-Oct-21	4.00	± 3.90	24	2170
28-Oct-21	3.83	± 6.24	23	2079
29-Oct-21	3.33	± 5.20	20	1808
30-Oct-21	0.00	± 0.00	0	0
31-Oct-21	1.17	± 0.98	7	633
01-Nov-21	1.17	± 2.40	7	633
02-Nov-21	0.83	± 1.33	5	452

Date	Mean daily count	Standard deviation	Total daily count	Estimated daily influx
03-Nov-21	8.00	± 15.81	48	4340
04-Nov-21	2.17	± 3.49	13	1175
05-Nov-21	0.83	± 1.33	5	452
06-Nov-21	0.50	± 1.22	3	271
07-Nov-21	1.50	± 2.35	9	814
08-Nov-21	0.67	± 1.21	4	362
09-Nov-21	1.00	± 1.10	6	542
10-Nov-21	1.00	± 1.67	6	542
11-Nov-21	0.17	± 0.41	1	90
12-Nov-21	3.33	± 4.50	20	1808
13-Nov-21	8.50	± 7.97	51	4611
14-Nov-21	2.17	± 1.83	13	1175
15-Nov-21	2.50	± 2.74	15	1356
16-Nov-21	3.83	± 2.99	23	2079
17-Nov-21	0.67	± 1.03	4	362
18-Nov-21	2.50	± 2.07	15	1356
19-Nov-21	1.00	± 2.00	6	542
20-Nov-21	0.83	± 1.17	5	452
21-Nov-21	4.17	± 4.12	25	2260
22-Nov-21	3.50	± 7.64	21	1899
23-Nov-21	1.50	± 1.38	9	814
24-Nov-21	5.33	± 6.62	32	2893
25-Nov-21	0.17	± 0.41	1	90
26-Nov-21	0.50	± 0.84	3	271
27-Nov-21	2.00	± 4.43	12	1085
28-Nov-21	0.17	± 0.41	1	90
29-Nov-21	0.83	± 1.33	5	452
30-Nov-21	1.67	± 2.25	10	904
01-Dec-21	0.67	± 1.03	4	362
02-Dec-21	1.67	± 1.86	10	904
03-Dec-21	1.00	± 2.45	6	542
04-Dec-21	2.00	± 2.61	12	1085
05-Dec-21	3.33	± 3.44	20	1808
06-Dec-21	0.83	± 1.33	5	452
07-Dec-21	0.83	± 1.33	5	452
08-Dec-21	0.50	± 1.22	3	271
09-Dec-21	0.00	± 0.00	0	0
10-Dec-21	0.50	± 1.22	3	271
11-Dec-21	0.00	± 0.00	0	0
12-Dec-21	1.00	± 2.00	6	542
13-Dec-21	0.67	± 1.63	4	362
14-Dec-21	1.17	± 2.04	7	633
15-Dec-21	2.00	± 1.67	12	1085
16-Dec-21	0.67	± 1.63	4	362
17-Dec-21	0.83	± 1.33	5	452
18-Dec-21	0.33	± 0.52	2	181
19-Dec-21	2.33	± 2.25	14	1266
20-Dec-21	0.17	± 0.41	1	90
21-Dec-21	0.17	± 0.41	1	90
22-Dec-21	0.33	± 0.82	2	181
23-Dec-21	0.00	± 0.00	0	0
24-Dec-21	0.00	± 0.00	0	0

Date	Mean daily count	Standard deviation	Total daily count	Estimated daily influx
25-Dec-21	1.50	± 2.51	9	814
26-Dec-21	0.00	± 0.00	0	0
27-Dec-21	0.00	± 0.00	0	0
28-Dec-21	0.17	± 0.41	1	90
29-Dec-21	0.00	± 0.00	0	0
30-Dec-21	1.17	± 2.40	7	633
31-Dec-21	0.50	± 1.22	3	271
01-Jan-22	0.00	± 0.00	0	0
02-Jan-22	0.83	± 2.04	5	452
03-Jan-22	1.83	± 3.25	11	994
04-Jan-22	0.00	± 0.00	0	0
05-Jan-22	0.00	± 0.00	0	0
06-Jan-22	2.00	± 2.76	12	1085
07-Jan-22	0.00	± 0.00	0	0
08-Jan-22	0.00	± 0.00	0	0
09-Jan-22	0.00	± 0.00	0	0
10-Jan-22	0.00	± 0.00	0	0
11-Jan-22	0.00	± 0.00	0	0
12-Jan-22	0.00	± 0.00	0	0
13-Jan-22	0.00	± 0.00	0	0
14-Jan-22	0.00	± 0.00	0	0
15-Jan-22	0.67	± 1.03	4	362
Total Count / Estimated Influx			665	60,117

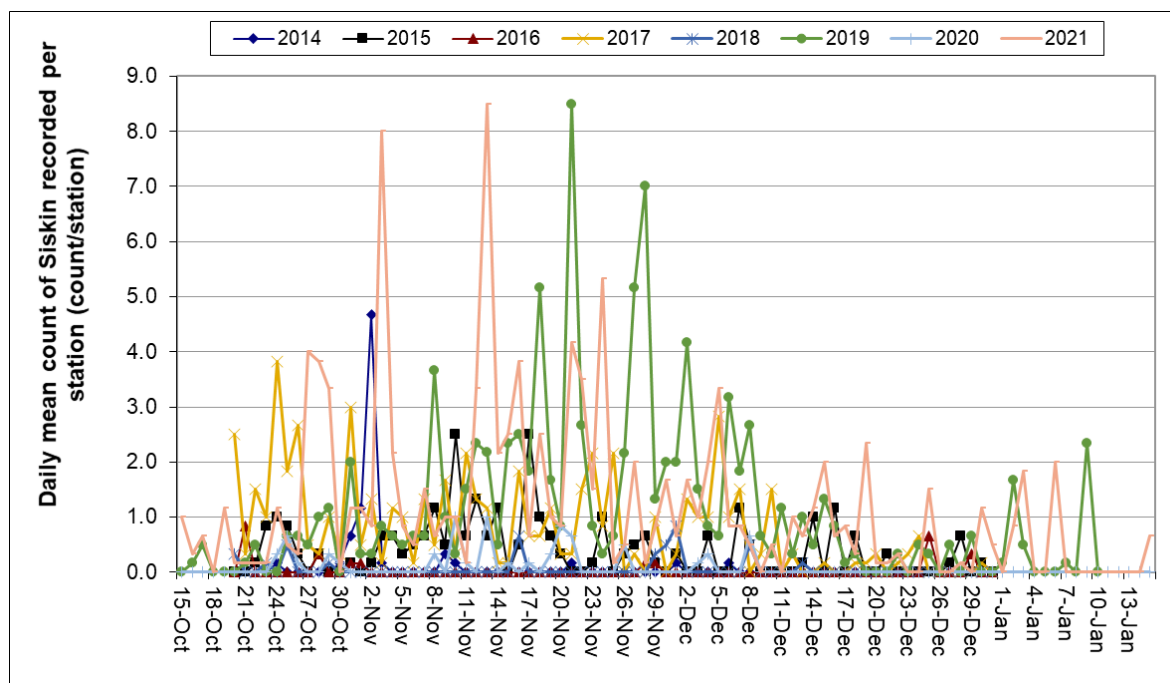


Figure 8. Daily mean counts of Eurasian Siskin per station (= site) recorded between 15 October and 15 January during the present (2021) and 2020 surveys, between 15 October 2019 and 10 January 2020 during the 2019 survey, and between 20 October and 31 December during previous (2014, 2015, 2016, 2017, 2018) surveys.

Mean count values for Siskin recorded from each of the 21 sites are indicated on the map shown in Figure 9. The highest mean count was recorded from Mtaħleb (Grid 4070) located in western Malta, while the lowest count was recorded from Żonqor (Grid 6069). Overall, comparatively higher mean counts were recorded from sites located along the northwestern parts of Malta and Gozo.

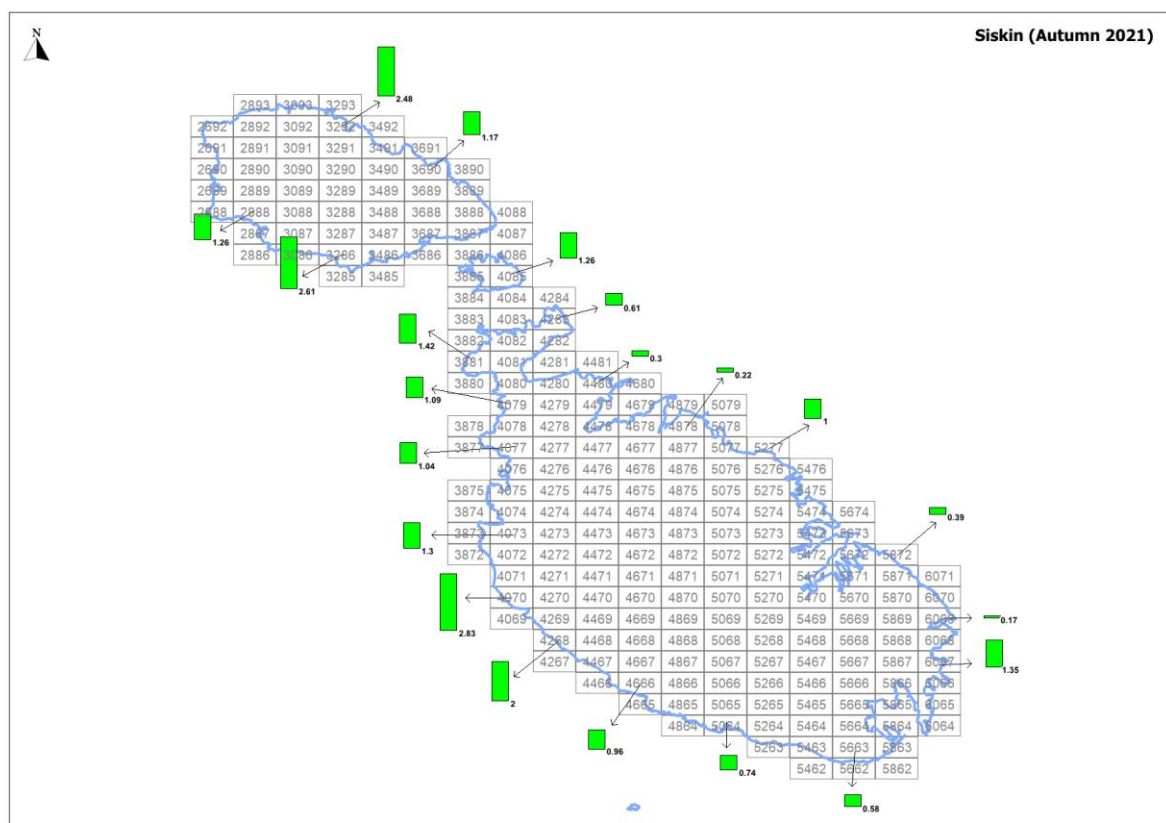


Figure 9. Map of the Maltese Islands showing the standard grid and respective codes, including ones used in the present study. The green bars indicate mean counts of Eurasian Siskin recorded from study sites in the respective cells during the present survey.

European Goldfinch

Raw daily counts for Goldfinch recorded from the 21 sites during the present study varied between 0 and a maximum of 5 (see Appendix I), while the mean daily counts ranged between 0 and 0.83 (Table 6). Counts for this species were therefore very low overall: between one and five Goldfinch individuals were recorded in total from each of the sites at grid locations 4073, 5663 and 5277 (see Figure 1), while no individuals were recorded throughout the survey period from any of the other sites.

Values of mean daily counts and total counts of Goldfinch individuals recorded during the period 15 October 2021 to 15 January 2022 from the present survey are summarised in Table 6. Values of standard deviation for the mean daily counts are also provided in Table 6. Counts of Goldfinch recorded from the present (autumn/winter 2021) survey, along with ones recorded during the autumn 2014, 2015, 2016, 2017, 2018, 2019 and 2020 surveys, are shown graphically in Figure 10. No Goldfinch individuals were recorded throughout the entire survey period in autumn 2016, while count values for Goldfinch recorded during the autumn 2014, 2015, 2017, 2018, 2019, 2020 and present (2021) surveys were low and sporadic. No temporal trend in migratory influx over the survey period in the different years is discernible (Figure 10).

Table 6

Values of mean ($\pm$ SD) daily count and daily total count recorded from the six study sites during the present survey, together with total influx of migratory European Goldfinch.

Date	Mean daily count	Standard deviation	Total daily count	Estimated daily influx
15-Oct-21	0.00	± 0.00	0	0
16-Oct-21	0.00	± 0.00	0	0
17-Oct-21	0.00	± 0.00	0	0
18-Oct-21	0.00	± 0.00	0	0
19-Oct-21	0.00	± 0.00	0	0
20-Oct-21	0.00	± 0.00	0	0
21-Oct-21	0.00	± 0.00	0	0
22-Oct-21	0.00	± 0.00	0	0
23-Oct-21	0.00	± 0.00	0	0
24-Oct-21	0.00	± 0.00	0	0
25-Oct-21	0.00	± 0.00	0	0
26-Oct-21	0.00	± 0.00	0	0
27-Oct-21	0.00	± 0.00	0	0
28-Oct-21	0.00	± 0.00	0	0
29-Oct-21	0.00	± 0.00	0	0
30-Oct-21	0.00	± 0.00	0	0
31-Oct-21	0.17	± 0.41	1	90
01-Nov-21	0.00	± 0.00	0	0
02-Nov-21	0.00	± 0.00	0	0
03-Nov-21	0.00	± 0.00	0	0
04-Nov-21	0.00	± 0.00	0	0
05-Nov-21	0.00	± 0.00	0	0
06-Nov-21	0.00	± 0.00	0	0
07-Nov-21	0.17	± 0.41	1	90
08-Nov-21	0.00	± 0.00	0	0
09-Nov-21	0.00	± 0.00	0	0
10-Nov-21	0.00	± 0.00	0	0
11-Nov-21	0.00	± 0.00	0	0
12-Nov-21	0.00	± 0.00	0	0
13-Nov-21	0.00	± 0.00	0	0
14-Nov-21	0.00	± 0.00	0	0
15-Nov-21	0.00	± 0.00	0	0
16-Nov-21	0.00	± 0.00	0	0
17-Nov-21	0.00	± 0.00	0	0
18-Nov-21	0.00	± 0.00	0	0
19-Nov-21	0.00	± 0.00	0	0
20-Nov-21	0.83	± 2.04	5	452
21-Nov-21	0.00	± 0.00	0	0
22-Nov-21	0.00	± 0.00	0	0
23-Nov-21	0.00	± 0.00	0	0
24-Nov-21	0.00	± 0.00	0	0
25-Nov-21	0.00	± 0.00	0	0
26-Nov-21	0.00	± 0.00	0	0
27-Nov-21	0.00	± 0.00	0	0
28-Nov-21	0.00	± 0.00	0	0
29-Nov-21	0.00	± 0.00	0	0
30-Nov-21	0.00	± 0.00	0	0

Date	Mean daily count	Standard deviation	Total daily count	Estimated daily influx
01-Dec-21	0.00	± 0.00	0	0
02-Dec-21	0.00	± 0.00	0	0
03-Dec-21	0.00	± 0.00	0	0
04-Dec-21	0.00	± 0.00	0	0
05-Dec-21	0.00	± 0.00	0	0
06-Dec-21	0.00	± 0.00	0	0
07-Dec-21	0.00	± 0.00	0	0
08-Dec-21	0.00	± 0.00	0	0
09-Dec-21	0.00	± 0.00	0	0
10-Dec-21	0.00	± 0.00	0	0
11-Dec-21	0.00	± 0.00	0	0
12-Dec-21	0.00	± 0.00	0	0
13-Dec-21	0.00	± 0.00	0	0
14-Dec-21	0.00	± 0.00	0	0
15-Dec-21	0.00	± 0.00	0	0
16-Dec-21	0.00	± 0.00	0	0
17-Dec-21	0.00	± 0.00	0	0
18-Dec-21	0.00	± 0.00	0	0
19-Dec-21	0.00	± 0.00	0	0
20-Dec-21	0.00	± 0.00	0	0
21-Dec-21	0.00	± 0.00	0	0
22-Dec-21	0.00	± 0.00	0	0
23-Dec-21	0.00	± 0.00	0	0
24-Dec-21	0.00	± 0.00	0	0
25-Dec-21	0.00	± 0.00	0	0
26-Dec-21	0.00	± 0.00	0	0
27-Dec-21	0.00	± 0.00	0	0
28-Dec-21	0.00	± 0.00	0	0
29-Dec-21	0.00	± 0.00	0	0
30-Dec-21	0.00	± 0.00	0	0
31-Dec-21	0.00	± 0.00	0	0
01-Jan-22	0.00	± 0.00	0	0
02-Jan-22	0.00	± 0.00	0	0
03-Jan-22	0.00	± 0.00	0	0
04-Jan-22	0.00	± 0.00	0	0
05-Jan-22	0.00	± 0.00	0	0
06-Jan-22	0.00	± 0.00	0	0
07-Jan-22	0.00	± 0.00	0	0
08-Jan-22	0.00	± 0.00	0	0
09-Jan-22	0.00	± 0.00	0	0
10-Jan-22	0.00	± 0.00	0	0
11-Jan-22	0.00	± 0.00	0	0
12-Jan-22	0.00	± 0.00	0	0
13-Jan-22	0.00	± 0.00	0	0
14-Jan-22	0.00	± 0.00	0	0
15-Jan-22	0.00	± 0.00	0	0
Total Count / Estimated Influx			7	632

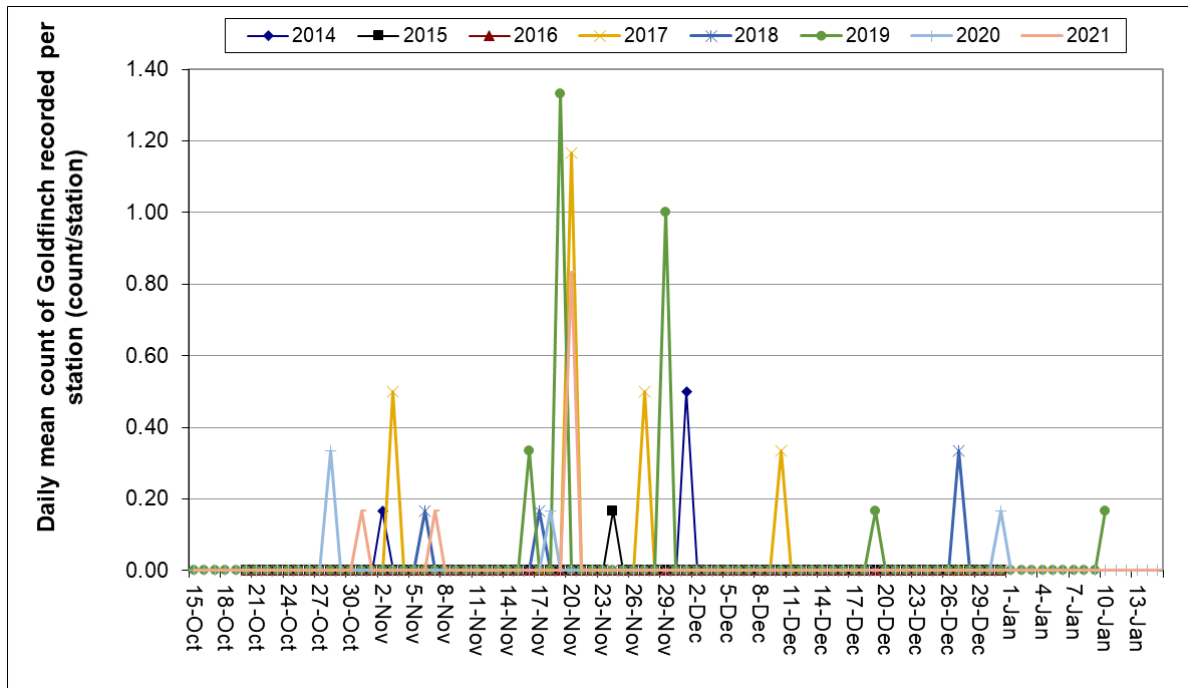


Figure 10. Daily mean counts of European Goldfinch per station (= site) recorded between 15 October and 15 January during the present (2021) and 2020 surveys, between 15 October 2019 and 10 January 2020 during the 2019 survey, and between 20 October and 31 December during previous (2014, 2015, 2016, 2017, 2018) surveys.

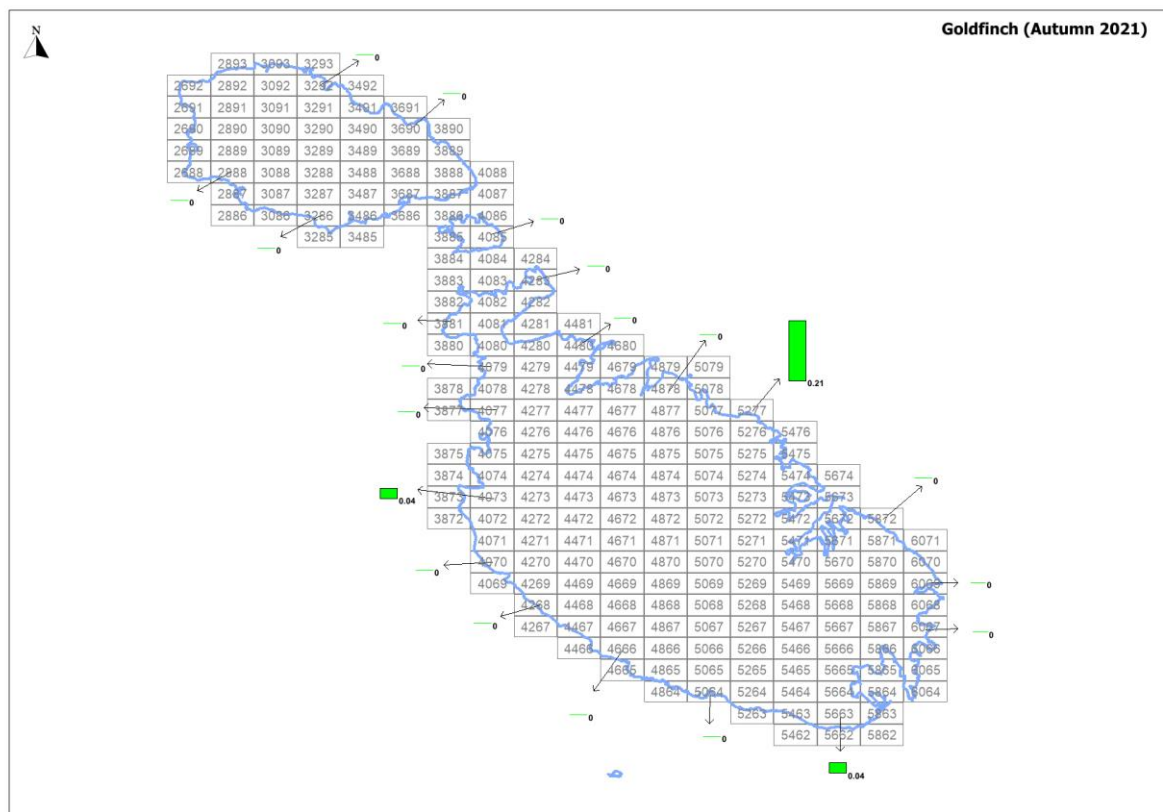


Figure 11. Map of the Maltese Islands showing the standard grid and respective codes, including ones used in the present study. The green bars indicate mean counts of European Goldfinch recorded from study sites in the respective cells during the present survey.

The estimated total influx of Goldfinch over the Maltese Islands is given in Table 6. Based on the mean daily counts (Table 6), extrapolation translates to an estimated daily influx ranging between 0 and 452 individuals, with a total influx over the survey period (15 October 2021 – 15 January 2022; i.e. 93 days) of 632 individuals; see Table 6.

Mean count values for Goldfinch recorded from each of the 21 sites are indicated on the map shown in Figure 11. Counts were only recorded from three sites located in western and northeastern Malta.

European Serin

Raw daily counts for Serin recorded from the 21 sites during the present study varied between 0 and a maximum of 11 (see Appendix I), while the mean daily counts ranged between 0 and 3.33 (Table 7). Low counts for this species were recorded throughout the survey period, with two small peaks on 15th December and 2nd January. The total counts, i.e. the total number of Serin individuals recorded from a given grid location (= study site) during the whole study period (93 days), did not vary appreciably between the different sites: at the lower end, no individuals were recorded throughout the survey period from five of the sites (grid locations 6069, 3268, 5872, 3690 and 5663; see Figure 1), while at the higher end, 27 Serin individuals were recorded from the site at grid location 4085, which was surveyed daily, and 14 individuals were recorded from the site at grid location 4283.

Values of mean daily counts and total counts of Serin recorded during the period 15 October 2021 to 15 January 2022 from the present survey are summarised in Table 7. Values of standard deviation for the mean daily counts are also provided in Table 7. Counts of Serin recorded from the present survey, along with ones made during the autumn 2014, 2015, 2016, 2017, 2018, 2019 and 2020 surveys, are shown graphically in Figure 12. Overall, count values for Serin from the present (autumn/winter 2021) survey are similar to those made in previous years, although a relatively higher peak count for this species was recorded during the 2014 survey. A similar pattern of higher count values made during the period early November to early January is noted between 2014 and 2021, while in 2019 the period of higher counts commenced in late November (Figure 12).

The estimated total influx of Serin over the Maltese Islands is given in Table 7. Based on the mean daily counts (Table 7), extrapolation translates to an estimated daily influx ranging between 0 and 1,808 individuals, with a total influx over the survey period (15 October 2021 – 15 January 2022; i.e. 93 days) of 14,824 individuals; see Table 7.

Mean count values for Serin recorded from each of the 21 sites are indicated on the map shown in Figure 13. The highest mean count was recorded from Anchor Bay (Grid 4079) located on the northwestern coast of Malta. Zero counts were recorded from Lapsi (Grid 5064) and Għar Hasan (Grid 5663) in southwestern Malta. Low counts were recorded from sites located at various points along the coasts of the Maltese Islands, while overall higher counts were recorded from a few sites on the northern coasts of Malta and from Marsalforn (Grid 3292) in Gozo.

Table 7

Values of mean ($\pm$ SD) daily count and daily total count recorded from the six study sites during the present survey, together with total influx of migratory European Serin.

Date	Mean daily count	Standard deviation	Total daily count	Estimated daily influx
15-Oct-21	0.00	± 0.00	0	0
16-Oct-21	0.00	± 0.00	0	0
17-Oct-21	0.00	± 0.00	0	0
18-Oct-21	0.00	± 0.00	0	0
19-Oct-21	0.00	± 0.00	0	0
20-Oct-21	0.00	± 0.00	0	0
21-Oct-21	0.00	± 0.00	0	0
22-Oct-21	0.00	± 0.00	0	0
23-Oct-21	0.50	± 1.22	3	271
24-Oct-21	0.00	± 0.00	0	0
25-Oct-21	0.00	± 0.00	0	0
26-Oct-21	0.00	± 0.00	0	0
27-Oct-21	0.00	± 0.00	0	0
28-Oct-21	0.00	± 0.00	0	0
29-Oct-21	1.00	± 2.45	6	542
30-Oct-21	0.33	± 0.82	2	181
31-Oct-21	0.33	± 0.82	2	181
01-Nov-21	0.33	± 0.82	2	181
02-Nov-21	0.00	± 0.00	0	0
03-Nov-21	0.00	± 0.00	0	0
04-Nov-21	0.50	± 1.22	3	271
05-Nov-21	0.83	± 1.60	5	452
06-Nov-21	0.00	± 0.00	0	0
07-Nov-21	1.33	± 3.27	8	723
08-Nov-21	0.33	± 0.82	2	181
09-Nov-21	0.00	± 0.00	0	0
10-Nov-21	0.17	± 0.41	1	90
11-Nov-21	0.00	± 0.00	0	0
12-Nov-21	0.00	± 0.00	0	0
13-Nov-21	0.50	± 1.22	3	271
14-Nov-21	1.67	± 3.20	10	904
15-Nov-21	0.00	± 0.00	0	0
16-Nov-21	0.00	± 0.00	0	0
17-Nov-21	0.00	± 0.00	0	0
18-Nov-21	0.33	± 0.82	2	181
19-Nov-21	0.67	± 1.63	4	362
20-Nov-21	1.50	± 2.51	9	814
21-Nov-21	0.17	± 0.41	1	90
22-Nov-21	0.83	± 2.04	5	452
23-Nov-21	0.00	± 0.00	0	0
24-Nov-21	0.00	± 0.00	0	0
25-Nov-21	0.00	± 0.00	0	0
26-Nov-21	0.17	± 0.41	1	90
27-Nov-21	0.00	± 0.00	0	0
28-Nov-21	0.00	± 0.00	0	0
29-Nov-21	0.00	± 0.00	0	0
30-Nov-21	0.17	± 0.41	1	90

Date	Mean daily count	Standard deviation	Total daily count	Estimated daily influx
01-Dec-21	0.00	± 0.00	0	0
02-Dec-21	0.33	± 0.82	2	181
03-Dec-21	0.00	± 0.00	0	0
04-Dec-21	1.00	± 2.45	6	542
05-Dec-21	0.17	± 0.41	1	90
06-Dec-21	0.00	± 0.00	0	0
07-Dec-21	0.00	± 0.00	0	0
08-Dec-21	0.33	± 0.82	2	181
09-Dec-21	0.17	± 0.41	1	90
10-Dec-21	0.00	± 0.00	0	0
11-Dec-21	0.00	± 0.00	0	0
12-Dec-21	0.00	± 0.00	0	0
13-Dec-21	0.00	± 0.00	0	0
14-Dec-21	0.00	± 0.00	0	0
15-Dec-21	2.83	± 3.66	17	1537
16-Dec-21	0.83	± 1.33	5	452
17-Dec-21	0.33	± 0.82	2	181
18-Dec-21	0.50	± 0.84	3	271
19-Dec-21	0.50	± 1.22	3	271
20-Dec-21	0.33	± 0.82	2	181
21-Dec-21	0.50	± 0.84	3	271
22-Dec-21	0.17	± 0.41	1	90
23-Dec-21	0.33	± 0.82	2	181
24-Dec-21	0.17	± 0.41	1	90
25-Dec-21	0.67	± 1.21	4	362
26-Dec-21	0.00	± 0.00	0	0
27-Dec-21	0.33	± 0.82	2	181
28-Dec-21	0.00	± 0.00	0	0
29-Dec-21	0.00	± 0.00	0	0
30-Dec-21	0.00	± 0.00	0	0
31-Dec-21	1.00	± 1.55	6	542
01-Jan-22	0.33	± 0.82	2	181
02-Jan-22	3.33	± 5.20	20	1808
03-Jan-22	0.33	± 0.82	2	181
04-Jan-22	0.00	± 0.00	0	0
05-Jan-22	0.00	± 0.00	0	0
06-Jan-22	0.00	± 0.00	0	0
07-Jan-22	0.00	± 0.00	0	0
08-Jan-22	0.00	± 0.00	0	0
09-Jan-22	0.67	± 1.63	4	362
10-Jan-22	0.00	± 0.00	0	0
11-Jan-22	0.00	± 0.00	0	0
12-Jan-22	0.50	± 0.84	3	271
13-Jan-22	0.00	± 0.00	0	0
14-Jan-22	0.00	± 0.00	0	0
15-Jan-22	0.00	± 0.00	0	0
Total Count / Estimated Influx			164	14,824

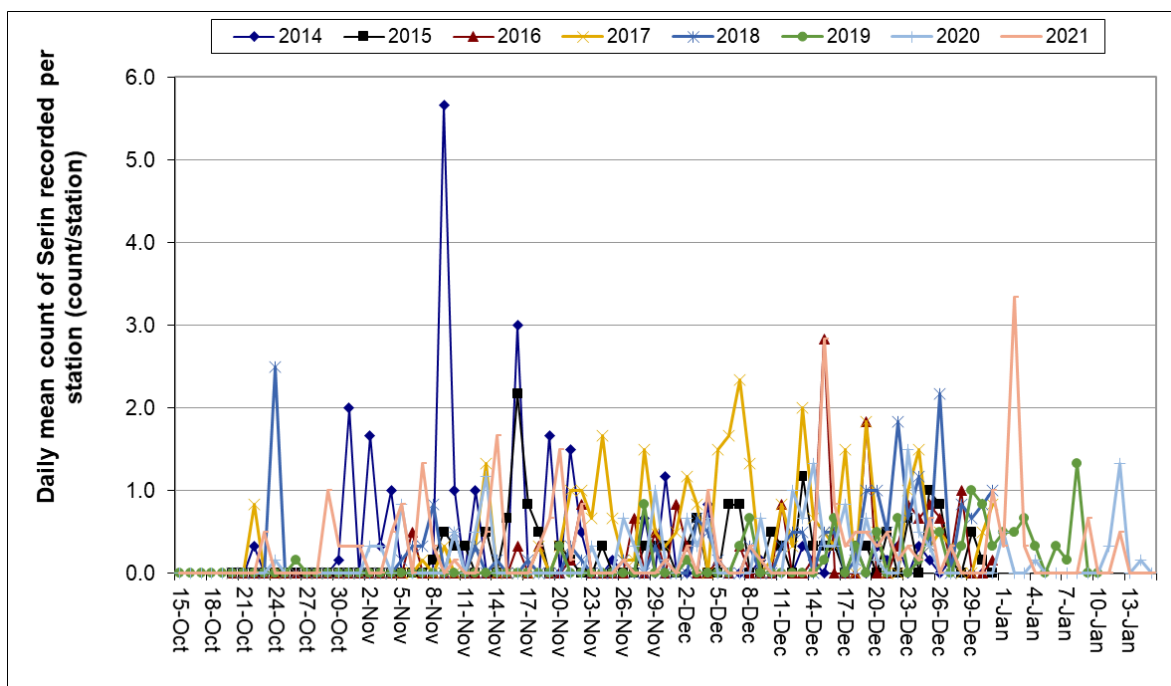


Figure 12. Daily mean counts of European Serin per station (= site) recorded between 15 October and 15 January during the present (2021) and 2020 surveys, between 15 October 2019 and 10 January 2020 during the 2019 survey, and between 20 October and 31 December during previous (2014, 2015, 2016, 2017, 2018) surveys.

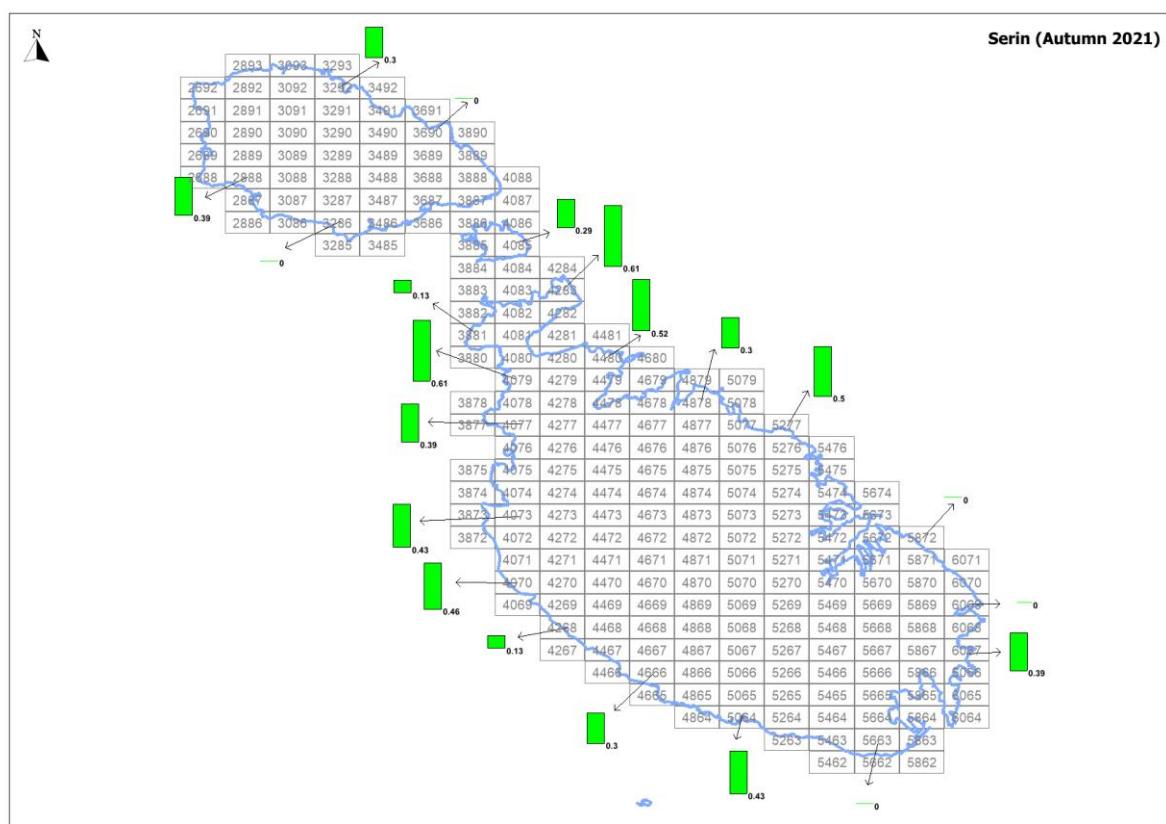


Figure 13. Map of the Maltese Islands showing the standard grid and respective codes, including ones used in the present study. The green bars indicate mean counts of European Serin recorded from study sites in the respective cells during the present survey.

Hawfinch

Raw daily counts for Hawfinch recorded from the 21 sites during the present study varied between 0 and a maximum of 4 (see Appendix I), while the mean daily counts ranged between 0 and 0.67 (Table 8). Counts for this species were therefore low overall: zero counts were recorded from eight of the study sites while between one and five Hawfinch individuals were recorded in total from each of the other sites. It should be noted, however, that the Hawfinch is a shy, elusive bird that seeks the cover of vegetation, particularly thick shrubs and trees, and is particularly difficult to detect while in flight, which could therefore lead to under-sampling.

Values of mean daily counts and total counts of Hawfinch recorded during the period 15 October 2021 to 15 January 2022 from the present survey are summarised in Table 8. Values of standard deviation associated with the mean daily counts are also provided in Table 8. Counts of Hawfinch recorded from the present survey, along with ones made during the autumn 2014, 2015, 2016, 2017, 2018, 2019 and 2020 surveys, are shown graphically in Figure 14. Overall, mean count values for Hawfinch recorded during the present (autumn/winter 2021) are similar to those made in autumn 2014, 2017 and 2019, but higher than those made in autumn 2015, 2016 and 2018 (when very few counts of this species were recorded). The overall temporal trend seen during the autumn 2014, 2017, 2019 and present (2021) surveys is of slightly higher and more frequent count values recorded from late October to end November (Figure 14).

The estimated total influx of Hawfinch over the Maltese Islands is given in Table 8. Based on the mean daily counts (Table 8), extrapolation translates to an estimated daily influx ranging between 0 and 362 individuals, with a total influx over the survey period (15 October 2021 – 15 January 2022; i.e. 93 days) of 2,891 individuals; see Table 8.

Table 8

Values of mean ($\pm$ SD) daily count and daily total count recorded from the six study sites during the present survey, together with total influx of migratory Hawfinch.

Date	Mean daily count	Standard deviation	Total daily count	Estimated daily influx
15-Oct-21	0.00	± 0.00	0	0
16-Oct-21	0.00	± 0.00	0	0
17-Oct-21	0.00	± 0.00	0	0
18-Oct-21	0.00	± 0.00	0	0
19-Oct-21	0.33	± 0.52	2	181
20-Oct-21	0.17	± 0.41	1	90
21-Oct-21	0.17	± 0.41	1	90
22-Oct-21	0.00	± 0.00	0	0
23-Oct-21	0.00	± 0.00	0	0
24-Oct-21	0.00	± 0.00	0	0
25-Oct-21	0.00	± 0.00	0	0
26-Oct-21	0.00	± 0.00	0	0
27-Oct-21	0.00	± 0.00	0	0
28-Oct-21	0.67	± 0.82	4	362
29-Oct-21	0.00	± 0.00	0	0
30-Oct-21	0.00	± 0.00	0	0
31-Oct-21	0.00	± 0.00	0	0
01-Nov-21	0.00	± 0.00	0	0
02-Nov-21	0.00	± 0.00	0	0
03-Nov-21	0.17	± 0.41	1	90

Date	Mean daily count	Standard deviation	Total daily count	Estimated daily influx
04-Nov-21	0.50	± 1.22	3	271
05-Nov-21	0.00	± 0.00	0	0
06-Nov-21	0.00	± 0.00	0	0
07-Nov-21	0.00	± 0.00	0	0
08-Nov-21	0.00	± 0.00	0	0
09-Nov-21	0.00	± 0.00	0	0
10-Nov-21	0.17	± 0.41	1	90
11-Nov-21	0.00	± 0.00	0	0
12-Nov-21	0.00	± 0.00	0	0
13-Nov-21	0.67	± 1.63	4	362
14-Nov-21	0.50	± 1.22	3	271
15-Nov-21	0.17	± 0.41	1	90
16-Nov-21	0.17	± 0.41	1	90
17-Nov-21	0.00	± 0.00	0	0
18-Nov-21	0.00	± 0.00	0	0
19-Nov-21	0.00	± 0.00	0	0
20-Nov-21	0.33	± 0.82	2	181
21-Nov-21	0.00	± 0.00	0	0
22-Nov-21	0.17	± 0.41	1	90
23-Nov-21	0.00	± 0.00	0	0
24-Nov-21	0.17	± 0.41	1	90
25-Nov-21	0.33	± 0.82	2	181
26-Nov-21	0.00	± 0.00	0	0
27-Nov-21	0.00	± 0.00	0	0
28-Nov-21	0.00	± 0.00	0	0
29-Nov-21	0.00	± 0.00	0	0
30-Nov-21	0.00	± 0.00	0	0
01-Dec-21	0.00	± 0.00	0	0
02-Dec-21	0.00	± 0.00	0	0
03-Dec-21	0.00	± 0.00	0	0
04-Dec-21	0.00	± 0.00	0	0
05-Dec-21	0.00	± 0.00	0	0
06-Dec-21	0.00	± 0.00	0	0
07-Dec-21	0.00	± 0.00	0	0
08-Dec-21	0.00	± 0.00	0	0
09-Dec-21	0.00	± 0.00	0	0
10-Dec-21	0.00	± 0.00	0	0
11-Dec-21	0.00	± 0.00	0	0
12-Dec-21	0.00	± 0.00	0	0
13-Dec-21	0.00	± 0.00	0	0
14-Dec-21	0.00	± 0.00	0	0
15-Dec-21	0.00	± 0.00	0	0
16-Dec-21	0.00	± 0.00	0	0
17-Dec-21	0.00	± 0.00	0	0
18-Dec-21	0.00	± 0.00	0	0
19-Dec-21	0.00	± 0.00	0	0
20-Dec-21	0.00	± 0.00	0	0
21-Dec-21	0.00	± 0.00	0	0
22-Dec-21	0.00	± 0.00	0	0
23-Dec-21	0.00	± 0.00	0	0
24-Dec-21	0.00	± 0.00	0	0
25-Dec-21	0.00	± 0.00	0	0

Date	Mean daily count	Standard deviation	Total daily count	Estimated daily influx
26-Dec-21	0.67	± 1.63	4	362
27-Dec-21	0.00	± 0.00	0	0
28-Dec-21	0.00	± 0.00	0	0
29-Dec-21	0.00	± 0.00	0	0
30-Dec-21	0.00	± 0.00	0	0
31-Dec-21	0.00	± 0.00	0	0
01-Jan-22	0.00	± 0.00	0	0
02-Jan-22	0.00	± 0.00	0	0
03-Jan-22	0.00	± 0.00	0	0
04-Jan-22	0.00	± 0.00	0	0
05-Jan-22	0.00	± 0.00	0	0
06-Jan-22	0.00	± 0.00	0	0
07-Jan-22	0.00	± 0.00	0	0
08-Jan-22	0.00	± 0.00	0	0
09-Jan-22	0.00	± 0.00	0	0
10-Jan-22	0.00	± 0.00	0	0
11-Jan-22	0.00	± 0.00	0	0
12-Jan-22	0.00	± 0.00	0	0
13-Jan-22	0.00	± 0.00	0	0
14-Jan-22	0.00	± 0.00	0	0
15-Jan-22	0.00	± 0.00	0	0
Total Count / Estimated Influx			32	2,891

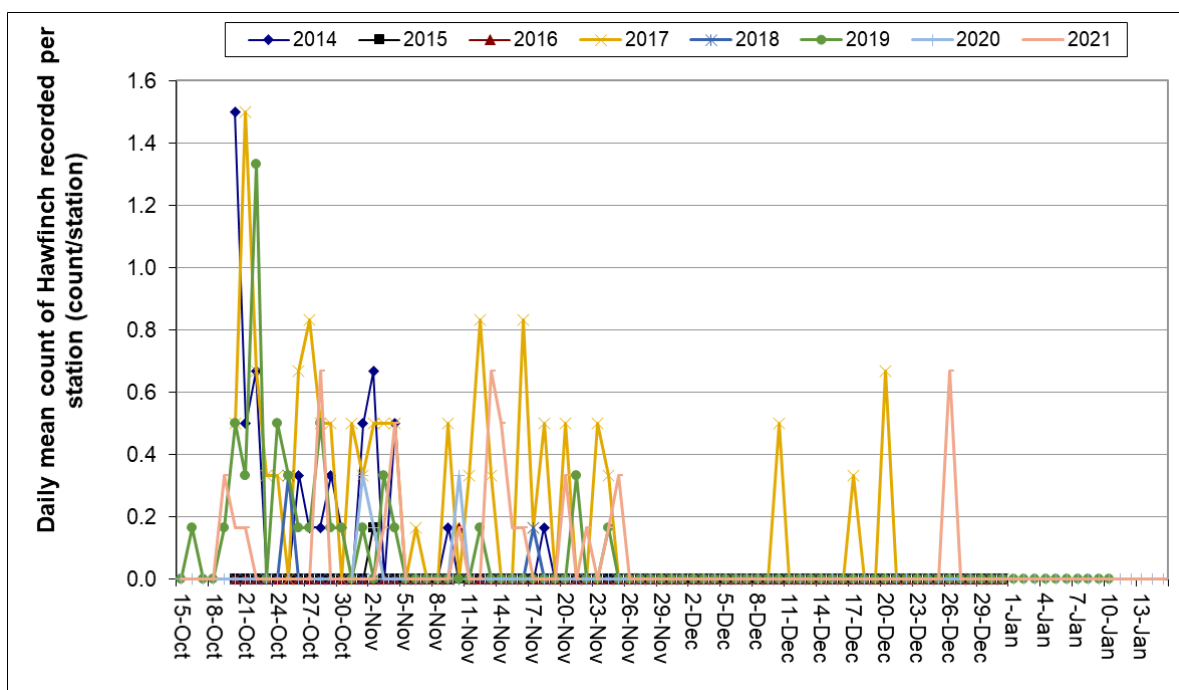


Figure 14. Daily mean counts of Hawfinch per station (= site) recorded between 15 October and 15 January during the present (2021) and 2020 surveys, between 15 October 2019 and 10 January 2020 during the 2019 survey, and between 20 October and 31 December during previous (2014, 2015, 2016, 2017, 2018) surveys.

Mean count values recorded from each of the 21 sites are indicated on the map shown in Figure 15. Zero or very low counts for this species were recorded from all sites.

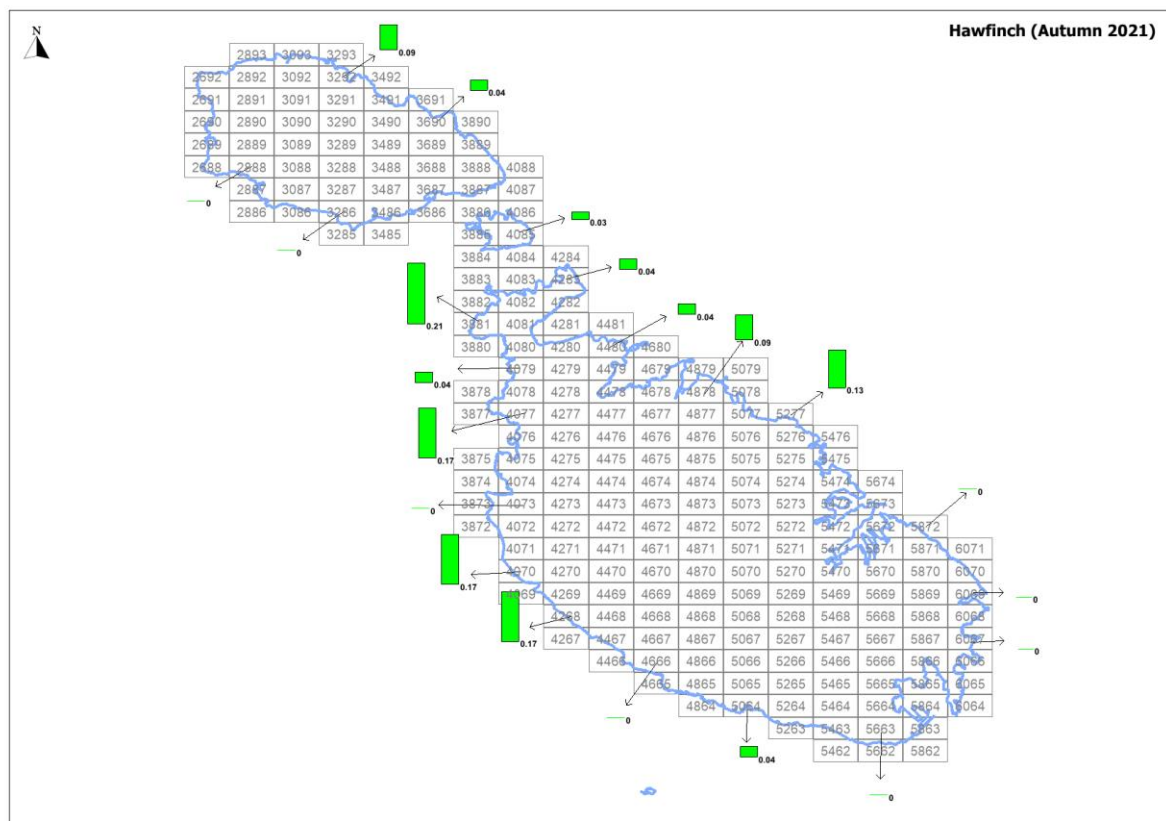


Figure 15. Map of the Maltese Islands showing the standard grid and respective codes, including ones used in the present study. The green bars indicate mean counts of Hawfinch recorded from study sites in the respective cells during the present survey.

4. Comparison with research derogation data

A comparative analysis of the results obtained during the present study with data obtained from the finch research derogation, as provided by the Wild Birds Regulation Unit (WBRU), was undertaken. It should be stated from the outset that the two sets of data were collected for different purposes, using very different methodologies, and therefore the magnitudes of values are not directly comparable. However, the temporal trends can be expected to follow similar patterns, that is periods when higher mean daily counts were recorded during the present survey should broadly correspond to dates when higher numbers of birds were captured and released (and reported in the research derogation data) in the same year. Whether the influx of the bird species follows the same temporal trend from year to year can only be confirmed through a longitudinal study of influx of the different bird species over a period of several years.

The data set provided by the WBRU for this comparison comprises the research derogation count of the seven finch species (as reported by licenced finch researchers through a telephonic game reporting system) for the period 20 October to 20 December 2021.

Graphical representations of the mean daily counts made during the present (2021) survey and the research derogation counts for the same time period (15 October – 15 January) in 2021 (WBRU unpublished data) for each of the seven bird species were prepared to compare temporal trends among the two different data sets. In a graphical plot showing daily counts, a high variation in counts from day to day may overshadow temporal trends over the two-month period. To aid visual interpretation, a second set of analyses was undertaken by computing a moving average using a rolling 5-day period for the time series count data. This has the effect of smoothening out the day-to-day fluctuations and hence making longer-term trends in mean daily counts or daily bag counts more apparent, thus facilitating visual interpretation of temporal trends. Note that the analyses based on a moving average do not replace those based on the raw daily counts. Rather, the graphical representations showing a 5-day moving average should be seen in conjunction with those based on daily counts, which are also presented.

Common Linnet

The daily research derogation counts indicating the number of Linnet individuals caught and released during the 2021 finch research derogation period and the mean daily counts of the same species made during the present (2021) survey are shown in Figure 16, while Figure 17 presents the 5-day moving average computed from these data. As already noted, the magnitude of the research derogation counts and those of the mean counts made in the 2021 survey are not directly comparable; consequently the two sets of values are on different scales. Therefore, in Figures 16–17, two separate y-axes are used: the research derogation count data are plotted on the left-side y-axis, whereas the counts from the 2021 survey are plotted on the right-side y-axis.

Overall, the highest daily counts recorded during the 2021 survey were in late October and late November, with counts declining thereafter. The 2021 research derogation data included a period of higher counts in late October to mid-November, with counts declining thereafter. Thus, the general trend observed in the both the mean daily counts made during the 2021 survey and in the research derogation counts for 2021 is of higher counts from late October to late November.

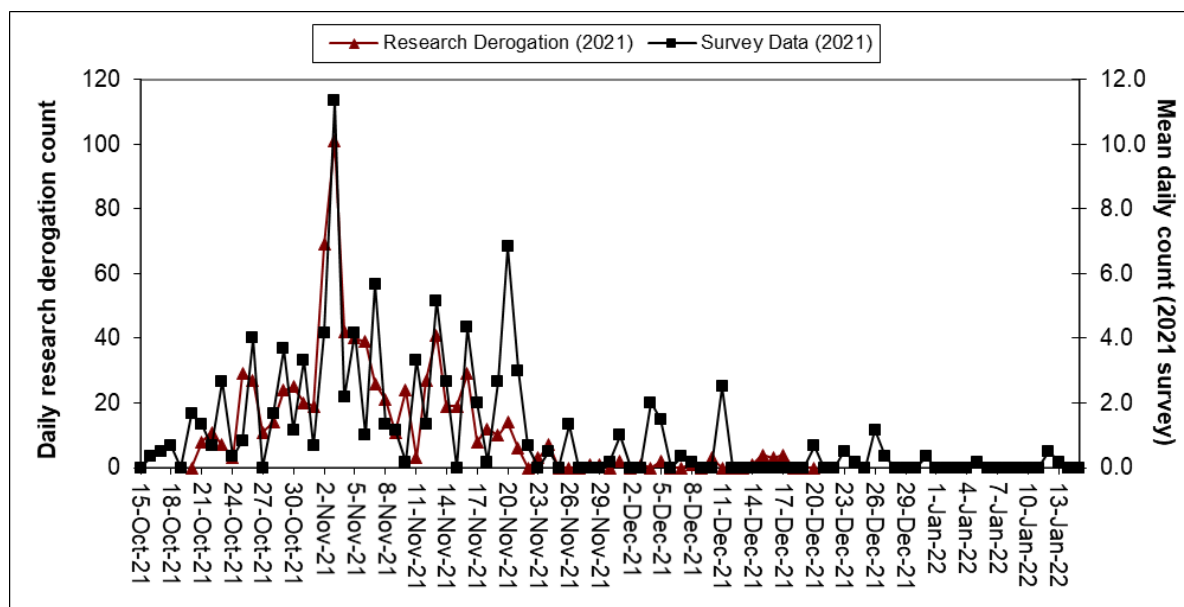


Figure 16. Daily research derogation count of Common Linnet for the period 20 October to 20 December 2021 (red line; values on left-side y-axis), together with the mean daily counts recorded during the present 2021 migration survey (black line; values on right-side y-axis) for the period 15 October 2021 to 15 January 2022.

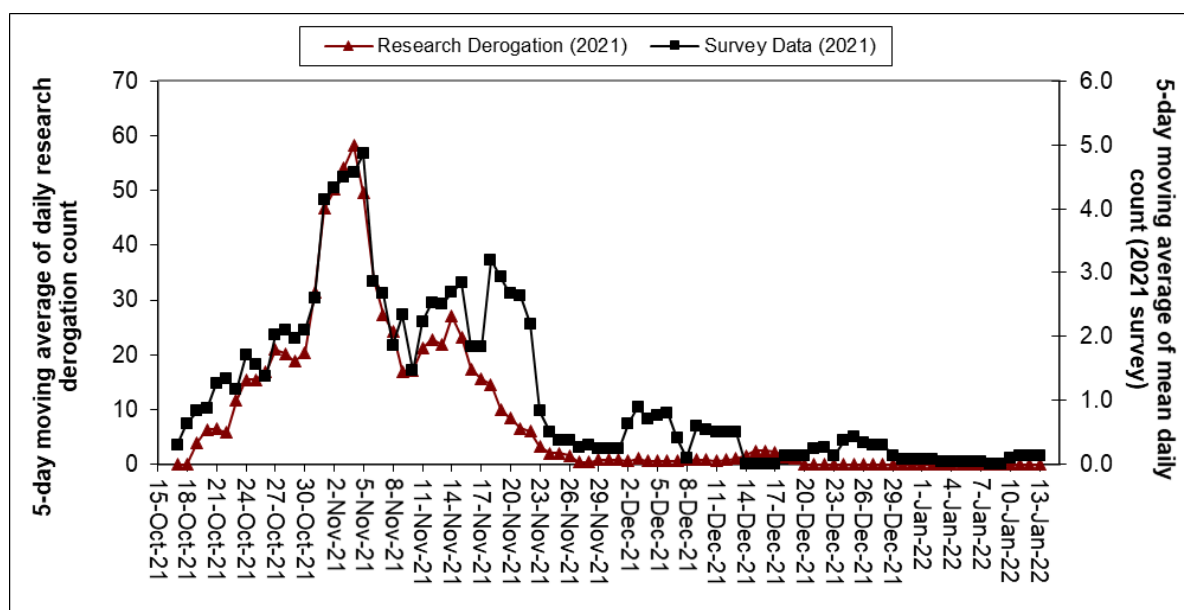


Figure 17. Moving average based on a 5-day rolling time period for the daily research derogation counts of Common Linnet for the period 20 October to 20 December 2021 (red line; values on left-side y-axis), together with the moving average for the mean daily counts recorded during the 2021 survey (black line; values on right-side y-axis) for the period 15 October to 15 January.

Common Chaffinch

The daily research derogation counts indicating the number of Chaffinch individuals caught and released during the 2021 finch research derogation period and the mean daily counts of the same species made during the present (2021) survey are shown in Figure 18, while Figure 19 presents the 5-day moving average computed from these data. As already noted, the magnitude of the research derogation counts and those of the mean counts made in the 2021 survey are not directly comparable; consequently the two sets of values are on different scales. Therefore, in Figures 18–19, two separate y-axes are used: the research derogation count data are plotted on the left-side y-axis, whereas the counts from the 2021 survey are plotted on the right-side y-axis.

Overall, the highest daily counts recorded during the 2021 survey were made between late October and mid-November, with several days in December being characterised by zero counts. The highest research derogation counts were also reported between late October and mid-November, while zero counts reported throughout December. Thus, the general trend observed in the research derogation counts for 2021 and daily counts recorded during the 2021 survey is of higher counts between late October and mid-November.

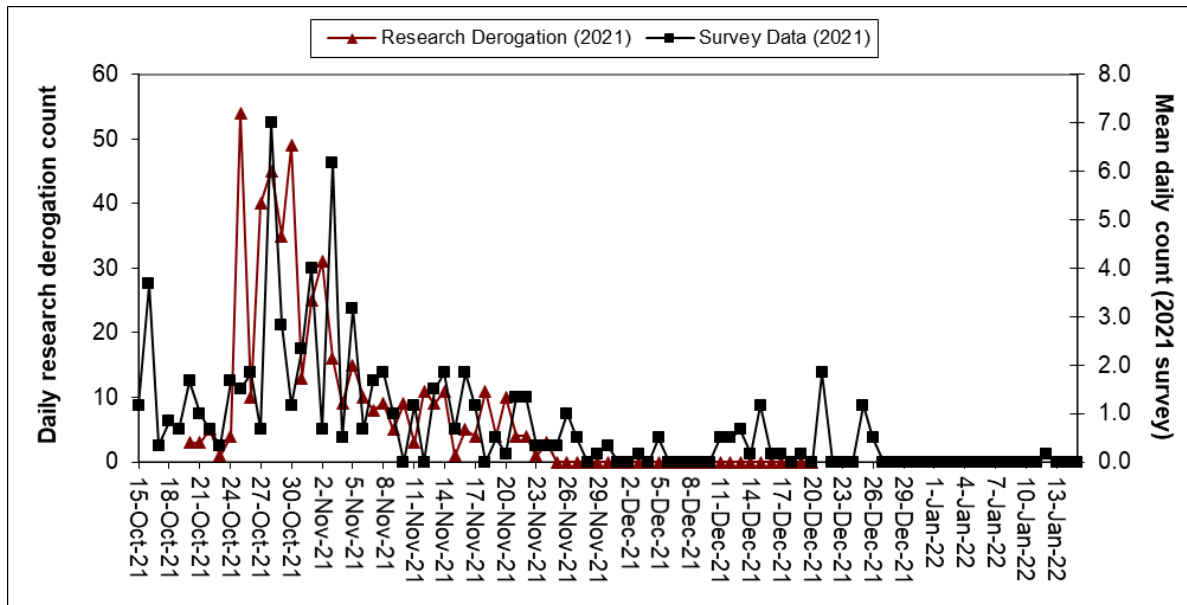


Figure 18. Daily research derogation count of Common Chaffinch for the period 20 October to 20 December 2021 (red line; values on left-side y-axis), together with the mean daily counts recorded during the present 2021 migration survey (black line; values on right-side y-axis) for the period 15 October 2021 to 15 January 2022.

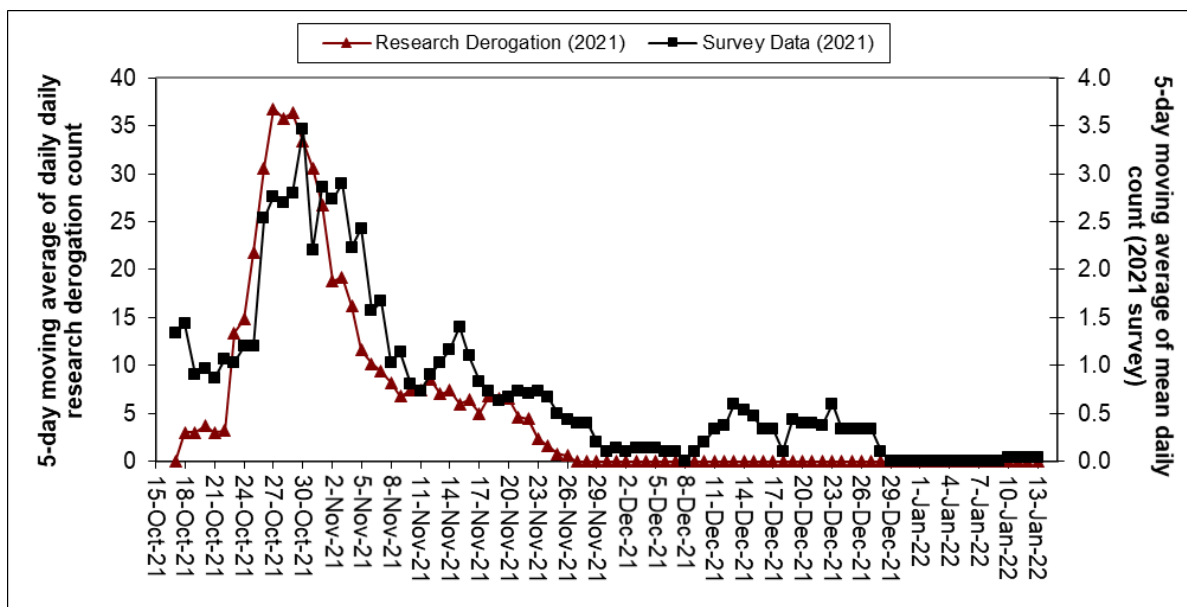


Figure 19. Moving average based on a 5-day rolling time period for the daily research derogation counts of Common Chaffinch for the period 20 October to 20 December 2021 (red line; values on left-side y-axis), together with the moving average for the mean daily counts recorded during the 2021 survey (black line; values on right-side y-axis) for the period 15 October to 15 January.

European Greenfinch

The daily research derogation counts indicating the number of Greenfinch individuals caught and released during the 2021 finch research derogation period and the mean daily counts of the same species made during the present (2021) survey are shown in Figure 20, while Figure 21 presents the 5-day moving average computed from these data. As already noted, the magnitude of the research derogation counts and those of the mean counts made in the 2021 survey are not directly comparable; consequently the two sets of values are on different scales. Therefore, in Figures 20–21, two separate y-axes are used: the research derogation count data are plotted on the left-side y-axis, whereas the counts from the 2021 survey are plotted on the right-side y-axis.

Overall, the highest daily counts recorded during the 2021 survey were made during November, especially in mid-November; much lower counts were recorded during December and several days were characterised by zero counts. The research derogation data showed a very similar trend with counts peaking in mid-November and then declining until the end of the month, with only low or zero counts in December. Therefore, the general trend observed in the research derogation counts for 2021 and daily counts recorded during the 2021 survey is of higher counts in November with a peak in mid-November.

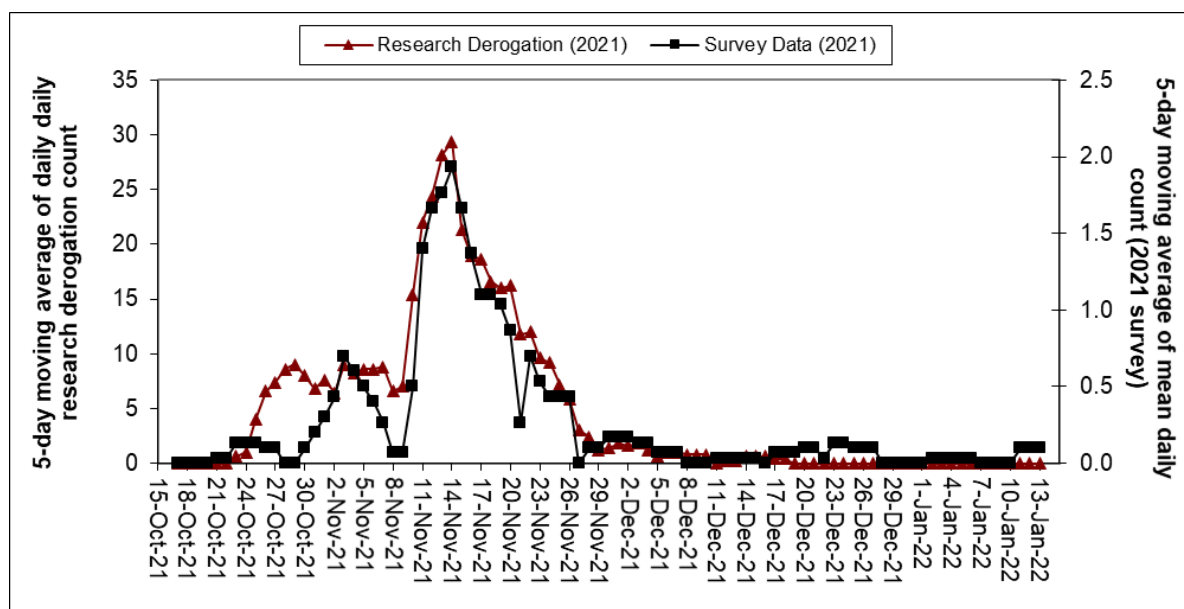


Figure 20. Daily research derogation count of European Greenfinch for the period 20 October to 20 December 2021 (red line; values on left-side y-axis), together with the mean daily counts recorded during the present 2021 migration survey (black line; values on right-side y-axis) for the period 15 October 2021 to 15 January 2022.

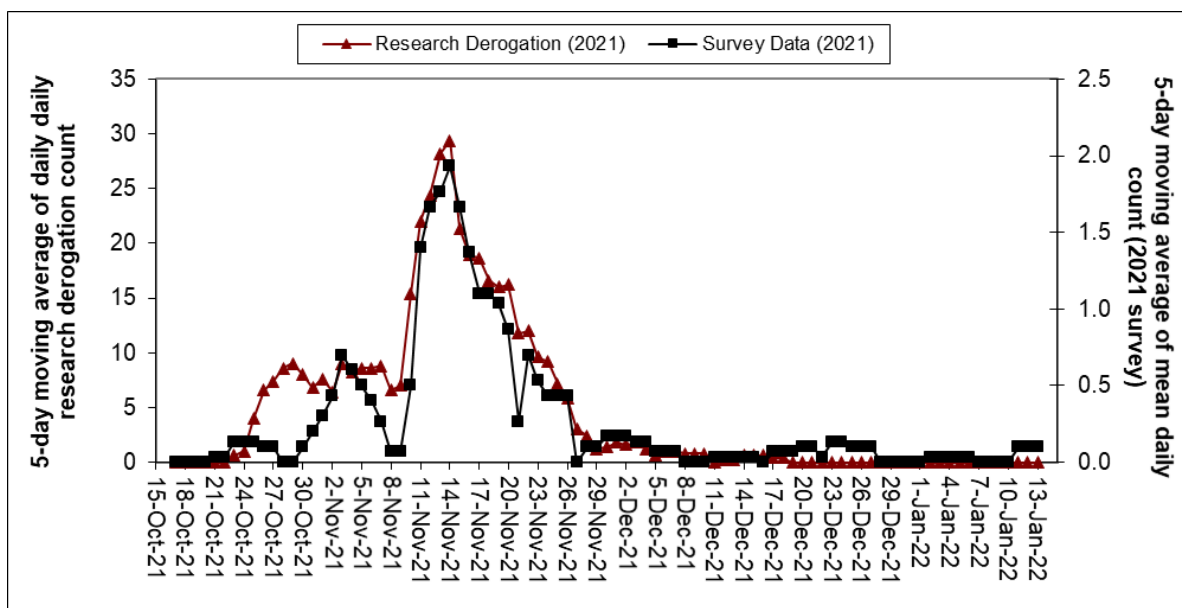


Figure 21. Moving average based on a 5-day rolling time period for the daily research derogation counts of European Greenfinch for the period 20 October to 20 December 2021 (red line; values on left-side y-axis), together with the moving average for the mean daily counts recorded during the 2021 survey (black line; values on right-side y-axis) for the period 15 October to 15 January.

Eurasian Siskin

The daily research derogation counts indicating the number of Siskin individuals caught and released during the 2021 finch research derogation period and the mean daily counts of the same species made during the present (2021) survey are shown in Figure 22, while Figure 23 presents the 5-day moving average computed from these data. As already noted, the magnitude of the research derogation counts and those of the mean counts made in the 2021 survey are not directly comparable; consequently the two sets of values are on different scales. Therefore, in Figures 22–23, two separate y-axes are used: the research derogation count data are plotted on the left-side y-axis, whereas the counts from the 2021 survey are plotted on the right-side y-axis.

Overall, higher daily counts were recorded during the 2021 survey between late October and late November; comparatively lower counts were recorded on most days during December. The research derogation counts data showed a similar trend of higher counts from late October to late November, while research derogation counts in December were very low. Thus, the general trend observed in the research derogation counts for 2021 and daily counts recorded during the 2021 survey is of higher counts between late October and late November, and lower counts in December.

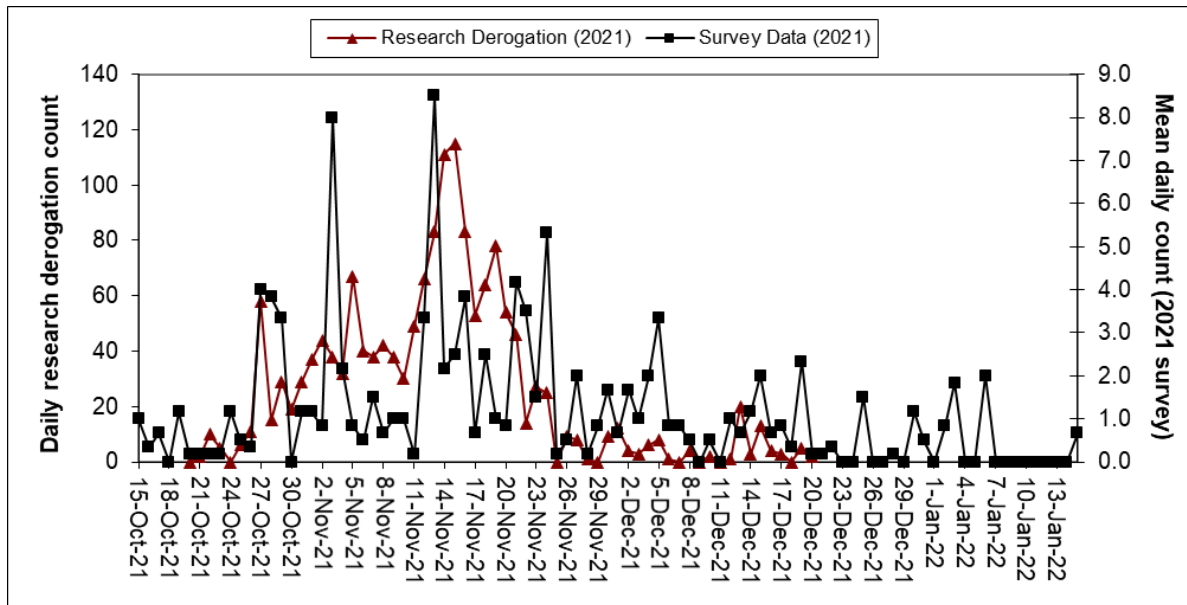


Figure 22. Daily research derogation count of Eurasian Siskin for the period 20 October to 20 December 2021 (red line; values on left-side y-axis), together with the mean daily counts recorded during the present 2021 migration survey (black line; values on right-side y-axis) for the period 15 October 2021 to 15 January 2022.

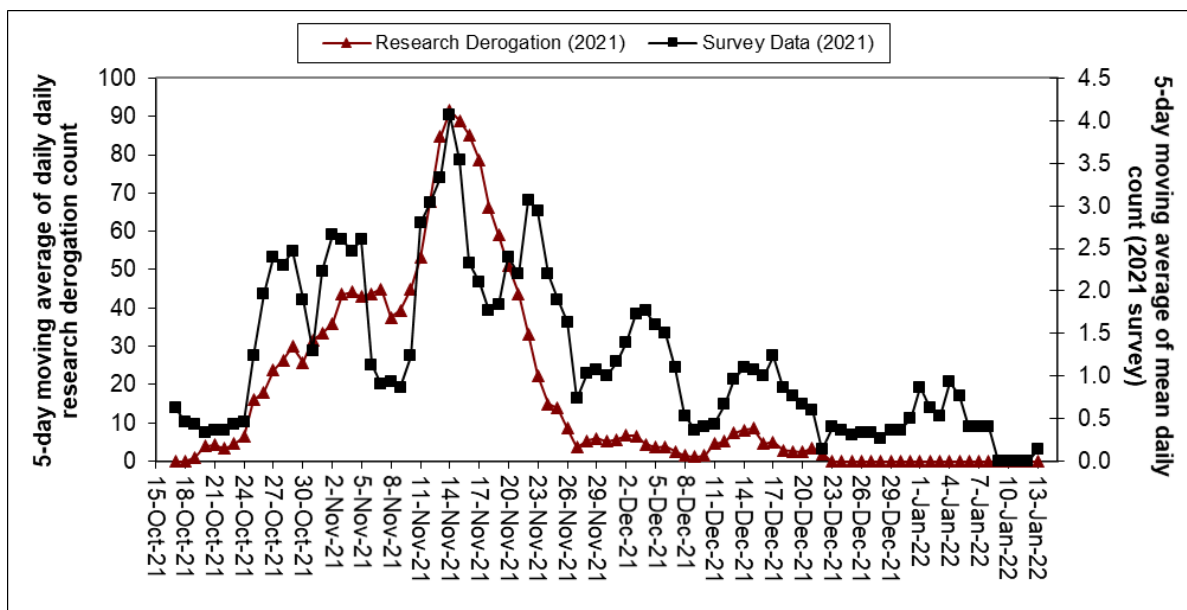


Figure 23. Moving average based on a 5-day rolling time period for the daily research derogation counts of Eurasian Siskin for the period 20 October to 20 December 2021 (red line; values on left-side y-axis), together with the moving average for the mean daily counts recorded during the 2021 survey (black line; values on right-side y-axis) for the period 15 October to 15 January.

European Goldfinch

The daily research derogation counts indicating the number of Goldfinch individuals caught and released during the 2021 finch research derogation period and the mean daily counts of the same species made during the present (2021) survey are shown in Figure 24, while Figure 25 presents the 5-day moving average computed from these data. As already noted, the magnitude of the research derogation counts and those of the mean counts made in the 2021 survey are not directly comparable; consequently the two sets of values are on different scales. Therefore, in Figures 24–25, two separate y-axes are used: the research derogation count data are plotted on the left-side y-axis, whereas the counts from the 2021 survey are plotted on the right-side y-axis.

Goldfinch individuals were only recorded on three days (31 October, 07 November and 20 November) during the 2021 survey. Inferences on temporal trends in migration rates cannot be drawn based on such limited data. The research derogation data shows sporadic counts from late October to late November.

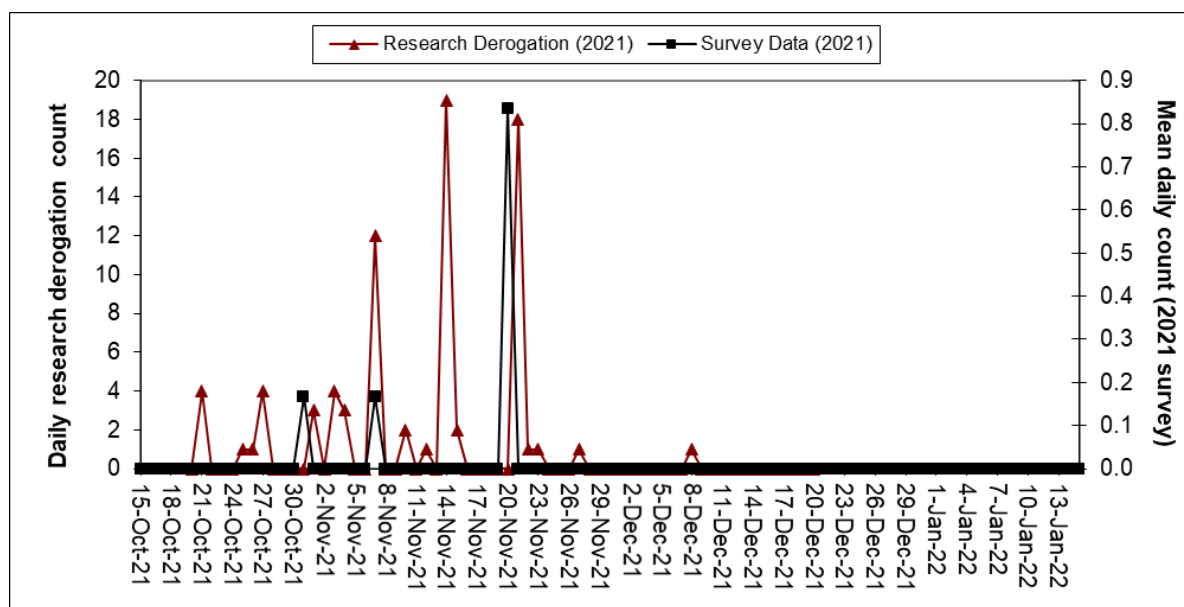


Figure 24. Daily research derogation count of European Goldfinch for the period 20 October to 20 December 2021 (red line; values on left-side y-axis), together with the mean daily counts recorded during the present 2021 migration survey (black line; values on right-side y-axis) for the period 15 October 2021 to 15 January 2022.

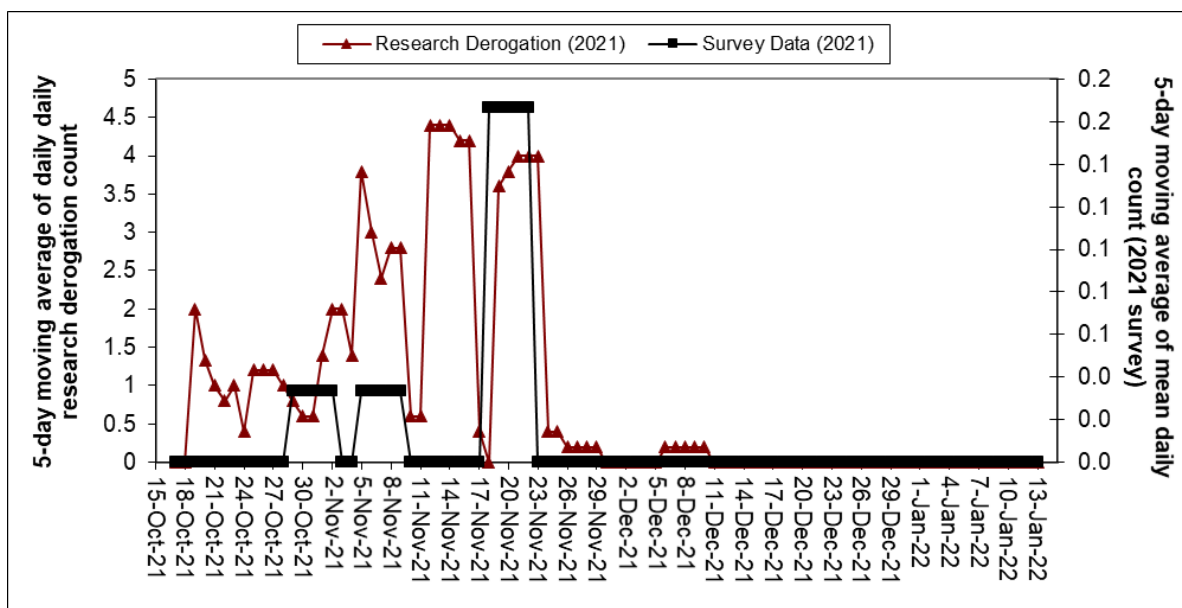


Figure 25. Moving average based on a 5-day rolling time period for the daily research derogation counts of European Goldfinch for the period 20 October to 20 December 2021 (red line; values on left-side y-axis), together with the moving average for the mean daily counts recorded during the 2021 survey (black line; values on right-side y-axis) for the period 15 October to 15 January.

European Serin

The daily research derogation counts indicating the number of Serin individuals caught and released during the 2021 finch research derogation period and the mean daily counts of the same species made during the present (2021) survey are shown in Figure 26, while Figure 27 presents the 5-day moving average computed from these data. As already noted, the magnitude of the research derogation counts and those of the mean counts made in the 2021 survey are not directly comparable; consequently the two sets of values are on different scales. Therefore, in Figures 26–27, two separate y-axes are used: the research derogation count data are plotted on the left-side y-axis, whereas the counts from the 2021 survey are plotted on the right-side y-axis.

Overall, the daily counts recorded during the 2021 survey were very low during late October, and subsequently increased and remained relatively similar until early January, with peak counts on 15 December and 02 January; however a period of slightly lower counts was recorded between late November and early December. The 2021 research derogation count data also showed very low counts initially, which increased in early November, decreased again from late November to mid-December and finally increase again in mid-December. Thus, the general trend observed in both the daily counts recorded during the 2021 survey and in the 2021 research derogation counts is of two periods characterised by slightly higher counts: from early to late November, and in mid-December; the peak count recorded in early January during the 2021 survey is not reflected in the research derogation data since the finch research derogation ended on 20 December.

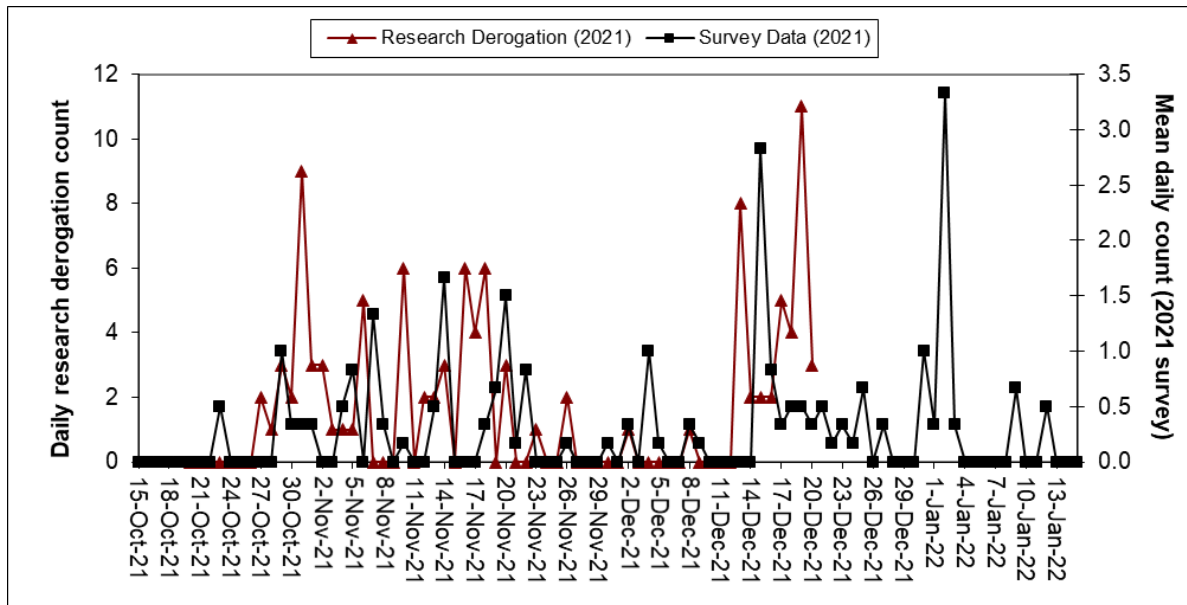


Figure 26. Daily research derogation count of European Serin for the period 20 October to 20 December 2021 (red line; values on left-side y-axis), together with the mean daily counts recorded during the present 2021 migration survey (black line; values on right-side y-axis) for the period 15 October 2021 to 15 January 2022.

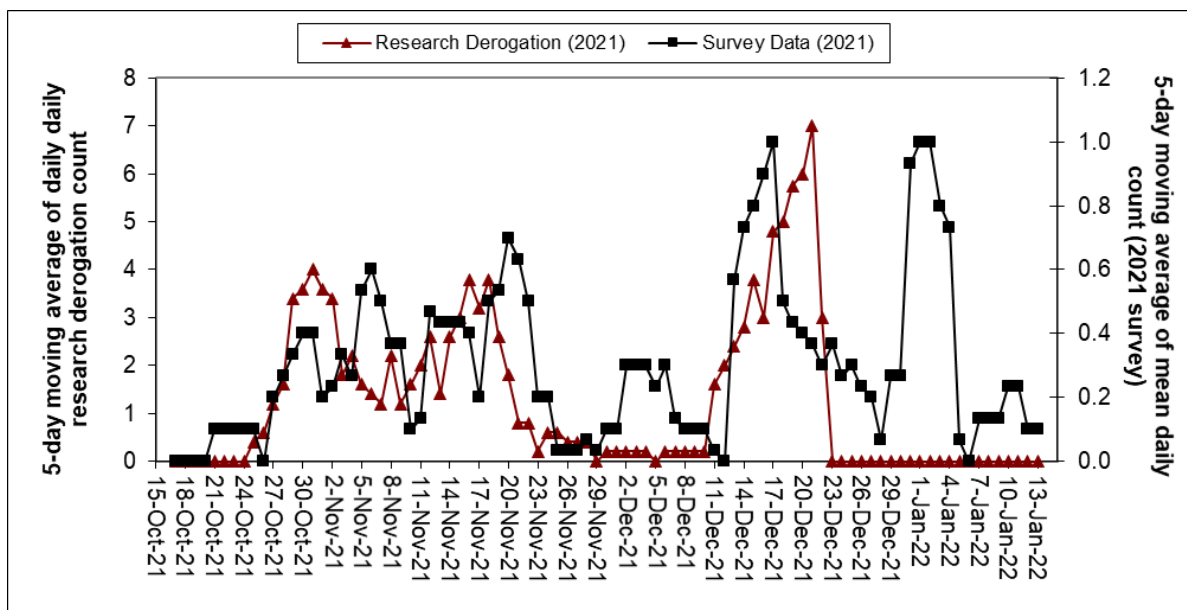


Figure 27. Moving average based on a 5-day rolling time period for the daily research derogation counts of European Serin for the period 20 October to 20 December 2021 (red line; values on left-side y-axis), together with the moving average for the mean daily counts recorded during the 2021 survey (black line; values on right-side y-axis) for the period 15 October to 15 January.

Hawfinch

The daily research derogation counts indicating the number of Hawfinch individuals caught and released during the 2021 finch research derogation period and the mean daily counts of the same species made during the present (2021) survey are shown in Figure 28, while Figure 29 presents the 5-day moving average computed from these data. As already noted, the magnitude of the research derogation counts and those of the mean counts made in the 2021 survey are not directly comparable; consequently the two sets of values are on different scales. Therefore, in Figures 28–29, two separate y-axes are used: the research derogation count data are plotted on the left-side y-axis, whereas the counts from the 2021 survey are plotted on the right-side y-axis.

Overall, the highest daily counts recorded during the 2021 survey were made between early October and end November, with most of December characterised by zero counts. The research derogation count data showed a similar pattern of higher counts from late October to late November, with most of December characterised by zero counts. Thus, the general trend in the research derogation count data and in the daily counts made during the 2021 survey is of higher counts until end-November, with only sporadic sightings made in December.

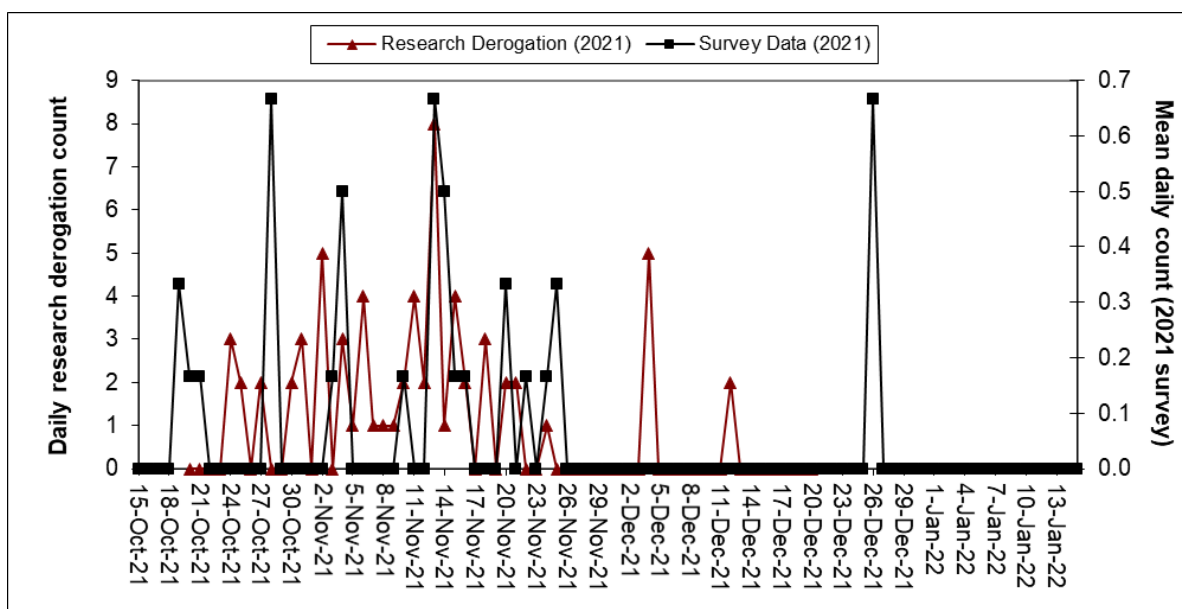


Figure 28. Daily research derogation count of Hawfinch for the period 20 October to 20 December 2021 (red line; values on left-side y-axis), together with the mean daily counts recorded during the present 2021 migration survey (black line; values on right-side y-axis) for the period 15 October 2021 to 15 January 2022.

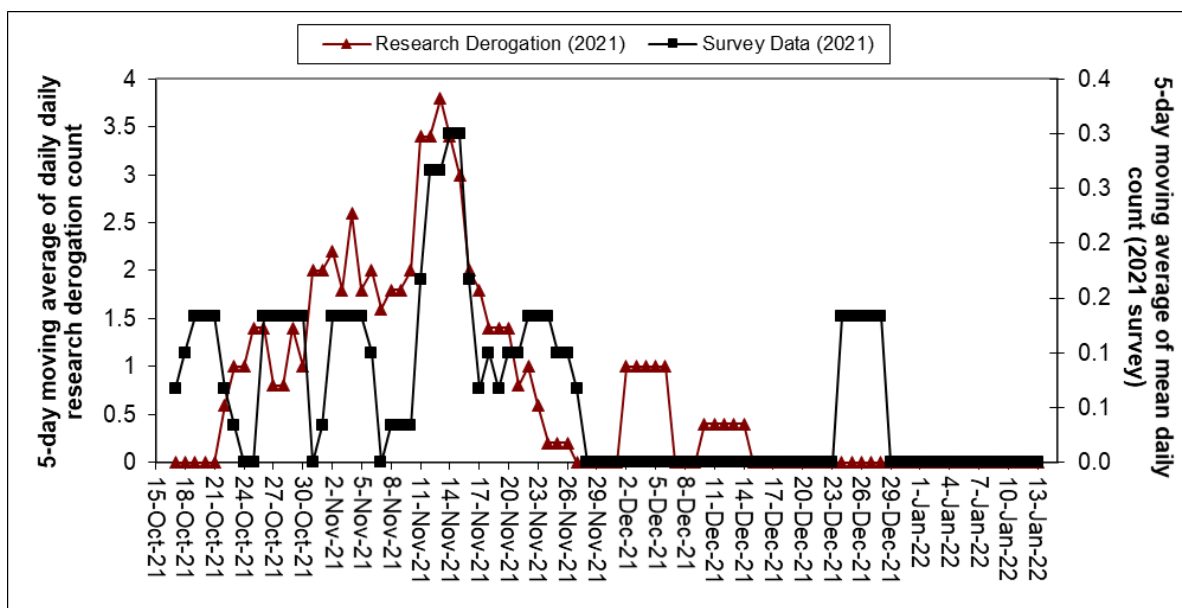


Figure 29. Moving average based on a 5-day rolling time period for the daily research derogation counts of Hawfinch for the period 20 October to 20 December 2021 (red line; values on left-side y-axis), together with the moving average for the mean daily counts recorded during the 2021 survey (black line; values on right-side y-axis) for the period 15 October to 15 January.

5. Appraisal

The present survey provides data on mean daily counts of seven Finch species - Common Linnet *Linaria cannabina*, Common Chaffinch *Fringilla coelebs*, European Serin *Serinus serinus*, European Goldfinch *Carduelis carduelis*, European Greenfinch *Chloris chloris*, Hawfinch *Coccothraustes coccothraustes*, and Eurasian Siskin *Spinus spinus* - recorded during the study period held between 15 October 2021 to 15 January 2022, together with estimates of the migratory influx of the seven species.

The mean daily counts did not indicate any large migratory peaks for any of the seven species, but the higher values recorded in certain periods suggest a general trend of migratory influx during the following periods: Linnet, late October to late November; Chaffinch, late October to mid-November; Greenfinch, early to late November; Siskin, late October to late November; Serin, early November to early January; Hawfinch: late October to late November. However, no discernible trend was noted in the case of Goldfinch, particularly given the low number of counts recorded for this species. The raw counts for some of the finch species varied appreciably among the different study sites. Such variation is to be expected in studies such as the present one, given that birds may have a strong influx at one site and a potentially much lower one at a different site, even if the two sites are separated by a very small distance of even a few hundred metres. Considerations of habitat and land cover apply only to a degree, since migratory birds also fly over urban and other built-up areas. Another noteworthy point is that some birds may pass overhead, maintaining high altitude and avoid alighting on land. The usefulness of the values provided in the present report therefore lies primarily in providing data for comparison of migratory influx between different years, rather than using the counts *per se*, which in any study of this type can only be a rough estimate.

The total influx of finch individuals for the present survey period (15 October 2021 – 15 January 2022) was estimated at 54,425 for Linnet; 38,691 for Chaffinch; 13,286 for Greenfinch; 60,117 for Siskin; 632 for Goldfinch; 14,824 for Serin; and 2,891 for Hawfinch. When comparing the present results with those from the autumn 2014, 2015, 2016, 2017, 2018, 2019 and 2020 surveys (Ecoserv, 2015a, 2016a, 2017a, 2018a, 2019a, 2020a, 2021a), the following overall observations are noted⁴:

- In the case of Linnet (see Figure 2) the migratory influx recorded during the present autumn/winter 2021 survey is similar to those recorded during the 2014, 2017, 2018 and 2019 surveys, and higher than those recorded in 2015, 2016 and 2020;
- The migratory influx recorded in the present autumn/winter 2021 survey for Chaffinch (see Figure 4) falls within the range recorded during previous surveys, being most similar to those recorded in 2018 and 2019;
- In the case of Greenfinch (see Figure 6), the migratory influx recorded during the present autumn/winter 2021 survey is similar to that recorded during the 2014 and 2017 surveys, appreciably lower than that recorded in 2019, but higher than those recorded in 2015, 2016, 2018 and 2020.
- In the case of Siskin (see Figure 8) the migratory influx recorded during the present autumn/winter 2021 survey is higher than those recorded during all previous surveys, being most similar to the migratory count recorded in 2019;
- For Goldfinch (see Figure 10), the migratory influx recorded during the present autumn/winter 2021 survey is similar to those recorded during the 2014, 2018 and 2020 surveys, higher than those recorded in 2015 and 2016 but lower than those recorded in 2017 and 2019;
- The migratory influx recorded in the present autumn/winter 2021 survey for Serin (see Figure 12) falls within the range recorded during previous surveys, being most similar to those recorded in 2014 and 2018;
- In the case of Hawfinch (see Figure 14), the migratory influx recorded during the present autumn/winter 2021 survey is similar to that recorded during the 2014 and 2019 surveys, higher than those recorded in 2015, 2016, 2018 and 2020, but lower than that recorded in 2017.
- When comparing data from the various years (2014 – 2021) within the context of the specific period during which a higher influx of these species was recorded, no discernible differences are evident since, overall, the higher counts for the respective species were recorded during the same period in all survey years.

It is reiterated that such estimates should be treated with utmost caution, given the relatively small number of field sites used in the survey, that counts were not made daily at each site, and since the extrapolation procedure used is likely to result in a rough estimate. Influx of birds at different localities is extremely variable, with potential large differences in number of birds passing at two different localities, even if these are separated by a very small distance, as indicated above. Furthermore, the total length of coastline surveyed per day (3 km) amounts to less than 1.5% of the total coastline. Other limitations are (i) bird migration starts in September and trails off by the end of January, and therefore birds that would have migrated outside the present study period (i.e. before 15 October or after 15 January) would not have been recorded; and (ii) counts were recorded over a five hour survey period, hence any individuals migrating at other times of the day were not included, leading to a potential underestimate of the total influx if significant migratory influx occurred outside the survey time on any day. Nevertheless, the stated estimate is useful when making comparison between different years, assuming data from surveys based on a similar design are available, to assess whether influx of any of the seven bird species is increasing or decreasing with time.

⁴ It should also be noted that the present survey extended over a period of 93 days, which is longer than the 88-day period in 2019 and the 73-day period used in the 2014-2017 surveys.

The design of the present survey included counts made over a 93-day period between 15 October 2021 and 15 January 2022, which covers the period when peak autumn migration of the seven finch species normally occurs.

Robust and rigorous assessment of migratory influx requires trend analysis based on data from monitoring carried out regularly over a sufficiently long period comprising subsequent years, and using the same methodology. For each year, the data should ideally be collected over the whole migratory season and using a larger sampling effort, for example by making counts daily at all of a minimum 21 sites. However, it should be noted that such higher sampling effort will entail very high costs, which may render the study prohibitively expensive, while it would be very difficult if not impossible to implement a survey involving daily counts at a large number of sites, given the large number of field personnel that would be required. Nevertheless, the data from the present study provides a useful indication of the autumn influx of the seven bird species, provided that results are interpreted in the context of the limitations indicated above.

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APPENDIX I - Raw counts**Table A. Daily counts of Linnet recorded per site.**

Ecoserv Sample Reference Code	B-117-21	B-118-21	B-119-21	B-120-21	B-121-21	B-122-21	B-123-21	B-124-21	B-125-21	B-126-21	B-127-21
Grid Location	4085	3292	4079	4268	6067	4878	2888	4077	4666	6069	4480
15-Oct-21	0										
16-Oct-21	0	0	0	0	0	2					
17-Oct-21	0						0	0	2	1	0
18-Oct-21	0										
19-Oct-21	0										
20-Oct-21	0	2	2	3	3	0					
21-Oct-21	4						0	2	0	0	2
22-Oct-21	4										
23-Oct-21	0										
24-Oct-21	0	0	1	1	0	0					
25-Oct-21	0						0	4	0	1	0
26-Oct-21	0										
27-Oct-21	0										
28-Oct-21	0	6	4	0	0	0					
29-Oct-21	2						0	0	18	0	2
30-Oct-21	0										
31-Oct-21	3										
01-Nov-21	0	0	0	4	0	0					
02-Nov-21	4						15	0	0	1	5
03-Nov-21	5										
04-Nov-21	3										
05-Nov-21	0	3	1	8	1	12					
06-Nov-21	4						0	0	0	0	2
07-Nov-21	14										
08-Nov-21	0										
09-Nov-21	0	0	7	0	0	0					
10-Nov-21	0						0	0	0	1	0

Ecoserv Sample Reference Code	B-117-21	B-118-21	B-119-21	B-120-21	B-121-21	B-122-21	B-123-21	B-124-21	B-125-21	B-126-21	B-127-21
11-Nov-21	0										
12-Nov-21	6										
13-Nov-21	0	3	0	4	14	10					
14-Nov-21	0						6	9	0	1	0
15-Nov-21	0										
16-Nov-21	0										
17-Nov-21	0	0	0	4	7	1					
18-Nov-21	0						0	0	1	0	0
19-Nov-21	0										
20-Nov-21	0										
21-Nov-21	0	5	0	0	13	0					
22-Nov-21	0						0	0	1	0	3
23-Nov-21	0										
24-Nov-21	0										
25-Nov-21	0	0	0	0	0	0					
26-Nov-21	0						0	4	0	0	4
27-Nov-21	0										
28-Nov-21	0										
29-Nov-21	0	0	0	0	0	0					
30-Nov-21	0						0	0	0	0	1
01-Dec-21	3										
02-Dec-21	0										
03-Dec-21	0	0	0	0	0	0					
04-Dec-21	4						0	8	0	0	0
05-Dec-21	0										
06-Dec-21	0										
07-Dec-21	0	0	0	0	2	0					
08-Dec-21	0						0	0	0	0	1
09-Dec-21	0										
10-Dec-21	0										
11-Dec-21	0	0	0	0	15	0					
12-Dec-21	0						0	0	0	0	0

Ecoserv Sample Reference Code	B-117-21	B-118-21	B-119-21	B-120-21	B-121-21	B-122-21	B-123-21	B-124-21	B-125-21	B-126-21	B-127-21
13-Dec-21	0										
14-Dec-21	0										
15-Dec-21	0	0	0	0	0	0					
16-Dec-21	0						0	0	0	0	0
17-Dec-21	0										
18-Dec-21	0										
19-Dec-21	0	0	0	0	0	0					
20-Dec-21	0						0	0	0	0	4
21-Dec-21	0										
22-Dec-21	0										
23-Dec-21	0	0	0	0	0	3					
24-Dec-21	0						0	1	0	0	0
25-Dec-21	0										
26-Dec-21	0										
27-Dec-21	0	0	2	0	0	0					
28-Dec-21	0						0	0	0	0	0
29-Dec-21	0										
30-Dec-21	0										
31-Dec-21	0	0	2	0	0	0					
01-Jan-22	0						0	0	0	0	0
02-Jan-22	0										
03-Jan-22	0										
04-Jan-22	0	0	0	0	0	0					
05-Jan-22	0						0	1	0	0	0
06-Jan-22	0										
07-Jan-22	0										
08-Jan-22	0	0	0	0	0	0					
09-Jan-22	0						0	0	0	0	0
10-Jan-22	0										
11-Jan-22	0										
12-Jan-22	3	0	0	0	0	0					
13-Jan-22	0						1	0	0	0	0

Ecoserv Sample Reference Code	B-117-21	B-118-21	B-119-21	B-120-21	B-121-21	B-122-21	B-123-21	B-124-21	B-125-21	B-126-21	B-127-21
14-Jan-22	0										
15-Jan-22	0										

Table A continued. Daily counts of Linnet recorded per site.

Ecoserv Sample Reference Code	B-128-21	B-129-21	B-130-21	B-131-21	B-132-21	B-133-21	B-134-21	B-135-21	B-136-21	B-137-21
Grid Location	3268	4073	5064	5872	4283	3690	3881	4070	5663	5277
15-Oct-21						0	0	0	0	0
16-Oct-21										
17-Oct-21										
18-Oct-21	0	3	0	0	1					
19-Oct-21						0	0	0	0	0
20-Oct-21										
21-Oct-21										
22-Oct-21	0	0	0	0	0					
23-Oct-21						2	2	12	0	0
24-Oct-21										
25-Oct-21										
26-Oct-21	0	19	0	2	3					
27-Oct-21						0	0	0	0	0
28-Oct-21										
29-Oct-21										
30-Oct-21	5	0	0	0	2					
31-Oct-21						5	0	5	0	7
01-Nov-21										
02-Nov-21										
03-Nov-21	25	11	0	4	23					
04-Nov-21						1	4	0	2	3
05-Nov-21										
06-Nov-21										

Ecoserv Sample Reference Code	B-128-21	B-129-21	B-130-21	B-131-21	B-132-21	B-133-21	B-134-21	B-135-21	B-136-21	B-137-21
07-Nov-21	10	10	0	0	0					
08-Nov-21						0	0	0	2	6
09-Nov-21										
10-Nov-21										
11-Nov-21	0	0	20	0	0					
12-Nov-21						0	0	0	2	0
13-Nov-21										
14-Nov-21										
15-Nov-21	0	0	0	0	0					
16-Nov-21						0	3	20	0	3
17-Nov-21										
18-Nov-21										
19-Nov-21	0	12	0	4	0					
20-Nov-21						2	0	29	0	10
21-Nov-21										
22-Nov-21										
23-Nov-21	0	0	0	0	0					
24-Nov-21						0	0	1	2	0
25-Nov-21										
26-Nov-21										
27-Nov-21	0	0	0	0	0					
28-Nov-21						0	0	0	0	0
29-Nov-21										
30-Nov-21										
01-Dec-21	0	3	0	0	0					
02-Dec-21						0	0	0	0	0
03-Dec-21										
04-Dec-21										
05-Dec-21	0	9	0	0	0					
06-Dec-21						0	0	0	0	0
07-Dec-21										
08-Dec-21										

Ecoserv Sample Reference Code	B-128-21	B-129-21	B-130-21	B-131-21	B-132-21	B-133-21	B-134-21	B-135-21	B-136-21	B-137-21
09-Dec-21	0	0	0	0	0					
10-Dec-21						0	0	0	0	0
11-Dec-21										
12-Dec-21										
13-Dec-21	0	0	0	0	0					
14-Dec-21						0	0	0	0	0
15-Dec-21										
16-Dec-21										
17-Dec-21	0	0	0	0	0					
18-Dec-21						0	0	0	0	0
19-Dec-21										
20-Dec-21										
21-Dec-21	0	0	0	0	0					
22-Dec-21						0	0	0	0	0
23-Dec-21										
24-Dec-21										
25-Dec-21	0	0	0	0	0					
26-Dec-21						0	0	7	0	0
27-Dec-21										
28-Dec-21										
29-Dec-21	0	0	0	0	0					
30-Dec-21						0	0	0	0	0
31-Dec-21										
01-Jan-22										
02-Jan-22	0	0	0	0	0					
03-Jan-22						0	0	0	0	0
04-Jan-22										
05-Jan-22										
06-Jan-22	0	0	0	0	0					
07-Jan-22						0	0	0	0	0
08-Jan-22										
09-Jan-22										

Ecoserv Sample Reference Code	B-128-21	B-129-21	B-130-21	B-131-21	B-132-21	B-133-21	B-134-21	B-135-21	B-136-21	B-137-21
10-Jan-22	0	0	0	0	0					
11-Jan-22						0	0	0	0	0
12-Jan-22										
13-Jan-22										
14-Jan-22	0	0	0	0	0					
15-Jan-22						0	0	0	0	0

Table B. Daily counts of Chaffinch recorded per site.

Ecoserv Sample Reference Code	B-138-21	B-139-21	B-140-21	B-141-21	B-142-21	B-143-21	B-144-21	B-145-21	B-146-21	B-147-21	B-148-21
Grid Location	4085	3292	4079	4268	6067	4878	2888	4077	4666	6069	4480
15-Oct-21	1										
16-Oct-21	5	11	2	0	3	1					
17-Oct-21	1						0	0	1	0	0
18-Oct-21	1										
19-Oct-21	2										
20-Oct-21	1	5	3	0	1	0					
21-Oct-21	0						1	0	2	3	0
22-Oct-21	2										
23-Oct-21	0										
24-Oct-21	0	8	2	0	0	0					
25-Oct-21	0						0	5	2	0	2
26-Oct-21	1										
27-Oct-21	1										
28-Oct-21	6	28	4	4	0	0					
29-Oct-21	0						1	2	11	2	1
30-Oct-21	0										
31-Oct-21	0										
01-Nov-21	1	10	3	0	8	2					

Ecoserv Sample Reference Code	B-138-21	B-139-21	B-140-21	B-141-21	B-142-21	B-143-21	B-144-21	B-145-21	B-146-21	B-147-21	B-148-21
02-Nov-21	0						2	0	0	2	0
03-Nov-21	0										
04-Nov-21	2										
05-Nov-21	0	9	0	0	1	9					
06-Nov-21	2						0	0	0	1	1
07-Nov-21	8										
08-Nov-21	2										
09-Nov-21	0	3	1	1	0	1					
10-Nov-21	0						0	0	0	0	0
11-Nov-21	0										
12-Nov-21	0										
13-Nov-21	2	7	0	0	0	0					
14-Nov-21	0						8	3	0	0	0
15-Nov-21	0										
16-Nov-21	3										
17-Nov-21	0	5	0	2	0	0					
18-Nov-21	0						0	0	0	0	0
19-Nov-21	0										
20-Nov-21	0										
21-Nov-21	2	4	2	0	0	0					
22-Nov-21	5						1	0	0	0	2
23-Nov-21	2										
24-Nov-21	0										
25-Nov-21	0	0	0	0	0	2					
26-Nov-21	0						0	2	0	0	4
27-Nov-21	0										
28-Nov-21	0										
29-Nov-21	0	0	1	0	0	0					
30-Nov-21	0						0	0	0	0	2
01-Dec-21	0										
02-Dec-21	0										
03-Dec-21	0	0	1	0	0	0					

Ecoserv Sample Reference Code	B-138-21	B-139-21	B-140-21	B-141-21	B-142-21	B-143-21	B-144-21	B-145-21	B-146-21	B-147-21	B-148-21
04-Dec-21	0						0	0	0	0	0
05-Dec-21	3										
06-Dec-21	0										
07-Dec-21	0	0	0	0	0	0					
08-Dec-21	0						0	0	0	0	0
09-Dec-21	0										
10-Dec-21	0										
11-Dec-21	0	0	1	1	0	1					
12-Dec-21	0						0	0	3	0	0
13-Dec-21	0										
14-Dec-21	0										
15-Dec-21	6	0	1	0	0	0					
16-Dec-21	1						0	0	0	0	0
17-Dec-21	1										
18-Dec-21	0										
19-Dec-21	0	0	0	0	0	1					
20-Dec-21	0						0	0	0	0	0
21-Dec-21	10										
22-Dec-21	0										
23-Dec-21	0	0	0	0	0	0					
24-Dec-21	0						0	0	0	0	0
25-Dec-21	3										
26-Dec-21	0										
27-Dec-21	0	0	0	0	0	0					
28-Dec-21	0						0	0	0	0	0
29-Dec-21	0										
30-Dec-21	0										
31-Dec-21	0	0	0	0	0	0					
01-Jan-22	0						0	0	0	0	0
02-Jan-22	0										
03-Jan-22	0										
04-Jan-22	0	0	0	0	0	0					

Ecoserv Sample Reference Code	B-138-21	B-139-21	B-140-21	B-141-21	B-142-21	B-143-21	B-144-21	B-145-21	B-146-21	B-147-21	B-148-21
05-Jan-22	0						0	0	0	0	0
06-Jan-22	0										
07-Jan-22	0										
08-Jan-22	0	0	0	0	0	0					
09-Jan-22	0						0	0	0	0	0
10-Jan-22	0										
11-Jan-22	0										
12-Jan-22	0	0	0	0	1	0					
13-Jan-22	0						0	0	0	0	0
14-Jan-22	0										
15-Jan-22	0										

Table B continued. Daily counts of Chaffinch recorded per site.

Ecoserv Sample Reference Code	B-149-21	B-150-21	B-151-21	B-152-21	B-153-21	B-154-21	B-155-21	B-156-21	B-157-21	B-158-21
Grid Location	3268	4073	5064	5872	4283	3690	3881	4070	5663	5277
15-Oct-21						5	1	0	0	0
16-Oct-21										
17-Oct-21										
18-Oct-21	0	4	0	0	0					
19-Oct-21						2	0	0	0	0
20-Oct-21										
21-Oct-21										
22-Oct-21	0	2	0	0	0					
23-Oct-21						2	0	0	0	0
24-Oct-21										
25-Oct-21										
26-Oct-21	0	8	0	0	2					
27-Oct-21						1	0	0	2	0
28-Oct-21										

Ecoserv Sample Reference Code	B-149-21	B-150-21	B-151-21	B-152-21	B-153-21	B-154-21	B-155-21	B-156-21	B-157-21	B-158-21
29-Oct-21										
30-Oct-21	5	1	0	0	1					
31-Oct-21						6	4	4	0	0
01-Nov-21										
02-Nov-21										
03-Nov-21	30	7	0	0	0					
04-Nov-21						0	0	1	0	0
05-Nov-21										
06-Nov-21										
07-Nov-21	2	0	0	0	0					
08-Nov-21						0	0	0	0	9
09-Nov-21										
10-Nov-21										
11-Nov-21	0	0	7	0	0					
12-Nov-21						0	0	0	0	0
13-Nov-21										
14-Nov-21										
15-Nov-21	0	3	0	1	0					
16-Nov-21						0	0	6	0	2
17-Nov-21										
18-Nov-21										
19-Nov-21	0	0	3	0	0					
20-Nov-21						1	0	0	0	0
21-Nov-21										
22-Nov-21										
23-Nov-21	0	0	0	0	0					
24-Nov-21						0	0	2	0	0
25-Nov-21										
26-Nov-21										
27-Nov-21	0	3	0	0	0					
28-Nov-21						0	0	0	0	0
29-Nov-21										

Ecoserv Sample Reference Code	B-149-21	B-150-21	B-151-21	B-152-21	B-153-21	B-154-21	B-155-21	B-156-21	B-157-21	B-158-21
30-Nov-21										
01-Dec-21	0	0	0	0	0					
02-Dec-21						0	0	0	0	0
03-Dec-21										
04-Dec-21										
05-Dec-21	0	0	0	0	0					
06-Dec-21						0	0	0	0	0
07-Dec-21										
08-Dec-21										
09-Dec-21	0	0	0	0	0					
10-Dec-21						0	0	0	0	0
11-Dec-21										
12-Dec-21										
13-Dec-21	0	0	4	0	0					
14-Dec-21						0	0	0	1	0
15-Dec-21										
16-Dec-21										
17-Dec-21	0	0	0	0	0					
18-Dec-21						0	0	0	0	0
19-Dec-21										
20-Dec-21										
21-Dec-21	1	0	0	0	0					
22-Dec-21						0	0	0	0	0
23-Dec-21										
24-Dec-21										
25-Dec-21	0	4	0	0	0					
26-Dec-21						0	3	0	0	0
27-Dec-21										
28-Dec-21										
29-Dec-21	0	0	0	0	0					
30-Dec-21						0	0	0	0	0
31-Dec-21										

Ecoserv Sample Reference Code	B-149-21	B-150-21	B-151-21	B-152-21	B-153-21	B-154-21	B-155-21	B-156-21	B-157-21	B-158-21
01-Jan-22										
02-Jan-22	0	0	0	0	0					
03-Jan-22						0	0	0	0	0
04-Jan-22										
05-Jan-22										
06-Jan-22	0	0	0	0	0					
07-Jan-22						0	0	0	0	0
08-Jan-22										
09-Jan-22										
10-Jan-22	0	0	0	0	0					
11-Jan-22						0	0	0	0	0
12-Jan-22										
13-Jan-22										
14-Jan-22	0	0	0	0	0					
15-Jan-22						0	0	0	0	0

Table C. Daily counts of Greenfinch recorded per site.

Ecoserv Sample Reference Code	B-159-21	B-160-21	B-161-21	B-162-21	B-163-21	B-164-21	B-165-21	B-166-21	B-167-21	B-168-21	B-169-21
Grid Location	4085	3292	4079	4268	6067	4878	2888	4077	4666	6069	4480
15-Oct-21	0										
16-Oct-21	0	0	0	0	0	0					
17-Oct-21	0						0	0	0	0	0
18-Oct-21	0										
19-Oct-21	0										
20-Oct-21	0	0	0	0	0	0					
21-Oct-21	0						0	0	0	0	0
22-Oct-21	0										
23-Oct-21	0										

Ecoserv Sample Reference Code	B-159-21	B-160-21	B-161-21	B-162-21	B-163-21	B-164-21	B-165-21	B-166-21	B-167-21	B-168-21	B-169-21
24-Oct-21	0	0	0	0	0	0					
25-Oct-21	3						0	0	0	0	0
26-Oct-21	0										
27-Oct-21	0										
28-Oct-21	0	0	0	0	0	0					
29-Oct-21	0						0	0	0	0	0
30-Oct-21	0										
31-Oct-21	0										
01-Nov-21	0	0	2	1	0	0					
02-Nov-21	2						0	0	1	0	0
03-Nov-21	0										
04-Nov-21	0										
05-Nov-21	0	6	0	2	0	0					
06-Nov-21	0						0	0	0	0	0
07-Nov-21	0										
08-Nov-21	0										
09-Nov-21	0	0	0	0	0	0					
10-Nov-21	1						0	1	0	0	0
11-Nov-21	0										
12-Nov-21	2										
13-Nov-21	0	8	9	0	10	0					
14-Nov-21	4						4	0	0	0	0
15-Nov-21	0										
16-Nov-21	0										
17-Nov-21	0	0	0	2	0	3					
18-Nov-21	0						3	0	15	0	0
19-Nov-21	0										
20-Nov-21	0										
21-Nov-21	3	0	0	0	0	0					
22-Nov-21	0						0	0	0	0	0
23-Nov-21	0										
24-Nov-21	0										

Ecoserv Sample Reference Code	B-159-21	B-160-21	B-161-21	B-162-21	B-163-21	B-164-21	B-165-21	B-166-21	B-167-21	B-168-21	B-169-21
25-Nov-21	0	0	0	0	0	0					
26-Nov-21	0						0	0	0	0	0
27-Nov-21	0										
28-Nov-21	0										
29-Nov-21	0	0	0	0	0	0					
30-Nov-21	0						0	2	0	0	1
01-Dec-21	0										
02-Dec-21	0										
03-Dec-21	0	0	0	0	0	0					
04-Dec-21	0						0	0	0	0	0
05-Dec-21	0										
06-Dec-21	0										
07-Dec-21	0	0	0	0	0	0					
08-Dec-21	0						0	0	0	0	0
09-Dec-21	0										
10-Dec-21	0										
11-Dec-21	0	0	0	0	0	0					
12-Dec-21	0						0	0	0	0	0
13-Dec-21	0										
14-Dec-21	0										
15-Dec-21	0	0	0	0	0	0					
16-Dec-21	0						0	0	0	0	0
17-Dec-21	0										
18-Dec-21	0										
19-Dec-21	0	0	2	0	0	0					
20-Dec-21	0						0	0	0	0	0
21-Dec-21	0										
22-Dec-21	0										
23-Dec-21	0	0	0	0	0	0					
24-Dec-21	0						0	0	0	0	0
25-Dec-21	0										
26-Dec-21	0										

Ecoserv Sample Reference Code	B-159-21	B-160-21	B-161-21	B-162-21	B-163-21	B-164-21	B-165-21	B-166-21	B-167-21	B-168-21	B-169-21
27-Dec-21	0	0	0	0	0	0					
28-Dec-21	0						0	0	0	0	0
29-Dec-21	0										
30-Dec-21	0										
31-Dec-21	0	0	0	0	0	0					
01-Jan-22	0						0	0	0	0	0
02-Jan-22	0										
03-Jan-22	0										
04-Jan-22	0	0	0	0	0	1					
05-Jan-22	0						0	0	0	0	0
06-Jan-22	0										
07-Jan-22	0										
08-Jan-22	0	0	0	0	0	0					
09-Jan-22	0						0	0	0	0	0
10-Jan-22	0										
11-Jan-22	0										
12-Jan-22	0	0	0	0	0	0					
13-Jan-22	0						3	0	0	0	0
14-Jan-22	0										
15-Jan-22	0										

Table C continued. Daily counts of Greenfinch recorded per site.

Ecoserv Sample Reference Code	B-170-21	B-171-21	B-172-21	B-173-21	B-174-21	B-175-21	B-176-21	B-177-21	B-178-21	B-179-21
Grid Location	3268	4073	5064	5872	4283	3690	3881	4070	5663	5277
15-Oct-21						0	0	0	0	0
16-Oct-21										
17-Oct-21										
18-Oct-21	0	0	0	0	0					
19-Oct-21						0	0	0	0	0

Ecoserv Sample Reference Code	B-170-21	B-171-21	B-172-21	B-173-21	B-174-21	B-175-21	B-176-21	B-177-21	B-178-21	B-179-21
20-Oct-21										
21-Oct-21										
22-Oct-21	0	0	0	0	0					
23-Oct-21						0	0	1	0	0
24-Oct-21										
25-Oct-21										
26-Oct-21	0	0	0	0	0					
27-Oct-21						0	0	0	0	0
28-Oct-21										
29-Oct-21										
30-Oct-21	0	0	0	0	0					
31-Oct-21						0	0	0	0	0
01-Nov-21										
02-Nov-21										
03-Nov-21	0	3	0	0	0					
04-Nov-21						4	0	0	0	0
05-Nov-21										
06-Nov-21										
07-Nov-21	0	0	0	0	0					
08-Nov-21						0	0	0	0	0
09-Nov-21										
10-Nov-21										
11-Nov-21	0	0	0	0	0					
12-Nov-21						0	2	5	4	0
13-Nov-21										
14-Nov-21										
15-Nov-21	0	2	0	0	3					
16-Nov-21						0	3	0	0	2
17-Nov-21										
18-Nov-21										
19-Nov-21	0	0	0	0	0					
20-Nov-21						2	0	0	1	2

Ecoserv Sample Reference Code	B-170-21	B-171-21	B-172-21	B-173-21	B-174-21	B-175-21	B-176-21	B-177-21	B-178-21	B-179-21
21-Nov-21										
22-Nov-21										
23-Nov-21	0	0	0	0	0					
24-Nov-21						3	0	6	0	4
25-Nov-21										
26-Nov-21										
27-Nov-21	0	0	0	0	0					
28-Nov-21						0	0	0	0	0
29-Nov-21										
30-Nov-21										
01-Dec-21	0	0	0	0	0					
02-Dec-21						0	0	0	0	2
03-Dec-21										
04-Dec-21										
05-Dec-21	1	0	0	1	0					
06-Dec-21						0	0	0	0	0
07-Dec-21										
08-Dec-21										
09-Dec-21	0	0	0	0	0					
10-Dec-21						0	0	0	0	0
11-Dec-21										
12-Dec-21										
13-Dec-21	0	0	0	0	1					
14-Dec-21						0	0	0	0	0
15-Dec-21										
16-Dec-21										
17-Dec-21	0	0	0	0	0					
18-Dec-21						0	0	0	0	0
19-Dec-21										
20-Dec-21										
21-Dec-21	0	0	0	0	0					
22-Dec-21						0	0	0	0	1

Ecoserv Sample Reference Code	B-170-21	B-171-21	B-172-21	B-173-21	B-174-21	B-175-21	B-176-21	B-177-21	B-178-21	B-179-21
23-Dec-21										
24-Dec-21										
25-Dec-21	0	3	0	0	0					
26-Dec-21						0	0	0	0	0
27-Dec-21										
28-Dec-21										
29-Dec-21	0	0	0	0	0					
30-Dec-21						0	0	0	0	0
31-Dec-21										
01-Jan-22										
02-Jan-22	0	0	0	0	0					
03-Jan-22						0	0	0	0	0
04-Jan-22										
05-Jan-22										
06-Jan-22	0	0	0	0	0					
07-Jan-22						0	0	0	0	0
08-Jan-22										
09-Jan-22										
10-Jan-22	0	0	0	0	0					
11-Jan-22						0	0	0	0	0
12-Jan-22										
13-Jan-22										
14-Jan-22	0	0	0	0	0					
15-Jan-22						0	0	0	0	0

Table D. Daily counts of Siskin recorded per site.

Ecoserv Sample Reference Code	B-180-21	B-181-21	B-182-21	B-183-21	B-184-21	B-185-21	B-186-21	B-187-21	B-188-21	B-189-21	B-190-21
Grid Location	4085	3292	4079	4268	6067	4878	2888	4077	4666	6069	4480
15-Oct-21	0										
16-Oct-21	0	2	0	0	0	0					
17-Oct-21	0						3	0	0	0	1
18-Oct-21	0										
19-Oct-21	0										
20-Oct-21	0	0	0	0	0	1					
21-Oct-21	0						1	0	0	0	0
22-Oct-21	0										
23-Oct-21	0										
24-Oct-21	0	7	0	0	0	0					
25-Oct-21	2						0	0	0	0	1
26-Oct-21	2										
27-Oct-21	2										
28-Oct-21	0	1	5	16	1	0					
29-Oct-21	0						11	9	0	0	0
30-Oct-21	0										
31-Oct-21	2										
01-Nov-21	1	6	0	0	0	0					
02-Nov-21	0						3	0	0	0	2
03-Nov-21	3										
04-Nov-21	0										
05-Nov-21	0	2	3	0	0	0					
06-Nov-21	0						3	0	0	0	0
07-Nov-21	0										
08-Nov-21	0										
09-Nov-21	2	2	2	0	0	0					
10-Nov-21	2						0	4	0	0	0
11-Nov-21	1										
12-Nov-21	0										

Ecoserv Sample Reference Code	B-180-21	B-181-21	B-182-21	B-183-21	B-184-21	B-185-21	B-186-21	B-187-21	B-188-21	B-189-21	B-190-21
13-Nov-21	1	17	4	11	18	0					
14-Nov-21	3						2	4	4	0	0
15-Nov-21	5										
16-Nov-21	5										
17-Nov-21	0	2	2	0	0	0					
18-Nov-21	2						0	6	3	3	1
19-Nov-21	0										
20-Nov-21	1										
21-Nov-21	0	8	4	3	10	0					
22-Nov-21	19						2	0	0	0	0
23-Nov-21	1										
24-Nov-21	2										
25-Nov-21	0	0	0	0	0	1					
26-Nov-21	0						0	0	1	0	2
27-Nov-21	11										
28-Nov-21	0										
29-Nov-21	0	2	3	0	0	0					
30-Nov-21	4						0	0	5	1	0
01-Dec-21	0										
02-Dec-21	0										
03-Dec-21	0	0	0	6	0	0					
04-Dec-21	7						2	1	2	0	0
05-Dec-21	0										
06-Dec-21	3										
07-Dec-21	2	0	0	3	0	0					
08-Dec-21	0						0	0	3	0	0
09-Dec-21	0										
10-Dec-21	0										
11-Dec-21	0	0	0	0	0	0					
12-Dec-21	5						1	0	0	0	0
13-Dec-21	0										
14-Dec-21	5										

Ecoserv Sample Reference Code	B-180-21	B-181-21	B-182-21	B-183-21	B-184-21	B-185-21	B-186-21	B-187-21	B-188-21	B-189-21	B-190-21
15-Dec-21	1	2	2	5	2	0					
16-Dec-21	0						0	0	4	0	0
17-Dec-21	2										
18-Dec-21	1										
19-Dec-21	3	6	0	2	0	3					
20-Dec-21	1						0	0	0	0	0
21-Dec-21	0										
22-Dec-21	0										
23-Dec-21	0	0	0	0	0	0					
24-Dec-21	0						0	0	0	0	0
25-Dec-21	3										
26-Dec-21	0										
27-Dec-21	0	0	0	0	0	0					
28-Dec-21	0						1	0	0	0	0
29-Dec-21	0										
30-Dec-21	0										
31-Dec-21	3	0	0	0	0	0					
01-Jan-22	0						0	0	0	0	0
02-Jan-22	0										
03-Jan-22	3										
04-Jan-22	0	0	0	0	0	0					
05-Jan-22	0						0	0	0	0	0
06-Jan-22	5										
07-Jan-22	0										
08-Jan-22	0	0	0	0	0	0					
09-Jan-22	0						0	0	0	0	0
10-Jan-22	0										
11-Jan-22	0										
12-Jan-22	0	0	0	0	0	0					
13-Jan-22	0						0	0	0	0	0
14-Jan-22	0										
15-Jan-22	2										

Table D continued. Daily counts of Siskin recorded per site.

Ecoserv Sample Reference Code	B-191-21	B-192-21	B-193-21	B-194-21	B-195-21	B-196-21	B-197-21	B-198-21	B-199-21	B-200-21
Grid Location	3268	4073	5064	5872	4283	3690	3881	4070	5663	5277
15-Oct-21						0	2	4	0	0
16-Oct-21										
17-Oct-21										
18-Oct-21	0	0	0	0	0					
19-Oct-21						2	5	0	0	0
20-Oct-21										
21-Oct-21										
22-Oct-21	0	0	0	0	1					
23-Oct-21						0	0	1	0	0
24-Oct-21										
25-Oct-21										
26-Oct-21	0	0	0	0	0					
27-Oct-21						6	1	11	1	3
28-Oct-21										
29-Oct-21										
30-Oct-21	0	0	0	0	0					
31-Oct-21						2	1	0	2	0
01-Nov-21										
02-Nov-21										
03-Nov-21	40	0	0	5	0					
04-Nov-21						0	2	9	0	2
05-Nov-21										
06-Nov-21										
07-Nov-21	6	1	0	0	2					
08-Nov-21						0	3	1	0	0
09-Nov-21										
10-Nov-21										
11-Nov-21	0	0	0	0	0					
12-Nov-21						8	10	2	0	0

Ecoserv Sample Reference Code	B-191-21	B-192-21	B-193-21	B-194-21	B-195-21	B-196-21	B-197-21	B-198-21	B-199-21	B-200-21
13-Nov-21										
14-Nov-21										
15-Nov-21	0	0	5	0	5					
16-Nov-21						3	3	9	0	3
17-Nov-21										
18-Nov-21										
19-Nov-21	5	1	0	0	0					
20-Nov-21						1	3	0	0	0
21-Nov-21										
22-Nov-21										
23-Nov-21	0	3	0	3	2					
24-Nov-21						2	0	18	3	7
25-Nov-21										
26-Nov-21										
27-Nov-21	0	0	0	0	1					
28-Nov-21						1	0	0	0	0
29-Nov-21										
30-Nov-21										
01-Dec-21	2	2	0	0	0					
02-Dec-21						0	0	4	3	3
03-Dec-21										
04-Dec-21										
05-Dec-21	7	8	2	0	3					
06-Dec-21						0	2	0	0	0
07-Dec-21										
08-Dec-21										
09-Dec-21	0	0	0	0	0					
10-Dec-21						0	0	0	3	0
11-Dec-21										
12-Dec-21										
13-Dec-21	0	0	4	0	0					
14-Dec-21						0	0	0	2	0

Ecoserv Sample Reference Code	B-191-21	B-192-21	B-193-21	B-194-21	B-195-21	B-196-21	B-197-21	B-198-21	B-199-21	B-200-21
15-Dec-21										
16-Dec-21										
17-Dec-21	0	3	0	0	0					
18-Dec-21						1	0	0	0	0
19-Dec-21										
20-Dec-21										
21-Dec-21	0	0	1	0	0					
22-Dec-21						2	0	0	0	0
23-Dec-21										
24-Dec-21										
25-Dec-21	0	6	0	0	0					
26-Dec-21						0	0	0	0	0
27-Dec-21										
28-Dec-21										
29-Dec-21	0	0	0	0	0					
30-Dec-21						0	0	1	0	6
31-Dec-21										
01-Jan-22										
02-Jan-22	0	0	5	0	0					
03-Jan-22						0	0	8	0	0
04-Jan-22										
05-Jan-22										
06-Jan-22	0	6	0	1	0					
07-Jan-22						0	0	0	0	0
08-Jan-22										
09-Jan-22										
10-Jan-22	0	0	0	0	0					
11-Jan-22						0	0	0	0	0
12-Jan-22										
13-Jan-22										
14-Jan-22	0	0	0	0	0					
15-Jan-22						0	2	0	0	0

Table E. Daily counts of Goldfinch recorded per site.

Ecoserv Sample Reference Code	B-201-21	B-202-21	B-203-21	B-204-21	B-205-21	B-206-21	B-207-21	B-208-21	B-209-21	B-210-21	B-211-21
Grid Location	4085	3292	4079	4268	6067	4878	2888	4077	4666	6069	4480
15-Oct-21	0										
16-Oct-21	0	0	0	0	0	0					
17-Oct-21	0						0	0	0	0	0
18-Oct-21	0										
19-Oct-21	0										
20-Oct-21	0	0	0	0	0	0					
21-Oct-21	0						0	0	0	0	0
22-Oct-21	0										
23-Oct-21	0										
24-Oct-21	0	0	0	0	0	0					
25-Oct-21	0						0	0	0	0	0
26-Oct-21	0										
27-Oct-21	0										
28-Oct-21	0	0	0	0	0	0					
29-Oct-21	0						0	0	0	0	0
30-Oct-21	0										
31-Oct-21	0										
01-Nov-21	0	0	0	0	0	0					
02-Nov-21	0						0	0	0	0	0
03-Nov-21	0										
04-Nov-21	0										
05-Nov-21	0	0	0	0	0	0					
06-Nov-21	0						0	0	0	0	0
07-Nov-21	0										
08-Nov-21	0										
09-Nov-21	0	0	0	0	0	0					
10-Nov-21	0						0	0	0	0	0
11-Nov-21	0										
12-Nov-21	0										

Ecoserv Sample Reference Code	B-201-21	B-202-21	B-203-21	B-204-21	B-205-21	B-206-21	B-207-21	B-208-21	B-209-21	B-210-21	B-211-21
13-Nov-21	0	0	0	0	0	0					
14-Nov-21	0						0	0	0	0	0
15-Nov-21	0										
16-Nov-21	0										
17-Nov-21	0	0	0	0	0	0					
18-Nov-21	0						0	0	0	0	0
19-Nov-21	0										
20-Nov-21	0										
21-Nov-21	0	0	0	0	0	0					
22-Nov-21	0						0	0	0	0	0
23-Nov-21	0										
24-Nov-21	0										
25-Nov-21	0	0	0	0	0	0					
26-Nov-21	0						0	0	0	0	0
27-Nov-21	0										
28-Nov-21	0										
29-Nov-21	0	0	0	0	0	0					
30-Nov-21	0						0	0	0	0	0
01-Dec-21	0										
02-Dec-21	0										
03-Dec-21	0	0	0	0	0	0					
04-Dec-21	0						0	0	0	0	0
05-Dec-21	0										
06-Dec-21	0										
07-Dec-21	0	0	0	0	0	0					
08-Dec-21	0						0	0	0	0	0
09-Dec-21	0										
10-Dec-21	0										
11-Dec-21	0	0	0	0	0	0					
12-Dec-21	0						0	0	0	0	0
13-Dec-21	0										
14-Dec-21	0										

Ecoserv Sample Reference Code	B-201-21	B-202-21	B-203-21	B-204-21	B-205-21	B-206-21	B-207-21	B-208-21	B-209-21	B-210-21	B-211-21
15-Dec-21	0	0	0	0	0	0					
16-Dec-21	0						0	0	0	0	0
17-Dec-21	0										
18-Dec-21	0										
19-Dec-21	0	0	0	0	0	0					
20-Dec-21	0						0	0	0	0	0
21-Dec-21	0										
22-Dec-21	0										
23-Dec-21	0	0	0	0	0	0					
24-Dec-21	0						0	0	0	0	0
25-Dec-21	0										
26-Dec-21	0										
27-Dec-21	0	0	0	0	0	0					
28-Dec-21	0						0	0	0	0	0
29-Dec-21	0										
30-Dec-21	0										
31-Dec-21	0	0	0	0	0	0					
01-Jan-22	0						0	0	0	0	0
02-Jan-22	0										
03-Jan-22	0										
04-Jan-22	0	0	0	0	0	0					
05-Jan-22	0						0	0	0	0	0
06-Jan-22	0										
07-Jan-22	0										
08-Jan-22	0	0	0	0	0	0					
09-Jan-22	0						0	0	0	0	0
10-Jan-22	0										
11-Jan-22	0										
12-Jan-22	0	0	0	0	0	0					
13-Jan-22	0						0	0	0	0	0
14-Jan-22	0										
15-Jan-22	0										

Table E continued. Daily counts of Goldfinch recorded per site.

Ecoserv Sample Reference Code	B-212-21	B-213-21	B-214-21	B-215-21	B-216-21	B-217-21	B-218-21	B-219-21	B-220-21	B-221-21
Grid Location	3268	4073	5064	5872	4283	3690	3881	4070	5663	5277
15-Oct-21						0	0	0	0	0
16-Oct-21										
17-Oct-21										
18-Oct-21	0	0	0	0	0					
19-Oct-21						0	0	0	0	0
20-Oct-21										
21-Oct-21										
22-Oct-21	0	0	0	0	0					
23-Oct-21						0	0	0	0	0
24-Oct-21										
25-Oct-21										
26-Oct-21	0	0	0	0	0					
27-Oct-21						0	0	0	0	0
28-Oct-21										
29-Oct-21										
30-Oct-21	0	0	0	0	0					
31-Oct-21						0	0	0	1	0
01-Nov-21										
02-Nov-21										
03-Nov-21	0	0	0	0	0					
04-Nov-21						0	0	0	0	0
05-Nov-21										
06-Nov-21										
07-Nov-21	0	1	0	0	0					
08-Nov-21						0	0	0	0	0
09-Nov-21										
10-Nov-21										
11-Nov-21	0	0	0	0	0					
12-Nov-21						0	0	0	0	0

Ecoserv Sample Reference Code	B-212-21	B-213-21	B-214-21	B-215-21	B-216-21	B-217-21	B-218-21	B-219-21	B-220-21	B-221-21
13-Nov-21										
14-Nov-21										
15-Nov-21	0	0	0	0	0					
16-Nov-21						0	0	0	0	0
17-Nov-21										
18-Nov-21										
19-Nov-21	0	0	0	0	0					
20-Nov-21						0	0	0	0	5
21-Nov-21										
22-Nov-21										
23-Nov-21	0	0	0	0	0					
24-Nov-21						0	0	0	0	0
25-Nov-21										
26-Nov-21										
27-Nov-21	0	0	0	0	0					
28-Nov-21						0	0	0	0	0
29-Nov-21										
30-Nov-21										
01-Dec-21	0	0	0	0	0					
02-Dec-21						0	0	0	0	0
03-Dec-21										
04-Dec-21										
05-Dec-21	0	0	0	0	0					
06-Dec-21						0	0	0	0	0
07-Dec-21										
08-Dec-21										
09-Dec-21	0	0	0	0	0					
10-Dec-21						0	0	0	0	0
11-Dec-21										
12-Dec-21										
13-Dec-21	0	0	0	0	0					
14-Dec-21						0	0	0	0	0

Ecoserv Sample Reference Code	B-212-21	B-213-21	B-214-21	B-215-21	B-216-21	B-217-21	B-218-21	B-219-21	B-220-21	B-221-21
15-Dec-21										
16-Dec-21										
17-Dec-21	0	0	0	0	0					
18-Dec-21						0	0	0	0	0
19-Dec-21										
20-Dec-21										
21-Dec-21	0	0	0	0	0					
22-Dec-21						0	0	0	0	0
23-Dec-21										
24-Dec-21										
25-Dec-21	0	0	0	0	0					
26-Dec-21						0	0	0	0	0
27-Dec-21										
28-Dec-21										
29-Dec-21	0	0	0	0	0					
30-Dec-21						0	0	0	0	0
31-Dec-21										
01-Jan-22										
02-Jan-22	0	0	0	0	0					
03-Jan-22						0	0	0	0	0
04-Jan-22										
05-Jan-22										
06-Jan-22	0	0	0	0	0					
07-Jan-22						0	0	0	0	0
08-Jan-22										
09-Jan-22										
10-Jan-22	0	0	0	0	0					
11-Jan-22						0	0	0	0	0
12-Jan-22										
13-Jan-22										
14-Jan-22	0	0	0	0	0					
15-Jan-22						0	0	0	0	0

Table F. Daily counts of Serin recorded per site.

Ecoserv Sample Reference Code	B-222-21	B-223-21	B-224-21	B-225-21	B-226-21	B-227-21	B-228-21	B-229-21	B-230-21	B-231-21	B-232-21
Grid Location	4085	3292	4079	4268	6067	4878	2888	4077	4666	6069	4480
15-Oct-21	0										
16-Oct-21	0	0	0	0	0	0					
17-Oct-21	0						0	0	0	0	0
18-Oct-21	0										
19-Oct-21	0										
20-Oct-21	0	0	0	0	0	0					
21-Oct-21	0						0	0	0	0	0
22-Oct-21	0										
23-Oct-21	0										
24-Oct-21	0	0	0	0	0	0					
25-Oct-21	0						0	0	0	0	0
26-Oct-21	0										
27-Oct-21	0										
28-Oct-21	0	0	0	0	0	0					
29-Oct-21	0						0	0	6	0	0
30-Oct-21	0										
31-Oct-21	0										
01-Nov-21	0	2	0	0	0	0					
02-Nov-21	0						0	0	0	0	0
03-Nov-21	0										
04-Nov-21	0										
05-Nov-21	0	0	1	0	0	4					
06-Nov-21	0						0	0	0	0	0
07-Nov-21	8										
08-Nov-21	0										
09-Nov-21	0	0	0	0	0	0					
10-Nov-21	0						0	1	0	0	0
11-Nov-21	0										
12-Nov-21	0										

Ecoserv Sample Reference Code	B-222-21	B-223-21	B-224-21	B-225-21	B-226-21	B-227-21	B-228-21	B-229-21	B-230-21	B-231-21	B-232-21
13-Nov-21	0	0	0	3	0	0					
14-Nov-21	0						2	8	0	0	0
15-Nov-21	0										
16-Nov-21	0										
17-Nov-21	0	0	0	0	0	0					
18-Nov-21	0						0	0	0	0	2
19-Nov-21	0										
20-Nov-21	0										
21-Nov-21	0	0	1	0	0	0					
22-Nov-21	5						0	0	0	0	0
23-Nov-21	0										
24-Nov-21	0										
25-Nov-21	0	0	0	0	0	0					
26-Nov-21	0						0	0	0	0	1
27-Nov-21	0										
28-Nov-21	0										
29-Nov-21	0	0	0	0	0	0					
30-Nov-21	0						0	0	1	0	0
01-Dec-21	0										
02-Dec-21	0										
03-Dec-21	0	0	0	0	0	0					
04-Dec-21	6						0	0	0	0	0
05-Dec-21	0										
06-Dec-21	0										
07-Dec-21	0	0	0	0	0	0					
08-Dec-21	0						0	0	0	0	2
09-Dec-21	0										
10-Dec-21	0										
11-Dec-21	0	0	0	0	0	0					
12-Dec-21	0						0	0	0	0	0
13-Dec-21	0										
14-Dec-21	0										

Ecoserv Sample Reference Code	B-222-21	B-223-21	B-224-21	B-225-21	B-226-21	B-227-21	B-228-21	B-229-21	B-230-21	B-231-21	B-232-21
15-Dec-21	0	0	5	0	9	3					
16-Dec-21	0						3	0	0	0	2
17-Dec-21	0										
18-Dec-21	1										
19-Dec-21	0	3	0	0	0	0					
20-Dec-21	0						0	0	0	0	2
21-Dec-21	0										
22-Dec-21	0										
23-Dec-21	0	0	2	0	0	0					
24-Dec-21	0						0	0	0	0	1
25-Dec-21	3										
26-Dec-21	0										
27-Dec-21	0	2	0	0	0	0					
28-Dec-21	0						0	0	0	0	0
29-Dec-21	0										
30-Dec-21	0										
31-Dec-21	3	0	3	0	0	0					
01-Jan-22	0						0	0	0	0	2
02-Jan-22	0										
03-Jan-22	0										
04-Jan-22	0	0	0	0	0	0					
05-Jan-22	0						0	0	0	0	0
06-Jan-22	0										
07-Jan-22	0										
08-Jan-22	0	0	0	0	0	0					
09-Jan-22	0						4	0	0	0	0
10-Jan-22	0										
11-Jan-22	0										
12-Jan-22	1	0	2	0	0	0					
13-Jan-22	0						0	0	0	0	0
14-Jan-22	0										
15-Jan-22	0										

Table F continued. Daily counts of Serin recorded per site.

Ecoserv Sample Reference Code	B-233-21	B-234-21	B-235-21	B-236-21	B-237-21	B-238-21	B-239-21	B-240-21	B-241-21	B-242-21
Grid Location	3268	4073	5064	5872	4283	3690	3881	4070	5663	5277
15-Oct-21						0	0	0	0	0
16-Oct-21										
17-Oct-21										
18-Oct-21	0	0	0	0	0					
19-Oct-21						0	0	0	0	0
20-Oct-21										
21-Oct-21										
22-Oct-21	0	0	0	0	0					
23-Oct-21						0	0	3	0	0
24-Oct-21										
25-Oct-21										
26-Oct-21	0	0	0	0	0					
27-Oct-21						0	0	0	0	0
28-Oct-21										
29-Oct-21										
30-Oct-21	0	2	0	0	0					
31-Oct-21						0	0	0	0	2
01-Nov-21										
02-Nov-21										
03-Nov-21	0	0	0	0	0					
04-Nov-21						0	0	3	0	0
05-Nov-21										
06-Nov-21										
07-Nov-21	0	0	0	0	0					
08-Nov-21						0	0	0	0	2
09-Nov-21										
10-Nov-21										
11-Nov-21	0	0	0	0	0					
12-Nov-21						0	0	0	0	0

Ecoserv Sample Reference Code	B-233-21	B-234-21	B-235-21	B-236-21	B-237-21	B-238-21	B-239-21	B-240-21	B-241-21	B-242-21
13-Nov-21										
14-Nov-21										
15-Nov-21	0	0	0	0	0					
16-Nov-21						0	0	0	0	0
17-Nov-21										
18-Nov-21										
19-Nov-21	0	4	0	0	0					
20-Nov-21						0	0	3	0	6
21-Nov-21										
22-Nov-21										
23-Nov-21	0	0	0	0	0					
24-Nov-21						0	0	0	0	0
25-Nov-21										
26-Nov-21										
27-Nov-21	0	0	0	0	0					
28-Nov-21						0	0	0	0	0
29-Nov-21										
30-Nov-21										
01-Dec-21	0	0	0	0	0					
02-Dec-21						0	0	0	0	2
03-Dec-21										
04-Dec-21										
05-Dec-21	0	0	1	0	0					
06-Dec-21						0	0	0	0	0
07-Dec-21										
08-Dec-21										
09-Dec-21	0	0	0	0	1					
10-Dec-21						0	0	0	0	0
11-Dec-21										
12-Dec-21										
13-Dec-21	0	0	0	0	0					
14-Dec-21						0	0	0	0	0

Ecoserv Sample Reference Code	B-233-21	B-234-21	B-235-21	B-236-21	B-237-21	B-238-21	B-239-21	B-240-21	B-241-21	B-242-21
15-Dec-21										
16-Dec-21										
17-Dec-21	0	2	0	0	0					
18-Dec-21						0	2	0	0	0
19-Dec-21										
20-Dec-21										
21-Dec-21	0	1	0	0	2					
22-Dec-21						0	1	0	0	0
23-Dec-21										
24-Dec-21										
25-Dec-21	0	1	0	0	0					
26-Dec-21						0	0	0	0	0
27-Dec-21										
28-Dec-21										
29-Dec-21	0	0	0	0	0					
30-Dec-21						0	0	0	0	0
31-Dec-21										
01-Jan-22										
02-Jan-22	0	0	9	0	11					
03-Jan-22						0	0	2	0	0
04-Jan-22										
05-Jan-22										
06-Jan-22	0	0	0	0	0					
07-Jan-22						0	0	0	0	0
08-Jan-22										
09-Jan-22										
10-Jan-22	0	0	0	0	0					
11-Jan-22						0	0	0	0	0
12-Jan-22										
13-Jan-22										
14-Jan-22	0	0	0	0	0					
15-Jan-22						0	0	0	0	0

Table G. Daily counts of Hawfinch recorded per site.

Ecoserv Sample Reference Code	B-243-21	B-244-21	B-245-21	B-246-21	B-247-21	B-248-21	B-249-21	B-250-21	B-251-21	B-252-21	B-253-21
Grid Location	4085	3292	4079	4268	6067	4878	2888	4077	4666	6069	4480
15-Oct-21	0										
16-Oct-21	0	0	0	0	0	0					
17-Oct-21	0						0	0	0	0	0
18-Oct-21	0										
19-Oct-21	0										
20-Oct-21	0	1	0	0	0	0					
21-Oct-21	0						0	0	0	0	1
22-Oct-21	0										
23-Oct-21	0										
24-Oct-21	0	0	0	0	0	0					
25-Oct-21	0						0	0	0	0	0
26-Oct-21	0										
27-Oct-21	0										
28-Oct-21	2	1	1	0	0	0					
29-Oct-21	0						0	0	0	0	0
30-Oct-21	0										
31-Oct-21	0										
01-Nov-21	0	0	0	0	0	0					
02-Nov-21	0						0	0	0	0	0
03-Nov-21	0										
04-Nov-21	0										
05-Nov-21	0	0	0	0	0	0					
06-Nov-21	0						0	0	0	0	0
07-Nov-21	0										
08-Nov-21	0										
09-Nov-21	0	0	0	0	0	0					
10-Nov-21	0						0	1	0	0	0
11-Nov-21	0										
12-Nov-21	0										

Ecoserv Sample Reference Code	B-243-21	B-244-21	B-245-21	B-246-21	B-247-21	B-248-21	B-249-21	B-250-21	B-251-21	B-252-21	B-253-21
13-Nov-21	0	0	0	4	0	0					
14-Nov-21	0						0	3	0	0	0
15-Nov-21	0										
16-Nov-21	0										
17-Nov-21	0	0	0	0	0	0					
18-Nov-21	0						0	0	0	0	0
19-Nov-21	0										
20-Nov-21	0										
21-Nov-21	0	0	0	0	0	0					
22-Nov-21	1						0	0	0	0	0
23-Nov-21	0										
24-Nov-21	0										
25-Nov-21	0	0	0	0	0	2					
26-Nov-21	0						0	0	0	0	0
27-Nov-21	0										
28-Nov-21	0										
29-Nov-21	0	0	0	0	0	0					
30-Nov-21	0						0	0	0	0	0
01-Dec-21	0										
02-Dec-21	0										
03-Dec-21	0	0	0	0	0	0					
04-Dec-21	0						0	0	0	0	0
05-Dec-21	0										
06-Dec-21	0										
07-Dec-21	0	0	0	0	0	0					
08-Dec-21	0						0	0	0	0	0
09-Dec-21	0										
10-Dec-21	0										
11-Dec-21	0	0	0	0	0	0					
12-Dec-21	0						0	0	0	0	0
13-Dec-21	0										
14-Dec-21	0										

Ecoserv Sample Reference Code	B-243-21	B-244-21	B-245-21	B-246-21	B-247-21	B-248-21	B-249-21	B-250-21	B-251-21	B-252-21	B-253-21
15-Dec-21	0	0	0	0	0	0					
16-Dec-21	0						0	0	0	0	0
17-Dec-21	0										
18-Dec-21	0										
19-Dec-21	0	0	0	0	0	0					
20-Dec-21	0						0	0	0	0	0
21-Dec-21	0										
22-Dec-21	0										
23-Dec-21	0	0	0	0	0	0					
24-Dec-21	0						0	0	0	0	0
25-Dec-21	0										
26-Dec-21	0										
27-Dec-21	0	0	0	0	0	0					
28-Dec-21	0						0	0	0	0	0
29-Dec-21	0										
30-Dec-21	0										
31-Dec-21	0	0	0	0	0	0					
01-Jan-22	0						0	0	0	0	0
02-Jan-22	0										
03-Jan-22	0										
04-Jan-22	0	0	0	0	0	0					
05-Jan-22	0						0	0	0	0	0
06-Jan-22	0										
07-Jan-22	0										
08-Jan-22	0	0	0	0	0	0					
09-Jan-22	0						0	0	0	0	0
10-Jan-22	0										
11-Jan-22	0										
12-Jan-22	0	0	0	0	0	0					
13-Jan-22	0						0	0	0	0	0
14-Jan-22	0										
15-Jan-22	0										

Table G continued. Daily counts of Hawfinch recorded per site.

Ecoserv Sample Reference Code	B-254-21	B-255-21	B-256-21	B-257-21	B-258-21	B-259-21	B-260-21	B-261-21	B-262-21	B-263-21
Grid Location	3268	4073	5064	5872	4283	3690	3881	4070	5663	5277
15-Oct-21						0	0	0	0	0
16-Oct-21										
17-Oct-21										
18-Oct-21	0	0	0	0	0					
19-Oct-21						1	1	0	0	0
20-Oct-21										
21-Oct-21										
22-Oct-21	0	0	0	0	0					
23-Oct-21						0	0	0	0	0
24-Oct-21										
25-Oct-21										
26-Oct-21	0	0	0	0	0					
27-Oct-21						0	0	0	0	0
28-Oct-21										
29-Oct-21										
30-Oct-21	0	0	0	0	0					
31-Oct-21						0	0	0	0	0
01-Nov-21										
02-Nov-21										
03-Nov-21	0	0	0	0	1					
04-Nov-21						0	0	3	0	0
05-Nov-21										
06-Nov-21										
07-Nov-21	0	0	0	0	0					
08-Nov-21						0	0	0	0	0
09-Nov-21										
10-Nov-21										
11-Nov-21	0	0	0	0	0					
12-Nov-21						0	0	0	0	0

Ecoserv Sample Reference Code	B-254-21	B-255-21	B-256-21	B-257-21	B-258-21	B-259-21	B-260-21	B-261-21	B-262-21	B-263-21
13-Nov-21										
14-Nov-21										
15-Nov-21	0	0	1	0	0					
16-Nov-21						0	0	1	0	0
17-Nov-21										
18-Nov-21										
19-Nov-21	0	0	0	0	0					
20-Nov-21						0	0	0	0	2
21-Nov-21										
22-Nov-21										
23-Nov-21	0	0	0	0	0					
24-Nov-21						0	0	0	0	1
25-Nov-21										
26-Nov-21										
27-Nov-21	0	0	0	0	0					
28-Nov-21						0	0	0	0	0
29-Nov-21										
30-Nov-21										
01-Dec-21	0	0	0	0	0					
02-Dec-21						0	0	0	0	0
03-Dec-21										
04-Dec-21										
05-Dec-21	0	0	0	0	0					
06-Dec-21						0	0	0	0	0
07-Dec-21										
08-Dec-21										
09-Dec-21	0	0	0	0	0					
10-Dec-21						0	0	0	0	0
11-Dec-21										
12-Dec-21										
13-Dec-21	0	0	0	0	0					
14-Dec-21						0	0	0	0	0

Ecoserv Sample Reference Code	B-254-21	B-255-21	B-256-21	B-257-21	B-258-21	B-259-21	B-260-21	B-261-21	B-262-21	B-263-21
15-Dec-21										
16-Dec-21										
17-Dec-21	0	0	0	0	0					
18-Dec-21						0	0	0	0	0
19-Dec-21										
20-Dec-21										
21-Dec-21	0	0	0	0	0					
22-Dec-21						0	0	0	0	0
23-Dec-21										
24-Dec-21										
25-Dec-21	0	0	0	0	0					
26-Dec-21						0	4	0	0	0
27-Dec-21										
28-Dec-21										
29-Dec-21	0	0	0	0	0					
30-Dec-21						0	0	0	0	0
31-Dec-21										
01-Jan-22										
02-Jan-22	0	0	0	0	0					
03-Jan-22						0	0	0	0	0
04-Jan-22										
05-Jan-22										
06-Jan-22	0	0	0	0	0					
07-Jan-22						0	0	0	0	0
08-Jan-22										
09-Jan-22										
10-Jan-22	0	0	0	0	0					
11-Jan-22						0	0	0	0	0
12-Jan-22										
13-Jan-22										
14-Jan-22	0	0	0	0	0					
15-Jan-22						0	0	0	0	0

