Wild Birds Regulation Unit

Report on a survey of the influx of Golden Plover and Song Thrush over the Maltese Islands, conducted between October 2024 and January 2025

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1. Introduction

The Sectoral Procurement Directorate published a call for tenders (reference SPD3/2023/061) titled "*Tender for independent scientific studies on the influx or passage of migratory Common Quail and Turtle Dove in Malta during autumn 2023 - 2025 and the influx or passage of migratory finches, Golden Plover and Song Thrush in Malta during the 2023 - 2025 autumn/winter seasons (3 years)*", on behalf of the Wild Birds Regulation Unit (WBRU) of the Ministry for Gozo (hereafter 'MGOZ').

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

2. Contract Objectives and Expected Results

2.1 Overall Objectives

The overall objective of this contract is:

- *To provide an independent study on the influx or passage of the migratory Turtle Dove* Streptopelia turtur *and Common Quail* Coturnix coturnix *during the Autumn period, between the 1st of September and 31st October, inclusive of both dates for the year 2023, 2024 and 2025; and*
- *To provide an independent study on the influx or passage during the Autumn/Winter, between the 15th of October till the 15th January, inclusive of both dates for each contracted year, of the following species:*
  *Common Linnet (*Linaria cannabina*),*
  *Common Chaffinch (*Fringilla coelebs*),*
  *European Serin (*Serinus serinus*),*
  *European Goldfinch (*Carduelis carduelis*),*
  *European Greenfinch (*Chloris chloris*),*
  *Hawfinch (*Coccothraustes coccothraustes*),*
  *Eurasian Siskin (*Spinus spinus*),*
  *Golden Plover (*Pluvialis apricaria*), and*
  *Song Thrush (*Turdus philomelos*)*

2.2 Specific Objectives

The objectives of this contract are as follows:

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

2.3 Results to be Achieved by the Consultant

The following results are expected to be delivered:

1. *Daily datasheets with raw counts for seven (7) finch species: (Common Linnet* Linaria cannabina*, Common Chaffinch* Fringilla coelebs*, European Serin* Serinus serinus*, European Goldfinch* Carduelis carduelis*, European Greenfinch* Chloris chloris*, Hawfinch* Coccothraustes coccothraustes*, Eurasian Siskin* Spinus spinus
2. *Daily datasheets with raw counts for Golden Plover* Pluvialis apricaria *and Song Thrush* Turdus philomelos*;*
3. *Daily datasheets with raw counts for the Turtle Dove* Streptopelia turtur *and Quail* Coturnix coturnix*; and*
4. *Submission of three (3) monitoring reports for Autumn/Winter for each of the contracted years: one report comprising the monitoring of the influx of seven species of finches, a separate report comprising the monitoring of the influx of Golden Plover and Song Thrush and another separate report comprising of the monitoring of Turtle Dove and Common Quail (nine (9) reports in total). Each of these reports must include:*
   a) *List of monitoring stations which recorded high/low counts;*
   b) *Dates which showed high/low peaks in the migration of each of the bird species;*
   c) *A daily estimate of the influx of each of the bird species for the whole of the Maltese Islands;*
   d) *The estimated total influx for these species for the whole of the study period, subject to scientifically justified assumptions;*
   e) *A comparative analysis of the results obtained during the past studies; and*
   A comparative assessment of the results obtained with the bag data extracted from telephonic reports for the year in question, which data shall be provided by the Wild Birds Regulation Unit at the end of each monitoring period, (for Golden Plover, Song Thrush and Finches reports, this would only apply in case relevant derogations permitting live-capturing or research derogations are applied in the years concerned).

3. Assumptions and Risks

3.1 Assumptions Underlying the Project Intervention

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

3.2 Risks

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

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

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

4 Scope of the Work

4.1 General

4.1.1 Project Description

The monitoring of the influx or passage of nine bird species (Common Linnet Linaria cannabina*, Common Chaffinch* Fringilla coelebs*, European Serin* Serinus serinus*, European Goldfinch* Carduelis carduelis*, European Greenfinch* Chloris chloris*, Hawfinch* Coccothraustes coccothraustes*, Eurasian Siskin* Spinus spinus*, Golden Plover* Pluvialis apricaria*, Song Thrush* Turdus philomelos*) shall take place during the period between the 15th October and the 15th January both dates included for the contracted years. The Contractor shall mobilise all staff and equipment for this study by the 25th of September of each of the contracted years, in preparation for the execution of Autumn/Winter migration study.*

The monitoring of the influx or passage of the Turtle Dove Streptopelia turtur *and Common Quail* Coturnix coturnix *at each station shall take place between the 1st of September till the 31st of October, both dates included of each of the contracted years, for at least two hours in the morning (prior to 12:00hrs) for Common Quail and for seven hours starting from 7:00hrs in the case of Turtle Dove. The consultant shall mobilise all staff and equipment for this study by the 16th of August of each contracted year, in preparation for the execution of the Autumn bird migration study. The bird monitoring phase shall commence on the 1st of September.*

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

The collection of scientific data to elucidate general population trends for these species is beyond the scope of this bird migration study. The Contractor must submit the daily datasheets with raw counts to the Contracting Authority at the end of each week. The draft monitoring reports and analysis for the Finches and Golden Plover and Song Thrush reports are to be submitted by the 24th of January of each contracted year (2024, 2025, 2026).The draft monitoring report for Turtle Dove and Quail is to be submitted within five (10) working days from the study phase, that is, by not later than the 15th November of each contracted year (2023, 2024, 2025).

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

4.1.2 Geographical Area to be covered

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

4.1.3 Target Groups

As appropriate.

4.2 Specific Activities

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

The Contractor should be available to physically meet the Contracting Authority's representative/s at the Contracting Authority's offices or at the monitoring stations as may be required throughout the contract within a 12-hour notice. The Contractor must also hold onsite meetings with stakeholders and be available to physically visit any of the monitoring stations within a 12-hour notice. Should the Contractor not prove to be available during the contract, or provide untruthful information, the contract will be immediately terminated.

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

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

For Golden Plover, Song Thrush and Finches monitoring study, daily monitoring at each station shall be conducted from 09:00hrs to 14:00hrs during the first part of the study until the day Malta changes to Daylight Saving Time. After this day, daily monitoring at each station shall be conducted from 08:00hrs to 13:00hrs.

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

For each day during the bird monitoring phase, at least six (6) monitoring stations must be fully manned. The exact number, location and area of the monitoring stations will be determined in consultation with scientific experts listed by contractor who are commissioned to undertake this bird migration study. The exact number of the monitoring stations and the location should should be included in the Technical offer Form by the Contractor. Given that the survey is aimed at quantifying the influx or passage of migrating birds, all monitoring stations shall be placed in strategic locations depending on the species being surveyed and the expected geographical occurrence of the species depending on the overall timing of the migration and prevailing weather conditions. The location of the monitoring stations shall be selected with care and shall not include areas where the settlement or sighting of the birds under study cannot in practice occur.

The Project coordinator should be able to co-ordinate a team of scientists and scientific experts and conduct environmental monitoring, nature-related and/or ornithological studies. The role of the scientists accompanying the Project coordinator should also include the ability to conduct environmental monitoring, nature-related and/or ornithological studies. The Project Coordinator and the scientist must hold weekly on site meetings with the Contractor, the Ornithologists and field assistants as well as visit the monitoring stations themselves. Both key experts must be in fluent in Maltese and English languages.

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

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

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

Nonetheless, in view that Finches, Golden Plover and Song Thrush have a preference for migrating during particular times of day, observations should focus on such peak times. In this respect the monitoring is to be carried out from 09:00hrs to 14:00hrs and from 08:00hrs to 13:00hrs following change in the Daylight Saving Time.

In view that the Common Quail has a preference for cover and may be more difficult to observe or be detected, the surveys for this species should focus on area searches. These may include, the use of dogs to flush the birds out and/or through the use of line transects (a method where observers traverse the monitoring area in close parallel lines to search the area). Surveys for

the Common Quail should be carried out for at least two hours in the morning (prior to 12:00hrs) at each of the monitoring stations in operation.

The surveys of the Turtle Dove, on the other hand, should focus mainly on observations (which should include both specimens observed in flight as well as those alighting within the study site). The monitoring of this species needs to be carried out during the times of maximum activity/ major influx of the Turtle Dove and for a minimum of seven hours starting from 7:00hrs at each of the monitoring stations in operation.

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

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

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

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

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

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

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

The field study for Golden Plover, Song Thrush and Finches shall cover 88 full days during the Autumn/Winter migration period, between the 15th October and the 15th January for each contracted year. The field study for the Turtle Dove and Quail shall cover 61 full days between the 1st September and 31st October for each contracted year. The collection of scientific data to elucidate population trends for each bird species is beyond the scope of this bird migration study. The contractor must submit the daily datasheets with raw counts to the Contracting Authority at the end of each week of each of the bird monitoring periods. The Autumn/Winter

Finches, Golden Plover and Song Thrush Migration monitoring reports and analysis is to be submitted by the 24th January of each contracted year (2024, 2025 and 2026). Once such draft reports have been certified for quality assurance by the Contracting Authority, the Finches Migration monitoring report and Golden Plover and Song Thrush Migration monitoring report are to be submitted within five (5) working days from such a review. The draft monitoring report and analysis for Turtle Dove and Quail Autumn study is to be submitted by the 15th of November of each contracted year. Once such draft reports have been certified for quality assurance by the Contracting Authority, the final Autumn monitoring reports are to be submitted within five (5) working days from such a review.

These activities will result in:

1. Daily datasheets with raw counts for each of the above mentioned bird species and three monitoring reports for each study period, including comparative analysis for Autumn/Winter season 2023.
2. Daily datasheets with raw counts for each of the above mentioned bird species and three monitoring reports for each study period, including comparative analysis for Autumn/Winter season 2024.
3. Daily datasheets with raw counts for each of the above mentioned bird species and three monitoring reports for each study period, including comparative analysis for Autumn/Winter season 2025.

4.3 Project Management

4.3.1 Responsible Body

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

4.3.2 Management Structure

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

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

As appropriate.

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 and for on-site meetings as may be required throughout the contract within a 12-hour notice.

5.2 Commencement Date & Period of Execution

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

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

6. Requirements

6.1 Personnel

6.1.1 Key experts

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 or equivalent related to Natural Sciences. The project coordinator must be able to communicate fluently in both Maltese and English.

Key Expert 2
A Scientist who must be:
In possession of a Masters degree or other academic qualification at MQRIC level 7 or equivalent in Natural Sciences. The scientist must be able to communicate fluently in both Maltese and English.

Key Experts must hold weekly on-site meetings with the Contractor, the Ornithologists and field assistants as well as visit the monitoring stations themselves.

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

6.1.2 Support Staff and Backstopping

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

6.2 Accommodation

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

6.3 Facilities to be provided by the Contractor

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

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

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

6.4 Equipment

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

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

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

7. Reports

7.1 Reporting Requirements

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

Following the survey/study period a detailed analysis shall be carried out on the data collated which are to be presented in a report. Such report should indicate:

- *the raw counts for the species covered by the corresponding migration report*
- *sampling methodology used*
- *the time schedule for the monitoring taken place*
- *the locations where monitoring was carried out and the estimated area of each site of observation*
- *the peak and low counts for each of the species under study*
- *the locations/ monitoring stations which had peak/low counts*

- *an extrapolation indicating the total influx of each of the relevant species migrating over the Maltese Islands for each day*
- *an estimated total influx of each of the relevant bird species for the whole study period*
- *assumptions taken for such estimates*
- *For Turtle Dove and Quail, comparison of the results with hunting bag data for this period*
- *For Golden Plover, Song Thrush and seven finch species comparison of the results with live-capturing bag data for the species concerned for the current period (this would only apply in case relevant derogations permitting live-capturing are applied in the respective years)*

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 report and analysis for Turtle Dove and Quail is to be submitted by the 15th November of each contracted year. The draft Autumn/Winter Migration monitoring Finch report and the Golden Plover and Song Thrush Migration monitoring report analysis are to be submitted by the 24th January of each contracted year.

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

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

7.2 Submission & approval of progress reports

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

8 Monitoring and Evaluation

8.1 Definition of Indicators

Specific performance measures chosen because they provide valid, useful, practical and comparable measures of progress towards achieving expected results. Can be quantitative: measures of quantity, including statistical statements; or qualitative: judgements and perception derived from subjective analysis.

8.2 Special Requirements

As appropriate.

Ecoserv Ltd (hereafter 'Ecoserv') submitted a response to the tender and was subsequently notified that the company's bid was successful. The present submission constitutes Ecoserv's report of the independent scientific study on the influx of Golden Plover (*Pluvialis apricaria*) and Song Thrush (*Turdus philomelos*) in Malta, undertaken by the company during the period 15 October 2024 to 15 January 2025, which overlaps with the 2024 autumn/winter live-capturing season (01 November 2024 to 10 January 2025 for Golden Plover[1]; 20 October to 31 December 2024 for Song Thrush), and is based on the ToR stated above. A report on the study of the migratory influx of Turtle Dove *Streptopelia turtur* and Common Quail *Coturnix coturnix* that forms part of the present tender was submitted in 2024 (Ecoserv, 2024d), while another report on the study of the migratory influx of finches Common Linnet *Linaria cannabina*, Common Chaffinch *Fringilla coelebs*, European Serin *Serinus serinus*, European Goldfinch *Carduelis carduelis*, European Greenfinch *Chloris chloris*, Hawfinch *Coccothraustes coccothraustes* and Eurasian Siskin *Spinus spinus* that also forms part of the present tender has been submitted separately but in parallel with the present submission (Ecoserv, 2025).

An overview of the migratory behaviour and records for Golden Plover (*Pluvialis apricaria*) and Song Thrush (*Turdus philomelos*) around the Maltese Islands has already been presented in Ecoserv (2016a) and will not be repeated here. Except for the bird migration monitoring studies conducted in autumn of 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022 and 2023 (see Ecoserv, 2016a; 2017a; 2018a; 2019a; 2020a; 2021a; 2022a; 2023a; 2024a), no similar studies on Golden Plover and Song Thrush have been previously undertaken locally. However, records of the number of individuals of these two species caught by live-capturers between 2002 and 2023 are available in the *Carnet de Chasse*/Game Reporting Data reports for the respective years (reports for 2010–2023 may be accessed at: https://wbru.gov.mt/en/resources/reports-and-statistics/), while records of Golden Plover and Song Thrush catches made during the 2012–2023 Autumn live-capturing derogations are available at https://wbru.gov.mt/en/resources/reports-and-statistics/autumn-live-capturing-derogations/.

2. Methodology

Field procedure

The survey design used by Ecoserv during the present autumn/winter 2023 survey was aimed at assessing the migratory influx of Golden Plover and Song Thrush, 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 to monitor the migratory influx of these two species (Ecoserv, 2016a; 2017a; 2018a; 2019a; 2020a; 2021a; 2022a; 2023a; 2024a) and other migratory bird species (Ecoserv, 2011; 2012; 2013; 2014a; 2014b; 2015b; 2015c; 2016b; 2016c; 2017b; 2017c; 2017d; 2018b; 2018c; 2018d; 2019b; 2019c; 2019d; 2020b; 2020c; 2020d; 2021b; 2021c; 2021d; 2022b; 2022c; 2022d; 2023b; 2023c; 2023d; 2024b; 2024c; 2024d). During the survey, two individuals - a field assistant capable of identifying Golden Plover and Song Thrush, and an observer who was responsible for recording data in the field - were stationed at a total of 21 sites (= count stations) distributed over Malta, Comino and Gozo. Prior to enrolment for the survey, the field assistants would have been assessed by Ecoserv's environmental scientists and ecologists to ensure that they are capable of identifying the concerned bird species. The observers were given briefings by Ecoserv's consultants on identification of Golden Plover and Song Thrush, and 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

[1] Although the statutory closing date of the season for Golden Plover was 10 January 2025, the national bag limit was reached on 27 December 2024 and the season was therefore closed on this date.

data proceeded as per designated protocol by carrying out field visits (most of which were 'surprise visits') on a regular basis.

The survey was undertaken over a period of 93 days, between 15 October 2024 and 15 January 2025. During the survey, counts of individuals of the two species (Golden Plover *Pluvialis apricaria* and Song Thrush *Turdus philomelos*) were made at each of 6 different sites on each day during the monitoring period. Each group of 6 sites was surveyed once every 4 days, such that a total of 21 sites were surveyed over each period of 4 days, as agreed with the Contracting Authority. The study site at Comino was included in the 6 sites surveyed on any one day, such that every attempt was made to survey this site on a daily basis. However, when sea transport services to Comino were unavailable due to inclement weather, count surveys were instead undertaken at an alternative site on Malta and located as close as possible to the former. The sampling sites are represented by the grid cell reference numbers listed in Table 1, while their locations are shown in Figure 1.

Table 1
List of grid locations where monitoring of influx of migratory birds was carried out.

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

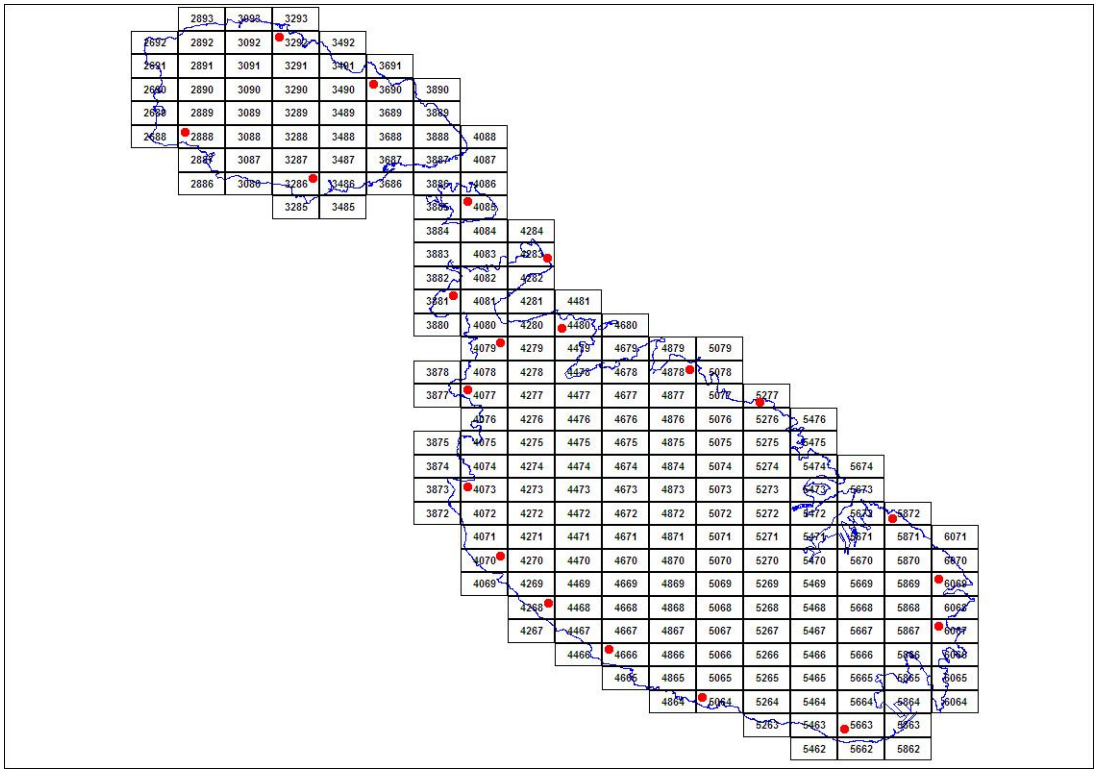

Figure 1. Map of the Maltese Islands showing the localities (grid cells indicated by the red filled circle) where the bird counts were made; see also Table 1.

Since the survey was mainly aimed at quantifying the influx of migrating individuals, field sites were sited at strategic locations in coastal areas. For each species, the number of individuals observed flying within each study site was recorded, while the count area was estimated as the area within the observer's field of view when observing horizontally (c. 250 m on each side of the observer) and vertically upwards (as far as the birds were detected by sight). Golden Plover and Song Thrush 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 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 Golden Plover and Song Thrush was made between 09:00 and 14:00 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, copies of which have been submitted to the Wild Birds Regulation Unit. Although it would be interesting to explore potential relationships between weather conditions and migratory influx of the bird species surveyed, this would entail in-depth statistical analyses, while assessment of the influence of local climatic factors on the migratory influx of birds was beyond the scope of the present study. Nevertheless, the weather data collected during the present survey is useful as it will be available for such potential study.

Data analysis

Using the recorded raw data for each of the two bird species, estimates were made of the mean daily count and total count for the study period (15 October 2024 to 15 January 2025). 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 Golden Plover and Song Thrush is not necessarily restricted to that time of the year covered by the present study; (b) a relatively small number of sites used; (c) the counts were not made daily at each site; and (d) bird counts were made while the live-capturing season for Golden Plover and Song Thrush was open, hence individuals may have been caught before the field personnel could record them. Being small birds, Golden Plover and Song Thrush are easy to miss and 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 is that on any day of the field survey, recording of data was stopped in the early afternoon and 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. Golden Plover and Song Thrush are known to also migrate between dusk and dawn; hence individuals migrating during this time would not be detected during the survey. One should also mention that Song Thrush migration starts before the survey period, given that this species starts migrating from mid-September onwards, whereas the autumn/winter migration of Golden Plover extends into late January; hence individuals of the latter species would not have been included in the present survey. On the other hand, the estimates given in the present report are useful when making comparisons of data collected from the present study period (autumn/winter 2024) and that collected from future studies held in autumn in subsequent years, assuming that a similar survey design is adopted to assess 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)[2]; that is, the estimated daily influx equals the mean daily count multiplied by an extrapolation factor of 271.22/0.5. Values of the estimated daily influx were then summed to obtain an estimate of the total influx of the two bird species (Golden Plover and Song Thrush).

3. Results

Ecoserv's laboratory report reference for the present survey is **012-25**. The sample reference codes for the bird count data are **B-24-274** to **B-24-315**.

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 that 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.

Golden Plover

Raw daily counts for Golden Plover recorded from the 21 sites during the present study varied between 0 and a maximum of 6 (see Appendix I), while the mean daily counts ranged between 0 and 1.5 (Table 2). Most of the counts for this species were recorded between mid-November and mid-January. The total counts, i.e. the total number of Golden Plover individuals recorded from a given grid location (= study site) during the whole study period (93 days), did not vary appreciably between the different sites: at the lower end, no individuals were recorded throughout the survey period from the site at grid location 5872, while at the higher end, 15 individuals were recorded from the site at grid location 3690.

Values of mean daily counts and total counts of Golden Plover recorded during the period 15 October 2024 to 15 January 2025 from the present survey are summarised in Table 2. Values of standard

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

deviation associated with the mean daily counts are also provided in Table 2. Counts of Golden Plover recorded from the present survey, along with those made during the autumn 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022 and 2023 surveys, are shown graphically in Figure 2. Overall, count values for Golden Plover from the present (autumn/winter 2024) survey show a similar trend to those recorded in the previous autumn surveys, with higher count values recorded during the period mid-November to early January.

An estimate of the total influx of Golden Plover over the Maltese Islands is given in Table 2. Based on the mean daily counts, extrapolation translates to an estimated daily influx ranging between 0 and 814 individuals, with a total influx over the survey period (15 October 2024 – 15 January 2025; i.e. 93 days) of 9,670 individuals; see Table 2.

Mean count values for Golden Plover recorded from each of the 21 sites are indicated on the map shown in Figure 3. The highest mean count was recorded from San Blas (Grid 3690) located in Gozo, while relatively high counts were also recorded from other sites in Gozo and some sites in northwestern Malta.

Table 2

Values of mean (± SD) daily count and daily total count recorded from the six study sites during the present survey, together with total influx of migratory Golden Plover.

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

Date	Mean daily count	Standard deviation	Total daily count	Estimated daily influx
13-Nov-24	0.00	± 0.00	0	0
14-Nov-24	0.50	± 1.22	3	271
15-Nov-24	0.00	± 0.00	0	0
16-Nov-24	0.00	± 0.00	0	0
17-Nov-24	1.50	± 2.35	9	814
18-Nov-24	0.33	± 0.82	2	181
19-Nov-24	0.00	± 0.00	0	0
20-Nov-24	0.33	± 0.82	2	181
21-Nov-24	0.17	± 0.41	1	90
22-Nov-24	0.17	± 0.41	1	90
23-Nov-24	0.17	± 0.41	1	90
24-Nov-24	1.33	± 2.16	8	723
25-Nov-24	0.33	± 0.82	2	181
26-Nov-24	0.17	± 0.41	1	90
27-Nov-24	1.00	± 2.00	6	542
28-Nov-24	1.00	± 1.55	6	542
29-Nov-24	0.00	± 0.00	0	0
30-Nov-24	1.50	± 2.35	9	814
01-Dec-24	0.67	± 0.82	4	362
02-Dec-24	0.67	± 1.21	4	362
03-Dec-24	0.33	± 0.82	2	181
04-Dec-24	0.33	± 0.82	2	181
05-Dec-24	0.17	± 0.41	1	90
06-Dec-24	0.83	± 2.04	5	452
07-Dec-24	0.50	± 0.84	3	271
08-Dec-24	0.33	± 0.82	2	181
09-Dec-24	0.17	± 0.41	1	90
10-Dec-24	0.17	± 0.41	1	90
11-Dec-24	0.00	± 0.00	0	0
12-Dec-24	0.00	± 0.00	0	0
13-Dec-24	0.33	± 0.82	2	181
14-Dec-24	0.17	± 0.41	1	90
15-Dec-24	0.83	± 1.33	5	452
16-Dec-24	0.33	± 0.82	2	181
17-Dec-24	0.00	± 0.00	0	0
18-Dec-24	0.00	± 0.00	0	0
19-Dec-24	0.00	± 0.00	0	0
20-Dec-24	0.00	± 0.00	0	0
21-Dec-24	0.17	± 0.41	1	90
22-Dec-24	0.00	± 0.00	0	0
23-Dec-24	0.17	± 0.41	1	90
24-Dec-24	0.00	± 0.00	0	0
25-Dec-24	0.00	± 0.00	0	0
26-Dec-24	0.00	± 0.00	0	0
27-Dec-24	0.00	± 0.00	0	0
28-Dec-24	0.17	± 0.41	1	90
29-Dec-24	0.67	± 1.21	4	362
30-Dec-24	0.00	± 0.00	0	0
31-Dec-24	0.00	± 0.00	0	0
01-Jan-25	0.00	± 0.00	0	0
02-Jan-25	0.33	± 0.82	2	181
03-Jan-25	0.00	± 0.00	0	0

Date	Mean daily count	Standard deviation	Total daily count	Estimated daily influx
04-Jan-25	0.00	± 0.00	0	0
05-Jan-25	0.17	± 0.41	1	90
06-Jan-25	0.00	± 0.00	0	0
07-Jan-25	0.00	± 0.00	0	0
08-Jan-25	0.17	± 0.41	1	90
09-Jan-25	0.67	± 1.03	4	362
10-Jan-25	0.00	± 0.00	0	0
11-Jan-25	0.00	± 0.00	0	0
12-Jan-25	0.00	± 0.00	0	0
13-Jan-25	0.00	± 0.00	0	0
14-Jan-25	0.00	± 0.00	0	0
15-Jan-25	0.00	± 0.00	0	0
Total Count / Estimated Influx			**107**	**9,670**

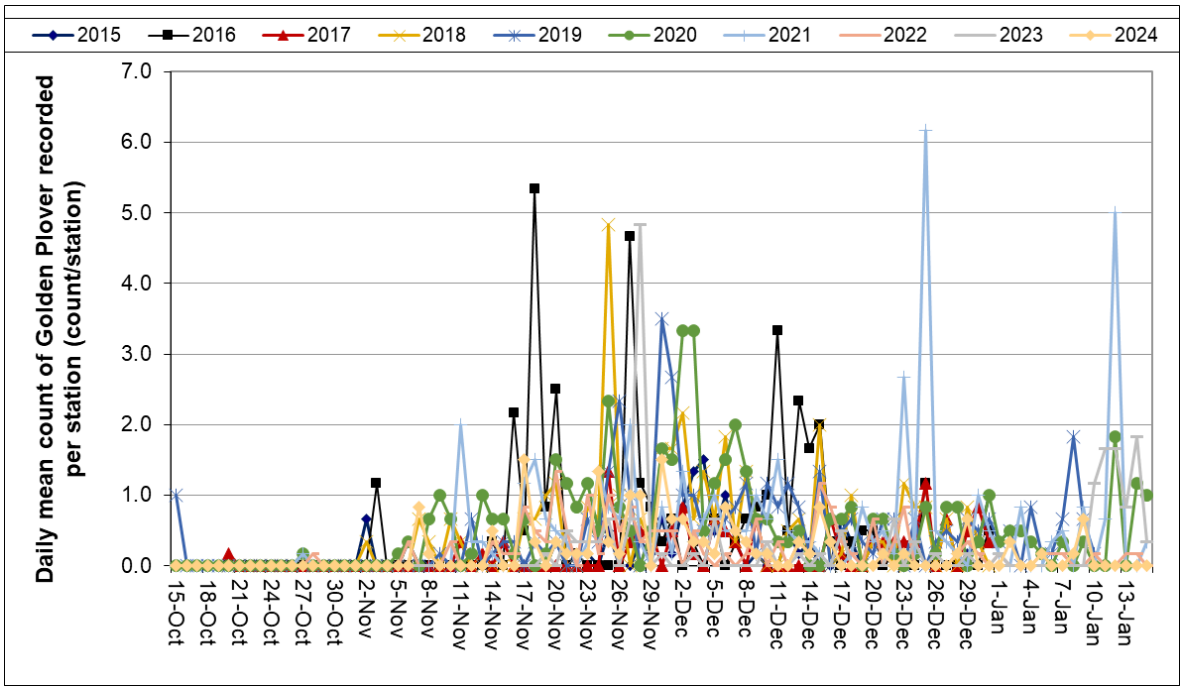

Figure 2. Daily mean counts of Golden Plover per station (= site) recorded between 15 October and 15 January during the present (2024), 2023, 2022, 2021 and 2020 surveys, between 15 October 2019 and 10 January 2020 during the 2019 survey, and between 20 October and 31 December during previous (2014, 2015, 2016, 2017, 2018) surveys.

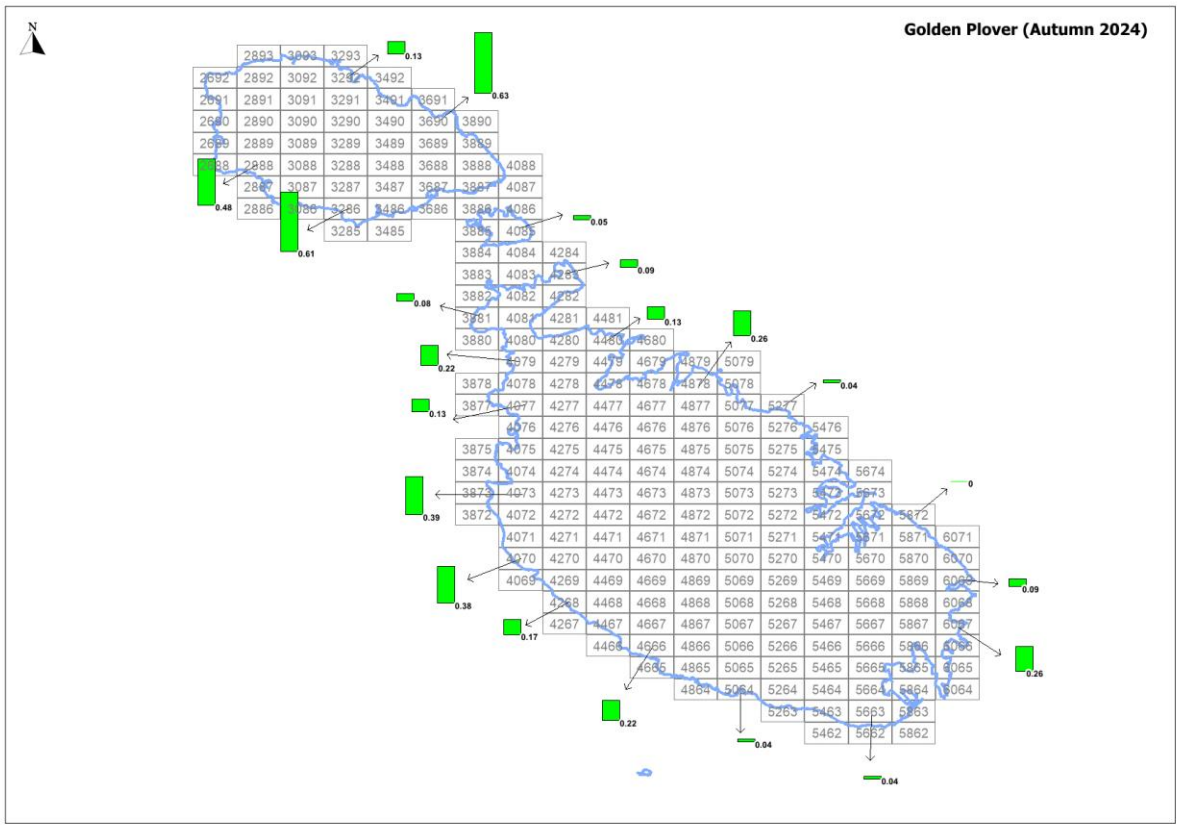

Figure 3. Map of the Maltese Islands showing the standard grid and respective codes, including ones used in the present study. The green bars indicate mean counts of Golden Plover recorded from study sites in the respective cells during the present survey.

Song Thrush

Raw daily counts for Song Thrush recorded from the 21 sites during the present study varied between 0 and a maximum of 40 (see Appendix I), while the mean daily counts ranged between 0 and 8.33 (Table 3). Higher counts were recorded between mid-October and late November, with low counts recorded during the rest of the survey period. The total count, i.e. the total number of Song Thrush individuals recorded from a given grid location (= study site) during the whole study period (93 days), varied appreciably between the different sites: at the lower end 5 individuals were recorded throughout the survey period from the site at grid location 6069, while at the higher end 125 individuals were recorded from the site at grid location 4085 (which was surveyed daily), and 64 individuals were recorded from the site at grid location 4268.

Values of mean daily counts and total counts of Song Thrush recorded during the period 15 October 2024 to 15 January 2025 from the present survey are summarised in Table 3. Values of standard deviation associated with the mean daily counts are also provided in Table 3. Counts of Song Thrush recorded from the present survey, along with those made during the autumn 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022 and 2023 surveys, are shown graphically in Figure 4. Overall, count values for Song Thrush from the present (autumn/winter 2024) survey show a similar trend to those recorded in the previous autumn surveys, with higher count values recorded during the period late October to mid-November (Figure 4).

Table 3

Values of mean (± SD) daily count and daily total count recorded from the six study sites during the present survey, together with total influx of migratory Song Thrush.

Date	Mean daily count	Standard deviation	Total daily count	Estimated daily influx
15-Oct-24	1.00	± 1.26	6	542
16-Oct-24	2.83	± 4.12	17	1537
17-Oct-24	2.00	± 2.76	12	1085
18-Oct-24	3.50	± 4.93	21	1899
19-Oct-24	3.67	± 4.13	22	1989
20-Oct-24	2.00	± 1.90	12	1085
21-Oct-24	0.50	± 0.55	3	271
22-Oct-24	1.50	± 1.64	9	814
23-Oct-24	2.50	± 2.35	15	1356
24-Oct-24	7.67	± 15.91	46	4159
25-Oct-24	3.00	± 2.37	18	1627
26-Oct-24	2.33	± 1.21	14	1266
27-Oct-24	4.17	± 4.88	25	2260
28-Oct-24	3.00	± 2.45	18	1627
29-Oct-24	8.33	± 8.57	50	4520
30-Oct-24	6.50	± 3.83	39	3526
31-Oct-24	4.50	± 3.45	27	2441
01-Nov-24	3.33	± 1.37	20	1808
02-Nov-24	2.17	± 2.14	13	1175
03-Nov-24	0.33	± 0.52	2	181
04-Nov-24	1.50	± 1.97	9	814
05-Nov-24	1.17	± 0.98	7	633
06-Nov-24	2.17	± 2.71	13	1175
07-Nov-24	3.17	± 2.48	19	1718
08-Nov-24	2.67	± 4.84	16	1447
09-Nov-24	2.00	± 1.67	12	1085
10-Nov-24	2.17	± 2.14	13	1175
11-Nov-24	0.50	± 0.84	3	271
12-Nov-24	1.50	± 1.22	9	814
13-Nov-24	1.33	± 1.63	8	723
14-Nov-24	0.33	± 0.82	2	181
15-Nov-24	1.00	± 1.67	6	542
16-Nov-24	0.83	± 0.98	5	452
17-Nov-24	0.50	± 0.84	3	271
18-Nov-24	0.50	± 0.84	3	271
19-Nov-24	0.67	± 1.03	4	362
20-Nov-24	1.00	± 1.26	6	542
21-Nov-24	0.00	± 0.00	0	0
22-Nov-24	0.00	± 0.00	0	0
23-Nov-24	0.33	± 0.52	2	181
24-Nov-24	0.83	± 1.17	5	452
25-Nov-24	1.17	± 2.04	7	633
26-Nov-24	3.00	± 6.42	18	1627
27-Nov-24	0.17	± 0.41	1	90
28-Nov-24	0.67	± 0.82	4	362
29-Nov-24	0.67	± 1.21	4	362
30-Nov-24	0.00	± 0.00	0	0
01-Dec-24	0.67	± 1.63	4	362

Date	Mean daily count	Standard deviation	Total daily count	Estimated daily influx
02-Dec-24	0.00	± 0.00	0	0
03-Dec-24	0.00	± 0.00	0	0
04-Dec-24	0.50	± 0.84	3	271
05-Dec-24	0.50	± 0.84	3	271
06-Dec-24	0.17	± 0.41	1	90
07-Dec-24	0.00	± 0.00	0	0
08-Dec-24	0.00	± 0.00	0	0
09-Dec-24	0.00	± 0.00	0	0
10-Dec-24	0.00	± 0.00	0	0
11-Dec-24	0.17	± 0.41	1	90
12-Dec-24	0.67	± 1.21	4	362
13-Dec-24	0.00	± 0.00	0	0
14-Dec-24	0.33	± 0.82	2	181
15-Dec-24	0.00	± 0.00	0	0
16-Dec-24	0.00	± 0.00	0	0
17-Dec-24	0.00	± 0.00	0	0
18-Dec-24	0.83	± 1.60	5	452
19-Dec-24	0.00	± 0.00	0	0
20-Dec-24	0.00	± 0.00	0	0
21-Dec-24	0.00	± 0.00	0	0
22-Dec-24	0.33	± 0.52	2	181
23-Dec-24	0.00	± 0.00	0	0
24-Dec-24	0.00	± 0.00	0	0
25-Dec-24	0.17	± 0.41	1	90
26-Dec-24	0.83	± 1.60	5	452
27-Dec-24	0.33	± 0.82	2	181
28-Dec-24	0.00	± 0.00	0	0
29-Dec-24	0.00	± 0.00	0	0
30-Dec-24	0.00	± 0.00	0	0
31-Dec-24	0.50	± 1.22	3	271
01-Jan-25	0.17	± 0.41	1	90
02-Jan-25	0.50	± 1.22	3	271
03-Jan-25	0.33	± 0.82	2	181
04-Jan-25	0.17	± 0.41	1	90
05-Jan-25	0.00	± 0.00	0	0
06-Jan-25	0.00	± 0.00	0	0
07-Jan-25	0.17	± 0.41	1	90
08-Jan-25	0.00	± 0.00	0	0
09-Jan-25	0.00	± 0.00	0	0
10-Jan-25	0.00	± 0.00	0	0
11-Jan-25	0.00	± 0.00	0	0
12-Jan-25	0.00	± 0.00	0	0
13-Jan-25	0.17	± 0.41	1	90
14-Jan-25	0.17	± 0.41	1	90
15-Jan-25	0.33	± 0.82	2	181
Total Count / Estimated Influx			**616**	**55,688**

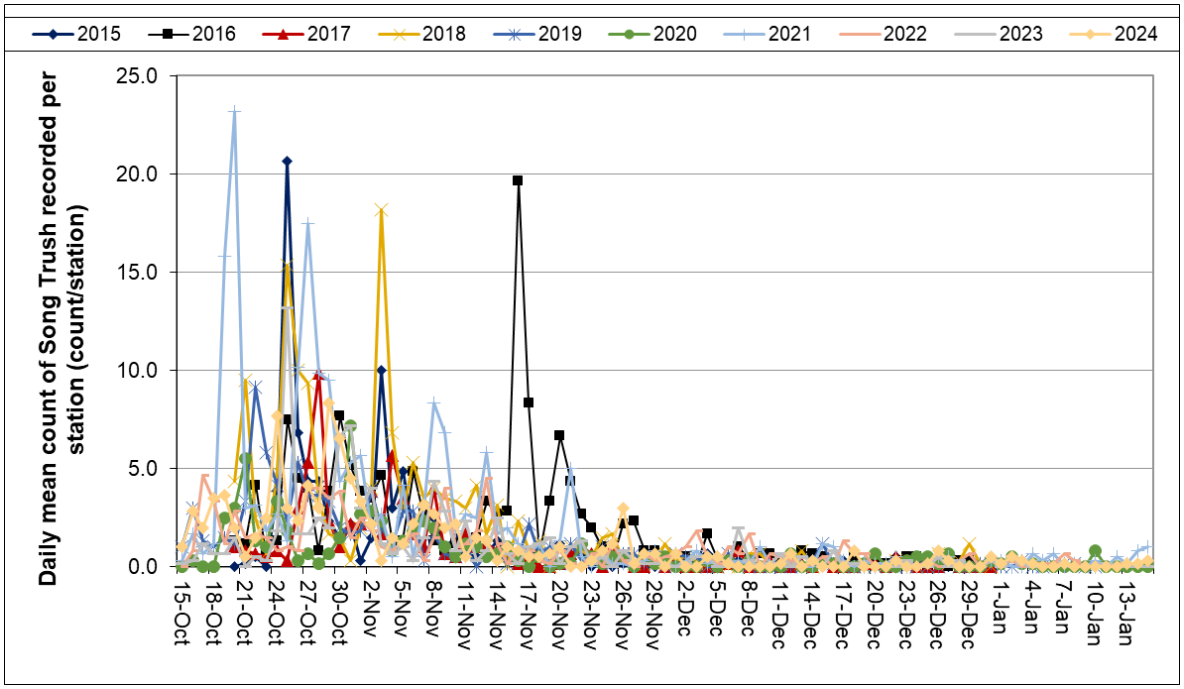

Figure 4. Daily mean counts of Song Thrush per station (= site) recorded between 15 October and 15 January during the present (2024), 2023, 2022, 2021 and 2020 surveys, between 15 October 2019 and 10 January 2020 during the 2019 survey, and between 20 October and 31 December during previous (2014, 2015, 2016, 2017, 2018) surveys.

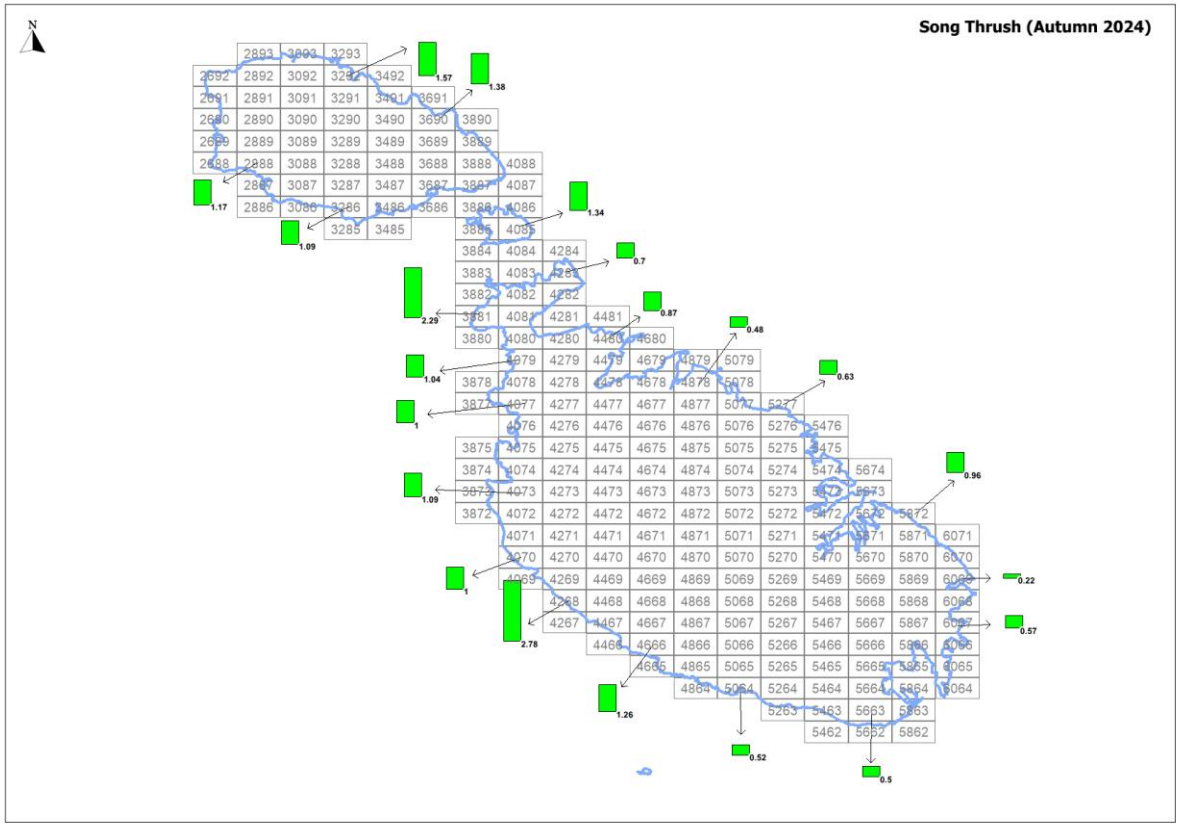

Figure 5. Map of the Maltese Islands showing the standard grid and respective codes, including ones used in the present study. The green bars indicate mean counts of Song Thrush recorded from study sites in the respective cells during the present survey.

An estimate of total influx of Song Thrush over the Maltese Islands is given in Table 3. Based on the mean daily counts, extrapolation translates to an estimated daily influx ranging between 0 and 4,520 individuals, with a total influx over the survey period (15 October 2024 – 15 January 2025; i.e. 93 days) of 55,688 individuals; see Table 3.

Mean count values for Song Thrush recorded from each of the 21 sites are indicated on the map shown in Figure 5. The highest mean count was recorded from Dingli (Grid 4268) in western Malta, while comparatively high mean counts were also recorded several sites in Gozo and sites located on the northwestern coast of Malta. The lowest counts for this species were recorded from study sites in the eastern and southern coasts of Malta.

4. Comparison with bag data

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

The data set provided by the WBRU for this comparison comprises the daily bag count of the two bird species (as reported by live-capturers through a telephonic game reporting system) for the period 01 November 2024 to 27 December 2024[3] in the case of Golden Plover and for the period 20 October 2024 to 31 December 2024 in the case of Song Thrush.

Graphical representations of the mean daily counts made during the present (2024) survey and the daily bag counts for 2024 (WBRU unpublished data) for each of the two bird species were prepared to compare temporal trends among the two different data sets. In a graphical plot showing daily counts, a high variation in counts from day to day may overshadow temporal trends over the two-month period. To aid visual interpretation, a second set of analyses was undertaken by computing a moving average using a rolling 5-day period for the time series count data. This has the effect of smoothening out the day to day fluctuations and hence making longer-term trends in mean daily counts or daily bag counts more apparent, thus facilitating visual interpretation of temporal trends. Note that the analyses based on a moving average do not replace those based on the raw daily counts. Rather, the graphical representations showing a 5-day moving average should be seen in conjunction with those based on daily counts, which are also presented.

Golden Plover

The daily bag counts indicating the number of Golden Plover caught during the 2024 live-capturing season and the mean daily counts of the same species made during the present (2024) survey are shown in Figure 6, while Figure 7 presents the 5-day moving average computed from these data. As

[3] Although the statutory closing date of the season for Golden Plover was 10 January 2025, the national bag limit was reached on 27 December 2024 and the season was therefore closed on this date.

already noted, the magnitude of the bag counts and those of the mean counts made in the 2024 survey are not directly comparable; consequently, the two sets of values are on different scales. Therefore, in Figures 6–7, two separate y-axes are used: the bag count data are plotted on the left-side y-axis, whereas the counts from the 2024 survey are plotted on the right-side y-axis.

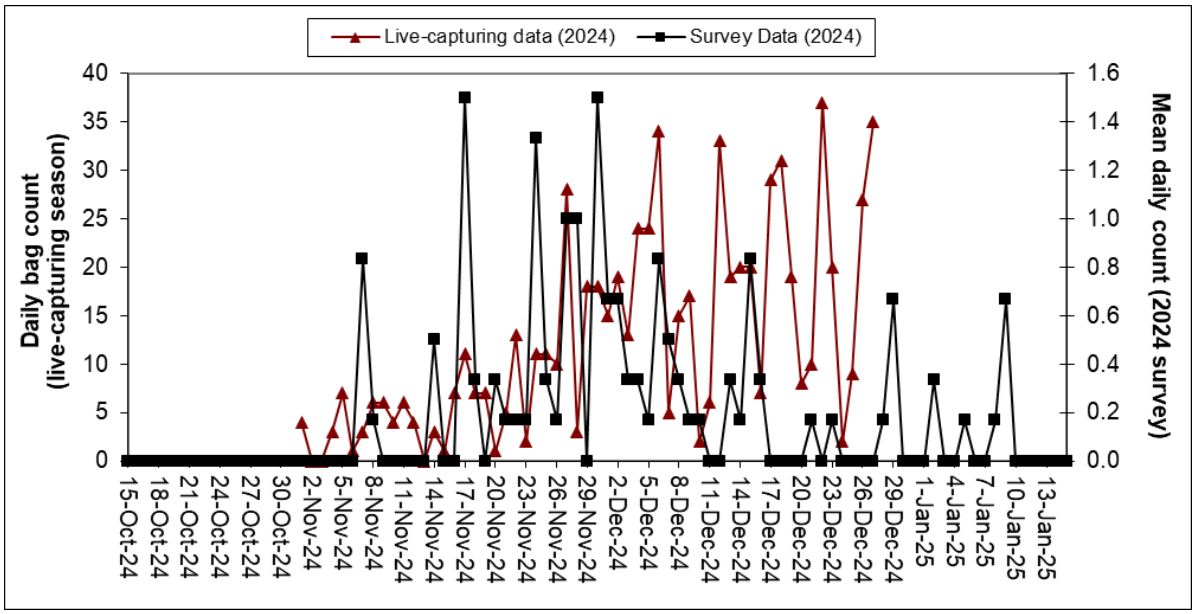

Figure 6. Daily bag count of Golden Plover for the period 01 November to 27 December 2024 (red line; values on left-side y-axis), together with the mean daily counts recorded during the present 2024 migration survey (black line; values on right-side y-axis) for the period 15 October 2024 to 15 January 2025.

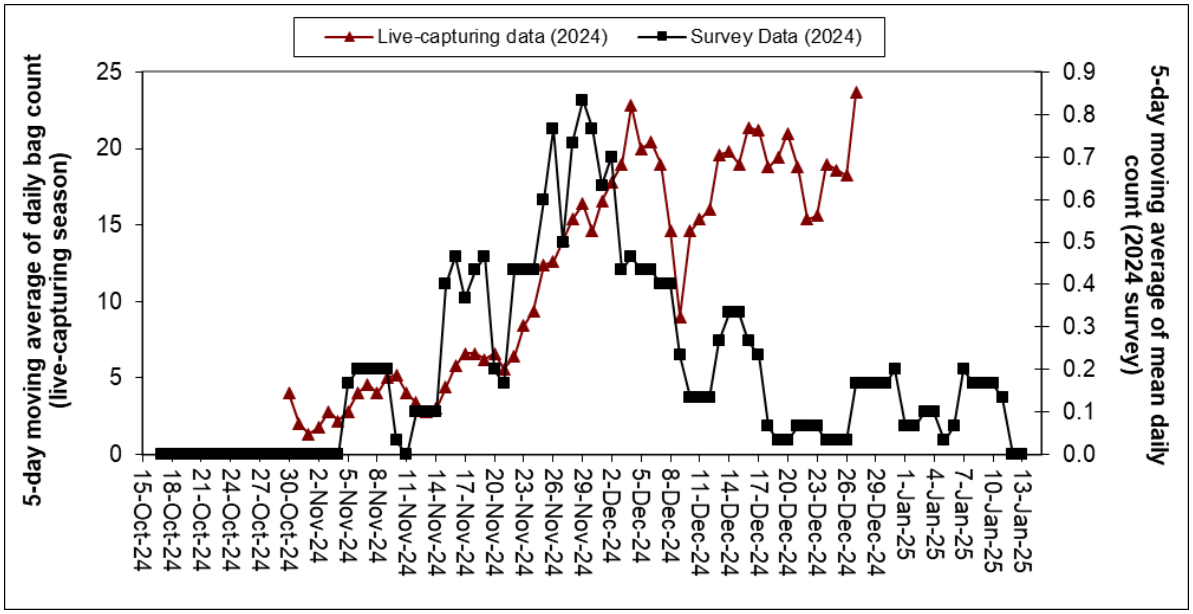

Figure 7. Moving average based on a 5-day rolling time period of the daily bag counts of Golden Plover for the period 01 November to 27 December 2024 (red line; values on left-side y-axis), together with the moving average for the mean daily counts recorded during the 2024 migration survey (black line; values on right-side y-axis) for the period 15 October 2024 to 15 January 2025.

Overall, the daily counts made during the 2024 survey were zero until early November, followed by a period of higher counts between mid-November and mid-December, and then a period of slightly lower counts until the second week of January. Bag counts in 2024 were nil throughout October when the season was not open, low in early November and increased between mid-November and end December. Thus, the general trend observed in the bag counts for 2024 and the daily counts recorded during the 2024 survey is of higher counts starting in mid-November and continuing until end December. However, the temporal pattern was not identical in the two data sets, since in the daily counts recorded during the 2024 survey there was a decreasing trend during December, while the bag counts remained high until the end of this month.

Song Thrush

The daily bag counts indicating the number of Song Thrush caught during the 2024 live-capturing season and the mean daily counts of the same species made during the present (2024) survey are shown in Figure 8, while Figure 9 presents the 5-day moving average computed from these data. As already noted, the magnitude of the bag counts and those of the mean counts made in the 2024 survey are not directly comparable, consequently the two sets of values are on different scales. Therefore, in Figures 8–9, two separate y-axes are used: the bag count data are plotted on the left-side y-axis, whereas the counts from the 2024 survey are plotted on the right-side y-axis.

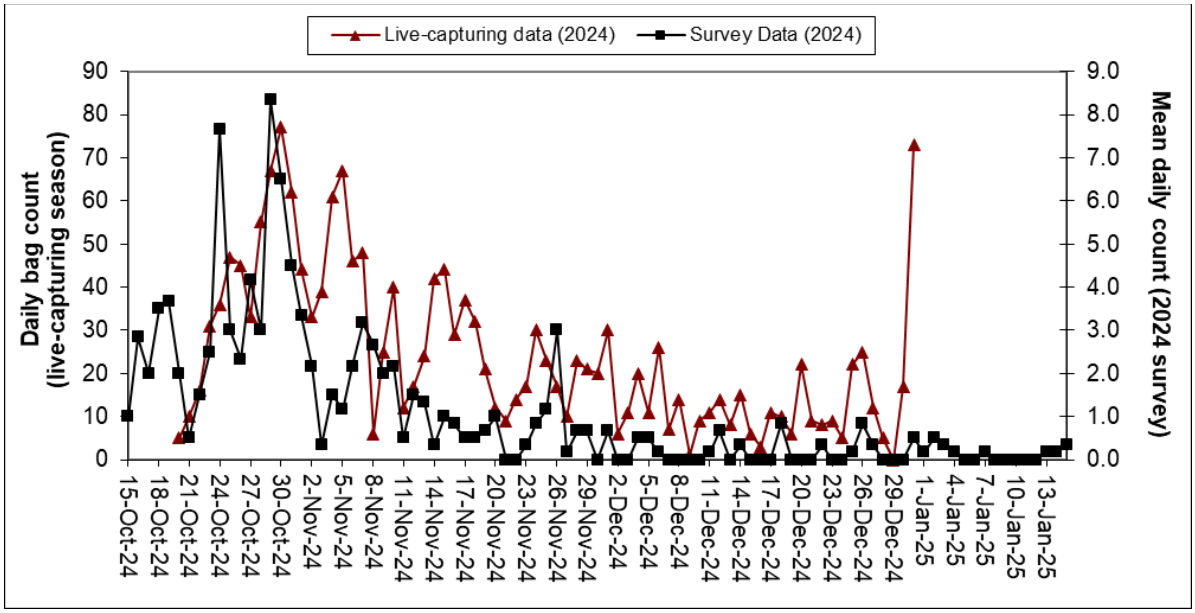

Figure 8. Daily bag count of Song Thrush for the period 20 October to 31 December 2024 (red line; values on left-side y-axis), together with the mean daily counts recorded during the present 2024 migration survey (black line; values on right-side y-axis) for the period 15 October 2024 to 15 January 2025.

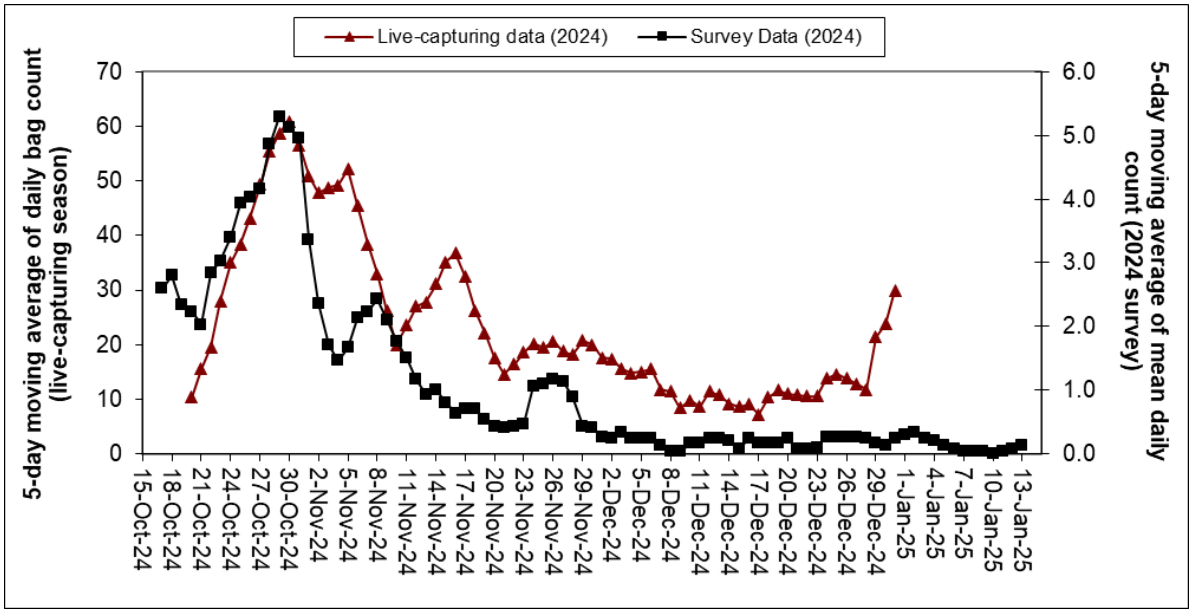

Figure 9. Moving average based on a 5-day rolling time period of the daily bag counts of Song Thrush for the period 01 November to 31 December 2024 (red line; values on left-side y-axis), together with the moving average for the mean daily counts recorded during the 2024 migration survey (black line; values on right-side y-axis) for the period 15 October 2024 to 15 January 2025.

Overall, the highest daily counts made during the present 2024 survey occurred between mid-October and mid-November, with counts declining thereafter; most days in December and January were characterised by low or zero counts. The highest bag counts in 2024 occurred between late October and mid-November, with slightly lower bag counts reported thereafter until the end of December, but with a peak count on 31 December. Thus, the general trend observed in both the bag counts for 2024 and the daily counts recorded during the 2024 survey is of higher counts in the earlier part of the live-capturing season, until around mid-November. However, the bag counts include a peak on last day of the live-capturing season for this species, whereas no such peak was registered during the present survey.

5. Appraisal

The present survey provides data on mean daily counts of Golden Plover (*Pluvialis apricaria*) and Song Thrush (*Turdus philomelos*) recorded during the study period held between 15 October 2024 and 15 January 2025, together with estimates of the migratory influx of the two species. Government had established the autumn/winter live-capturing season for these species (01 November 2024 to 10 January 2025[4] for Golden Plover; 20 October to 31 December 2024 for Song Thrush), which overlapped with the period of the present study.

[4] Although the statutory closing date of the season for Golden Plover was 10 January 2024, the national bag limit was reached on 27 December 2024 and the season was therefore closed on this date.

The mean daily counts from the present survey indicate that a higher frequency of counts for Golden Plover was recorded between mid-November and mid-January, while for Song Thrush higher counts were recorded between mid-October and mid-November. The higher values recorded on certain dates indicate a general trend of migratory influx during mid-November up to mid-January for Golden Plover, and during late October to mid-November for Song Thrush. The raw counts for Song Thrush varied appreciably among the different stations. Such variation is to be expected in studies such 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 noteworthy consideration 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 future comparison, rather than using the counts *per se*, which in any study of this type should be considered as a rough estimate.

The total influx of individuals for the present survey period (15 October 2024 – 15 January 2025) was estimated at 9,670 for Golden Plover and 55,688 for Song Thrush. When comparing the present results with those from the autumn 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022 and 2023 surveys (Ecoserv, 2016a, 2017a, 2018a, 2019a, 2020a, 2021a, 2022a, 2023a, 2024a), the following overall observations are noted[5]:

- The migratory influx of Golden Plover recorded from the present autumn/winter 2024 survey is similar to that recorded during the autumn 2015, 2017, 2022 and 2023 surveys. The total influx of this species recorded during these years is around a third to a half of that recorded during the autumn 2016, 2018, 2019, 2020 and 2021 surveys; this can be attributed to the presence of more migratory peaks recorded during the 2016, 2018, 2019, 2020 and 2021 surveys, whereas only a single peak was recorded during the 2023 survey and no such peaks were recorded in the 2015, 2017, 2022 and present surveys.
- In the case of Song Thrush, the migratory influx recorded from the present autumn/winter 2024 survey is similar to those recorded during the autumn 2015, 2017, 2018, 2019, 2020, 2022 and 2023 surveys, but lower than those recorded in autumn 2016, 2018 and 2021. This can also be attributed to the presence of more migratory peaks during autumn 2016, 2018 and 2021.
- When comparing data from the present 2024 survey with those from previous surveys within the context of the specific period during which a higher influx of the two species was recorded, no discernible differences are evident since overall higher counts for the respective species were recorded during the same period in all survey years.

It is reiterated that estimates of total influx should be treated with utmost caution, given the relatively small number of field sites used in the survey, that counts were not made daily at each site, and since the extrapolation procedure used is likely to result in a rough estimate. Influx of birds at different localities is extremely variable, with potential large differences in number of birds passing at two different localities, even if these are separated by a very small distance, as indicated above. Furthermore, the total length of coastline surveyed per day (3 km) amounts to less than 1.5% of the total coastline. Other limitations are (i) bird migration starts in September, and therefore birds that would have migrated before the start of the present study (i.e. before 15 October) 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

[5] It should also be noted that the present survey extended over a period of 93 days, which is longer than the 88-day period in 2019 and the 73-day period used in all the other surveys held before 2019.

surveys based on a similar design are available, to assess whether influx of any of the two bird species is increasing or decreasing with time.

The design of the present survey included counts made over a 93-day period between 15 October 2024 and 15 January 2025, which covers the period when peak autumn migration of Golden Plover and Song Thrush 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 to carry out 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 gives a useful indication of the autumn influx of the two bird species, provided that results are interpreted in the context of the limitations indicated above.

6. References

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APPENDIX I - Raw counts

Table A. Daily counts of Golden Plover recorded per site.

Ecoserv Sample Reference Code	B-24-274	B-24-275	B-24-276	B-24-277	B-24-278	B-24-279	B-24-280	B-24-281	B-24-282	B-24-283	B-24-284
Grid Location	**4085**	**3292**	**4079**	**4268**	**6067**	**4878**	**2888**	**4077**	**4666**	**6069**	**4480**
15-Oct-24	0										
16-Oct-24	0	0	0	0	0	0					
17-Oct-24	0						0	0	0	0	0
18-Oct-24	0										
19-Oct-24	0										
20-Oct-24	0	0	0	0	0	0					
21-Oct-24	0						0	0	0	0	0
22-Oct-24	0										
23-Oct-24	0										
24-Oct-24	0	0	0	0	0	0					
25-Oct-24	0						0	0	0	0	0
26-Oct-24	0										
27-Oct-24	0										
28-Oct-24	0	0	0	0	0	0					
29-Oct-24	0						0	0	0	0	0
30-Oct-24	0										
31-Oct-24	0										
01-Nov-24	0	0	0	0	0	0					
02-Nov-24	0						0	0	0	0	0
03-Nov-24	0										
04-Nov-24	0										
05-Nov-24	0	0	0	0	0	0					
06-Nov-24	0						0	0	0	0	0
07-Nov-24	0										
08-Nov-24	0										
09-Nov-24	0	0	0	0	0	0					
10-Nov-24	0						0	0	0	0	0

Ecoserv Sample Reference Code	B-24-274	B-24-275	B-24-276	B-24-277	B-24-278	B-24-279	B-24-280	B-24-281	B-24-282	B-24-283	B-24-284
11-Nov-24	0										
12-Nov-24	0										
13-Nov-24	0	0	0	0	0	0					
14-Nov-24	0						0	0	3	0	0
15-Nov-24	0										
16-Nov-24	0										
17-Nov-24	0	0	0	4	5	0					
18-Nov-24	0						0	0	0	0	2
19-Nov-24	0										
20-Nov-24	0										
21-Nov-24	0	0	0	0	0	1					
22-Nov-24	0						0	0	0	1	0
23-Nov-24	0										
24-Nov-24	0										
25-Nov-24	0	0	2	0	0	0					
26-Nov-24	0						0	0	0	0	1
27-Nov-24	0										
28-Nov-24	0										
29-Nov-24	0	0	0	0	0	0					
30-Nov-24	2						6	0	0	1	0
01-Dec-24	1										
02-Dec-24	0										
03-Dec-24	0	0	0	0	0	2					
04-Dec-24	2						0	0	0	0	0
05-Dec-24	0										
06-Dec-24	0										
07-Dec-24	0	2	1	0	0	0					
08-Dec-24	0						2	0	0	0	0
09-Dec-24	0										
10-Dec-24	0										
11-Dec-24	0	0	0	0	0	0					
12-Dec-24	0						0	0	0	0	0

Ecoserv Sample Reference Code	B-24-274	B-24-275	B-24-276	B-24-277	B-24-278	B-24-279	B-24-280	B-24-281	B-24-282	B-24-283	B-24-284
13-Dec-24	0										
14-Dec-24	0										
15-Dec-24	0	0	2	0	0	3					
16-Dec-24	0						0	0	2	0	0
17-Dec-24	0										
18-Dec-24	0										
19-Dec-24	0	0	0	0	0	0					
20-Dec-24	0						0	0	0	0	0
21-Dec-24	0										
22-Dec-24	0										
23-Dec-24	0	0	0	0	1	0					
24-Dec-24	0						0	0	0	0	0
25-Dec-24	0										
26-Dec-24	0										
27-Dec-24	0	0	0	0	0	0					
28-Dec-24	0						1	0	0	0	0
29-Dec-24	0										
30-Dec-24	0										
31-Dec-24	0	0	0	0	0	0					
01-Jan-25	0						0	0	0	0	0
02-Jan-25	0										
03-Jan-25	0										
04-Jan-25	0	0	0	0	0	0					
05-Jan-25	0						0	1	0	0	0
06-Jan-25	0										
07-Jan-25	0										
08-Jan-25	0	1	0	0	0	0					
09-Jan-25	0						2	2	0	0	0
10-Jan-25	0										
11-Jan-25	0										
12-Jan-25	0	0	0	0	0	0					
13-Jan-25	0						0	0	0	0	0

Ecoserv Sample Reference Code	B-24-274	B-24-275	B-24-276	B-24-277	B-24-278	B-24-279	B-24-280	B-24-281	B-24-282	B-24-283	B-24-284
14-Jan-25	0										
15-Jan-25	0										

Table A continued. Daily counts of Golden Plover recorded per site.

Ecoserv Sample Reference Code	B-24-285	B-24-286	B-24-287	B-24-288	B-24-289	B-24-290	B-24-291	B-24-292	B-24-293	B-24-294
Grid Location	**3268**	**4073**	**5064**	**5872**	**4283**	**3690**	**3881**	**4070**	**5663**	**5277**
15-Oct-24						0	0	0	0	0
16-Oct-24										
17-Oct-24										
18-Oct-24	0	0	0	0	0					
19-Oct-24						0	0	0	0	0
20-Oct-24										
21-Oct-24										
22-Oct-24	0	0	0	0	0					
23-Oct-24						0	0	0	0	0
24-Oct-24										
25-Oct-24										
26-Oct-24	0	0	0	0	0					
27-Oct-24						0	0	0	0	0
28-Oct-24										
29-Oct-24										
30-Oct-24	0	0	0	0	0					
31-Oct-24						0	0	0	0	0
01-Nov-24										
02-Nov-24										
03-Nov-24	0	0	0	0	0					
04-Nov-24						0	0	0	0	0
05-Nov-24										

Ecoserv Sample Reference Code	B-24-285	B-24-286	B-24-287	B-24-288	B-24-289	B-24-290	B-24-291	B-24-292	B-24-293	B-24-294
06-Nov-24										
07-Nov-24	0	5	0	0	0					
08-Nov-24						0	1	0	0	0
09-Nov-24										
10-Nov-24										
11-Nov-24	0	0	0	0	0					
12-Nov-24						0	0	0	0	0
13-Nov-24										
14-Nov-24										
15-Nov-24	0	0	0	0	0					
16-Nov-24						0	0	0	0	0
17-Nov-24										
18-Nov-24										
19-Nov-24	0	0	0	0	0					
20-Nov-24						0	0	2	0	0
21-Nov-24										
22-Nov-24										
23-Nov-24	1	0	0	0	0					
24-Nov-24						3	0	5	0	0
25-Nov-24										
26-Nov-24										
27-Nov-24	5	1	0	0	0					
28-Nov-24						4	1	1	0	0
29-Nov-24										
30-Nov-24										
01-Dec-24	2	1	0	0	0					
02-Dec-24						3	0	1	0	0
03-Dec-24										
04-Dec-24										
05-Dec-24	0	0	1	0	0					
06-Dec-24						5	0	0	0	0
07-Dec-24										

Ecoserv Sample Reference Code	B-24-285	B-24-286	B-24-287	B-24-288	B-24-289	B-24-290	B-24-291	B-24-292	B-24-293	B-24-294
08-Dec-24										
09-Dec-24	1	0	0	0	0					
10-Dec-24						0	0	0	1	0
11-Dec-24										
12-Dec-24										
13-Dec-24	0	2	0	0	0					
14-Dec-24						0	0	0	0	1
15-Dec-24										
16-Dec-24										
17-Dec-24	0	0	0	0	0					
18-Dec-24						0	0	0	0	0
19-Dec-24										
20-Dec-24										
21-Dec-24	0	0	0	0	1					
22-Dec-24						0	0	0	0	0
23-Dec-24										
24-Dec-24										
25-Dec-24	0	0	0	0	0					
26-Dec-24						0	0	0	0	0
27-Dec-24										
28-Dec-24										
29-Dec-24	3	0	0	0	1					
30-Dec-24						0	0	0	0	0
31-Dec-24										
01-Jan-25										
02-Jan-25	2	0	0	0	0					
03-Jan-25						0	0	0	0	0
04-Jan-25										
05-Jan-25										
06-Jan-25	0	0	0	0	0					
07-Jan-25						0	0	0	0	0
08-Jan-25										

Ecoserv Sample Reference Code	B-24-285	B-24-286	B-24-287	B-24-288	B-24-289	B-24-290	B-24-291	B-24-292	B-24-293	B-24-294
09-Jan-25										
10-Jan-25	0	0	0	0	0					
11-Jan-25						0	0	0	0	0
12-Jan-25										
13-Jan-25										
14-Jan-25	0	0	0	0	0					
15-Jan-25						0	0	0	0	0

Table B. Daily counts of Song Thrush recorded per site.

Ecoserv Sample Reference Code	B-310-23	B-311-23	B-312-23	B-313-23	B-314-23	B-315-23	B-316-23	B-317-23	B-318-23	B-319-23	B-320-23
Grid Location	**4085**	**3292**	**4079**	**4268**	**6067**	**4878**	**2888**	**4077**	**4666**	**6069**	**4480**
15-Oct-24	1										
16-Oct-24	0	11	2	2	2	0					
17-Oct-24	2						3	7	0	0	0
18-Oct-24	13										
19-Oct-24	4										
20-Oct-24	0	3	5	2	2	0					
21-Oct-24	1						1	1	0	0	0
22-Oct-24	0										
23-Oct-24	4										
24-Oct-24	0	4	0	40	1	1					
25-Oct-24	2						7	3	0	4	2
26-Oct-24	1										
27-Oct-24	1										
28-Oct-24	0	3	3	7	1	4					
29-Oct-24	22						7	5	15	0	1
30-Oct-24	8										
31-Oct-24	5										

Ecoserv Sample Reference Code	B-310-23	B-311-23	B-312-23	B-313-23	B-314-23	B-315-23	B-316-23	B-317-23	B-318-23	B-319-23	B-320-23
01-Nov-24	4	5	3	3	4	1					
02-Nov-24	0						3	1	5	0	4
03-Nov-24	1										
04-Nov-24	0										
05-Nov-24	1	1	3	1	0	1					
06-Nov-24	5						0	2	0	0	6
07-Nov-24	6										
08-Nov-24	4										
09-Nov-24	0	1	4	4	1	2					
10-Nov-24	0						4	3	5	1	0
11-Nov-24	0										
12-Nov-24	2										
13-Nov-24	0	0	4	0	2	2					
14-Nov-24	0						0	0	0	0	2
15-Nov-24	0										
16-Nov-24	0										
17-Nov-24	0	1	0	2	0	0					
18-Nov-24	0						0	1	0	0	2
19-Nov-24	2										
20-Nov-24	2										
21-Nov-24	0	0	0	0	0	0					
22-Nov-24	0						0	0	0	0	0
23-Nov-24	1										
24-Nov-24	0										
25-Nov-24	5	0	0	2	0	0					
26-Nov-24	16						2	0	0	0	0
27-Nov-24	0										
28-Nov-24	2										
29-Nov-24	3	0	0	1	0	0					
30-Nov-24	0						0	0	0	0	0
01-Dec-24	0										
02-Dec-24	0										

Ecoserv Sample Reference Code	B-310-23	B-311-23	B-312-23	B-313-23	B-314-23	B-315-23	B-316-23	B-317-23	B-318-23	B-319-23	B-320-23
03-Dec-24	0	0	0	0	0	0					
04-Dec-24	0						0	0	1	0	2
05-Dec-24	0										
06-Dec-24	0										
07-Dec-24	0	0	0	0	0	0					
08-Dec-24	0						0	0	0	0	0
09-Dec-24	0										
10-Dec-24	0										
11-Dec-24	0	1	0	0	0	0					
12-Dec-24	1						0	0	3	0	0
13-Dec-24	0										
14-Dec-24	0										
15-Dec-24	0	0	0	0	0	0					
16-Dec-24	0						0	0	0	0	0
17-Dec-24	0										
18-Dec-24	4										
19-Dec-24	0	0	0	0	0	0					
20-Dec-24	0						0	0	0	0	0
21-Dec-24	0										
22-Dec-24	1										
23-Dec-24	0	0	0	0	0	0					
24-Dec-24	0						0	0	0	0	0
25-Dec-24	0										
26-Dec-24	0										
27-Dec-24	0	2	0	0	0	0					
28-Dec-24	0						0	0	0	0	0
29-Dec-24	0										
30-Dec-24	0										
31-Dec-24	0	3	0	0	0	0					
01-Jan-25	0						0	0	0	0	1
02-Jan-25	0										
03-Jan-25	0										

Ecoserv Sample Reference Code	B-310-23	B-311-23	B-312-23	B-313-23	B-314-23	B-315-23	B-316-23	B-317-23	B-318-23	B-319-23	B-320-23
04-Jan-25	0	1	0	0	0	0					
05-Jan-25	0						0	0	0	0	0
06-Jan-25	0										
07-Jan-25	0										
08-Jan-25	0	0	0	0	0	0					
09-Jan-25	0						0	0	0	0	0
10-Jan-25	0										
11-Jan-25	0										
12-Jan-25	0	0	0	0	0	0					
13-Jan-25	1						0	0	0	0	0
14-Jan-25	0										
15-Jan-25	0										

Table B continued. Daily counts of Song Thrush recorded per site.

Ecoserv Sample Reference Code	B-321-23	B-322-23	B-323-23	B-324-23	B-325-23	B-326-23	B-327-23	B-328-23	B-329-23	B-330-23
Grid Location	**3268**	**4073**	**5064**	**5872**	**4283**	**3690**	**3881**	**4070**	**5663**	**5277**
15-Oct-24						0	3	0	2	0
16-Oct-24										
17-Oct-24										
18-Oct-24	3	0	4	1	0					
19-Oct-24						2	5	0	0	11
20-Oct-24										
21-Oct-24										
22-Oct-24	1	3	0	4	1					
23-Oct-24						2	6	3	0	0
24-Oct-24										
25-Oct-24										
26-Oct-24	4	3	3	1	2					

Ecoserv Sample Reference Code	B-321-23	B-322-23	B-323-23	B-324-23	B-325-23	B-326-23	B-327-23	B-328-23	B-329-23	B-330-23
27-Oct-24						6	13	4	1	0
28-Oct-24										
29-Oct-24										
30-Oct-24	6	11	0	9	5					
31-Oct-24						9	1	7	5	0
01-Nov-24										
02-Nov-24										
03-Nov-24	1	0	0	0	0					
04-Nov-24						1	4	0	0	4
05-Nov-24										
06-Nov-24										
07-Nov-24	5	5	0	2	1					
08-Nov-24						0	12	0	0	0
09-Nov-24										
10-Nov-24										
11-Nov-24	1	0	0	2	0					
12-Nov-24						3	2	2	0	0
13-Nov-24										
14-Nov-24										
15-Nov-24	0	0	0	2	4					
16-Nov-24						0	2	2	1	0
17-Nov-24										
18-Nov-24										
19-Nov-24	0	0	0	0	2					
20-Nov-24						3	0	0	1	0
21-Nov-24										
22-Nov-24										
23-Nov-24	0	0	1	0	0					
24-Nov-24						3	1	1	0	0
25-Nov-24										
26-Nov-24										
27-Nov-24	0	0	0	0	1					

Ecoserv Sample Reference Code	B-321-23	B-322-23	B-323-23	B-324-23	B-325-23	B-326-23	B-327-23	B-328-23	B-329-23	B-330-23
28-Nov-24						0	0	1	1	0
29-Nov-24										
30-Nov-24										
01-Dec-24	4	0	0	0	0					
02-Dec-24						0	0	0	0	0
03-Dec-24										
04-Dec-24										
05-Dec-24	0	0	2	1	0					
06-Dec-24						0	1	0	0	0
07-Dec-24										
08-Dec-24										
09-Dec-24	0	0	0	0	0					
10-Dec-24						0	0	0	0	0
11-Dec-24										
12-Dec-24										
13-Dec-24	0	0	0	0	0					
14-Dec-24						0	2	0	0	0
15-Dec-24										
16-Dec-24										
17-Dec-24	0	0	0	0	0					
18-Dec-24						0	0	0	1	0
19-Dec-24										
20-Dec-24										
21-Dec-24	0	0	0	0	0					
22-Dec-24						0	0	1	0	0
23-Dec-24										
24-Dec-24										
25-Dec-24	0	0	1	0	0					
26-Dec-24						4	0	1	0	0
27-Dec-24										
28-Dec-24										
29-Dec-24	0	0	0	0	0					

Ecoserv Sample Reference Code	B-321-23	B-322-23	B-323-23	B-324-23	B-325-23	B-326-23	B-327-23	B-328-23	B-329-23	B-330-23
30-Dec-24						0	0	0	0	0
31-Dec-24										
01-Jan-25										
02-Jan-25	0	3	0	0	0					
03-Jan-25						0	0	2	0	0
04-Jan-25										
05-Jan-25										
06-Jan-25	0	0	0	0	0					
07-Jan-25						0	1	0	0	0
08-Jan-25										
09-Jan-25										
10-Jan-25	0	0	0	0	0					
11-Jan-25						0	0	0	0	0
12-Jan-25										
13-Jan-25										
14-Jan-25	0	0	1	0	0					
15-Jan-25						0	2	0	0	0