Wilds Birds Regulation Unit

Report on a survey of the influx of migratory Common Quail and Turtle Dove over the Maltese Islands, made during September and October 2020

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1. Introduction

On 20th December 2019, the then Ministry for the Environment, Sustainable Development and Climate Change (hereafter 'MESDC')[1] issued a call for tenders (reference: MESDC Tender 445/2019), titled "*Tender for an independent scientific study on the influx or passage of migratory Common Quail and Turtle Dove in Malta during autumn 2020 and the influx or passage of migratory finches, Golden Plover and Song Thrush in Malta during the 2020 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:

1. *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 2020 to the 31st October 2020, inclusive of both dates; and*
2. *To provide an independent study on the influx or passage during the Autumn/Winter 2020, between the 15th of October 2020 till the 15th January 2021, inclusive of both dates, of the following species:*
   *Common Linnet (*Linaria cannabina*),*
   *Common Chaffinch (*Fringilla coelebs*),*
   *European Serin (*Serinus serinus*),*
   *European Goldfinch (*Carduelis carduelis*),*
   *European Greenfinch (*Chloris chloris*),*
   *Hawfinch (*Coccothraustes coccothraustes*),*
   *Eurasian Siskin (*Spinus spinus*),*
   *Golden Plover (*Pluvialis apricaria*), and*
   *Song Thrush (*Turdus philomelos*)*

2.2 Specific Objectives

The objectives of this contract are as follows:

- *To survey and scientifically monitor the daily influx of Turtle Dove, Common Quail, seven species of finches, Golden Plover and Song Thrush on the respective dates/periods specified above;*
- *To estimate the overall presence (influx) of these eleven species per day and for the whole study period for each respective species as specified above, subject to scientifically justified assumptions; and*
- *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 2020 autumn season.*

2.3 Results to be Achieved by the Consultant

[1] Tender MESDC 388/2019 was issued by the Ministry for the Environment, Sustainable Development and Climate Change on behalf of the Wild Birds Regulation Unit (WBRU); the WBRU now falls within the Ministry for Gozo.

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 2020: one report comprising the monitoring of the influx of seven species of finches, a separate report comprising the monitoring of the influx of Golden Plover and Song Thrush and another separate report comprising of the monitoring of Turtle Dove and Common Quail. Each of these reports must include:*
   a) *List of monitoring stations which recorded high/low counts;*
   b) *Dates which showed high/low peaks in the migration of each of the bird species;*
   c) *A daily estimate of the influx of each of the bird species for the whole of the Maltese Islands;*
   d) *The estimated total influx for these species for the whole of the study period, subject to scientifically justified assumptions;*
   e) *A comparative analysis of the results obtained during the past studies; and*
   f) *A comparative assessment of the results obtained with the bag data extracted from telephonic reports for 2020, which data shall be provided by the Wild Birds Regulation Unit at the end of each monitoring period, (for Golden Plover, Song Thrush and Finches reports, this would only apply in case relevant derogations permitting live-capturing are applied in 2020).*

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.*

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 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 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 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

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 2020 and the 15th January 2021 both dates included. The Contractor shall mobilise all staff and equipment for this study by the 24th of September 2020, in preparation for the execution of Autumn/Winter 2020 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 2020 till the 31st of October 2020, both dates included, for at least two hours in the morning (prior to 12:00hrs) for Common Quail and for seven hours starting from 7:00hrs in the case of Turtle Dove. The consultant shall mobilise all staff and equipment for this study by the 17th of August 2020, in preparation for the execution of the Autumn 2020 bird migration study. The bird monitoring phase shall commence on the 1st of September 2020.*

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 22th of January 2021.The draft monitoring report for Turtle Dove and Quail is to be submitted within five (5) working days from the study phase, that is, by the 6th November 2020.

Once the draft Autumn 2020 study reports have been certified for quality assurance by the Contracting Authority, the final monitoring reports are to be submitted for quality assurance within five (5) working days from such review.

Geographical Area to be covered

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

Target Groups

As appropriate.

4.2 Specific Activities

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

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

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

For Golden Plover, Song Thrush and Finches monitoring study, daily monitoring at each station shall be conducted from 09:00hrs to 14:00hrs during the first ten days of the study (15th October-24th October) and from 08:00hrs to 13:00hrs during the 25th October-15th January study period to factor in the Daylight Saving Time, which ends on 24th October.

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 2020 till the 31st October 2020, 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. Such details should be included in the methodology submitted in Section 4 Technical Offer (Organization and Methodology) by the Contractor. Given that the survey is aimed at quantifying the influx or passage of migrating birds, all monitoring stations shall be placed in strategic locations depending on the species being surveyed and the expected geographical occurrence of the species depending on the overall timing of the migration and prevailing weather conditions. The location of the monitoring stations shall be selected with care and shall not include areas where the settlement or sighting of the birds under study cannot in practice occur.

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

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

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

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

Nonetheless, in view that Finches, Golden Plover and Song Thrush have a preference for migrating during particular times of day, observations should focus on such peak times. In this respect the monitoring is to be carried out from 09:00hrs to 14:00hrs during the first ten days of the study (15th October–24th October) and from 08:00hrs to 13:00hrs during the 25st October–15th January study period to factor in the Daylight Saving Time, which ends on 24th October.

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 2020 and the 15th January 2021. The field study for the Turtle Dove and Quail shall cover 61 full days between the 1stSeptember and 31st October 2020. 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 2020 Finches, Golden Plover and Song Thrush Migration monitoring reports and analysis is to be submitted by the 22nd January 2021. Once such draft reports have been certified for quality assurance by the Contracting Authority, the Finches Migration 2020 monitoring report and Golden Plover and Song Thrush Migration

2020 monitoring report are to be submitted within 5 working days from such a review. The draft monitoring report and analysis for Turtle Dove and Quail Autumn 2020 study is to be submitted by the 6th of November 2020. Once such draft report has been certified for quality assurance by the Contracting Authority, the final Autumn 2020 monitoring report is to be submitted within 5 working days from such a review.

These activities will result in:

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

4.3 Project Management

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.

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.

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

None

5. Logistics and Timing

5.1 Location

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

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

5.2 Commencement Date & Period of Execution

The intended commencement date for the monitoring phase for Turtle Dove and Quail study is from the 1st September 2020 and the study of the Golden Plover, Song Thrush and Finches is the 15th October 2020. 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 co-ordinator who must be:
In possession of a Ph.D. or equivalent or other academic qualification at MQRIC Level 8 related to natural sciences

Key Expert 2

A Scientist who must be:
In possession of a Masters degree or equivalent or other academic qualification at MQRIC level 7 in natural sciences

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

Other experts

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

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

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

The selection procedures used by the 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.

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 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 Three separate reports (one concerning Turtle Dove and Common Quail, one concerning seven finch species and a separate report concerning Golden Plover and Song Thrush migration). Such reports are to indicate:

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

- *assumptions taken for such estimates*
- *For Turtle Dove and Quail, comparison of the results with hunting bag data for this period*
- *For Golden Plover, Song Thrush and seven finch species comparison of the results with live-capturing bag data for the species concerned for the current period (this would only apply in case relevant derogations permitting live-capturing are applied in 2020)*

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 2020 report and analysis for Turtle Dove and Quail is to be submitted by the 6th November 2020. The draft Autumn/Winter 2020 Migration monitoring Finch report and the Golden Plover and Song Thrush Migration monitoring report analysis are to be submitted by the 22nd January 2021.

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 daysafter the Contracting Authority reviews the report.

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

7.2 Submission & approval of progress reports

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

8 Monitoring and Evaluation

8.1 Definition of Indicators

Results	***Objectively verifiable indicators***	***Sources of verifications***
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	*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.*

coccothraustes, *Eurasian Siskin* Spinus spinus, *Golden Plover* Pluvialis apricaria, *and Song Thrush* Turdus philomelos, *Turtle Dove* Streptopelia turtur *and Common Quail* Coturnix coturnix		
Daily datasheets with raw counts of Turtle Dove Streptopelia turtur *and Common Quail* Coturnix coturnix	*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 2020 Finches migration monitoring report which presents clear analyses of the monitoring carried out.	*The draft monitoring report shall be submitted by the 22nd of January 2021.* *The monitoring report will be finalised by the consultant and approved by the Contracting Authority within five working days of the final submitted report.*	*The actual monitoring report presented by the contractor.*
Turtle Dove and Quail Autumn 2020 season monitoring report which presents a clear analyses of the monitoring carried out as well as analysis and comparison with results of past studies	*The draft monitoring report shall be completed within the 6th November 2020.* *The monitoring report will be finalised by the consultant and approved by the Contracting Authority within five working days of the final submitted report.*	*The actual monitoring report presented by the contractor.*

Ecoserv Ltd (hereafter 'Ecoserv') submitted a response to the tender and was subsequently notified that the company's bid was successful. The present submission constitutes Ecoserv's report of the independent scientific study on the influx of migratory Common Quail *Coturnix coturnix* and Turtle Dove *Streptopelia turtur* in Malta, undertaken by Ecoserv during the period 1 September to 31 October 2020, which coincides with part of the 2020 autumn hunting season, and is based on the ToR stated above.

An overview of the migratory behaviour of the two bird species, as well as an overview of local bird hunting and trapping activities and of EU legislation concerning these activities, were presented in Ecoserv (2011). Although there is a dearth of published information on migration of the Common Quail and Turtle Dove across the Maltese Islands, a considerable amount of data has been collected over the past decade, with such collection of data being initiated by Thomaidis (nd), who studied the occurrence and patterns of movement of these two species over the Islands between spring 2008 and autumn 2009. The data used to compile the report by Thomaidis (nd) were recorded by assigned hunters who contributed to the surveys under his supervision and coordination. Subsequently, regular local surveys

of migration of these two species in autumn were carried out between 2014 and 2018 by Ecoserv (Ecoserv, 2014a; 2015a; 2016a; 2017a; 2018a; 2019a).

In order to put the present study in perspective, an overview of the findings from the previous similar studies undertaken in autumn 2014, 2015, 2016, 2017, 2018 and 2019 (Ecoserv, 2014a; 2015a; 2016a; 2017a; 2018a; 2019a) follows. The main findings from the autumn surveys, including the survey period and duration, range of mean daily counts, and estimated total influx for Turtle Dove and Common Quail recorded in different years, are summarised in Table 1.

For Turtle Dove, when comparing the results of the various surveys, a similar trend of counts amongst the different survey sessions is noted overall. The general pattern of counts indicates a migratory influx during September. These included peak counts in some years, namely in 2009 (mean count of 4.1, recorded on 23-09-09; Thomaidis, nd), 2015 (mean count of 6.0, recorded on 09-09-15; Ecoserv, 2015a) and 2019 (mean count of 10.7, recorded on 02-09-19; Ecoserv, 2019a). No mean counts greater than 3 were recorded in any of the other years. Thus, the main autumn migration of Turtle Dove usually occurs in September, occasionally with migratory peaks occurring on some days during that month.

In the case of Common Quail, the overall trend recorded from the various surveys is that the main migratory influx occurs between mid-September and mid-October. High peak counts were recorded in 2008 (mean count of 9.6, recorded on 27-09-08) and 2009 (mean count of 6.0, recorded on 23-09-09) by Thomaidis (nd), whereas no particularly high peak counts (i.e., a mean count >3) were recorded in any of the subsequent surveys held between 2014 and 2019. Thus, the main autumn migration of Common Quail mostly occurs between mid-September and mid-October, occasionally with migratory peaks occurring on some days during that period.

Table 1

Summary of findings made during surveys of the migration of Turtle Dove and Common Quail undertaken in autumn 2014 – 2019 (Ecoserv, 2014a; 2015a; 2016a; 2017a; 2018a; 2019a).

Year	Survey period	Duration (days)	Turtle Dove		Common Quail	
			Range of mean daily counts	Estimated total influx	Range of mean daily counts	Estimated total influx
2014	01 Sep – 31 Oct	61	0.00 – 1.33	7,956	0.00 – 1.00	45,683
2015	01 Sep – 31 Oct	61	0.00 – 6.00	12,386	0.00 – 1.00	50,514
2016	01 Sep – 31 Oct	61	0.00 – 1.17	6,868	0.00 – 2.33	69,915
2017	01 Sep – 31 Oct	61	0.00 – 2.17	9,943	0.00 – 1.50	97,965
2018	01 Sep – 31 Oct	61	0.00 – 2.33	15,369	0.00 – 1.00	78,454
2019	01 Sep – 31 Oct	61	0.00 – 10.67	17,809	0.00 – 1.17	79,245

In the various reports (Ecoserv, 2014a; 2015a; 2016a; 2017a; 2018a; 2019a), the authors stressed that estimates of total influx for Turtle Dove and Common Quail must be treated with utmost caution, given the relatively small number of field sites used in the surveys, that counts were not made daily at each site, and since the extrapolation procedure used is likely to result in a rough estimate. Birds may migrate along specific pathways, such that the influx at different localities can be extremely variable, with potential large differences in the number of individuals recorded from two different localities, even if these are separated by a very small distances. In the case of Turtle Dove, the authors also emphasised that the length of coastline surveyed per day (4 km) amounted to less than 1.5% of the total coastline; the accuracy of the estimated total migratory influx would be higher if a larger proportion of coastline is surveyed. It was also noted that the total coastline length used in the extrapolation includes stretches of coast that are highly developed and densely inhabited, for example,

the Sliema – Valletta and Cottonera areas, where one would expect some disturbance to birds migrating at low altitude, hence their numbers there would be expected to be lower, resulting in an overestimate. Another limitation emphasised by the authors is that the Turtle Dove migration counts were recorded over a seven-hour period, hence any individuals migrating at other times of the day were not included. This could have led to a potential underestimate of the total influx if significant Turtle Dove migration occurred outside of the survey time period, although the one used in the surveys (06:00–13:00 or 07:00–14:00) represents the time during which the activity of Turtle Dove is deemed maximum. In the case of the Common Quail, the authors noted that the daily area surveyed amounts to less than 1% of the total local area that can potentially be used by this species; the accuracy of the estimated total migratory influx would thus be higher if a larger area is surveyed.

The authors stressed that the Turtle Dove and Common Quail migratory count data presented in Ecoserv's reports (Ecoserv, 2014a; 2015a; 2016a; 2017a; 2018a; 2019a) can only be used for purposes of trend analysis. Even in this respect, due caution should be exercised given that the sampling effort used in the studies undertaken by Ecoserv, while partly based on that reported and utilized by Thomaidis (nd) for the years 2008 and 2009, was not identical. The authors emphasised that 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 a minimum of 21 sites. Nevertheless, the data from surveys provides a useful indication of the influx of Turtle Dove and Common Quail over the years, provided that results of the studies are interpreted in the context of these limitations.

2. Methodology

The methodology used by Ecoserv during the present autumn 2020 survey is identical to that used in surveys made by the same company in previous autumn (see Ecoserv, 2014a; 2015a; 2016a; 2017a; 2018a; 2019a) and spring seasons (see Ecoserv, 2011; 2012; 2013; 2014b; 2015b; 2016b; 2017b; 2018b; 2019b; 2020); the survey design is aimed at assessing changes in migratory influx, which entails trend analysis based on data from monitoring carried out regularly over a sufficiently long period over subsequent years, and using the same methodology. During the survey, two individuals - a field assistant capable of identifying Turtle Dove and Common Quail 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 consultants and ecologists to ensure that they are capable of identifying the two bird species. The observers were given briefings by Ecoserv's consultants on identification of the two bird species and received further training in the field on same by the Ecoserv's staff and the recruited field assistants. Throughout the survey, Ecoserv's environmental consultants 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 eight-week period between 1 September and 31 October 2020. During the survey, counts of individuals of the two species *Coturnix coturnix* and *Streptopelia turtur* 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. The study site at Comino was included in the 6 sites surveyed on any one day, such that this site was surveyed on a daily basis. On those days when access to Comino was not possible due to adverse weather conditions, the surveys were undertaken at an alternative site instead. The sampling sites used in the present study include ones used in the previous surveys undertaken during

autumn 2014–2019 (Ecoserv, 2014a; 2015a; 2016a; 2017a; 2018a; 2019a) and spring 2011–2020 (see Ecoserv, 2011; 2012; 2013; 2014b; 2015b; 2016b; 2017b; 2018b; 2019b; 2020), and are represented by the grid cell reference numbers listed in Table 1, while their locations are shown in Figure 1.

Table 1

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

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

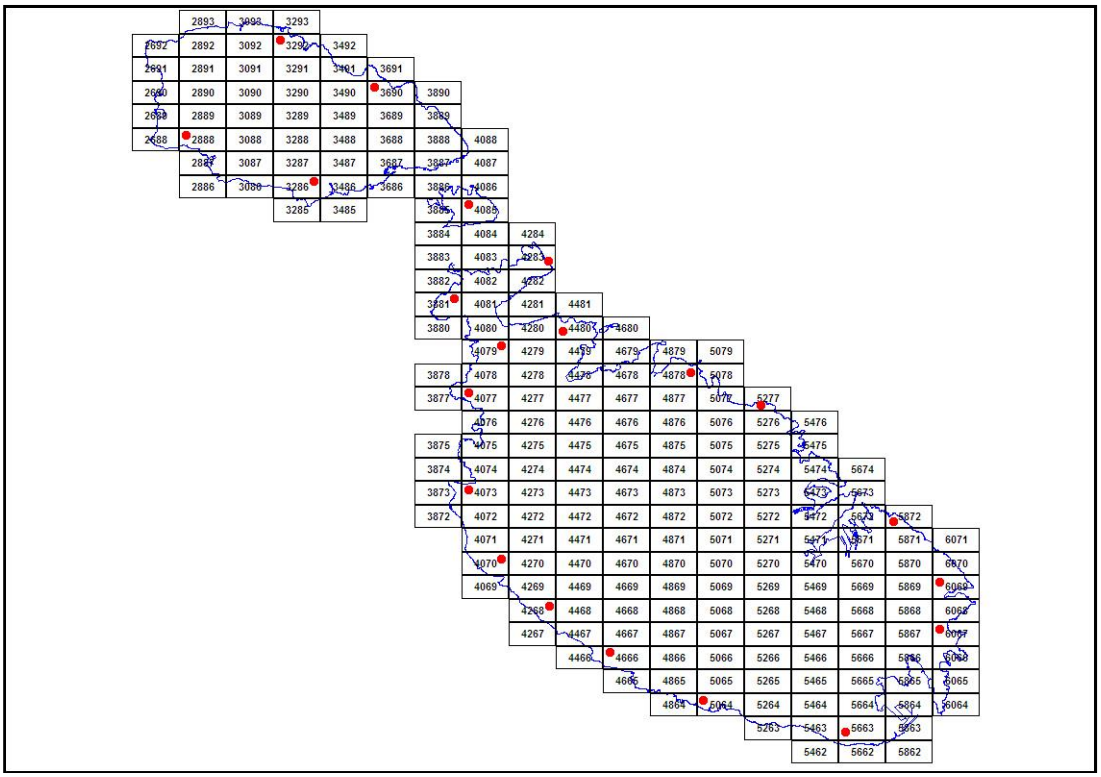

Figure 1. Map of the Maltese Islands showing the 21 sites (grid cells indicated by the red filled circle) where the bird counts were made; see also Table 1.

Since the survey was mainly aimed at quantifying the influx of migrating individuals, field sites were located at strategic locations within coastal areas. However, it should be noted that birds reach land at different altitudes; sometimes they are observed flying high over coastal areas and may either keep that course as they overfly or alight in inland areas. In the case of Turtle Dove, 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. 500m) and vertically upwards (as far as the birds were detected by sight). In the case of Common Quail, it should be noted that this species has the tendency to reach the Maltese Islands late in the afternoon, particularly in

late October and in November. As the survey period covered the earlier part of its migration period, and since Common Quail is mainly a nocturnal migrant, monitoring of this species was mainly based on counts of individuals that would have settled in during the previous night. Surveys of Common Quail entailed the use of trained dogs to locate and flush birds in order to count them when taking flight following disturbance. The count area was taken as the total area surveyed in this manner at a particular site. Monitoring of Turtle Dove was always made between 07:00 and 14:00, while monitoring of Quail was made during a 2 hour window between 07:00 and 12:00. 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 (WBRU).

3. Results

Ecoserv's laboratory report reference for the present survey is **123-20**. The sample reference codes for the bird count data are **B-592-20** to **B-633-20**.

Turtle dove

Raw daily counts for Turtle Dove recorded from any given site (out of the 21 sites) during the present study varied between 0 and a maximum of 18 (see Appendix I), while the mean daily counts ranged between 0 and 9.0 (Table 2). A peak in migratory counts was recorded on 15 September 2020, when birds were observed migrating in small groups at more than one site, while comparatively high mean counts were also recorded on 7, 14 and 16 September. The recorded counts showed some variation between the different sites over the whole survey period: at the lower end, no Turtle Dove individuals were recorded throughout the survey period from grid location 5872 (southeast Malta), while at the higher end, 45 Turtle Dove individuals were recorded from the site at grid location 4077 (northwest Malta).

Values of mean daily counts and total counts of Turtle Dove recorded during the period 1 September to 31 October 2020 from the present survey are summarised in Table 2. Values of standard deviation associated with the mean daily counts are also provided in Table 2. 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 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. These same values are also shown, along with values of mean counts recorded for the same period in 2008, 2009 (Thomaidis, nd), 2014 (Ecoserv, 2014a), 2015 (Ecoserv, 2015a), 2016 (Ecoserv, 2016a), 2017 (Ecoserv, 2017a), 2018 (Ecoserv, 2018a) and 2019 (Ecoserv, 2019a) in Figure 2. Overall, counts recorded during the present survey show a similar trend to those recorded by Thomaidis (nd) in autumn 2008 and 2009, and by Ecoserv (2014a; 2015a; 2016a; 2017a; 2018a; 2019a) in autumn 2014–2019; that is, the main migratory influx occurs during September, with occasional migratory peaks recorded in some years.

Values of the grand mean of Turtle Dove counts recorded during the period 1 September to 31 October 2020 from the present survey, together with values of the grand mean for the same period in 2008, 2009 (Thomaidis, nd), 2014, 2015, 2016, 2017, 2018 and 2019 (Ecoserv, 2014a; 2015a; 2016a; 2017a;

2018a; 2019a) are shown in Figure 3. Overall, the grand mean recorded during the present (autumn 2020) survey is higher than that recorded in any of the previous surveys held in autumn.

Table 2

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

Date	Mean Count ± SD		Total count	Estimated Daily Influx
01-Sep-20	0.17	± 0.41	1	90
02-Sep-20	1.50	± 1.38	9	814
03-Sep-20	2.67	± 5.09	16	1447
04-Sep-20	1.17	± 1.47	7	633
05-Sep-20	0.67	± 0.82	4	362
06-Sep-20	0.33	± 0.52	2	181
07-Sep-20	4.00	± 4.69	24	2170
08-Sep-20	0.33	± 0.52	2	181
09-Sep-20	1.33	± 1.03	8	723
10-Sep-20	0.83	± 0.98	5	452
11-Sep-20	1.00	± 0.89	6	542
12-Sep-20	0.67	± 1.21	4	362
13-Sep-20	1.33	± 2.42	8	723
14-Sep-20	6.00	± 4.82	36	3255
15-Sep-20	9.00	± 7.64	54	4882
16-Sep-20	3.50	± 5.86	21	1899
17-Sep-20	0.50	± 0.55	3	271
18-Sep-20	0.83	± 0.75	5	452
19-Sep-20	0.83	± 0.75	5	452
20-Sep-20	0.33	± 0.52	2	181
21-Sep-20	0.00	± 0.00	0	0
22-Sep-20	0.33	± 0.52	2	181
23-Sep-20	0.33	± 0.52	2	181
24-Sep-20	0.33	± 0.52	2	181
25-Sep-20	0.00	± 0.00	0	0
26-Sep-20	0.17	± 0.41	1	90
27-Sep-20	1.33	± 2.80	8	723
28-Sep-20	0.00	± 0.00	0	0
29-Sep-20	0.17	± 0.41	1	90
30-Sep-20	0.67	± 0.82	4	362
01-Oct-20	0.67	± 0.82	4	362
02-Oct-20	0.50	± 0.84	3	271
03-Oct-20	0.50	± 0.84	3	271
04-Oct-20	0.00	± 0.00	0	0
05-Oct-20	0.50	± 0.84	3	271
06-Oct-20	0.17	± 0.41	1	90
07-Oct-20	0.00	± 0.00	0	0
08-Oct-20	0.17	± 0.41	1	90
09-Oct-20	0.50	± 0.84	3	271
10-Oct-20	0.50	± 0.84	3	271
11-Oct-20	0.33	± 0.52	2	181
12-Oct-20	0.00	± 0.00	0	0
13-Oct-20	0.00	± 0.00	0	0
14-Oct-20	0.00	± 0.00	0	0
15-Oct-20	0.00	± 0.00	0	0

Date	Mean Count ± SD		Total count	Estimated Daily Influx
16-Oct-20	0.00	± 0.00	0	0
17-Oct-20	0.00	± 0.00	0	0
18-Oct-20	0.00	± 0.00	0	0
19-Oct-20	0.00	± 0.00	0	0
20-Oct-20	0.00	± 0.00	0	0
21-Oct-20	0.17	± 0.41	1	90
22-Oct-20	0.00	± 0.00	0	0
23-Oct-20	0.00	± 0.00	0	0
24-Oct-20	0.00	± 0.00	0	0
25-Oct-20	0.17	± 0.41	1	90
26-Oct-20	0.00	± 0.00	0	0
27-Oct-20	0.00	± 0.00	0	0
28-Oct-20	0.00	± 0.00	0	0
29-Oct-20	0.00	± 0.00	0	0
30-Oct-20	0.33	± 0.82	2	181
31-Oct-20	0.00	± 0.00	0	0
Sum total			**269**	**24319**

As has been done in previous surveys undertaken in autumn (Ecoserv, 2014a; 2015a; 2016a; 2017a; 2018a; 2019a) and spring (Ecoserv, 2011; 2012; 2013; 2014b; 2015b; 2016b; 2017b; 2018b; 2019b; 2020), an estimate of the total influx of Turtle Dove over the Maltese Islands was made using the daily counts (Figure 2). Extrapolations were then made to obtain the total number of individuals of this species that have migrated over the Maltese Islands on a particular date. However, as emphasised in reports from previous surveys (Ecoserv, 2014a; 2015a; 2016a; 2017a; 2018a; 2019a), such an estimate must be treated with utmost caution, given that the Turtle Dove migration starts around the third week of August, which period is not covered by the present survey; the relatively small number of sites used; and that the counts were not made daily at each site. Furthermore, passage 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 only by a very small distance. As already stated, the other limiting factor is that the field survey stops at 14:00 and does not start again before 07:00, hence potentially missing birds that arrive in the afternoon and during the night, which are usually seen at the very first light of day, many of which end up being shot within a very short time, and therefore these may have not been recorded by the field observers during the survey. On the other hand, the estimate given in the present report is useful when making comparison between different years, assuming data from surveys based on a similar design are available 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 Turtle Dove per 0.5 km coastline.

The estimated daily influx was obtained by extrapolating the recorded mean daily values (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. The values of estimated daily influx were then summed to obtain an estimate of the total influx of migrating Turtle Dove for the eight-week study period. Based on the mean daily counts (Table 2), extrapolation translates to an estimated daily influx ranging between 0 and 4,882 individuals, with a total influx over the survey period (1 September to 31 October; i.e. 61 days) of 24,319 individuals, i.e. some 399 birds per day; see Table 2.

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

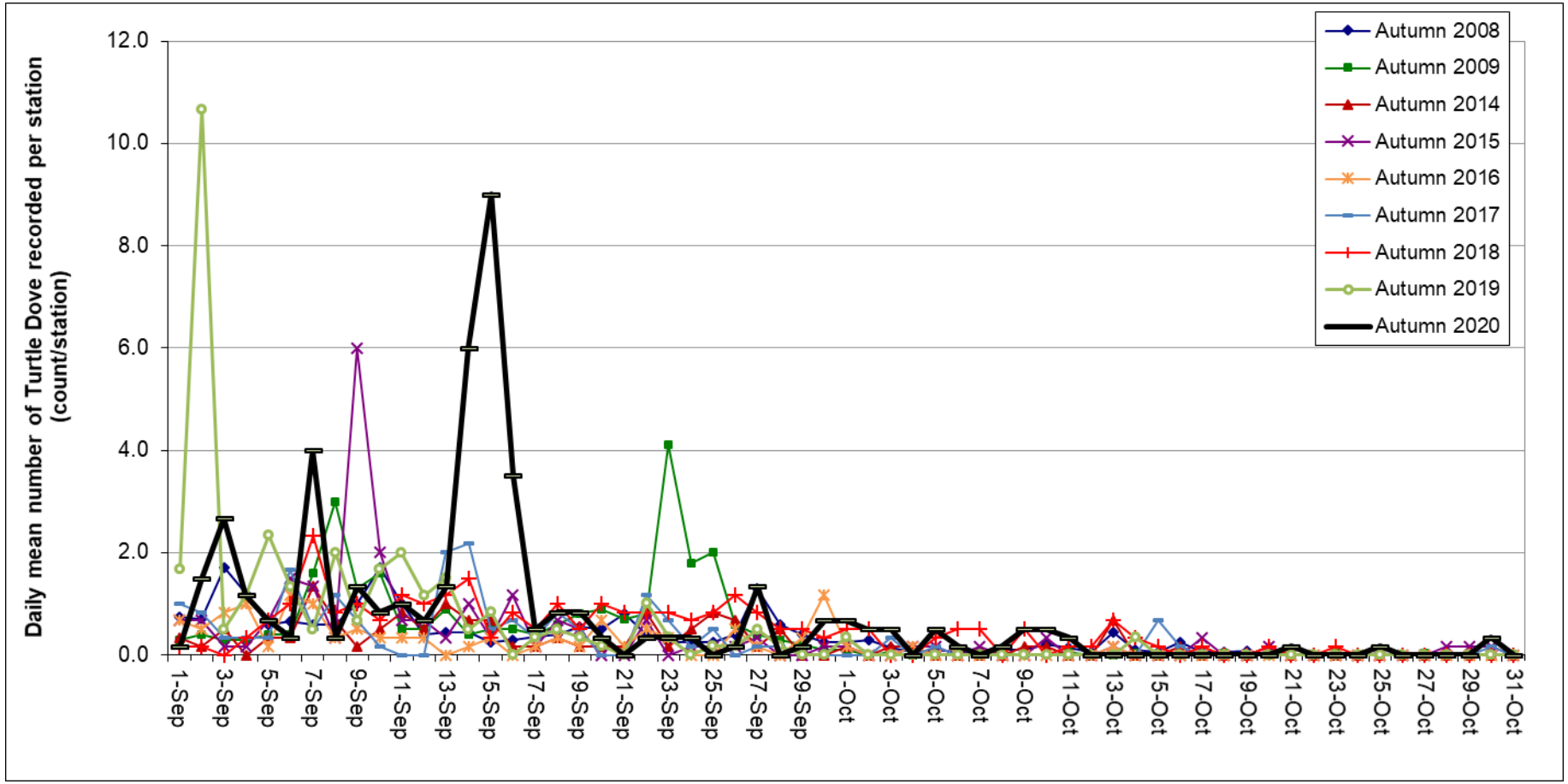

Figure 2. Daily mean counts of Turtle Dove per station (= site) recorded during the present survey during the period 1 September to 31 October 2020, together with values of the same statistic for autumn 2008 and 2009 as reported in Thomaidis (nd), and for autumn 2014, 2015, 2016, 2017, 2018 and 2019 as reported in Ecoserv (2014a; 2015a; 2016a; 2017a; 2018a; 2019a).

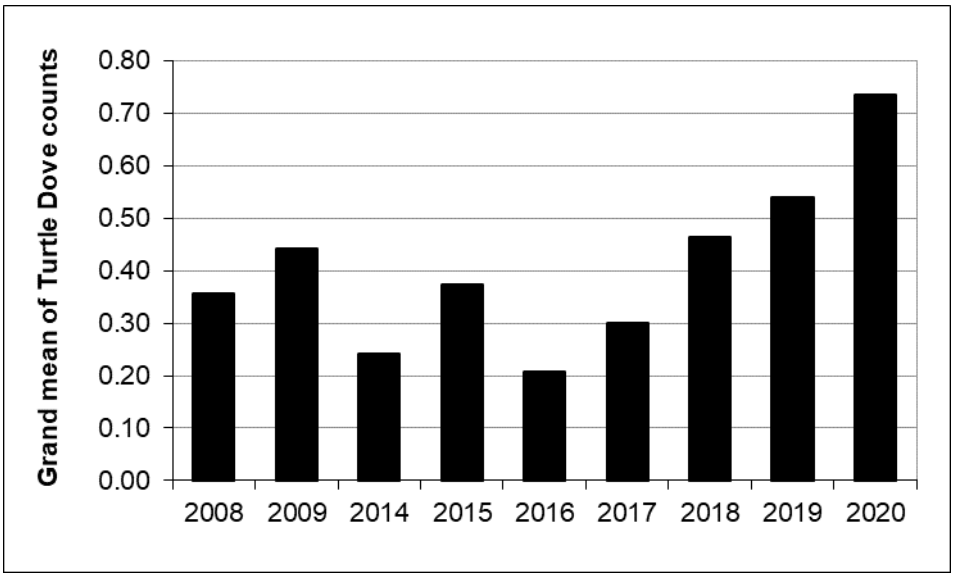

Figure 3. Grand mean of Turtle Dove counts made using data from the period 1 September to 31 October for autumn 2020 (present survey), autumn 2014–2019 (Ecoserv, 2014a; 2015a; 2016a; 2017a; 2018a; 2019a) and autumn 2008–2009 (Thomaidis, nd).

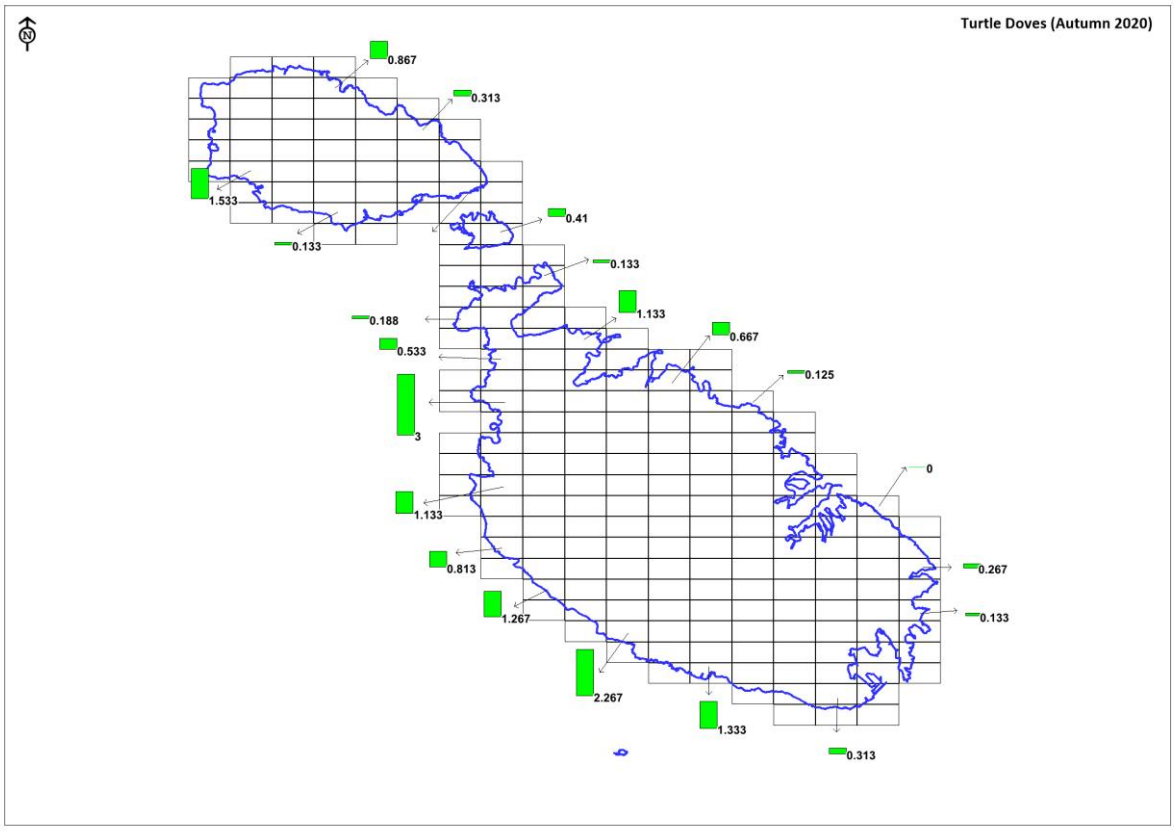

Figure 4. Map of the Maltese Islands showing the standard grid and respective codes, including ones used in the present study. The green bars indicate mean counts of Turtle Dove recorded from study sites in the respective cells during the present (autumn 2020) survey.

Mean count values recorded from each of the 21 sites are indicated on the map shown in Figure 4. The highest mean count was recorded from Għajn Tuffieħa (Grid 4077) located in northwest Malta, while overall high counts were recorded from other study sites located along the western parts of Malta and from Kerċem (Grid 2888) in Gozo. The lowest mean counts were mostly recorded from sites located on the eastern side of the Maltese Islands. The mean count recoded from the study site on Comino was 0.410; this is close to the median value of 0.533 for the whole range of recorded mean counts.

Common Quail[3]

The daily observation times by the field observers spent at each Common Quail monitoring station are given in Appendix II. Raw daily counts for Common Quail recorded from any given site (out of the 21 sites) during the present study varied between 0 and a maximum of 7 (see Appendix I), while the mean daily counts ranged between 0 and 1.83. The recorded counts did not vary appreciably between the different sites: at the higher end, a total of 16 individuals were recorded from grid location 4085 located in Comino, which was surveyed daily; at the lower end, no Quail individuals were recorded throughout the survey period from grid locations 4268 (western Malta) and 5872 (eastern Malta).

Values of mean daily counts and total counts of Common Quail recorded during the period 1 September to 31 October 2020 from the present survey, as well as the respective area surveyed at each site, are given in Table 3. As already indicated above for Turtle Dove, values of standard deviation associated with the mean daily counts are also provided in Table 3. Standard deviation is a measure of variability among counts recorded from the different sites, that is, 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 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. These same values are also shown, along with values of mean counts for the same period in 2008, 2009 (Thomaidis, nd), 2014 (Ecoserv, 2014a), 2015 (Ecoserv, 2015a), 2016 (Ecoserv, 2016a), 2017 (Ecoserv, 2017a), 2018 (Ecoserv, 2018a) and 2019 (Ecoserv, 2019a), are shown in Figure 5. The daily mean counts recorded during the period 1 September to 31 October 2020 (present survey) are overall lower than values recorded in 2008 and 2009 (Thomaidis, nd) for the same period, but similar to those recorded in 2014–2019 (Ecoserv, 2014a; 2015a; 2016a; 2017a; 2018a; 2019a). No migration peaks (with a mean count >2) were recorded during the present survey. The general pattern from all years being compared is a main migratory influx between mid-September and mid-October.

Values of the grand mean for Common Quail counts for autumn 2020 (present survey), autumn 2019 (Ecoserv, 2019a), autumn 2018 (Ecoserv, 2018a), autumn 2017 (Ecoserv, 2017a), autumn 2016 (Ecoserv, 2016a), autumn 2015 (Ecoserv, 2015a), autumn 2014 (Ecoserv, 2014a), and autumn 2008 and autumn 2009 (Thomaidis, nd) surveys, are shown graphically in Figure 6. The comparison in Figure 6 is based on data collected during the same period (1 September to 31 October) in each of the surveys. The grand mean recorded during the present (autumn 2020) survey is lower than that recorded during the 2008 and 2009 (Thomaidis, nd) surveys, but similar to values recorded during the 2014–2019 surveys (Ecoserv, 2014a; 2015a; 2016a; 2017a; 2018a; 2019a).

Mean count values recorded from each of the 21 sites are indicated on the map shown in Figure 7. The highest mean count was recorded from Mtaħleb (Grid 4070) located in northwestern Malta, while overall high counts were recorded from other study sites located in the western side of Malta and from Marsalforn (Grid 3292) and Kerċem (Grid 2888) in Gozo. The lowest mean counts were recorded from

[3] The results presented in this section include Common Quail counts made during the two-hour daily observation period for this species. An additional four Common Quail individuals were recorded from White Rocks (Grid 5277) on 30th October 2020 after the two-hour survey had been completed.

Dingli (Grid 4268), Rinella (Grid 5872) and other sites in the eastern parts of Malta (with the exception of L-Aħrax tal-Mellieħa (Grid 4283). The mean count recoded from the study site on Comino was 0.262, which was slightly higher than the median value of 0.200 for the whole range of recorded mean counts.

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 Quail.

Date	Mean Count ± SD		Total Area Surveyed (km^2)	Total count	Estimated Daily Influx
01-Sep-20	0.00	± 0.00	0.152	0	0
02-Sep-20	0.00	± 0.00	0.182	0	0
03-Sep-20	0.00	± 0.00	0.148	0	0
04-Sep-20	0.00	± 0.00	0.226	0	0
05-Sep-20	0.00	± 0.00	0.152	0	0
06-Sep-20	0.00	± 0.00	0.182	0	0
07-Sep-20	0.00	± 0.00	0.148	0	0
08-Sep-20	0.00	± 0.00	0.226	0	0
09-Sep-20	0.00	± 0.00	0.152	0	0
10-Sep-20	0.00	± 0.00	0.182	0	0
11-Sep-20	0.00	± 0.00	0.148	0	0
12-Sep-20	0.17	± 0.41	0.226	1	981
13-Sep-20	0.17	± 0.41	0.152	1	1455
14-Sep-20	0.67	± 1.21	0.182	4	4868
15-Sep-20	1.00	± 1.67	0.148	6	8960
16-Sep-20	1.83	± 2.64	0.226	11	10787
17-Sep-20	0.67	± 1.03	0.152	4	5821
18-Sep-20	0.33	± 0.82	0.182	2	2434
19-Sep-20	0.67	± 1.63	0.148	4	5973
20-Sep-20	0.33	± 0.52	0.226	2	1961
21-Sep-20	0.17	± 0.41	0.152	1	1455
22-Sep-20	1.50	± 1.38	0.182	9	10953
23-Sep-20	1.00	± 0.89	0.148	6	8960
24-Sep-20	0.67	± 0.82	0.226	4	3922
25-Sep-20	0.50	± 0.84	0.152	3	4366
26-Sep-20	0.00	± 0.00	0.182	0	0
27-Sep-20	0.00	± 0.00	0.148	0	0
28-Sep-20	0.33	± 0.52	0.226	2	1961
29-Sep-20	0.83	± 1.17	0.152	5	7276
30-Sep-20	0.00	± 0.00	0.182	0	0
01-Oct-20	1.67	± 1.03	0.148	10	14933
02-Oct-20	1.00	± 1.55	0.226	6	5884
03-Oct-20	0.67	± 0.52	0.152	4	5821
04-Oct-20	0.33	± 0.52	0.182	2	2434
05-Oct-20	0.00	± 0.00	0.148	0	0
06-Oct-20	0.17	± 0.41	0.226	1	981
07-Oct-20	0.00	± 0.00	0.152	0	0
08-Oct-20	0.00	± 0.00	0.182	0	0
09-Oct-20	0.17	± 0.41	0.148	1	1493
10-Oct-20	0.00	± 0.00	0.226	0	0
11-Oct-20	0.17	± 0.41	0.152	1	1455
12-Oct-20	0.00	± 0.00	0.182	0	0
13-Oct-20	0.17	± 0.41	0.148	1	1493

Date	Mean Count ± SD		Total Area Surveyed (km^2)	Total count	Estimated Daily Influx
14-Oct-20	0.17	± 0.41	0.226	1	981
15-Oct-20	0.33	± 0.82	0.152	2	2911
16-Oct-20	0.17	± 0.41	0.182	1	1217
17-Oct-20	0.17	± 0.41	0.148	1	1493
18-Oct-20	0.33	± 0.52	0.226	2	1961
19-Oct-20	0.17	± 0.41	0.152	1	1455
20-Oct-20	0.00	± 0.00	0.182	0	0
21-Oct-20	0.00	± 0.00	0.148	0	0
22-Oct-20	0.33	± 0.52	0.226	2	1961
23-Oct-20	0.00	± 0.00	0.152	0	0
24-Oct-20	0.00	± 0.00	0.182	0	0
25-Oct-20	0.00	± 0.00	0.148	0	0
26-Oct-20	0.00	± 0.00	0.226	0	0
27-Oct-20	0.00	± 0.00	0.152	0	0
28-Oct-20	0.00	± 0.00	0.182	0	0
29-Oct-20	0.17	± 0.41	0.148	1	1493
30-Oct-20	0.00	± 0.00	0.226	0	0
31-Oct-20	0.00	± 0.00	0.152	0	0
Sum total				**102**	**130099**

As has been done in previous surveys undertaken in autumn (Ecoserv, 2014a; 2015a; 2016a; 2017a; 2018a; 2019a) and spring (Ecoserv, 2011; 2012; 2013; 2014b; 2015b; 2016b; 2017b; 2018b; 2019b; 2020), the total influx of Common Quail was estimated for the whole area of the Maltese Islands using the recorded area surveyed for Common Quail at each site. However, such an estimate should be considered with the greatest caution because of the assumption that the rate of Common Quail settling at coastal sites (where the survey was carried out) is equal to that at inland locations. While this appears to hold true during spring, observations indicate that Common Quail tend to settle in larger numbers in coastal areas compared to inland ones. Common Quail also tends to appear in certain localities before others (Fenech, 2010; Fenech, *in. litt.*). On the other hand, coastal areas are more likely to serve as short-term stopover sites immediately following a migratory flight compared to inland locations; thus, including inland locations as study sites in the survey may result in an overestimate of the total influx due to repeat counting of resident Quail.

To ensure that the total area used to estimate the migration count does not include regions within which Quail do not normally settle, even though some birds may fly over urbanized areas, the total area was calculated as the sum of agricultural areas (161.5 km^2), forested areas (2.1 km^2) and areas of natural vegetation (57.8 km^2); this amounts to 221.4 km^2, representing 72% of the 315 km^2 total area of the Maltese Islands (land cover data source: MEPA, 2010). The mean (± SD) daily counts and estimated daily influx of birds per day are shown in Table 3. The estimated daily influx was obtained by extrapolating the mean daily values obtained for the surveyed areas indicated in Table 3 to an area of 221.4 km^2 obtained as explained above. Values of estimated daily influx were then summed to obtain an estimate of the total influx of migrating Quail for the eight-week study period. Based on these data, extrapolation translates to a total influx of Common Quail during 1 September – 31 October 2020 of 130,099 individuals, or some 2,133 Quail per day (see Table 3). However, as already emphasised in the reports of previous surveys (Ecoserv, 2011; 2012; 2013; 2014a; 2014b; 2015a; 2015b; 2016a; 2016b; 2017a; 2017b; 2018a; 2018b; 2019a; 2019b; 2020), such an estimate must be treated with utmost caution, given the relatively small number of field sites used in the present survey and that counts were not made daily at each site, such that only a very small portion of the total area of potential habitat in the Maltese Islands was sampled.

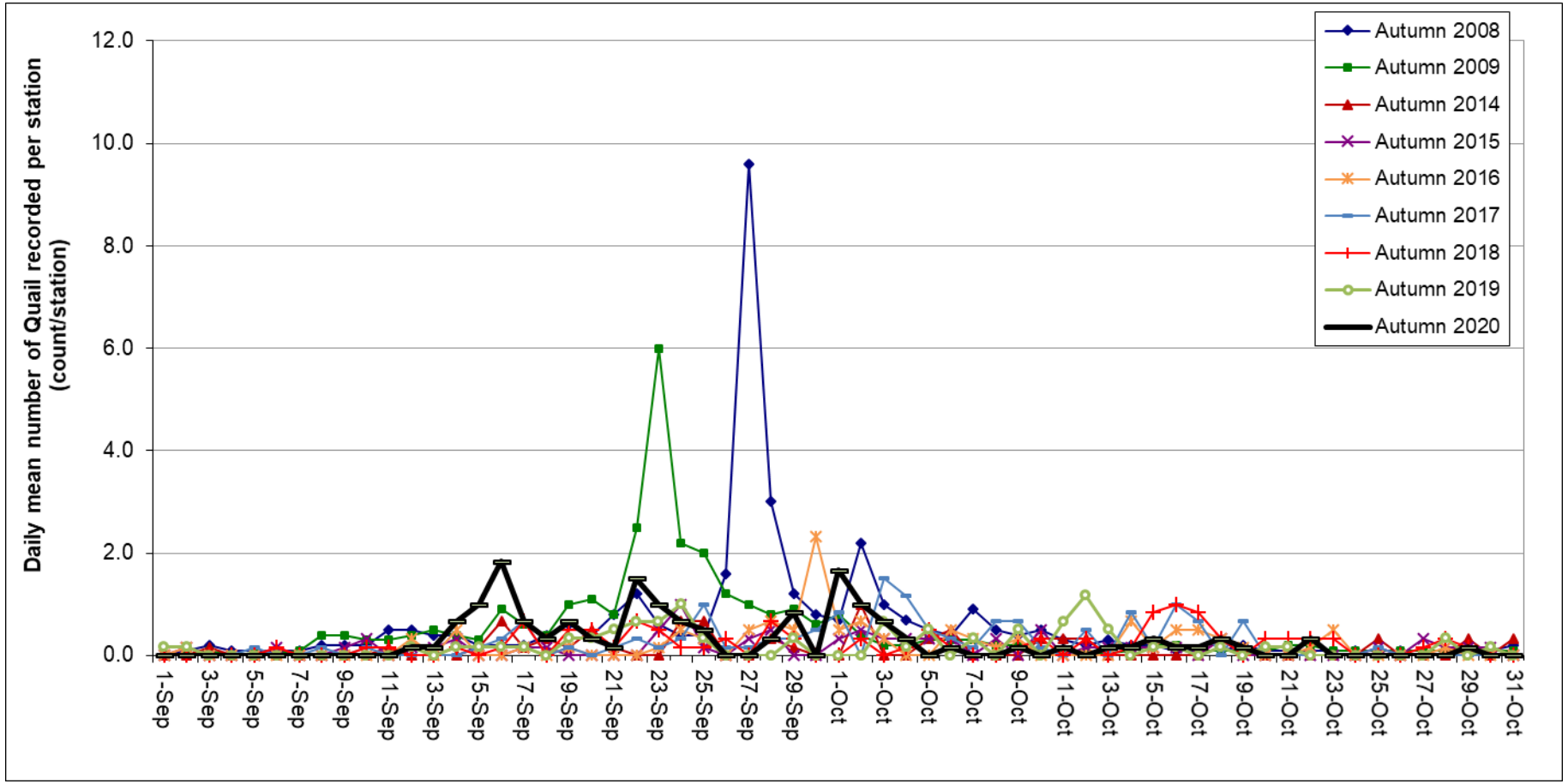

Figure 5. Daily mean counts of Common Quail per station (= site) recorded during the present survey during the period 1 September to 31 October 2020, together with values of the same statistic for autumn 2008 and 2009 as reported in Thomaidis (nd), for autumn 2014, 2015, 2016, 2017, 2018 and 2019 as reported in Ecoserv (2014a; 2015a; 2016a; 2017a; 2018a; 2019a).

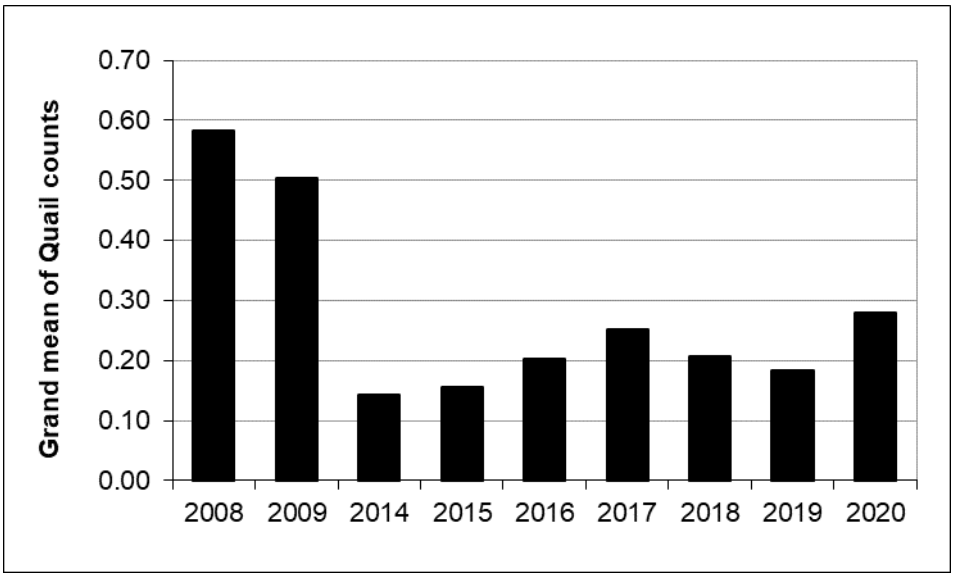

Figure 6. Grand mean of Common Quail counts made using data from the period 1 September to 31 October for autumn 2020 (present survey), autumn 2014–2019 (Ecoserv, 2014a; 2015a; 2016a; 2017a; 2018a; 2019a) and autumn 2008–2009 (Thomaidis, nd).

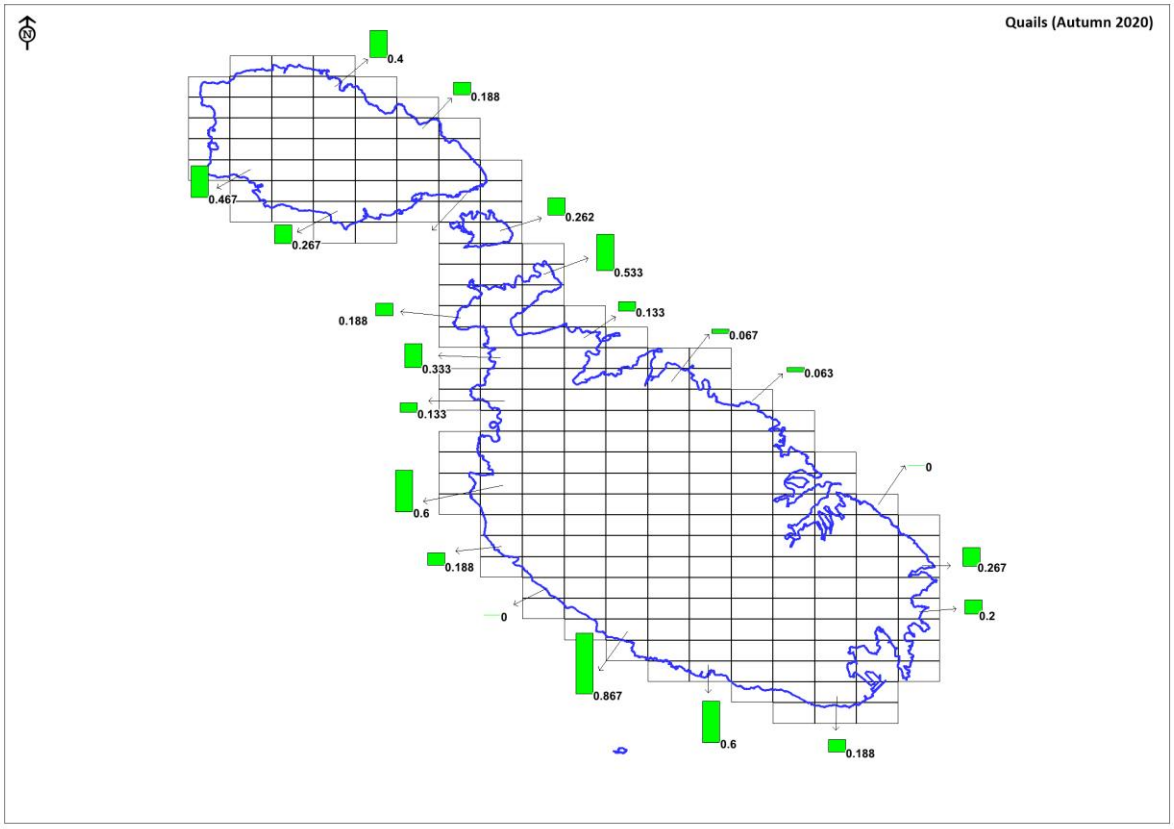

Figure 7. Map of the Maltese Islands showing the standard grid and respective codes, including ones used in the present study. The green bars indicate mean counts of Common Quail recorded from study sites in the respective cells during the present (autumn 2020) survey.

4. Comparison with bag data

A comparative analysis of data from the present study with bag data provided by the WBRU was undertaken. The dataset provided by the WBRU comprised the daily bag count of Turtle Dove and Common Quail (as reported by hunters) for the period 01 September to 31 October 2020, noting that the hunting season for Turtle Dove closed on 30 September 2020. It should also be noted that the two sets of data were collected for different purposes, using very different methodologies, and therefore the magnitudes of values are not directly comparable. However, the temporal trends can be expected to follow a similar pattern, that is within the same season, the periods when higher mean daily counts were recorded during the present survey should broadly follow the days when higher numbers of turtle dove or common quail were caught (and reported in the bag data). Graphical representations of the mean or total daily counts made during the present (2020) survey and the daily bag counts for the same time period (01 September to 31 October 2020; WBRU unpublished data) of Turtle Dove and Common Quail were prepared to compare temporal trends among the two different data sets.

Turtle Dove

The daily bag counts indicating the number of Turtle Dove caught during the 2020 autumn hunting season and the mean daily counts of Turtle Dove made during the present (2020) survey are shown in Figure 8, while Figure 9 shows the same data but with the results from the present (2020) survey given as total daily counts. As already noted, the magnitudes of the bag counts and those of the mean/total counts made in the 2020 survey are not directly comparable; hence the two sets of values are on different scales. Therefore, in Figures 8 and 9, two separate y-axes are used: the bag count data is plotted on the left-side y-axis, whereas the counts from the 2020 survey are plotted on the right-side y-axis.

Overall, the general trend of daily counts recorded during the 2020 survey is of relatively higher counts in early to mid-September, including a peak count on 14-15 September, and lower counts recorded up to the beginning of October and with the rest of October mostly characterised by zero counts. The bag count data includes a similar trend with higher numbers caught early to mid-September, including peak bag counts on 4, 14 and 15 September, and lower numbers caught until the end of the month; no Turtle Dove individuals were bagged in October given that the hunting season for Turtle Dove closed on 30 September. Therefore, overall, there was a very similar temporal trend of higher counts in early to mid-September 2020 in both the daily counts made during the present survey and the bag count data, followed by lower counts until the beginning of October, and few or no counts thereafter.

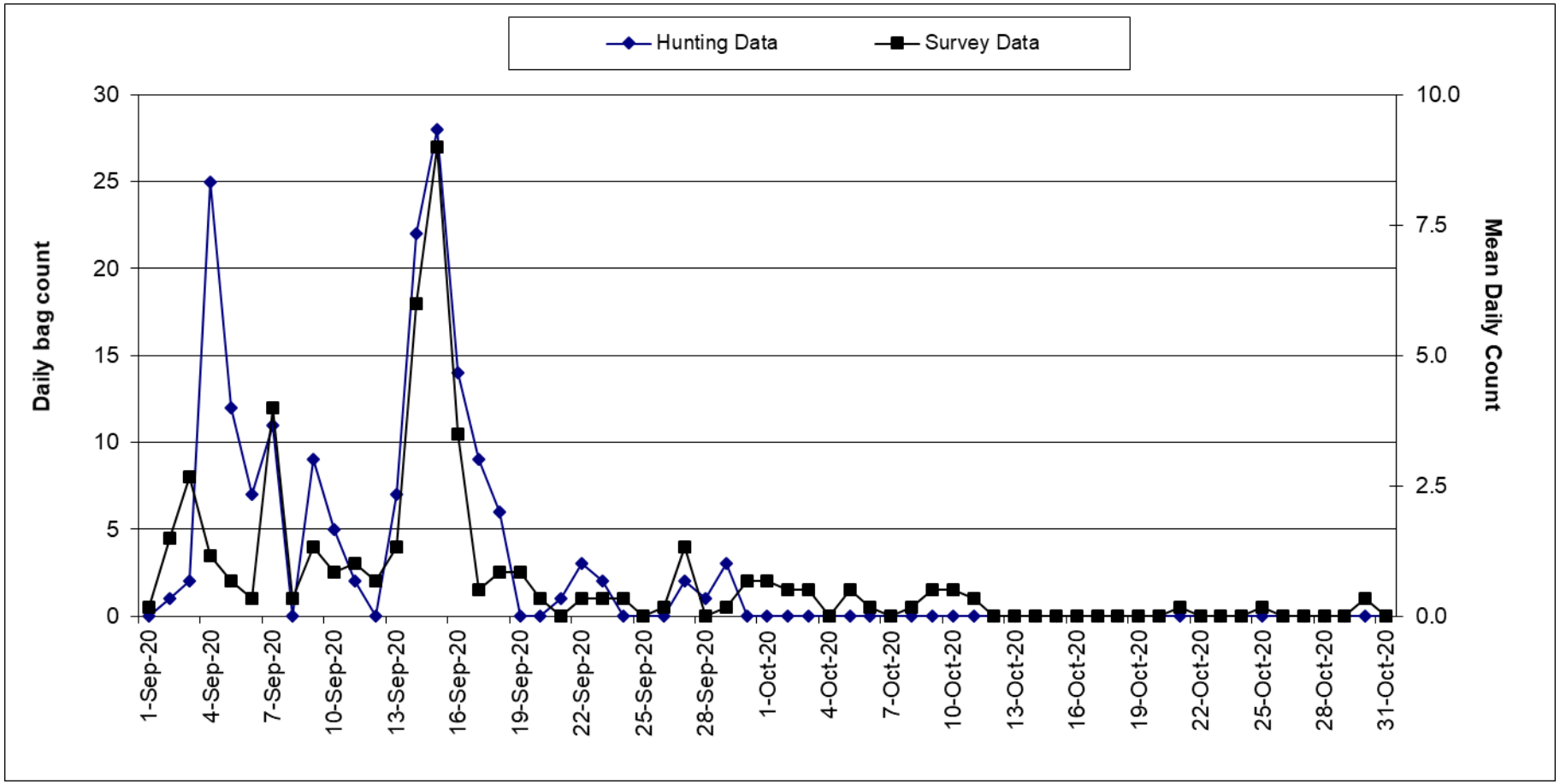

Figure 8. Daily bag count of Turtle Dove during 202020 (blue line; values on left-side y-axis), together with the mean daily counts recorded during the 2020 survey (black line; values on right-side y-axis), for the period 1 September – 31 October 2020. It should be noted that bag counts for October are all zero given that the hunting season for this species closed on 30 September 2020.

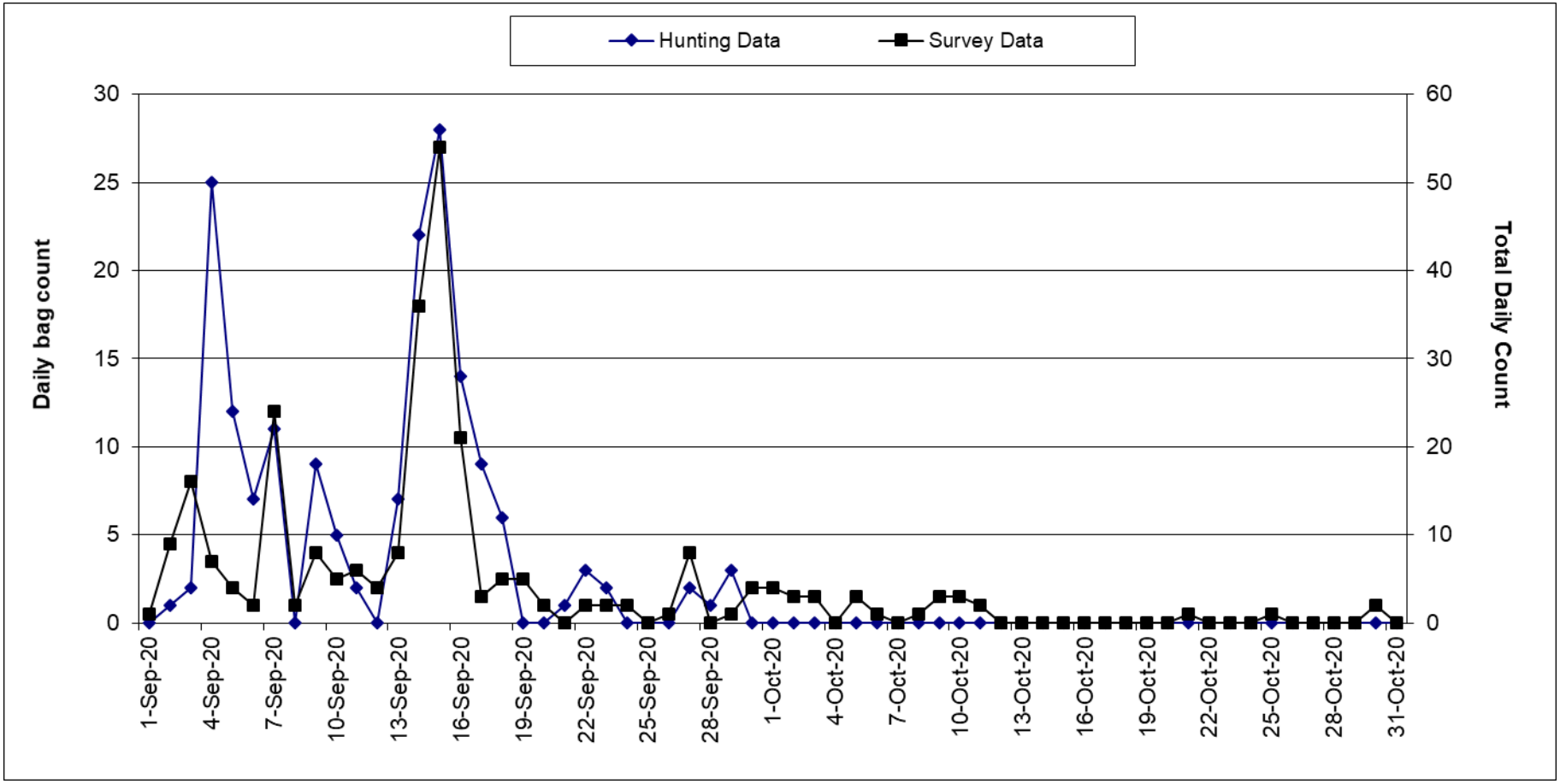

Figure 9. Daily bag count of Turtle Dove during 2020 (blue line; values on left-side y-axis), together with the total daily counts recorded during the 2020 survey (black line; values on right-side y-axis), for the period 1 September – 31 October 2020. It should be noted that bag counts for October are all zero given that the hunting season for this species closed on 30 September 2020.

Common Quail

The daily bag counts indicating the number of Common Quail caught during the 2020 autumn hunting season and the mean daily counts of Common Quail recorded during the present (2020) survey are shown in Figure 10, while Figure 11 shows the same data, but with the results from the present (2020) survey given as total daily counts. As already noted, the magnitude of the bag counts and those of the mean/total counts made in the 2020 survey are not directly comparable; hence the two sets of values are on different scales. Therefore, in Figures 10 and 11, two separate y-axes are used: the bag count data is plotted on the left-side y-axis, whereas the counts from the 2020 survey are plotted on the right-side y-axis.

Overall, the general trend of daily counts recorded during the 2020 survey is of low counts throughout the survey period. Very low or zero counts were recorded at the start of the survey up to mid-September, followed by a period of relatively higher counts between the mid-September and the beginning of October, and lower counts until the end of October. The bag count data includes a similar trend; very few Common Quail were captured up to mid-September, and higher numbers were caught between mid-September and mid-October, while lower bag counts were reported thereafter until end-October. Therefore, overall, there was a similar temporal trend of zero or low counts up to mid-September followed by higher counts until the mid-October, and a subsequent decline in counts in late October, in both the daily counts made during the present survey and the bag count data.

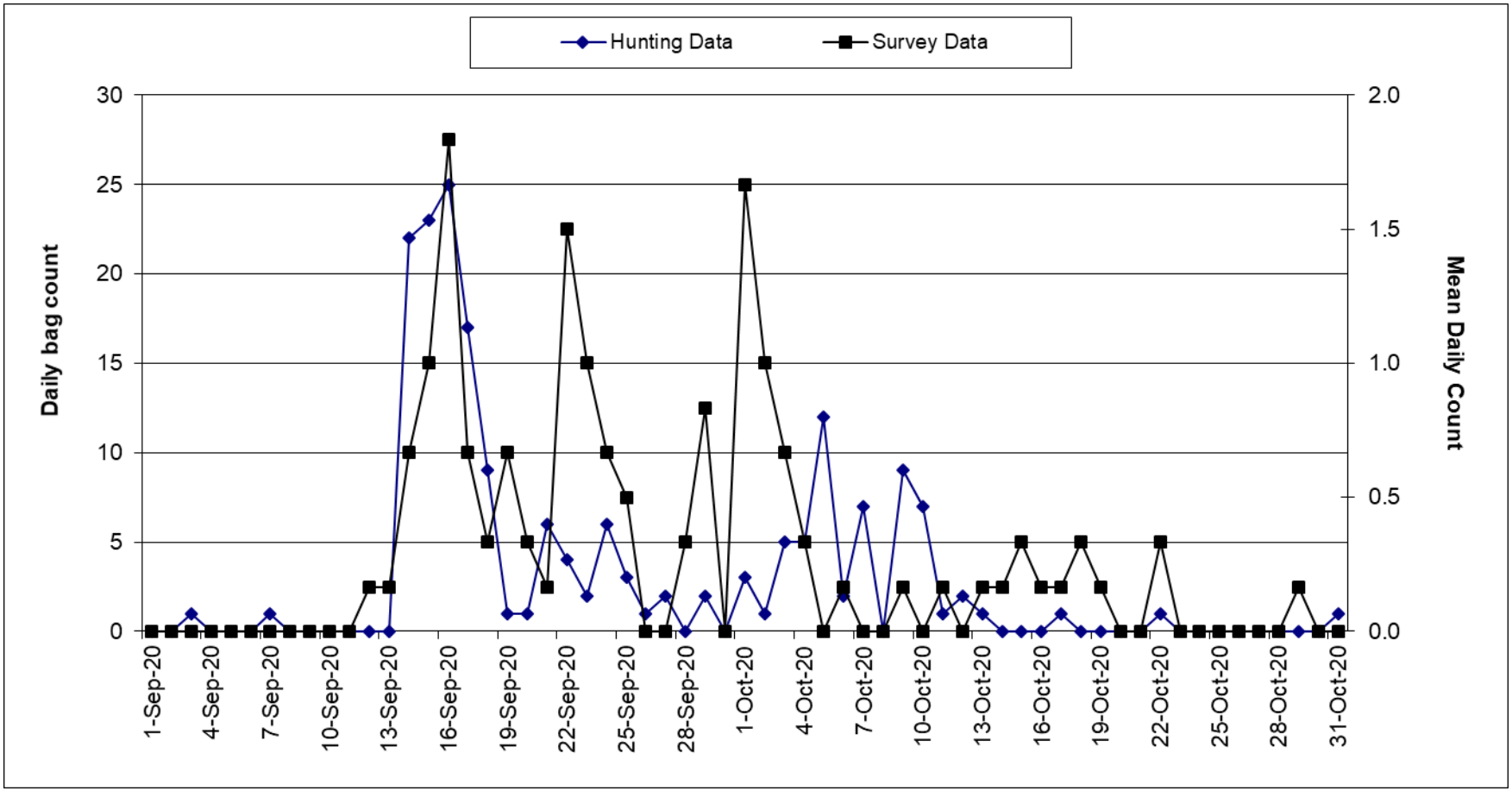

Figure 10. Daily bag count of Common Quail during 2020 (blue line; values on left-side y-axis), together with the mean daily counts recorded during the 2020 survey (black line; values on right-side y-axis), for the period 1 September – 31 October 2020.

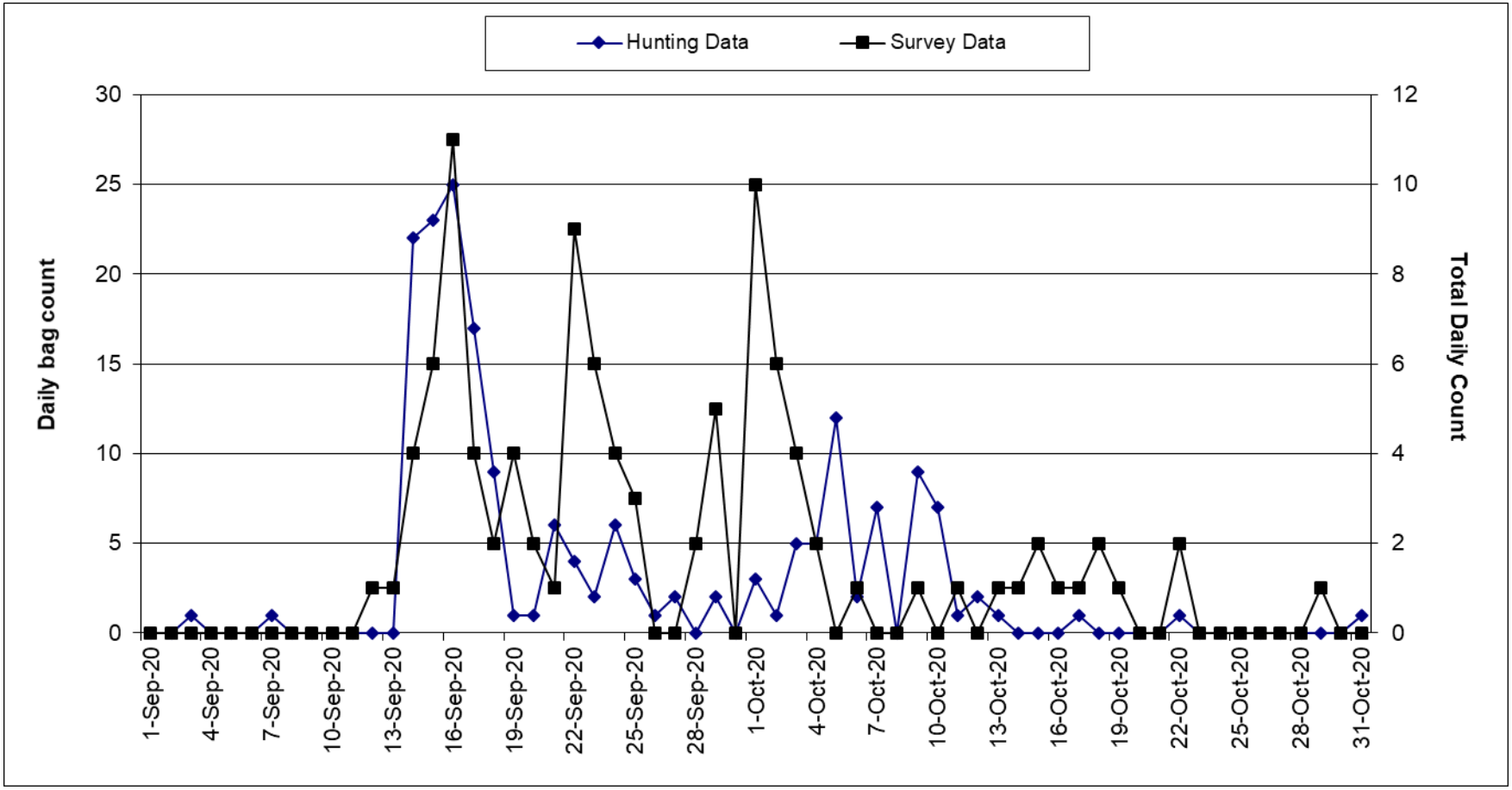

Figure 11. Daily bag count of Common Quail during 2020 (blue line; values on left-side y-axis), together with the total daily counts recorded during the 2020 survey (black line; values on right-side y-axis), for the period 1 September – 31 October 2020.

5. Appraisal

The present survey provides data on counts of Turtle Dove and Common Quail recorded during September and October 2020, as well as estimates of the migratory influx of the two species. Government had established the autumn open season during the period 1 September 2020 – 31 January 2021; the present survey therefore coincided with the initial two months of the 2020 autumn hunting season.

For Turtle Dove, when comparing the results of the present (autumn 2020) survey with those from Thomaidis' (nd) surveys held in 2008 and 2009 and those from the autumn 2014–2019 surveys by Ecoserv (2014a; 2015a; 2016a; 2017a; 2018a; 2019), a similar trend of counts recorded during the period 1 September – 31 October is noted overall; the pattern of counts for the years compared indicates a migratory influx during September. A migratory peak was recorded during the present survey on 15 September; a higher peak had been recorded in 2018 and slightly smaller peaks were also recorded during the 2009 and 2015 surveys, while no migratory peaks were recorded during the 2008, 2014, 2016 or 2017 surveys. The grand mean value recorded during the present (autumn 2020) survey was slightly higher than that recorded from all previous surveys.

The total influx of Turtle Dove for the present survey period (1 September – 31 October 2020) is estimated at 24,319 individuals, which is higher than the estimate for the same period in 2014 (Ecoserv, 2014a), 2015 (Ecoserv, 2015a), 2016 (Ecoserv, 2016a), 2017 (Ecoserv, 2017a), 2018 (Ecoserv, 2018a) and 2019 (Ecoserv, 2019a). When comparing the daily influx of Turtle Dove recorded during the present autumn 2020 survey with that recorded during the spring 2020 survey (see Ecoserv, 2020), mean values of daily influx of the species recorded during the present (autumn) survey are overall lower than values recorded during spring for the same year.

As highlighted in previous reports, 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. Increasing the number of field sites per day is desirable since influx of birds at different localities is extremely variable, with potential large differences in Turtle Dove passing at two different localities, even if these are separated by a very small distance, as indicated above. Furthermore, the length of coastline surveyed per day (4 km) amounts to less than 1.5% of the total coastline; the accuracy of the estimated total migratory influx would be higher if a larger proportion of coastline is surveyed. It should be noted that the total coastline length used in the present extrapolation includes stretches of coast that are highly developed and densely inhabited, for example, the Sliema, Valletta and Cottonera areas, where one would expect some disturbance to birds migrating at low altitude, hence their numbers may be lower, resulting in an overestimate. Another limitation is that the Turtle Dove migration counts were recorded over a seven-hour survey period (07:00–14:00), hence any individuals migrating at other times of the day were not included, leading to a potential underestimate of the total influx if significant Turtle Dove migration occurred between 14:00 and 07:00 of the following day. On the other hand, the 07:00–14:00 time period represents the time during which the activity of Turtle Dove is deemed maximum. 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 Turtle Dove is increasing or decreasing with time.

For Common Quail, when comparing the results of the present (autumn 2020) survey with those from Thomaidis' (nd) surveys held in 2008 and 2009 and those from the autumn 2014–2019 surveys by Ecoserv (2014a; 2015a; 2016a; 2017a; 2018a; 2019a), a similar trend of Common Quail counts recorded during the period 1 September – 31 October is noted overall; the pattern of counts for the years

compared indicates a migratory influx between mid-September and mid-October. No migratory peak for Common Quail was recorded during the present survey, whereas pronounced peaks were recorded in 2008 and 2009, but not in 2014, 2015, 2017, 2018 or 2019, while a small peak was recorded in 2016. The grand mean value recorded during the present (autumn 2020) survey was lower than values recorded by Thomaidis (nd) in 2008 and 2009, but similar to values recorded by Ecoserv (2014a; 2015a; 2016a; 2017a; 2018a; 2019a) in autumn 2014, 2015, 2016, 2017, 2018 and 2019.

The total influx of Common Quail for the present survey period (1 September – 31 October 2020) is estimated at 130,099 individuals, which is higher than the estimate for the same period in 2014 (Ecoserv, 2014a), 2015 (Ecoserv, 2015a), 2016 (Ecoserv, 2016a), 2017 (Ecoserv, 2017a), 2018 (Ecoserv, 2018a) and 2019 (Ecoserv, 2019a). When comparing the daily influx of Common Quail recorded during the present autumn 2020 survey with that recorded during the spring 2020 survey (see Ecoserv, 2020), mean values of daily influx of the species recorded during the present (autumn) survey are marginally lower than those recorded during spring for the same year.

As already indicated above, such estimates must be treated with utmost caution, given the relatively small number of field sites used in the present survey, that counts were not made daily at all 21 sites, and since the extrapolation procedure used is likely to result in a rough estimate. The considerations emphasised above for Turtle Dove also apply to the Common Quail – birds may migrate along specific pathways, with the result that high numbers may be recorded at one site and a potentially much lower number at a different site, even if the two sites are separated by a very small distance of even a few hundred meters. Hence increasing the number of field sites per day to account for such variation in counts between different sites is desirable. Furthermore, the daily area surveyed for Common Quail amounts to less than 1% of the total area; the accuracy of the estimated total migratory influx would be higher if a larger area is surveyed.

The design of the present survey included counts made over a 61 day period between 1 September – 31 October 2020, which covers the period when peak autumn migration of Turtle Dove and Quail normally occurs. For both Turtle Dove and Common Quail, a number of limitations, which have already been highlighted in Ecoserv (2011; 2012; 2013; 2014a; 2014b; 2015a; 2015b; 2016a; 2016b; 2017a; 2017b; 2018a; 2018b; 2019a; 2019b; 2020), are reiterated, namely:

- The data reported on in the present document can only be used for purposes of trend analysis, and even in this respect, due caution should be exercised given that the sampling methodology and effort used in the present 2020 study, while partly based on that reported and utilized by Thomaidis (nd) for the years 2008 and 2009, is not identical. In addition, the survey times for the 2014 and 2015 studies covered the period 06:00–13:00, whereas in the 2016–2020 studies surveys were held over the period 07:00–14:00.
- Robust and rigorous assessment of migratory influx requires trend analysis based on data from monitoring should ideally be 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 of 21 sites.

Nevertheless, the data from the present study provides a useful indication of the autumn influx of Turtle Dove and Common Quail, provided that results are interpreted in the context of these limitations.

6. Conclusion

The present results indicated that, for Turtle Dove, a similar trend of counts to that from previous surveys made by Thomaidis (nd) in 2008 and 2009, and by Ecoserv (2014a; 2015a; 2016a; 2017a; 2018a; 2019a) in autumn 2014–2019 using a similar methodology, was recorded during the present survey period (1 September – 31 October 2020); the main migratory influx occurred during September. Raw daily counts for Turtle Dove recorded from any given site (out of the 21 sites) during the present study varied between 0 and a maximum of 18, while the mean daily counts ranged between 0 and 9.0. A peak in migratory counts was recorded on 15 September 2020, while comparatively high mean counts were also recorded on 7, 14 and 16 September. The recorded counts showed some variation between the different sites: at the lower end, no Turtle Dove individuals were recorded throughout the survey period from grid location 5872 (southeast Malta), while at the higher end, 45 Turtle Dove individuals were recorded from the site at grid location 4077 (northwest Malta). The total influx of Turtle Dove for the present survey is estimated at 24,319 individuals. When comparing the grand mean value recorded during the present survey with that recorded during previous surveys made in autumn (2008, 2009, 2014, 2015, 2016, 2017, 2018, 2019), the influx of Turtle Dove in autumn 2020 is survey is higher than that recorded in any of the previous surveys. When comparing the recorded daily influx of Turtle Dove between the present autumn 2020 survey and the spring 2020 survey (see Ecoserv, 2020) mean values of daily influx of the species recorded during the present (autumn) survey are overall lower than values recorded during spring for the same year.

For Common Quail, when comparing the results from the present survey with ones held in autumn in previous years (2008, 2009, 2014, 2015, 2016, 2017, 2018, 2019), a similar trend of counts was recorded; a migratory influx occurred between mid-September and mid-October. No migratory peaks for Common Quail were recorded during the present survey, in contrast with the appreciably higher peaks recorded in 2008 and 2009. The daily observation times by the field observers spent at each Quail monitoring station are given in Appendix II. Raw daily counts for Common Quail recorded from any given site (out of the 21 sites) during the present study varied between 0 and a maximum of 7, while the mean daily counts ranged between 0 and 1.83. The recorded counts did not vary appreciably between the different sites: at the higher end, a total of 16 individuals were recorded from grid location 4085 located in Comino, which was surveyed daily; at the lower end, no Quail individuals were recorded throughout the survey period from grid locations 4268 (western Malta) and 5872 (eastern Malta). The total influx of Common Quail for the present survey period is estimated at 130,099 individuals. When comparing the grand mean value recorded during the present survey with that recorded during previous surveys made in autumn (2008, 2009, 2014, 2015, 2016, 2017, 2018, 2019), the influx of Common Quail in autumn 2020 was lower than that in 2008 and 2009, but similar to those recorded during the 2014, 2015, 2016, 2017, 2018 and 2019 surveys. When comparing the recorded daily influx of Common Quail between the present autumn 2020 survey and the spring 2020 survey (see Ecoserv, 2020), mean values of daily influx of this species recorded during the present (autumn) survey are marginally lower than those recorded during spring 2020.

Estimates of migratory influx reported in this report must be treated with utmost caution, given the relatively small number of field sites used in the present survey, that counts were not made daily at each site, and since the extrapolation procedure used is likely to result in a rough estimate. A more reliable value is the daily mean count; hence it is more appropriate to use this estimate.

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APPENDIX I - Raw counts

Table A. Daily counts of Turtle Dove recorded per site.

Ecoserv Sample Reference Code	B-592-20	B-593-20	B-594-20	B-595-20	B-596-20	B-597-20	B-598-20	B-599-20	B-600-20	B-601-20	B-602-20
Grid Location	**4085**	**3690**	**3881**	**4070**	**5663**	**5277**	**3292**	**4079**	**4268**	**6067**	**4878**
01-Sep-20	1	0	0	5	4	0					
02-Sep-20	1						35	9	10	9	0
03-Sep-20	0										
04-Sep-20	0										
05-Sep-20	0	0	2	11	1	0					
06-Sep-20	1						3	2	1	1	0
07-Sep-20	0										
08-Sep-20	0										
09-Sep-20	0	0	1	2	0	1					
10-Sep-20	0						1	1	7	1	0
11-Sep-20	1										
12-Sep-20	0										
13-Sep-20	0	1	5	2	1	0					
14-Sep-20	0						2	0	0	1	0
15-Sep-20	0										
16-Sep-20	0										
17-Sep-20	1	0	0	1	0	0					
18-Sep-20	0						1	0	2	0	0
19-Sep-20	0										
20-Sep-20	0										
21-Sep-20	0	0	0	0	0	0					
22-Sep-20	0						2	2	2	0	0
23-Sep-20	0										
24-Sep-20	0										
25-Sep-20	0	0	0	1	0	0					
26-Sep-20	0						0	0	1	0	0

Ecoserv Sample Reference Code	B-592-20	B-593-20	B-594-20	B-595-20	B-596-20	B-597-20	B-598-20	B-599-20	B-600-20	B-601-20	B-602-20
27-Sep-20	0										
28-Sep-20	0										
29-Sep-20	0	0	0	0	0	0					
30-Sep-20	0						0	0	0	0	0
01-Oct-20	0										
02-Oct-20	0										
03-Oct-20	0	0	0	0	0	0					
04-Oct-20	0						0	0	0	0	0
05-Oct-20	0										
06-Oct-20	0										
07-Oct-20	0	0	0	0	0	0					
08-Oct-20	0						0	0	0	0	0
09-Oct-20	0										
10-Oct-20	0										
11-Oct-20	0	0	0	0	0	0					
12-Oct-20	0						0	0	0	0	0
13-Oct-20	0										
14-Oct-20	0										
15-Oct-20	0	0	0	0	0	0					
16-Oct-20	0						0	0	0	0	0
17-Oct-20	0										
18-Oct-20	0										
19-Oct-20	0	0	0	0	0	0					
20-Oct-20	0						0	0	0	0	0
21-Oct-20	0										
22-Oct-20	0										
23-Oct-20	0	0	0	0	0	0					
24-Oct-20	0						0	0	0	0	0
25-Oct-20	0										
26-Oct-20	0										
27-Oct-20	0	0	0	0	0	0					

Ecoserv Sample Reference Code	B-592-20	B-593-20	B-594-20	B-595-20	B-596-20	B-597-20	B-598-20	B-599-20	B-600-20	B-601-20	B-602-20
28-Oct-20	0						0	0	0	0	0
29-Oct-20	0										
30-Oct-20	0										
31-Oct-20	0	0	0	0	0	0					

Table A continued. Daily counts of Turtle Dove recorded per site.

Ecoserv Sample Reference Code	B-602-20	B-604-20	B-605-20	B-606-20	B-607-20	B-608-20	B-609-20	B-610-20	B-611-20	B-612-20
Grid Location	**2888**	**4077**	**4666**	**6069**	**4480**	**3286**	**4073**	**5064**	**5872**	**4283**
01-Sep-20										
02-Sep-20										
03-Sep-20	0	0	3	0	0					
04-Sep-20						2	2	2	0	1
05-Sep-20										
06-Sep-20										
07-Sep-20	0	1	2	0	0					
08-Sep-20						0	9	1	1	1
09-Sep-20										
10-Sep-20										
11-Sep-20	2	1	6	0	2					
12-Sep-20						2	2	0	3	0
13-Sep-20										
14-Sep-20										
15-Sep-20	1	0	4	0	0					
16-Sep-20						0	0	0	0	0
17-Sep-20										
18-Sep-20										
19-Sep-20	0	1	1	0	0					
20-Sep-20						0	1	0	0	0

Ecoserv Sample Reference Code	B-602-20	B-604-20	B-605-20	B-606-20	B-607-20	B-608-20	B-609-20	B-610-20	B-611-20	B-612-20
21-Sep-20										
22-Sep-20										
23-Sep-20	0	1	1	0	0					
24-Sep-20						0	0	0	0	0
25-Sep-20										
26-Sep-20										
27-Sep-20	0	1	0	0	2					
28-Sep-20						0	1	0	0	0
29-Sep-20										
30-Sep-20										
01-Oct-20	0	1	0	0	1					
02-Oct-20						0	0	0	0	0
03-Oct-20										
04-Oct-20										
05-Oct-20	0	0	0	0	0					
06-Oct-20						0	0	0	0	0
07-Oct-20										
08-Oct-20										
09-Oct-20	0	0	0	0	0					
10-Oct-20						0	0	0	0	0
11-Oct-20										
12-Oct-20										
13-Oct-20	0	0	0	0	0					
14-Oct-20						1	1	0	0	0
15-Oct-20										
16-Oct-20										
17-Oct-20	0	0	0	0	0					
18-Oct-20						0	0	0	0	0
19-Oct-20										
20-Oct-20										
21-Oct-20	0	0	0	0	0					

Ecoserv Sample Reference Code	B-602-20	B-604-20	B-605-20	B-606-20	B-607-20	B-608-20	B-609-20	B-610-20	B-611-20	B-612-20
22-Oct-20						0	0	0	0	0
23-Oct-20										
24-Oct-20										
25-Oct-20	0	0	0	0	0					
26-Oct-20						0	0	0	0	0
27-Oct-20										
28-Oct-20										
29-Oct-20	0	0	0	0	0					
30-Oct-20						0	0	0	0	0
31-Oct-20										

Table B. Daily counts of Common Quail recorded per site, together with the area surveyed at each site.

Ecoserv Sample Reference Code	B-613-20	B-614-20	B-615-20	B-616-20	B-617-20	B-618-20	B-619-20	B-620-20	B-621-20	B-622-20	B-623-20
Grid Location	**4085**	**3690**	**3881**	**4070**	**5663**	**5277**	**3292**	**4079**	**4268**	**6067**	**4878**
Surveyed Area (km^2)	**0.024**	**0.042**	**0.035**	**0.009**	**0.031**	**0.010**	**0.048**	**0.052**	**0.021**	**0.019**	**0.017**
01-Sep-20	0	0	0	0	0	1					
02-Sep-20	0						1	0	0	0	0
03-Sep-20	0										
04-Sep-20	0										
05-Sep-20	0	0	0	0	0	0					
06-Sep-20	0						0	0	0	0	0
07-Sep-20	0										
08-Sep-20	0										
09-Sep-20	0	0	0	0	0	0					
10-Sep-20	0						0	0	0	0	0
11-Sep-20	0										

Ecoserv Sample Reference Code	B-613-20	B-614-20	B-615-20	B-616-20	B-617-20	B-618-20	B-619-20	B-620-20	B-621-20	B-622-20	B-623-20
12-Sep-20	0										
13-Sep-20	0	0	0	0	0	0					
14-Sep-20	0						0	0	0	1	0
15-Sep-20	0										
16-Sep-20	0										
17-Sep-20	0	0	1	0	0	0					
18-Sep-20	0						0	0	0	0	0
19-Sep-20	0										
20-Sep-20	0										
21-Sep-20	1	0	1	0	1	0					
22-Sep-20	1						2	1	0	0	0
23-Sep-20	0										
24-Sep-20	1										
25-Sep-20	0	1	1	0	0	0					
26-Sep-20	0						0	0	0	0	0
27-Sep-20	0										
28-Sep-20	0										
29-Sep-20	0	0	0	1	0	1					
30-Sep-20	0						0	0	0	0	0
01-Oct-20	0										
02-Oct-20	0										
03-Oct-20	0	0	0	4	0	0					
04-Oct-20	0						1	0	0	0	0
05-Oct-20	0										
06-Oct-20	0										
07-Oct-20	0	0	0	2	0	0					
08-Oct-20	0						0	0	0	0	0
09-Oct-20	0										
10-Oct-20	0										
11-Oct-20	0	0	1	0	1	2					
12-Oct-20	0						2	2	1	0	2

Ecoserv Sample Reference Code	B-613-20	B-614-20	B-615-20	B-616-20	B-617-20	B-618-20	B-619-20	B-620-20	B-621-20	B-622-20	B-623-20
13-Oct-20	0										
14-Oct-20	0										
15-Oct-20	0	0	0	1	0	0					
16-Oct-20	0						0	0	0	1	0
17-Oct-20	0										
18-Oct-20	0										
19-Oct-20	0	0	0	0	0	0					
20-Oct-20	0						0	0	0	0	1
21-Oct-20	0										
22-Oct-20	0										
23-Oct-20	0	0	0	0	0	0					
24-Oct-20	0						0	0	0	0	0
25-Oct-20	0										
26-Oct-20	0										
27-Oct-20	0	0	0	0	0	0					
28-Oct-20	0						0	0	0	2	0
29-Oct-20	0										
30-Oct-20	0										
31-Oct-20	0	0	0	0	0	0					

Table B continued. Daily counts of Common Quail recorded per site, together with the area surveyed at each site.

Ecoserv Sample Reference Code	B-624-20	B-625-20	B-626-20	B-627-20	B-628-20	B-629-20	B-630-20	B-631-20	B-632-20	B-633-20
Grid Location	**2888**	**4077**	**4666**	**6069**	**4480**	**3286**	**4073**	**5064**	**5872**	**4283**
Surveyed Area (km^2)	**0.015**	**0.016**	**0.018**	**0.032**	**0.043**	**0.085**	**0.005**	**0.051**	**0.025**	**0.036**
01-Sep-20										
02-Sep-20										
03-Sep-20	0	0	0	0	0					

Ecoserv Sample Reference Code	B-624-20	B-625-20	B-626-20	B-627-20	B-628-20	B-629-20	B-630-20	B-631-20	B-632-20	B-633-20
04-Sep-20						0	0	0	0	0
05-Sep-20										
06-Sep-20										
07-Sep-20	0	0	0	0	0					
08-Sep-20						0	0	0	0	0
09-Sep-20										
10-Sep-20										
11-Sep-20	0	0	0	0	0					
12-Sep-20						0	0	1	0	0
13-Sep-20										
14-Sep-20										
15-Sep-20	0	1	0	0	0					
16-Sep-20						0	0	0	0	1
17-Sep-20										
18-Sep-20										
19-Sep-20	0	0	1	1	0					
20-Sep-20						0	0	0	1	1
21-Sep-20										
22-Sep-20										
23-Sep-20	1	1	0	1	1					
24-Sep-20						1	2	0	0	2
25-Sep-20										
26-Sep-20										
27-Sep-20	0	0	0	0	0					
28-Sep-20						0	0	0	0	0
29-Sep-20										
30-Sep-20										
01-Oct-20	0	0	0	0	0					
02-Oct-20						0	0	0	0	0
03-Oct-20										
04-Oct-20										

Ecoserv Sample Reference Code	B-624-20	B-625-20	B-626-20	B-627-20	B-628-20	B-629-20	B-630-20	B-631-20	B-632-20	B-633-20
05-Oct-20	1	1	1	0	0					
06-Oct-20						0	0	0	0	0
07-Oct-20										
08-Oct-20										
09-Oct-20	0	1	0	0	2					
10-Oct-20						0	0	0	0	0
11-Oct-20										
12-Oct-20										
13-Oct-20	0	1	1	0	1					
14-Oct-20						0	0	0	0	0
15-Oct-20										
16-Oct-20										
17-Oct-20	0	0	0	0	0					
18-Oct-20						0	0	1	0	0
19-Oct-20										
20-Oct-20										
21-Oct-20	0	0	0	0	1					
22-Oct-20						0	0	0	0	0
23-Oct-20										
24-Oct-20										
25-Oct-20	0	0	0	0	0					
26-Oct-20						0	0	0	0	0
27-Oct-20										
28-Oct-20										
29-Oct-20	0	0	0	0	0					
30-Oct-20						0	0	0	0	1
31-Oct-20										

APPENDIX II - The daily observation times by the field observers spent at each quail monitoring station

Date	Location	Observation time	Date	Location	Observation time
1 September 2020	Comino	08:00 – 10:00	8 September 2020	Comino	07:00 – 09:00
1 September 2020	Gozo: San Blas	07:00 – 09:00	8 September 2020	Gozo: Ta Cenc	07:00 – 09:00
1 September 2020	Cirkewwa / Paradise Bay	07:00 – 09:00	8 September 2020	Fomm ir-Rih	07:00 – 09:00
1 September 2020	Mtahleb to Migra l-Ferha	09:00 – 11:00	8 September 2020	Lapsi	07:10 – 09:10
1 September 2020	Ghar Hassan	07:00 – 09:00	8 September 2020	Rinella	08:00 – 10:00
1 September 2020	White Rocks	07:30 – 09:30	8 September 2020	L-Ahrax	07:00 – 09:00
2 September 2020	Comino	07:00 – 09:00	9 September 2020	Comino	08:30 – 10:30
2 September 2020	Gozo: Marsalforn	07:00 – 09:00	9 September 2020	Gozo: San Blas	07:30 – 09:30
2 September 2020	Anchor Bay	07:30 – 09:30	9 September 2020	Cirkewwa / Paradise Bay	07:00 – 09:00
2 September 2020	Rdum ta Had-Dingli	07:30 – 09:30	9 September 2020	Mtahleb to Migra l-Ferha	07:00 – 09:00
2 September 2020	San Tumas	08:00 – 10:00	9 September 2020	Ghar Hassan	07:00 – 09:00
2 September 2020	Ghallis	07:15 – 09:15	9 September 2020	White Rocks	07:30 – 09:30
3 September 2020	Comino	07:00 – 09:00	10 September 2020	Comino	07:00 – 09:00
3 September 2020	Gozo: Kercem	07:00 – 09:00	10 September 2020	Gozo: Marsalforn	07:00 – 09:00
3 September 2020	Ghajn Tuffieha	07:00 – 09:00	10 September 2020	Anchor Bay	07:00 – 09:00
3 September 2020	Fawwara	09:45 – 11:45	10 September 2020	Rdum ta Had-Dingli	07:00 – 09:00
3 September 2020	Zonqor Point	07:00 – 09:00	10 September 2020	San Tumas	07:00 – 09:00
3 September 2020	Mistra / Mgiebah	07:00 – 09:00	10 September 2020	Ghallis	08:00 – 10:00
4 September 2020	Comino	07:00 – 09:00	11 September 2020	Comino	07:00 – 09:00
4 September 2020	Gozo: Ta Cenc	07:00 – 09:00	11 September 2020	Gozo: Kercem	07:00 – 09:00
4 September 2020	Fomm ir-Rih	07:00 – 09:00	11 September 2020	Ghajn Tuffieha	07:00 – 09:00
4 September 2020	Lapsi	07:30 – 09:30	11 September 2020	Fawwara	07:00 – 09:00
4 September 2020	Rinella	07:00 – 09:00	11 September 2020	Zonqor Point	07:00 – 09:00
4 September 2020	L-Ahrax tal-Mellieha	07:15 – 09:15	11 September 2020	Mistra / Mgiebah	07:15 – 09:15
5 September 2020	Comino	07:00 – 09:00	12 September 2020	Comino	07:00 – 09:00
5 September 2020	Gozo: San Blas	07:00 – 09:00	12 September 2020	Gozo: Ta Cenc	07:00 – 09:00
5 September 2020	Cirkewwa / Paradise Bay	07:20 – 09:20	12 September 2020	Fomm ir-Rih	07:30 – 09:30
5 September 2020	Mtahleb to Migra l-Ferha	08:00 – 10:00	12 September 2020	Lapsi	08:00 – 10:00
5 September 2020	Ghar Hassan	07:00 – 09:00	12 September 2020	Rinella	07:00 – 09:00
5 September 2020	White Rocks	07:00 – 09:00	12 September 2020	L-Ahrax	09:00 – 11:00
6 September 2020	Comino	07:00 – 09:00	13 September 2020	Comino	07:00 – 09:00
6 September 2020	Gozo: Marsalforn	07:00 –09:00	13 September 2020	Gozo: San Blas	07:00 – 09:00
6 September 2020	Anchor Bay	07:00 – 09:00	13 September 2020	Cirkewwa / Paradise Bay	07:00 – 09:00
6 September 2020	Rdum ta Had-Dingli	09:00 – 11:00	13 September 2020	Mtahleb to Migra l-Ferha	07:30 – 09:30
6 September 2020	San Tumas	07:30 – 09:30	13 September 2020	Ghar Hassan	07:00 – 09:00
6 September 2020	Ghallis	08:00 –10:00	13 September 2020	White Rocks	07:00 – 09:00
7 September 2020	Comino	07:00 – 09:00	14 September 2020	Comino	07:30 – 09:30
7 September 2020	Gozo: Kercem	07:00 – 09:00	14 September 2020	Gozo: Marsalforn	07:00 – 09:00
7 September 2020	Ghajn Tuffieha	07:00 – 09:00	14 September 2020	Anchor Bay	07:00 – 09:00
7 September 2020	Fawwara	07:00 – 09:00	14 September 2020	Rdum ta Had-Dingli	07:00 – 09:00
7 September 2020	Zonqor Point	07:00 – 09:00	14 September 2020	San Tumas	07:00 – 09:00
7 September 2020	Mistra / Mgiebah	07:15 – 09:15	14 September 2020	Ghallis	08:00 – 10:00

APPENDIX II continued.

Date	Location	Observation time	Date	Location	Observation time
15 September 2020	Comino	07:00 – 09:00	22 September 2020	Comino	07:00 – 09:00
15 September 2020	Gozo: Kercem	07:00 – 09:00	22 September 2020	Gozo: Marsalforn	07:00 – 09:00
15 September 2020	Ghajn Tuffieha	07:00 – 09:00	22 September 2020	Anchor Bay	07:30 – 09:30
15 September 2020	Fawwara	10:00 – 12:00	22 September 2020	Rdum ta Had-Dingli	07:00 – 09:00
15 September 2020	Zonqor Point	07:00 – 09:00	22 September 2020	San Tumas	08:00 – 10:00
15 September 2020	Mistra / Mgiebah	07:15 – 09:15	22 September 2020	Ghallis	07:00 – 09:00
16 September 2020	Comino	07:00 – 09:00	23 September 2020	Comino	07:15 – 09:15
16 September 2020	Gozo: Ta Cenc	07:00 – 09:00	23 September 2020	Gozo: Kercem	07:00 – 09:00
16 September 2020	Fomm ir-Rih	09:00 – 11:00	23 September 2020	Ghajn Tuffieha	07:00 – 09:00
16 September 2020	Lapsi	07:15 – 09:15	23 September 2020	Fawwara	07:00 – 09:00
16 September 2020	Rinella	09:15 – 11:15	23 September 2020	Zonqor Point	07:00 – 09:00
16 September 2020	L-Ahrax tal-Mellieha	07:00 – 09:00	23 September 2020	Mistra / Mgiebah	07:00 – 09:00
17 September 2020	Comino	07:00 – 09:00	24 September 2020	Comino	07:00 – 09:00
17 September 2020	Gozo: San Blas	07:30 – 09:30	24 September 2020	Gozo: Ta Cenc	07:00 – 09:00
17 September 2020	Cirkewwa / Paradise Bay	07:00 – 09:00	24 September 2020	Fomm ir-Rih	07:15 – 09:15
17 September 2020	Mtahleb to Migra l-Ferha	07:30 – 09:30	24 September 2020	Lapsi	08:00 – 10:00
17 September 2020	Ghar Hassan	07:00 – 09:00	24 September 2020	Rinella	07:00 – 09:00
17 September 2020	White Rocks	07:30 –09:30	24 September 2020	L-Ahrax tal-Mellieha	07:30 – 09:30
18 September 2020	Comino	07:00 – 09:00	25 September 2020	Comino	07:15 – 09:15
18 September 2020	Gozo: Marsalforn	08:00 – 10:00	25 September 2020	Gozo: San Blas	07:30 – 09:30
18 September 2020	Anchor Bay	07:20 – 09:20	25 September 2020	Cirkewwa / Paradise Bay	09:00 – 11:00
18 September 2020	Rdum ta Had-Dingli	09:00 – 11:00	25 September 2020	Mtahleb to Migra l-Ferha	07:00 – 09:00
18 September 2020	San Tumas	07:00 – 09:00	25 September 2020	Ghar Hassan	08:00 – 10:00
18 September 2020	Ghallis	07:00 – 09:00	25 September 2020	White Rocks	07:35 – 09:35
19 September 2020	Comino	07:30 – 09:30	26 September 2020	Comino	07:00 – 09:00
19 September 2020	Gozo: Kercem	07:00 – 09:00	26 September 2020	Gozo: Marsalforn	07:00 – 09:00
19 September 2020	Ghajn Tuffieha	07:00 – 09:00	26 September 2020	Anchor Bay	07:00 – 09:00
19 September 2020	Fawwara	07:00 – 09:00	26 September 2020	Rdum ta Had-Dingli	07:30 – 09:30
19 September 2020	Zonqor Point	08:00 – 10:00	26 September 2020	San Tumas	08:00 – 10:00
19 September 2020	Mistra / Mgiebah	07:00 – 09:00	26 September 2020	Ghallis	07:30 – 09:30
20 September 2020	Comino	07:00 – 09:00	27 September 2020	Comino	07:00 – 09:00
20 September 2020	Gozo: Ta Cenc	07:00 – 09:00	27 September 2020	Gozo: Kercem	07:00 – 09:00
20 September 2020	Fomm ir-Rih	07:00 – 09:00	27 September 2020	Ghajn Tuffieha	07:00 – 09:00
20 September 2020	Lapsi	07:30 – 09:30	27 September 2020	Fawwara	07:00 – 09:00
20 September 2020	Rinella	08:00 – 10:00	27 September 2020	Zonqor Point	07:00 – 09:00
20 September 2020	L-Ahrax tal-Mellieha	07:30 – 09:30	27 September 2020	Mistra / Mgiebah	07:00 – 09:00
21 September 2020	Comino	07:00 – 09:00	28 September 2020	Comino	07:30 – 09:30
21 September 2020	Gozo: San Blas	07:00 – 09:00	28 September 2020	Gozo: Ta Cenc	07:00 – 09:00
21 September 2020	Cirkewwa / Paradise Bay	07:15 – 09:15	28 September 2020	Fomm ir-Rih	07:30 – 09:30
21 September 2020	Mtahleb to Migra l-Ferha	07:30 – 09:30	28 September 2020	Lapsi	07:00 – 09:00
21 September 2020	Ghar Hassan	07:00 – 09:00	28 September 2020	Rinella	07:15 – 09:15
21 September 2020	White Rocks	07:00 – 09:00	28 September 2020	L-Ahrax tal-Mellieha	07:30 – 09:30

APPENDIX II continued.

Date	Location	Observation time	Date	Location	Observation time
29 September 2020	Comino	07:00 – 09:00	6 October 2020	Comino	07:00 – 09:00
29 September 2020	Gozo: San Blas	07:00 – 09:00	6 October 2020	Gozo: Ta Cenc	07:00 – 09:00
29 September 2020	Cirkewwa / Paradise Bay	09:00 – 11:00	6 October 2020	Fomm ir-Rih	08:00 – 10:00
29 September 2020	Mtahleb to Migra l-Ferha	07:30 – 09:30	6 October 2020	Lapsi	07:00 – 09:00
29 September 2020	Ghar Hassan	08:00 – 10:00	6 October 2020	Rinella	10:00 – 12:00
29 September 2020	White Rocks	07:00 – 09:00	6 October 2020	L-Ahrax	07:30 – 09:30
30 September 2020	Comino	07:00 – 09:00	7 October 2020	Comino	07:00 – 09:00
30 September 2020	Gozo: Marsalforn	07:30 – 09:30	7 October 2020	Gozo: San Blas	07:00 – 09:00
30 September 2020	Anchor Bay	07:10 – 09:10	7 October 2020	Cirkewwa / Paradise Bay	08:00 – 10:00
30 September 2020	Rdum ta Had-Dingli	07:00 – 09:00	7 October 2020	Mtahleb to Migra l-Ferha	07:00 – 09:00
30 September 2020	San Tumas	07:00 – 09:00	7 October 2020	Ghar Hassan	07:00 – 09:00
30 September 2020	Ghallis	07:15 – 09:15	7 October 2020	White Rocks	07:00 – 09:00
1 October 2020	Comino	07:00 – 09:00	8 October 2020	Comino	07:00 – 09:00
1 October 2020	Gozo: Kercem	07:15 – 09:15	8 October 2020	Gozo: Marsalforn	07:00 – 09:00
1 October 2020	Ghajn Tuffieha	07:30 – 09:30	8 October 2020	Anchor Bay	07:15 – 09:15
1 October 2020	Fawwara	07:00 – 09:00	8 October 2020	Rdum ta Had-Dingli	10:00 – 12:00
1 October 2020	Zonqor Point	08:00 – 10:00	8 October 2020	San Tumas	08:00 – 10:00
1 October 2020	Mistra / Mgiebah	07:10 – 09:10	8 October 2020	Ghallis	07:30 – 09:30
2 October 2020	Comino	07:30 – 09:30	9 October 2020	Comino	07:00 – 09:00
2 October 2020	Gozo: Ta Cenc	07:30 – 09:30	9 October 2020	Gozo: Kercem	07:00 – 09:00
2 October 2020	Fomm ir-Rih	07:30 – 09:30	9 October 2020	Ghajn Tuffieha	07:00 – 09:00
2 October 2020	Lapsi	09:00 – 11:00	9 October 2020	Fawwara	07:00 – 09:00
2 October 2020	Rinella	07:00 – 09:00	9 October 2020	Zonqor Point	07:00 – 09:00
2 October 2020	L-Ahrax tal-Mellieha	07:00 – 09:00	9 October 2020	Mistra / Mgiebah	07:00 – 09:00
3 October 2020	Comino	07:00 – 09:00	10 October 2020	Comino	07:00 – 09:00
3 October 2020	Gozo: San Blas	07:00 – 09:00	10 October 2020	Gozo: Ta Cenc	07:00 – 09:00
3 October 2020	Cirkewwa / Paradise Bay	07:45 – 09:45	10 October 2020	Fomm ir-Rih	07:30 – 09:30
3 October 2020	Mtahleb to Migra l-Ferha	07:00 – 09:00	10 October 2020	Lapsi	07:30 – 09:30
3 October 2020	Ghar Hassan	07:00 – 09:00	10 October 2020	Rinella	07:00 – 09:00
3 October 2020	White Rocks	07:15 – 09:15	10 October 2020	L-Ahrax	09:00 – 11:00
4 October 2020	Comino	07:00 – 09:00	11 October 2020	Comino	07:00 – 09:00
4 October 2020	Gozo: Marsalforn	07:00 – 09:00	11 October 2020	Gozo: San Blas	07:30 – 09:30
4 October 2020	Anchor Bay	07:30 – 09:30	11 October 2020	Cirkewwa / Paradise Bay	09:30 – 11:30
4 October 2020	Rdum ta Had-Dingli	07:30 – 09:30	11 October 2020	Mtahleb to Migra l-Ferha	08:00 – 10:00
4 October 2020	San Tumas	07:00 – 09:00	11 October 2020	Ghar Hassan	07:30 – 09:30
4 October 2020	Ghallis	07:00 – 09:00	11 October 2020	White Rocks	07:00 – 09:00
5 October 2020	Comino	07:15 – 09:15	12 October 2020	Comino	07:00 – 09:00
5 October 2020	Gozo: Kercem	07:30 – 09:30	12 October 2020	Gozo: Marsalforn	07:00 – 09:00
5 October 2020	Ghajn Tuffieha	07:00 – 09:00	12 October 2020	Anchor Bay	07:00 – 09:00
5 October 2020	Fawwara	08:30 – 10:30	12 October 2020	Rdum ta Had-Dingli	07:00 – 09:00
5 October 2020	Zonqor Point	07:00 – 09:00	12 October 2020	San Tumas	07:00 – 09:00
5 October 2020	Mistra / Mgiebah	07:15 – 09:15	12 October 2020	Ghallis	07:00 – 09:00

APPENDIX II continued.

Date	Location	Observation time	Date	Location	Observation time
13 October 2020	Comino	07:30 – 09:30	20 October 2020	Comino	07:00 – 09:00
13 October 2020	Gozo: Kercem	07:00 – 09:00	20 October 2020	Gozo: Marsalforn	07:00 – 09:00
13 October 2020	Ghajn Tuffieha	07:00 – 09:00	20 October 2020	Anchor Bay	07:30 – 09:30
13 October 2020	Fawwara	07:00 – 09:00	20 October 2020	Rdum ta Had-Dingli	09:00 – 11:00
13 October 2020	Zonqor Point	07:00 – 09:00	20 October 2020	San Tumas	10:00 – 12:00
13 October 2020	Mistra / Mgiebah	07:00 – 09:00	20 October 2020	Ghallis	07:30 – 09:30
14 October 2020	Comino	08:00 – 10:00	21 October 2020	Comino	07:30 – 09:30
14 October 2020	Gozo: Ta Cenc	07:00 – 09:00	21 October 2020	Gozo: Kercem	07:00 – 09:00
14 October 2020	Fomm ir-Rih	07:00 – 09:00	21 October 2020	Ghajn Tuffieha	07:00 – 09:00
14 October 2020	Lapsi	07:00 – 09:00	21 October 2020	Fawwara	07:00 – 09:00
14 October 2020	Rinella	08:00 – 10:00	21 October 2020	Zonqor Point	07:00 – 09:00
14 October 2020	L-Ahrax tal-Mellieha	07:30 – 09:30	21 October 2020	Mistra / Mgiebah	07:30 – 09:30
15 October 2020	Comino	07:00 – 09:00	22 October 2020	Comino	07:00 – 09:00
15 October 2020	Gozo: San Blas	07:00 – 09:00	22 October 2020	Gozo: Ta Cenc	07:00 – 09:00
15 October 2020	Cirkewwa / Paradise Bay	09:30 – 11:30	22 October 2020	Fomm ir-Rih	08:00 – 10:00
15 October 2020	Mtahleb to Migra l-Ferha	07:00 – 09:00	22 October 2020	Lapsi	07:00 – 09:00
15 October 2020	Ghar Hassan	07:00 – 09:00	22 October 2020	Rinella	07:00 – 09:00
15 October 2020	White Rocks	07:00 – 09:00	22 October 2020	L-Ahrax tal-Mellieha	07:30 – 09:30
16 October 2020	Comino	07:30 – 09:30	23 October 2020	Comino	07:30 – 09:30
16 October 2020	Gozo: Marsalforn	07:00 – 09:00	23 October 2020	Gozo: San Blas	07:00 – 09:00
16 October 2020	Anchor Bay	07:30 – 09:30	23 October 2020	Cirkewwa / Paradise Bay	07:30 – 09:30
16 October 2020	Rdum ta Had-Dingli	07:00 – 09:00	23 October 2020	Mtahleb to Migra l-Ferha	07:30 – 09:30
16 October 2020	San Tumas	07:00 – 09:00	23 October 2020	Ghar Hassan	07:00 – 09:00
16 October 2020	Ghallis	07:00 – 09:00	23 October 2020	White Rocks	07:00 – 09:00
17 October 2020	Comino	08:00 – 10:00	24 October 2020	Comino	07:00 – 09:00
17 October 2020	Gozo: Kercem	07:00 – 09:00	24 October 2020	Gozo: Marsalforn	07:00 – 09:00
17 October 2020	Ghajn Tuffieha	07:00 – 09:00	24 October 2020	Anchor Bay	07:30 – 09:30
17 October 2020	Fawwara	07:30 – 09:30	24 October 2020	Rdum ta Had-Dingli	07:00 – 09:00
17 October 2020	Zonqor Point	07:00 – 09:00	24 October 2020	San Tumas	09:00 – 11:00
17 October 2020	Mistra / Mgiebah	08:00 – 10:00	24 October 2020	Ghallis	07:15 – 09:15
18 October 2020	Comino	07:00 – 09:00	25 October 2020	Comino	07:00 – 09:00
18 October 2020	Gozo: Ta Cenc	07:00 – 09:00	25 October 2020	Gozo: Kercem	07:00 – 09:00
18 October 2020	Fomm ir-Rih	09:30 – 11:30	25 October 2020	Ghajn Tuffieha	07:30 – 09:30
18 October 2020	Lapsi	07:00 – 09:00	25 October 2020	Fawwara	07:00 – 09:00
18 October 2020	Rinella	07:15 – 09:15	25 October 2020	Zonqor Point	07:30 – 09:30
18 October 2020	L-Ahrax tal-Mellieha	07:20 – 09:20	25 October 2020	Mistra / Mgiebah	07:00 – 09:00
19 October 2020	Comino	07:00 – 09:00	26 October 2020	Comino	07:00 – 09:00
19 October 2020	Gozo: San Blas	08:30 – 10:30	26 October 2020	Gozo: Ta Cenc	07:00 – 09:00
19 October 2020	Cirkewwa / Paradise	07:00 – 09:00	26 October 2020	Fomm ir-Rih	07:00 – 09:00
19 October 2020	Mtahleb to Migra l-	07:00 – 09:00	26 October 2020	Lapsi	07:00 – 09:00
19 October 2020	Ghar Hassan	07:00 – 09:00	26 October 2020	Rinella	07:00 – 09:00
19 October 2020	White Rocks	07:00 – 09:00	26 October 2020	L-Ahrax tal-Mellieha	07:00 – 09:00

APPENDIX II continued.

Date	Location	Observation time
27 October 2020	Comino	07:00 – 09:00
27 October 2020	Gozo: San Blas	08:00 – 10:00
27 October 2020	Cirkewwa / Paradise Bay	07:30 – 09:30
27 October 2020	Mtahleb to Migra l-Ferha	08:00 – 10:00
27 October 2020	Ghar Hassan	07:00 – 09:00
27 October 2020	White Rocks	10:00 – 12:00
28 October 2020	Comino	07:30 – 09:30
28 October 2020	Gozo: Marsalforn	07:00 – 09:00
28 October 2020	Anchor Bay	09:00 – 11:00
28 October 2020	Rdum ta Had-Dingli	07:30 – 09:30
28 October 2020	San Tumas	07:00 – 09:00
28 October 2020	Ghallis	07:00 – 09:00
29 October 2020	Comino	07:30 – 09:30
29 October 2020	Gozo: Kercem	07:00 – 09:00
29 October 2020	Ghajn Tuffieha	10:00 – 12:00
29 October 2020	Fawwara	07:00 – 09:00
29 October 2020	Zonqor Point	07:10 – 09:10
29 October 2020	Mistra / Mgiebah	07:30 – 09:30
30 October 2020	Comino	07:30 – 09:30
30 October 2020	Gozo: Ta Cenc	08:00 – 10:00
30 October 2020	Fomm ir-Rih	07:15 – 09:15
30 October 2020	Lapsi	07:00 – 09:00
30 October 2020	Rinella	07:00 – 09:00
30 October 2020	L-Ahrax tal-Mellieha	07:00 – 09:00
31 October 2020	Comino	07:00 – 09:00
31 October 2020	Gozo: San Blas	07:00 – 09:00
31 October 2020	Cirkewwa / Paradise Bay	09:00 – 11:00
31 October 2020	Mtahleb to Migra l-Ferha	07:00 – 09:00
31 October 2020	Ghar Hassan	07:00 – 09:00
31 October 2020	White Rocks	07:00 – 09:00