Wild Birds Regulation Unit

Report on a survey of the influx of migratory Common Quail and Turtle Dove over the Maltese Islands, made in Spring 2022

Prepared by

12, Sir Arthur Borton Street
Mosta, MST1881
MALTA

Telephone: (+356) 2143 1900
Fax: (+356) 21424 137
e-mail: info@ecoserv.com.mt

www.ecoserv.com.mt

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This report has been compiled by:

JOSEPH A. BORG
BSc MSc PhD (Plymouth) CBiol FRSB FIBMS FMBA

AND

JULIAN EVANS
BSc (Hons) MSc PhD (Plymouth) CBiol MRSB MMBA

Coordinator of study logistics:

SARAH DEBONO
BSc (Hons) MSc MRSB

Report checked by:

Julian Evans BSc(Hons) MSc PhD CBiol MRSB MMBA

Report approved by:

Joseph A Borg BSc MSc PhD CBiol FRSB FIBMS FMBA

1. Introduction

The Ministry for Gozo (hereafter 'MGOZ') published a call for tenders bearing reference SPD3/2022/002, titled "Services - Tender for an independent scientific study on the influx or passage of migratory Common Quail and Turtle Dove in Malta during the 2022 spring season", on behalf of the Wild Birds Regulation Unit (WBRU). The Terms of Reference (ToR) of the call are as follows:

2 Contract Objectives and Expected Results

2.1 Overall Objectives

The overall objective of the contract is to provide an independent study on the influx or passage of the migratory turtle dove and common quail in Malta during the 2022 Spring season.

2.2 Specific Objectives

The specific objectives of this contract are as follows:

- *To survey and scientifically monitor the daily influx of the Turtle Dove and Common Quail;*
- *To estimate the overall presence (influx) of these two species per day and for the whole study period, subject to scientifically justified assumptions;*
- *To analyse observed and estimated migration trends in conjunction with the trends recorded in past studies, and in conjunction with any hunting data on the species surveyed, if applicable.*

2.3 Results to be achieved by the Consultant

The following results are expected to be delivered:

1. *Daily datasheets with raw counts for Turtle Dove and Common Quail;*

2. *A monitoring report for Spring 2022 season which must include:*
   a) *List of monitoring stations which recorded high/low counts;*
   b) *Dates which indicate high/low peaks in the migration of the Turtle Dove and Common Quail;*
   c) *A daily estimate of the influx of these two 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 with the results of previous studies commissioned during Spring of 2008–2009; and of 2012–2021. Reports available on: https://mgoz.gov.mt/en/Pages/WBRU/Reports-and-Statistics.aspx*
   f) *A comparison between the results of the present study and any hunting data on the species surveyed, if applicable.*

These may be presented either in order of importance or in chronological order, as appropriate.

3. Assumptions and Risks

3.1 Assumptions Underlying the Project Intervention

For the purposes of this bird migration study, it will be assumed that the consultant shall use the daily counts obtained from the monitoring stations to extrapolate the approximate estimate of the total influx of the Turtle Dove and Common Quail over the Maltese islands during the period stipulated in Section 3 Article 18. 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 24 in number, of which at least 10 stations are to be active on any given day during the monitoring period). It shall be the responsibility of the consultant to ensure that the monitoring stations (at least 10 in number on any given day), are manned by a sufficient number of ornithologists and/or field assistants. 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. The contractor shall propose strategies to address the identified risks. These proposals shall be included in the tenderer's technical offer. This tender shall in no way be construed or perceived as obliging the Government or any other relevant authority to take any decision concerning application of any derogation in Spring 2022.

4 Scope of the Work

4.1 General

4.1.1 Project Description

The monitoring of the influx or passage of the Turtle Dove and Common Quail shall take place during Spring 2022, between 15 March and 15 May, inclusive of both dates. The contractor shall mobilise all staff and equipment by early March, in preparation for the execution of the Spring 2022 bird migration study.

The bird migration study should comprise the on-field surveying and scientific monitoring of the daily influx of migration of both species concerned. This would provide an independent verification of the level of presence of the two species in Spring and the timing of their migration. This shall be achieved by generating a "Migration Count," that is a count of migrant birds of both species in question in the stipulated time span when monitoring is undertaken. The collection of scientific data to elucidate general population trends for both 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 report and analysis is to be submitted by 24 May 2022. Once the draft Spring 2022 report has been certified for quality assurance by the Contracting Authority, the final Spring 2022 monitoring report is to be submitted within 5 working days from such a review.

4.1.2 Geographical Area to be covered

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

4.1.3 Target Groups

As appropriate.

4.2 Specific Activities

The bird migration study shall monitor the influx of migratory specimens of the Turtle Dove and the Common Quail, bearing in mind any methodological limitations in the monitoring of these species (as identified in the European Union Management Plan for the Common Quail).

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

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

A network of monitoring stations will need to be set up throughout the three inhabited islands of the Maltese archipelago for the study period. Such a network would need to comprise at least 24 monitoring stations. Each of these monitoring stations shall be operated on at least two days per week and manned by at least two ornithologists and/or field assistants. The number of active stations on any given day shall be at least 10. 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 appropriate abilities to carry out bird identification in flight and shall specifically have the capacity to identify both Turtle Dove and Quail in the field with ease.

For each day during the bird monitoring phase, at least 10 monitoring stations must be fully manned. The exact number, location and area of the monitoring stations will be determined in consultation with scientific experts who are commissioned to undertake this bird migration study. Given that the survey is aimed at quantifying the influx or passage of migrating specimens, all monitoring stations shall be placed in strategic locations depending on the species being surveyed and the expected geographical occurrence of the species depending on the timing of the migration. The location of the monitoring stations shall be selected with care and shall not include areas where the settlement or sighting of the Turtle Dove and the Common Quail cannot in practice occur.

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, particularly nocturnal migrants, attention should be drawn to birds observed at short-term stopover sites immediately following a migratory flight. There are several options for producing a useful migration count of small landbirds; these options include: visible migration count; area search or route census counts; incidental observations; and daily estimated totals. The commissioned experts should define in the final monitoring report what they will consider as a migration count and what standardised methods will be used.

Nonetheless, in view that the 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 at each of the monitoring stations in operation. The consultant may also propose a variation to such methodology, but this shall not take effect unless previously agreed with and confirmed in writing by the Contracting Authority and shall in any case not involve any trapping or any taking of any bird, whether alive or dead, nor any part of any bird.

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 both the Common Quail and Turtle Dove. The calculations for such counts also need to include the standard deviation errors. Such mean counts shall then be extrapolated so as to cover the total area where the species may settle / which serves as short-term stopover sites, in order to estimate the total number of birds migrating daily over the Maltese Islands.

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

Relevant seasonal, local topographic (e.g. configuration of the coast), climatic and anthropogenic factors (such as degree of local urbanization) shall be duly taken into account in the extrapolation methodology, subject to scientifically justified assumptions. The methodology shall not involve trapping or any taking of any bird, whether alive or dead, nor any part of any bird.

The contractor must submit the daily datasheets with raw counts to the Contracting Authority at the end of each week of each of the bird monitoring periods. The draft monitoring report and analysis for Spring 2022 is to be submitted by 24 May 2022. Once such draft report has been certified for quality assurance by the Contracting Authority, the final Spring 2022 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 the Turtle Dove and Common Quail*
2. *A monitoring report for the season.*

4.3 Project Management

4.3.1 Responsible Body

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

4.3.2 Management Structure

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

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

None

5. Logistics and Timing

5.1 Location

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

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

5.2 Commencement Date & Period of Execution

The intended commencement date is the date of signature of the contract but shall not, in any case, be later than 15 March 2022.

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

6. Requirements

6.1 Personnel and Key Experts

6.1.1 Key Experts

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

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

Key Expert 1:
A Project co-ordinator who must be:
In possession of a Ph.D. or other academic qualification at MQRIC level 8 or equivalent related to natural sciences

Key Expert 2:
A Scientist who must be:
In possession of a Masters degree or other academic qualification at MQRIC level 7 or equivalent in natural sciences

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

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

6.1.2 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.

6.1.3 Support Staff and Backstopping

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

6.2 Accommodation

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

6.3 Facilities to be provided by the Contractor

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

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

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

6.4 Equipment

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

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

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

7. Reports

7.1 Reporting Requirements

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

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

- *the raw counts for the species covered by the corresponding migration report*
- *sampling methodology used*
- *the time schedule for the monitoring taken place*
- *the locations where monitoring was carried out and the estimated area of each site of observation*
- *the peak and low counts for each of the species under study*
- *the locations/monitoring stations which had peak/low counts*
- *an extrapolation indicating the total influx of the Turtle Dove and the Common Quail migrating over the Maltese Islands for each day*
- *an estimated total influx of the Turtle Dove and the Common Quail for the whole study period*
- *assumptions taken for such estimates*
- *an analysis of the observed and estimated migration trends in conjunction with the trends recorded in past studies, and in conjunction with any hunting data on the species surveyed, if applicable*

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 Spring 2022 bird monitoring phase. The draft Spring 2022 report and analysis is to be submitted by 24 May 2022. Once such draft report has been certified for quality assurance by the Contracting Authority, the final Spring 2022 monitoring report is to be submitted within five working days from such a review. All Spring 2022 project activities must be completed to the Contracting Authority's satisfaction by 31 May 2022. All reports and other forms of written communication must be presented in an editable format using commonly available software.

All reports must be approved by the Contracting Authority before these can be considered finalised. All reports will be property of the Contracting Authority and it will have sole copyright.

7.2 Submission & approval of progress reports

The daily data sheets with raw counts and one (1) 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 the Turtle Dove and Common Quail	*The original raw datasheets which are to be completed on site during the monitoring*	*The original datasheets submitted to the Contracting Authority.*

	process to be submitted by the end of each week of the monitoring phase.	
Spring 2022 Monitoring report which presents a clear analyses of the monitoring carried out	*The draft monitoring report shall be completed by 24 May 2022. The monitoring report will be finalised by the contractor and approved by the Contracting Authority by 31 May 2022.*	*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 the company during the period 15 March to 15 May 2022, which includes the period during which the 2022 spring season was open for hunting Quail (10 to 30 April 2022) and Turtle Dove (17 to 30 April 2022).

An overview of the migratory behaviour of the two bird species, and a review of local bird hunting and trapping activities and of EU legislation concerning these activities, have been 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 spring were carried out between 2011 and 2021 by Ecoserv (Ecoserv, 2011; 2012; 2013; 2014; 2015; 2016; 2017; 2018; 2019; 2020; 2021).

In order to put the present study in perspective, an overview of the findings from previous similar studies undertaken in spring follows (Ecoserv, 2011; 2012; 2013; 2014; 2015; 2016; 2017; 2018; 2019; 2020; 2021). These findings, 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. The minimum and maximum mean daily count, and the total estimated influx, are largely dependent on the survey period and duration; thus values for surveys held over different periods are not directly comparable.

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 is of very low mean bird counts recorded in March and early April, and higher counts recorded in mid-April to early May, that subsequently peter out during May. These include peak counts in some years, namely: in 2008, a very high mean count (98, on 15-4-08) and a secondary peak (26, on 20-04-08) were recorded by Thomaidis (nd), in 2009 there was a single main peak (33, on 23-04-09; Thomaidis, nd), while in 2018 a single main peak (25, on 19-04-18) was recorded (Ecoserv, 2018). No mean counts greater than 20 were recorded in any of the other years. Thus, the main migration of Turtle Dove usually occurs in the last three weeks of April, occasionally with migratory peaks occurring on some days, but migration can also extend to May.

In the case of Common Quail, the overall trend recorded from the various surveys is that migratory bird counts start to increase in late March, with the highest counts recorded in mid to end April, and a subsequent decrease in counts during May. No particularly high peak counts were recorded in any of the surveys: the highest count was recorded in 2012 (3.1, on 19-04-12; Ecoserv, 2012). Thus, the migration of Common Quail mostly occurs between late March and early May, with higher influx occurring during the last three weeks of April.

In the various reports of previous surveys (Ecoserv, 2011; 2012; 2013; 2014; 2015; 2016; 2017; 2018; 2019; 2020; 2021), 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 distance. In the case of Turtle Dove, the authors also emphasise 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.

Table 1

Summary of findings made during surveys of the migration of Turtle Dove and Common Quail undertaken in spring 2011 – 2020 (Ecoserv, 2011; 2012; 2013; 2014; 2015; 2016; 2017; 2018; 2019; 2020; 2021).

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
2011	8 May – 28 May	21	0.38 – 4.25	18,057	0.00 – 1.38	22,699
2012	9 Apr – 26 May	48	0.00 – 11.75	57,160	0.00 – 3.13	35,018
2013	10 Apr – 30 Apr	21	0.75 – 12.29	42,521	0.00 – 0.75	67,460
2014	10 Apr – 30 Apr	21	0.30 – 6.00	24,922	0.00 – 0.70	37,773
2015	14 Apr – 30 Apr	17	0.00 – 9.20	25,006	0.00 – 0.40	20,211
2016	10 Apr – 30 Apr	21	0.20 – 5.40	22,349	0.00 – 1.00	31,264
2017	25 Apr – 14 Apr	21	0.00 – 2.90	7,539	0.00 – 0.60	27,615
2018	1 Apr – 21 Apr	21	0.10 – 25.10	34,333	0.00 – 0.90	46,503
2019	15 Mar – 15 May	62	0.00 – 5.60	38,616	0.00 – 1.00	113,116
2020	15 Mar – 15 May	62	0.00 – 12.90	46,214	0.00 – 2.20	185,905
2021	15 Mar – 15 May	62	0.00 – 7.50	42,848	0.00 – 0.80	143,159

The authors stress that the Turtle Dove and Common Quail migratory count data presented in Ecoserv's reports (Ecoserv, 2011; 2012; 2013; 2014; 2015; 2016; 2017; 2018; 2019; 2020; 2021) can only be used for the purpose 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. In addition, comparison of data collected by Ecoserv from 2011 onward is also limited because the exact survey period varied amongst different years (see Table 1). The authors emphasise 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 greater sampling effort; for example, by making counts daily at all of a minimum 28 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. For the present study, the period identified by the WBRU during which the survey will be undertaken is 15th March to 15th May 2022, which is identical to that used in the previous spring 2019, 2020 and 2021 studies, and represents the longest period used in studies of this type to date. Such period is considered to be sufficiently extensive to incorporate the main spring migratory period for both Turtle Dove and Common Quail.

2. Methodology

The methodology used by Ecoserv during the present (spring 2022) survey is identical to that used in surveys made by the same company in previous spring seasons (see Ecoserv, 2011; 2012; 2013; 2014; 2015; 2016; 2017; 2018; 2019; 2020; 2021). 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 comprising 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 data in the field – were stationed at a total of 28 sites (= count stations) distributed around Malta, Comino and Gozo. The survey was undertaken over a 2-month period between 15 March and 15 May 2022. During the survey, counts of individuals of the two species *Coturnix coturnix* and *Streptopelia turtur* were made at 10 different sites each day. Each group of sites was surveyed once every 3 days, such that a total of 28 sites were surveyed over each period of 3 days. Furthermore, wherever possible, the study site at Comino was included in the 10 sites surveyed on any one day; hence planning that this site will be surveyed on a daily basis. When weather conditions precluded surveys at the Comino site due to unavailability of sea transport services, these were undertaken at an alternative site (Qala, San Blas or Ramla tal-Bir) instead. The sampling sites used in the present study include ones used in the previous surveys undertaken during spring 2011–2021 (see Ecoserv, 2011; 2012; 2013; 2014; 2015; 2016; 2017; 2018; 2019; 2020; 2021), and are represented by the grid cell reference numbers listed in Table 2, while their locations are shown in Figure 1.

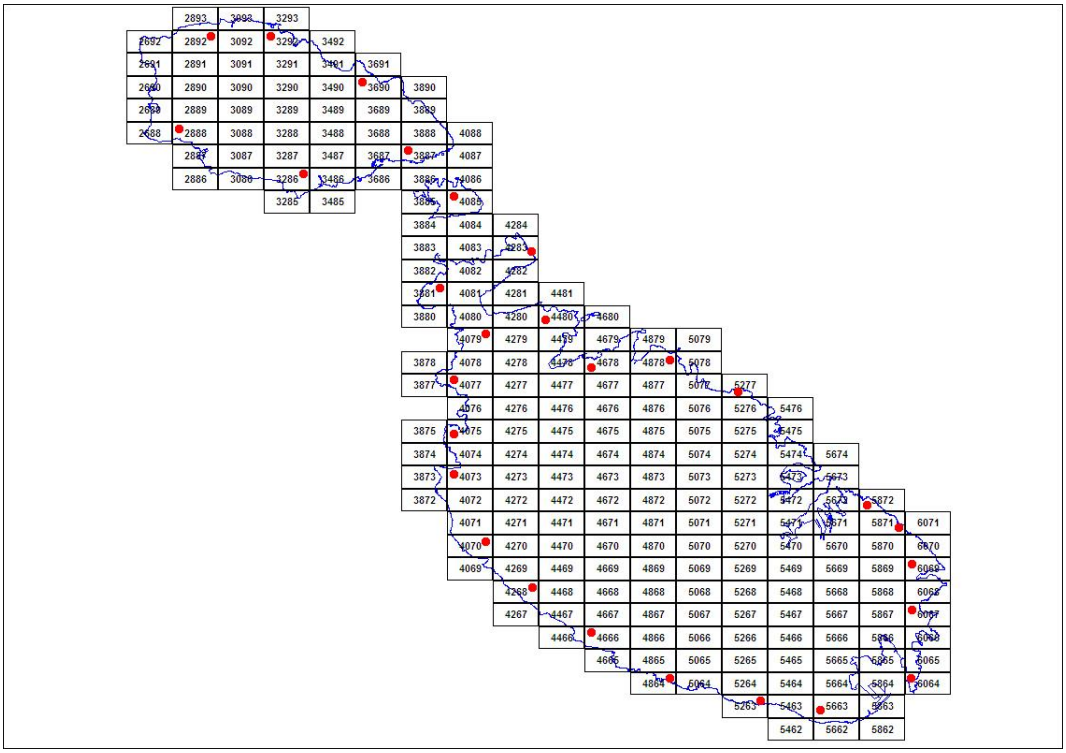

Figure 1. Map of the Maltese Islands showing the localities (grid cells indicated by the red filled circle) where the bird counts were made; see also Table 1.

Table 2

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

Location	Day 1	Day 2	Day 3
Gozo	2892	3690	3292
Gozo	3887	3286	2888
Comino	4085	4085	4085
Malta	3881	4077	4079
Malta	4073	4075	4070
Malta	4268	5263	4666
Malta	4864	5663	6064
Malta	6067	6071	6069
Malta	5872	5277	4878
Malta	4678	4480	4283

Since the survey was mainly aimed at quantifying the influx of migrating individuals, field sites were sited at strategic locations within coastal areas. Birds also fly in at different altitudes; sometimes they are observed flying high over coastal areas and they 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). Since Common Quail is mainly a nocturnal migrant, monitoring of this species was based on counts of individuals that would have settled in during the previous night. Surveys of Quail entailed the use of trained dogs to locate and flush the birds out from vegetation, in order to count them when they take flight. The count area was taken as the total area surveyed in this manner at a particular site.

Monitoring of Turtle Dove was made between 07:00 and 14:00, while monitoring of Common Quail was made during a two hour period sometime between 07:00 and 12:00. The count data collected for the pre-defined area and count period at each study site were 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 survey raw data sheets, copies of which have been submitted to the Wild Birds Regulation Unit (WBRU) of the Ministry for Gozo.

3. Results

Ecoserv's laboratory report reference for the present survey is **050-22**. The sample reference codes for the bird count data are **B-006-22** to **B-060-22**.

Turtle dove

Raw counts for Turtle Dove recorded from the 28 sites during the present study varied between 0 and a maximum of 28 (see Appendix I), while the mean daily counts ranged between 0 and 7.40 (Table 3). The counts recorded from different sites incorporate small peaks recorded on some of the days. During the present (2022) migration, higher numbers of Turtle Dove were recorded between 14 April and 30 May, with peak counts on 16, 22, and 27-28 April. The recorded counts varied appreciably between the different sites. At the lower end, at grid location 6069 (see Figure 1), only 3 Turtle Dove individuals were recorded throughout the survey period, while at the higher end, 64 individuals were recorded from the site at grid location 4070.

Values of mean and total daily counts of Turtle Dove recorded during the period 15 March to 15 May from the present survey are summarised in Table 3. These same values are also shown in Figure 2 along with values of mean counts for the same period in 2009 (Thomaidis, nd), 2019, 2020 and 2021 (Ecoserv, 2019; 2020; 2021). Figure 2 also shows the mean daily counts recorded in 2008 (Thomaidis, nd), 2012 (Ecoserv, 2012), 2013 (Ecoserv, 2013), 2014 (Ecoserv, 2014), 2015 (Ecoserv, 2015), 2016 (Ecoserv, 2016), 2017 (Ecoserv, 2017), and 2018 (Ecoserv, 2018). However, it should be noted that, apart from the 2009, and 2019–2021 surveys, none of the previous surveys covered the entire period from 15 March to 15 May (see Table 1); hence there is only partial overlap between the survey period used in several of the previous studies and that used in the present study.

Overall, counts recorded during the present survey show a similar trend to those recorded in previous surveys. The general pattern is of very low counts recorded in March and early April, with marginally higher counts recorded from mid-April to early May. The daily mean counts recorded during the present survey are similar to those recorded in previous years. Occasional peaks were recorded in some years: in 2008, a very high mean count (98, on 15-4-08) and a secondary peak (26, on 20-04-08) were recorded, while a single main peak was recorded in 2009 (33, on 23-04-09) and in 2018 (25, on 19-04-18); no mean counts greater than 20 were recorded in any of the other years, including during the present survey.

Table 3

Mean (± SD) and total daily counts of Turtle Dove recorded during the present study, together with estimates of daily and total influx of migratory individuals.

Date	Mean Daily Count ± SD		Total Daily Count	Estimated Total Daily Influx
15-Mar-22	0.00	± 0.00	0	0
16-Mar-22	0.00	± 0.00	0	0
17-Mar-22	0.10	± 0.32	1	54
18-Mar-22	0.00	± 0.00	0	0
19-Mar-22	0.50	± 1.58	5	271
20-Mar-22	0.00	± 0.00	0	0
21-Mar-22	0.00	± 0.00	0	0
22-Mar-22	0.10	± 0.32	1	54
23-Mar-22	0.00	± 0.00	0	0
24-Mar-22	0.00	± 0.00	0	0
25-Mar-22	0.10	± 0.32	1	54
26-Mar-22	0.00	± 0.00	0	0
27-Mar-22	0.40	± 1.26	4	217
28-Mar-22	0.10	± 0.32	1	54
29-Mar-22	0.00	± 0.00	0	0
30-Mar-22	0.20	± 0.63	2	108
31-Mar-22	0.50	± 1.58	5	271
01-Apr-22	0.30	± 0.67	3	163
02-Apr-22	0.30	± 0.67	3	163
03-Apr-22	0.00	± 0.00	0	0
04-Apr-22	0.40	± 0.70	4	217
05-Apr-22	0.20	± 0.42	2	108
06-Apr-22	0.10	± 0.32	1	54
07-Apr-22	1.20	± 1.93	12	651
08-Apr-22	0.50	± 1.27	5	271
09-Apr-22	0.80	± 1.75	8	434
10-Apr-22	1.50	± 1.78	15	814
11-Apr-22	0.40	± 0.97	4	217
12-Apr-22	1.00	± 1.25	10	542
13-Apr-22	1.40	± 0.84	14	759
14-Apr-22	3.10	± 2.56	31	1682
15-Apr-22	4.40	± 4.35	44	2387
16-Apr-22	5.60	± 4.77	56	3038
17-Apr-22	4.40	± 4.09	44	2387
18-Apr-22	2.40	± 2.07	24	1302
19-Apr-22	1.50	± 1.78	15	814
20-Apr-22	0.70	± 1.34	7	380
21-Apr-22	1.10	± 1.60	11	597
22-Apr-22	4.70	± 3.06	47	2549
23-Apr-22	2.80	± 3.94	28	1519
24-Apr-22	2.30	± 2.31	23	1248
25-Apr-22	2.20	± 1.93	22	1193
26-Apr-22	2.60	± 3.24	26	1410
27-Apr-22	6.70	± 7.02	67	3634
28-Apr-22	7.40	± 8.80	74	4014
29-Apr-22	4.90	± 8.60	49	2658
30-Apr-22	2.70	± 2.71	27	1465

Date	Mean Daily Count ± SD		Total Daily Count	Estimated Total Daily Influx
01-May-22	2.30	± 1.89	23	1248
02-May-22	1.00	± 1.70	10	542
03-May-22	1.70	± 0.67	17	922
04-May-22	2.60	± 2.17	26	1410
05-May-22	1.00	± 0.82	10	542
06-May-22	0.70	± 1.34	7	380
07-May-22	1.20	± 1.40	12	651
08-May-22	0.90	± 1.20	9	488
09-May-22	0.80	± 0.63	8	434
10-May-22	1.00	± 2.16	10	542
11-May-22	1.40	± 2.07	14	759
12-May-22	0.50	± 0.97	5	271
13-May-22	1.10	± 1.10	11	597
14-May-22	0.70	± 0.95	7	380
15-May-22	0.40	± 0.70	4	217
Sum Total			**869**	**47,136**

The grand mean of Turtle Dove counts recorded during the period 15 March to 15 May from the present (2022) survey is 1.40; this is appreciably lower than the grand mean of 2.76 recorded over the same period in 2009 but very similar to those recorded in 2019–2021 (1.15–1.37).

Comparisons of the grand mean for the period 15 March to 15 May from the present (2022) study with that from other previous surveys is not possible since the latter covered much shorter periods. The main period which was covered by most surveys is from 10 to 30 April. Values of the grand mean of Turtle Dove counts recorded during this period (10 to 30 April) from the present (2022) survey, together with values of the grand mean for the same period in 2018, 2009 (Thomaidis, nd), 2012, 2013, 2014, 2016, 2019, 2020 and 2021 (Ecoserv, 2012; 2013; 2014; 2016; 2019; 2020; 2021), for the period 14 to 30 April 2015 (Ecoserv, 2015), for the period 10 to 14 April 2017 (Ecoserv, 2017), and for the period 10 to 21 April 2018 (Ecoserv, 2018) are shown in Figure 3. Overall, the grand mean recorded during the present (2022) survey during the period 10 to 30 April is similar to that recorded from most surveys held between 2012 and 2021, but lower than that recorded from surveys made in 2008, 2009 and 2018.

Mean count values recorded from each of the 28 sites during the present survey are indicated on the map shown in Figure 4. The highest mean count was recorded from Mtaħleb/Miġra l-Ferħa (Grid 4070), while overall high counts were recorded from other study sites located in the northwestern and western parts of Malta and from Marsalforn (Grid 3292) and Kerċem/Għadira ta' Sarraflu (Grid 2888) in Gozo. The lowest mean counts were recorded from the southeastern parts of Malta.

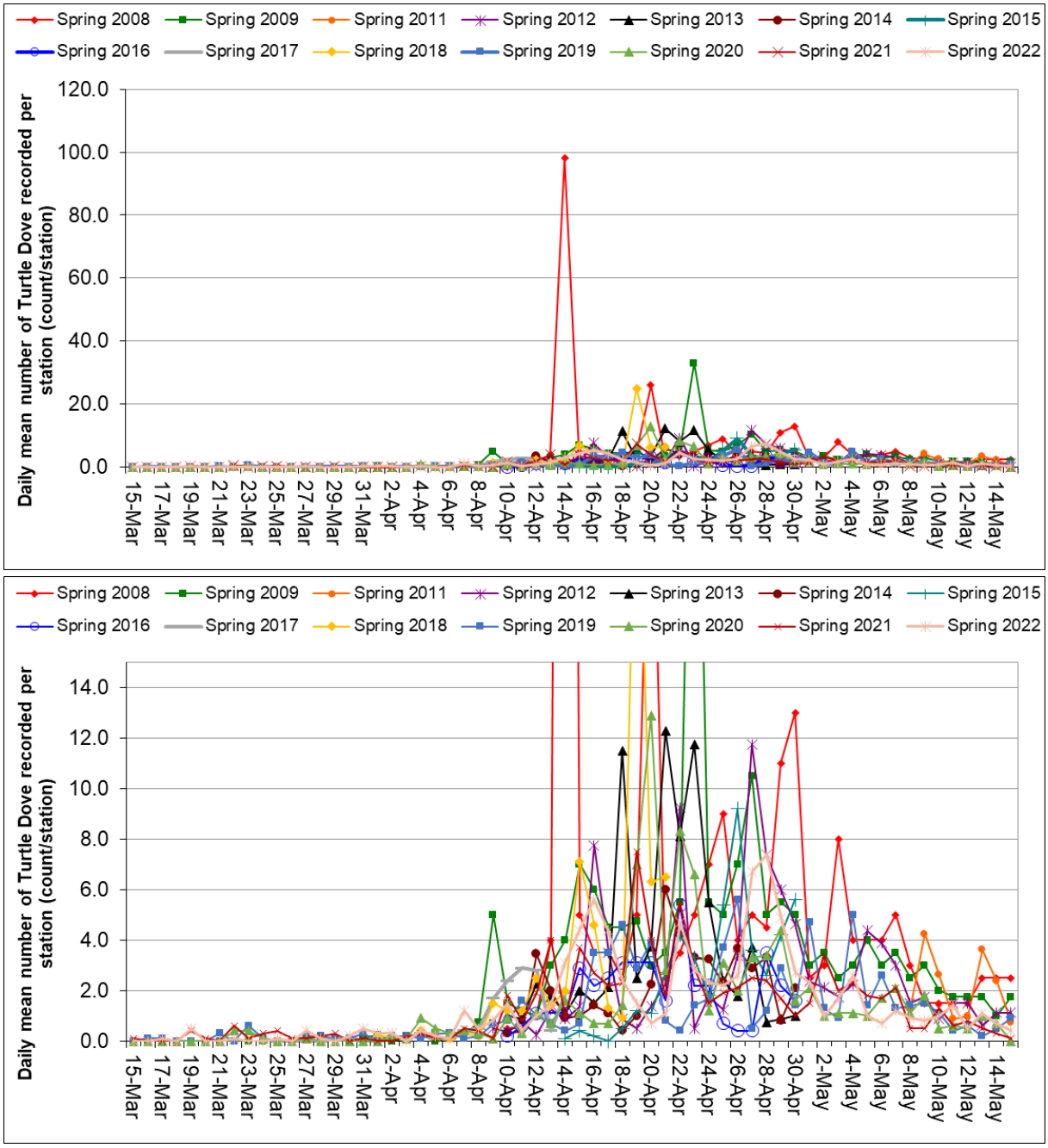

Figure 2. Daily mean counts of Turtle Dove per station (= site) recorded during the present (spring 2022) survey held between 15 March and 15 May, together with values of the same statistic for: spring 2008 and 2009 as reported in Thomaidis (nd), spring 2012 as reported in Ecoserv (2012), spring 2013 as reported in Ecoserv (2013), spring 2014 as reported in Ecoserv (2014), spring 2015 as reported in Ecoserv (2015), spring 2016 as reported in Ecoserv (2016), spring 2017 as reported in Ecoserv (2017), spring 2018 as reported in Ecoserv (2018), spring 2019 as reported in Ecoserv (2019), spring 2020 as reported in Ecoserv (2020), and spring 2021 as reported in Ecoserv (2021). *Top*: graph showing all values including peak counts >20 individuals recorded in 2008, 2009 and 2018; *Bottom*: graph showing all values except the peak counts >20 individuals recorded in 2008, 2009 and 2018.

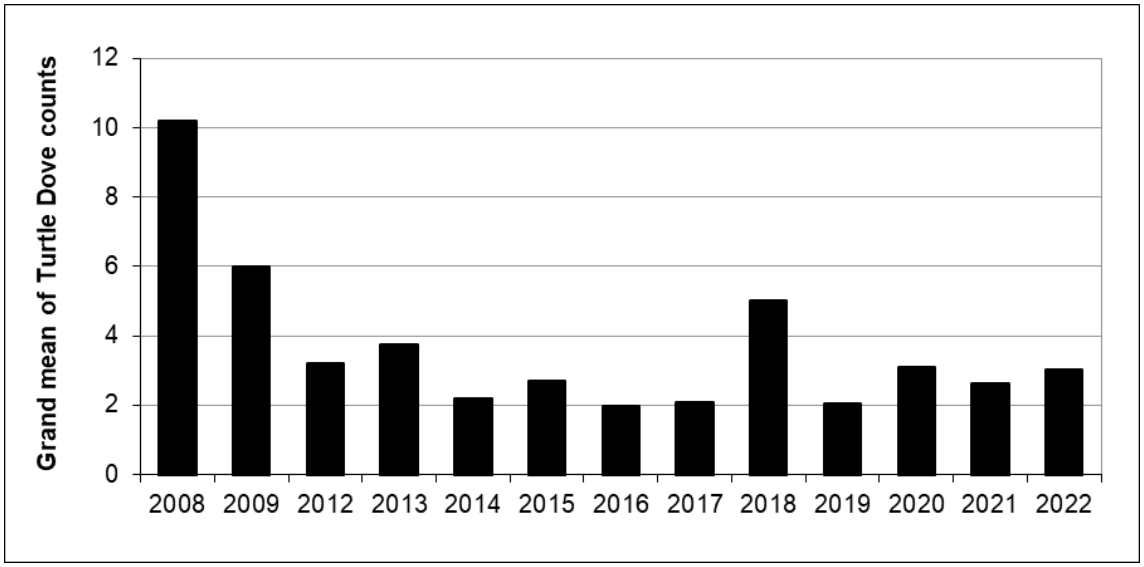

Figure 3. Grand mean of Turtle Dove counts for data from the period 10 to 30 April recorded in spring 2022 (present survey) and spring 2008, 2009 (Thomaidis, nd), 2012, 2013, 2014, 2016, 2019, 2020 and 2021 (Ecoserv, 2012; 2013; 2014; 2016; 2019; 2020; 2021), together with the grand mean for data from the period 14 to 30 April recorded in spring 2015 (Ecoserv, 2015), from the period 10 to 14 April recorded in spring 2017 (Ecoserv, 2017), and from the period 10 to 21 April recorded in spring 2018 (Ecoserv, 2018).

As has been done in previous surveys (Ecoserv, 2011; 2012; 2013; 2014; 2015; 2016; 2017; 2018; 2019; 2020; 2021), an estimate of the total influx of Turtle Dove over the Maltese Islands was made using the daily counts recorded from the present survey. Extrapolations were then made to obtain the approximate total number of individuals of this species that are envisaged to have migrated over the Maltese Islands on a particular date. However, as emphasised in reports of surveys from previous years made in spring (Ecoserv, 2011; 2012; 2013; 2014; 2015; 2016; 2017; 2018; 2019; 2020; 2021), such an estimate must be treated with utmost caution, given the relatively small number of sites used on any one day 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 birds passing at two different sites, even if these are separated by a small distance. As already stated in the introduction section above, the other limiting factor is that the field survey stops at 14:00 and does not start again before 07:00 of the following morning, hence potentially missing birds arriving late in the afternoon and early evening, as well as those arriving during the night, which 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 total influx of migrating Turtle Dove for the three-week study period was estimated by extrapolating the values obtained to the total coastline length for the Maltese Islands, which have a perimeter of 271.22 km (Mallia *et al*, 2002)[1]. Based on the mean daily counts (Table 3), extrapolation translates to an estimated daily influx ranging between 0 and 4,014 individuals, with a total influx over the survey period (15 March to 15 May 2022; i.e. 62 days) of 47,136 individuals, i.e. some 760 birds per day; see Table 3.

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

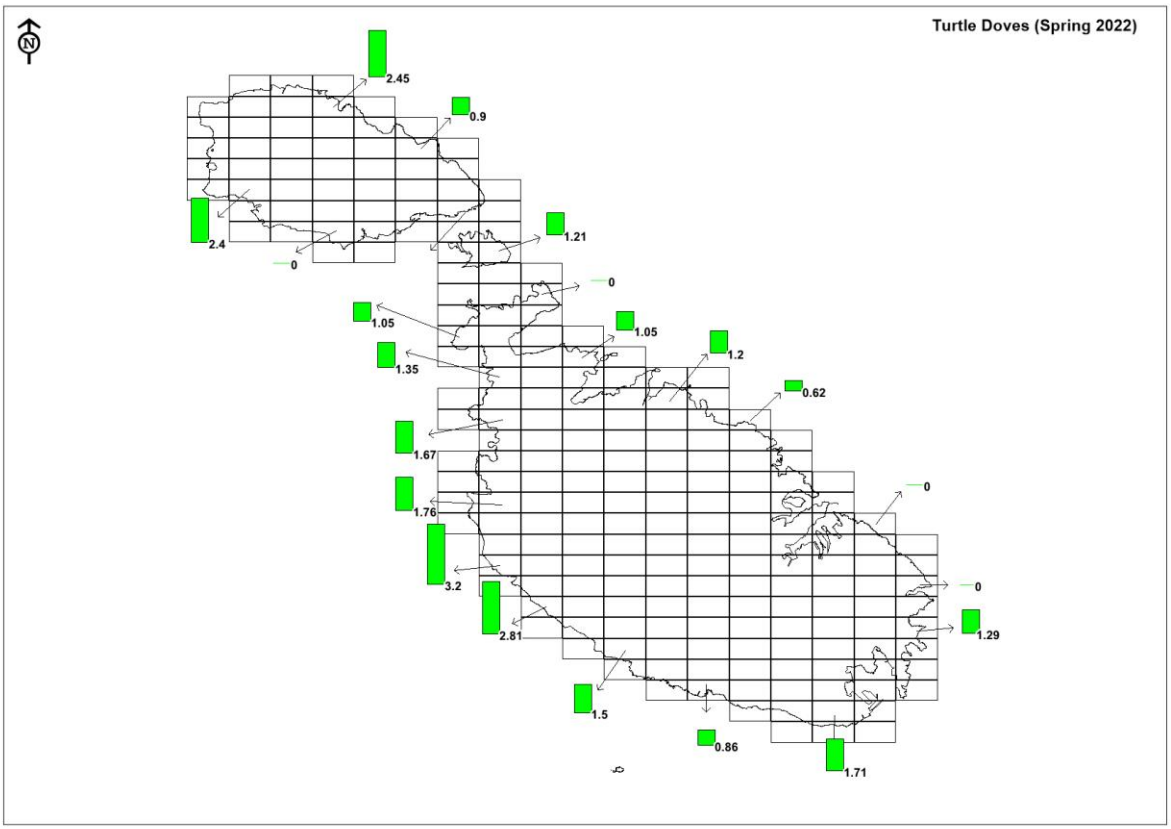

Figure 4. Map of the Maltese Islands showing the standard grid and respective codes, including ones used in the present study. The green bars indicate mean counts of Turtle Dove recorded from study sites in the respective cells.

Common Quail

The daily observation times by the field observers spent at each quail monitoring station are given in Appendix II. Raw counts for Common Quail recorded from the 28 sites during the present study varied between 0 and a maximum of 4 (see Appendix I), while the mean daily counts ranged between 0 and 0.90. The recorded counts varied slightly between the different sites: at the higher end, a total of 17 individuals were recorded from grid locations 2892 and 3292, while at the lower end 1 Quail individual was recorded from grid location 6071.

Values of mean and total daily counts of Common Quail recorded during the period 15 March to 15 May from the present survey, as well as the respective area surveyed on each day, are given in Table 4. These same values are also shown in Figure 5, along with values of mean counts for the same period in 2009 (Thomaidis, nd), 2019, 2020 and 2021 (Ecoserv, 2019; 2020; 2021). Figure 5 also shows the mean daily counts recorded in 2008 (Thomaidis, nd), 2012 (Ecoserv, 2012), 2013 (Ecoserv, 2013), 2014 (Ecoserv, 2014), 2015 (Ecoserv, 2015), 2016 (Ecoserv, 2016), 2017 (Ecoserv, 2017) and 2018 (Ecoserv, 2018). However, it should be noted that, apart from the 2009 survey and 2019–2021 surveys, none of the previous surveys covered the entire period from 15 March to 15 May (see Table 1); hence there is only partial overlap between the survey period used in several of the previous studies and that used in the present study.

Overall, counts recorded during the present study remained low during the entire survey period. The general pattern observed in previous surveys is of low migratory counts in mid-March, which start to increase in late March, with the highest counts usually recorded in mid to end April, and a subsequent decline in counts during May. The daily mean counts recorded during the present survey are overall slightly lower than those in 2008 and 2009 (Thomaidis, nd) and similar to those in 2011–2021 (Ecoserv 2011; 2012; 2013; 2014; 2015; 2016; 2017; 2018; 2019; 2020; 2021). Minor peaks of around 2.0–3.0 were recorded in spring 2008, 2009, 2012 and 2020, while no mean counts greater than 1.5 were recorded in any of the other years, including in the present survey.

The grand mean of Common Quail counts recorded during the period 15 March to 15 May from the present (2022) survey is 0.30, which is lower than the grand mean of 0.74 recorded over the same period in 2009, but similar to those recorded in 2019–2021 (0.25–0.40).

Comparisons of the grand mean for the period 15 March to 15 May with other previous surveys is not possible since these covered much shorter periods. The main period which was covered by most surveys is from 10 to 30 April. Values of the grand mean of Common Quail counts recorded during this period (10 to 30 April) from the present (2022) survey, together with values of the grand mean for the same period in 2018, 2009 (Thomaidis, nd), 2012, 2013, 2014, 2016, 2019, 2020 and 2021 (Ecoserv, 2012; 2013; 2014; 2016; 2019; 2020; 2021), for the period 14 to 30 April 2015 (Ecoserv, 2015), for the period 10 to 14 April 2017 (Ecoserv, 2017), and for the period 10 to 21 April 2018 (Ecoserv, 2018) are shown in Figure 6. Overall, the grand mean recorded during the present (2022) survey for the period 10 to 30 April is similar to that recorded during the 2013–2021 surveys, but lower than that recorded in 2008, 2009 and 2012.

Mean count values recorded from each of the 28 sites are indicated on the map shown in Figure 7. The highest mean count was recorded from Marsalforn (Grid 3292) and Wied il-Mielaħ in Gozo, while relatively high counts were also recorded from sites located in western Malta. Low mean counts were recorded from several sites around the Maltese Islands, particularly from sites located in southeastern Malta.

Table 4

Mean (± SD) daily counts of Common Quail recorded and area surveyed, together with estimates of daily and total influx of migratory individuals.

Date	Mean Daily Count ± SD		Total Area Surveyed (km^2)	Total Daily Count	Estimated Daily Influx
15-Mar-22	0.60	± 0.97	0.251	6	5298
16-Mar-22	0.30	± 0.67	0.450	3	1476
17-Mar-22	0.20	± 0.63	0.281	2	1575
18-Mar-22	0.20	± 0.42	0.251	2	1766
19-Mar-22	0.20	± 0.63	0.450	2	984
20-Mar-22	0.20	± 0.42	0.281	2	1575
21-Mar-22	0.90	± 1.45	0.251	9	7946
22-Mar-22	0.60	± 0.84	0.450	6	2951
23-Mar-22	0.10	± 0.32	0.281	1	788
24-Mar-22	0.40	± 0.97	0.251	4	3532
25-Mar-22	0.10	± 0.32	0.450	1	492
26-Mar-22	0.80	± 0.92	0.281	8	6300
27-Mar-22	0.10	± 0.32	0.251	1	883
28-Mar-22	0.40	± 0.70	0.450	4	1967

Date	Mean Daily Count ± SD		Total Area Surveyed (km^2)	Total Daily Count	Estimated Daily Influx
29-Mar-22	0.80	± 0.79	0.281	8	6300
30-Mar-22	0.50	± 1.27	0.251	5	4415
31-Mar-22	0.50	± 0.53	0.450	5	2459
01-Apr-22	0.40	± 0.97	0.281	4	3150
02-Apr-22	0.20	± 0.42	0.251	2	1766
03-Apr-22	0.80	± 1.14	0.450	8	3935
04-Apr-22	0.40	± 0.52	0.281	4	3150
05-Apr-22	0.50	± 0.53	0.251	5	4415
06-Apr-22	0.20	± 0.42	0.450	2	984
07-Apr-22	0.50	± 0.71	0.281	5	3938
08-Apr-22	0.20	± 0.42	0.251	2	1766
09-Apr-22	0.60	± 0.84	0.450	6	2951
10-Apr-22	0.10	± 0.32	0.281	1	788
11-Apr-22	0.30	± 0.48	0.251	3	2649
12-Apr-22	0.50	± 0.71	0.450	5	2459
13-Apr-22	0.50	± 0.71	0.281	5	3938
14-Apr-22	0.40	± 0.70	0.251	4	3532
15-Apr-22	0.40	± 0.84	0.450	4	1967
16-Apr-22	0.60	± 0.70	0.281	6	4725
17-Apr-22	0.30	± 0.48	0.251	3	2649
18-Apr-22	0.10	± 0.32	0.450	1	492
19-Apr-22	0.40	± 0.52	0.281	4	3150
20-Apr-22	0.80	± 0.92	0.251	8	7063
21-Apr-22	0.00	± 0.00	0.450	0	0
22-Apr-22	0.20	± 0.42	0.281	2	1575
23-Apr-22	0.50	± 0.85	0.251	5	4415
24-Apr-22	0.20	± 0.42	0.450	2	984
25-Apr-22	0.20	± 0.42	0.281	2	1575
26-Apr-22	0.50	± 0.85	0.251	5	4415
27-Apr-22	0.30	± 0.67	0.450	3	1476
28-Apr-22	0.00	± 0.00	0.281	0	0
29-Apr-22	0.10	± 0.32	0.251	1	883
30-Apr-22	0.10	± 0.32	0.450	1	492
01-May-22	0.10	± 0.32	0.281	1	788
02-May-22	0.40	± 0.70	0.251	4	3532
03-May-22	0.20	± 0.42	0.450	2	984
04-May-22	0.20	± 0.42	0.281	2	1575
05-May-22	0.30	± 0.67	0.251	3	2649
06-May-22	0.00	± 0.00	0.450	0	0
07-May-22	0.00	± 0.00	0.281	0	0
08-May-22	0.00	± 0.00	0.251	0	0
09-May-22	0.10	± 0.32	0.450	1	492
10-May-22	0.00	± 0.00	0.281	0	0
11-May-22	0.20	± 0.42	0.251	2	1766
12-May-22	0.00	± 0.00	0.450	0	0
13-May-22	0.00	± 0.00	0.281	0	0
14-May-22	0.10	± 0.32	0.251	1	883
15-May-22	0.00	± 0.00	0.450	0	0
Sum Total				**188**	**138,658**

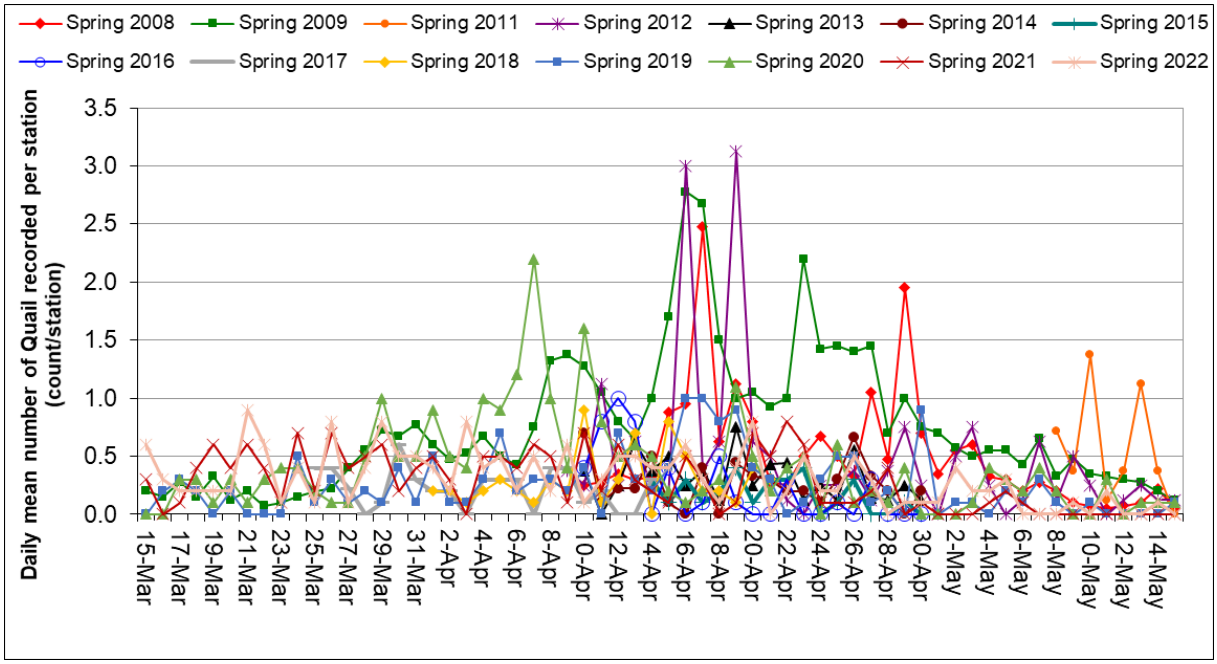

Figure 5. Daily mean counts of Common Quail per station (= site) recorded during the present (spring 2022) survey held between 15 March and 15 May, together with values of the same statistic for: spring 2008 and 2009 as reported in Thomaidis (nd), spring 2012 as reported in Ecoserv (2012), spring 2013 as reported in Ecoserv (2013), spring 2014 as reported in Ecoserv (2014), spring 2015 as reported in Ecoserv (2015), spring 2016 as reported in Ecoserv (2016), spring 2017 as reported in Ecoserv (2017), spring 2018 as reported in Ecoserv (2018), spring 2019 as reported in Ecoserv (2019), spring 2020 as reported in Ecoserv (2020), and spring 2021 as reported in Ecoserv (2021).

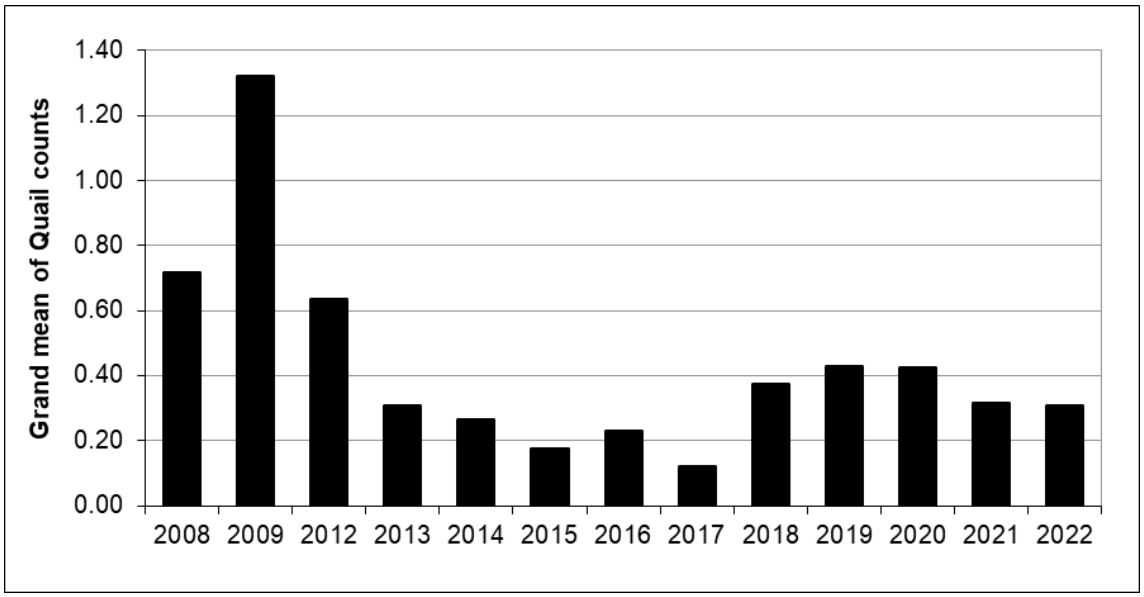

Figure 6. Grand mean of Common Quail counts for data from the period 10 to 30 April recorded in spring 2022 (present survey) and spring 2008, 2009 (Thomaidis, nd), 2012, 2013, 2014, 2016, 2019, 2020 and 2021 (Ecoserv, 2012; 2013; 2014; 2016; 2019; 2020; 2021), together with the grand mean for data from the period 14 to 30 April recorded in spring 2015 (Ecoserv, 2015), from the period 10 to 14 April recorded in spring 2017 (Ecoserv, 2017), and from the period 10 to 21 April recorded in spring 2018 (Ecoserv, 2018).

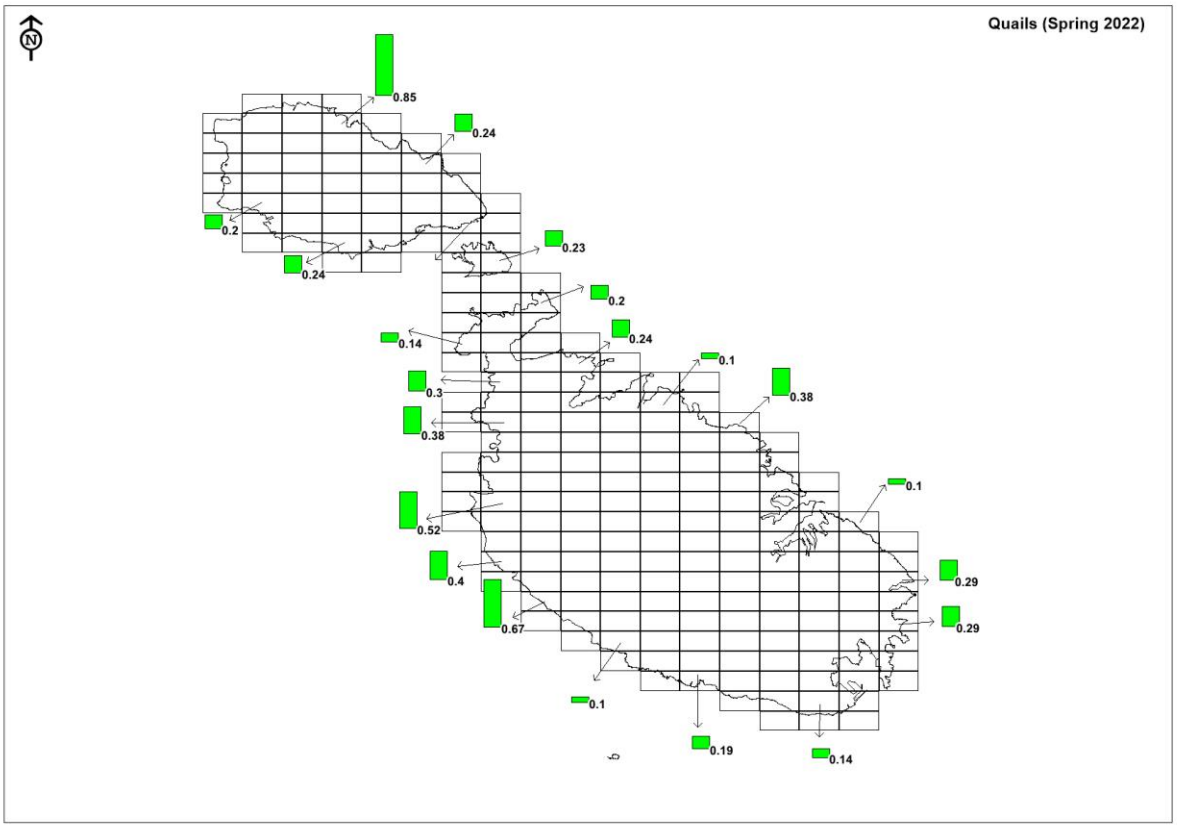

Figure 7. Map of the Maltese Islands showing the standard grid and respective codes, including ones used in the present study. The green bars indicate mean counts of Common Quail recorded from study sites in the respective cells.

As has been done in previous surveys (Ecoserv, 2011; 2012; 2013; 2014; 2015; 2016; 2017; 2018; 2019; 2020; 2021), the total influx of Common Quail was estimated for the whole area of the Maltese Islands using the recorded area surveyed for Quail at each site. However, such an estimate requires the following assumptions: (i) the rate of Quail settling at coastal sites (where the survey was carried out) is equal to that at inland locations, and (ii) the total area used to estimate the migration count does not include areas where settlement of Quail cannot occur in practice. Since Quail tend to migrate to inland sites, settling of Quail in coastal areas will likely be less than or equal to that in inland regions, but not greater, meaning that the estimated total may be an underestimate. The use of only coastal sites is still justified since these are more likely to serve as short-term stopover sites immediately following a migratory flight than inland locations; thus, including inland locations may result in an overestimate of the total influx due to repeated counting of resident Quails. 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 total influx of birds per day are shown in Table 4. Based on these data, extrapolation translates to a total influx of Common Quail during 15 March to 15 May 2022 of 138,658 individuals, or some 2,236 Quail per day (see Table 4). However, as emphasised in the reports of previous surveys (Ecoserv, 2011; 2012; 2013; 2014; 2015; 2016; 2017; 2018; 2019; 2020; 2021), such an estimate must be treated with utmost caution, given the relatively small number of field sites used on any one day 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.

4. Comparison with bag data

A comparative analysis of data from the present study with bag data provided by the Wild Birds Regulation Unit (WBRU) of the Ministry for Gozo was undertaken. The dataset provided by the WBRU comprises the daily bag count of Turtle Dove (as reported by hunters through a telephone reporting system and the Game Reporting MT app) for the period 17 to 30 April 2022, and the daily bag count of Common Quail (as reported by hunters through a telephone reporting system and the Game Reporting MT app) for the period 10 to 30 April 2022. It should be noted that the two sets of data were collected for different purposes and using very different methodologies; therefore, the magnitudes of values are not directly comparable. However, the temporal trends can be expected to follow similar patterns; 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 (2022) survey and the daily bag counts for the same period (10 to 30 April 2022 or 17 to 30 April 2022; WBRU unpublished data) for 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 2022 spring hunting season and the mean daily counts of Turtle Dove made during the present (2022) survey are shown in Figure 8, while Figures 9 shows the same data but with the results from the present (2022) 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 2022 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 2022 survey are plotted on the right-side y-axis.

Overall, the general trend of daily counts made during the 2022 survey is of relatively similar counts between 17 and 30 April, with small peaks on 22 and 27-28 April. The bag count data includes a similar trend of relatively similar counts between 17 and 29 April, with marginally higher numbers on 22 and 27-28 April, but also an appreciable increase in bag counts during the last day of the spring hunting season, when the bag count was more than twice that recorded on any of the other days. Therefore, overall, there was a similar temporal trend of slightly higher counts on 22 and 27-28 April in both the daily counts made during the present survey and the bag count data, but the bag count data showed a significant peak in counts on 30 April, whereas no such increase in daily counts made on 30 April 2022 was recorded during the 2022 survey.

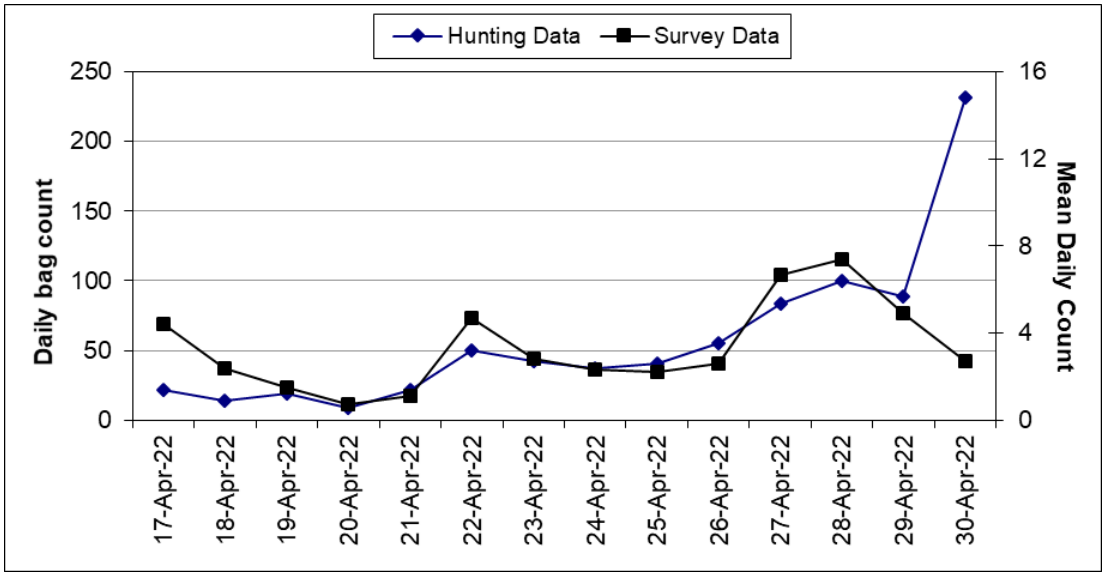

Figure 8. **Daily bag count of Turtle Dove during 2022 (blue line; values on left-side y-axis), together with the mean daily counts recorded during the 2022 survey (black line; values on right-side y-axis), for the period 17 – 30 April 2022.**

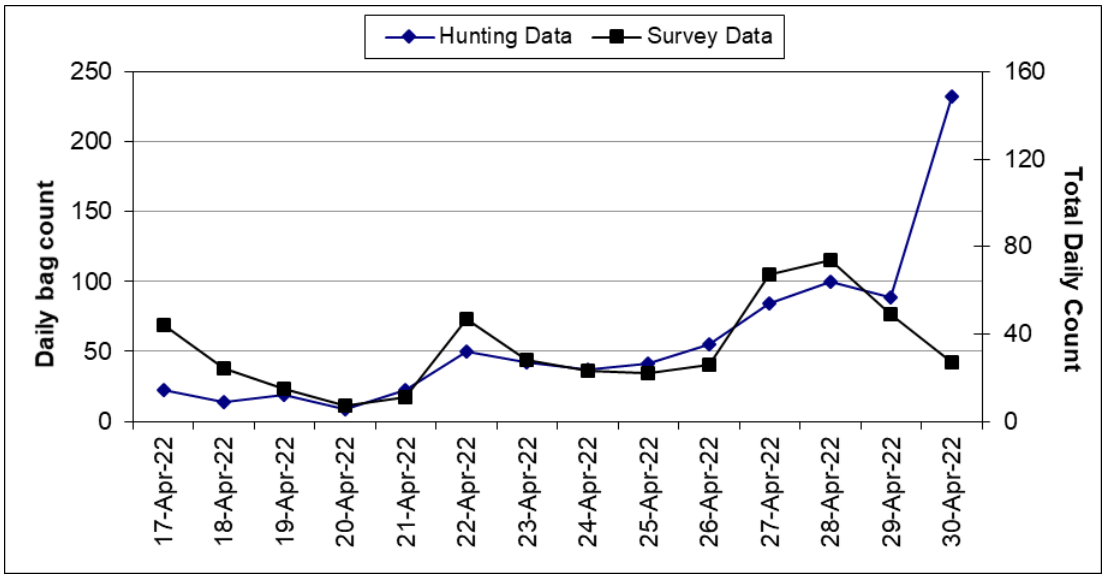

Figure 9. **Daily bag count of Turtle Dove during 2022 (blue line; values on left-side y-axis), together with the total daily counts recorded during the 2022 survey (black line; values on right-side y-axis), for the period 17 – 30 April 2022.**

Common Quail

The daily bag counts indicating the number of Common Quail caught during the 2022 spring hunting season and the mean daily counts of Common Quail recorded during the present (2022) survey are shown in Figure 10, while Figure 11 shows the same data but with the results from the present 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 2022 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 2022 survey are plotted on the right-side y-axis.

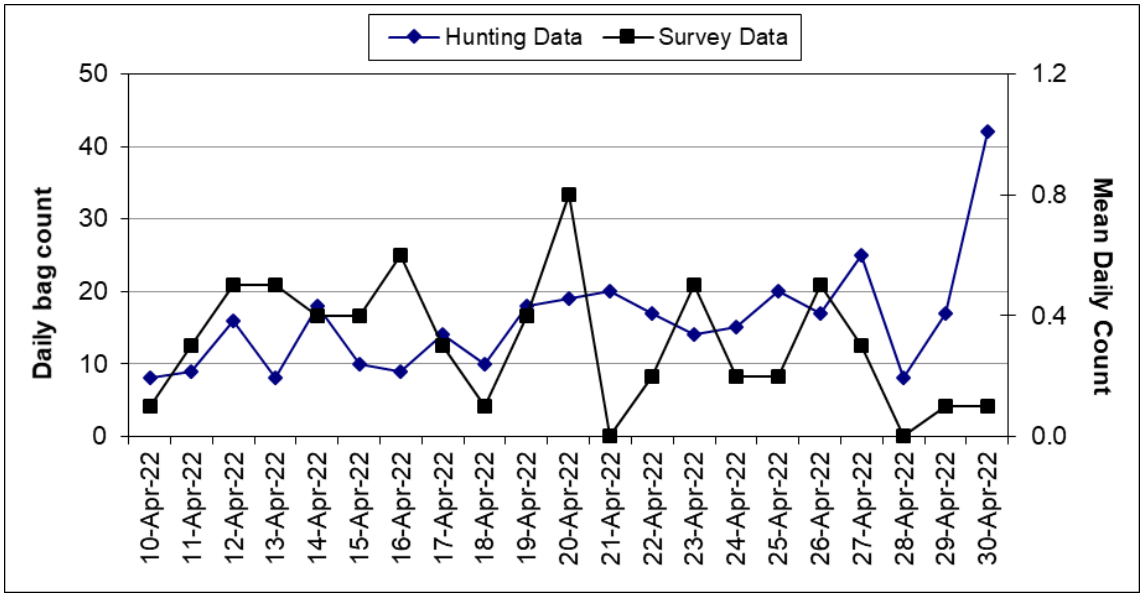

Figure 10. Daily bag count of Common Quail during 2022 (blue line; values on left-side y-axis), together with the mean daily counts recorded during the 2022 survey (black line; values on right-side y-axis), for the period 10 – 30 April 2022.

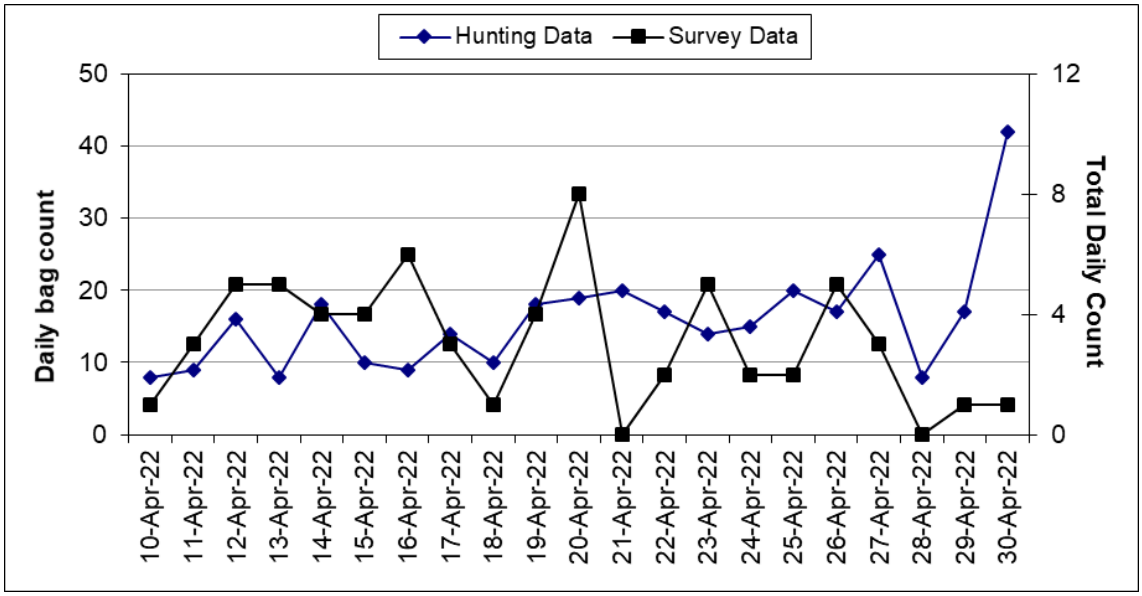

Figure 11. Daily bag count of Common Quail during 2022 (blue line; values on left-side y-axis), together with the total daily counts recorded during the 2022 survey (black line; values on right-side y-axis), for the period 10 – 30 April 2022.

The daily counts made during the 2022 survey include day-to-day fluctuations, but the overall pattern is of similar counts recorded throughout the period 10–30 April with marginally higher counts on some days between 12 and 26 April. No overall trend of increase or decrease in daily survey counts is discernible over most of the survey period but counts made from 28 to 30 April were lower than on most previous days. The bag count data also included an overall pattern of similar counts recorded throughout the period 10–29 April, but with an appreciable increase in bag counts during the last day of the spring hunting season. Therefore, overall, there was a similar temporal trend of similar counts between 10 and 29 April in both the daily counts made during the present survey and the bag count

data, but with an increase in the bag count in the last day of the open season (30 April), which is not reflected in the daily counts made during the 2022 survey. It should be noted, however, that the total daily counts made during the 2022 survey were low, which introduces an additional difficulty in making interpretations of these comparisons.

5. Appraisal

The present survey provides data on counts of Turtle Dove and Common Quail recorded between 15 March and 15 May 2022, as well as estimates of the migratory influx of the two species. In 2022, the Government had established the open season for hunting of Turtle Dove between 17 and 30 April, and of Common Quail between 10 and 30 April, which was covered by the period during which the present study was held.

For Turtle Dove, when comparing the results of the present survey with those from previous surveys, a similar trend of counts is noted overall. The general pattern is of very low counts recorded in March and early April, with marginally higher counts recorded from mid-April to early May, including peaks in some years. The daily mean counts recorded during the present survey were similar to those recorded in previous years. Occasional peaks were recorded in some years: in 2008, a very high mean count (98, on 15-4-08) and a secondary peak (26, on 20-04-08) were recorded, while a single main peak was recorded in 2009 (33, on 23-04-09) and in 2018 (25, on 19-04-18); no mean counts greater than 20 were recorded in any of the other years, including during the present survey. The grand mean of Turtle Dove counts recorded during the period 15 March to 15 May from the present (2022) survey is 1.40, which is lower than the grand mean of 2.76 recorded over the same period in 2009, but similar to those recorded between 2019 and 2021. The grand mean recorded during the present (2022) survey during the period 10 to 30 April is similar to that recorded from surveys held between 2012 and 2021, but lower than that recorded from surveys made in 2008, 2009 and 2018.

The total influx of Turtle Dove for the present survey period (15 March to 15 May 2022) is estimated at 47,136 individuals. When compared to estimates made during previous surveys in spring (see Table 1), the estimate from the present survey (2022) is the second highest overall, with the highest one being that made in 2012. Nonetheless, the present survey covered a period of 62 days; apart from the 2012, 2019, 2020 and 2021 surveys (48, 62, 62 and 62 days respectively), all other surveys covered a period of not more than 21 days. It is reiterated that such estimates must be treated with utmost caution, given the relatively small number of field sites used on any one day, 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 the 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. 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 also 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 there would be expected to 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. 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. Furthermore, actual implementation of a survey such as the present poses huge logistical (including to recruit a sufficient number of suitable personnel for a relatively short duration) and cost contraints.

For Common Quail, when comparing the results of the present survey with those from previous surveys, the observed general pattern in most previous surveys is of low migratory counts in mid-March which start to increase in late March, with the highest counts usually recorded in mid- to end April, and a subsequent decline in counts during May; in contrast, counts made during the present survey remained low throughout the survey period. The daily mean counts recorded during the present survey are overall slightly lower than those in 2008 and 2009 (Thomaidis, nd) and similar to those in 2011–2021 (Ecoserv 2011; 2012; 2013; 2014; 2015; 2016; 2017; 2018; 2019; 2020; 2021). Minor peaks of around 2.0–3.0 were recorded in spring 2008, 2009, 2012 and 2020, while no mean counts greater than 1.5 were recorded in any of the other years, including in the present survey. The grand mean of Common Quail counts recorded during the period 15 March to 15 May from the present (2022) survey is 0.30, which is lower than the grand mean of 0.74 recorded over the same period in 2009, but similar to those recorded between 2019 and 2021. The grand mean recorded during the present (2022) survey during the period 10 to 30 April is similar to that recorded during the 2013–2021 surveys, and lower than that recorded in 2008, 2009 and 2012.

The total influx of Common Quail for the present survey period (15 March to 15 May 2022) is estimated at 138,658 individuals. When compared to estimates made during previous surveys in spring (see Table 1), the estimate from the present survey (2022) is the third highest overall. Nonetheless, the present survey covered a period of 62 days; apart from the 2012, 2019, 2020 and 2021 surveys (48, 62, 62 and 62 days respectively), all other surveys covered a period of not more than 21 days. It is reiterated that 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 each site, 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 62-day period between 15 March and 15 May 2022. While the peak migration of Turtle Dove and Common Quail usually occurs in the last three weeks of April, Turtle Dove migration can also extend to May and migratory peaks for Common Quail can occur in late March and early April. Therefore, the survey period used in the present survey is considered an appreciable improvement over the 21 day period used in several of the previous surveys, which only covered part of the migratory season.

For both Turtle Dove and Common Quail, a number of limitations, which have already been highlighted in Ecoserv (2011; 2012; 2013; 2014; 2015; 2016; 2017; 2018; 2019; 2020; 2021), 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 effort used in the present 2022 study, while partly similar that reported and utilized by Thomaidis (nd) for the years 2008 and 2009, is not identical. Comparison with data collected by Ecoserv in most

previous surveys (2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021) was limited to the periods covered by those surveys which, apart from 2012, 2019, 2020 and 2021, were limited to just 21 days or less.

- Robust and rigorous assessment of migratory influx requires trend analysis based on data from monitoring carried out regularly over a sufficiently long period comprising subsequent years, and using the same methodology. For each year, the data should ideally be collected over the whole migratory season and using a larger sampling effort, for example by making counts daily at all of a minimum 28 sites.

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

6. References

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APPENDIX I - Raw counts

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

Ecoserv Sample Reference Code	B-005-22	B-006-22	B-007-22	B-008-22	B-009-22	B-010-22	B-011-22	B-012-22	B-013-22	B-014-22	B-015-22	B-016-22	B-017-22	B-018-22
Grid Location	**4085**	**3887**	**2892**	**3881**	**4073**	**4268**	**4864**	**6067**	**5872**	**4678**	**3690**	**3286**	**4077**	**4075**
15-Mar-22	0	0	0	0	0	0	0	0	0	0				
16-Mar-22	0										0	0	0	0
17-Mar-22	0													
18-Mar-22	0	0	0	0	0	0	0	0	0	0				
19-Mar-22	0										0	0	**5**	0
20-Mar-22	0													
21-Mar-22	0	0	0	0	0	0	0	0	0	0				
22-Mar-22	0										0	0	1	0
23-Mar-22	0													
24-Mar-22	0	0	0	0	0	0	0	0	0	0				
25-Mar-22	0										0	0	0	0
26-Mar-22	0													
27-Mar-22	0	0	0	0	4	0	0	0	0	0				
28-Mar-22	0										1	0	0	0
29-Mar-22	0													
30-Mar-22	0	2	0	0	0	0	0	0	0	0				
31-Mar-22	0										0	0	5	0
01-Apr-22	0													
02-Apr-22	0	2	0	0	1	0	0	0	0	0				
03-Apr-22	0										0	0	0	0
04-Apr-22	0													
05-Apr-22	0	1	0	0	0	1	0	0	0	0				
06-Apr-22	0										0	0	0	0

Ecoserv Sample Reference Code	B-005-22	B-006-22	B-007-22	B-008-22	B-009-22	B-010-22	B-011-22	B-012-22	B-013-22	B-014-22	B-015-22	B-016-22	B-017-22	B-018-22
Grid Location	**4085**	**3887**	**2892**	**3881**	**4073**	**4268**	**4864**	**6067**	**5872**	**4678**	**3690**	**3286**	**4077**	**4075**
07-Apr-22	0													
08-Apr-22	0	0	0	0	1	0	0	4	0	0				
09-Apr-22	0										3	0	0	5
10-Apr-22	2													
11-Apr-22	0	3	0	0	0	0	1	0	0	0				
12-Apr-22	0										2	0	3	0
13-Apr-22	1													
14-Apr-22	1	0	2	3	8	3	6	4	0	4				
15-Apr-22	10										0	3	5	13
16-Apr-22	4													
17-Apr-22	1	3	15	3	6	2	3	5	5	1				
18-Apr-22	3										4	6	0	1
19-Apr-22	1													
20-Apr-22	2	1	0	0	0	0	0	0	0	4				
21-Apr-22	0										0	0	0	2
22-Apr-22	4													
23-Apr-22	11	2	0	9	1	3	0	1	1	0				
24-Apr-22	4										0	1	7	2
25-Apr-22	5													
26-Apr-22	1	0	0	2	2	9	0	8	2	2				
27-Apr-22	8										1	9	3	16
28-Apr-22	0													
29-Apr-22	0	1	0	1	8	28	7	1	1	2				
30-Apr-22	1										5	0	2	2
01-May-22	0													
02-May-22	0	3	1	1	0	5	0	0	0	0				
03-May-22	3										1	2	1	2

Ecoserv Sample Reference Code	B-005-22	B-006-22	B-007-22	B-008-22	B-009-22	B-010-22	B-011-22	B-012-22	B-013-22	B-014-22	B-015-22	B-016-22	B-017-22	B-018-22
Grid Location	**4085**	**3887**	**2892**	**3881**	**4073**	**4268**	**4864**	**6067**	**5872**	**4678**	**3690**	**3286**	**4077**	**4075**
04-May-22	5													
05-May-22	0	2	2	1	2	1	0	0	1	1				
06-May-22	0										0	0	0	4
07-May-22	4													
08-May-22	0	3	0	1	1	0	0	0	1	3				
09-May-22	1										2	0	1	1
10-May-22	0													
11-May-22	0	0	0	0	2	6	1	4	0	1				
12-May-22	0										0	0	0	0
13-May-22	3													
14-May-22	0	3	0	1	1	1	0	0	0	1				
15-May-22	0										0	0	2	0

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

Ecoserv Sample Reference Code	B-019-22	B-020-22	B-021-22	B-022-22	B-023-22	B-024-22	B-025-22	B-026-22	B-027-22	B-028-22	B-029-22	B-030-22	B-031-22	B-032-22
Grid Location	**5263**	**5663**	**5871**	**5277**	**4480**	**3292**	**2888**	**4079**	**4070**	**4666**	**6064**	**6069**	**4878**	**4283**
15-Mar-22														
16-Mar-22	0	0	0	0	0									
17-Mar-22						0	0	0	1	0	0	0	0	0
18-Mar-22														
19-Mar-22	0	0	0	0	0									
20-Mar-22						0	0	0	0	0	0	0	0	0
21-Mar-22														
22-Mar-22	0	0	0	0	0									

Ecoserv Sample Reference Code	B-019-22	B-020-22	B-021-22	B-022-22	B-023-22	B-024-22	B-025-22	B-026-22	B-027-22	B-028-22	B-029-22	B-030-22	B-031-22	B-032-22
Grid Location	**5263**	**5663**	**5871**	**5277**	**4480**	**3292**	**2888**	**4079**	**4070**	**4666**	**6064**	**6069**	**4878**	**4283**
23-Mar-22						0	0	0	0	0	0	0	0	0
24-Mar-22														
25-Mar-22	0	0	0	0	1									
26-Mar-22						0	0	0	0	0	0	0	0	0
27-Mar-22														
28-Mar-22	0	0	0	0	0									
29-Mar-22						0	0	0	0	0	0	0	0	0
30-Mar-22														
31-Mar-22	0	0	0	0	0									
01-Apr-22						0	0	0	2	0	0	0	1	0
02-Apr-22														
03-Apr-22	0	0	0	0	0									
04-Apr-22						1	0	1	2	0	0	0	0	0
05-Apr-22														
06-Apr-22	0	1	0	0	0									
07-Apr-22						0	0	0	2	2	2	0	6	0
08-Apr-22														
09-Apr-22	0	0	0	0	0									
10-Apr-22						2	1	1	6	0	0	0	2	1
11-Apr-22														
12-Apr-22	0	1	0	1	3									
13-Apr-22						2	1	1	3	2	1	0	2	1
14-Apr-22														
15-Apr-22	7	2	2	2	0									
16-Apr-22						10	13	2	3	5	5	0	1	13
17-Apr-22														
18-Apr-22	3	3	0	0	4									

Ecoserv Sample Reference Code	B-019-22	B-020-22	B-021-22	B-022-22	B-023-22	B-024-22	B-025-22	B-026-22	B-027-22	B-028-22	B-029-22	B-030-22	B-031-22	B-032-22
Grid Location	**5263**	**5663**	**5871**	**5277**	**4480**	**3292**	**2888**	**4079**	**4070**	**4666**	**6064**	**6069**	**4878**	**4283**
19-Apr-22						2	1	2	0	0	6	1	2	0
20-Apr-22														
21-Apr-22	5	1	2	0	1									
22-Apr-22						9	4	4	9	1	7	0	3	6
23-Apr-22														
24-Apr-22	2	1	0	1	5									
25-Apr-22						5	1	4	3	2	0	1	1	0
26-Apr-22														
27-Apr-22	6	21	1	2	0									
28-Apr-22						3	23	0	18	11	16	0	2	1
29-Apr-22														
30-Apr-22	9	2	0	2	4									
01-May-22						4	1	5	1	4	3	0	1	4
02-May-22														
03-May-22	2	2	1	2	1									
04-May-22						3	0	6	5	3	0	1	1	2
05-May-22														
06-May-22	0	0	1	2	0									
07-May-22						2	1	0	3	0	1	0	0	1
08-May-22														
09-May-22	0	1	0	1	1									
10-May-22						4	0	0	6	0	0	0	0	0
11-May-22														
12-May-22	3	1	0	0	1									
13-May-22						2	2	1	0	0	0	0	2	1
14-May-22														
15-May-22	1	0	0	0	1									

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

Ecoserv Sample Reference Code	B-033-22	B-034-22	B-035-22	B-036-22	B-037-22	B-038-22	B-039-22	B-040-22	B-041-22	B-042-22	B-043-22	B-044-22	B-045-22	B-046-22
Grid Location	**4085**	**3887**	**2892**	**3881**	**4073**	**4268**	**4864**	**6067**	**5872**	**4678**	**3690**	**3286**	**4077**	**4075**
Surveyed Area (km^2)	0.023–0.034	0.023	0.018	0.035	0.015	0.021	0.007	0.019	0.025	0.031	0.034	0.085	0.016	0.015
15-Mar-22	1	0	1	0	0	3	0	0	0	1				
16-Mar-22	0										0	0	0	0
17-Mar-22	0													
18-Mar-22	1	0	0	0	0	0	0	0	0	1				
19-Mar-22	0										0	0	0	0
20-Mar-22	1													
21-Mar-22	0	1	0	0	4	0	3	0	0	1				
22-Mar-22	0										0	2	2	1
23-Mar-22	0													
24-Mar-22	0	0	3	0	0	0	0	0	0	1				
25-Mar-22	0										0	0	0	1
26-Mar-22	2													
27-Mar-22	0	0	0	0	0	0	0	0	1	0				
28-Mar-22	0										1	0	2	0
29-Mar-22	2													
30-Mar-22	0	0	1	0	0	4	0	0	0	0				
31-Mar-22	1										0	0	1	1
01-Apr-22	0													
02-Apr-22	0	0	1	0	0	0	0	0	0	1				
03-Apr-22	2										3	0	0	1
04-Apr-22	0													
05-Apr-22	0	0	1	1	1	1	0	1	0	0				
06-Apr-22	0										0	0	0	1

Ecoserv Sample Reference Code	B-033-22	B-034-22	B-035-22	B-036-22	B-037-22	B-038-22	B-039-22	B-040-22	B-041-22	B-042-22	B-043-22	B-044-22	B-045-22	B-046-22
Grid Location	**4085**	**3887**	**2892**	**3881**	**4073**	**4268**	**4864**	**6067**	**5872**	**4678**	**3690**	**3286**	**4077**	**4075**
07-Apr-22	0													
08-Apr-22	0	0	1	0	0	0	1	0	0	0				
09-Apr-22	0										0	2	0	0
10-Apr-22	0													
11-Apr-22	0	0	1	0	1	1	0	0	0	0				
12-Apr-22	0										1	0	1	0
13-Apr-22	2													
14-Apr-22	0	0	0	0	2	0	0	1	0	1				
15-Apr-22	0										0	0	2	0
16-Apr-22	0													
17-Apr-22	0	0	1	0	0	1	0	0	1	0				
18-Apr-22	0										0	0	0	0
19-Apr-22	0													
20-Apr-22	1	0	3	1	1	0	0	1	0	1				
21-Apr-22	0										0	0	0	0
22-Apr-22	0													
23-Apr-22	0	2	2	1	0	0	0	0	0	0				
24-Apr-22	0										0	0	0	1
25-Apr-22	0													
26-Apr-22	0	2	0	0	0	2	0	1	0	0				
27-Apr-22	0										0	0	0	0
28-Apr-22	0													
29-Apr-22	0	0	0	0	0	0	0	1	0	0				
30-Apr-22	0										0	1	0	0
01-May-22	0													
02-May-22	0	1	0	0	2	1	0	0	0	0				
03-May-22	0										0	0	0	0

Ecoserv Sample Reference Code	B-033-22	B-034-22	B-035-22	B-036-22	B-037-22	B-038-22	B-039-22	B-040-22	B-041-22	B-042-22	B-043-22	B-044-22	B-045-22	B-046-22
Grid Location	**4085**	**3887**	**2892**	**3881**	**4073**	**4268**	**4864**	**6067**	**5872**	**4678**	**3690**	**3286**	**4077**	**4075**
04-May-22	0													
05-May-22	0	0	2	0	0	0	0	0	0	1				
06-May-22	0										0	0	0	0
07-May-22	0													
08-May-22	0	0	0	0	0	0	0	0	0	0				
09-May-22	1										0	0	0	0
10-May-22	0													
11-May-22	0	0	0	0	0	1	0	1	0	0				
12-May-22	0										0	0	0	0
13-May-22	0													
14-May-22	0	0	0	0	0	0	0	0	0	1				
15-May-22	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-047-22	B-048-22	B-049-22	B-050-22	B-051-22	B-052-22	B-053-22	B-054-22	B-055-22	B-056-22	B-057-22	B-058-22	B-059-22	B-060-22
Grid Location	**5263**	**5663**	**5871**	**5277**	**4480**	**3292**	**2888**	**4079**	**4070**	**4666**	**6064**	**6069**	**4878**	**4283**
Surveyed Area (km^2)	0.019	0.031	0.022	0.029	0.043	0.048	0.015	0.052	0.009	0.018	0.023	0.032	0.017	0.036
15-Mar-22														
16-Mar-22	0	1	0	2	0									
17-Mar-22						2	0	0	0	0	0	0	0	0
18-Mar-22														
19-Mar-22	2	0	0	0	0									

Ecoserv Sample Reference Code	B-047-22	B-048-22	B-049-22	B-050-22	B-051-22	B-052-22	B-053-22	B-054-22	B-055-22	B-056-22	B-057-22	B-058-22	B-059-22	B-060-22
Grid Location	**5263**	**5663**	**5871**	**5277**	**4480**	**3292**	**2888**	**4079**	**4070**	**4666**	**6064**	**6069**	**4878**	**4283**
20-Mar-22						1	0	0	0	0	0	0	0	0
21-Mar-22														
22-Mar-22	1	0	0	0	0									
23-Mar-22						1	0	0	0	0	0	0	0	0
24-Mar-22														
25-Mar-22	0	0	0	0	0									
26-Mar-22						2	0	2	1	0	1	0	0	0
27-Mar-22														
28-Mar-22	1	0	0	0	0									
29-Mar-22						1	0	0	2	1	0	1	1	0
30-Mar-22														
31-Mar-22	0	0	1	1	0									
01-Apr-22						3	0	0	1	0	0	0	0	0
02-Apr-22														
03-Apr-22	2	0	0	0	0									
04-Apr-22						1	0	1	0	0	0	1	1	0
05-Apr-22														
06-Apr-22	0	0	0	1	0									
07-Apr-22						2	0	0	1	0	0	1	0	1
08-Apr-22														
09-Apr-22	0	1	0	1	2									
10-Apr-22						0	1	0	0	0	0	0	0	0
11-Apr-22														
12-Apr-22	2	0	0	0	1									
13-Apr-22						0	1	0	1	0	0	1	0	0
14-Apr-22														
15-Apr-22	2	0	0	0	0									

Ecoserv Sample Reference Code	B-047-22	B-048-22	B-049-22	B-050-22	B-051-22	B-052-22	B-053-22	B-054-22	B-055-22	B-056-22	B-057-22	B-058-22	B-059-22	B-060-22
Grid Location	**5263**	**5663**	**5871**	**5277**	**4480**	**3292**	**2888**	**4079**	**4070**	**4666**	**6064**	**6069**	**4878**	**4283**
16-Apr-22						2	0	1	1	1	0	0	0	1
17-Apr-22														
18-Apr-22	0	1	0	0	0									
19-Apr-22						0	1	1	0	0	0	1	0	1
20-Apr-22														
21-Apr-22	0	0	0	0	0									
22-Apr-22						1	1	0	0	0	0	0	0	0
23-Apr-22														
24-Apr-22	0	0	0	1	0									
25-Apr-22						1	0	0	1	0	0	0	0	0
26-Apr-22														
27-Apr-22	0	0	0	2	1									
28-Apr-22						0	0	0	0	0	0	0	0	0
29-Apr-22														
30-Apr-22	0	0	0	0	0									
01-May-22						0	0	0	0	0	0	0	0	1
02-May-22														
03-May-22	1	0	0	0	1									
04-May-22						0	0	1	0	0	1	0	0	0
05-May-22														
06-May-22	0	0	0	0	0									
07-May-22						0	0	0	0	0	0	0	0	0
08-May-22														
09-May-22	0	0	0	0	0									
10-May-22						0	0	0	0	0	0	0	0	0
11-May-22														
12-May-22	0	0	0	0	0									

Ecoserv Sample Reference Code	B-047-22	B-048-22	B-049-22	B-050-22	B-051-22	B-052-22	B-053-22	B-054-22	B-055-22	B-056-22	B-057-22	B-058-22	B-059-22	B-060-22
Grid Location	**5263**	**5663**	**5871**	**5277**	**4480**	**3292**	**2888**	**4079**	**4070**	**4666**	**6064**	**6069**	**4878**	**4283**
13-May-22						0	0	0	0	0	0	0	0	0
14-May-22														
15-May-22	0	0	0	0	0									

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

Date	Location	Observation time	Date	Location	Observation time
15 March 2022	Comino	07:15 – 09:15	19 March 2022	Comino	07:00 – 09:00
15 March 2022	Gozo: Qala	07:00 – 09:00	19 March 2022	Gozo: San Blas	07:00 – 09:00
15 March 2022	Gozo: Wied il-Mielah	08:00 – 10:00	19 March 2022	Gozo: Ta' Cenc	07:00 – 09:00
15 March 2022	Cirkewwa / Torri l-Ahmar	08:00 – 10:00	19 March 2022	Ghajn Tuffieha	09:00 – 11:00
15 March 2022	Fomm ir-Rih	07:00 – 09:00	19 March 2022	Gnejna	07:15 – 09:15
15 March 2022	Rdum ta' Had-Dingli	08:00 – 10:00	19 March 2022	Zurrieq	07:30 – 09:30
15 March 2022	Lapsi	07:00 – 09:00	19 March 2022	Ghar Hasan	08:00 – 10:00
15 March 2022	San Tumas	08:20 – 10:20	19 March 2022	Xghajra Ta' Barkat	08:00 – 10:00
15 March 2022	Rinella	07:00 – 09:00	19 March 2022	White Rocks	08:30 – 10:30
15 March 2022	Wardija	07:30 – 09:30	19 March 2022	Mistra / Mgiebah	07:00 – 09:00
16 March 2022	Comino	07:00 – 09:00	20 March 2022	Comino	07:00 – 09:00
16 March 2022	Gozo: San Blas	07:15 – 09:15	20 March 2022	Gozo: Marsalforn	07:00 – 09:00
16 March 2022	Gozo: Ta' Cenc	07:00 – 09:00	20 March 2022	Gozo: Ghadira ta' Sarraflu	08:00 – 10:00
16 March 2022	Ghajn Tuffieha	07:45 – 09:45	20 March 2022	Anchor Bay / Rdum taht il-Mellieha	08:30 – 10:30
16 March 2022	Gnejna	07:30 – 09:30	20 March 2022	Mtahleb to Migra l-Ferha	07:15 – 09:15
16 March 2022	Zurrieq	07:00 – 09:00	20 March 2022	Fawwara	07:20 – 09:20
16 March 2022	Ghar Hasan	07:30 – 09:30	20 March 2022	Delimara Point	07:00 – 09:00
16 March 2022	Xghajra Ta' Barkat	07:00 – 09:00	20 March 2022	Zonqor Point	08:30 – 10:30
16 March 2022	White Rocks	07:15 – 09:15	20 March 2022	Ghallis	07:00 – 09:00
16 March 2022	Mistra / Mgiebah	07:15 – 09:15	20 March 2022	L-Ahrax tal-Mellieha	08:00 – 10:00
17 March 2022	Comino	07:00 – 09:00	21 March 2022	Comino	07:00 – 09:00
17 March 2022	Gozo: Marsalforn	07:30 – 09:30	21 March 2022	Gozo: Qala	07:00 – 09:00
17 March 2022	Gozo: Ghadira ta' Sarraflu	07:00 – 09:00	21 March 2022	Gozo: Wied il-Mielah	07:15 – 09:15
17 March 2022	Anchor Bay / Rdum taht il-Mellieha	07:00 – 09:00	21 March 2022	Cirkewwa / Torri l-Ahmar	08:00 – 10:00
17 March 2022	Mtahleb to Migra l-Ferha	07:00 – 09:00	21 March 2022	Fomm ir-Rih	10:00 – 12:00
17 March 2022	Fawwara	08:00 – 10:00	21 March 2022	Rdum ta' Had-Dingli	07:30 – 09:30
17 March 2022	Delimara Point	08:30 – 10:30	21 March 2022	Lapsi	07:00 – 09:00
17 March 2022	Zonqor Point	07:15 – 09:15	21 March 2022	San Tumas	07:30 – 09:30
17 March 2022	Ghallis	09:00 – 11:00	21 March 2022	Rinella	07:15 – 09:15
17 March 2022	L-Ahrax tal-Mellieha	07:30 – 09:30	21 March 2022	Wardija	08:30 – 10:30
18 March 2022	Comino	08:00 – 10:00	22 March 2022	Comino	07:20 – 09:20
18 March 2022	Gozo: Qala	07:00 – 09:00	22 March 2022	Gozo: San Blas	07:00 – 09:00
18 March 2022	Gozo: Wied il-Mielah	07:00 – 09:00	22 March 2022	Gozo: Ta' Cenc	07:00 – 09:00
18 March 2022	Cirkewwa / Torri l-Ahmar	07:00 – 09:00	22 March 2022	Ghajn Tuffieha	09:00 – 11:00
18 March 2022	Fomm ir-Rih	07:00 – 09:00	22 March 2022	Gnejna	07:00 – 09:00
18 March 2022	Rdum ta' Had-Dingli	07:30 – 09:30	22 March 2022	Zurrieq	07:00 – 09:00
18 March 2022	Lapsi	08:00 – 10:00	22 March 2022	Ghar Hasan	07:30 – 09:30
18 March 2022	San Tumas	07:00 – 09:00	22 March 2022	Xghajra Ta' Barkat	08:00 – 10:00
18 March 2022	Rinella	08:00 – 10:00	22 March 2022	White Rocks	07:15 – 09:15
18 March 2022	Wardija	07:30 – 09:30	22 March 2022	Mistra / Mgiebah	07:30 – 09:30

APPENDIX II continued.

Date	Location	Observation time	Date	Location	Observation time
23 March 2022	Comino	07:00 – 09:00	27 March 2022	Comino	07:00 – 09:00
23 March 2022	Gozo: Marsalforn	07:00 – 09:00	27 March 2022	Gozo: Qala	07:00 – 09:00
23 March 2022	Gozo: Ghadira ta' Sarraflu	07:00 – 09:00	27 March 2022	Gozo: Wied il-Mielah	07:00 – 09:00
23 March 2022	Anchor Bay / Rdum taht il-Mellieha	07:30 – 09:30	27 March 2022	Cirkewwa / Torri l-Ahmar	07:30 – 09:30
23 March 2022	Mtahleb to Migra l-Ferha	07:00 – 09:00	27 March 2022	Fomm ir-Rih	09:30 – 11:30
23 March 2022	Fawwara	07:00 – 09:00	27 March 2022	Rdum ta' Had-Dingli	07:30 – 09:30
23 March 2022	Delimara Point	07:30 – 09:30	27 March 2022	Lapsi	08:00 – 10:00
23 March 2022	Zonqor Point	07:00 – 09:00	27 March 2022	San Tumas	08:00 – 10:00
23 March 2022	Ghallis	07:30 – 09:30	27 March 2022	Rinella	07:20 – 09:20
23 March 2022	L-Ahrax tal-Mellieha	08:00 – 10:00	27 March 2022	Wardija	07:00 – 09:00
24 March 2022	Comino	07:00 – 09:00	28 March 2022	Comino	07:00 – 09:00
24 March 2022	Gozo: Qala	07:15 – 09:15	28 March 2022	Gozo: San Blas	07:00 – 09:00
24 March 2022	Gozo: Wied il-Mielah	07:30 – 09:30	28 March 2022	Gozo: Ta' Cenc	07:00 – 09:00
24 March 2022	Cirkewwa / Torri l-Ahmar	07:00 – 09:00	28 March 2022	Ghajn Tuffieha	09:00 – 11:00
24 March 2022	Fomm ir-Rih	08:00 – 10:00	28 March 2022	Gnejna	08:30 – 10:30
24 March 2022	Rdum ta' Had-Dingli	07:00 – 09:00	28 March 2022	Zurrieq	07:30 – 09:30
24 March 2022	Lapsi	08:00 – 10:00	28 March 2022	Ghar Hasan	07:00 – 09:00
24 March 2022	San Tumas	08:00 – 10:00	28 March 2022	Xghajra Ta' Barkat	07:30 – 09:30
24 March 2022	Rinella	08:00 – 10:00	28 March 2022	White Rocks	08:30 – 10:30
24 March 2022	Wardija	09:00 – 11:00	28 March 2022	Mistra / Mgiebah	07:00 – 09:00
25 March 2022	Comino	07:30 – 09:30	29 March 2022	Comino	07:30 – 09:30
25 March 2022	Gozo: San Blas	07:00 – 09:00	29 March 2022	Gozo: Marsalforn	07:00 – 09:00
25 March 2022	Gozo: Ta' Cenc	07:30 – 09:30	29 March 2022	Gozo: Ghadira ta' Sarraflu	07:30 – 09:30
25 March 2022	Ghajn Tuffieha	07:00 – 09:00	29 March 2022	Anchor Bay / Rdum taht il-Mellieha	07:30 – 09:30
25 March 2022	Gnejna	08:00 – 10:00	29 March 2022	Mtahleb to Migra l-Ferha	07:30 – 09:30
25 March 2022	Zurrieq	07:30 – 09:30	29 March 2022	Fawwara	08:00 – 10:00
25 March 2022	Ghar Hasan	07:00 – 09:00	29 March 2022	Delimara Point	07:00 – 09:00
25 March 2022	Xghajra Ta' Barkat	07:40 – 09:40	29 March 2022	Zonqor Point	07:00 – 09:00
25 March 2022	White Rocks	08:00 – 10:00	29 March 2022	Ghallis	07:30 – 09:30
25 March 2022	Mistra / Mgiebah	08:00 – 10:00	29 March 2022	L-Ahrax tal-Mellieha	08:00 – 10:00
26 March 2022	Comino	07:00 – 09:00	30 March 2022	Comino	07:00 – 09:00
26 March 2022	Gozo: Marsalforn	08:00 – 10:00	30 March 2022	Gozo: Qala	07:00 – 09:00
26 March 2022	Gozo: Ghadira ta' Sarraflu	07:00 – 09:00	30 March 2022	Gozo: Wied il-Mielah	07:00 – 09:00
26 March 2022	Anchor Bay / Rdum taht il-Mellieha	07:15 – 09:15	30 March 2022	Cirkewwa / Torri l-Ahmar	07:30 – 09:30
26 March 2022	Mtahleb to Migra l-Ferha	08:30 – 10:30	30 March 2022	Fomm ir-Rih	07:00 – 09:00
26 March 2022	Fawwara	08:00 – 10:00	30 March 2022	Rdum ta' Had-Dingli	10:00 – 12:00
26 March 2022	Delimara Point	09:30 – 11:30	30 March 2022	Lapsi	07:30 – 09:30
26 March 2022	Zonqor Point	07:30 – 09:30	30 March 2022	San Tumas	09:00 – 11:00
26 March 2022	Ghallis	07:15 – 09:15	30 March 2022	Rinella	07:00 – 09:00
26 March 2022	L-Ahrax tal-Mellieha	07:30 – 09:30	30 March 2022	Wardija	07:00 – 09:00

APPENDIX II continued.

Date	Location	Observation time	Date	Location	Observation time
31 March 2022	Comino	07:00 – 09:00	4 April 2022	Comino	07:30 – 09:30
31 March 2022	Gozo: San Blas	07:00 – 09:00	4 April 2022	Gozo: Marsalforn	07:00 – 09:00
31 March 2022	Gozo: Ta' Cenc	07:15 – 09:15	4 April 2022	Gozo: Ghadira ta' Sarraflu	07:00 – 09:00
31 March 2022	Ghajn Tuffieha	08:30 – 10:30	4 April 2022	Anchor Bay / Rdum taht il-Mellieha	07:30 – 09:30
31 March 2022	Gnejna	08:00 – 10:00	4 April 2022	Mtahleb to Migra l-Ferha	09:00 – 11:00
31 March 2022	Zurrieq	08:00 – 10:00	4 April 2022	Fawwara	07:00 – 09:00
31 March 2022	Ghar Hasan	07:00 – 09:00	4 April 2022	Delimara Point	07:00 – 09:00
31 March 2022	Xghajra Ta' Barkat	08:00 – 10:00	4 April 2022	Zonqor Point	08:00 – 10:00
31 March 2022	White Rocks	07:30 – 09:30	4 April 2022	Ghallis	08:00 – 10:00
31 March 2022	Mistra / Mgiebah	08:30 – 10:30	4 April 2022	L-Ahrax tal-Mellieha	07:30 – 09:30
1 April 2022	Comino	07:00 – 09:00	5 April 2022	Comino	07:15 – 09:15
1 April 2022	Gozo: Marsalforn	07:00 – 09:00	5 April 2022	Gozo: Qala	07:20 – 09:20
1 April 2022	Gozo: Ghadira ta' Sarraflu	07:30 – 09:30	5 April 2022	Gozo: Wied il-Mielah	07:00 – 09:00
1 April 2022	Anchor Bay / Rdum taht il-Mellieha	07:45 – 09:45	5 April 2022	Cirkewwa / Torri l-Ahmar	07:30 – 09:30
1 April 2022	Mtahleb to Migra l-Ferha	07:00 – 09:00	5 April 2022	Fomm ir-Rih	07:15 – 09:15
1 April 2022	Fawwara	08:00 – 10:00	5 April 2022	Rdum ta' Had-Dingli	09:00 – 11:00
1 April 2022	Delimara Point	08:00 – 10:00	5 April 2022	Lapsi	07:00 – 09:00
1 April 2022	Zonqor Point	07:00 – 09:00	5 April 2022	San Tumas	08:00 – 10:00
1 April 2022	Ghallis	07:15 – 09:15	5 April 2022	Rinella	07:15 – 09:15
1 April 2022	L-Ahrax tal-Mellieha	07:00 – 09:00	5 April 2022	Wardija	07:00 – 09:00
2 April 2022	Comino	07:00 – 09:00	6 April 2022	Comino	07:00 – 09:00
2 April 2022	Gozo: Qala	07:00 – 09:00	6 April 2022	Gozo: San Blas	07:00 – 09:00
2 April 2022	Gozo: Wied il-Mielah	07:00 – 09:00	6 April 2022	Gozo: Ta' Cenc	07:30 – 09:30
2 April 2022	Cirkewwa / Torri l-Ahmar	07:30 – 09:30	6 April 2022	Ghajn Tuffieha	07:00 – 09:00
2 April 2022	Fomm ir-Rih	08:00 – 10:00	6 April 2022	Gnejna	07:45 – 09:45
2 April 2022	Rdum ta' Had-Dingli	07:00 – 09:00	6 April 2022	Zurrieq	08:00 – 10:00
2 April 2022	Lapsi	08:00 – 10:00	6 April 2022	Ghar Hasan	08:00 – 10:00
2 April 2022	San Tumas	07:00 – 09:00	6 April 2022	Xghajra Ta' Barkat	07:00 – 09:00
2 April 2022	Rinella	07:00 – 09:00	6 April 2022	White Rocks	07:20 – 09:20
2 April 2022	Wardija	07:30 – 09:30	6 April 2022	Mistra / Mgiebah	07:10 – 09:10
3 April 2022	Comino	07:15 – 09:15	7 April 2022	Comino	08:00 – 10:00
3 April 2022	Gozo: San Blas	07:00 – 09:00	7 April 2022	Gozo: Marsalforn	07:00 – 09:00
3 April 2022	Gozo: Ta' Cenc	07:00 – 09:00	7 April 2022	Gozo: Ghadira ta' Sarraflu	07:30 – 09:30
3 April 2022	Ghajn Tuffieha	07:30 – 09:30	7 April 2022	Anchor Bay / Rdum taht il-Mellieha	07:30 – 09:30
3 April 2022	Gnejna	08:00 – 10:00	7 April 2022	Mtahleb to Migra l-Ferha	10:00 – 12:00
3 April 2022	Zurrieq	07:30 – 09:30	7 April 2022	Fawwara	08:00 – 10:00
3 April 2022	Ghar Hasan	07:40 – 09:40	7 April 2022	Delimara Point	08:30 – 10:30
3 April 2022	Xghajra Ta' Barkat	08:00 – 10:00	7 April 2022	Zonqor Point	08:30 – 10:30
3 April 2022	White Rocks	07:30 – 09:30	7 April 2022	Ghallis	07:00 – 09:00
3 April 2022	Mistra / Mgiebah	07:30 – 09:30	7 April 2022	L-Ahrax tal-Mellieha	07:20 – 09:20

APPENDIX II continued.

Date	Location	Observation time	Date	Location	Observation time
8 April 2022	Comino	07:30 – 09:30	12 April 2022	Comino	07:00 – 09:00
8 April 2022	Gozo: Qala	07:00 – 09:00	12 April 2022	Gozo: San Blas	07:30 – 09:30
8 April 2022	Gozo: Wied il-Mielah	07:15 – 09:15	12 April 2022	Gozo: Ta' Cenc	07:30 – 09:30
8 April 2022	Cirkewwa / Torri l-Ahmar	08:00 – 10:00	12 April 2022	Ghajn Tuffieha	08:00 – 10:00
8 April 2022	Fomm ir-Rih	08:30 – 10:30	12 April 2022	Gnejna	08:00 – 10:00
8 April 2022	Rdum ta' Had-Dingli	08:00 – 10:00	12 April 2022	Zurrieq	08:30 – 10:30
8 April 2022	Lapsi	07:00 – 09:00	12 April 2022	Ghar Hasan	08:00 – 10:00
8 April 2022	San Tumas	09:30 – 11:30	12 April 2022	Xghajra Ta' Barkat	08:00 – 10:00
8 April 2022	Rinella	07:00 – 09:00	12 April 2022	White Rocks	08:30 – 10:30
8 April 2022	Wardija	09:30 – 11:30	12 April 2022	Mistra / Mgiebah	07:00 – 09:00
9 April 2022	Comino	07:00 – 09:00	13 April 2022	Comino	07:00 – 09:00
9 April 2022	Gozo: San Blas	07:00 – 09:00	13 April 2022	Gozo: Marsalforn	07:00 – 09:00
9 April 2022	Gozo: Ta' Cenc	07:00 – 09:00	13 April 2022	Gozo: Ghadira ta' Sarraflu	07:15 – 09:15
9 April 2022	Ghajn Tuffieha	07:30 – 09:30	13 April 2022	Anchor Bay / Rdum taht il-Mellieha	08:15 – 10:15
9 April 2022	Gnejna	07:00 – 09:00	13 April 2022	Mtahleb to Migra l-Ferha	10:00 – 12:00
9 April 2022	Zurrieq	07:15 – 09:15	13 April 2022	Fawwara	07:00 – 09:00
9 April 2022	Ghar Hasan	07:05 – 09:05	13 April 2022	Delimara Point	08:30 – 10:30
9 April 2022	Xghajra Ta' Barkat	07:00 – 09:00	13 April 2022	Zonqor Point	08:15 – 10:15
9 April 2022	White Rocks	07:30 – 09:30	13 April 2022	Ghallis	08:00 – 10:00
9 April 2022	Mistra / Mgiebah	07:30 – 09:30	13 April 2022	L-Ahrax tal-Mellieha	07:30 – 09:30
10 April 2022	Comino	07:00 – 09:00	14 April 2022	Comino	07:00 – 09:00
10 April 2022	Gozo: Marsalforn	07:00 – 09:00	14 April 2022	Gozo: Qala	07:00 – 09:00
10 April 2022	Gozo: Ghadira ta' Sarraflu	07:00 – 09:00	14 April 2022	Gozo: Wied il-Mielah	07:00 – 09:00
10 April 2022	Anchor Bay / Rdum taht il-Mellieha	07:00 – 09:00	14 April 2022	Cirkewwa / Torri l-Ahmar	07:00 – 09:00
10 April 2022	Mtahleb to Migra l-Ferha	08:00 – 10:00	14 April 2022	Fomm ir-Rih	08:00 – 10:00
10 April 2022	Fawwara	07:30 – 09:30	14 April 2022	Rdum ta' Had-Dingli	09:00 – 11:00
10 April 2022	Delimara Point	07:00 – 09:00	14 April 2022	Lapsi	07:00 – 09:00
10 April 2022	Zonqor Point	08:00 – 10:00	14 April 2022	San Tumas	09:00 – 11:00
10 April 2022	Ghallis	07:20 – 09:20	14 April 2022	Rinella	08:15 – 10:15
10 April 2022	L-Ahrax tal-Mellieha	07:30 – 09:30	14 April 2022	Wardija	08:00 – 10:00
11 April 2022	Comino	07:30 – 09:30	15 April 2022	Comino	07:00 – 09:00
11 April 2022	Gozo: Qala	07:00 – 09:00	15 April 2022	Gozo: San Blas	07:00 – 09:00
11 April 2022	Gozo: Wied il-Mielah	07:00 – 09:00	15 April 2022	Gozo: Ta' Cenc	07:15 – 09:15
11 April 2022	Cirkewwa / Torri l-Ahmar	07:30 – 09:30	15 April 2022	Ghajn Tuffieha	08:00 – 10:00
11 April 2022	Fomm ir-Rih	07:00 – 09:00	15 April 2022	Gnejna	08:00 – 10:00
11 April 2022	Rdum ta' Had-Dingli	08:00 – 10:00	15 April 2022	Zurrieq	07:00 – 09:00
11 April 2022	Lapsi	07:00 – 09:00	15 April 2022	Ghar Hasan	08:00 – 10:00
11 April 2022	San Tumas	08:30 – 10:30	15 April 2022	Xghajra Ta' Barkat	07:00 – 09:00
11 April 2022	Rinella	07:30 – 09:30	15 April 2022	White Rocks	08:00 – 10:00
11 April 2022	Wardija	07:30 – 09:30	15 April 2022	Mistra / Mgiebah	07:30 – 09:30

APPENDIX II continued.

Date	Location	Observation time	Date	Location	Observation time
16 April 2022	Comino	07:00 – 09:00	20 April 2022	Comino	07:00 – 09:00
16 April 2022	Gozo: Marsalforn	07:00 – 09:00	20 April 2022	Gozo: Qala	07:00 – 09:00
16 April 2022	Gozo: Ghadira ta' Sarraflu	07:00 – 09:00	20 April 2022	Gozo: Wied il-Mielah	08:00 – 10:00
16 April 2022	Anchor Bay / Rdum taht il-Mellieha	07:30 – 09:30	20 April 2022	Cirkewwa / Torri l-Ahmar	08:00 – 10:00
16 April 2022	Mtahleb to Migra l-Ferha	07:30 – 09:30	20 April 2022	Fomm ir-Rih	07:30 – 09:30
16 April 2022	Fawwara	07:00 – 09:00	20 April 2022	Rdum ta' Had-Dingli	07:30 – 09:30
16 April 2022	Delimara Point	08:00 – 10:00	20 April 2022	Lapsi	07:30 – 09:30
16 April 2022	Zonqor Point	07:00 – 09:00	20 April 2022	San Tumas	07:00 – 09:00
16 April 2022	Ghallis	08:00 – 10:00	20 April 2022	Rinella	07:00 – 09:00
16 April 2022	L-Ahrax tal-Mellieha	07:00 – 09:00	20 April 2022	Wardija	08:00 – 10:00
17 April 2022	Comino	07:00 – 09:00	21 April 2022	Comino	08:00 – 10:00
17 April 2022	Gozo: Qala	07:00 – 09:00	21 April 2022	Gozo: San Blas	07:00 – 09:00
17 April 2022	Gozo: Wied il-Mielah	07:00 – 09:00	21 April 2022	Gozo: Ta' Cenc	07:00 – 09:00
17 April 2022	Cirkewwa / Torri l-Ahmar	07:30 – 09:30	21 April 2022	Ghajn Tuffieha	07:30 – 09:30
17 April 2022	Fomm ir-Rih	08:00 – 10:00	21 April 2022	Gnejna	07:00 – 09:00
17 April 2022	Rdum ta' Had-Dingli	08:00 – 10:00	21 April 2022	Zurrieq	07:00 – 09:00
17 April 2022	Lapsi	07:30 – 09:30	21 April 2022	Ghar Hasan	07:00 – 09:00
17 April 2022	San Tumas	09:00 – 11:00	21 April 2022	Xghajra Ta' Barkat	08:00 – 10:00
17 April 2022	Rinella	10:00 – 12:00	21 April 2022	White Rocks	08:00 – 10:00
17 April 2022	Wardija	07:15 – 09:15	21 April 2022	Mistra / Mgiebah	07:00 – 09:00
18 April 2022	Comino	07:00 – 09:00	22 April 2022	Comino	07:00 – 09:00
18 April 2022	Gozo: San Blas	07:15 – 09:15	22 April 2022	Gozo: Marsalforn	07:15 – 09:15
18 April 2022	Gozo: Ta' Cenc	07:00 – 09:00	22 April 2022	Gozo: Ghadira ta' Sarraflu	07:00 – 09:00
18 April 2022	Ghajn Tuffieha	08:00 – 10:00	22 April 2022	Anchor Bay / Rdum taht il-Mellieha	08:30 – 10:30
18 April 2022	Gnejna	07:30 – 09:30	22 April 2022	Mtahleb to Migra l-Ferha	07:00 – 09:00
18 April 2022	Zurrieq	07:00 – 09:00	22 April 2022	Fawwara	08:00 – 10:00
18 April 2022	Ghar Hasan	08:00 – 10:00	22 April 2022	Delimara Point	08:00 – 10:00
18 April 2022	Xghajra Ta' Barkat	07:00 – 09:00	22 April 2022	Zonqor Point	07:30 – 09:30
18 April 2022	White Rocks	08:00 – 10:00	22 April 2022	Ghallis	07:00 – 09:00
18 April 2022	Mistra / Mgiebah	07:00 – 09:00	22 April 2022	L-Ahrax tal-Mellieha	07:30 – 09:30
19 April 2022	Comino	07:00 – 09:00	23 April 2022	Comino	07:00 – 09:00
19 April 2022	Gozo: Marsalforn	08:00 – 10:00	23 April 2022	Gozo: Qala	07:00 – 09:00
19 April 2022	Gozo: Ghadira ta' Sarraflu	07:00 – 09:00	23 April 2022	Gozo: Wied il-Mielah	07:00 – 09:00
19 April 2022	Anchor Bay / Rdum taht il-Mellieha	07:00 – 09:00	23 April 2022	Cirkewwa / Torri l-Ahmar	07:30 – 09:30
19 April 2022	Mtahleb to Migra l-Ferha	07:30 – 09:30	23 April 2022	Fomm ir-Rih	08:00 – 10:00
19 April 2022	Fawwara	08:00 – 10:00	23 April 2022	Rdum ta' Had-Dingli	08:00 – 10:00
19 April 2022	Delimara Point	08:30 – 10:30	23 April 2022	Lapsi	07:10 – 09:10
19 April 2022	Zonqor Point	07:15 – 09:15	23 April 2022	San Tumas	07:00 – 09:00
19 April 2022	Ghallis	07:00 – 09:00	23 April 2022	Rinella	07:00 – 09:00
19 April 2022	L-Ahrax tal-Mellieha	08:00 – 10:00	23 April 2022	Wardija	07:30 – 09:30

APPENDIX II continued.

Date	Location	Observation time	Date	Location	Observation time
24 April 2022	Comino	07:00 – 09:00	28 April 2022	Comino	07:30 – 09:30
24 April 2022	Gozo: San Blas	07:00 – 09:00	28 April 2022	Gozo: Marsalforn	07:00 – 09:00
24 April 2022	Gozo: Ta' Cenc	07:00 – 09:00	28 April 2022	Gozo: Ghadira ta' Sarraflu	08:15 – 10:15
24 April 2022	Ghajn Tuffieha	08:00 – 10:00	28 April 2022	Anchor Bay / Rdum taht il-Mellieha	08:00 – 10:00
24 April 2022	Gnejna	07:00 – 09:00	28 April 2022	Mtahleb to Migra l-Ferha	07:00 – 09:00
24 April 2022	Zurrieq	07:30 – 09:30	28 April 2022	Fawwara	08:00 – 10:00
24 April 2022	Ghar Hasan	07:30 – 09:30	28 April 2022	Delimara Point	09:30 – 11:30
24 April 2022	Xghajra Ta' Barkat	07:00 – 09:00	28 April 2022	Zonqor Point	07:15 – 09:15
24 April 2022	White Rocks	07:30 – 09:30	28 April 2022	Ghallis	07:30 – 09:30
24 April 2022	Mistra / Mgiebah	08:00 – 10:00	28 April 2022	L-Ahrax tal-Mellieha	07:30 – 09:30
25 April 2022	Comino	08:15 – 10:15	29 April 2022	Comino	07:00 – 09:00
25 April 2022	Gozo: Marsalforn	08:00 – 10:00	29 April 2022	Gozo: Qala	07:00 – 09:00
25 April 2022	Gozo: Ghadira ta' Sarraflu	07:00 – 09:00	29 April 2022	Gozo: Wied il-Mielah	07:00 – 09:00
25 April 2022	Anchor Bay / Rdum taht il-Mellieha	07:00 – 09:00	29 April 2022	Cirkewwa / Torri l-Ahmar	07:30 – 09:30
25 April 2022	Mtahleb to Migra l-Ferha	08:00 – 10:00	29 April 2022	Fomm ir-Rih	07:45 – 09:45
25 April 2022	Fawwara	07:00 – 09:00	29 April 2022	Rdum ta' Had-Dingli	07:00 – 09:00
25 April 2022	Delimara Point	07:00 – 09:00	29 April 2022	Lapsi	07:00 – 09:00
25 April 2022	Zonqor Point	07:30 – 09:30	29 April 2022	San Tumas	07:30 – 09:30
25 April 2022	Ghallis	07:20 – 09:20	29 April 2022	Rinella	08:00 – 10:00
25 April 2022	L-Ahrax tal-Mellieha	07:00 – 09:00	29 April 2022	Wardija	09:00 – 11:00
26 April 2022	Comino	07:20 – 09:20	30 April 2022	Comino	07:00 – 09:00
26 April 2022	Gozo: Qala	07:00 – 09:00	30 April 2022	Gozo: San Blas	07:00 – 09:00
26 April 2022	Gozo: Wied il-Mielah	07:00 – 09:00	30 April 2022	Gozo: Ta' Cenc	07:00 – 09:00
26 April 2022	Cirkewwa / Torri l-Ahmar	07:30 – 09:30	30 April 2022	Ghajn Tuffieha	07:30 – 09:30
26 April 2022	Fomm ir-Rih	08:00 – 10:00	30 April 2022	Gnejna	08:00 – 10:00
26 April 2022	Rdum ta' Had-Dingli	10:00 – 12:00	30 April 2022	Zurrieq	07:00 – 09:00
26 April 2022	Lapsi	07:00 – 09:00	30 April 2022	Ghar Hasan	07:00 – 09:00
26 April 2022	San Tumas	07:00 – 09:00	30 April 2022	Xghajra Ta' Barkat	07:15 – 09:15
26 April 2022	Rinella	09:00 – 11:00	30 April 2022	White Rocks	07:30 – 09:30
26 April 2022	Wardija	08:00 – 10:00	30 April 2022	Mistra / Mgiebah	07:30 – 09:30
27 April 2022	Comino	07:00 – 09:00	1 May 2022	Comino	07:00 – 09:00
27 April 2022	Gozo: San Blas	07:30 – 09:30	1 May 2022	Gozo: Marsalforn	08:00 – 10:00
27 April 2022	Gozo: Ta' Cenc	07:00 – 09:00	1 May 2022	Gozo: Ghadira ta' Sarraflu	07:00 – 09:00
27 April 2022	Ghajn Tuffieha	07:15 – 09:15	1 May 2022	Anchor Bay / Rdum taht il-Mellieha	08:00 – 10:00
27 April 2022	Gnejna	07:00 – 09:00	1 May 2022	Mtahleb to Migra l-Ferha	07:30 – 09:30
27 April 2022	Zurrieq	07:30 – 09:30	1 May 2022	Fawwara	07:00 – 09:00
27 April 2022	Ghar Hasan	08:00 – 10:00	1 May 2022	Delimara Point	07:00 – 09:00
27 April 2022	Xghajra Ta' Barkat	07:00 – 09:00	1 May 2022	Zonqor Point	07:00 – 09:00
27 April 2022	White Rocks	07:30 – 09:30	1 May 2022	Ghallis	08:30 – 10:30
27 April 2022	Mistra / Mgiebah	08:00 – 10:00	1 May 2022	L-Ahrax tal-Mellieha	07:30 – 09:30

APPENDIX II continued.

Date	Location	Observation time	Date	Location	Observation time
2 May 2022	Comino	07:30 – 09:30	6 May 2022	Comino	07:00 – 09:00
2 May 2022	Gozo: Qala	07:00 – 09:00	6 May 2022	Gozo: San Blas	07:30 – 09:30
2 May 2022	Gozo: Wied il-Mielah	07:00 – 09:00	6 May 2022	Gozo: Ta' Cenc	07:00 – 09:00
2 May 2022	Cirkewwa / Torri l-Ahmar	07:30 – 09:30	6 May 2022	Ghajn Tuffieha	07:00 – 09:00
2 May 2022	Fomm ir-Rih	08:00 – 10:00	6 May 2022	Gnejna	08:00 – 10:00
2 May 2022	Rdum ta' Had-Dingli	09:00 – 11:00	6 May 2022	Zurrieq	08:00 – 10:00
2 May 2022	Lapsi	07:00 – 09:00	6 May 2022	Ghar Hasan	08:30 – 10:30
2 May 2022	San Tumas	07:00 – 09:00	6 May 2022	Xghajra Ta' Barkat	07:00 – 09:00
2 May 2022	Rinella	08:00 – 10:00	6 May 2022	White Rocks	07:15 – 09:15
2 May 2022	Wardija	08:00 – 10:00	6 May 2022	Mistra / Mgiebah	07:30 – 09:30
3 May 2022	Comino	07:15 – 09:15	7 May 2022	Comino	07:00 – 09:00
3 May 2022	Gozo: San Blas	07:30 – 09:30	7 May 2022	Gozo: Marsalforn	08:00 – 10:00
3 May 2022	Gozo: Ta' Cenc	07:15 – 09:15	7 May 2022	Gozo: Ghadira ta' Sarraflu	07:00 – 09:00
3 May 2022	Ghajn Tuffieha	08:00 – 10:00	7 May 2022	Anchor Bay / Rdum taht il-Mellieha	07:30 – 09:30
3 May 2022	Gnejna	07:00 – 09:00	7 May 2022	Mtahleb to Migra l-Ferha	08:00 – 10:00
3 May 2022	Zurrieq	07:00 – 09:00	7 May 2022	Fawwara	08:00 – 10:00
3 May 2022	Ghar Hasan	08:30 – 10:30	7 May 2022	Delimara Point	07:00 – 09:00
3 May 2022	Xghajra Ta' Barkat	07:30 – 09:30	7 May 2022	Zonqor Point	07:20 – 09:20
3 May 2022	White Rocks	07:00 – 09:00	7 May 2022	Ghallis	08:00 – 10:00
3 May 2022	Mistra / Mgiebah	07:25 – 09:25	7 May 2022	L-Ahrax tal-Mellieha	09:00 – 11:00
4 May 2022	Comino	07:30 – 09:30	8 May 2022	Comino	07:00 – 09:00
4 May 2022	Gozo: Marsalforn	07:00 – 09:00	8 May 2022	Gozo: Qala	07:00 – 09:00
4 May 2022	Gozo: Ghadira ta' Sarraflu	07:00 – 09:00	8 May 2022	Gozo: Wied il-Mielah	07:00 – 09:00
4 May 2022	Anchor Bay / Rdum taht il-Mellieha	08:00 – 10:00	8 May 2022	Cirkewwa / Torri l-Ahmar	07:30 – 09:30
4 May 2022	Mtahleb to Migra l-Ferha	08:30 – 10:30	8 May 2022	Fomm ir-Rih	09:00 – 11:00
4 May 2022	Fawwara	08:00 – 10:00	8 May 2022	Rdum ta' Had-Dingli	08:30 – 10:30
4 May 2022	Delimara Point	08:00 – 10:00	8 May 2022	Lapsi	09:00 – 11:00
4 May 2022	Zonqor Point	07:00 – 09:00	8 May 2022	San Tumas	09:30 – 11:30
4 May 2022	Ghallis	08:00 – 10:00	8 May 2022	Rinella	07:00 – 09:00
4 May 2022	L-Ahrax tal-Mellieha	07:30 – 09:30	8 May 2022	Wardija	08:00 – 10:00
5 May 2022	Comino	07:15 – 09:15	9 May 2022	Comino	07:30 – 09:30
5 May 2022	Gozo: Qala	07:15 – 09:15	9 May 2022	Gozo: San Blas	07:00 – 09:00
5 May 2022	Gozo: Wied il-Mielah	07:00 – 09:00	9 May 2022	Gozo: Ta' Cenc	07:00 – 09:00
5 May 2022	Cirkewwa / Torri l-Ahmar	07:20 – 09:20	9 May 2022	Ghajn Tuffieha	07:00 – 09:00
5 May 2022	Fomm ir-Rih	08:30 – 10:30	9 May 2022	Gnejna	08:00 – 10:00
5 May 2022	Rdum ta' Had-Dingli	07:00 – 09:00	9 May 2022	Zurrieq	09:00 – 11:00
5 May 2022	Lapsi	07:00 – 09:00	9 May 2022	Ghar Hasan	07:00 – 09:00
5 May 2022	San Tumas	08:00 – 10:00	9 May 2022	Xghajra Ta' Barkat	07:30 – 09:30
5 May 2022	Rinella	07:00 – 09:00	9 May 2022	White Rocks	07:15 – 09:15
5 May 2022	Wardija	08:00 – 10:00	9 May 2022	Mistra / Mgiebah	08:00 – 10:00

APPENDIX II continued.

Date	Location	Observation time	Date	Location	Observation time
10 May 2022	Comino	07:00 – 09:00	13 May 2022	Comino	07:00 – 09:00
10 May 2022	Gozo: Marsalforn	07:15 – 09:15	13 May 2022	Gozo: Marsalforn	07:00 – 09:00
10 May 2022	Gozo: Ghadira ta' Sarraflu	08:00 – 10:00	13 May 2022	Gozo: Ghadira ta' Sarraflu	07:15 – 09:15
10 May 2022	Anchor Bay / Rdum taht il-Mellieha	07:15 – 09:15	13 May 2022	Anchor Bay / Rdum taht il-Mellieha	07:30 – 09:30
10 May 2022	Mtahleb to Migra l-Ferha	07:00 – 09:00	13 May 2022	Mtahleb to Migra l-Ferha	07:30 – 09:30
10 May 2022	Fawwara	07:00 – 09:00	13 May 2022	Fawwara	09:00 – 11:00
10 May 2022	Delimara Point	07:15 – 09:15	13 May 2022	Delimara Point	08:00 – 10:00
10 May 2022	Zonqor Point	07:00 – 09:00	13 May 2022	Zonqor Point	07:00 – 09:00
10 May 2022	Ghallis	07:25 – 09:25	13 May 2022	Ghallis	08:00 – 10:00
10 May 2022	L-Ahrax tal-Mellieha	07:30 – 09:30	13 May 2022	L-Ahrax tal-Mellieha	07:20 – 09:20
11 May 2022	Comino	07:00 – 09:00	14 May 2022	Comino	07:00 – 09:00
11 May 2022	Gozo: Qala	07:00 – 09:00	14 May 2022	Gozo: Qala	07:00 – 09:00
11 May 2022	Gozo: Wied il-Mielah	07:00 – 09:00	14 May 2022	Gozo: Wied il-Mielah	07:00 – 09:00
11 May 2022	Cirkewwa / Torri l-Ahmar	07:30 – 09:30	14 May 2022	Cirkewwa / Torri l-Ahmar	07:00 – 09:00
11 May 2022	Fomm ir-Rih	07:00 – 09:00	14 May 2022	Fomm ir-Rih	07:00 – 09:00
11 May 2022	Rdum ta' Had-Dingli	10:00 – 12:00	14 May 2022	Rdum ta' Had-Dingli	08:00 – 10:00
11 May 2022	Lapsi	10:00 – 12:00	14 May 2022	Lapsi	07:00 – 09:00
11 May 2022	San Tumas	09:30 – 11:30	14 May 2022	San Tumas	07:00 – 09:00
11 May 2022	Rinella	07:30 – 09:30	14 May 2022	Rinella	07:20 – 09:20
11 May 2022	Wardija	08:30 – 10:30	14 May 2022	Wardija	08:00 – 10:00
12 May 2022	Comino	07:30 – 09:30	15 May 2022	Comino	07:00 – 09:00
12 May 2022	Gozo: San Blas	07:00 – 09:00	15 May 2022	Gozo: San Blas	07:00 – 09:00
12 May 2022	Gozo: Ta' Cenc	07:00 – 09:00	15 May 2022	Gozo: Ta' Cenc	07:00 – 09:00
12 May 2022	Ghajn Tuffieha	08:00 – 10:00	15 May 2022	Ghajn Tuffieha	08:00 – 10:00
12 May 2022	Gnejna	07:30 – 09:30	15 May 2022	Gnejna	07:30 – 09:30
12 May 2022	Zurrieq	08:00 – 10:00	15 May 2022	Zurrieq	07:00 – 09:00
12 May 2022	Ghar Hasan	08:00 – 10:00	15 May 2022	Ghar Hasan	07:30 – 09:30
12 May 2022	Xghajra Ta' Barkat	07:30 – 09:30	15 May 2022	Xghajra Ta' Barkat	07:10 – 09:10
12 May 2022	White Rocks	07:30 – 09:30	15 May 2022	White Rocks	10:00 – 12:00
12 May 2022	Mistra / Mgiebah	08:00 – 10:00	15 May 2022	Mistra / Mgiebah	08:00 – 10:00