Malta Environment and Planning Authority

Report on a survey of the influx of migratory Common Quail and Turtle Dove over the Maltese Islands, made in April 2013

Prepared by

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1. INTRODUCTION

On 26th February 2013, the Malta Environment and Planning Authority (hereafter 'MEPA') published a call for tenders titled 'Service tender for an independent scientific study on the influx or passage of migratory Common Quail *Coturnix coturnix coturnix* and Turtle Dove *Streptopelia turtur turtur* in Malta during the spring season of 2013' bearing reference T04/2013. The Terms of Reference (ToR) of the tender are as follows:

2.1 - Overall Objectives

The overall objectives of the project is to provide an independent study on the influx or passage of the migratory turtle dove and common quail in Malta during the spring season of 2013.

2.2 - Specific Objectives

The 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;

2.3 - Results to be achieved by the Consultant

The tender results are the following:

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

2. *A monitoring report which must include:*

a) List of monitoring stations which recorded high/low counts

b) Dates which showed 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

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 Clause 4.1.1. Moreover, it shall also be assumed that the passage of birds at different localities is extremely variable.

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 20 in number). It shall be the responsibility of the Consultant to ensure that the monitoring stations (at least 20 in number), are at all times, manned by a sufficient number of ornithologists and/or field assistants.

The consultants shall propose strategies to address the identified risks. These proposals shall be included in the tenderer's technical offer in Volume 3 Section 2.

The award of this tender and hence the undertaking of this bird migration study is dependent on a decision to apply a derogation for the hunting of Turtle Dove and Quail in spring 2013. The award of the tender shall be cancelled if no such derogation is applied. Provided that this tender shall in no way be construed or perceived as obliging the Government or any other relevant authority to take a decision applying a derogation for the spring Hunting 2013 season.

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 for a period specified by the Contracting Authority, which shall not exceed three weeks. The Consultant shall mobilise all staff and equipment by the end of March, in preparation for the execution of the bird migration study. The bird monitoring phase shall commence at the earliest in the beginning of April 2013, in accordance with the dates specified for that purpose by the Contracting Authority.

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 population trends for both species is beyond the scope of this bird migration study. The Consultant must submit the daily datasheets with raw counts to the Contracting Authority at the end of each week, whereas, the draft monitoring report and analysis is to be submitted within 10 working days from the termination of the bird monitoring phase. Once such draft report has been certified for quality assurance by the Contracting Authority, the final monitoring report is to be submitted within 5 working days from such a review. All project activities must be completed to the Contracting Authority's satisfaction within four weeks from the termination of the bird monitoring phase.

4.1.2 Geographical Area to be covered

The three inhabited islands of the Maltese archipelago.

4.1.3 Target Groups

Not applicable

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 difficulties in the monitoring of these species (as identified in the European Union Management Plan for the Common Quail).

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

A network of monitoring stations will need to be set up throughout the three inhabited islands of the Maltese archipelago for the study period. Such a network would need to comprise at least 20 monitoring stations. Each of these monitoring stations shall be operated on at least one or two days per week and manned by at least two ornithologists and/or field assistants. These ornithologists and/ or field assistants shall be persons with relevant experience in bird identification.

For each day during the bird monitoring phase, at least eight 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. The location of the monitoring stations shall be selected with care and shall not include areas where the settlement 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 land birds, 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 land birds; 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 and any assumptions taken for such calculations need to be clearly stated in the monitoring report.

The methodology shall not involve trapping or any taking of any bird, whether alive or dead, nor any part of any bird.

The field study shall cover a maximum of 3 weeks during the spring migration period, as specified by the Contracting Authority. The collection of scientific data to elucidate population trends for both species is beyond the scope of this bird migration study. The Consultant must submit the daily datasheets with raw counts to the Contracting Authority at the end of each week; whereas, the draft monitoring report and analysis is to be submitted within 10 working days from the termination of the bird monitoring phase. Once such draft report has been certified for quality assurance by the Contracting Authority, the final monitoring report is to be submitted within 5 working days from such a review. All project activities must be completed to the Contracting Authority's satisfaction by four weeks from the termination of the bird monitoring phase.

These activities will result in:

1. *Daily datasheets with raw counts for the Turtle Dove and Common Quail*
2. *A monitoring report.*

Please refer to Section 2.3 for more details.

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 Director of Environment (DoE) is the official at Malta Environment and Planning Authority (MEPA) responsible for this contract. The DoE may delegate various tasks to other officials within MEPA 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

Republic of Malta. The monitoring stations shall be set up at appropriate locations within the three inhabited Maltese Islands. The Consultant, moreover, is expected to compile reports, prepare scientific analysis, and prepare the setup of the administrative framework from his own premises. The Consultant 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 this contract and the period of execution of the contract will be 4 weeks from the termination of the bird monitoring phase. Article 18.1 of the Special Conditions will determine the actual commencement date and period of execution.

6. Requirements

6.1 – Personnel

6.1.1 Other Experts

CVs for experts other than the key experts are not examined prior to the signature of the contract. The Consultant shall select and hire other experts as required according to the profiles identified in the Organisation & Methodology and these Terms of Reference. For the purposes of this contract, international experts are considered to be those whose permanent residence is outside the beneficiary country while local experts are considered to be those whose permanent residence is in the beneficiary country.

The Consultant should pay attention to the need to ensure the active participation of local professional skills where available, and a suitable mix of international and local staff in the project teams. All experts must be independent and free from conflicts of interest in the responsibilities accorded to them.

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

Note that civil servants and other staff of the Public Service of the beneficiary country cannot be recruited as experts. See sub-article 9.5 of the General Conditions.

6.1.2 Support Staff and Backstopping

o The bird migration study is to be supported by ornithologists or field assistants with relevant experience in bird identification.

o Other support staff should be capable in carrying out statistical analysis, report writing and/or other relevant administration work.

6.2 – Accommodation

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

6.3 - Facilities to be provided by the Consultant

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

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

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

6.4 – Equipment

No equipment is to be purchased on behalf of the Contracting Authority as part of this service contract or transferred to the Contracting Authority at the end of this contract.

The Consultant shall not place, or cause to be placed, any orders with suppliers or otherwise incur liabilities in the name of the Contracting Authority, any representative of the Contracting Authority or any of the Institutions represented on the Board.

The Consultant 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.
Gun dogs to flush out Common Quails
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 a report is to indicate:

- *the raw counts*
- *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*

This report should only concern information/data on the influx of the migratory Turtle Dove and Common Quail and should not include personal opinions of the Consultant.

The Consultant must submit the daily datasheets with raw counts to the Contracting Authority at the end of each week, whereas, the draft report and analysis is to be submitted within ten working days from the termination of the bird monitoring phase.

Once such draft report has been certified for quality assurance by the Contracting Authority, the final monitoring report is to be submitted within five working days from such a review. All project activities must be completed to the Contracting Authority's satisfaction within four weeks from the termination of the bird monitoring phase.

All reports and other forms of written communication must be presented in an editable format using popular 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 2 hard copies and a soft copy of the monitoring report referred to above must be submitted to the Project Manager identified in the contract. The raw datasheets and the report must be written in English. The Project Manager is responsible for approving the draft monitoring report.

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 process to be submitted by the end of each week.*	*The original datasheets submitted to the Contracting Authority.*
Monitoring report which presents a clear analyses of the monitoring carried out	*The draft monitoring report shall be completed within ten working days from the termination of the bird monitoring phase.* *The monitoring report will be finalised and approved by the Contracting Authority within four weeks from the termination of the bird monitoring phase.*	*The actual monitoring report presented by the consultant.*

8.2 - Special Requirements

Not applicable

Ecoserv Ltd (hereafter 'Ecoserv') submitted a response to tender and on 2 April 2013 was notified by the MEPA 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 coturnix* and turtle dove *Streptopelia turtur turtur* in Malta, undertaken by the company during the period 10 to 30 April 2013, which coincides with the 2013 spring hunting season, and based on the ToR stated above.

In order to put the present study in perspective, an overview of the findings from previous similar studies follows, however, the reader is also referred to the review on migratory behaviour of the two species, as well as the overview of local bird hunting and trapping activities and of EU legislation concerning these activities, that have been presented in Ecoserv (2011).

Although there is a dearth of published data on migration of the Common Quail and Turtle Dove across the Maltese Islands, considerably extensive data have been collected in recent years by Thomaidis (nd), who studied the occurrence and patterns of movement of these two species within the Islands between spring 2008 and autumn 2009. The data used to compile the report by Thomaidis (nd) were recorded by hunters under his supervision and coordination.

Records of the number of individuals of Common Quail and Turtle Dove, caught or trapped by hunters and trappers in spring and autumn of 2002 through to 2012, are also available in the *Carnet de Chasse* reports for the respective years, while data and other relevant information pertaining to the aforementioned species may also be held by Federazzjoni Kaccaturi Nassaba u Konservazzjonisti (FKNK) and BirdLife Malta (BLM).

The findings from the spring 2011 survey, which was undertaken by Ecoserv during the period 8th – 28th May 2011, and was based on ToR that are similar to the ones for the present study, are as follows (see Ecoserv, 2011):

- Counts for Turtle Dove recorded from the 24 field sites (= stations) varied between a minimum of 0 and a maximum of 14, with mean daily counts ranging between 0.38 and 4.25. With extrapolation, the daily mean figures translated to an estimated daily influx ranging between 203 and 2,305 individuals, with a total influx over the survey period (21 days) of 18,057 individuals. It was noted that the recorded counts varied appreciably between the different field sites, which is to be expected, given that the birds may have a strong influx at one site and a potentially much lower one at a different site, even if the two sites are separated by a very small distance of even a few hundred meters. Another limitation of the estimated counts is that some birds may pass overhead, maintaining high altitude and avoiding landfall, while others migrate during the night. Nonetheless, the counts for Turtle Dove recorded by Ecoserv (2011) did not appear to differ markedly from those reported by Thomaidis (nd) for the years 2008 and 2009.
- Counts for Common Quail recorded from the 24 field sites varied between a minimum of 0 and a maximum of 11, while the mean daily counts ranged between 0 and 1.38. Through extrapolation, this translated to a total influx of 22, 699 individuals over the survey period (21 days). No Common Quail were recorded at 13 of the 24 sites, on any of the survey dates. As in the case of Turtle Dove, migration of Common Quail is dependent on weather conditions and 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. Given that Common Quail tend to stay in the same area for a few days if left undisturbed, it was not possible to ascertain whether high numbers of individuals recorded successively at the same field site included new migratory individuals, or whether they comprised individuals already included in counts from previous days.
- Overall, when comparing the results of Ecoserv's spring 2011 survey with those from Thomaidis' (nd) surveys held in 2008 and 2009 for the same period, similar counts are noted for Turtle Dove. In the case of Common Quail, there was a tendency for overall higher counts recorded during the spring 2011 survey. Therefore, no decreased influx of migratory Turtle Dove and Common Quail was evident when comparing the results of the spring 2011 survey with those from Thomaidis' (nd) 2008 and 2009 surveys.
- A number of constraints were pointed out in Ecoserv (2011)'s report:
    - 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. Furthermore, the migration count was based on count data recorded over part of the day only (06:00 - 13:00), hence any individuals migrating at other times of the day (including night time) were not taken into consideration, leading to a potential underestimate of the total influx of birds if significant migration occurred between 13:00 and 06:00. Furthermore, 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 influx of birds would be expected to be lower, hence this may result in an overestimate.

- The survey commenced late during the migratory season; it effectively incorporated only the tail end of the Turtle Dove migratory season and essentially missed the peak period of Quail migration. The data set from the spring 2011 study is therefore limited and limits the value of comparisons with data collected from previous years.
- Given resource limitations and time constraints, it was not feasible to collect a larger data set; the relatively small sampling effort used in the spring 2011 study is reflected in the observed high standard deviation values. Inasmuch, the extrapolations made were estimated using limited count data and the stated estimates of total influx should therefore be treated as indicative, and used with caution.
- The data can only be used for purposes of trend analysis, and even in this respect, due caution should be exercised given the limited data collected; the sampling effort used, while based on that reported and utilized by Thomaidis (nd) for the years 2008 and 2009, is not identical, hence comparison of data over a three-year period may not be sufficient to determine migratory influx with accuracy. Comparisons made in Ecoserv's (2011) report are therefore purely indicative.

- Ecoserv (2011) recommended that robust and rigorous assessment of migratory influx would require 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 be collected over the whole migratory season and, ideally, the study would entail a larger sampling effort, for example by making counts daily at all of a minimum 24 sites.

The findings from the spring 2012 survey, which was undertaken by Ecoserv during the period 9 April to 26 May, 2012, and was based on ToR that are similar to the ones for the 2011 (Ecoserv, 2011) and present studies, are as follows:

Turtle Dove

- When comparing the results of the 2012 survey with those from Thomaidis' (nd) surveys held in 2008 and 2009 for the same period and with those from the May 2011 survey by Ecoserv (2011), a similar trend of Turtle Dove counts is noted overall; the pattern of counts for the four years compared indicates a steady migratory influx during April, while the last 2-3 weeks of May represent the tail end of the Turtle Dove' migration period. However, in contrast to the occasional high mean counts recorded in 2008 and in 2009, no such peaks were recorded in spring 2012. When comparing the grand mean count recorded during the 2012 survey to that recorded during the previous 2011 survey, a higher value is evident for the former, however, this was attributed to collection of data late in the migratory period; namely between 8 and 28 May 2011, while the data from the 2012 survey were collected over a much longer period of 48 days that spanned April and May, and therefore included the peak migratory period for the species. On the other hand, the grand mean count recorded during the 2012 survey was lower than that recorded in 2008 and in 2009. While this would seem to indicate a lower influx of Turtle Dove for spring 2012, the data collected by Thomaidis (nd) during 2008 and 2009 utilised a greater number of field sites per day, which would increase accuracy. Hence, the lower grand mean count recorded during the 2012 survey may have resulted from the lower sampling effort compared to that made in Thomaidis (nd)' surveys. It was also noted that the occasional very high peak counts of Turtle Dove recorded in 2008 and 2009 during Thomaidis (nd)' surveys contributed to a high grand mean count. No such very high peak counts were recorded during the 2012 survey.

- A total influx of 57, 160 individuals of Turtle Dove was estimated for 2012, compared to a total influx of 18, 057 individuals estimated for 2011. However, Ecoserv (2011) emphasised that such estimates must be treated with utmost caution, given the relatively small number of field sites used in the surveys and that counts were not made daily at each station. Increasing the number of field sites per day is desirable since influx of birds at different localities is extremely variable, with potential large differences in Turtle Dove passing at two different localities, even if these are separated by a very small distance. 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. Moreover, the total coastline length used to estimate total influx includes stretches of coast that are highly developed and densely inhabited, for example, the Sliema – Valletta and Cottonera areas, where influx of birds would be expected to be lower, hence resulting in an overestimate. Another limitation was that the Turtle Dove migration counts were recorded over a seven hour survey period (06:00 - 13:00), hence any individuals migrating at other times of the day were not taken into consideration, leading to a potential underestimate of the total influx if significant Turtle Dove migration occurred between 13:00 and 06:00. On the other hand, the 06:00-13:00 time period represents the time during which the activity of Turtle Dove is at a 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.

Common Quail

- When comparing the results of the 2012 survey with those from Thomaidis' (nd) surveys held in 2008 and 2009 for the same period, and with those from the 2011 survey by Ecoserv (2011), a similar trend of Common Quail counts was noted overall; the pattern of counts for the four years compared indicates a steady migratory influx during April, while the last 2-3 weeks of May represent the tail end of the migration period for this species. As recorded in 2008 and in 2009, some peaks of Common Quail counts were recorded during the 2012. When comparing the total mean count recorded during the 2012 survey with that recorded during the previous 2011 survey, a slightly lower value is evident for the former. This was somewhat unexpected, given that the data from the previous 2011 survey were collected late in the migratory period; namely over a short period of 21 days between 8 and 28 May 2011, while the data on Common Quail from the 2012 were collected over a much longer period of 48 days that spanned April and May, and therefore included the peak migratory period for the species. Evidently, this resulted from the unusual high counts for Common Quail recorded during May 2011. However, although the grand mean count of Common Quail recorded during the 2012 survey turned out to be lower than that recorded in 2009, it was similar to that recorded in 2008.

- The total influx of Common Quail estimated for 2012 was 35,018 individuals, compared to 22, 699 individuals estimated for the previous year 2011. However, as emphasised above for Turtle Dove, such estimates must be treated with utmost caution, given the relatively small number of field sites used in the surveys and that counts were not made daily at each site. The considerations highlighted 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 relatively small distance of a few hundred meters. Hence, increasing the number of survey 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.

- It was noted that the design of the 2012 survey was largely improved compared to that of the previous survey made in 2011, since counts from spring 2012 were made over a period of 48 days, which included a great part of the peak migratory period of both Turtle Dove and Common Quail.
- For both Turtle Dove and Common Quail, a number of limitations, which had already been highlighted in Ecoserv's (2011) report, were reiterated, namely:
  - The data presented in the 2012 report can only be used for purposes of trend analysis, and even in this respect, due caution should be exercised; the sampling effort used in the study, while partly based on that reported and utilized by Thomaidis (nd) for the years 2008 and 2009, is not identical, hence comparison of data with that collected in 2008 and 2009 may not be sufficient to determine migratory influx and trends over time with accuracy. Comparison of data from 2012 with data from 2011 is limited since the bird counts from the latter year were restricted to a 21 day period during May, unlike bird counts from the 2012 survey which spanned nearly both April and May. Comparisons made in Ecoserv's 2012 report should therefore be interpreted with caution.
  - 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 be collected over the whole migratory season and, ideally, the study would entail a larger sampling effort, for example by making counts daily at all of a minimum 24 sites. Nevertheless, the data from the 2012 survey provided a useful indication of influx of Turtle Dove and Common Quail, provided that results are interpreted within the context of the stated limitations.

2. METHODOLOGY

The methodology used by Ecoserv during the present 2013 survey is identical to that used in the previous two surveys made by Ecoserv in 2011 and 2012 (see Ecoserv, 2011; 2012); 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 hunter and an independent observer (hereafter 'field assistants') - were stationed at a total of 24 sites (= count stations) distributed over Malta, Comino and Gozo. The survey was undertaken over a 3 week period between 10 and 30 April, 2013. During the survey, counts of individuals of the two species *Coturnix coturnix coturnix* and *Streptopelia turtur turtur* were made at 8 different sites each day. Each group of 8 sites was surveyed once every 3 days, such that a total of 24 sites were surveyed in total over each period of 3 days. The sampling sites are the same ones used in the previous 2011 and 2012 spring surveys (see Ecoserv, 2011, 2012) and are represented by the grid cell reference numbers listed in Table 1, while their locations are shown in Figure 1.

Since the survey was mainly aimed at quantifying the influx of migrating individuals, field sites were sited at strategic locations within coastal areas, which are more likely to serve as short-term stopover sites immediately following landfall during migration than are inland locations. 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 the Common Quail is

a 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 dogs to locate and flush birds in order to count them while in flight. The count area was taken as the total area surveyed in this manner at a particular site. Monitoring of Turtle Dove was always made between 06:00 and 13:00, while monitoring of Quail was made during a 2 hour period sometime between 06:30 and 12:00. The count data collected for the pre-defined area and count period at each study site was used to establish the mean number of birds recorded for each day of the survey.

In its proposal, Ecoserv had recommended that a third individual – a member of BirdLife Malta (hereafter BLM) be included in the team deployed at the field sites, however, BLM declined to participate in the survey.

Table 1

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	2888	3286
Comino			4085
Malta	3881	4283	4077
Malta	4480	4070	6069
Malta	4073	5064	4268
Malta	4666	5277	5663
Malta	6064	4079	4878
Malta	5872	6067	

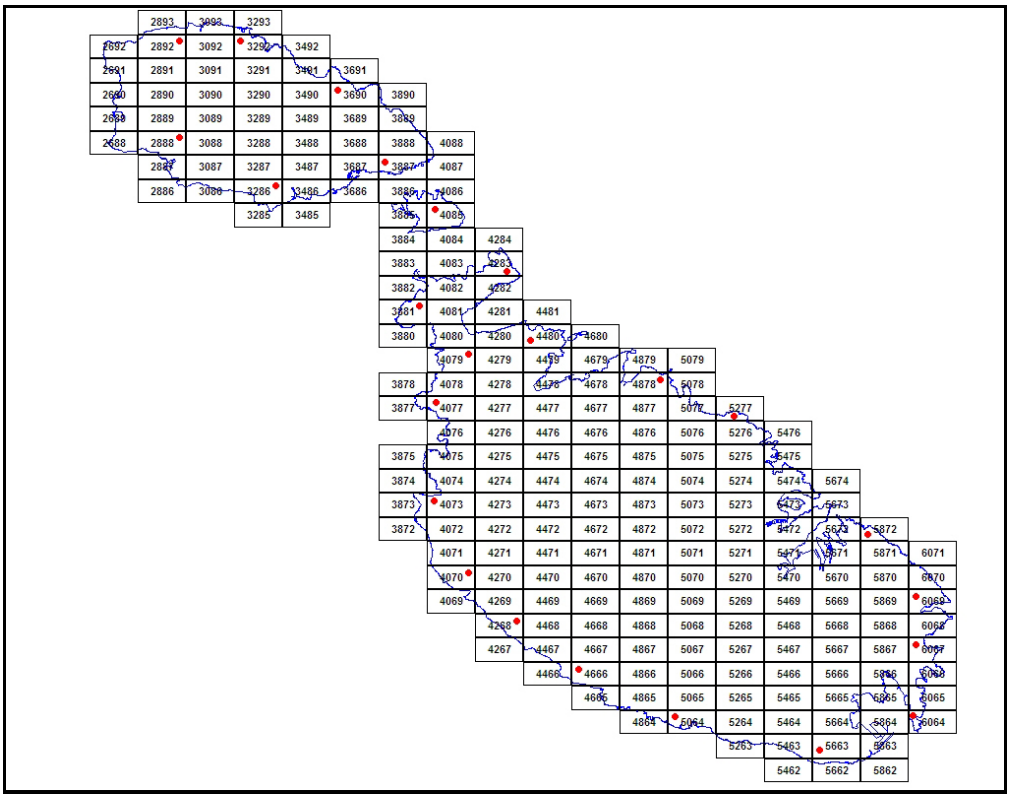

Figure 1. Map of the Maltese Islands showing the localities (grid cells indicated by the red filled circle) where the bird counts were made; see also Table 1.

At each study site, the observers also recorded the prevalent meteorological conditions, namely wind direction and strength, and degree of cloud cover. This information is available on the raw data sheets, copies of which have been submitted to the MEPA.

One-way Analysis of Variance (ANOVA) was carried to test for differences in counts of Turtle Dove and Quail between 2012 (Ecoserv, 2012) and 2013 (present survey), using the mean daily values recorded between 10 and 30 April from the two years as replicate data. Data collected by Thomaidis (nd) in 2008 and 2009 was not included in this analysis since the survey methodology used by Thomaidis (nd) in 2008 and 2009 was not identical to that used in later surveys. Nor was data from the 2011 survey (Ecoserv, 2011) included in the analysis given that the data had been collected during a different period; i.e. in May.

3. RESULTS

Ecoserv's laboratory report reference for the present survey is **058-13**. The sample reference codes for the bird count data are **B-011-13** to **B-058-13**.

Turtle dove

Raw counts for Turtle Dove recorded from the 24 sites during the present study varied between a minimum of 0 and a maximum of 46 (see Appendix 1), while the mean daily counts ranged between 0.75 and 12.29 (Table 2). It is to be noted that counts from different sites incorporate peaks (such as a count of 46 at one site on 21 April, and another count of 27 at a different site on 23 April). During the present (2013) migration, peak numbers of Turtle Dove occurred on 18 April and between 22 and 24 April. The recorded counts also varied appreciably between the different sites. At the lower end, at grid location 5277 (see Figure 1), only two individual Turtle Doves were recorded throughout the survey period. At the higher end, 100 Turtle Dove individuals, which included flocks were recorded from the site at grid location 3292, while comparatively high counts were also recorded from the sites at grid locations 6069 (50 individuals), 4283 (40 individuals), and 4268 (38 individuals).

The mean daily counts of Turtle Dove recorded during the period 10 to 30 April from the present survey, together with the mean counts for the same period in 2008, 2009 (Thomaidis, nd), and 2012 (Ecoserv, 2012), are summarised in Table 2 and shown graphically in Figure 2. Overall, counts recorded during the present survey show a similar trend to those recorded by Thomaidis (nd) in spring 2008 and 2009, and by Ecoserv (2012) in 2012 for the same survey period, although no very high mean counts as recorded in 2008 (98 on 15-4-08 and 26 on 20-4-08; see Figure 2) and in 2009 (33 on 23-4-12; see Figure 2) were recorded during the present survey. When counts recorded from the present (2013) survey are compared to those from the 2012 survey, counts from the former are higher between 20 and 25 April but lower between 26 and 30 April, overall. However, the general pattern from all four years being compared is a steady migratory influx during the last two weeks of April.

Values of the grand mean of Turtle Dove counts recorded during the period 10 to 30 April from the present survey, together with values of the grand mean for the same period in 2008, 2009 (Thomaidis, nd), and 2012 (Ecoserv, 2012), are shown in Figure 3. Overall, the grand mean recorded during the present (spring 2013) survey is higher than that recorded during the previous (spring 2012) survey, but lower than that recorded in 2008 and in 2009. However, the results of ANOVA indicated that counts did not differ significantly between 2012 and 2013.

As has been done in previous surveys (Ecoserv, 2011; 2012), an estimate of total influx of Turtle Dove over the Maltese Islands was made using the daily counts. Extrapolations were then made to obtain the total number of individuals of this species that may have migrated over the Maltese Islands on a particular date. However, as emphasised in reports of surveys from previous years (Ecoserv, 2011; 2012), such an estimate must be treated with utmost caution, given the relatively small number of sites used and that the counts were not made daily at each site. Furthermore, passage of birds at different localities is extremely variable, with potential large differences in birds passing at two different localities, even if these are separated only by a very small distance. As already stated, the other limiting factor is that the field survey stops at 13.00 and does no start again before 06.00, hence potentially missing the birds arriving during the night that are usually seen at the very first light of day, many of which end up shot within a very short time, and which may not recorded by the field observers during the survey. On the other hand, the estimate given in this 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 2), extrapolation translates to an estimated daily influx ranging between 407 and 6,664 individuals, with a total influx over the survey period (10 – 30 April 2013; i.e. 21 days) of 42,521 individuals, i.e. some 2,025 birds per day; see Table 4.

Table 2

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

Date	Mean Count ± SD		Estimated Daily Influx
10-Apr-13	1.00	± 1.77	542
11-Apr-13	0.88	± 0.99	475
12-Apr-13	2.13	± 2.53	1153
13-Apr-13	1.75	± 1.67	949
14-Apr-13	1.13	± 1.25	610
15-Apr-13	2.00	± 2.73	1085
16-Apr-13	1.50	± 2.67	814
17-Apr-13	2.13	± 2.03	1153
18-Apr-13	11.50	± 6.89	6238
19-Apr-13	2.50	± 2.45	1356
20-Apr-13	3.75	± 3.69	2034
21-Apr-13	12.29	± 16.42	6664
22-Apr-13	8.11	± 4.46	4400
23-Apr-13	11.75	± 9.79	6374
24-Apr-13	5.50	± 4.11	2983
25-Apr-13	2.38	± 2.33	1288
26-Apr-13	1.78	± 1.99	964
27-Apr-13	3.71	± 3.90	2015
28-Apr-13	0.75	± 1.04	407
29-Apr-13	0.88	± 1.13	475
30-Apr-13	1.00	± 0.76	542
		Estimated Total Influx	**42,521**

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

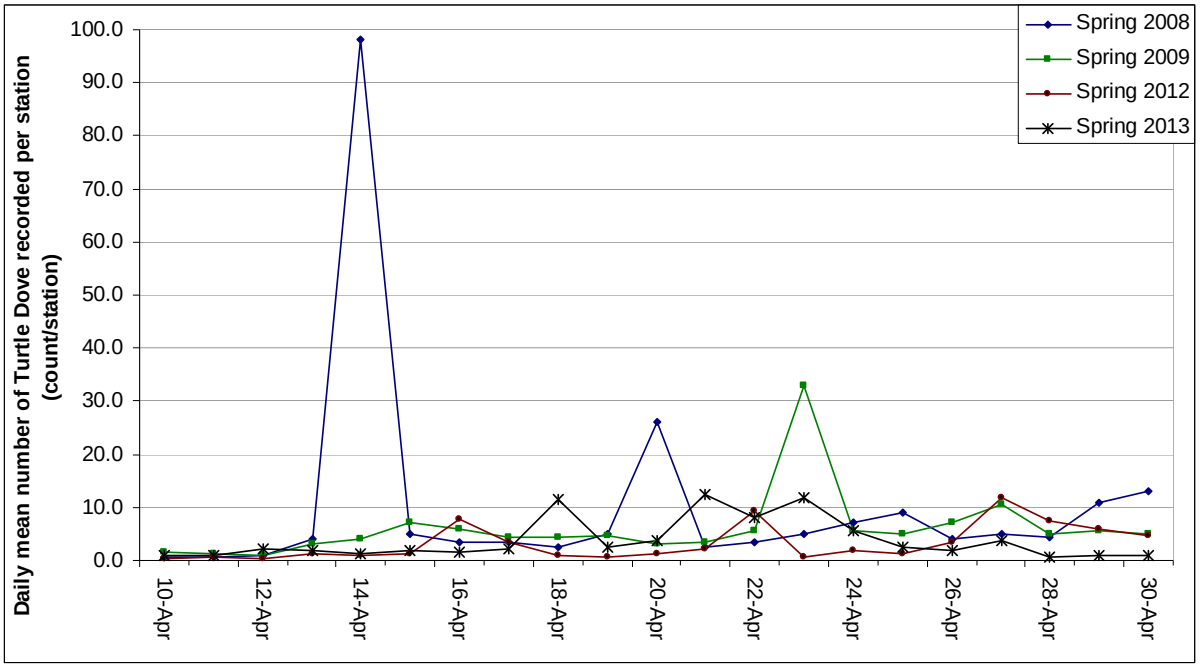

Figure 2. **Daily mean counts of Turtle Dove per station (= site) recorded during the present survey during the period 10 – 30 April, together with values of the same statistic for spring 2008 and 2009 as reported in Thomaidis (nd), and for spring 2012 as reported in Ecoserv (2012).**

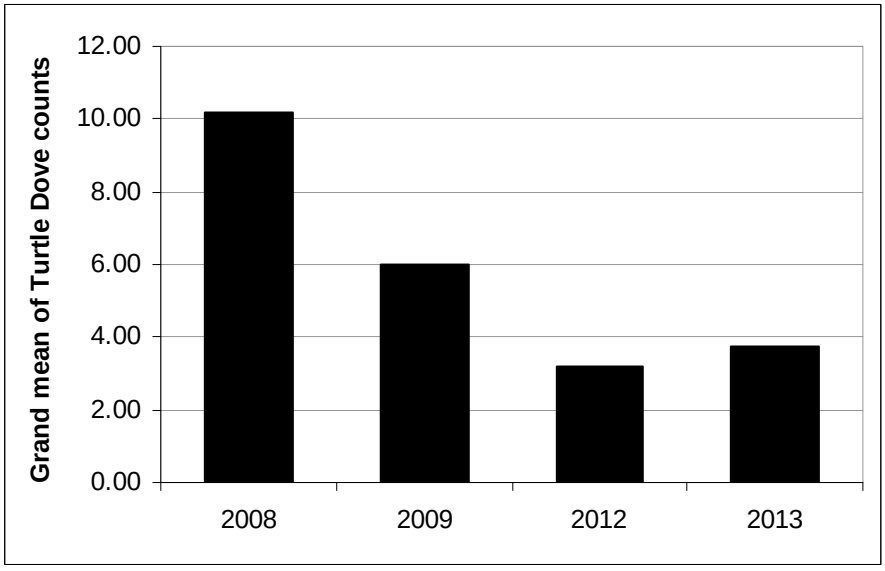

Figure 3. **Grand mean of Turtle Dove counts made using data from the period 10 – 30 April for spring 2013 (present survey), spring 2012 (Ecoserv, 2012), spring 2009 (Thomaidis, nd) and spring 2008 (Thomaidis, nd).**

Common Quail

Raw counts for Common Quail recorded from the 24 sites during the present study varied between a minimum of 0 and a maximum of 4 (see Appendix 1), while the mean daily counts ranged between 0 and 0.75. The recorded counts did not vary appreciably between the different sites: at the higher end, a total of 12 individuals were recorded from grid location 2892, while the lower end, no Quails were recorded throughout the survey period from grid locations 3887, 4070, 5064, 5277, 4077 and 4878.

The recorded mean daily counts of Common Quail and respective area surveyed at each site during the present survey (spring 2013), together with the mean counts for spring 2008 and spring 2009 reported by Thomaidis (nd), and for spring 2012 reported by Ecoserv (2012), are given in Table 3 and shown graphically in Figure 4. The daily mean counts recorded during the period 10 – 30 April 2013 (present survey) are overall lower than those obtained in 2009 (Thomaidis, nd) but comparable to those obtained in 2008 (Thomaidis, nd) and 2012 (Ecoserv, 2012) for the same dates, except that no migration peaks (with a mean count >2) as recorded in 2008, 2009 and 2012 (see Figure 4) were recorded during the present survey.

Table 3

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

Date	Mean Count ± SD		Total Area Surveyed (km^2)	Estimated Daily Influx
10-Apr-13	0.38	± 0.52	0.101	6557
11-Apr-13	0.00	± 0.00	0.247	0
12-Apr-13	0.25	± 0.71	0.448	989
13-Apr-13	0.63	± 0.92	0.101	10929
14-Apr-13	0.38	± 0.52	0.247	2689
15-Apr-13	0.50	± 0.76	0.448	1978
16-Apr-13	0.25	± 0.46	0.101	4372
17-Apr-13	0.38	± 0.74	0.247	2689
18-Apr-13	0.13	± 0.35	0.448	494
19-Apr-13	0.75	± 1.39	0.101	13115
20-Apr-13	0.25	± 0.71	0.247	1793
21-Apr-13	0.43	± 0.53	0.425	1564
22-Apr-13	0.44	± 0.73	0.124	7127
23-Apr-13	0.13	± 0.35	0.247	896
24-Apr-13	0.25	± 0.46	0.448	989
25-Apr-13	0.13	± 0.35	0.101	2186
26-Apr-13	0.56	± 1.33	0.270	4100
27-Apr-13	0.14	± 0.38	0.425	521
28-Apr-13	0.13	± 0.35	0.101	2186
29-Apr-13	0.25	± 0.46	0.247	1793
30-Apr-13	0.13	± 0.35	0.448	494
Estimated Total Influx				**67,460**

Values of the grand mean Common Quail counts for spring 2013 (present survey), spring 2012 (Ecoserv, 2012), and spring 2008 and spring 2009 (Thomaidis, nd), are shown graphically in Figure 5. The comparison in Figure 5 is based on data collected during the same period (10 to 30 April) in each of the four surveys. The grand mean recorded during the present (spring 2013) survey is lower than that recorded during all the previous surveys. However, the results of ANOVA indicated that the counts of Common Quail did not differ significantly between 2012 and 2013.

As has been done in previous surveys (Ecoserv, 2011; 2012), the total influx of Quail was estimated for the whole area of the Maltese Islands using the recorded area surveyed for Quails 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 coastal sites only 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 repeat 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 3. Based on these data, extrapolation translates to a total influx of Common Quail during 10 – 30 April 2013 of 67,460 individuals, or some 3212 Quails per day (see Table 3). However, as emphasised in the reports of previous surveys (Ecoserv, 2011; 2012), such an estimate must be treated with utmost caution, given the relatively small number of field sites used in the present survey and that counts were not made daily at each site, such that only a very small portion of the total area of potential habitat in the Maltese Islands was sampled.

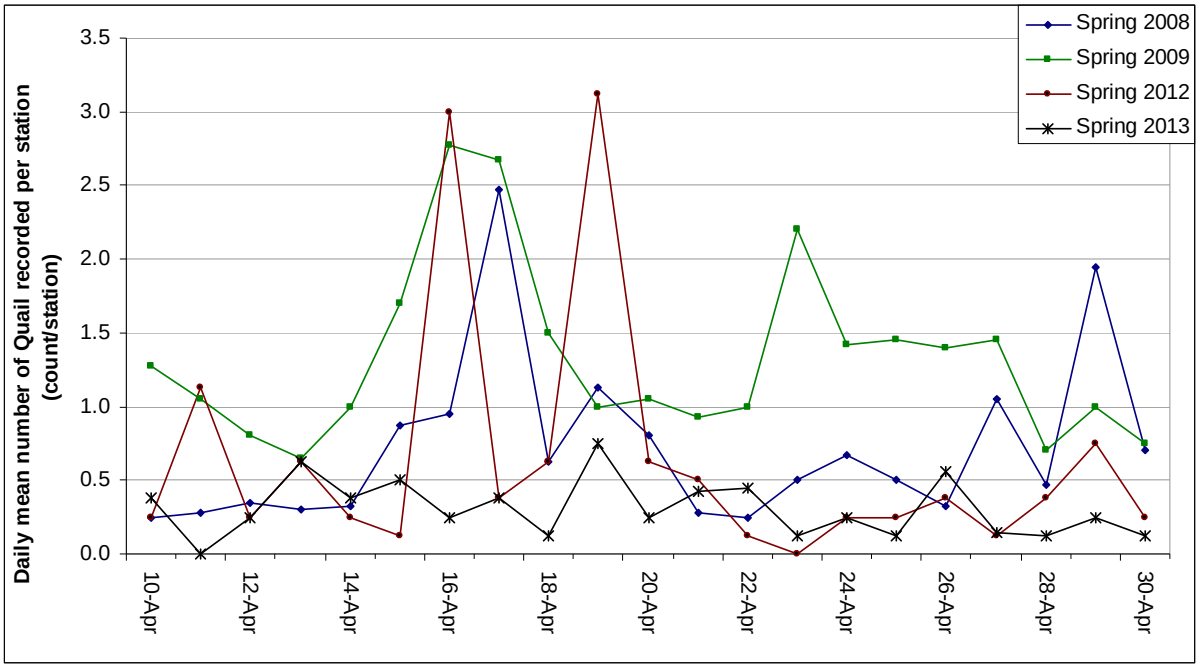

Figure 4. **Daily mean counts of Common Quail per station (= site) recorded during the present survey during the period 10 – 30 April, together with values of the same statistic for spring 2008 and 2009 as reported in Thomaidis (nd), and for spring 2012 as reported in Ecoserv (2012).**

4. APPRAISAL

The present survey provides data on counts of Turtle Dove and Common Quail recorded during April 2013, and estimates of the migratory influx of the two species. In 2013, Government had established the open season during the period 10 – 30 April, which coincided with the period during which the present study was held.

For Turtle Dove, when comparing the results of the present survey with those from Thomaidis' (nd) surveys held in 2008 and 2009, and those from the 2012 survey by Ecoserv (2012), a similar trend of counts recorded during the period 10 – 30 April is noted overall; the pattern of counts for the four

years compared indicates a steady migratory influx during the last two weeks of April. However, in contrast to the occasional high mean counts recorded in 2008 and in 2009, no such peaks were recorded during the present survey. When comparing the grand mean value recorded during the present (spring 2013) survey to that recorded during the previous (spring 2012) survey, a higher value is evident for the former, but this difference was not statistically significant. However, the grand mean value recorded during the present survey is lower than that recorded in 2008 and 2009. While this would seem to indicate a lower influx of Turtle Dove for spring 2013 compared to 2008 and 2009, the data collected by Thomaidis (nd) during the latter two years utilised a greater number of field sites per day, which would increase accuracy. Hence, the lower grand mean value recorded during the present survey may have resulted from the lower sampling effort compared to that used in Thomaidis (nd)' surveys. On the other hand, the occasional very high peak counts of Turtle Dove recorded in 2008 and 2009 (see Figure 2) from Thomaidis (nd)' (2008 and 2009) surveys contribute to a high grand mean. No such very high peak counts were recorded during the present survey.

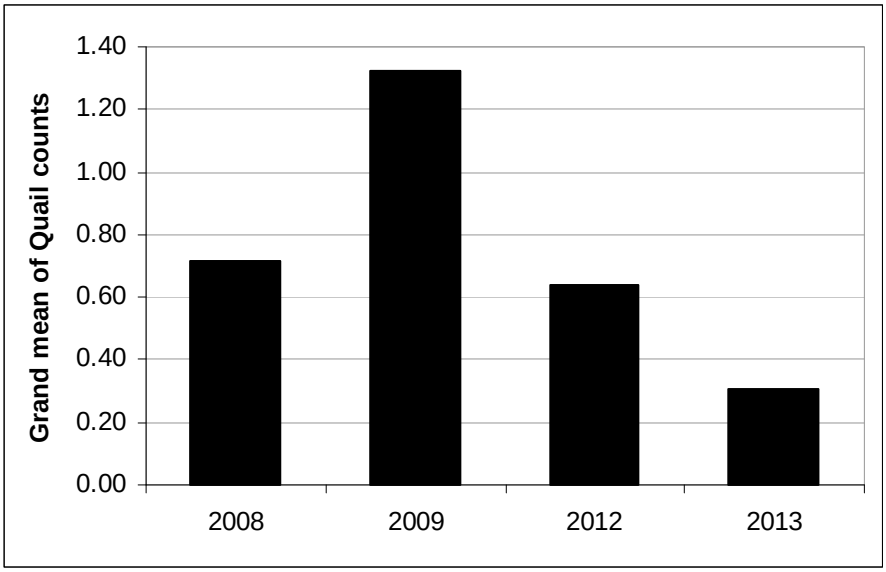

Figure 5. Grand mean of Common Quail counts made using data from the period 10 – 30 April for spring 2013 (present survey), spring 2012 (Ecoserv, 2012), spring 2009 (Thomaidis, nd) and spring 2008 (Thomaidis, nd).

The total influx of Turtle Dove for the present survey period (10 – 30 April 2013) is estimated at 42,521 individuals. For the period 9 April – 26 May 2012, Ecoserv (2012) estimated a total influx of 57, 160 individuals, while a total influx of 18, 057 individuals was estimated for the period 8 – 28 May 2011 (Ecoserv, 2011). However, it is reiterated that such values 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. Increasing the number of field sites per day is desirable since influx of birds at different localities is extremely variable, with potential large differences in Turtle Dove passing at two different localities, even if these are separated by a very small distance, as indicated above. Furthermore, the length of coastline surveyed per day (4 km) amounts to less than 1.5% of the total coastline; the accuracy of the estimated total migratory influx would be higher if a larger proportion of coastline is surveyed. It should also be noted that the total coastline length used in the present extrapolation includes stretches of coast that are highly developed and densely inhabited (e.g. the Sliema – Valletta and Cottonera areas) where influx of birds would be expected to be lower, hence this may result in an

overestimate. Another limitation is that the Turtle Dove migration counts were recorded over a seven hour survey period (06:00 - 13:00), 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 13:00 and 06:00. On the other hand, the 06:00-13:00 time period represents the time during which the activity of Turtle Dove is deemed maximum. Nevertheless, the stated estimate is useful when making comparison between different years, assuming data from surveys based on a similar design are available, to assess whether influx of Turtle Dove is increasing or decreasing with time.

For Common Quail, when comparing the results of the present survey with those from Thomaidis' (nd) surveys held in 2008 and 2009, and those from the 2012 survey by Ecoserv (2012), a similar trend of Common Quail counts recorded during the period 10 – 30 April is noted overall between the 2008, 2012 and present surveys, while slightly higher counts were recorded in 2009. However, no migratory peaks for Common Quail were recorded during the present survey, whereas such peaks had been recorded in 2008, 2009 and 2012. When comparing the grand mean value recorded during the present (2013) survey with that recorded during the previous (2012) survey, a lower value is evident for the former, although this difference was not statistically significant. The grand mean value of Common Quail recorded during the present survey is also lower than those recorded in 2008 and 2009.

The total influx of Common Quail for the present survey period (10 – 30 April 2013) is estimated at 67,460 individuals. For the period 9 April – 26 May 2012, Ecoserv (2012) estimated a total influx of 35,018 individuals, while a total influx of 22, 699 individuals was estimated for the period 8 – 28 May 2011 (Ecoserv, 2011). The estimate made for the present survey (2013) is therefore much higher than for previous year and may be an overestimate resulting from an artefact of the extrapolation procedure. 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 21 day period between 10 and 30 April 2013, which covers the period when peak migration of Turtle Dove and Quail normally occurs and is therefore and improvement over the 2011 survey (which, having been held in May, only covered the tail end of the migratory periods). However, no information on potential migratory peaks, particularly for Turtle Dove, which may have occurred in May 2013, is available, given that no count data were collected during this month.

For both Turtle Dove and Common Quail, a number of limitations, which have already been highlighted in Ecoserv (2011, 2012), 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 2013 study, while partly based on that reported and utilized by Thomaidis (nd) for the years 2008 and 2009, is not identical. Comparison with data collected by Ecoserv (2011) during spring 2011 was not possible since the bird counts from that year were collected in May, while the present survey was made in April, which is deemed to be

more representative of the period during which migratory influx of Turtle Dove, and to a lesser extent Common Quail[2], is highest.

- 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 24 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 these limitations.

5. REFERENCES

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

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Thomaidis (nd). Study of the migration patterns of Turtle Dove *Streptopelia turtur* and quail *Coturnix coturnix* over the Maltese Islands. Technological Education Institute of Lamia, Department of Forestry and Management of Narutal Environment, Kapenisi, Greece; 56 pp.

[2] Given that migratory peaks for Common Quail also occur in late March – early April.

APPENDIX I - Raw counts

Table I-1. Daily counts of Turtle Dove recorded per site.

Ecoserv Sample Reference Code	B-011-13	B-012-13	B-013-13	B-014-13	B-015-13	B-016-13	B-017-13	B-018-13	B-019-13	B-020-13	B-021-13	B-022-13
Grid Location	**3887**	**2892**	**3881**	**4073**	**4666**	**6064**	**5872**	**4480**	**3690**	**2888**	**4079**	**4070**
10-April-13	5	0	0	1	0	2	0	0				
11-April-13									1	1	1	0
12-April-13												
13-April-13	1	3	0	1	4	4	0	1				
14-April-13									3	0	2	2
15-April-13												
16-April-13	1	0	1	0	0	8	1	1				
17-April-13									3	0	3	1
18-April-13												
19-April-13	0	1	2	2	0	7	3	5				
20-April-13									11	5	1	3
21-April-13												
22-April-13	11	9	17	3	11	5	8	4				
23-April-13									12	21	20	4
24-April-13												
25-April-13	0	2	4	1	2	3	0	7				
26-April-13									1	4	0	1
27-April-13												
28-April-13	2	2	0	0	2	0	0	0				
29-April-13									1	3	2	0
30-April-13												

Table I-1 cont. Daily counts of Turtle Dove recorded per site.

Ecoserv Sample Reference Code	B-023-13	B-024-13	B-025-13	B-026-13	B-027-13	B-028-13	B-029-13	B-030-13	B-031-13	B-032-13	B-033-13	B-034-13
Grid Location	**5064**	**6067**	**5277**	**4283**	**4085**	**3292**	**3286**	**4077**	**4268**	**5663**	**6069**	**4878**
10-April-13												
11-April-13	0	3	0	1								
12-April-13					1	7	1	0	1	0	5	2
13-April-13												
14-April-13	0	2	0	0								
15-April-13					0	8	1	3	3	1	0	0
16-April-13												
17-April-13	0	3	1	6								
18-April-13					19	18	6	6	22	6	8	7
19-April-13												
20-April-13	0	6	0	4								
21-April-13						46	8	0	1	0	18	13
22-April-13					5							
23-April-13	6	3	1	27								
24-April-13					4	8	3	4	9	1	13	2
25-April-13												
26-April-13	5	0	0	1	4							
27-April-13						11	1	1	0	2	5	6
28-April-13												
29-April-13	0	0	0	1								
30-April-13					1	2	0	1	2	1	1	0

Table I-2. Daily counts of Common Quail recorded per site, together with the area surveyed at each site.

Ecoserv Sample Reference Code	B-035-13	B-036-13	B-037-13	B-038-13	B-039-13	B-040-13	B-041-13	B-042-13	B-043-13	B-044-13	B-045-13	B-046-13
Grid Location	**3887**	**2892**	**3881**	**4073**	**4666**	**6064**	**5872**	**4480**	**3690**	**2888**	**4079**	**4070**
Surveyed Area (km^2)	0.015	0.009	0.021	0.019	0.012	0.010	0.004	0.012	0.045	0.006	0.005	0.028
10-April-13	0	1	0	0	1	0	0	1				
11-April-13									0	0	0	0
12-April-13												
13-April-13	0	2	0	2	0	0	0	1				
14-April-13									1	1	0	0
15-April-13												
16-April-13	0	1	0	1	0	0	0	0				
17-April-13									2	0	0	0
18-April-13												
19-April-13	0	4	1	0	0	1	0	0				
20-April-13									0	2	0	0
21-April-13												
22-April-13	0	2	0	1	0	0	1	0				
23-April-13									1	0	0	0
24-April-13												
25-April-13	0	1	0	0	0	0	0	0				
26-April-13									0	0	4	0
27-April-13												
28-April-13	0	1	0	0	0	0	0	0				
29-April-13									0	0	0	0
30-April-13												

Table I-2 cont. Daily counts of Common Quail recorded per site, together with the area surveyed at each site.

Ecoserv Sample Reference Code	B-047	B-048	B-049	B-050	B-051	B-052	B-053	B-054	B-055	B-056	B-057	B-058
Grid Location	5064	6067	5277	4283	4085	3292	3286	4077	4268	5663	6069	4878
Surveyed Area (km^2)	0.095	0.005	0.044	0.019	0.023	0.009	0.233	0.072	0.015	0.003	0.033	0.060
10-April-13												
11-April-13	0	0	0	0								
12-April-13					0	2	0	0	0	0	0	0
13-April-13												
14-April-13	0	0	0	1								
15-April-13					1	1	0	0	0	0	2	0
16-April-13												
17-April-13	0	1	0	0								
18-April-13					0	1	0	0	0	0	0	0
19-April-13												
20-April-13	0	0	0	0								
21-April-13						1	1	0	0	1	0	0
22-April-13					0							
23-April-13	0	0	0	0								
24-April-13					0	1	0	0	0	0	1	0
25-April-13												
26-April-13	0	0	0	1	0							
27-April-13						0	0	0	1	0	0	0
28-April-13												
29-April-13	0	1	0	1								
30-April-13					0	1	0	0	0	0	0	0