Ministry for the Environment, Sustainable Development and Climate Change

Report on a survey of the influx of migratory finches (Common Linnet, Common Chaffinch, European Serin, European Goldfinch, European Greenfinch, Hawfinch, Eurasian Siskin) over the Maltese Islands, made between October and December 2018

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1. Introduction

1.1 Preamble

The Ministry for the Environment, Sustainable Development and Climate Change (hereafter 'MESDC') issued a call for tenders (reference: MESDC 218/2018) on the 17th August 2018 titled "*Tender for an independent scientific study on the influx or passage of migratory finches, Golden Plover and Song Thrush in Malta during the 2018 Autumn/Winter season*". 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 during the Autumn/Winter 2018 migration period 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 which are not necessarily those of the project are as follows:

- *To survey and scientifically monitor the daily influx of seven species of finches, Golden Plover and Song Thrush; and*
- *To estimate the overall presence (influx) of these nine species per day and for the whole study period, 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 2018 autumn season.*

2.3 Results to be achieved by the Consultant

1. *Daily datasheets with raw counts for 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*, and*

2. *Daily datasheets with raw counts for Golden Plover (*Pluvialis apricaria*) and Song Thrush (*Turdus philomelos*); and*

3. *Two (2) monitoring reports for Autumn/Winter 2018: one report comprising the monitoring of the influx of seven species of finches, and a separate report comprising the monitoring of the influx of golden plover and song thrush. Each of these two 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) *Comparison of the influxes recorded in 2018 with the influxes recorded as a result of 2014, 2015, 2016 and 2017 studies (reports of such past studies are available online from: http://environment.gov.mt/en/Pages/WBRU/livecapturingder.aspx); and*
   f) *A comparative analysis of the results obtained with the bag data extracted from live-capturers' telephonic reports for 2018, (this would only apply in case relevant derogations permitting live-capturing are applied in 2018).*

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 consultant shall use the daily counts obtained from the monitoring stations to extrapolate the approximate estimate of the total influx of each of the 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 *and Song Thrush* Turdus philomelos*) over the Maltese Islands.*

Moreover, it shall also be assumed that the passage of birds at different localities is extremely variable and may be subject to local topographic, anthropogenic, climatic and other conditions which are to be taken into account in the appropriate extrapolation methods that shall be used to estimate the total influx of the species concerned.

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 consultant 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 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 http://environment.gov.mt/en/Pages/WBRU/Reports-and-Statistics.aspx.

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

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 *and Song Thrush* Turdus philomelos*) shall take place during the period between the 20th October 2018 and the 31st December 2018 both dates included. The consultant shall mobilise all staff and equipment by the end of September 2018, in preparation for the execution of Autumn/Winter 2018 migration study.*

The bird migration study should comprise the on-field surveying and scientific monitoring of the daily influx of migration of all 7 finch species and golden plover and song thrush concerned. This would provide an independent verification of the level of presence of the nine 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 consultant must submit the daily datasheets with raw counts to the Contracting Authority at the end of each week. The draft monitoring reports and analysis are to be submitted by the 15th of January 2019.

The issuance of the quality assurance certification shall not be later than 31st January 2019. In this regard, the Contractor is bound to submit his final version for quality assurance certification to the Contracting Authority, three (3) working days prior to termination of Contract.

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 study 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 *and Song Thrush* Turdus philomelos*, 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.*

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 period. Such a network would need to comprise at least 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 nine (9) bird species visually but most importantly being able to recognise their call in flight. Daily monitoring at each station shall be conducted from 09:00hrs to 14:00hrs during the first eleven days of the study (20th October–30th October) and from 08:00hrs to 13:00hrs during the 31st October–31st December study period to factor in the Daylight Saving Time, which ends on 30th October.

For each day during the bird monitoring phase, at least 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 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 specimens, 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 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 the bird species under study 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 during the first eleven days of the study (20th October–30th October) and from 08:00hrs to 13:00hrs during the 31st October–31st December study period to factor in the Daylight Saving Time, which ends on 30th October.

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 nine (9) 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, nor any part of any bird.

The field study shall cover 73 days during the Autumn/Winter migration period, between the 20th October 2018 and the 31st December 2018. 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 2018 Finches, Golden Plover and Song Thrush Migration monitoring reports and analysis is to be submitted by the 15th January 2019. Once such draft reports have been certified for quality assurance by the Contracting Authority, the Finches Migration 2018 monitoring report and Golden Plover and Song Thrush Migration 2018 monitoring report are to be submitted within 10 working days from such a review. All Autumn/Winter 2018 project activities must be completed to the Contracting Authority's satisfaction within four weeks from the termination of the Autumn/Winter bird monitoring phase.

These activities will result in:

1. Daily datasheets with raw counts for each of the above mentioned bird species.
2. Two monitoring reports for the season, 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 Sustainable Development, the Environment 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 is the 20th October 2018 and the period of execution of the contract shall be not later than 31st January, 2019. Article 19.1 of the Special Conditions will determine the actual commencement date and period of execution.

6. Requirements

6.1 Personnel

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 coordinator who must be:
In possession of a Ph.D. 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 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.

6.1.1 Other Experts

CVs for experts other than the key experts are not examined prior to the signature of the contract. They should not have been included in tenders.

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 Contractor 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..

6.1.2 Support Staff and Backstopping

- *The bird migration study is to be supported by ornithologists or field assistants with relevant knowledge 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 Consultant

The Consultant 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 Consultant 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 TWO separate reports (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*
- *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 would be applied in 2018)*

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/Winter 2018 Migration monitoring report Finch report and the Golden Plover and Song Thrush Migration monitoring report analysis are to be submitted by the 15th January 2019.

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. The issuance of the quality assurance certification shall not be later than 31st January 2019. In this regard, the Contractor is bound to submit his final version for quality assurance certification to the Contracting Authority, three (3) working days prior to termination of Contract

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 and two (2) hard copies 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*
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 Siskin* Spinus spinus*, Golden Plover* Pluvialis apricaria *and Song Thrush* Turdus philomelos	*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.*	*The original datasheets submitted to the Contracting Authority.*
Autumn/Winter 2018 Finches migration monitoring report which presents clear analyses of the monitoring carried out.	*The draft monitoring report shall be completed within the 15th January 2019.* *The monitoring report will be finalised by the consultant and approved by the Contracting Authority within four weeks from the termination of the bird monitoring phase.*	*The actual monitoring report presented by the contractor.*
Autumn/Winter 2018 Golden Plover and Song Thrush migration monitoring report which presents clear analyses of the monitoring carried out.	*The draft monitoring report shall be completed within the 15th January 2019.* *The monitoring report will be finalised by the consultant and approved by the Contracting Authority within four weeks from the termination of the bird monitoring phase.*	*The actual monitoring report presented by the contractor.*

Ecoserv Ltd (hereafter 'Ecoserv') made a submission and was subsequently informed by the MESDC that its bid was successful and, as a result, was awarded the tender.

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*, Eurasian Siskin *Spinus spinus*) - in Malta, undertaken by the company during the period 20 October to 31 December 2018, and is based on the ToR stated above.

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 7 finch species that have been previously undertaken locally are the finch migration surveys conducted by Ecoserv in the autumn of 2014, 2015, 2016 and 2017 (see Ecoserv, 2015a; 2016a; 2017a; 2018a). Records of the number of finch individuals caught by live-capturers between 2002 and 2008 are available in the *Carnet de Chasse* reports for the respective years, 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 (WBRU) (http://msdec.gov.mt/en/Pages/WBRU/livecapturingder.aspx).

2. Methodology

Field procedure

The survey design used by Ecoserv during the present autumn/winter 2018 survey was aimed at assessing changes in 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) and other species (Ecoserv, 2011; 2012; 2013; 2014a; 2014b; 2015b; 2015c; 2016b; 2016c; 2017b; 2017c; 2017d; 2018b; 2018c; 2018d). During the survey, two individuals - a field assistant capable of identifying finch species and an observer who was responsible for recording of 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 an 11-week period between 20 October and 31 December, 2018. 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 weather conditions precluded count surveys at the Comino site due to unavailability of sea transport services, counts were taken at an alternative site (in Qala) located at the southeastern tip of Gozo (close to Comino) instead. The sampling sites are represented by the grid cell reference numbers listed in Table 1, while their locations are shown in Figure 1.

Since the survey was mainly aimed at quantifying the influx of migrating birds, field sites were sited at strategic locations behind the coast. 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 on the basis of 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 eleven 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) of the MESDC. 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.

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

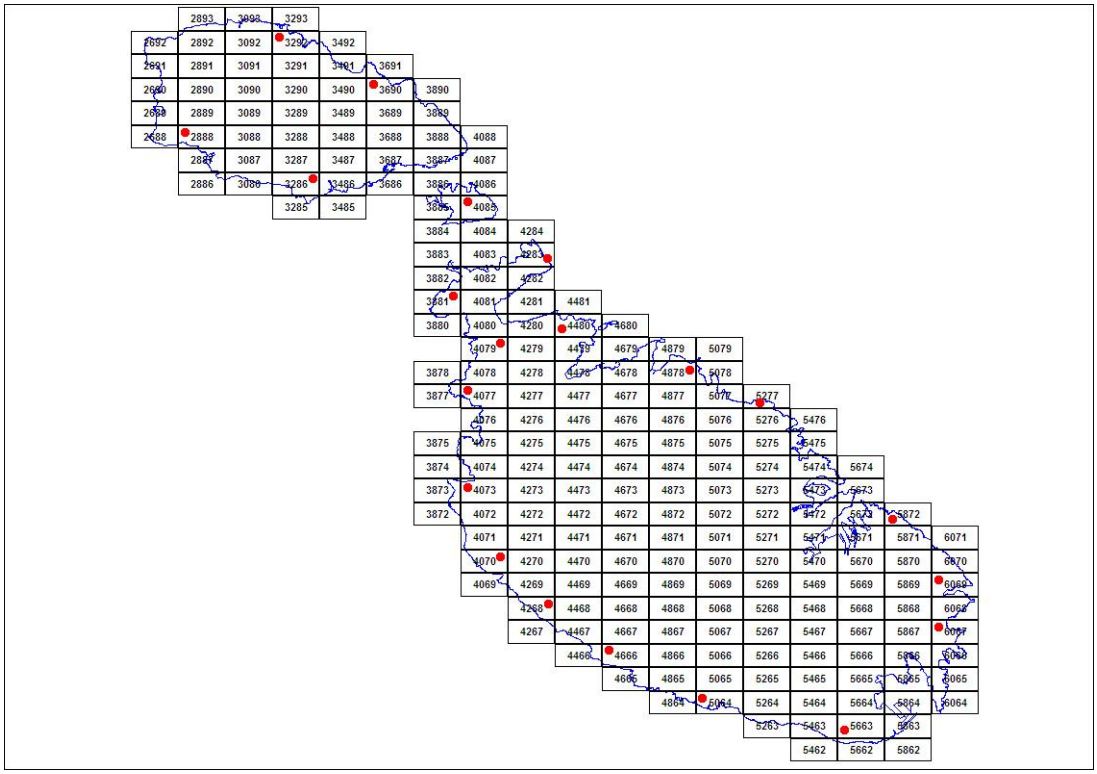

Figure 1. Map of the Maltese Islands showing the localities (grid cells indicated by the red filled circle) where the bird counts were made; see also Table 1.

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 (20 October to 31 December 2018). 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 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 pass 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 was 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 to end-January; hence such 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 2018) 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)[1]; 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*, Eurasian Siskin *Spinus spinus*).

3. Results

Ecoserv's laboratory report reference for the present survey is **001-19**. The sample reference codes for the bird count data are **B-122-18** to **B-268-18**.

Where indicated in the following results, a mean count value of '0' recorded for a 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 22 (see Appendix I), while the mean daily counts ranged between 0 and 7.67 (Table 2). During the present autumn migration, relatively high counts for this species were recorded on some days between 23rd October and 14th November 2018. The total counts, i.e. the total number of Linnet individuals, recorded from a given grid location (= study site) during the whole study period (73 days), varied appreciably between the different sites: at the lower end, no individuals were recorded from the sites at grid location 6069 (see Figure 1), while at the higher end, 128 Linnet individuals were recorded from the site at grid location 4085.

Values of mean daily counts and total counts of Linnet recorded during the period 20 October to 31 December 2018 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 present survey, along with those made during the autumn 2014, 2015, 2016 and 2017 surveys,

[1] Note, however, that this estimate includes the perimeter of minor islets and rocks.

are shown graphically in Figure 2. Overall, count values for Linnet from the present (autumn 2018) survey are similar to those made in previous years. A pattern of higher count values made during the period late October to mid-November is noted for the five years 2014 - 2018 (Figure 2).

An estimate of 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 4,159 individuals, with a total influx over the survey period (20 October – 31 December; i.e. 73 days) of 49,456 individuals, i.e. some 677 birds per day; see Table 2.

Table 2

Values of mean (± SD) daily count and daily total count recorded from the six study sites, together with total influx of migratory Common Linnet.

Date	Mean daily count	Standard deviation	Total daily count	Estimated daily influx
20-Oct-18	0.67	± 1.03	4	362
21-Oct-18	1.50	± 3.21	9	814
22-Oct-18	0.33	± 0.82	2	181
23-Oct-18	2.83	± 3.71	17	1537
24-Oct-18	4.17	± 7.05	25	2260
25-Oct-18	4.33	± 4.41	26	2351
26-Oct-18	2.83	± 3.71	17	1537
27-Oct-18	2.67	± 2.50	16	1447
28-Oct-18	2.67	± 5.61	16	1447
29-Oct-18	0.33	± 0.82	2	181
30-Oct-18	1.67	± 2.07	10	904
31-Oct-18	0.33	± 0.82	2	181
1-Nov-18	4.33	± 5.96	26	2351
2-Nov-18	3.50	± 5.65	21	1899
3-Nov-18	4.00	± 5.48	24	2170
4-Nov-18	2.50	± 2.07	15	1356
5-Nov-18	7.67	± 9.05	46	4159
6-Nov-18	4.00	± 6.20	24	2170
7-Nov-18	1.67	± 2.42	10	904
8-Nov-18	2.50	± 3.73	15	1356
9-Nov-18	2.00	± 2.28	12	1085
10-Nov-18	1.50	± 1.64	9	814
11-Nov-18	3.50	± 5.75	21	1899
12-Nov-18	2.33	± 4.41	14	1266
13-Nov-18	5.33	± 6.12	32	2893
14-Nov-18	2.67	± 2.80	16	1447
15-Nov-18	0.67	± 1.03	4	362
16-Nov-18	0.00	± 0	0	0
17-Nov-18	1.00	± 1.55	6	542
18-Nov-18	1.00	± 1.67	6	542
19-Nov-18	0.50	± 0.84	3	271
20-Nov-18	0.33	± 0.82	2	181
21-Nov-18	1.67	± 1.63	10	904
22-Nov-18	0.83	± 1.60	5	452
23-Nov-18	0.33	± 0.52	2	181
24-Nov-18	0.33	± 0.82	2	181
25-Nov-18	1.17	± 1.60	7	633
26-Nov-18	0.33	± 0.82	2	181

Date	Mean daily count	Standard deviation	Total daily count	Estimated daily influx
27-Nov-18	0.00	± 0	0	0
28-Nov-18	0.00	± 0	0	0
29-Nov-18	0.17	± 0.41	1	90
30-Nov-18	1.33	± 1.86	8	723
1-Dec-18	0.00	± 0	0	0
2-Dec-18	1.67	± 1.86	10	904
3-Dec-18	0.17	± 0.41	1	90
4-Dec-18	0.50	± 1.22	3	271
5-Dec-18	0.17	± 0.41	1	90
6-Dec-18	0.00	± 0	0	0
7-Dec-18	0.17	± 0.41	1	90
8-Dec-18	0.67	± 1.63	4	362
9-Dec-18	0.00	± 0	0	0
10-Dec-18	0.00	± 0	0	0
11-Dec-18	0.00	± 0	0	0
12-Dec-18	3.00	± 5.62	18	1627
13-Dec-18	0.00	± 0	0	0
14-Dec-18	0.00	± 0	0	0
15-Dec-18	0.00	± 0	0	0
16-Dec-18	0.33	± 0.82	2	181
17-Dec-18	0.00	± 0	0	0
18-Dec-18	0.17	± 0.41	1	90
19-Dec-18	0.33	± 0.82	2	181
20-Dec-18	0.00	± 0	0	0
21-Dec-18	0.00	± 0	0	0
22-Dec-18	0.33	± 0.82	2	181
23-Dec-18	0.00	± 0	0	0
24-Dec-18	0.50	± 1.22	3	271
25-Dec-18	0.00	± 0	0	0
26-Dec-18	0.33	± 0.82	2	181
27-Dec-18	0.50	± 1.22	3	271
28-Dec-18	0.00	± 0	0	0
29-Dec-18	0.33	± 0.82	2	181
30-Dec-18	0.00	± 0	0	0
31-Dec-18	0.50	± 1.22	3	271
Total Count / Estimated Influx			**547**	**49,456**

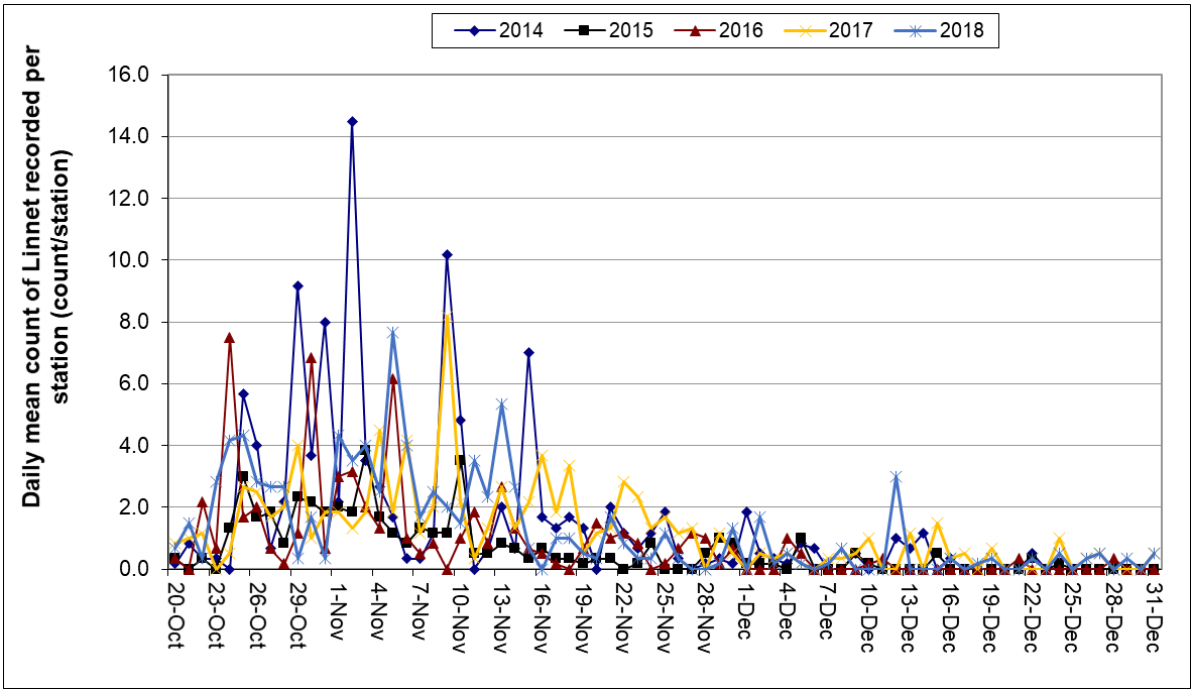

Figure 2. **Daily mean counts of Common Linnet per station (= site) recorded between 20 October and 31 December during the present (2018) and previous (2014, 2015, 2016, 2017) surveys.**

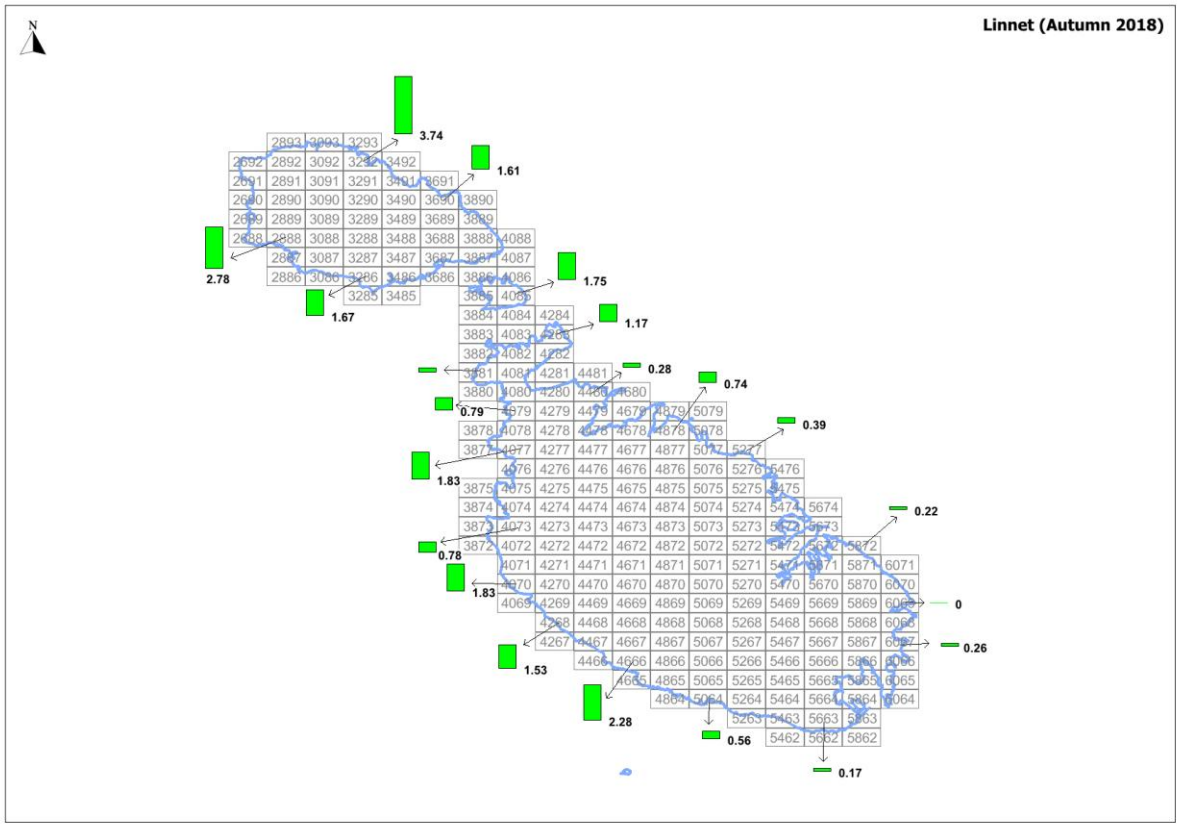

Figure 3. **Map of the Maltese Islands showing the standard grid and respective codes, including ones used in the present study. The green bars indicate mean counts of Common Linnet recorded from study sites in the respective cells.**

Mean count values for Linnet recorded from each of the 21 sites are indicated on the map shown in Figure 3. The highest mean counts were recorded from Marsalforn (Grid 3292) and Kercem (Grid 2888) located in Gozo. Relatively high counts were also recorded from the sites located in western Malta and Comino. The lowest mean counts were recorded from the eastern parts of Malta.

Common Chaffinch

Raw daily counts for Chaffinch recorded from the 21 sites during the present study varied between 0 and a maximum of 33 (see Appendix I), while the mean daily counts ranged between 0 and 8.17 (Table 3). Relatively high counts for this species were recorded on some days between 26th October and 15th November. The total counts, i.e. the total number of Chaffinch, recorded from a given grid location (= study site) during the whole study period (73 days), varied appreciably between the different sites: at the lower end, no individuals were recorded throughout the survey period from the site at grid location 5663, while at the higher end 82 Chaffinch individuals were recorded from the site at grid location 3268.

Values of mean daily counts and total counts of Chaffinch recorded during the period 20 October to 31 December 2018 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 and 2017 surveys, are shown graphically in Figure 4. Overall, count values for Chaffinch from the present (autumn 2018) survey are similar to those made in previous years, although relatively high peak counts for this species were mostly recorded during the 2014 survey. An overall similar pattern of higher count values is evident during the period 21 October to late November for the five years 2014 - 2018 (see Figure 4).

An estimate of 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 4,430 individuals, with a total influx over the survey period (20 October – 31 December; i.e. 73 days) of 40,320 individuals, i.e. some 552 birds per day; 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 counts were recorded from Ta Ċenċ (Grid 3268) and Marsalforn (Grid 3292) in Gozo. Overall high counts were also recorded from sites in northern Malta and in Gozo, while the lowest mean counts were recorded from sites located in the southeastern parts of Malta.

Table 3

Values of mean (± SD) daily count and daily total count recorded from the six study sites, together with total influx of migratory Common Chaffinch.

Date	Mean daily count	Standard deviation	Total daily count	Estimated daily influx
20-Oct-18	0.50	± 1.22	3	271
21-Oct-18	0.50	± 0.84	3	271
22-Oct-18	0.00	± 0	0	0
23-Oct-18	0.50	± 1.22	3	271
24-Oct-18	2.17	± 2.48	13	1175
25-Oct-18	1.33	± 2.16	8	723
26-Oct-18	6.17	± 8.59	37	3345
27-Oct-18	0.33	± 0.82	2	181

Date	Mean daily count	Standard deviation	Total daily count	Estimated daily influx
28-Oct-18	1.17	± 2.04	7	633
29-Oct-18	0.17	± 0.41	1	90
30-Oct-18	0.67	± 1.03	4	362
31-Oct-18	0.00	± 0	0	0
1-Nov-18	1.50	± 1.64	9	814
2-Nov-18	1.17	± 2.86	7	633
3-Nov-18	0.00	± 0	0	0
4-Nov-18	1.33	± 1.63	8	723
5-Nov-18	3.17	± 4.17	19	1718
6-Nov-18	1.00	± 1.26	6	542
7-Nov-18	8.17	± 12.67	49	4430
8-Nov-18	3.50	± 3.67	21	1899
9-Nov-18	2.50	± 3.02	15	1356
10-Nov-18	1.17	± 1.47	7	633
11-Nov-18	1.67	± 2.88	10	904
12-Nov-18	1.67	± 2.25	10	904
13-Nov-18	3.83	± 2.99	23	2079
14-Nov-18	1.33	± 1.51	8	723
15-Nov-18	5.00	± 7.04	30	2712
16-Nov-18	0.33	± 0.52	2	181
17-Nov-18	2.17	± 1.60	13	1175
18-Nov-18	0.67	± 1.21	4	362
19-Nov-18	0.00	± 0	0	0
20-Nov-18	0.33	± 0.82	2	181
21-Nov-18	1.17	± 0.98	7	633
22-Nov-18	2.67	± 2.80	16	1447
23-Nov-18	0.83	± 1.60	5	452
24-Nov-18	1.17	± 1.94	7	633
25-Nov-18	2.17	± 2.14	13	1175
26-Nov-18	0.00	± 0	0	0
27-Nov-18	0.00	± 0	0	0
28-Nov-18	0.50	± 1.22	3	271
29-Nov-18	0.83	± 2.04	5	452
30-Nov-18	0.50	± 0.55	3	271
1-Dec-18	0.67	± 1.03	4	362
2-Dec-18	0.83	± 1.60	5	452
3-Dec-18	1.50	± 1.38	9	814
4-Dec-18	0.17	± 0.41	1	90
5-Dec-18	0.33	± 0.82	2	181
6-Dec-18	0.17	± 0.41	1	90
7-Dec-18	0.33	± 0.82	2	181
8-Dec-18	0.33	± 0.82	2	181
9-Dec-18	0.50	± 1.22	3	271
10-Dec-18	0.00	± 0	0	0
11-Dec-18	0.17	± 0.41	1	90
12-Dec-18	0.00	± 0	0	0
13-Dec-18	0.83	± 2.04	5	452
14-Dec-18	0.17	± 0.41	1	90
15-Dec-18	0.33	± 0.82	2	181
16-Dec-18	0.83	± 1.60	5	452
17-Dec-18	0.00	± 0	0	0

Date	Mean daily count	Standard deviation	Total daily count	Estimated daily influx
18-Dec-18	0.00	± 0	0	0
19-Dec-18	0.33	± 0.82	2	181
20-Dec-18	0.67	± 1.63	4	362
21-Dec-18	0.33	± 0.82	2	181
22-Dec-18	0.17	± 0.41	1	90
23-Dec-18	0.33	± 0.82	2	181
24-Dec-18	0.17	± 0.41	1	90
25-Dec-18	0.00	± 0	0	0
26-Dec-18	0.00	± 0	0	0
27-Dec-18	0.00	± 0	0	0
28-Dec-18	0.17	± 0.41	1	90
29-Dec-18	0.50	± 1.22	3	271
30-Dec-18	0.00	± 0	0	0
31-Dec-18	0.67	± 1.63	4	362
Total Count / Estimated Influx			**446**	**40,320**

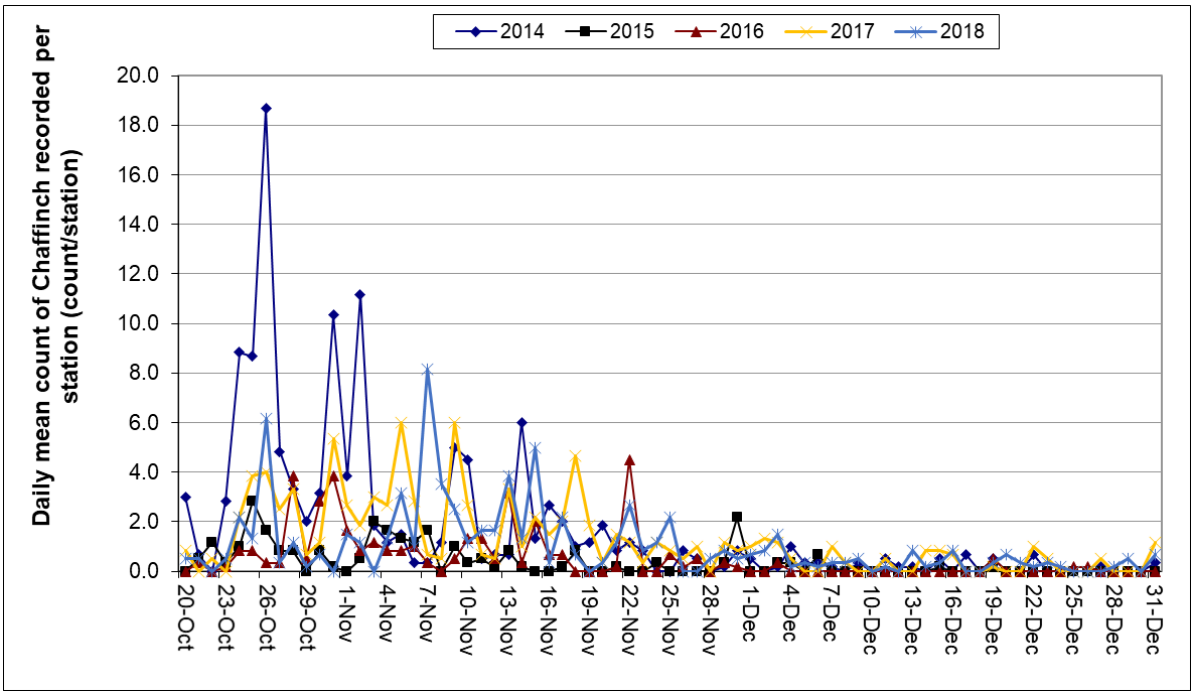

Figure 4. Daily mean counts of Common Chaffinch per station (= site) recorded between 20 October and 31 December during the present (2018) and previous (2014, 2015, 2016, 2017) surveys.

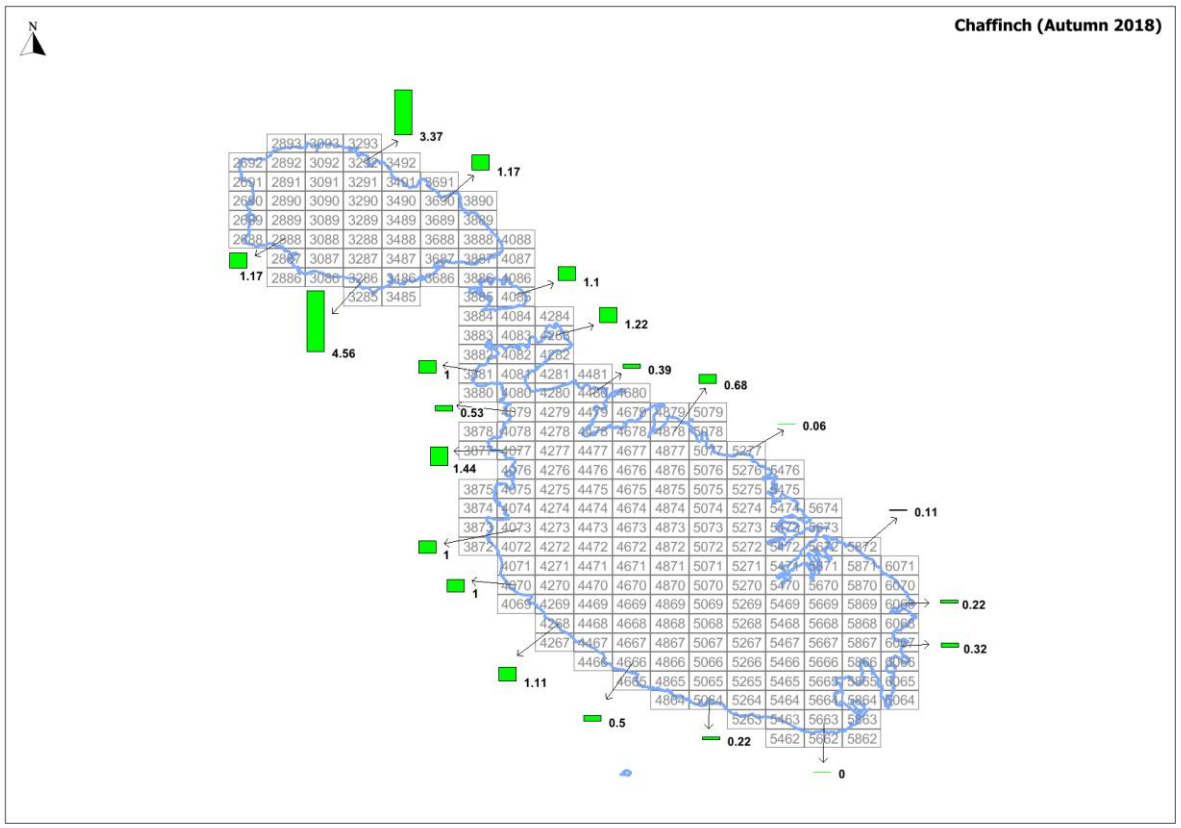

Figure 5. **Map of the Maltese Islands showing the standard grid and respective codes, including ones used in the present study. The green bars indicate mean counts of Common Chaffinch recorded from study sites in the respective cells.**

European Greenfinch

Raw daily counts for Greenfinch recorded from the 21 sites during the present study varied between 0 and a maximum of 3 (see Appendix I), while the mean daily counts ranged between 0 and 0.67 (Table 4). Low or zero counts for this species were recorded throughout most of the survey period, with observations being more frequent during the period 10th November to 4th December. The total counts, i.e. the total number of Greenfinch, recorded from a given grid location (= study site) during the whole study period (73 days), did not vary appreciably between the different sites: at the lower end, no individuals were recorded throughout the survey period from ten of the sites, while at the higher end 5 Greenfinch individuals were recorded from the site at grid location 4666.

Values of mean daily counts and total counts of Greenfinch recorded during the period 20 October to 31 December 2018 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 and 2017 surveys, are shown graphically in Figure 6. Overall, count values for Greenfinch from the present (autumn 2018) survey are similar to those recorded during the autumn 2015 and 2016 surveys, and lower than those recorded from the autumn 2014 and 2017 surveys and higher than those recorded in the autumn 2015 and 2016 surveys. Individuals of this species were recorded throughout the survey period in all five years, albeit sporadically and in low counts during 2015, 2016 and 2018 (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 362 individuals, with a total influx over the survey period (20 October – 31 December; i.e. 73 days) of 2,259 individuals, i.e. some 31 birds per day; 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 counts were recorded from Fawwara (Grid 4666) located in western Malta and White Rocks (Grid 5277) located in eastern Malta. Mean counts recorded from most of the other sites were generally low, with a mean count of zero recorded from 10 of the 21 sites.

Table 4

Values of mean (± SD) daily count and daily total count recorded from the six study sites, together with total influx of migratory European Greenfinch.

Date	Mean daily count	Standard deviation	Total daily count	Estimated daily influx
20-Oct-18	0.00	± 0	0	0
21-Oct-18	0.33	± 0.82	2	181
22-Oct-18	0.00	± 0	0	0
23-Oct-18	0.00	± 0	0	0
24-Oct-18	0.00	± 0	0	0
25-Oct-18	0.00	± 0	0	0
26-Oct-18	0.00	± 0	0	0
27-Oct-18	0.00	± 0	0	0
28-Oct-18	0.00	± 0	0	0
29-Oct-18	0.00	± 0	0	0
30-Oct-18	0.17	± 0.41	1	90
31-Oct-18	0.00	± 0	0	0
1-Nov-18	0.00	± 0	0	0
2-Nov-18	0.00	± 0	0	0
3-Nov-18	0.00	± 0	0	0
4-Nov-18	0.00	± 0	0	0
5-Nov-18	0.00	± 0	0	0
6-Nov-18	0.00	± 0	0	0
7-Nov-18	0.00	± 0	0	0
8-Nov-18	0.00	± 0	0	0
9-Nov-18	0.00	± 0	0	0
10-Nov-18	0.33	± 0.82	2	181
11-Nov-18	0.00	± 0	0	0
12-Nov-18	0.00	± 0	0	0
13-Nov-18	0.67	± 1.21	4	362
14-Nov-18	0.33	± 0.82	2	181
15-Nov-18	0.00	± 0	0	0
16-Nov-18	0.00	± 0	0	0
17-Nov-18	0.00	± 0	0	0
18-Nov-18	0.33	± 0.82	2	181
19-Nov-18	0.00	± 0	0	0
20-Nov-18	0.50	± 1.22	3	271
21-Nov-18	0.00	± 0	0	0
22-Nov-18	0.17	± 0.41	1	90
23-Nov-18	0.00	± 0	0	0

Date	Mean daily count	Standard deviation	Total daily count	Estimated daily influx
24-Nov-18	0.00	± 0	0	0
25-Nov-18	0.00	± 0	0	0
26-Nov-18	0.00	± 0	0	0
27-Nov-18	0.00	± 0	0	0
28-Nov-18	0.00	± 0	0	0
29-Nov-18	0.00	± 0	0	0
30-Nov-18	0.00	± 0	0	0
1-Dec-18	0.33	± 0.82	2	181
2-Dec-18	0.00	± 0	0	0
3-Dec-18	0.00	± 0	0	0
4-Dec-18	0.17	± 0.41	1	90
5-Dec-18	0.00	± 0	0	0
6-Dec-18	0.00	± 0	0	0
7-Dec-18	0.00	± 0	0	0
8-Dec-18	0.00	± 0	0	0
9-Dec-18	0.00	± 0	0	0
10-Dec-18	0.00	± 0	0	0
11-Dec-18	0.00	± 0	0	0
12-Dec-18	0.00	± 0	0	0
13-Dec-18	0.00	± 0	0	0
14-Dec-18	0.00	± 0	0	0
15-Dec-18	0.00	± 0	0	0
16-Dec-18	0.00	± 0	0	0
17-Dec-18	0.00	± 0	0	0
18-Dec-18	0.00	± 0	0	0
19-Dec-18	0.00	± 0	0	0
20-Dec-18	0.00	± 0	0	0
21-Dec-18	0.33	± 0.82	2	181
22-Dec-18	0.00	± 0	0	0
23-Dec-18	0.00	± 0	0	0
24-Dec-18	0.17	± 0.41	1	90
25-Dec-18	0.00	± 0	0	0
26-Dec-18	0.00	± 0	0	0
27-Dec-18	0.17	± 0.41	1	90
28-Dec-18	0.00	± 0	0	0
29-Dec-18	0.00	± 0	0	0
30-Dec-18	0.17	± 0.41	1	90
31-Dec-18	0.00	± 0	0	0
Total Count / Estimated Influx			**25**	**2,259**

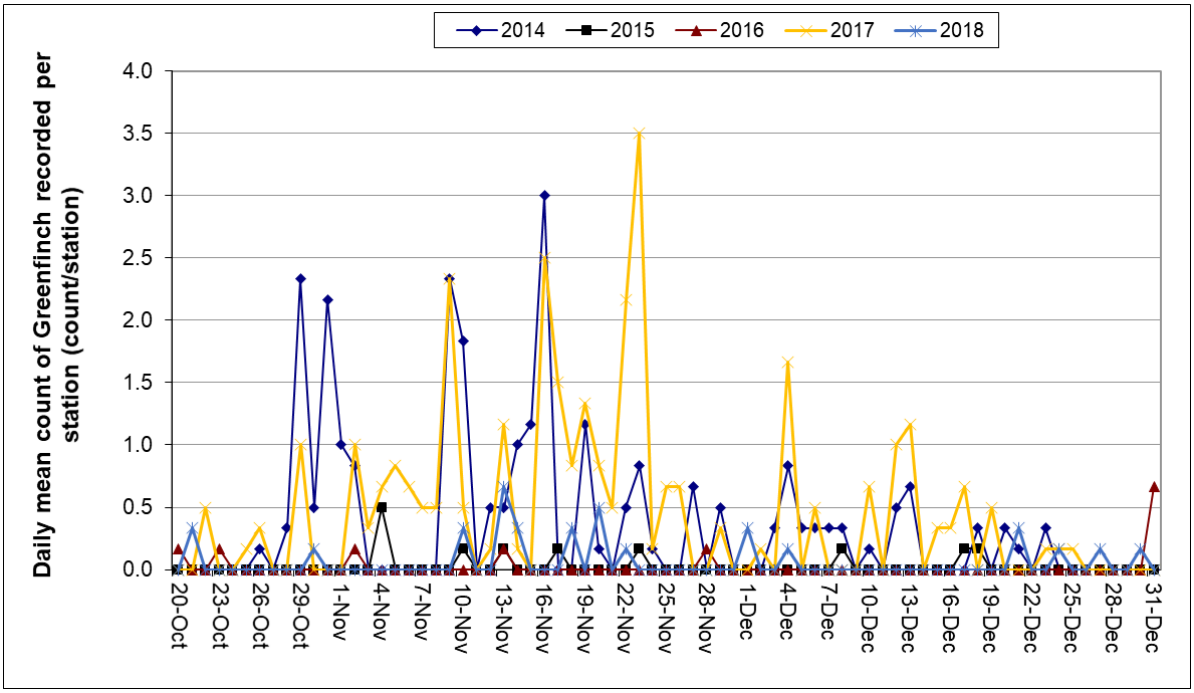

Figure 6. **Daily mean counts of European Greenfinch per station (= site) recorded between 20 October and 31 December during the present (2018) and previous (2014, 2015, 2016, 2017) surveys.**

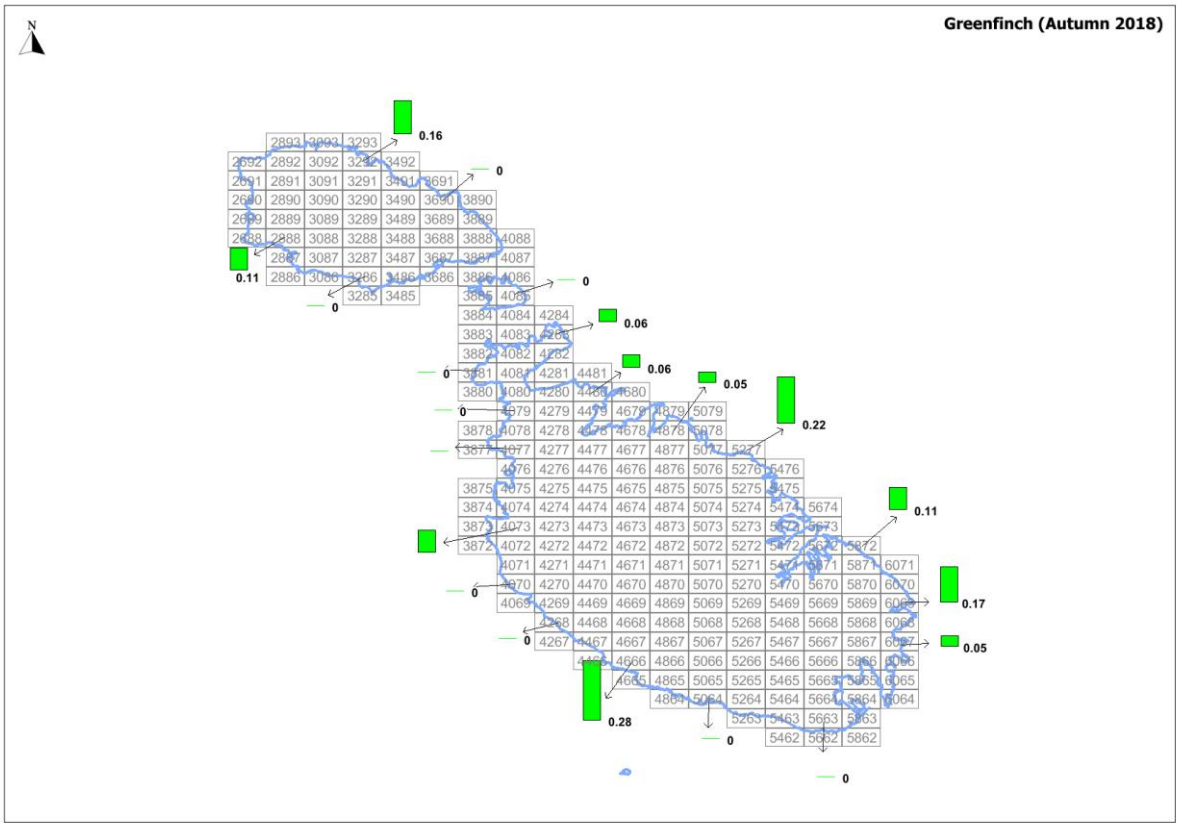

Figure 7. **Map of the Maltese Islands showing the standard grid and respective codes, including ones used in the present study. The green bars indicate mean counts of European Greenfinch recorded from study sites in the respective cells.**

Eurasian Siskin

Raw daily counts for Siskin 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 5). Low or zero counts for this species were recorded throughout most of the survey period, with comparatively higher counts recorded on 16th November and 1st December. The total counts, i.e. the total number of Siskin, recorded from a given grid location (= study site) during the whole study period (73 days), did not vary appreciably between the different sites: at the lower end, no individuals were recorded throughout the survey period from 15 sites, while at the higher end 9 Siskin individuals were recorded from the site at grid location 4077.

Values of mean daily counts and total counts of Siskin recorded during the period 20 October to 31 December 2018 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 and 2017 surveys, are shown graphically in Figure 8. Overall, count values for Siskin from the present (autumn 2018) survey are comparable to those recorded in autumn 2014 and 2016, and lower than those made in the 2015 and 2017 surveys. Counts for this species extended from late October to late December during the autumn 2017, 2016 and 2015 surveys, even if zero counts were recorded on several days in 2016, whereas no Siskin were recorded after mid-December in 2014 and 2018 (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 452 individuals, with a total influx over the survey period (20 October – 31 December; i.e. 73 days) of 2,259 individuals, i.e. some 31 birds per day; see Table 5.

Mean count values for Siskin recorded from each of the 21 sites are indicated on the map shown in Figure 9. The highest mean counts were recorded from Għajn Tuffieħa (Grid 4077), Fomm ir-Riħ (Grid 4073) and Mtaħleb (Grid 4070) located in western Malta, while a mean count of zero was recorded from 15 of the 21 sites.

Table 5

Values of mean (± SD) daily count and daily total count recorded from the six study sites, together with total influx of migratory Eurasian Siskin.

Date	Mean daily count	Standard deviation	Total daily count	Estimated daily influx
20-Oct-18	0.33	± 0.82	2	181
21-Oct-18	0.00	± 0	0	0
22-Oct-18	0.00	± 0	0	0
23-Oct-18	0.17	± 0.41	1	90
24-Oct-18	0.00	± 0	0	0
25-Oct-18	0.50	± 1.22	3	271
26-Oct-18	0.00	± 0	0	0
27-Oct-18	0.00	± 0	0	0
28-Oct-18	0.00	± 0	0	0
29-Oct-18	0.17	± 0.41	1	90
30-Oct-18	0.00	± 0	0	0
31-Oct-18	0.00	± 0	0	0
1-Nov-18	0.00	± 0	0	0
2-Nov-18	0.00	± 0	0	0

Date	Mean daily count	Standard deviation	Total daily count	Estimated daily influx
3-Nov-18	0.00	± 0	0	0
4-Nov-18	0.00	± 0	0	0
5-Nov-18	0.00	± 0	0	0
6-Nov-18	0.00	± 0	0	0
7-Nov-18	0.00	± 0	0	0
8-Nov-18	0.00	± 0	0	0
9-Nov-18	0.00	± 0	0	0
10-Nov-18	0.00	± 0	0	0
11-Nov-18	0.00	± 0	0	0
12-Nov-18	0.00	± 0	0	0
13-Nov-18	0.00	± 0	0	0
14-Nov-18	0.00	± 0	0	0
15-Nov-18	0.00	± 0	0	0
16-Nov-18	0.67	± 1.63	4	362
17-Nov-18	0.00	± 0	0	0
18-Nov-18	0.00	± 0	0	0
19-Nov-18	0.00	± 0	0	0
20-Nov-18	0.00	± 0	0	0
21-Nov-18	0.00	± 0	0	0
22-Nov-18	0.00	± 0	0	0
23-Nov-18	0.00	± 0	0	0
24-Nov-18	0.00	± 0	0	0
25-Nov-18	0.00	± 0	0	0
26-Nov-18	0.00	± 0	0	0
27-Nov-18	0.00	± 0	0	0
28-Nov-18	0.00	± 0	0	0
29-Nov-18	0.33	± 0.82	2	181
30-Nov-18	0.50	± 1.22	3	271
1-Dec-18	0.83	± 2.04	5	452
2-Dec-18	0.00	± 0	0	0
3-Dec-18	0.00	± 0	0	0
4-Dec-18	0.00	± 0	0	0
5-Dec-18	0.00	± 0	0	0
6-Dec-18	0.00	± 0	0	0
7-Dec-18	0.00	± 0	0	0
8-Dec-18	0.50	± 1.22	3	271
9-Dec-18	0.00	± 0	0	0
10-Dec-18	0.00	± 0	0	0
11-Dec-18	0.00	± 0	0	0
12-Dec-18	0.00	± 0	0	0
13-Dec-18	0.17	± 0.41	1	90
14-Dec-18	0.00	± 0	0	0
15-Dec-18	0.00	± 0	0	0
16-Dec-18	0.00	± 0	0	0
17-Dec-18	0.00	± 0	0	0
18-Dec-18	0.00	± 0	0	0
19-Dec-18	0.00	± 0	0	0
20-Dec-18	0.00	± 0	0	0
21-Dec-18	0.00	± 0	0	0
22-Dec-18	0.00	± 0	0	0
23-Dec-18	0.00	± 0	0	0

Date	Mean daily count	Standard deviation	Total daily count	Estimated daily influx
24-Dec-18	0.00	± 0	0	0
25-Dec-18	0.00	± 0	0	0
26-Dec-18	0.00	± 0	0	0
27-Dec-18	0.00	± 0	0	0
28-Dec-18	0.00	± 0	0	0
29-Dec-18	0.00	± 0	0	0
30-Dec-18	0.00	± 0	0	0
31-Dec-18	0.00	± 0	0	0
Total Count / Estimated Influx			**25**	**2,259**

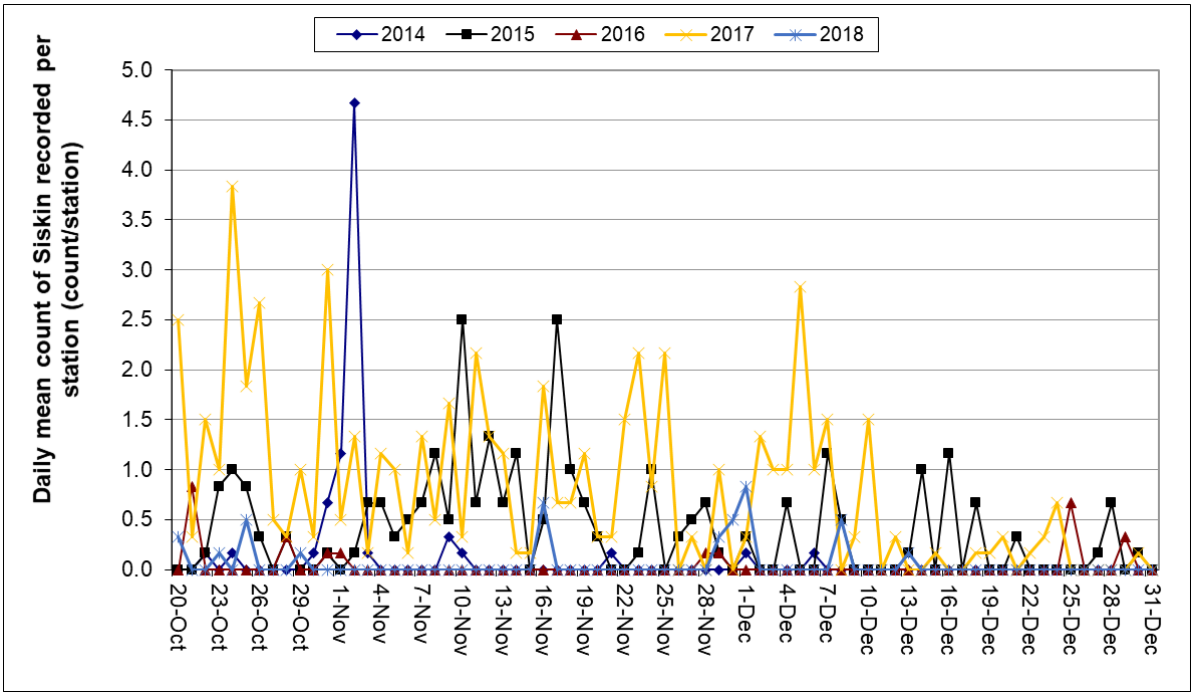

Figure 8. Daily mean counts of Eurasian Siskin per station (= site) recorded between 20 October and 31 December during the present (2018) and previous (2014, 2015, 2016, 2017) surveys.

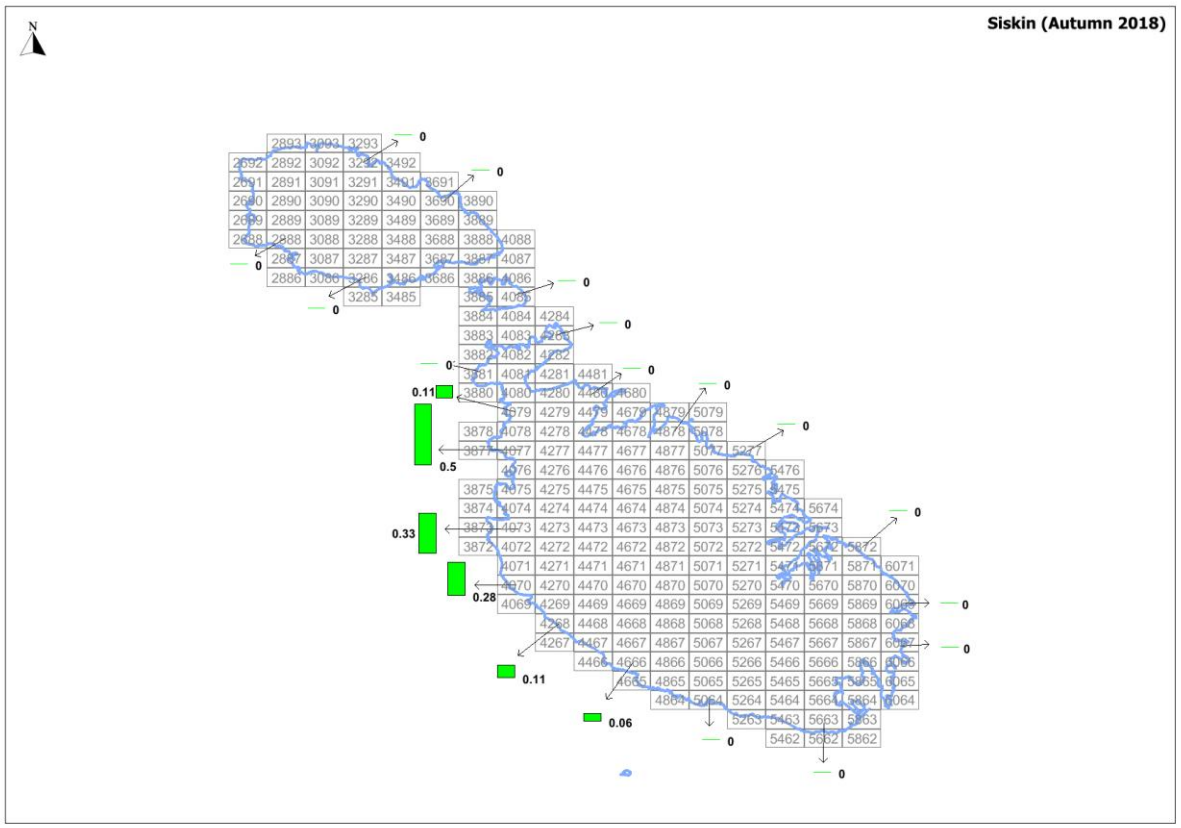

Figure 9. Map of the Maltese Islands showing the standard grid and respective codes, including ones used in the present study. The green bars indicate mean counts of Eurasian Siskin recorded from study sites in the respective cells.

European Goldfinch

Raw daily counts for Goldfinch recorded from the 21 sites during the present study varied between 0 and a maximum of 2 (see Appendix I), while the mean daily counts ranged between 0 and 0.33 (Table 6). Counts for this species were therefore very low overall: one to two Goldfinch individuals were recorded in total from each of the sites at grid locations 3292, 4666 and 4878 (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 recorded during the period 20 October to 31 December 2018 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 2018) survey, along with ones recorded during the autumn 2014, 2015, 2016 and 2017 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 and 2018 surveys were low and sporadic. No temporal trend in migratory influx over the survey period in the five years discernible (Figure 10).

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 181 individuals, with a total influx over the survey period (20 October – 31 December; i.e. 73 days) of 361 individuals, i.e. some 5 birds per day; 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 the sites at Għallis (Grid 4878) and Fawwara (Grid 4666) in Malta and from Marsalforn (Grid 3292) in Gozo.

Table 6

Values of mean (± SD) daily count and daily total count recorded from the six study sites, together with total influx of migratory European Goldfinch.

Date	Mean daily count	Standard deviation	Total daily count	Estimated daily influx
20-Oct-18	0.00	+ 0	0	0
21-Oct-18	0.00	+ 0	0	0
22-Oct-18	0.00	+ 0	0	0
23-Oct-18	0.00	+ 0	0	0
24-Oct-18	0.00	+ 0	0	0
25-Oct-18	0.00	+ 0	0	0
26-Oct-18	0.00	+ 0	0	0
27-Oct-18	0.00	+ 0	0	0
28-Oct-18	0.00	+ 0	0	0
29-Oct-18	0.00	+ 0	0	0
30-Oct-18	0.00	+ 0	0	0
31-Oct-18	0.00	+ 0	0	0
1-Nov-18	0.00	+ 0	0	0
2-Nov-18	0.00	+ 0	0	0
3-Nov-18	0.00	+ 0	0	0
4-Nov-18	0.00	+ 0	0	0
5-Nov-18	0.00	+ 0	0	0
6-Nov-18	0.17	+ 0.41	1	90
7-Nov-18	0.00	+ 0	0	0
8-Nov-18	0.00	+ 0	0	0
9-Nov-18	0.00	+ 0	0	0
10-Nov-18	0.00	+ 0	0	0
11-Nov-18	0.00	+ 0	0	0
12-Nov-18	0.00	+ 0	0	0
13-Nov-18	0.00	+ 0	0	0
14-Nov-18	0.00	+ 0	0	0
15-Nov-18	0.00	+ 0	0	0
16-Nov-18	0.00	+ 0	0	0
17-Nov-18	0.17	+ 0.41	1	90
18-Nov-18	0.00	+ 0	0	0
19-Nov-18	0.00	+ 0	0	0
20-Nov-18	0.00	+ 0	0	0
21-Nov-18	0.00	+ 0	0	0
22-Nov-18	0.00	+ 0	0	0
23-Nov-18	0.00	+ 0	0	0
24-Nov-18	0.00	+ 0	0	0
25-Nov-18	0.00	+ 0	0	0
26-Nov-18	0.00	+ 0	0	0
27-Nov-18	0.00	+ 0	0	0
28-Nov-18	0.00	+ 0	0	0
29-Nov-18	0.00	+ 0	0	0
30-Nov-18	0.00	+ 0	0	0

Date	Mean daily count	Standard deviation	Total daily count	Estimated daily influx
1-Dec-18	0.00	+ 0	0	0
2-Dec-18	0.00	+ 0	0	0
3-Dec-18	0.00	+ 0	0	0
4-Dec-18	0.00	+ 0	0	0
5-Dec-18	0.00	+ 0	0	0
6-Dec-18	0.00	+ 0	0	0
7-Dec-18	0.00	+ 0	0	0
8-Dec-18	0.00	+ 0	0	0
9-Dec-18	0.00	+ 0	0	0
10-Dec-18	0.00	+ 0	0	0
11-Dec-18	0.00	+ 0	0	0
12-Dec-18	0.00	+ 0	0	0
13-Dec-18	0.00	+ 0	0	0
14-Dec-18	0.00	+ 0	0	0
15-Dec-18	0.00	+ 0	0	0
16-Dec-18	0.00	+ 0	0	0
17-Dec-18	0.00	+ 0	0	0
18-Dec-18	0.00	+ 0	0	0
19-Dec-18	0.00	+ 0	0	0
20-Dec-18	0.00	+ 0	0	0
21-Dec-18	0.00	+ 0	0	0
22-Dec-18	0.00	+ 0	0	0
23-Dec-18	0.00	+ 0	0	0
24-Dec-18	0.00	+ 0	0	0
25-Dec-18	0.00	+ 0	0	0
26-Dec-18	0.00	+ 0	0	0
27-Dec-18	0.33	+ 0.82	2	181
28-Dec-18	0.00	+ 0	0	0
29-Dec-18	0.00	+ 0	0	0
30-Dec-18	0.00	+ 0	0	0
31-Dec-18	0.00	+ 0	0	0
Total Count / Estimated Influx			**4**	**361**

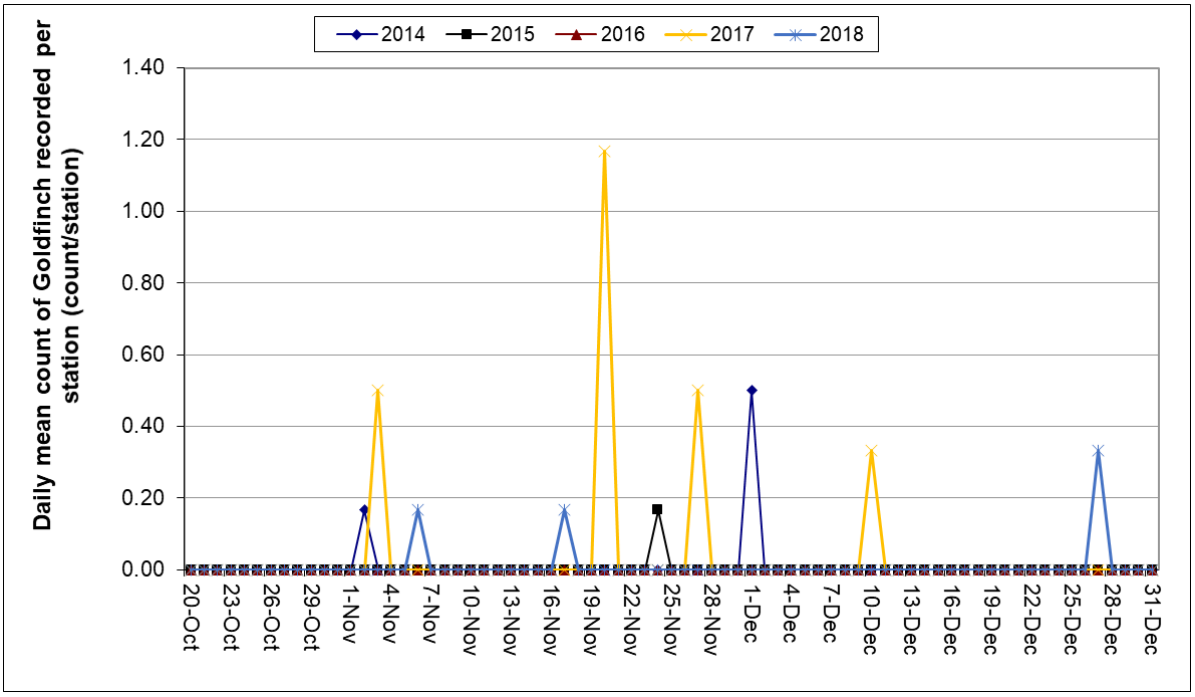

Figure 10. Daily mean counts of European Goldfinch per station (= site) recorded between 20 October and 31 December during the present (2018) and previous (2014, 2015, 2016, 2017) surveys.

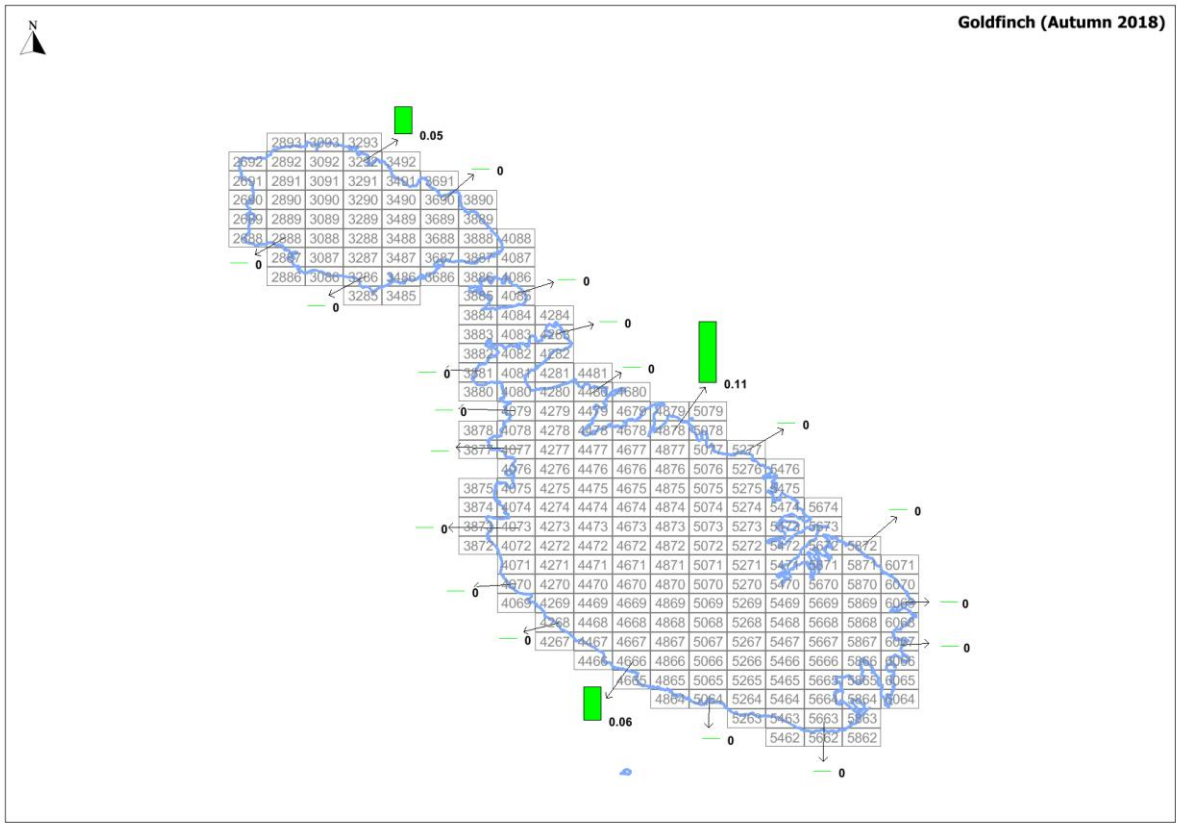

Figure 11. Map of the Maltese Islands showing the standard grid and respective codes, including ones used in the present study. The green bars indicate mean counts of European Goldfinch recorded from study sites in the respective cells.

European Serin

Raw daily counts for Serin 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 2.50 (Table 7). Comparatively higher counts for this species were recorded on 24th October and in late December 2018. The total counts, i.e. the total number of Serin, recorded from a given grid location (= study site) during the whole study period (73 days), varied appreciably between the different sites: at the lower end, no individuals were recorded throughout the survey period from the site at grid location 5277 (see Figure 1), while at the higher end, 30 Serin individuals were recorded from the site at grid location 4085.

Values of mean daily counts and total counts of Serin recorded during the period 20 October to 31 December 2018 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 and 2018 surveys, are shown graphically in Figure 12. Overall, count values for Serin from the present (autumn 2018) 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 highest count values made during the period early November to late December is noted for all five years (Figure 12).

Table 7

Values of mean (± SD) daily count and daily total count recorded from the six study sites, together with total influx of migratory European Serin.

Date	Mean daily count	Standard deviation	Total daily count	Estimated daily influx
20-Oct-18	0.00	± 0	0	0
21-Oct-18	0.00	± 0	0	0
22-Oct-18	0.00	± 0	0	0
23-Oct-18	0.00	± 0	0	0
24-Oct-18	2.50	± 6.12	15	1356
25-Oct-18	0.00	± 0	0	0
26-Oct-18	0.00	± 0	0	0
27-Oct-18	0.00	± 0	0	0
28-Oct-18	0.00	± 0	0	0
29-Oct-18	0.00	± 0	0	0
30-Oct-18	0.00	± 0	0	0
31-Oct-18	0.00	± 0	0	0
1-Nov-18	0.00	± 0	0	0
2-Nov-18	0.00	± 0	0	0
3-Nov-18	0.00	± 0	0	0
4-Nov-18	0.00	± 0	0	0
5-Nov-18	0.17	± 0.41	1	90
6-Nov-18	0.33	± 0.82	2	181
7-Nov-18	0.33	± 0.52	2	181
8-Nov-18	0.83	± 2.04	5	452
9-Nov-18	0.00	± 0	0	0
10-Nov-18	0.50	± 1.22	3	271
11-Nov-18	0.00	± 0	0	0
12-Nov-18	0.33	± 0.82	2	181
13-Nov-18	0.00	± 0	0	0
14-Nov-18	0.17	± 0.41	1	90

Date	Mean daily count	Standard deviation	Total daily count	Estimated daily influx
15-Nov-18	0.00	± 0	0	0
16-Nov-18	0.00	± 0	0	0
17-Nov-18	0.17	± 0.41	1	90
18-Nov-18	0.00	± 0	0	0
19-Nov-18	0.00	± 0	0	0
20-Nov-18	0.00	± 0	0	0
21-Nov-18	0.33	± 0.82	2	181
22-Nov-18	0.17	± 0.41	1	90
23-Nov-18	0.00	± 0	0	0
24-Nov-18	0.00	± 0	0	0
25-Nov-18	0.00	± 0	0	0
26-Nov-18	0.17	± 0.41	1	90
27-Nov-18	0.00	± 0	0	0
28-Nov-18	0.00	± 0	0	0
29-Nov-18	0.33	± 0.82	2	181
30-Nov-18	0.00	± 0	0	0
1-Dec-18	0.00	± 0	0	0
2-Dec-18	0.00	± 0	0	0
3-Dec-18	0.67	± 1.03	4	362
4-Dec-18	0.50	± 1.22	3	271
5-Dec-18	0.17	± 0.41	1	90
6-Dec-18	0.00	± 0	0	0
7-Dec-18	0.00	± 0	0	0
8-Dec-18	0.33	± 0.82	2	181
9-Dec-18	0.00	± 0	0	0
10-Dec-18	0.00	± 0	0	0
11-Dec-18	0.33	± 0.82	2	181
12-Dec-18	0.50	± 0.84	3	271
13-Dec-18	0.50	± 0.84	3	271
14-Dec-18	0.00	± 0	0	0
15-Dec-18	0.50	± 0.84	3	271
16-Dec-18	0.50	± 1.22	3	271
17-Dec-18	0.00	± 0	0	0
18-Dec-18	0.17	± 0.41	1	90
19-Dec-18	1.00	± 1.26	6	542
20-Dec-18	1.00	± 1.67	6	542
21-Dec-18	0.50	± 0.84	3	271
22-Dec-18	1.83	± 2.23	11	994
23-Dec-18	0.67	± 1.63	4	362
24-Dec-18	1.17	± 1.6	7	633
25-Dec-18	0.33	± 0.82	2	181
26-Dec-18	2.17	± 3.06	13	1175
27-Dec-18	0.00	± 0	0	0
28-Dec-18	0.83	± 1.33	5	452
29-Dec-18	0.67	± 1.03	4	362
30-Dec-18	0.83	± 1.33	5	452
31-Dec-18	1.00	± 1.67	6	542
Total Count / Estimated Influx			**135**	**12,201**

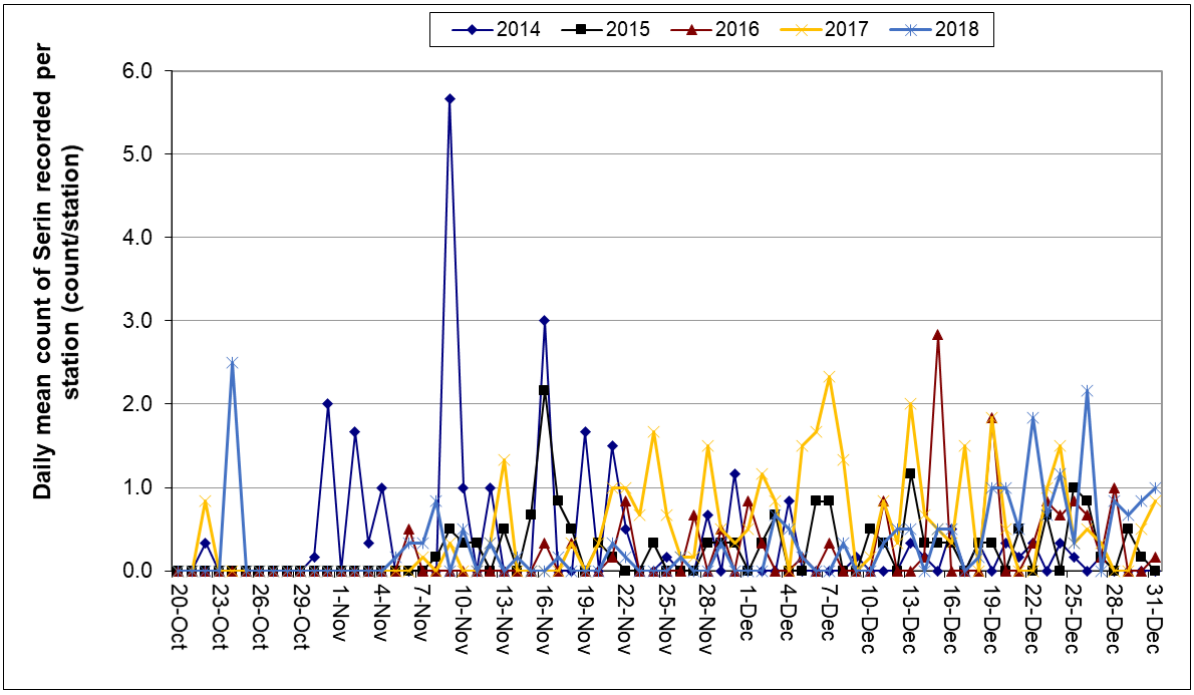

Figure 12. Daily mean counts of European Serin per station (= site) recorded between 20 October and 31 December during the present (2018) and previous (2014, 2015, 2016, 2017) surveys.

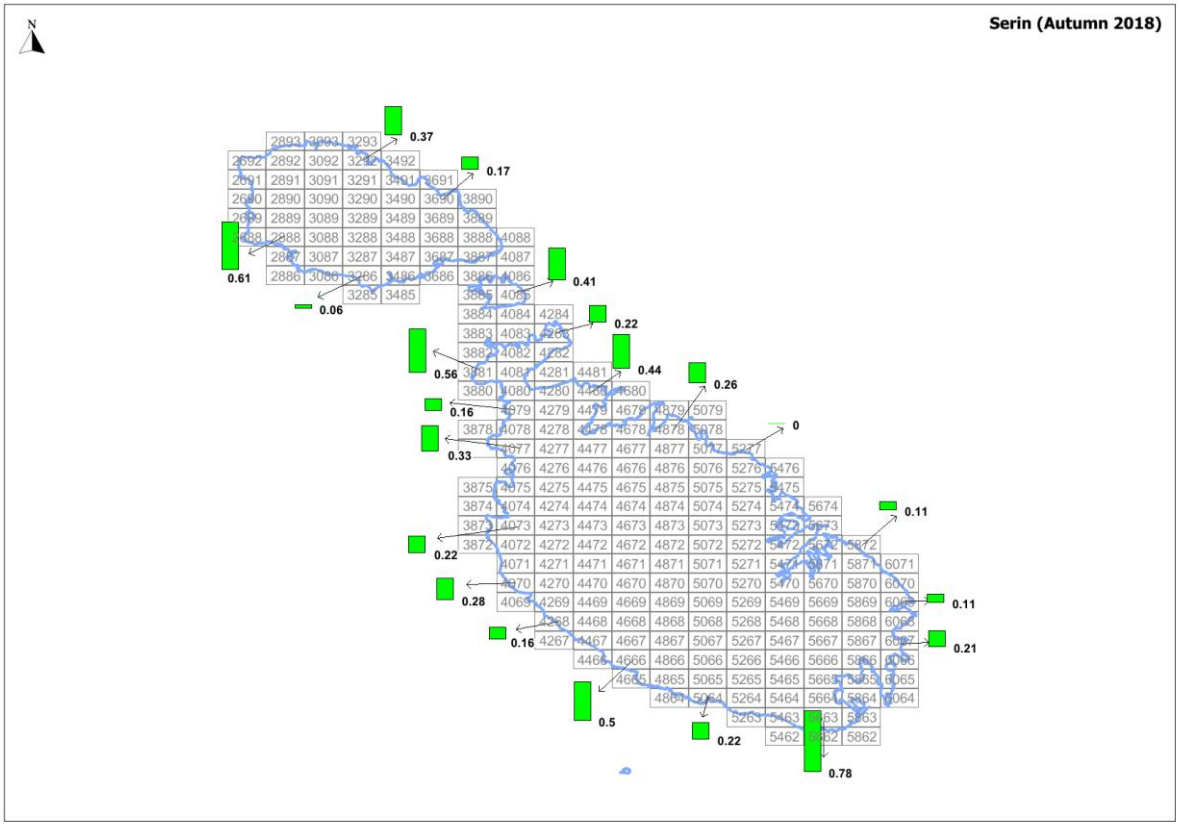

Figure 13. Map of the Maltese Islands showing the standard grid and respective codes, including ones used in the present study. The green bars indicate mean counts of European Serin recorded from study sites in the respective cells.

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 1,356 individuals, with a total influx over the survey period (20 October – 31 December; i.e. 73 days) of 12,201 individuals, i.e. some 167 birds per day; 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 Għar Ħasan (Grid 5663) located on the southern coast of Malta, while overall high counts were also recorded from the site at Kercem (Grid 2888) in Gozo and from the sites at Ċirkewwa (Grid 3881) and Fawwara (Grid 4666) in northwestern and western Malta. Low counts were recorded from sites located at various points along the coasts of the Maltese Islands with no discernible spatial pattern.

Hawfinch

Raw daily counts for Hawfinch recorded from the 21 sites during the present study varied between 0 and a maximum of 2 (see Appendix I), while the mean daily counts ranged between 0 and 0.33 (Table 8). Counts for this species were therefore very low overall. The total counts, i.e. the total number of Hawfinch, recorded from a given grid location (= study site) during the whole study period (73 days), did not vary appreciably between the different sites: one to two individuals were recorded from the sites at grid locations 4268 and 4077 (see Figure 1), while no individuals were recorded throughout the survey period from any 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 20 October to 31 December 2018 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 and 2017 surveys, are shown graphically in Figure 14. Overall, mean count values for Hawfinch recorded during the present (autumn 2018) are lower than those made in autumn 2014 and 2017, but similar to those made in autumn 2015 and 2016 when only single counts of this species were recorded.

Table 8

Values of mean (± SD) daily count and daily total count recorded from the six study sites, together with total influx of migratory Hawfinch.

Date	Mean daily count	Standard deviation	Total daily count	Estimated daily influx
20-Oct-18	0.00	± 0	0	0
21-Oct-18	0.00	± 0	0	0
22-Oct-18	0.00	± 0	0	0
23-Oct-18	0.00	± 0	0	0
24-Oct-18	0.00	± 0	0	0
25-Oct-18	0.33	± 0.82	2	181
26-Oct-18	0.00	± 0	0	0
27-Oct-18	0.00	± 0	0	0
28-Oct-18	0.00	± 0	0	0
29-Oct-18	0.00	± 0	0	0
30-Oct-18	0.00	± 0	0	0
31-Oct-18	0.00	± 0	0	0

Date	Mean daily count	Standard deviation	Total daily count	Estimated daily influx
1-Nov-18	0.00	± 0	0	0
2-Nov-18	0.00	± 0	0	0
3-Nov-18	0.00	± 0	0	0
4-Nov-18	0.00	± 0	0	0
5-Nov-18	0.00	± 0	0	0
6-Nov-18	0.00	± 0	0	0
7-Nov-18	0.00	± 0	0	0
8-Nov-18	0.00	± 0	0	0
9-Nov-18	0.00	± 0	0	0
10-Nov-18	0.00	± 0	0	0
11-Nov-18	0.00	± 0	0	0
12-Nov-18	0.00	± 0	0	0
13-Nov-18	0.00	± 0	0	0
14-Nov-18	0.00	± 0	0	0
15-Nov-18	0.00	± 0	0	0
16-Nov-18	0.00	± 0	0	0
17-Nov-18	0.17	± 0.41	1	90
18-Nov-18	0.00	± 0	0	0
19-Nov-18	0.00	± 0	0	0
20-Nov-18	0.00	± 0	0	0
21-Nov-18	0.00	± 0	0	0
22-Nov-18	0.00	± 0	0	0
23-Nov-18	0.00	± 0	0	0
24-Nov-18	0.00	± 0	0	0
25-Nov-18	0.00	± 0	0	0
26-Nov-18	0.00	± 0	0	0
27-Nov-18	0.00	± 0	0	0
28-Nov-18	0.00	± 0	0	0
29-Nov-18	0.00	± 0	0	0
30-Nov-18	0.00	± 0	0	0
1-Dec-18	0.00	± 0	0	0
2-Dec-18	0.00	± 0	0	0
3-Dec-18	0.00	± 0	0	0
4-Dec-18	0.00	± 0	0	0
5-Dec-18	0.00	± 0	0	0
6-Dec-18	0.00	± 0	0	0
7-Dec-18	0.00	± 0	0	0
8-Dec-18	0.00	± 0	0	0
9-Dec-18	0.00	± 0	0	0
10-Dec-18	0.00	± 0	0	0
11-Dec-18	0.00	± 0	0	0
12-Dec-18	0.00	± 0	0	0
13-Dec-18	0.00	± 0	0	0
14-Dec-18	0.00	± 0	0	0
15-Dec-18	0.00	± 0	0	0
16-Dec-18	0.00	± 0	0	0
17-Dec-18	0.00	± 0	0	0
18-Dec-18	0.00	± 0	0	0
19-Dec-18	0.00	± 0	0	0
20-Dec-18	0.00	± 0	0	0
21-Dec-18	0.00	± 0	0	0
22-Dec-18	0.00	± 0	0	0

Date	Mean daily count	Standard deviation	Total daily count	Estimated daily influx
23-Dec-18	0.00	± 0	0	0
24-Dec-18	0.00	± 0	0	0
25-Dec-18	0.00	± 0	0	0
26-Dec-18	0.00	± 0	0	0
27-Dec-18	0.00	± 0	0	0
28-Dec-18	0.00	± 0	0	0
29-Dec-18	0.00	± 0	0	0
30-Dec-18	0.00	± 0	0	0
31-Dec-18	0.00	± 0	0	0
Total Count / Estimated Influx			**3**	**271**

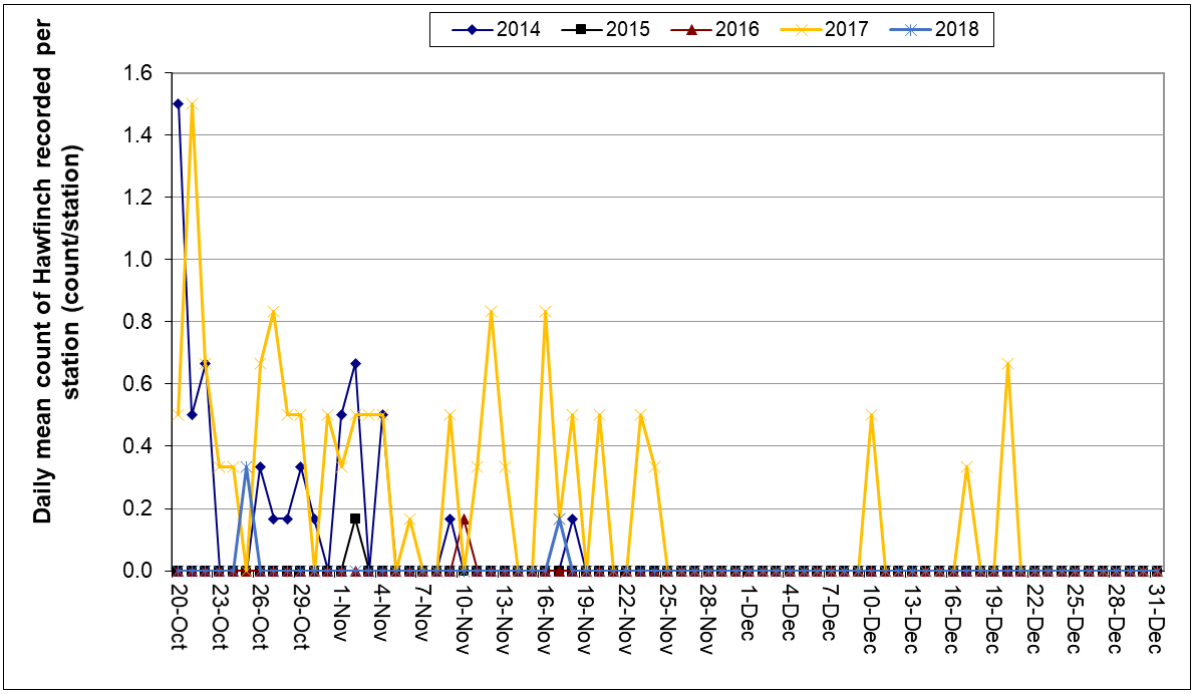

Figure 14. Daily mean counts of Hawfinch per station (= site) recorded between 20 October and 31 December during the present (2018) and previous (2014, 2015, 2016, 2017) surveys.

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 181 individuals, with a total influx over the survey period (20 October – 31 December; i.e. 73 days) of 271 individuals, i.e. some 4 birds per day; see Table 8.

Mean count values recorded from each of the 21 sites are indicated on the map shown in Figure 15. The only counts of Hawfinch were made from the sites at Għajn Tuffieħa (Grid 4077) and Dingli (Grid 4268) located on the northwestern coast of Malta; zero counts were recorded from all other sites.

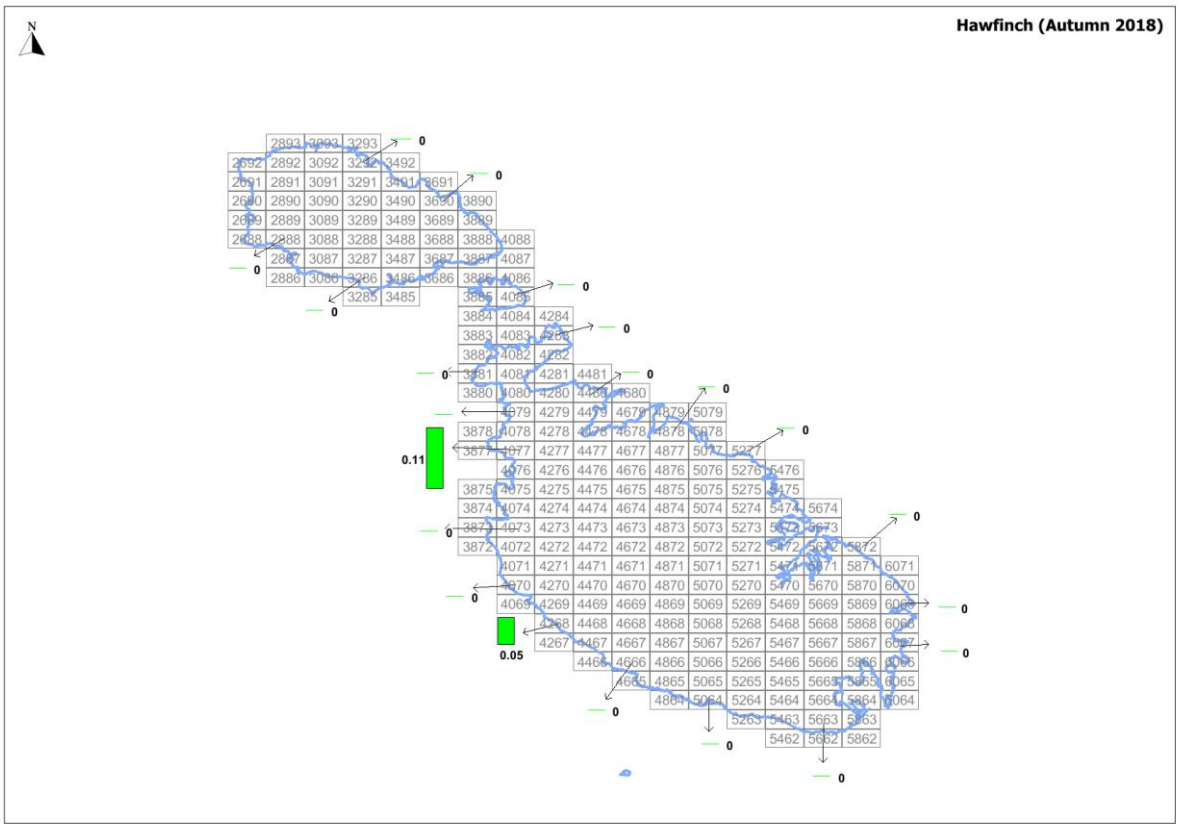

Figure 15. Map of the Maltese Islands showing the standard grid and respective codes, including ones used in the present study. The green bars indicate mean counts of Hawfinch recorded from study sites in the respective cells.

4. 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 20 October and 31 December 2018, 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 higher values recorded in certain periods suggest a general trend of migratory influx during the following periods: Linnet, late October to mid-November; Chaffinch, late October to late November; Serin, November to December. However, no discernible trend was noted in the case of Greenfinch, Siskin, Goldfinch and Hawfinch, particularly given the low number of counts recorded for these 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 as the present, 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 consideration worthy of mention is that some birds may also 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 (20 October – 31 December 2018) was estimated at 49,456 for Linnet; 40,320 for Chaffinch; 2,259 for Greenfinch; 2,259 for Siskin; 361 for Goldfinch; 12,201 for Serin; and 271 for Hawfinch. When comparing the present results with those from the autumn 2014, 2015, 2016 and 2017 surveys (Ecoserv, 2015a, 2016a, 2017a, 2018a), the following overall observations are noted:

- In the case of Linnet (see Figure 2) and Chaffinch (see Figure 4), the migratory influx recorded from the present autumn 2018 survey is similar to that recorded during the previous year (2017), and higher than those recorded in autumn 2015 and 2016, but lower than that recorded in 2014.
- In the case of Greenfinch (see Figure 6) and Hawfinch (see Figure 14) the migratory influx recorded from the present autumn 2018 survey is lower than that recorded during the autumn 2014 and 2017 surveys, but similar to those recorded in autumn 2015 and 2016.
- The migratory influx recorded in the present autumn 2018 survey for Goldfinch (see Figure 10) and Serin (see Figure 12) is also similar to those recorded in autumn 2015 and 2016 and lower than that recorded in autumn 2017, while the influx of these two species recorded in autumn 2014 is comparable to that recorded during the present survey.
- For Siskin (see Figure 8), the influx recorded during the present 2018 autumn survey is appreciably lower than those made in the previous year (2017) and in autumn 2015, but similar to those recorded in autumn 2014 and 2016.
- When comparing data from the five years (2014-2018) within the context of the specific period during which a higher influx of these species was recorded, no discernible pattern of differences is 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 must 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 20 October or after 31 December) 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.

The design of the present survey included counts made over a 73 day period between 20 October and 31 December 2018, 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.

5. References

Ecoserv (2011). Report on a survey of the influx of migratory Common Quail and Turtle Dove following the spring hunting open season in Malta, made in May 2011. Malta, unpublished report; 37pp.

Ecoserv (2012). Report on a survey of the influx of migratory Common Quail and Turtle Dove following the spring hunting open season in Malta, made in April - May 2012. Malta, unpublished report; 26pp.

Ecoserv (2013). Report on a survey of the influx of migratory Common Quail and Turtle Dove following the spring hunting open season in Malta, made in April 2013. Malta, unpublished report; 30pp.

Ecoserv (2014a). Report on a survey of the influx of migratory Common Quail and Turtle Dove over the Maltese Islands, made in April 2014. Malta, unpublished report; 34pp.

Ecoserv (2014b). Report on a survey of the influx of migratory Common Quail and Turtle Dove over the Maltese Islands, made in during September and October 2014. Malta, unpublished report; 54pp.

Ecoserv (2015a). Report on a survey of the influx of migratory finches over the Maltese Islands, made between October and December 2014. Malta, unpublished report; 105pp.

Ecoserv (2015b). Report on a survey of the influx of migratory Common Quail and Turtle Dove over the Maltese Islands, made in April 2015. Malta, unpublished report; 41pp.

Ecoserv (2015c). Report on a survey of the influx of migratory Common Quail and Turtle Dove over the Maltese Islands, made in during September and October 2015. Malta, unpublished report; 42pp.

Ecoserv (2016a). Report on a survey of the influx of migratory finches, Golden Plover and Song Thrush over the Maltese Islands, made between October and December 2015. Malta, unpublished report; 107pp.

Ecoserv (2016b). Report on a survey of the influx of migratory Common Quail and Turtle Dove over the Maltese Islands, made in April 2016. Malta, unpublished report; 43pp.

Ecoserv (2016c). Report on a survey of the influx of migratory Common Quail and Turtle Dove over the Maltese Islands, made in during September and October 2016. Malta, unpublished report; 47pp.

Ecoserv (2017a). Report on a survey of the influx of migratory finches (Linnet, Chaffinch, Serin, Goldfinch, Greenfinch, Hawfinch, and Siskin) over the Maltese Islands, made between October and December 2016. Malta, unpublished report; 85pp.

Ecoserv (2017b). Report on a survey of the influx of Golden Plover and Song Thrush over the Maltese Islands, made between October and December 2016. Malta, unpublished report; 38pp.

Ecoserv (2017c). Report on a survey of the influx of migratory Common Quail and Turtle Dove over the Maltese Islands, made in April 2017. Malta, unpublished report; 44pp.

Ecoserv (2017d). Report on a survey of the influx of migratory Common Quail and Turtle Dove over the Maltese Islands, made in during September and October 2017. Malta, unpublished report; 51pp.

Ecoserv (2018a). Report on a survey of the influx of migratory finches (Linnet, Chaffinch, Serin, Goldfinch, Greenfinch, Hawfinch, and Siskin) over the Maltese Islands, made between October and December 2017. Malta, unpublished report; 87pp.

Ecoserv (2018b). Report on a survey of the influx of Golden Plover and Song Thrush over the Maltese Islands, made between October and December 2017. Malta, unpublished report; 38pp.

Ecoserv (2018c). Report on a survey of the influx of migratory Common Quail and Turtle Dove over the Maltese Islands, made in April 2018. Malta, unpublished report; 47pp.

Ecoserv (2018d). Report on a survey of the influx of migratory Common Quail and Turtle Dove over the Maltese Islands, made in during September and October 2018. Malta, unpublished report; 54pp.

Mallia, A., Briguglio, M., Ellul, A.E. and Formosa, S. (2002). Physical Background, Demography, Tourism, Mineral Resources and Land-Use. In: State of the Environment Report for Malta, 2002. Ministry for Home Affairs and the Environment; 120 pp.

APPENDIX I - Raw counts

Table A. Daily counts of Linnet recorded per site.

Ecoserv Sample Reference Code	B-122-18	B-123-18	B-124-18	B-125-18	B-126-18	B-127-18	B-128-18	B-129-18	B-130-18	B-131-18	B-132-18
Grid Location	**4085**	**3292**	**4079**	**4268**	**6067**	**4878**	**2888**	**4077**	**4666**	**6069**	**4480**
20-Oct-18	2	2	0	0	0	0					
21-Oct-18	1						8	0	0	0	0
22-Oct-18	0										
23-Oct-18	8										
24-Oct-18	17	8	0	0	0	0					
25-Oct-18	12						5	5	4	0	0
26-Oct-18	2										
27-Oct-18	5										
28-Oct-18	0	14	0	2	0	0					
29-Oct-18	0						2	0	0	0	0
30-Oct-18	2										
31-Oct-18	0										
1-Nov-18	16	4	3	0	0	3					
2-Nov-18	0						13	8	0	0	0
3-Nov-18	5										
4-Nov-18	0										
5-Nov-18	16	22	3	3	0	2					
6-Nov-18	4						0	4	16	0	0
7-Nov-18	0										
8-Nov-18	1										
9-Nov-18	2	6	0	3	0	1					
10-Nov-18	3						0	1	4	0	1
11-Nov-18	3										
12-Nov-18	0										
13-Nov-18	4	6	1	17	0	4					
14-Nov-18	7						2	2	5	0	0
15-Nov-18	2										

Ecoserv Sample Reference Code	B-122-18	B-123-18	B-124-18	B-125-18	B-126-18	B-127-18	B-128-18	B-129-18	B-130-18	B-131-18	B-132-18
16-Nov-18	0										
17-Nov-18	0	3	0	0	3	0					
18-Nov-18	2						0	0	4	0	0
19-Nov-18	0										
20-Nov-18	0										
21-Nov-18	2	4	3	1	0	0					
22-Nov-18	0						0	4	1	0	0
23-Nov-18	0										
24-Nov-18	2										
25-Nov-18	0	1	0	0	2	4					
26-Nov-18	0						2	0	0	0	0
27-Nov-18	0										
28-Nov-18	0										
29-Nov-18	1	0	0	0	0	0					
30-Nov-18	0						1	5	1	0	1
1-Dec-18	0										
2-Dec-18	4										
3-Dec-18	0	1	0	0	0	0					
4-Dec-18	0						3	0	0	0	0
5-Dec-18	1										
6-Dec-18	0										
7-Dec-18	1	0	0	0	0	0					
8-Dec-18	0						0	0	4	0	0
9-Dec-18	0										
10-Dec-18	0										
11-Dec-18	0	0	0	0	0	0					
12-Dec-18	0						14	4	0	0	0
13-Dec-18	0										
14-Dec-18	0										
15-Dec-18	0	0	0	0	0	0					
16-Dec-18	0						0	0	2	0	0
17-Dec-18	0										

Ecoserv Sample Reference Code	B-122-18	B-123-18	B-124-18	B-125-18	B-126-18	B-127-18	B-128-18	B-129-18	B-130-18	B-131-18	B-132-18
18-Dec-18	1										
19-Dec-18	0	0	2	0	0	0					
20-Dec-18	0						0	0	0	0	0
21-Dec-18	0										
22-Dec-18	0										
23-Dec-18	0	0	0	0	0	0					
24-Dec-18	0						0	0	0	0	3
25-Dec-18	0										
26-Dec-18	0										
27-Dec-18	0	0	3	0	0	0					
28-Dec-18	0						0	0	0	0	0
29-Dec-18	2										
30-Dec-18	0										
31-Dec-18	0	0	0	3	0	0					

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

Ecoserv Sample Reference Code	B-133-18	B-134-18	B-135-18	B-136-18	B-137-18	B-138-18	B-139-18	B-140-18	B-141-18	B-142-18
Grid Location	**3268**	**4073**	**5064**	**5872**	**4283**	**3690**	**3881**	**4070**	**5663**	**5277**
20-Oct-18										
21-Oct-18										
22-Oct-18	0	0	2	0	0					
23-Oct-18						7	0	2	0	0
24-Oct-18										
25-Oct-18										
26-Oct-18	8	0	7	0	0					
27-Oct-18						3	0	6	0	2
28-Oct-18										
29-Oct-18										
30-Oct-18	5	0	0	0	3					

Ecoserv Sample Reference Code	B-133-18	B-134-18	B-135-18	B-136-18	B-137-18	B-138-18	B-139-18	B-140-18	B-141-18	B-142-18
31-Oct-18						2	0	0	0	0
1-Nov-18										
2-Nov-18										
3-Nov-18	0	5	0	0	14					
4-Nov-18						3	3	4	0	5
5-Nov-18										
6-Nov-18										
7-Nov-18	1	6	0	3	0					
8-Nov-18						9	0	5	0	0
9-Nov-18										
10-Nov-18										
11-Nov-18	15	0	0	1	2					
12-Nov-18						3	0	11	0	0
13-Nov-18										
14-Nov-18										
15-Nov-18	0	2	0	0	0					
16-Nov-18						0	0	0	0	0
17-Nov-18										
18-Nov-18										
19-Nov-18	0	0	1	0	2					
20-Nov-18						0	2	0	0	0
21-Nov-18										
22-Nov-18										
23-Nov-18	1	1	0	0	0					
24-Nov-18						0	0	0	0	0
25-Nov-18										
26-Nov-18										
27-Nov-18	0	0	0	0	0					
28-Nov-18						0	0	0	0	0
29-Nov-18										
30-Nov-18										
1-Dec-18	0	0	0	0	0					

Ecoserv Sample Reference Code	B-133-18	B-134-18	B-135-18	B-136-18	B-137-18	B-138-18	B-139-18	B-140-18	B-141-18	B-142-18
2-Dec-18						0	0	3	3	0
3-Dec-18										
4-Dec-18										
5-Dec-18	0	0	0	0	0					
6-Dec-18						0	0	0	0	0
7-Dec-18										
8-Dec-18										
9-Dec-18	0	0	0	0	0					
10-Dec-18						0	0	0	0	0
11-Dec-18										
12-Dec-18										
13-Dec-18	0	0	0	0	0					
14-Dec-18						0	0	0	0	0
15-Dec-18										
16-Dec-18										
17-Dec-18	0	0	0	0	0					
18-Dec-18						0	0	0	0	0
19-Dec-18										
20-Dec-18										
21-Dec-18	0	0	0	0	0					
22-Dec-18						2	0	0	0	0
23-Dec-18										
24-Dec-18										
25-Dec-18	0	0	0	0	0					
26-Dec-18						0	0	2	0	0
27-Dec-18										
28-Dec-18										
29-Dec-18	0	0	0	0	0					
30-Dec-18						0	0	0	0	0
31-Dec-18										

Table B. Daily counts of Chaffinch recorded per site.

Ecoserv Sample Reference Code	B-143-18	B-144-18	B-145-18	B-146-18	B-147-18	B-148-18	B-149-18	B-150-18	B-151-18	B-152-18	B-153-18
Grid Location	**4085**	**3292**	**4079**	**4268**	**6067**	**4878**	**2888**	**4077**	**4666**	**6069**	**4480**
20-Oct-18	0	3	0	0	0	0					
21-Oct-18	0						1	0	0	0	2
22-Oct-18	0										
23-Oct-18	0										
24-Oct-18	5	5	3	0	0	0					
25-Oct-18	3						0	5	0	0	0
26-Oct-18	10										
27-Oct-18	0										
28-Oct-18	5	2	0	0	0	0					
29-Oct-18	0						0	0	0	0	1
30-Oct-18	2										
31-Oct-18	0										
1-Nov-18	1	3	0	1	0	4					
2-Nov-18	0						7	0	0	0	0
3-Nov-18	0										
4-Nov-18	0										
5-Nov-18	3	11	0	4	1	0					
6-Nov-18	0						0	3	1	2	0
7-Nov-18	3										
8-Nov-18	2										
9-Nov-18	3	8	3	1	0	0					
10-Nov-18	1						4	1	0	0	1
11-Nov-18	7										
12-Nov-18	0										
13-Nov-18	3	5	1	9	1	4					
14-Nov-18	3						3	0	0	2	0
15-Nov-18	0										
16-Nov-18	1										
17-Nov-18	4	4	2	1	2	0					

Ecoserv Sample Reference Code	B-143-18	B-144-18	B-145-18	B-146-18	B-147-18	B-148-18	B-149-18	B-150-18	B-151-18	B-152-18	B-153-18
18-Nov-18	1						3	0	0	0	0
19-Nov-18	0										
20-Nov-18	0										
21-Nov-18	2	2	0	1	2	0					
22-Nov-18	1						2	8	2	0	3
23-Nov-18	0										
24-Nov-18	1										
25-Nov-18	5	3	0	1	0	4					
26-Nov-18	0						0	0	0	0	0
27-Nov-18	0										
28-Nov-18	3										
29-Nov-18	0	5	0	0	0	0					
30-Nov-18	1						0	1	1	0	0
1-Dec-18	2										
2-Dec-18	0										
3-Dec-18	3	2	1	3	0	0					
4-Dec-18	0						0	0	1	0	0
5-Dec-18	2										
6-Dec-18	0										
7-Dec-18	0	2	0	0	0	0					
8-Dec-18	0						0	2	0	0	0
9-Dec-18	0										
10-Dec-18	0										
11-Dec-18	0	1	0	0	0	0					
12-Dec-18	0						0	0	0	0	0
13-Dec-18	0										
14-Dec-18	0										
15-Dec-18	0	2	0	0	0	0					
16-Dec-18	0						0	1	4	0	0
17-Dec-18	0										
18-Dec-18	0										
19-Dec-18	0	2	0	0	0	0					

Ecoserv Sample Reference Code	B-143-18	B-144-18	B-145-18	B-146-18	B-147-18	B-148-18	B-149-18	B-150-18	B-151-18	B-152-18	B-153-18
20-Dec-18	0						0	4	0	0	0
21-Dec-18	0										
22-Dec-18	1										
23-Dec-18	2	0	0	0	0	0					
24-Dec-18	0						0	1	0	0	0
25-Dec-18	0										
26-Dec-18	0										
27-Dec-18	0	0	0	0	0	0					
28-Dec-18	0						1	0	0	0	0
29-Dec-18	0										
30-Dec-18	0										
31-Dec-18	0	4	0	0	0	0					

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

Ecoserv Sample Reference Code	B-154-18	B-155-18	B-156-18	B-157-18	B-158-18	B-159-18	B-160-18	B-161-18	B-162-18	B-163-18
Grid Location	**3268**	**4073**	**5064**	**5872**	**4283**	**3690**	**3881**	**4070**	**5663**	**5277**
20-Oct-18										
21-Oct-18										
22-Oct-18	0	0	0	0	0					
23-Oct-18						0	3	0	0	0
24-Oct-18										
25-Oct-18										
26-Oct-18	22	0	2	0	3					
27-Oct-18						0	2	0	0	0
28-Oct-18										
29-Oct-18										
30-Oct-18	0	0	0	2	0					
31-Oct-18						0	0	0	0	0
1-Nov-18										

Ecoserv Sample Reference Code	B-154-18	B-155-18	B-156-18	B-157-18	B-158-18	B-159-18	B-160-18	B-161-18	B-162-18	B-163-18
2-Nov-18										
3-Nov-18	0	0	0	0	0					
4-Nov-18						4	2	2	0	0
5-Nov-18										
6-Nov-18										
7-Nov-18	33	1	2	0	10					
8-Nov-18						8	8	3	0	0
9-Nov-18										
10-Nov-18										
11-Nov-18	3	0	0	0	0					
12-Nov-18						5	1	4	0	0
13-Nov-18										
14-Nov-18										
15-Nov-18	18	7	0	0	5					
16-Nov-18						1	0	0	0	0
17-Nov-18										
18-Nov-18										
19-Nov-18	0	0	0	0	0					
20-Nov-18						2	0	0	0	0
21-Nov-18										
22-Nov-18										
23-Nov-18	4	0	0	0	1					
24-Nov-18						0	0	5	0	1
25-Nov-18										
26-Nov-18										
27-Nov-18	0	0	0	0	0					
28-Nov-18						0	0	0	0	0
29-Nov-18										
30-Nov-18										
1-Dec-18	0	2	0	0	0					
2-Dec-18						1	0	4	0	0
3-Dec-18										

Ecoserv Sample Reference Code	B-154-18	B-155-18	B-156-18	B-157-18	B-158-18	B-159-18	B-160-18	B-161-18	B-162-18	B-163-18
4-Dec-18										
5-Dec-18	0	0	0	0	0					
6-Dec-18						0	1	0	0	0
7-Dec-18										
8-Dec-18										
9-Dec-18	0	3	0	0	0					
10-Dec-18						0	0	0	0	0
11-Dec-18										
12-Dec-18										
13-Dec-18	0	5	0	0	0					
14-Dec-18						0	1	0	0	0
15-Dec-18										
16-Dec-18										
17-Dec-18	0	0	0	0	0					
18-Dec-18						0	0	0	0	0
19-Dec-18										
20-Dec-18										
21-Dec-18	2	0	0	0	0					
22-Dec-18						0	0	0	0	0
23-Dec-18										
24-Dec-18										
25-Dec-18	0	0	0	0	0					
26-Dec-18						0	0	0	0	0
27-Dec-18										
28-Dec-18										
29-Dec-18	0	0	0	0	3					
30-Dec-18						0	0	0	0	0
31-Dec-18										

Table C. Daily counts of Greenfinch recorded per site.

Ecoserv Sample Reference Code	B-164-18	B-165-18	B-166-18	B-167-18	B-168-18	B-169-18	B-170-18	B-171-18	B-172-18	B-173-18	B-174-18
Grid Location	**4085**	**3292**	**4079**	**4268**	**6067**	**4878**	**2888**	**4077**	**4666**	**6069**	**4480**
20-Oct-18	0	0	0	0	0	0					
21-Oct-18	0						2	0	0	0	0
22-Oct-18	0										
23-Oct-18	0										
24-Oct-18	0	0	0	0	0	0					
25-Oct-18	0						0	0	0	0	0
26-Oct-18	0										
27-Oct-18	0										
28-Oct-18	0	0	0	0	0	0					
29-Oct-18	0						0	0	0	0	0
30-Oct-18	0										
31-Oct-18	0										
1-Nov-18	0	0	0	0	0	0					
2-Nov-18	0						0	0	0	0	0
3-Nov-18	0										
4-Nov-18	0										
5-Nov-18	0	0	0	0	0	0					
6-Nov-18	0						0	0	0	0	0
7-Nov-18	0										
8-Nov-18	0										
9-Nov-18	0	0	0	0	0	0					
10-Nov-18	0						0	0	2	0	0
11-Nov-18	0										
12-Nov-18	0										
13-Nov-18	0	3	0	0	0	1					
14-Nov-18	0						0	0	2	0	0
15-Nov-18	0										
16-Nov-18	0										
17-Nov-18	0	0	0	0	0	0					

Ecoserv Sample Reference Code	B-164-18	B-165-18	B-166-18	B-167-18	B-168-18	B-169-18	B-170-18	B-171-18	B-172-18	B-173-18	B-174-18
18-Nov-18	0						0	0	0	2	0
19-Nov-18	0										
20-Nov-18	0										
21-Nov-18	0	0	0	0	0	0					
22-Nov-18	0						0	0	0	0	1
23-Nov-18	0										
24-Nov-18	0										
25-Nov-18	0	0	0	0	0	0					
26-Nov-18	0						0	0	0	0	0
27-Nov-18	0										
28-Nov-18	0										
29-Nov-18	0	0	0	0	0	0					
30-Nov-18	0						0	0	0	0	0
1-Dec-18	0										
2-Dec-18	0										
3-Dec-18	0	0	0	0	0	0					
4-Dec-18	0						0	0	0	1	0
5-Dec-18	0										
6-Dec-18	0										
7-Dec-18	0	0	0	0	0	0					
8-Dec-18	0						0	0	0	0	0
9-Dec-18	0										
10-Dec-18	0										
11-Dec-18	0	0	0	0	0	0					
12-Dec-18	0						0	0	0	0	0
13-Dec-18	0										
14-Dec-18	0										
15-Dec-18	0	0	0	0	0	0					
16-Dec-18	0						0	0	0	0	0
17-Dec-18	0										
18-Dec-18	0										
19-Dec-18	0	0	0	0	0	0					

Ecoserv Sample Reference Code	B-164-18	B-165-18	B-166-18	B-167-18	B-168-18	B-169-18	B-170-18	B-171-18	B-172-18	B-173-18	B-174-18
20-Dec-18	0						0	0	0	0	0
21-Dec-18	0										
22-Dec-18	0										
23-Dec-18	0	0	0	0	0	0					
24-Dec-18	0						0	0	1	0	0
25-Dec-18	0										
26-Dec-18	0										
27-Dec-18	0	0	0	0	1	0					
28-Dec-18	0						0	0	0	0	0
29-Dec-18	0										
30-Dec-18	0										
31-Dec-18	0	0	0	0	0	0					

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

Ecoserv Sample Reference Code	B-175-18	B-176-18	B-177-18	B-178-18	B-179-18	B-180-18	B-181-18	B-182-18	B-183-18	B-184-18
Grid Location	**3268**	**4073**	**5064**	**5872**	**4283**	**3690**	**3881**	**4070**	**5663**	**5277**
20-Oct-18										
21-Oct-18										
22-Oct-18	0	0	0	0	0					
23-Oct-18						0	0	0	0	0
24-Oct-18										
25-Oct-18										
26-Oct-18	0	0	0	0	0					
27-Oct-18						0	0	0	0	0
28-Oct-18										
29-Oct-18										
30-Oct-18	0	0	0	0	1					
31-Oct-18						0	0	0	0	0

Ecoserv Sample Reference Code	B-175-18	B-176-18	B-177-18	B-178-18	B-179-18	B-180-18	B-181-18	B-182-18	B-183-18	B-184-18
1-Nov-18										
2-Nov-18										
3-Nov-18	0	0	0	0	0					
4-Nov-18						0	0	0	0	0
5-Nov-18										
6-Nov-18										
7-Nov-18	0	0	0	0	0					
8-Nov-18						0	0	0	0	0
9-Nov-18										
10-Nov-18										
11-Nov-18	0	0	0	0	0					
12-Nov-18						0	0	0	0	0
13-Nov-18										
14-Nov-18										
15-Nov-18	0	0	0	0	0					
16-Nov-18						0	0	0	0	0
17-Nov-18										
18-Nov-18										
19-Nov-18	0	0	0	0	0					
20-Nov-18						0	0	0	0	3
21-Nov-18										
22-Nov-18										
23-Nov-18	0	0	0	0	0					
24-Nov-18						0	0	0	0	0
25-Nov-18										
26-Nov-18										
27-Nov-18	0	0	0	0	0					
28-Nov-18						0	0	0	0	0
29-Nov-18										
30-Nov-18										
1-Dec-18	0	2	0	0	0					
2-Dec-18						0	0	0	0	0

Ecoserv Sample Reference Code	B-175-18	B-176-18	B-177-18	B-178-18	B-179-18	B-180-18	B-181-18	B-182-18	B-183-18	B-184-18
3-Dec-18										
4-Dec-18										
5-Dec-18	0	0	0	0	0					
6-Dec-18						0	0	0	0	0
7-Dec-18										
8-Dec-18										
9-Dec-18	0	0	0	0	0					
10-Dec-18						0	0	0	0	0
11-Dec-18										
12-Dec-18										
13-Dec-18	0	0	0	0	0					
14-Dec-18						0	0	0	0	0
15-Dec-18										
16-Dec-18										
17-Dec-18	0	0	0	0	0					
18-Dec-18						0	0	0	0	0
19-Dec-18										
20-Dec-18										
21-Dec-18	0	0	0	2	0					
22-Dec-18						0	0	0	0	0
23-Dec-18										
24-Dec-18										
25-Dec-18	0	0	0	0	0					
26-Dec-18						0	0	0	0	0
27-Dec-18										
28-Dec-18										
29-Dec-18	0	0	0	0	0					
30-Dec-18						0	0	0	0	1
31-Dec-18										

Table D. Daily counts of Siskin recorded per site.

Ecoserv Sample Reference Code	B-185-18	B-186-18	B-187-18	B-188-18	B-189-18	B-190-18	B-191-18	B-192-18	B-193-18	B-194-18	B-195-18
Grid Location	**4085**	**3292**	**4079**	**4268**	**6067**	**4878**	**2888**	**4077**	**4666**	**6069**	**4480**
20-Oct-18	0	0	2	0	0	0					
21-Oct-18	0						0	0	0	0	0
22-Oct-18	0										
23-Oct-18	0										
24-Oct-18	0	0	0	0	0	0					
25-Oct-18	0						0	3	0	0	0
26-Oct-18	0										
27-Oct-18	0										
28-Oct-18	0	0	0	0	0	0					
29-Oct-18	0						0	0	1	0	0
30-Oct-18	0										
31-Oct-18	0										
1-Nov-18	0	0	0	0	0	0					
2-Nov-18	0						0	0	0	0	0
3-Nov-18	0										
4-Nov-18	0										
5-Nov-18	0	0	0	0	0	0					
6-Nov-18	0						0	0	0	0	0
7-Nov-18	0										
8-Nov-18	0										
9-Nov-18	0	0	0	0	0	0					
10-Nov-18	0						0	0	0	0	0
11-Nov-18	0										
12-Nov-18	0										
13-Nov-18	0	0	0	0	0	0					
14-Nov-18	0						0	0	0	0	0
15-Nov-18	0										
16-Nov-18	0										
17-Nov-18	0	0	0	0	0	0					

Ecoserv Sample Reference Code	B-185-18	B-186-18	B-187-18	B-188-18	B-189-18	B-190-18	B-191-18	B-192-18	B-193-18	B-194-18	B-195-18
18-Nov-18	0						0	0	0	0	0
19-Nov-18	0										
20-Nov-18	0										
21-Nov-18	0	0	0	0	0	0					
22-Nov-18	0						0	0	0	0	0
23-Nov-18	0										
24-Nov-18	0										
25-Nov-18	0	0	0	0	0	0					
26-Nov-18	0						0	0	0	0	0
27-Nov-18	0										
28-Nov-18	0										
29-Nov-18	0	0	0	2	0	0					
30-Nov-18	0						0	3	0	0	0
1-Dec-18	0										
2-Dec-18	0										
3-Dec-18	0	0	0	0	0	0					
4-Dec-18	0						0	0	0	0	0
5-Dec-18	0										
6-Dec-18	0										
7-Dec-18	0	0	0	0	0	0					
8-Dec-18	0						0	3	0	0	0
9-Dec-18	0										
10-Dec-18	0										
11-Dec-18	0	0	0	0	0	0					
12-Dec-18	0						0	0	0	0	0
13-Dec-18	0										
14-Dec-18	0										
15-Dec-18	0	0	0	0	0	0					
16-Dec-18	0						0	0	0	0	0
17-Dec-18	0										
18-Dec-18	0										
19-Dec-18	0	0	0	0	0	0					

Ecoserv Sample Reference Code	B-185-18	B-186-18	B-187-18	B-188-18	B-189-18	B-190-18	B-191-18	B-192-18	B-193-18	B-194-18	B-195-18
20-Dec-18	0						0	0	0	0	0
21-Dec-18	0										
22-Dec-18	0										
23-Dec-18	0	0	0	0	0	0					
24-Dec-18	0						0	0	0	0	0
25-Dec-18	0										
26-Dec-18	0										
27-Dec-18	0	0	0	0	0	0					
28-Dec-18	0						0	0	0	0	0
29-Dec-18	0										
30-Dec-18	0										
31-Dec-18	0	0	0	0	0	0					

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

Ecoserv Sample Reference Code	B-196-18	B-197-18	B-198-18	B-199-18	B-200-18	B-201-18	B-202-18	B-203-18	B-204-18	B-205-18
Grid Location	**3268**	**4073**	**5064**	**5872**	**4283**	**3690**	**3881**	**4070**	**5663**	**5277**
20-Oct-18										
21-Oct-18										
22-Oct-18	0	0	0	0	0					
23-Oct-18						0	0	1	0	0
24-Oct-18										
25-Oct-18										
26-Oct-18	0	0	0	0	0					
27-Oct-18						0	0	0	0	0
28-Oct-18										
29-Oct-18										
30-Oct-18	0	0	0	0	0					
31-Oct-18						0	0	0	0	0
1-Nov-18										

Ecoserv Sample Reference Code	B-196-18	B-197-18	B-198-18	B-199-18	B-200-18	B-201-18	B-202-18	B-203-18	B-204-18	B-205-18
2-Nov-18										
3-Nov-18	0	0	0	0	0					
4-Nov-18						0	0	0	0	0
5-Nov-18										
6-Nov-18										
7-Nov-18	0	0	0	0	0					
8-Nov-18						0	0	0	0	0
9-Nov-18										
10-Nov-18										
11-Nov-18	0	0	0	0	0					
12-Nov-18						0	0	0	0	0
13-Nov-18										
14-Nov-18										
15-Nov-18	0	0	0	0	0					
16-Nov-18						0	0	4	0	0
17-Nov-18										
18-Nov-18										
19-Nov-18	0	0	0	0	0					
20-Nov-18						0	0	0	0	0
21-Nov-18										
22-Nov-18										
23-Nov-18	0	0	0	0	0					
24-Nov-18						0	0	0	0	0
25-Nov-18										
26-Nov-18										
27-Nov-18	0	0	0	0	0					
28-Nov-18						0	0	0	0	0
29-Nov-18										
30-Nov-18										
1-Dec-18	0	5	0	0	0					
2-Dec-18						0	0	0	0	0
3-Dec-18										

Ecoserv Sample Reference Code	B-196-18	B-197-18	B-198-18	B-199-18	B-200-18	B-201-18	B-202-18	B-203-18	B-204-18	B-205-18
4-Dec-18										
5-Dec-18	0	0	0	0	0					
6-Dec-18						0	0	0	0	0
7-Dec-18										
8-Dec-18										
9-Dec-18	0	0	0	0	0					
10-Dec-18						0	0	0	0	0
11-Dec-18										
12-Dec-18										
13-Dec-18	0	1	0	0	0					
14-Dec-18						0	0	0	0	0
15-Dec-18										
16-Dec-18										
17-Dec-18	0	0	0	0	0					
18-Dec-18						0	0	0	0	0
19-Dec-18										
20-Dec-18										
21-Dec-18	0	0	0	0	0					
22-Dec-18						0	0	0	0	0
23-Dec-18										
24-Dec-18										
25-Dec-18	0	0	0	0	0					
26-Dec-18						0	0	0	0	0
27-Dec-18										
28-Dec-18										
29-Dec-18	0	0	0	0	0					
30-Dec-18						0	0	0	0	0
31-Dec-18										

Table E. Daily counts of Goldfinch recorded per site.

Ecoserv Sample Reference Code	B-206-18	B-207-18	B-208-18	B-209-18	B-210-18	B-211-18	B-212-18	B-213-18	B-214-18	B-215-18	B-216-18
Grid Location	**4085**	**3292**	**4079**	**4268**	**6067**	**4878**	**2888**	**4077**	**4666**	**6069**	**4480**
20-Oct-18	0	0	0	0	0	0					
21-Oct-18	0						0	0	0	0	0
22-Oct-18	0										
23-Oct-18	0										
24-Oct-18	0	0	0	0	0	0					
25-Oct-18	0						0	0	0	0	0
26-Oct-18	0										
27-Oct-18	0										
28-Oct-18	0	0	0	0	0	0					
29-Oct-18	0						0	0	0	0	0
30-Oct-18	0										
31-Oct-18	0										
1-Nov-18	0	0	0	0	0	0					
2-Nov-18	0						0	0	0	0	0
3-Nov-18	0										
4-Nov-18	0										
5-Nov-18	0	0	0	0	0	0					
6-Nov-18	0						0	0	1	0	0
7-Nov-18	0										
8-Nov-18	0										
9-Nov-18	0	0	0	0	0	0					
10-Nov-18	0						0	0	0	0	0
11-Nov-18	0										
12-Nov-18	0										
13-Nov-18	0	0	0	0	0	0					
14-Nov-18	0						0	0	0	0	0
15-Nov-18	0										
16-Nov-18	0										
17-Nov-18	0	1	0	0	0	0					

Ecoserv Sample Reference Code	B-206-18	B-207-18	B-208-18	B-209-18	B-210-18	B-211-18	B-212-18	B-213-18	B-214-18	B-215-18	B-216-18
18-Nov-18	0						0	0	0	0	0
19-Nov-18	0										
20-Nov-18	0										
21-Nov-18	0	0	0	0	0	0					
22-Nov-18	0						0	0	0	0	0
23-Nov-18	0										
24-Nov-18	0										
25-Nov-18	0	0	0	0	0	0					
26-Nov-18	0						0	0	0	0	0
27-Nov-18	0										
28-Nov-18	0										
29-Nov-18	0	0	0	0	0	0					
30-Nov-18	0						0	0	0	0	0
1-Dec-18	0										
2-Dec-18	0										
3-Dec-18	0	0	0	0	0	0					
4-Dec-18	0						0	0	0	0	0
5-Dec-18	0										
6-Dec-18	0										
7-Dec-18	0	0	0	0	0	0					
8-Dec-18	0						0	0	0	0	0
9-Dec-18	0										
10-Dec-18	0										
11-Dec-18	0	0	0	0	0	0					
12-Dec-18	0						0	0	0	0	0
13-Dec-18	0										
14-Dec-18	0										
15-Dec-18	0	0	0	0	0	0					
16-Dec-18	0						0	0	0	0	0
17-Dec-18	0										
18-Dec-18	0										
19-Dec-18	0	0	0	0	0	0					

Ecoserv Sample Reference Code	B-206-18	B-207-18	B-208-18	B-209-18	B-210-18	B-211-18	B-212-18	B-213-18	B-214-18	B-215-18	B-216-18
20-Dec-18	0						0	0	0	0	0
21-Dec-18	0										
22-Dec-18	0										
23-Dec-18	0	0	0	0	0	0					
24-Dec-18	0						0	0	0	0	0
25-Dec-18	0										
26-Dec-18	0										
27-Dec-18	0	0	0	0	0	2					
28-Dec-18	0						0	0	0	0	0
29-Dec-18	0										
30-Dec-18	0										
31-Dec-18	0	0	0	0	0	0					

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

Ecoserv Sample Reference Code	B-217-18	B-218-18	B-219-18	B-220-18	B-221-18	B-222-18	B-223-18	B-224-18	B-225-18	B-226-18
Grid Location	**3268**	**4073**	**5064**	**5872**	**4283**	**3690**	**3881**	**4070**	**5663**	**5277**
20-Oct-18										
21-Oct-18										
22-Oct-18	0	0	0	0	0					
23-Oct-18						0	0	0	0	0
24-Oct-18										
25-Oct-18										
26-Oct-18	0	0	0	0	0					
27-Oct-18						0	0	0	0	0
28-Oct-18										
29-Oct-18										
30-Oct-18	0	0	0	0	0					
31-Oct-18						0	0	0	0	0
1-Nov-18										

Ecoserv Sample Reference Code	B-217-18	B-218-18	B-219-18	B-220-18	B-221-18	B-222-18	B-223-18	B-224-18	B-225-18	B-226-18
2-Nov-18										
3-Nov-18	0	0	0	0	0					
4-Nov-18						0	0	0	0	0
5-Nov-18										
6-Nov-18										
7-Nov-18	0	0	0	0	0					
8-Nov-18						0	0	0	0	0
9-Nov-18										
10-Nov-18										
11-Nov-18	0	0	0	0	0					
12-Nov-18						0	0	0	0	0
13-Nov-18										
14-Nov-18										
15-Nov-18	0	0	0	0	0					
16-Nov-18						0	0	0	0	0
17-Nov-18										
18-Nov-18										
19-Nov-18	0	0	0	0	0					
20-Nov-18						0	0	0	0	0
21-Nov-18										
22-Nov-18										
23-Nov-18	0	0	0	0	0					
24-Nov-18						0	0	0	0	0
25-Nov-18										
26-Nov-18										
27-Nov-18	0	0	0	0	0					
28-Nov-18						0	0	0	0	0
29-Nov-18										
30-Nov-18										
1-Dec-18	0	0	0	0	0					
2-Dec-18						0	0	0	0	0
3-Dec-18										

Ecoserv Sample Reference Code	B-217-18	B-218-18	B-219-18	B-220-18	B-221-18	B-222-18	B-223-18	B-224-18	B-225-18	B-226-18
4-Dec-18										
5-Dec-18	0	0	0	0	0					
6-Dec-18						0	0	0	0	0
7-Dec-18										
8-Dec-18										
9-Dec-18	0	0	0	0	0					
10-Dec-18						0	0	0	0	0
11-Dec-18										
12-Dec-18										
13-Dec-18	0	0	0	0	0					
14-Dec-18						0	0	0	0	0
15-Dec-18										
16-Dec-18										
17-Dec-18	0	0	0	0	0					
18-Dec-18						0	0	0	0	0
19-Dec-18										
20-Dec-18										
21-Dec-18	0	0	0	0	0					
22-Dec-18						0	0	0	0	0
23-Dec-18										
24-Dec-18										
25-Dec-18	0	0	0	0	0					
26-Dec-18						0	0	0	0	0
27-Dec-18										
28-Dec-18										
29-Dec-18	0	0	0	0	0					
30-Dec-18						0	0	0	0	0
31-Dec-18										

Table F. Daily counts of Serin recorded per site.

Ecoserv Sample Reference Code	B-227-18	B-228-18	B-229-18	B-230-18	B-231-18	B-232-18	B-233-18	B-234-18	B-235-18	B-236-18	B-237-18
Grid Location	**4085**	**3292**	**4079**	**4268**	**6067**	**4878**	**2888**	**4077**	**4666**	**6069**	**4480**
20-Oct-18	0	0	0	0	0	0					
21-Oct-18	0						0	0	0	0	0
22-Oct-18	0										
23-Oct-18	0										
24-Oct-18	15	0	0	0	0	0					
25-Oct-18	0						0	0	0	0	0
26-Oct-18	0										
27-Oct-18	0										
28-Oct-18	0	0	0	0	0	0					
29-Oct-18	0						0	0	0	0	0
30-Oct-18	0										
31-Oct-18	0										
1-Nov-18	0	0	0	0	0	0					
2-Nov-18	0						0	0	0	0	0
3-Nov-18	0										
4-Nov-18	0										
5-Nov-18	0	1	0	0	0	0					
6-Nov-18	0						0	0	2	0	0
7-Nov-18	0										
8-Nov-18	5										
9-Nov-18	0	0	0	0	0	0					
10-Nov-18	0						3	0	0	0	0
11-Nov-18	0										
12-Nov-18	0										
13-Nov-18	0	0	0	0	0	0					
14-Nov-18	0						1	0	0	0	0
15-Nov-18	0										
16-Nov-18	0										
17-Nov-18	0	0	0	1	0	0					

Ecoserv Sample Reference Code	B-227-18	B-228-18	B-229-18	B-230-18	B-231-18	B-232-18	B-233-18	B-234-18	B-235-18	B-236-18	B-237-18
18-Nov-18	0						0	0	0	0	0
19-Nov-18	0										
20-Nov-18	0										
21-Nov-18	0	2	0	0	0	0					
22-Nov-18	0						0	0	1	0	0
23-Nov-18	0										
24-Nov-18	0										
25-Nov-18	0	0	0	0	0	0					
26-Nov-18	0						0	1	0	0	0
27-Nov-18	0										
28-Nov-18	0										
29-Nov-18	0	0	0	2	0	0					
30-Nov-18	0						0	0	0	0	0
1-Dec-18	0										
2-Dec-18	0										
3-Dec-18	2	2	0	0	0	0					
4-Dec-18	0						0	0	0	0	3
5-Dec-18	0										
6-Dec-18	0										
7-Dec-18	0	0	0	0	0	0					
8-Dec-18	0						0	0	2	0	0
9-Dec-18	0										
10-Dec-18	0										
11-Dec-18	0	0	2	0	0	0					
12-Dec-18	1						0	0	0	2	0
13-Dec-18	0										
14-Dec-18	0										
15-Dec-18	2	0	1	0	0	0					
16-Dec-18	0						0	3	0	0	0
17-Dec-18	0										
18-Dec-18	0										
19-Dec-18	3	2	0	0	0	1					

Ecoserv Sample Reference Code	B-227-18	B-228-18	B-229-18	B-230-18	B-231-18	B-232-18	B-233-18	B-234-18	B-235-18	B-236-18	B-237-18
20-Dec-18	0						4	0	0	0	2
21-Dec-18	0										
22-Dec-18	0										
23-Dec-18	0	0	0	0	0	4					
24-Dec-18	0						0	2	4	0	1
25-Dec-18	0										
26-Dec-18	0										
27-Dec-18	0	0	0	0	0	0					
28-Dec-18	0						3	0	0	0	2
29-Dec-18	0										
30-Dec-18	0										
31-Dec-18	2	0	0	0	4	0					

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

Ecoserv Sample Reference Code	B-238-18	B-239-18	B-240-18	B-241-18	B-242-18	B-243-18	B-244-18	B-245-18	B-246-18	B-247-18
Grid Location	**3268**	**4073**	**5064**	**5872**	**4283**	**3690**	**3881**	**4070**	**5663**	**5277**
20-Oct-18										
21-Oct-18										
22-Oct-18	0	0	0	0	0					
23-Oct-18						0	0	0	0	0
24-Oct-18										
25-Oct-18										
26-Oct-18	0	0	0	0	0					
27-Oct-18						0	0	0	0	0
28-Oct-18										
29-Oct-18										
30-Oct-18	0	0	0	0	0					
31-Oct-18						0	0	0	0	0
1-Nov-18										

Ecoserv Sample Reference Code	B-238-18	B-239-18	B-240-18	B-241-18	B-242-18	B-243-18	B-244-18	B-245-18	B-246-18	B-247-18
2-Nov-18										
3-Nov-18	0	0	0	0	0					
4-Nov-18						0	0	0	0	0
5-Nov-18										
6-Nov-18										
7-Nov-18	1	1	0	0	0					
8-Nov-18						0	0	0	0	0
9-Nov-18										
10-Nov-18										
11-Nov-18	0	0	0	0	0					
12-Nov-18						2	0	0	0	0
13-Nov-18										
14-Nov-18										
15-Nov-18	0	0	0	0	0					
16-Nov-18						0	0	0	0	0
17-Nov-18										
18-Nov-18										
19-Nov-18	0	0	0	0	0					
20-Nov-18						0	0	0	0	0
21-Nov-18										
22-Nov-18										
23-Nov-18	0	0	0	0	0					
24-Nov-18						0	0	0	0	0
25-Nov-18										
26-Nov-18										
27-Nov-18	0	0	0	0	0					
28-Nov-18						0	0	0	0	0
29-Nov-18										
30-Nov-18										
1-Dec-18	0	0	0	0	0					
2-Dec-18						0	0	0	0	0
3-Dec-18										

Ecoserv Sample Reference Code	B-238-18	B-239-18	B-240-18	B-241-18	B-242-18	B-243-18	B-244-18	B-245-18	B-246-18	B-247-18
4-Dec-18										
5-Dec-18	0	0	0	0	1					
6-Dec-18						0	0	0	0	0
7-Dec-18										
8-Dec-18										
9-Dec-18	0	0	0	0	0					
10-Dec-18						0	0	0	0	0
11-Dec-18										
12-Dec-18										
13-Dec-18	0	1	2	0	0					
14-Dec-18						0	0	0	0	0
15-Dec-18										
16-Dec-18										
17-Dec-18	0	0	0	0	0					
18-Dec-18						0	1	0	0	0
19-Dec-18										
20-Dec-18										
21-Dec-18	0	0	2	0	1					
22-Dec-18						0	5	2	4	0
23-Dec-18										
24-Dec-18										
25-Dec-18	0	0	0	0	2					
26-Dec-18						1	1	3	8	0
27-Dec-18										
28-Dec-18										
29-Dec-18	0	2	0	2	0					
30-Dec-18						0	3	0	2	0
31-Dec-18										

Table G. Daily counts of Hawfinch recorded per site.

Ecoserv Sample Reference Code	B-248-18	B-249-18	B-250-18	B-251-18	B-252-18	B-253-18	B-254-18	B-255-18	B-256-18	B-257-18	B-258-18
Grid Location	**4085**	**3292**	**4079**	**4268**	**6067**	**4878**	**2888**	**4077**	**4666**	**6069**	**4480**
20-Oct-18	0	0	0	0	0	0					
21-Oct-18	0						0	0	0	0	0
22-Oct-18	0										
23-Oct-18	0										
24-Oct-18	0	0	0	0	0	0					
25-Oct-18	0						0	2	0	0	0
26-Oct-18	0										
27-Oct-18	0										
28-Oct-18	0	0	0	0	0	0					
29-Oct-18	0						0	0	0	0	0
30-Oct-18	0										
31-Oct-18	0										
1-Nov-18	0	0	0	0	0	0					
2-Nov-18	0						0	0	0	0	0
3-Nov-18	0										
4-Nov-18	0										
5-Nov-18	0	0	0	0	0	0					
6-Nov-18	0						0	0	0	0	0
7-Nov-18	0										
8-Nov-18	0										
9-Nov-18	0	0	0	0	0	0					
10-Nov-18	0						0	0	0	0	0
11-Nov-18	0										
12-Nov-18	0										
13-Nov-18	0	0	0	0	0	0					
14-Nov-18	0						0	0	0	0	0
15-Nov-18	0										
16-Nov-18	0										
17-Nov-18	0	0	0	1	0	0					

Ecoserv Sample Reference Code	B-248-18	B-249-18	B-250-18	B-251-18	B-252-18	B-253-18	B-254-18	B-255-18	B-256-18	B-257-18	B-258-18
18-Nov-18	0						0	0	0	0	0
19-Nov-18	0										
20-Nov-18	0										
21-Nov-18	0	0	0	0	0	0					
22-Nov-18	0						0	0	0	0	0
23-Nov-18	0										
24-Nov-18	0										
25-Nov-18	0	0	0	0	0	0					
26-Nov-18	0						0	0	0	0	0
27-Nov-18	0										
28-Nov-18	0										
29-Nov-18	0	0	0	0	0	0					
30-Nov-18	0						0	0	0	0	0
1-Dec-18	0										
2-Dec-18	0										
3-Dec-18	0	0	0	0	0	0					
4-Dec-18	0						0	0	0	0	0
5-Dec-18	0										
6-Dec-18	0										
7-Dec-18	0	0	0	0	0	0					
8-Dec-18	0						0	0	0	0	0
9-Dec-18	0										
10-Dec-18	0										
11-Dec-18	0	0	0	0	0	0					
12-Dec-18	0						0	0	0	0	0
13-Dec-18	0										
14-Dec-18	0										
15-Dec-18	0	0	0	0	0	0					
16-Dec-18	0						0	0	0	0	0
17-Dec-18	0										
18-Dec-18	0										
19-Dec-18	0	0	0	0	0	0					

Ecoserv Sample Reference Code	B-248-18	B-249-18	B-250-18	B-251-18	B-252-18	B-253-18	B-254-18	B-255-18	B-256-18	B-257-18	B-258-18
20-Dec-18	0						0	0	0	0	0
21-Dec-18	0										
22-Dec-18	0										
23-Dec-18	0	0	0	0	0	0					
24-Dec-18	0						0	0	0	0	0
25-Dec-18	0										
26-Dec-18	0										
27-Dec-18	0	0	0	0	0	0					
28-Dec-18	0						0	0	0	0	0
29-Dec-18	0										
30-Dec-18	0										
31-Dec-18	0	0	0	0	0	0					

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

Ecoserv Sample Reference Code	B-259-18	B-260-18	B-261-18	B-262-18	B-263-18	B-264-18	B-265-18	B-266-18	B-267-18	B-268-18
Grid Location	**3268**	**4073**	**5064**	**5872**	**4283**	**3690**	**3881**	**4070**	**5663**	**5277**
20-Oct-18										
21-Oct-18										
22-Oct-18	0	0	0	0	0					
23-Oct-18						0	0	0	0	0
24-Oct-18										
25-Oct-18										
26-Oct-18	0	0	0	0	0					
27-Oct-18						0	0	0	0	0
28-Oct-18										
29-Oct-18										
30-Oct-18	0	0	0	0	0					
31-Oct-18						0	0	0	0	0
1-Nov-18										

Ecoserv Sample Reference Code	B-259-18	B-260-18	B-261-18	B-262-18	B-263-18	B-264-18	B-265-18	B-266-18	B-267-18	B-268-18
2-Nov-18										
3-Nov-18	0	0	0	0	0					
4-Nov-18						0	0	0	0	0
5-Nov-18										
6-Nov-18										
7-Nov-18	0	0	0	0	0					
8-Nov-18						0	0	0	0	0
9-Nov-18										
10-Nov-18										
11-Nov-18	0	0	0	0	0					
12-Nov-18						0	0	0	0	0
13-Nov-18										
14-Nov-18										
15-Nov-18	0	0	0	0	0					
16-Nov-18						0	0	0	0	0
17-Nov-18										
18-Nov-18										
19-Nov-18	0	0	0	0	0					
20-Nov-18						0	0	0	0	0
21-Nov-18										
22-Nov-18										
23-Nov-18	0	0	0	0	0					
24-Nov-18						0	0	0	0	0
25-Nov-18										
26-Nov-18										
27-Nov-18	0	0	0	0	0					
28-Nov-18						0	0	0	0	0
29-Nov-18										
30-Nov-18										
1-Dec-18	0	0	0	0	0					
2-Dec-18						0	0	0	0	0
3-Dec-18										

Ecoserv Sample Reference Code	B-259-18	B-260-18	B-261-18	B-262-18	B-263-18	B-264-18	B-265-18	B-266-18	B-267-18	B-268-18
4-Dec-18										
5-Dec-18	0	0	0	0	0					
6-Dec-18						0	0	0	0	0
7-Dec-18										
8-Dec-18										
9-Dec-18	0	0	0	0	0					
10-Dec-18						0	0	0	0	0
11-Dec-18										
12-Dec-18										
13-Dec-18	0	0	0	0	0					
14-Dec-18						0	0	0	0	0
15-Dec-18										
16-Dec-18										
17-Dec-18	0	0	0	0	0					
18-Dec-18						0	0	0	0	0
19-Dec-18										
20-Dec-18										
21-Dec-18	0	0	0	0	0					
22-Dec-18						0	0	0	0	0
23-Dec-18										
24-Dec-18										
25-Dec-18	0	0	0	0	0					
26-Dec-18						0	0	0	0	0
27-Dec-18										
28-Dec-18										
29-Dec-18	0	0	0	0	0					
30-Dec-18						0	0	0	0	0
31-Dec-18										