Malta Environment and Planning Authority

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

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1. INTRODUCTION

1.1 Preamble

In April 2011, Ecoserv Ltd (hereafter 'Ecoserv') received a request from the Malta Environment and Planning Authority (hereafter 'MEPA') for a quotation for an independent scientific study aimed at assessing the influx of two largely migratory bird species in Malta, the Common Quail *Coturnix coturnix coturnix* and the European Turtle Dove *Streptopelia turtur turtur*, following the 2011 spring hunting open season, which the Government had conceded between 13 and 30 April 2011.

Data on migration across the Maltese Islands of the Common Quail and Turtle Dove collected in recent years is contained in a report by Thomaidis (nd), who studied occurrence and patterns of movement of these two species within the Islands between spring 2008 and autumn 2009. Records on the number of individuals of these two species, caught or trapped by hunters and trappers, in spring and autumn of 2002 through to 2010 are also available in the Carnet de Chasse reports of the respective years (MEPA, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010). It appears that other data may also be held by Federazzjoni Kaccaturi Nassaba u Konservazzjonist (FKNK) and BirdLife Malta (BLM). Notwithstanding, independent and reliable data on the two species are lacking, hence MEPA's call for an independent study.

The MEPA's the Terms of Reference (ToR) were as follows:

> ***"Overall Aim and Scope of the Study***
>
> *This preliminary study shall focus on two species – Common Quail and Turtle Dove - and shall take place for the duration of the spring hunting season and extend to two weeks after its closure. The Study should comprise the surveying of the daily influx of migrating specimens of the two species throughout the period of operation of the derogation for spring hunting. The main purpose is to establish a system of independent scientific monitoring of the daily influx of migration of both species concerned throughout the period during which the derogation may operate (Regulation 9 of LN 79 of 2006, as amended). This would provide an independent verification of the level of presence of the two species and the timing of their migration against which the daily take by hunting may be evaluated. 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 data that will be gathered may also be used for long-term population monitoring so as to assess the conservation status of these species in line with the requirements of EC Birds Directive and transposing national legislation.*
>
> *This study shall only cover the Spring Hunting Season. The collection of scientific data to elucidate population trends for both species is beyond the scope of this study*
>
> ***Methodology***
>
> *The Study shall monitor the influx of migratory specimens of both species, bearing in mind any methodological difficulties in monitoring these species. 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 the need to take into consideration however flexibility of techniques used to meet constraints imposed by local geographical conditions and the availability of skilled personnel.*

A network of monitoring stations will need to be set up throughout the three inhabited islands of the Maltese archipelago with every station working daily throughout the migration season/spring hunting season (e.g. each operated on one or two days per week or with a greater frequency of monitoring but most or all days should however be covered by at least one station). The exact number, location and area of stations will be determined in consultation with scientific experts who are commissioned to undertake this Study. The count 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 sampling procedures occur. Length of count period should take into account the normal numbers of personnel and the hours that they are available.

Surveys should focus on observations and migration counts, and should be coordinated by a scientific person or team, so as to enable an appropriate scientific determination (with ecological statistics and/or models leading to possible population estimates, with standard errors) and should cover, at least, the three main inhabited islands of Malta. The migration count can include birds counted at a site, observed flying past a fixed point in diurnal migration, captured in nets or traps, seen on radar screens, or whose calls are recorded in nocturnal migration. For monitoring small landbirds, particularly nocturnal migrants, attention should be drawn to birds observed or captured at short-term stopover sites immediately following a migratory flight. Depending on the situation, a migration count may be derived exclusively from observations, exclusively from standardized netting of birds, or from a combination of observations and captures. There are several options for producing a useful migration count of small landbirds. More than one type of data can be collected simultaneously, which can be useful to facilitate assessment of each method. These options include: visible migration count; area search or route census counts; banding captures by net or trap; incidental observations; and daily estimated totals. The commissioned experts should define what they will consider as a migration count and what standardised methods will be used. 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.

Expected Deliverables

Independent scientific data is required on observations and migration counts of migrating individuals of Streptopelia turtur *and* Coturnix coturnix *from the start of season until two weeks after its closure. Results of the study should indicate population changes during the spring migration of these birds and must be presented in a final monitoring report."*

The MEPA's request for the study was communicated to Ecoserv on 15-4-11, while the ToR requested that the study be carried out during the last two weeks of April 2011. Consequently, the company did not have sufficient time to formulate a detailed proposal and informed the MEPA accordingly. Subsequently, the MEPA informed Ecoserv that the Authority was considering extending the study period till end May 2011. Based on this new development, Ecoserv produced a proposal bearing reference P-150411-MEPA-Bird_Study, which was submitted to the MEPA on 2-5-11. This proposal was based on discussions between Ecoserv's scientific consultants and the Authority, during which an outline of the study design proposed by the present consultants was presented. Ecoserv's study design was in-part based on specialist recommendations made by its scientific consultants and

partly on the methodological design developed by Dr Christos Thomaidis in his study[1], carried out locally during 2008 and 2009. Consideration of the study by Thomaidis was important, both in terms of approach and results, given that this study had generated a substantial amount of data, which could be used for comparison with data collected during subsequent years.

Ecoserv's proposed approach entailed the identification of bird count stations at strategic locations in coastal areas, with stations sited in all three inhabited islands. Coastal locations are more likely to serve as short-term stopover sites immediately following a migratory flight than inland regions; thus the exclusion of inland survey sites reduces the risk of erroneous double-counts, that is, counting the same individual twice (at a coastal site and further inland as birds funnel into the hinterland, often following valley systems), which would result in an over-estimation of the number of migratory birds of the species in question, although this cannot be taken as a rule of thumb. It was thus proposed to collect data on bird counts on a daily basis from a total of 26 survey localities. The data were to be collected by a team of 3 observers – a hunter, an independent observer, and a member of Bird Life Malta (BLM) – deployed daily at each of the 26 localities between 0600 and 1300. This, therefore, involved a total of 72 observers in the study. Such a survey design, involving a considerably large number of observers and field stations across three islands, was deemed desirable for collection of robust data. Involvement of 3 observers, one from each of the 2 organisations (FKNK and BLM), along with an independent observer recruited by Ecoserv, was desirable to ensure proper identification of the bird species and transparency of the data collection procedure. However, the proposed study design resulted to be very costly, and the required funding exceeded initial budgetary considerations. Ecoserv were therefore requested by the MEPA to revise the proposal to one based on a less costly study option.

In Ecoserv's revised proposal (bearing reference: P-150411-MEPA-Bird_Study_revised and submitted on 5 May 2011), it was decided to undertake data collection as proposed initially but with the number of localities reduced to 24, while the field observers would collect data from each locality every three days instead of daily, over a period of 21 days. This resulted in the deployment of 8 hunters, 8 BLM members and 8 independent scientific observers each day throughout the study period. On the same day of submission of the revised proposal (i.e. on 5 May 2011), Ecoserv received instructions to proceed with the study based on the revised proposal, which was to be undertaken between 8 and 28 May 2011. However, BLM opted out of the study and the team of observers deployed at each study locality therefore consisted of 2 persons: a hunter identified by the FKNK and a scientific observer recruited by Ecoserv.

The present submission comprises a survey of sightings during the passage of Turtle Dove and Common Quail in May 2011. In order to set the scene and place matters into perspective, a review of migratory behaviour of the two species, as well as an overview of local bird hunting and trapping activities, and EU legislation on the latter activities, is presented.

[1] Thomaidis C. (n.d.) Study of the migration patterns of Turtle Dove *Streptopelia turtur* and Quail *Coturnix coturnix* over the Maltese Islands.

1.2 Status of the Common Quail *Coturnix coturnix coturnix* and European Turtle Dove *Streptopelia turtur turtur* status, and their migration in Europe

Turtle Dove *Streptopelia turtur turtur*

The Turtle Dove is the smallest bird of the dove family in Europe. There are four sub species: *S. t. turtur* (the nominate race present in Europe), *S. t. arenicola (Balearic Islands), S. t. rufescens* and *S. t. hoggara*.

The breeding range of the nominate race incorporates Europe, Asia and North Africa. The majority of breeding populations in EU member states are to be found in Mediterranean countries. The European population is entirely migratory, wintering in Sahelien Africa from Senegal to Eritrea (Glutz 1980, Geroudet 1983, Cramp 1985). The nesting area of the nominal race *Streptopelia turtur turtur* in Europe stretches from Portugal East to the Ural, and from the 35th parallel to the 65th parallel North, with the distribution area being vast and greater in latitude in the eastern half. The Turtle Dove is currently found in all EU Member States and Mediterranean Islands, with the exception of the Alpine Arc and Ireland (Parslow 1967, Sharrock 1976, Snow and Perrins 1998). Since the late 1980s, it has also colonised Denmark, where it is almost exclusively confined to the southwestern corner of Jutland on mainland Denmark (Grell *et al*. 2004). Its distribution is linked to an isotherm of a minimum of 16° C in July (19°C in Great Britain) (Glutz, 1980). In general, the bird nests at a maximum altitude of 350 meters (Glutz, 1980) but very occasionally on warmer slopes up to 1,000 meters.

In the Maltese Islands, it is the nominate race of Turtle Dove *Streptopelia turtur turtur* that occurs, although the subspecies *Streptopelia turtur isabellinus* and *Streptopelia turtur arenicola* have also been recorded (Fenech 2010). Senior hunters and trappers, who used to shoot and trap large numbers of Turtle Doves up to the early 1970s, say there were two varieties of Turtle Doves, which differed in size and which appeared when different winds were prevalent. With easterly winds, large-sized Turtle Doves, that were more greyish, occurred. These were called *Gamiem tar-riħ isfel* (doves of southern winds), while smaller and markedly more reddish birds occurred when westerly winds were prevalent. These were referred to as *Gamiem tar-riħ fuq* (doves of northern winds).

The EU's Management Plan for the species states that estimates of population sizes are available for most European countries; but they are still imprecise, with big differences between maximum and minimum numbers. For most countries, these estimates are not backed by censuses derived from surveys.

The total European population estimate stands between 3.5 and 7.2 million pairs (BirdLife International, 2004a). This relative broad range results from lack of information on the populations in Russia and Turkey. Without these two countries, the estimate is between 2.2 and 3.8 million breeding pairs. In the EU, the population has been set at 1.6 to 2.6 million that comprises 36-46% of the total European population (BirdLife International 2004b).

According to BirdLife International (2004a, b), the status of the species in Europe is declining in the EU alone it is an even larger continuous decline. The decline is particularly significant for the large populations in Spain, Russia, Turkey and Ukraine but also for the smaller populations in Finland, the Baltic States, Poland, Germany, UK, Belgium and the Netherlands (BirdLife International 2004a). Using data from shooting captures in the Iberian peninsula during the postnuptial migration, the population decrease between the 1970s and 1990s has been estimated at 57% to 63% (Hidalgo and Rocha, 2005). Stable populations are found in central Europe; namely Italy, Austria, Czech Republic

and Slovenia (BirdLife International 2004a). Of the populations in Europe only the ones in France and Romania are increasing (BirdLife International 2004a).

One of the essential characteristics of Turtle Dove is its entirely migratory character. The postnuptial migration towards Africa starts by the end of July and reaches its most intense period at the end of August and beginning of September, with the last birds being observed at the beginning of October (Snow and Perrins 1998). The main migratory routes are through the Iberian Peninsula and Morocco. Other routes are through Tunisia, Malta and Italy, as well as Egypt, Greece and the Middle-East (Cramp, 1985, Rocha and Hidalgo, 2002a).

The wintering area of Turtle Dove in Africa is between the 10th and 20th parallels North, and corresponds to the Sahelian-Sudanian zone. Western European populations of this species migrate over the southwest of France and the Iberian Peninsula, where they are joined by birds breeding in Portugal and Spain, all of which subsequently cross over Morocco and Mauritania, and finally wintering in the savannahs of the western half of tropical Africa. Senegal, Gambia, Guinea Bissau, the northern parts of Konakry Guinea and southwest Mali have been considered to be the host countries for the greater part of these populations, but the species has also been recorded in many other African countries (Burkina Faso, southern Niger, northern Ivory Coast, northern Ghana, northern Nigeria, northern Cameroon) (Aebischer 2002). Some individuals also winter in Morocco (Jarry 1994). A more eastward migratory band, probably comprising birds originating from Central Europe, stretches over Italy, Malta, Cyprus, Tunisia and Libya, and possibly winters in Sudan, Ethiopia and Chad.

The prenuptial migration of Turtle Dove in Europe starts in late March but is most intense between 21 and 30 April, reaches a maximum during the first 20 days of May and eventually decreasing between 11 and 20 June.

Common Quail *Coturnix coturnix cournix*

Eight subspecies of the Common Quail *Coturnix coturnix cournix* iare recognised (Cramp and Simmons 1980; Johnsgard 1988; del Hoyo *et al.* 1994; etc), but only three occur in Europe: *C. c. confisa*, which occurs in the Canary Islands and the Madeira archipelago; *C. c. conturbans*, which is endemic to the Azores Islands, and *C. c. inopinata*, which occurs in the Cape Verde Islands.

The range of the Common Quail extends over almost the entire Palearctic zone south of *ca.* 60° N and to an altitude of 1200 m. Its breeding areas lie between 28° N and 55-60° N, while the wintering areas lie between 10-12° N and 38-39° N, hence breeding and wintering areas overlap broadly in North Africa, the Nile and Jordan valleys, and southernmost Europe.

The European population can be roughly divided, from east to west, into three groups defined by the main migratory flows: the Egypt-Syria route in the near-east, the Tunisia-Italy route in central Europe, nd the Morocco-Iberia route in the western Atlantic area.

The nesting area of the nominate race *Coturnix coturnix* in Europe stretches from Portugal and Ireland east to the Urals, south of the 60th parallel North. The extent of the distribution area somewhat varies depending on population fluctuations, with the species occurring in countries such as Ireland only during some years. Apart from the latter country, the Common Quail currently breeds regularly in all EU member states, including all the large Mediterranean Islands (BirdLife International 2004a, Handrinos and Akriotis 1997). The estimated European population totals between 2.8 and 4.7 million pairs (BirdLife International 2004a).

Only 5-24% of the global Quail population breeds in Europe and 43% - 54% of the European population breeds in Russia (BirdLife International 2004a; or 35% - 37% Guyomarc'h 2003), with large populations known to occur also in Belarus, Bulgaria, Turkey, Romania and Ukraine. Only 23% - 38% of the European population breeds in the EU (BirdLife International 2004b). Some 33% - 57% of the EU's Common Quail population breeds in Spain, whilst France, Germany, Italy, Poland and Portugal also have large breeding populations. The EU population totals some 884,000 - 1,912,000 calling males and, in contrast to the European population as a whole, is in favourable conservation status.

The Common Quail is the only migratory Galliform. It is only a partial migrant though; the tendency to migrate is inherited, and very sensitive to selection. All populations produce both sub-sedentary birds and others which undertake long and short migrations, respectively called 'sedentary phenotype' and 'long/short migrant phenotypes'.

The annual cycle is extremely difficult to study and summarize, since different populations show various levels of migratory tendencies; birds from populations with low migratory tendency can produce offspring which are long distance migrants; young birds born in March–April are capable of undertaking their first pre-nuptial migration from the age of 8 or 9 weeks, with a pattern different from, but geographically overlapping with, patterns shown by older birds; birds can breed several times in succession in a given year, in different countries or even continents, and undertake either migrations or other movements between breeding cycles. This can lead to a very high turnover of individuals in a given breeding area, which can reach up to 95% in 15 days (Rodríguez-Teijeiro *et al*. 1992b). The EU management plan for Quail states that this extraordinary mobility is a key obstacle to any serious population monitoring. There is also no synchrony between male and female movements. Because of the lack of male parental involvement, a male may undertake new movements of variable scale (distinct from true migration) in search of another mate, as soon as its first mate has completed egg-laying.

Overall, in central latitudes (30° - 35° N), the birds breed very early and have a very low migratory tendency, whereas in the very low (Sahel) or very high latitudes (Northern Europe, Central Asia), most birds undertake long migrations. Northern populations show strong migratory 'leap-frog' tendencies over those with a weak migratory tendency, e.g. the sub-sedentary populations of North Africa and the Near East.

Common Quail from Europe winter from the Mediterranean south to tropical Africa, where they overlap to some extent with African populations of the *erlangeri* and *africana* subspecies. After wintering south of the Sahara, populations of long-migrating birds undertake their pre-nuptial migration at the end of January and February (Guyomarc'h 1992, Rodwell *et al*. 1996). They start to arrive in the Maghreb countries from the third week of February, or even as early as the second week in the south. Some will move on and reach southern Europe (Spain, Romania) in late March - early April (Puigcerver *et al*. 1989, Munteanu and Maties 1974).

Simultaneously, populations of short migrants (migrating between 25° and 35° N, i.e. those from the Mediterranean basin) undertake their first reproductive cycle. Whatever their migratory status, 80% - 90% of western Palearctic Quails are thus, by March, either in the nesting phase in all favourable areas below 40° latitude from Portugal to Arabia (Fontoura and Gonçalves 1996b), or migrating over Morocco, Egypt and Israel (Baha el Din *et al.* 1989, Mendelssohn *et al.* 1969).

A second large migration then follows, made up of birds that have bred earlier at lower latitudes (south of 40° N). These come in several waves: adult males first, then adult females, and finally young birds born in the same year. These three groups show abundance peaks separated by several weeks. They reach regions north of 40° N between 10 April and late May, or even early June for the first young birds. For a given latitude, birds breeding at moderate altitudes (1000-1200 m) arrive several

weeks later than those breeding in the plains, as was noticed in several parts of Europe and Morocco (Puigcerver *et al.* 1989; Gallego *et al.* 1993, Michaïlov 1996, Mur 1994). The EU management plan for Quail states that the quantitative importance of these migratory waves seen by Europeans largely depends on the earlier breeding success in southern latitudes.

In Italy, the index of relative abundance as derived from intense ringing campaign of passage migrants (Macchio *et al*. 1999) shows a maximum on the third decade of May. Simultaneously with this second wave, a large part of the southern population (birds with the "short distance migrant" phenotype) remain in the favourable southern habitats, notably on the huge irrigated plains of Morocco and Arabia. Densities there are very high in May – June, and the populations consist of a majority of sexually mature birds (a mixture of one-year-old adults and young adults).

After breeding in Europe is completed, the autumn migration starts. To summarise, the migration of populations from south of the Loire (France), Castilla (Spain) and northern Italy is under way by the first week of September (Spano and Truffi 1992). Rodríguez-Teijeiro *et al*. (1996) even recorded it from north Castilla (Spain) in the last week of August. Apparently, timings are determined by the Quail's biological clock rather than by external environmental factors such as atmospheric pressure, wind direction, etc. In autumn, there seems to be no sexual or age segregation in the succession of migratory waves; the only obvious trend being that the large majority of Quails recorded in October are youngsters from the same year.

The autumn migration (September - October) of the populations in Eastern Europe (including Russia) is shifting to the east and the west from the known spring route, reaching the western part of Bulgaria (Nankinov 1982) and being very intensive along the Romanian and Bulgarian Black Sea coast.

An important phase of preparation for the southwards migration takes place before embarking on crossing the sea area. In Italy, out of a large overall sample of over 25,000 birds studied through ringing (Licheri D. *et al*. 2005), a fast and significant increase in mean body mass was observed, starting with the first decade of September, with peaks in the second and third decade of the same month for adults and juveniles, respectively. The first birds from the western populations arrive in lower Senegal at the end of September, in the last weeks of the rainy season.

The proportion of birds with a weak or moderate migratory tendency ('sedentary phenotype') used to be marginal in Europe in the past. It has probably increased considerably in the southern Palearctic: Morocco, Spain, Portugal, Arabia, Egypt, etc. Conversely, the proportion of birds inheriting strong migratory tendencies is decreasing, presumably because of the bad wintering conditions in the Sudan-Sahelian regions since the 1970s (Guyomarc'h 1992). A similar phenomenon has been observed in southern Africa (lat. 20° south), with a resulting tendency for populations to become increasingly sedentary overall (Mentis 1972).

The size of the European population of Common Quail is not known with certainty. The EU management plan for the species states that estimates and trends available for most European countries are still imprecise, as reflected in the large differences between maximum and minimum numbers because of methodological difficulties in censuring the species and inadequacies in large-scale compilations. High inter-annual fluctuations in breeding numbers for a given country do not necessarily reflect the real variability in the total population size, but rather a variability in the amplitude of the pre-breeding, northwards migration.

Birdlife International roughly confirms these overall trends in Europe: a strong decline between 1970 and 1990, especially in eastern and central Europe (Tucker and Heath 1994), followed by a decade of variable density during the period 1990 - 2000, with large differences between countries (e.g. increases in northern and central Europe, and declines in the southeast, especially Turkey). As a

result, the species is currently classified as 'depleted' in Europe (BirdLife International 2004a), rather than "Vulnerable" as it was classified a decade ago.
Although the decline of this species at the European scale is obvious, its dispersed distribution, discreet character, very unusual migration patterns and breeding cycle make it very difficult to study and to monitor on its breeding grounds.

Some of the possible threats to the Common Quail in the EU are identified as the destruction and modification of the breeding and staging habitats, which are linked to intensification of agriculture; droughts and climate change in wintering areas and in some breeding areas; and genetic pollution from released Japanese and/or hybrid Quails. Furthermore, hunting and non-human predation can, in some cases, be seen as aggravating factors.

Situation of Turtle Dove and Common Quail in Malta

In spring, Turtle Doves occur in Malta from mid-March to the end of June. Single birds or pairs are usually noted early and late in the season, with peak migrations taking place between the second week of April and the first or second week of May. In autumn, Turtle Doves migrate across the Maltese Islands from mid-August to early October, with some birds occasionally occurring in November, with most sightings occurring between the last week of August and the third week of September. Heavy passages can occur on some days in both spring and autumn, most often taking place over two or more consecutive days.

Common Quail migration is typically more spread out, with the peak in spring occurring between mid-March to mid or late April, and the peak in autumn usually occurring between the first weeks of September and the end of October. Notwithstanding, some Quails can be encountered at different times of the year as the species continues to migrate late into autumn, with attempts to over-winter while early birds of the spring passage sporadically make an appearance by mid-February. Some occasionally attempt to breed and in recent years there have been a few breeding records between April and July. Quails usually make landfall during the night, although, at times, during the autumn migration, one may encounter the species coming in over the sea during daytime. Over the past few years, the use of electronic bird callers have been a determining factor in attracting Quails to particular areas where these are then hunted the following morning. These callers are often fitted with a timer programmed for activation between midnight and dawn. Although it is not known, with precision, what influence on numbers these callers have on those birds that would have otherwise continued to migrate; what is certain is that they do have some effect on enticing Quail to gather in small areas. Even though the use of such callers is illegal, it appears that they are still in use, albeit on a smaller scale compared to the past. In the course of a three week operation in September 2009, members of the Committee Against Bird Slaughter located 119 bird callers (CABS 2009) while in Spring 2010, 41 were encountered (CABS 2010).

Ringing recoveries have shown that most of the migrant birds that reach Malta originate from regions in Central Europe and Eastern European countries. There are no direct recoveries of Turtle Dove, that is, birds that were recovered in the same or subsequent season after they were ringed. However, there is a pattern of birds coming from breeding populations located in the north and northeast, with single birds arriving from the northwest as well. Two birds ringed in July 1985 and May 1986 in a locality which currently forms part of the Czech Republic were shot during spring migration in Gozo, five years later. A bird ringed in Naples in April 1987 was shot in Malta in April 1988. Other Turtle Doves ringed in The Czech Republic, former Yugoslavia, Hungary, Poland, Germany, Austria, France, Italy and Tunisia have been recovered in Malta, while Quails ringed in Italy, Sicily, Tunisia and Hungary have been recovered in Malta (Fenech 2010).

The lack of data highlights the need of study programs for both species. The idea of involving former bird trappers for specific ringing projects for Turtle Dove and Quail, as was done in Holland with Golden Plover trappers, has been mentioned during the last few years. The idea is to invite trappers to trap birds in specific locations and the trapped birds would be ringed by a ringer and released on the spot. This can be of benefit as it can contribute to knowledge about the destination of birds seen on migration in Malta, which currently is very lacking. It will also help satisfy trappers' desire to practice their hobby of trapping, hence reducing the pressure to open the trapping season for birds that would end up being kept instead of released. It would also, as in Holland, result in an enhanced conservation effort, since the trappers themselves would in no time be among those lobbying for better protection as they learn more about birds and their behaviour and ecology.

As far as Common Quail is concerned, the Eurasian race *Coturnix coturnix coturnix* occurs locally. Senior Quail trappers argue that a number of races of Common Quail migrate to Malta and they cite the names *Sejjettun* and *Turki, Lhudi, l-Abjad*, *l-Aħmar* and *tas-Salib,* some of which appear only in spring or autumn, and some in both seasons.

The EU's Management Plan underlies the fact that few studies have been carried out on the demography of the species. The Turtle Dove is capable of reproducing at the age of one year and the maximum lifespan for a bird in the wild is estimated at 20 years (Glutz 1980), but with the annual mortality rate being around 64% during the first year of life, and 50% for those surviving beyond that (Calladine *et al*. 1997). Turtle Dove nest success rate averages at around 53% during incubation and 65% during the nestling stage, so that only 35% of nests successfully produce young in the UK (Browne and Aebischer 2004), while in Spain the percentage of nest successfully producing young reaches 53% in Extremadura and 36% -58 % in the Madrid area (Rocha and Hidalgo, 2002a).

According to Murton (1968), the annual fledgling production rate per pair was between 2 and 2.8 fledglings in the 1960s, while Fontoura and Dias (1995) also observed a rate of 2.71 young per pair in northwest Portugal. According to Rocha and Hidalgo (2002), the annual productivity in Extremadura can vary from 2 to 3 chicks per couple, depending on the years.

Browne and Aebischer (2004) have shown that the number of nesting attempts undertaken by each pair per breeding season was significantly lower in the late 1990s compared with the early 1960s, so the observed decline of the species is perhaps mainly caused by a reduction in nesting attempts. The reduction of food availability and reduced availability of nesting habitat may be the underlying causes of the decrease of productivity (Browne and Aebischer 2005). In Great Britain, the breeding season seems also to be shortened by 8 days; the production per pair being half the number of clutches and young compared to former years.

In summary, the breeding success of Turtle Doves has been estimated to range from 35% to 58% (Browne and Aebischer 2004; Rocha and Hidalgo 2002). Therefore, only an average 46.5% of nesting attempts produce young. The annual production rate per pair has been estimated between 2 and 3 chicks (Murton 1968; Fontoura and Dias 1995; Rocha and Hidalgo 2002). Mortality rates for survivors have been estimated at 64% during the first year of life and 50% for adults (Calladine *et al.* 1997). These findings show that the species has a low survival rate and low productivity, which have implications for the sustainability of hunting this species.

The European Commission's Management Plan for Common Quail for 2009 – 2011 states that Quail has an unfavourable conservation status in Europe and that populations showed decreasing trends in many member states during 1970-1990, and that in spite some increases between 1990 and 2000, its European population is still considered to be 'depleted'. Although Quails lay large clutches, breeding success is also low. Mean annual production rate per pair has been estimated between 4 and 5 chicks (Guyomarc'h *et al*. 1989; Spano and Truffi 1994). Mortality rates have been estimated at 99%

during the first year of life and 70% for survivors beyond one year (Puigcerver *et al*. 1992; Mur 1994). The Quail thus has a low survival rate and low breeding success.

The Turtle Dove *Streptopelia turtur* is listed in Annex II/2 of the EU Birds Directive as a species for which hunting is permitted in Greece, Spain, France, Italy, Cyprus, Malta, Austria and Portugal. The EU's Management Plan for Turtle Doves states that 2-4 million Turtle Doves are shot annually.

The Turtle Dove has been identified as a bird species with an unfavourable conservation status within the EU because populations of this species are in decline in many EU member states.

The EU's Management Plan states that the breeding numbers of Turtle Dove show an overall decline since the 1970s. The decline in the number of birds seen in Malta from the 1970s onwards is similar to that observed for Europe as a whole. As indicated further on in this report, senior hunters and trappers speak about a drastic drop in number of Turtle Doves seen, trapped or shot from the 1970s onwards. It is interesting to note that in the 1950s and 60s, when the observed number of Turtle Doves was considerably large, many senior hunters and trappers recall that their fathers and grandfathers used to say that Turtle Doves were decreasing in number and that the flocks that were being seen in the 1950s and 60s 'were nothing' compared to what their ancestors used to see (NF, in prep).

The EU's Management Plan for Turtle Doves attributes the decline of this species in western Europe to three main factors, along with a possible fourth: (i) intensification of agriculture which leads to destruction or modification of breeding habitats; (ii) droughts and climate change in wintering areas; and (iii) hunting, which is seen as an aggravating factor especially when it takes place in spring during migration and the reproduction period. The latter is especially true since the annual bag is somewhat large and the species has a low productivity and low adult and juvenile survivorship. The Management Plan also states that attention must also be paid to possible competition with the Collared Dove, which is increasing in numbers and extending its range in Europe.

The range expansion of the Collared Dove has also been witnessed in Malta over the past eight years. Formerly a vagrant species, the Collard Dove is now a breeding resident which has spread since the first breeding record in 2003; there are now sizable populations in several localities (Fenech 2010). The number of Turtle Doves breeding in Malta was never high, with a pair or two at most attempting to breed in areas such as Buskett, but these breeding attempts have not been successful as the adult birds were almost always invariably shot during the rabbit hunting season by rabbit hunters or poachers. Hence, one cannot argue that in Malta's case, the Collard Dove has had any impact on the breeding population of Turtle Dove, although this cannot be excluded in the future.

1.3 Hunting of Common Quail and Turtle Dove in Malta: a historical overview

Turtle Dove and Common Quail are the two most important game birds in the Maltese Islands and both species were hunted in both spring and autumn until 2007. From 2008 to 2010, both species were hunted in autumn and to a lesser degree, Common Quail was also hunted in winter. Spring hunting activity was blocked by a European Court of Justice temporary ban until a case instituted by the European Commission was decided. A very limited spring hunting period was opened in 2010, where only 23 licences were issued, while in 2011, 5,610 hunting licences were issued for hunting Turtle Dove and Quail between 13 and the 30 of April. During both periods, there was a degree of illegal hunting, with a number of hunters being charged by the police either for hunting without a licence or for other infringements of the hunting regulations.

As birds such as Turtle Doves and Quail were an important source of food for a very long time in the past, it comes as no surprise that one finds reference to them in various aspects of Maltese culture. Remains of Quail were among the several species of birds that had been identified from fossil remains found in Quaternary deposits at several sites in Malta, some of which date back to around 135,000 – 115,000 years Before Present (BP) (Hunt and Schembri 1999). Bird remains resembling those of Quail have been found in various prehistoric sites right up to the late 1800s, while Turtle Doves feature in hunting scenes depicted by Jean Houel around the 1780s and again in watercolours by Charles Brocktorff, painted around the 1830s (Fenech 2010). The Maltese name for Quail remained virtually unchanged since the first written record dating back to 1517 while the vernacular name of the Turtle dove has virtually remained unchanged since it was first recorded in writing in 1574 (Fenech 2010).

The cultural importance attached to Quail can be discerned through a variety of sources. There are five words describing different calls of the Quail: the call of the female is referred to as *tkerker* or *tnewwaħ* while *ifaqqa'* and *itaqtaq* are used for the repetitive call of the male. *Ipejjeż* is the particular call of the male, usually uttered by a decoy bird placed under the net, on seeing a wild bird close by. The significance of these birds can also be seen by the fact that they are frequently cited in proverbs and sayings: Turtle Doves are mentioned in 24 proverbs while Quail is mentioned in at least ten proverbs. Most proverbs usually speak about migration and associate the migration of birds with weather and particular feasts.

The first rather detailed references to migration in Malta were given by Abela in 1647. He spoke about bi-annual migrations of Quail, Turtle Doves, thrushes, ducks, pigeons and partridges. Ciantar, who in 1772 updated Abela's work, wrote that in March, southern winds brought Quails, while in April, Quails and Turtle Doves appeared with the onset of north-westerly winds. In September, Quail and Turtle Doves appeared with easterly winds. One can find references to hunting and migration in accounts by several authors who wrote on aspects ranging from history to travellers accounts. De Boisgelin (1805) stated that "*flights of birds of passage come to Malta and afford much amusement to sportsmen, who shoot them with great perseverance. The Maltese are remarkable for imitating the notes of different birds, and catch them with surprising skill. They have also a very long sight and perceive falcons and others of the feathered race at a wonderful height in the air. They are excellent shots, and seldom miss those birds which they do not take in the nets. Beccaficos, quails and plovers are the most delicate juicy food. These birds of passage are in much greater quantities in some years than in others; and the quails almost constantly arrive during the September equinox*".

Badger (1838) stated that game was plentiful in September and April, "*when there are generally a great many quails, which light upon the island in their flight, and are not infrequently caught by hand. Wild duck, snipe, fig-peckers, woodcocks, plovers and doves form the chief game for sportsmen*." Sperling (1864) wrote: "*if a flight of Quail, doves or owls come in during the night, they are all shot in the morning, in the market at noon, and eaten by the evening; for the Maltese are an omnivorous nation, and are not averse to eating owls, Bee-eaters, Hoopoes etc*," but then adds that one might easily shoot ten or twelve Quails before breakfast during the shooting season and that he did not think "*any one would regret going to the Mediterranean to shoot in winter*."

In his many accounts, Wright shares his experience about how best to shoot Quail (Wright 1860a, 1862b). Wright's diaries are also interesting because he often jotted down notes on the remarkable bags he had heard about. For instance, in autumn 1855, he noted that he had heard of a man who had shot 45 Quails near Mdina. In autumn 1856, a man shot 30 Quail and 21 Nightjars, while over 40 Quail were shot by an individual at Naxxar on 27 April 1859 (Wright 1860a). In another entry he noted that from the 30th April to the middle of May, one man who "*went out every day, and beat the fields for many hours a day*" shot 193 Quails (Wright 1861).

On 23 April 1862, "*an immense number of Quail visited the island, more than had been seen for many years. As many as 148 were shot by one man and bags of from seventy to one hundred were not uncommon. The wind was from westwards and they continued arriving till ten o'clock in the morning, which was rather unusual as at this season, Quails rarely come during the daytime*" (Wright 1862b). Quails were sold for food from the market and Wright noted that on 5 September 1862 Quails "*as cheap as ¾ or a penny apiece. I never remember them being sold at so low a price before, a sign that great numbers must have been taken,*" (Wright 1862b).

Adams (1874) stated that the "*coming and going of Quail are very regular as to time, and their rarity or abundance in spring or autumn, is generally to be accounted for by the prevalence or otherwise of favourable winds*." He noted that the stronger the sirocco, north wind and the denser the sea haze, the more likely it was for an abundance of Quail, which were fatter and more plump in spring than in autumn.

Davies (1893) spoke of Quail shooting in Malta, saying "*an old hand*" from HMS *Dreadnought* had "*picked up twenty four couple of Quail round the Corradino area in one morning*" in spring while a sharp shooter from the Connaught Rangers "*had accounted for forty couple*" from Gozo in one day in the same spring. "*Ninety-eight couple at Corradino is the record bag for one day during our time*," Davies wrote.

Ballou (1893) noted that various game birds could be seen on the Valletta market and these included Quails that were brought from Gozo. Ballou wrote that during the open season, officers of the British garrison went to Gozo for Quail shooting. Peto (1927) made a passing reference to birds when she mentioned dogs used in duck and dove shooting and stated that one might receive "*a queer invitation for the April dove shooting*" in Malta. "*There is not much to shoot*" she stated, adding that "*there is so little to eat in the island that every kind of bird is shot and cooked immediately it appears. Malta is assuredly no bird sanctua*ry".

A decline in Quail numbers started to be felt in the mid-1970s. In 1954 Roberts stated that it was common while a few years later, De Lucca (1969) stated that it is common in spring and more common in autumn. Sultana, Gauci and Beaman (1975) and later Sultana and Gauci (1982) stated that it was a common migrant with influxes recorded in April and September. Bannerman and Vella Gaffiero (1976) stated that Quail had become very scarce and the picture given by Schembri and Wright has changed considerably, for a sportsman would find it very difficult to bag 30 Quails in any one season.

In some years, very large influxes of Quail are recorded. Many elderly hunters speak of a massive influx which occurred in October 1951, when, following a storm during the night, Quails were abundant and hunters without a dog were able to bag as many as 60 Quails while those with pointers bagged larger numbers. In autumn 2009 there was a similar influx, with a very strong passage on 23rd September. In the southeast of Malta, individual hunters bagged over 100 birds each, while hunters in other localities bagged between 2 and just over 30 birds on that day alone (pers. observation/communication: NF, 2009).

Apart from hunting, Quail was traditionally caught with horizontal nets spread over vegetation. In the late 1800s, the practice of catching Quail with vertical nets was introduced, a custom that was common on the northern shores of Africa, but this practice was short lived. In 1883, the Police Superintendent aired a grievance on behalf of hunters who were complaining that nets 8 to 10 feet high and spanning up to 3,500 yards were being set up in different places in April, May and September. Shortly after, a total of 210 hunters sent a petition asking "*that the custom lately introduced of laying Quail nets on the sea shores may be prohibited*" as they were unable to find any Quail to shoot as a result of these nets. Hunters were threatening that they would no longer pay the

hunting licence, arguing this would mean a loss of revenue to government. The law was subsequently changed and only small nets could be used to catch Quail (Fenech 2010).

Wright (1864a) was the first to describe the 'nets spread on the standing corn' which were used for catching Quail. Such nets were still used till 2009, until before Quail trapping became illegal. It could be that Quail trapping was not as widespread as other forms of trapping because the species is trapped before daybreak, when Quails move to where they hear others calling, and then there is no scope for the for the trapper to continue with his activity as Quails tend to fly when attempts are made to drive them towards the nets.

Birds remained an important source of food until even the 1960s and peasants would readily tell you that they could eat meat more easily in April, May and September, when Turtle Doves and Quail were plentiful and to a lesser degree in October and November, when Skylarks abounded. Turtle Doves and Quails were cooked in broths and their meat was either consumed with the broth or, more often, it was used for pie-making, or used as (bread) stuffing or cooked with pasta sauce.

Before Turtle Doves were hunted, they were trapped in large numbers. Trapping made more economical sense as a significant number of birds could be trapped in a haul, and could be kept alive until they had to be consumed. What was shot had to be consumed on the day or soon after since there was neither refrigeration nor any efficient way to preserve meat, save salting. Trapping of Turtle Doves was practised during the time of the Knights of St John, who came to Malta in 1530 and edicts issued during the time of the Knights established the opening and closure of the hunting seasons. The British Ornithologist Charles A. Wright described in detail how Turtle Dove trapping took place. He stated that twenty or thirty birds and sometimes more were frequently taken in one haul. He also described how male Quails were caught in nets spread on standing corn in spring by attracting them by the call of the female (Wright 1864b). Dr Andrew Leith Adams, a naturalist and geologist wrote that "*myriads of Turtle Doves pass over Malta with every south and east wind in April and May, and are captured by clap nets and decoy birds*". Adams noted that most birds were killed for food (Adams 1870).

References to trapping sites can be found in the mid-1600s and during the time of the Order of St John, vertical and other nets were used. Edicts regulating hunting specifically mentioning the use of nets, can be traced back to February 1655. An edict dated 29 March 1773, for instance, permitted people to catch 'migratory birds and Turtle Doves' with nets (Fenech 2010).

Davy (1842) who gave the first and only known illustration of the netting site for Turtle Doves in Malta, states that he had seen a priest using such trapping equipment in Malta. The notion the clergy used to trap birds was very colourfully exposed by Wright (1864a), who wrote that "*the sport is a favourite amusement of the country gentry; and in most casals, or villages, the village priest, whose occupations and duties afford him an abundance of idle time, pursues it with great assiduity*."

But way before these authors, Abela (1647) had already given rather detailed references to migration in Malta. He spoke about bi-annual migrations of Quail, Turtle Doves as well as other birds. Abela (1647) stated that on the feast of St George (23 April), Quails appeared with north-westerly winds while Turtle Doves and Cuckoos appeared with south-westerly ones. Ciantar, who in 1772 updated Abela's work, stated that in April, Quails and Turtle Doves appeared with the onset of north-westerly winds.

All ornithologists from the 1800s onwards referred to migration of Turtle Dove and Quail. Schembri (1843) referred to the passage of the Turtle Dove in April and September. William Tallack's work of 1861 also refers to "*scores*" of Turtle Doves in wicker baskets which were hawked about the streets in Valletta and sold for making "*pigeon pies*" in the season. Wright (1864) stated large flocks passed

in April and May and that thousands may annually be seen passing over the island without alighting. Wright stated that in September they were not generally as plentiful as in spring and that more juvenile birds were present. Despott (1917) stated that Turtle Doves were seen in great numbers only during spring. Roberts (1954) stated that the Turtle Dove was a common passage migrant during April and May and passed again in much smaller numbers in September and October. According to Roberts (1954), the species has undoubtedly much decreased since the days of Wright, who records it as also as having occasionally bred in Gozo. De Lucca (1969) stated that the Turtle Dove was very common and regular in spring and frequent in autumn.

Sultana Gauci and Beaman (1975) stated that it was a very common spring migrant which was often seen in large flocks with "*high treble figures*" recorded on several days but very heavy passages with to 20,000 birds occur on up to 3 dates on most years. In autumn it passes in much smaller numbers, usually only double or low treble figures, occasionally with up to 6,000 in a day. Bannerman and Vella Gaffiero (1976) stated that it could still be termed as common, although much diminished in its spring migration while in autumn it arrived in much smaller numbers though there could be heavy passages also in autumn. Bannerman and Vella Gaffiero (1976) state that "*In the past 10 years there was a marked decrease in the numbers of Turtle Doves which visit Malta*."

A very big passage of Turtle Doves occurred in autumn 1963, when migration of other species was very poor. Turtle Doves began to arrive on 12 September and continued to pass over the island in large flocks for about 10 days. This was due to unfavourable weather conditions at the time (Sammy Borg, pers. comm.).

The Turtle Dove has seen a very marked decline over the past 40 years or so. A paper by De Lucca, published in *The Ibis* in 1969, shows the changes that have taken place in the status of many species. "*Large flocks of Turtle Doves may be seen arriving in early morning, flock succeeding flock without pause, so that a stream of flocks is continuously passing northwards, flying high or very high, along the north-western coast. Usually this movement stops by 6 to 8 am but occasionally it may continue throughout the morning*".

On 23 April 1952, De Lucca remarked there were large numbers of migrants "*on every bit of available countryside. At Wied id-Dis, near Għargħur, a stretch of valley about one and a half miles (2.5 km) long and about 60 yards (55m) wide, Nightjars and Turtle Doves were thick on the ground. An idea of the bird concentration may be obtained from the fact that a few of the guns, which were many, got between 95 and 135 Nightjars each, besides several Turtle Doves, and this within the space of a few hours, from 4 to about 9 am. From reports I have gathered, it appeared that these bags were more or less the same from all over Malta*". Bags such as those that were recorded in the 1950s, are no longer possible because of the decline in bird numbers.

Before Turtle Dove trapping in spring became illegal, the prime location for this activity was the area known as id-Dahar, which lies on the westernmost tip of the Marfa Ridge. Other good localities were l-Għerien and ix-Xagħra ta' Gardellu, also in Mellieħa and Wardija. At id-Dahar, the number of doves caught was so large that some trapping sites had well-like holes in which weights were suspended, so that would help the nets work faster as well as preventing large flocks from holding the nets from falling on the birds (Indri Mifsud, pers. comm.). At id-Dahar, it was not uncommon for trappers to catch up to a 1,000 birds in a season and, up to the 1950s, over 50 birds in one haul. However, the best known trapping site at id-Dahar only yielded three doves in 2003. Trappers using this locality claim to have caught between one and two dozen birds at the very most, in an entire season, and the trend seems to have been constant over the past few years (Fenech 2010).

Using the bag records of Salvino Sant Manduca, who hunted at Wardija between 10 April and 20 May every year from 1916 to 1938, and who also kept notes on the number of doves trapped there

between 1926 and 1938, as well as the sightings since 1990 published by the Malta Ornithological Society (MOS - now BirdLife Malta) and the records held by John Vella from Mellieħa, who kept accurate notes from a site at id-Dahar, an analysis can be made that shows that there has been a considerable decline in the number of Turtle Doves seen.

All of these records show fluctuations with good and better years as well as some rather poor ones as far as Turtle Dove migration was concerned. But a downward trend can be distinguished even in these old records. The mean number of Turtle Doves shot by Sant Manduca at Wardija over a 23-year period was 30.6 birds a year (Table 1 and Figure 1). The best year was 1923, when he shot 63 doves. A very poor year was merely five years later in 1928, when only 5 Turtle Doves were shot and the entry in his diary reads: "*the worst shooting season that I remember*".

Table 1
Record of Turtle Doves shot or trapped at Wardijja.
Source: bag records by Salvino Sant Manduca who hunted and trapped Turtle Doves at Wardija between 10 April and 20 May each year during the period 1916 and 1938.

Year	Shot	Trapped
1916	36	-
1917	44	-
1918	42	-
1919	47	-
1920	39	-
1921	19	-
1922	39	-
1923	63	-
1924	56	-
1925	36	-
1926	22	69
1927	32	66
1928	5	49
1929	45	278
1930	28	222
1931	27	141
1931	16	148
1933	21	111
1934	24	148
1935	15	196
1936	9	169
1937	10	103
1938	29	251

During the first 11 years up to 1927, bag numbers exceeded the mean of 30.6 birds, except in 1926 (Table 1). During the next 12 years, from 1928 onwards, the number of birds shot was below this mean, except for 1929. A trend line applied to the data shows a declining trend in Turtle Dove numbers over the years. However, during the 13 years that followed 1926, the number of Turtle Doves trapped significantly exceeded birds that were shot; the mean number of birds trapped is 150.1 compared a mean number of 30.6 birds shot. The mean number of birds caught by from the original trapping site was 61.3 birds in spring, and 176.7 per year after 1935.

In contrast with the number of birds shot, trend analysis shows an increase in the number of Turtle Doves trapped at Wardija. This is because, when trapping, larger numbers of birds can be taken at one go, while on the other hand, a double-barrelled shotgun is far more restricted at taking birds when shooting them while in flight, even if the user is an experienced and very good shooter; normally the hunter would hit a single bird or, at most, two birds each time. On the other hand, with one sweep with nets, a trapper has the potential of catching the equivalent of what a hunter would get with around 50 shots. The reason for the apparent increase in the number of Turtle Doves resulting from trapping may be explained by the fact that from 1926 to 1928, only one trapping site was in operation, whereas thereafter three different trapping sites were manned. In fact, the mean number of birds caught between 1929 and 1938 from the three sites is 2.9 times the mean taken from one site between 1926 and 1928.

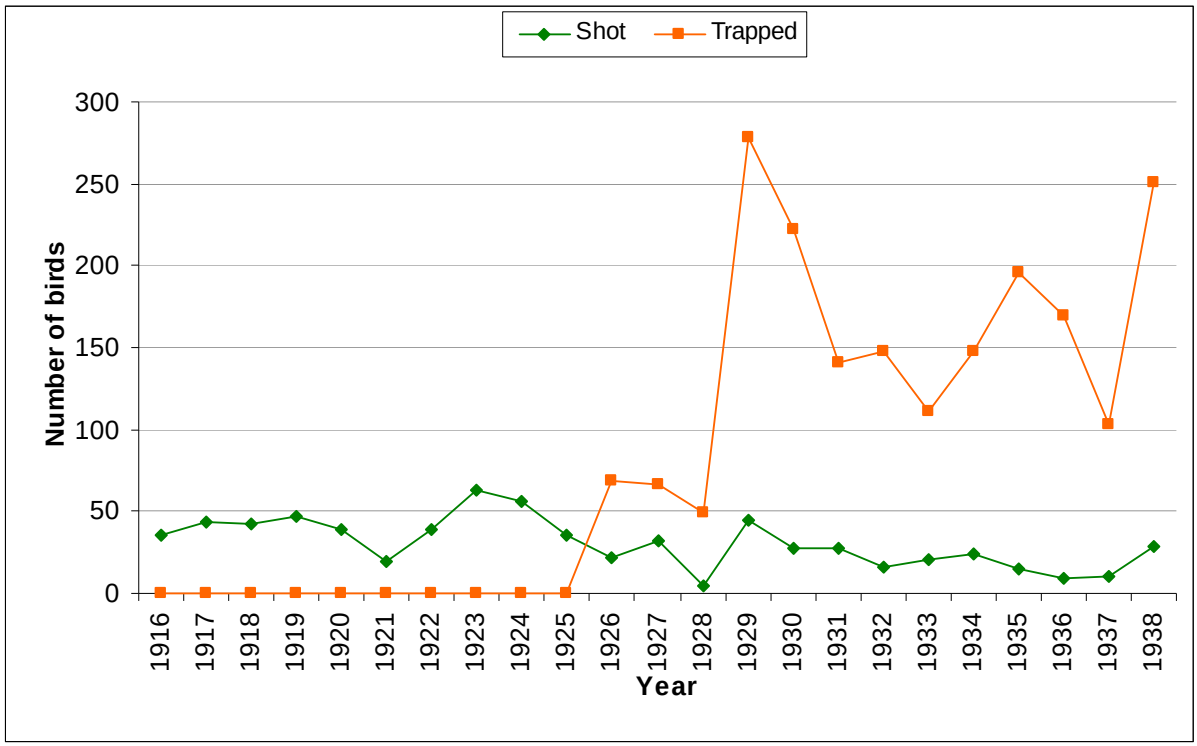

Figure 1. Trend of Turtle doves that were shot and trapped at Wardijja during the period 1916 to 1938 (see also Table 1).

Analysis of another data set comprising Turtle Dove sightings at id-Dahar, Mellieħa Ridge, recorded by John Vella between 1992 and 2006 (Table 2), also shows a declining trend in numbers of birds seen (Figure 2). It will be recalled that id-Dahar has always been the prime site for Turtle Dove trapping. Analysis of this data shows that during the 14 year period (1992 – 2006), there was only one year (1997) when the number of birds recorded in spring virtually equalled the number recorded in autumn; in 1997, 103 Turtle Doves were observed in September, which is virtually equivalent to the number recorded in April and May combined. The data also shows that, on average, in April, more than twice as many Turtle Doves were recorded compared to May. However, there were four years when more birds were seen in May (1992, 1994, 1998, 2002), while an equal number were seen in 2000. On the other hand, there were more years when more Turtle Doves were seen in April (Table 2 and Figure 2). The data also shows that, at this particular location, 89.3 per cent of the Turtle doves were recorded in spring, with 62.7 per cent being recorded in April and 26.6 per cent in May, while only 10 per cent were recorded in September.

Table 2
Number of Turtle Doves recorded , recorded by John Vella in April, May and September, from id-Dahar, Mellieha, during the period 1993 to 2006

Year	April	May	Total for May and September	September	Grand total
1992	105	201	306	0	306
1993	203	77	280	6	286
1994	152	164	316	43	359
1995	240	131	371	55	426
1996	499	57	556	0	556
1997	67	64	131	130	261
1998	100	135	235	35	270
1999	50	2	52	40	92
2000	100	100	200	0	200
2001	180	0	180	71	251
2002	3	7	10	0	10
2003	100	0	100	0	100
2004	220	3	223	0	223
2005	80	10	90	0	90
2006	150	3	153	2	156

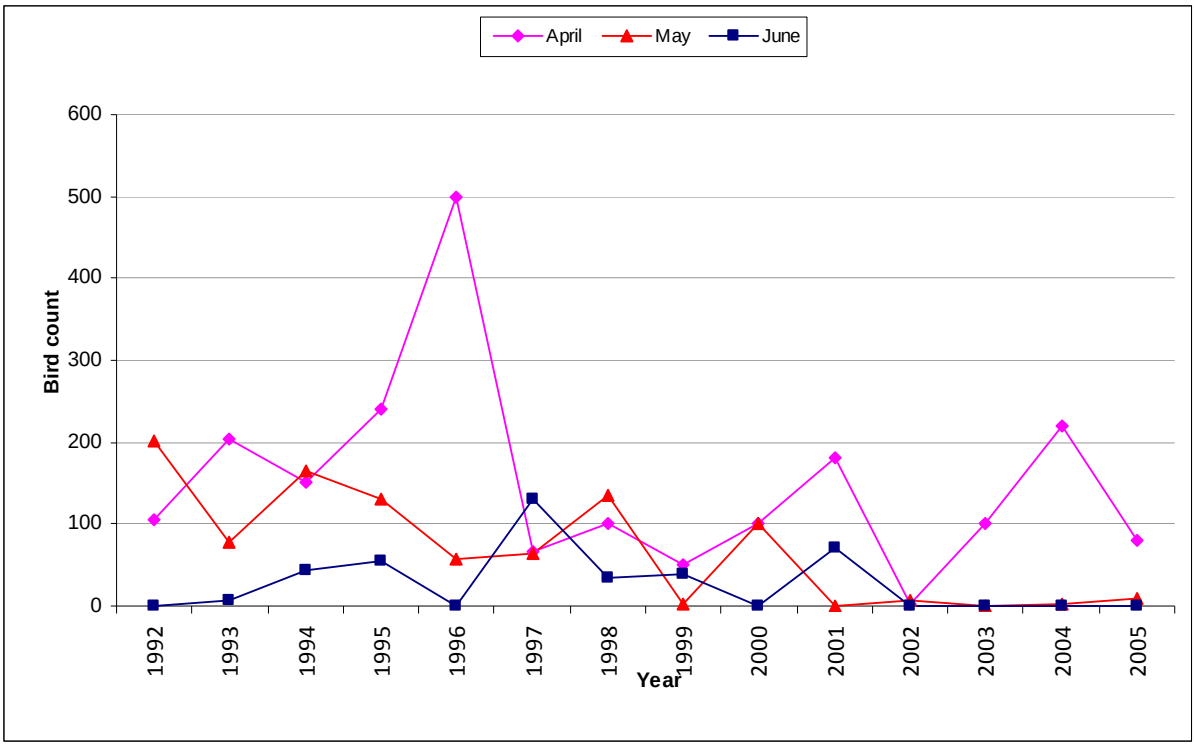

Figure 2. Trend of Turtle doves recorded in April, May and September during the period 1992 and 2005 (see also Table 1).

The data from Wardijja for 1916 and 1938, as well as the data from id-Dahar for 1992 and 2006, show a variation in influx of Turtle Doves over the Maltese Islands between different years. Worthy of mention is that very low numbers were recorded at a time when Turtle Dove populations were known to have been healthier.

Bird hunting and trapping were important activities in the past, as they provided food for the table as well as a form of recreation. From the late 1960s through the 1970s, hunting began to take a different dimension and became more of a recreational activity, while an enhanced standard of living brought guns within the reach of more people; this, coupled with the increased availability of free time and mobility because of access to better means of transport, meant that it became easier to hunt beyond the village precincts. In fact, there is a correlation between the increase in the number of hunting licences and the increase in GDP from the 1970s to the early 1990s, when Malta experienced its greatest GDP growth. While between the 1900s and 1970s hunters constituted under 3% per cent of the population, from the 1970s onwards this went up to about 5% of the population (Fenech 1997). An indication of how passionate hunters were about their pastime is the fact that annual vacation leave was accumulated and taken during the hunting season. When leave was not approved or had already been expended, it was common practice for some hunters to report sick in order to go hunting. This is documented by former Prime Minister Dom Mintoff, who in his foreword to a book on the Birds of the Maltese Archipelago, published by the Museums Department, wrote: "*during the two migration periods, absenteeism in the building industry, in Government employment and in new industries reaches frustrating peaks*" (Bannerman and Vella Gaffiero 1976).

The number of birds shot in the Maltese Islands has been a contentious issue and there have been three main studies which tried to estimate the number of birds that were shot. The first was by Woldhek (1980), who had estimated the number of birds shot in the Mediterranean, basing his estimations on information given by Joe Vella Gaffiero and Charles Gauci, who in turn relied on first-hand information as well as on their experience and knowledge. Magnin (1986) had also estimated the number of birds killed in Malta through interviews with several bird watchers, asking them how many birds they think were shot and subsequently based his calculations on these estimates. Fenech (1992) also estimated the number of birds shot. These were based on bag records of ten hunters over a collective fifty-three year period as well as records from two taxidermists who used to stuff birds for a known number of hunters between 1976 and 1986. These estimates had raised the most vociferous criticism from hunters. In a later study, Fenech (1997) had compared some of the figures given in his previous work with figures given by hunters (Farrugia 1988, 1995) and found out that these were very similar for Quail, Turtle Doves and Song Thrush.

Fenech estimated that the annual bag of Turtle Doves in Malta was between 160,000 and 480,000 (or ten birds per hunter in poor years to 30 birds per hunter in good years). Bag records available indicated that each hunter shot a mean of 15 Turtle Doves annually, 78.4 per cent of which were taken in spring and 21.6 per cent were taken in autumn. Traditionally, the spring hunting season for Turtle Dove was always more important as bigger flocks of birds were seen and more used to be shot or caught than during the autumn. With respect to Quails, the numbers taken in spring and autumn was more or less similar. It was estimated that on average, hunters killed one to two Quails each, bringing the total annual bag to between 16,000 and 32,000 Quails. Of these, between 11,000 and 21,000 Quails were shot in spring; between 4,500 and 9,000 were shot in autumn and between 700 and 1,400 were shot in winter (Fenech 1992, 1997).

Extrapolation of data submitted later by the hunters showed these figures to be correct. Following an analysis of data on birds shot by hunters in chosen areas, Farrugia (1998) concluded that between sunrise and 10.00 am from 15 April and 15 May 1988, the mean bag of 33 hunters was of 9.03 Turtle Doves and 1.2 Quails per shooter. The figures given by Farrugia omitted any birds shot between 10 am and the rest of the day, as well as the birds shot between 16 and 21 May, when the season

officially closed. Farrugia's figures also excluded all Turtle Doves and Quails trapped. Farrugia stressed that his figures were "*realistic statistics and not exaggerated figures often cited by abolitionists*" and that migration "*was poor, especially for Turtle Doves and the only game which probably appeared in slightly larger numbers was Quail*".

In 1988, there were 15,947 licensed hunters. Using the mean of 9.03 Turtle Doves and 1.2 Quails per shooter given by Farrugia, it results in a total of 144,001 Turtle Doves and 19,136 Quails. To this, one must add the number of Turtle Doves trapped. The number of active Turtle Dove trappers in 1988 is not known as they required no special licence, but if one assumes that the number remained the same as in 1995, when there were 928 trappers, then the number of Turtle Doves trapped would amount to 5,700, giving a collective spring bag total of 149,701, which falls within the range of 125,000 to 376,000 given by Fenech (Fenech 1992).

A similar pattern is available for Quail; using the number of licensed hunters in 1988 and extrapolating the figures given by Farrugia (1998), it results that 19,136 Quails were bagged. Again, this figure is conservative since Quails are also shot after ten o'clock in the morning, after which time Farrugia did not collect any records. Fenech (1992) had given an annual range of 16,000 to 32,000 Quails shot annually.

Since 2002, hunters have been obliged to record their bags in the Carnet de Chasse. However, the reliability of these declarations are doubtful both because of the low catches reported for common species as well as because they include high figures of species which can be hunted but which are very rare in Malta, such as geese. The Carnet de Chasse reports for 2002 and 2003 include 58 Greylag Geese and 49 Bean Goose, when only single birds are usually recorded annually. This trend may be different in future as some hunters seem to be declaring more birds shot, but on the other hand the number of declared numbers has decreased. The MEPA report for 2008 states that "*while declared catches are on the rise following awareness-raising among hunters of the importance of accurate statistics (total catch declared in 2007 rose by 80 percent over the previous year), the number of returned forms decreased by an average of 260 per year between 2002 and 2007*" (MEPA 2008).

1.4 Regulation of bird hunting in the Maltese Islands following accession to the EU in 2004

In its report to the Commission justifying the derogation for 2004, the government stated there was no alternative solution to spring hunting, and that small numbers were taken. According to the report, 10,111 Turtle Doves and 2,128 Quails were shot or trapped by Maltese hunters and trappers between 1 and 22 May 2004. In 2004, there were 11,759 hunters and 4,491 trappers. This means that, on average, between 1 and 22 May, a total of 16,250 hunters and trappers took 12,239 Turtle Doves and Quails, which translates to a mean of 0.75 birds each. The Maltese government continued to submit derogation reports each year until 2007, the last time the spring hunting season was open.

When Malta joined the European Union in 2004, Government started applying a derogation to enable the hunting of Turtle Doves and Quail in spring until 2007. The case ended up on the European Court of Justice, which in April 2008, issued an Interim ruling that the spring hunting of Turtle Dove and Quail in Malta was not to be allowed during spring 2008. In a ruling given on 10th September 2009, the European Court ruled that by authorising the opening of a hunting season for Quails and Turtle Doves during the spring migration period in the years 2004 to 2007, Malta had failed to fulfil its obligations under the Birds Directive (Case C-76/08). The judgement however established a number of principles that paved the way for spring hunting for Quail and Turtle Dove to

open again, and the government decided to open hunting in spring 2010, but because of the strict conditions imposed, only 24 hunters applied.

In 2011 the season was, again, opened with restrictive measures and a total of 5,610 hunters, out of the 12,300 hunters eligible, applied for and were given the special licence to hunt Quail and Turtle Dove between the 13 and the 30 of April 2011, but no hunting could take place on 17, 22 and 24 April which, according to local legislation for this season fell on a public holiday and two Sundays, when hunting is prohibited. Hunters could not shoot more than a bird a day and not more than 4 in the whole season and had to send an SMS and fill in their carnet de chasse when a bird was shot. At the end of the hunting season it was declared that the number of shot birds had not reached the national bag limits of 2,500 Quail and 9,000 Turtle Doves. However, the police encountered and subsequently fined a number of hunters with more than one Quail or Turtle Dove, hence, it is evident that the reporting system was not strictly adhered to.

According to a report drawn up by Saint Hubert Hunters (KSU), a total of 1,263 Turtle Doves were recorded between 13 and 30 April, with the maximum number observed in one day being 433 and the lowest being 8. The report states that the highest number of Turtle Doves recorded by one observer throughout the season is 201 compared to another observer in a different location who recorded 21. With regard to Quail, the total number recorded during the season was 89 with the maximum number recorded in one day being 31 and the minimum being 1. A total of 433 Turtle Doves were recorded on 20th April, and 31 Quails on 23rd April. During these two days, as opposed to all other days within the season; birds of both species were present in practically all observation areas, though not in the same numbers (Mifsud Bonnici 2011).

Another significant passage of Turtle Doves occurred on 22 April 2011 (Good Friday), with over 120 birds being seen at il-Qadi. These included a flock of 32 and a flock of 20. Turtle Doves were recorded from several of other localities, fewer numbers were recorded.

2. METHODOLOGY

Fieldwork in relation to the present study was undertaken daily during a 21-day period between 8 and 28 May, 2011. Counts were made at 8 different stations each day, with each group of 8 stations being surveyed once every 3 days; thus a total of 24 survey localities were surveyed in all. The sampling sites are represented by the grid cells listed in Table 3, while their locations are shown in Figure 3. Since the survey was mainly aimed at quantifying the influx of migrating individuals, counting stations were sited at strategic locations in coastal areas, which are more likely to serve as short-term stopover sites immediately following a migratory flight than inland locations.

At each study site, scientific observers also recorded the prevalent meteorological conditions, namely wind direction and strength, and degree of cloud cover.

Monitoring of migratory influx of birds was carried out as per the following schedule:

06:00 – 13:00 survey of Turtle Doves
06:30 – 08:30 survey of Quails

In the case of Turtle Doves, 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 viewing horizontally (c. 500m) and vertically upwards (as far as the birds were detected by sight). Since the Common Quail is 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 disturb the birds and have them take flight, which were then counted. The count area was taken as the total area surveyed in this manner at a particular site.

Table 3

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

Location	Day 1	Day 2	Day 3
Gozo	3690	2892	3292
Gozo	2888	3286	3887
Comino		4085	
Malta	4283	4079	3881
Malta	4077	4268	4480
Malta	4070	5663	4073
Malta	5064	6067	4666
Malta	6069	4878	6064
Malta	5277		5872

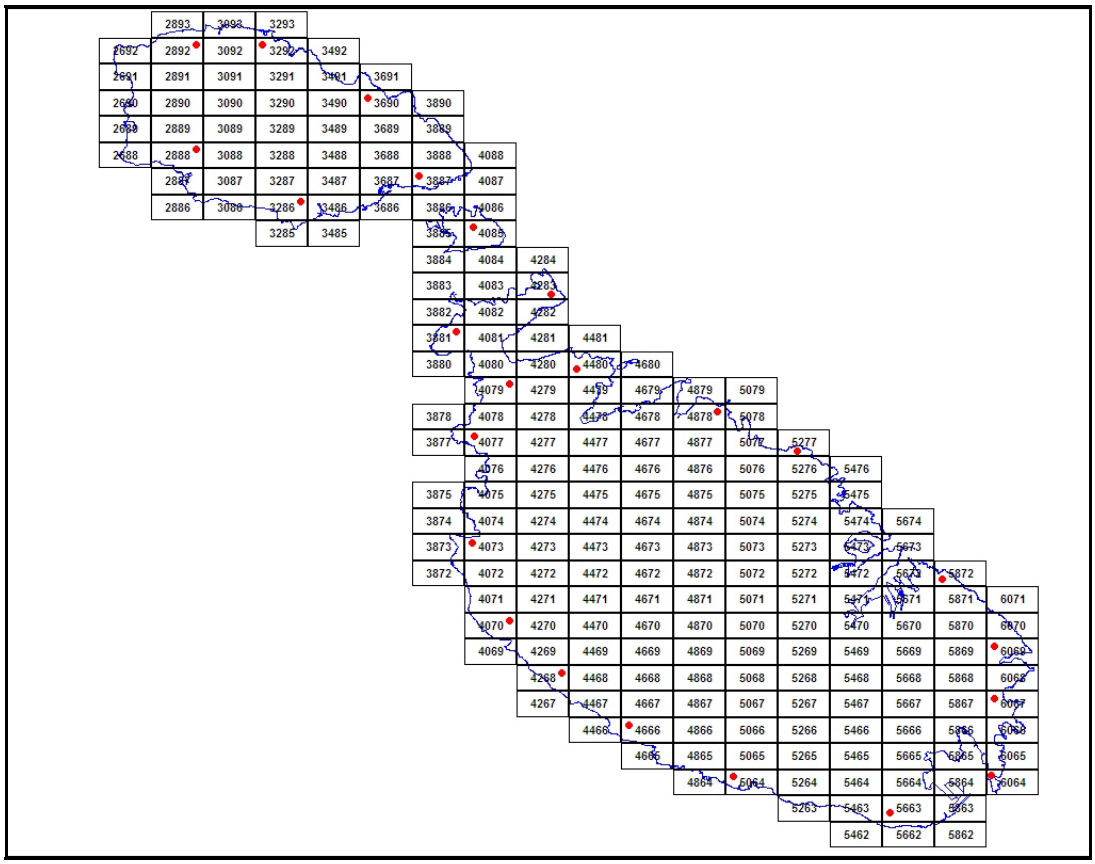

Figure 3. Map of the Maltese Islands showing the localities (grid cells indicated by the red filled circle) where the bird counts were made; see also Table 3.

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 observed for each day of the survey. This enabled comparison with the data collected by Thomaidis (nd) for the same study period (ie. 8 – 28 May) in 2008 and

2009. As the raw data from Thomaidis' (nd) study were not available, it was not possible to carry out statistical analyses to establish whether counts recorded during the present study differed significantly from those recorded by Thamaidis (nd) in 2008 and 2009.

3. RESULTS

Ecoserv's laboratory report reference for the present survey is **059-11**. The sample reference codes for the bird count data are **B-016-11** to **B-039-11**.

The mean daily counts of Turtle Doves recorded during the present survey, together with the mean counts for Spring 2008 and Spring 2009 reported by Thomaidis (nd) are summarised in Table 4 and shown graphically in Figure 4, while the raw count data for the present survey are given in Appendix I. Overall, the results indicate that the daily mean counts recorded during the period 8 – 28 May 2011 (present survey) are comparable to those recorded by Thomaidis (nd) in May 2008 and 2009 for the same survey period, and clearly represent the tail end of the Turtle Doves' migration period, when mean counts tend to be lower and in gradual decline. The observed pattern for counts from the three years under comparison is occasionally interrupted by small migration peaks such as those that occurred on 16 May 2008 and 26 May 2011.

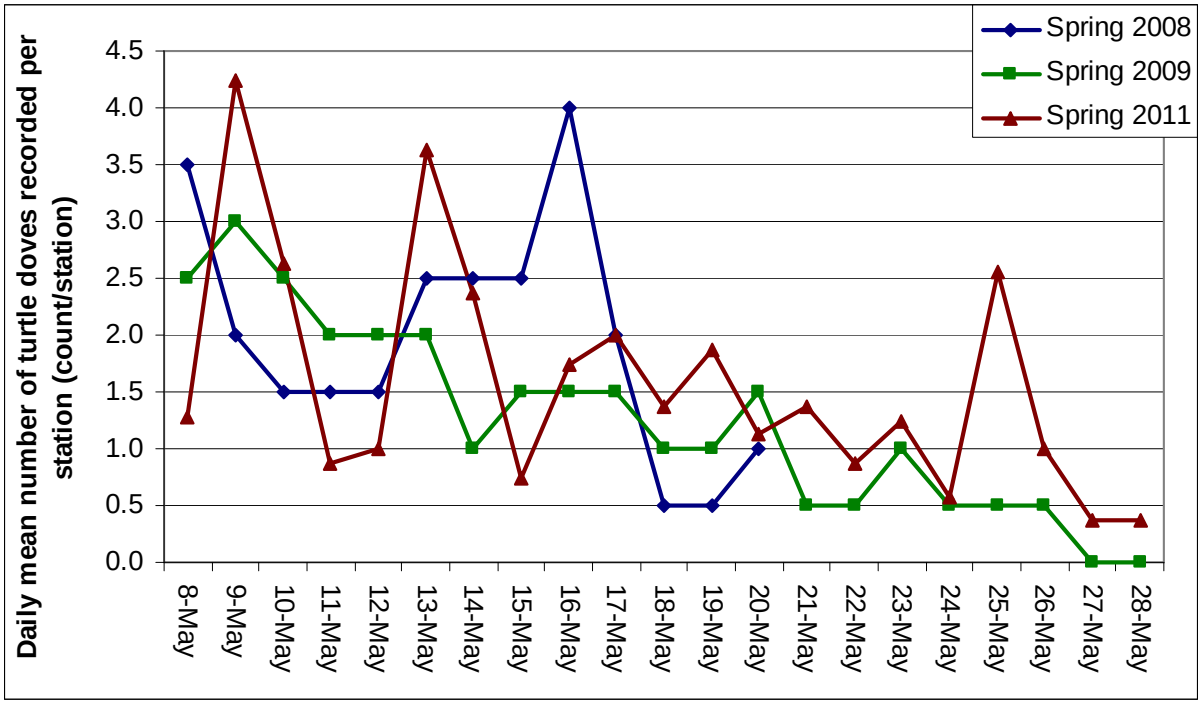

Figure 4. **Daily mean counts of Turtle Doves per station recorded form the present survey during the period 8 - 28 May, together with values of the same statistic for Spring 2008 and 2009 as reported in Thomaidis (nd).**

To obtain an approximate estimate of total influx over the Maltese Islands, one can use daily counts and extrapolate these to obtain the total number of birds migrating over the Maltese Islands on a particular day. However, such an estimate must be treated with utmost caution, given the relatively small number of count stations used in the present survey and that counts were not made daily at each station. Furthermore, passage of birds at different localities is extremely variable, with potential

large differences in birds passing at two different localities, even if these are separated by a very small distance. On the other hand, such an estimate would be 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 station during the present survey is approximately 0.5 km, the total influx of migrating Turtle Doves 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). The mean (± SD) daily counts and estimated total influx of birds per day are shown in Table 4. Based on these data, the total influx of migrating Turtle Doves during 8 – 28 May 2011 was estimated at 18,057 individuals. However, it must be pointed out that 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 is based on count data 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 Doves is at a maximum. 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 influx of birds would be expected to be lower, hence this may to an overestimate.

Table 4

Mean (± SD) daily counts of Turtle Doves, together with estimates of daily and total influx of migratory individuals.

Date	Mean Count ± SD		Estimated Daily Influx
08-May-11	1.29	± 1.60	697
09-May-11	4.25	± 4.20	2305
10-May-11	2.63	± 2.88	1424
11-May-11	0.88	± 1.13	475
12-May-11	1.00	± 0.93	542
13-May-11	3.63	± 3.10	1966
14-May-11	2.38	± 1.69	1288
15-May-11	0.75	± 0.89	407
16-May-11	1.75	± 2.55	949
17-May-11	2.00	± 1.85	1085
18-May-11	1.38	± 2.20	746
19-May-11	1.88	± 1.46	1017
20-May-11	1.13	± 1.36	610
21-May-11	1.38	± 3.11	746
22-May-11	0.88	± 0.99	475
23-May-11	1.25	± 1.49	678
24-May-11	0.57	± 0.79	310
25-May-11	2.56	± 3.50	1386
26-May-11	1.00	± 1.60	542
27-May-11	0.38	± 0.74	203
28-May-11	0.38	± 1.06	203
Estimated Total Influx			**18,057**

The recorded mean daily counts of Common Quail and area surveyed at each site during the present survey (Spring 2011), together with the mean counts for Spring 2008 and Spring 2009 reported by Thomaidis (nd), are given in Table 5 and shown graphically in Figure 5. The raw count data for the

present survey are given in Appendix I. The daily mean counts recorded during the period 8 – 28 May 2011 (present survey) are generally comparable to those obtained in May 2008 and 2009 for the same dates, except on 6 days (out of a total of 21 days) when the mean counts recorded during the present survey were appreciably higher than those recorded during the other days. Inspection of the raw data shows elevated counts on 4 particular days (10, 13, 19 and 25 May 2011) which resulted from records of between 6 and 11 Quails at grid location 4666, while zero counts were obtained from the other seven stations on the same 4 days. Similarly, the peak count recorded on 23 May 2011 resulted from the presence of 6 individuals at grid location 4070, while no Quails were recorded from the other sites on that day. Thus, the maxima in Quail counts shown in Figure 5 resulted from higher numbers of Quail being present at a single location, and not from a general influx of Quails across the islands. It cannot be established with certainty, however, whether the Quails recorded on successive occasions from grid location 4666 were fresh migratory individuals or individuals that had previously settled in the area.

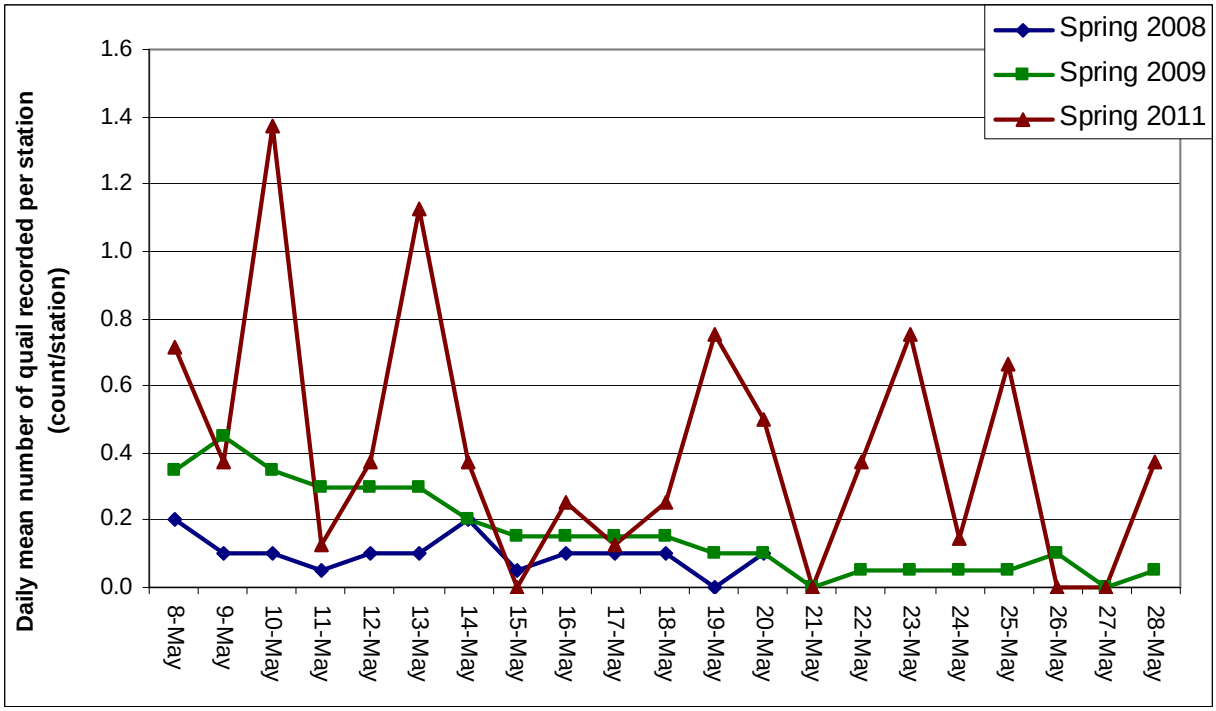

Figure 5. **Daily mean count of Common Quail per station recorded during the period 8 – 28 May in the present (Spring 2011) survey, together with values of the same statistic for Spring 2008 and 2009 as reported in Thomaidis (nd).**

Since the area surveyed for Quails at each site was recorded, the total influx of Quail could be estimated for the whole area of the Maltese Islands provided that the following assumptions are made: (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 would 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 would have resulted in overestimating the total influx due to repeat counting of resident Quails, as may have occurred at grid location 4666. To ensure that the total area used to estimate the migration count does not include regions within which Quail do not normally settle, 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) which 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 5. Based on these data, the total influx of Common Quail during 8 – 28 May 2011 was estimated at 22,699 individuals. However, it must be pointed out that the area surveyed each day 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.

Once again, it should be emphasised that such an estimate must be treated with utmost caution, given the relatively small number of count stations used in the present survey and that counts were not made daily at each station. Furthermore, the influx of birds at different localities is extremely variable, with potential large differences in birds passing at two different localities, even if these are separated by a very small distance. On the other hand, such an estimate would be 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.

Table 5

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
08-May-11	0.71	0.95	1.283	863
09-May-11	0.38	0.52	0.765	868
10-May-11	1.38	3.89	0.525	4639
11-May-11	0.13	0.35	1.357	163
12-May-11	0.38	0.74	0.772	860
13-May-11	1.13	3.18	0.525	3795
14-May-11	0.38	1.06	1.357	489
15-May-11	0.00	0.00	0.772	0
16-May-11	0.25	0.46	0.525	843
17-May-11	0.13	0.35	1.357	163
18-May-11	0.25	0.71	0.772	574
19-May-11	0.75	2.12	0.525	2530
20-May-11	0.50	0.76	1.357	653
21-May-11	0.00	0.00	0.772	0
22-May-11	0.38	1.06	0.525	1265
23-May-11	0.75	2.12	1.357	979
24-May-11	0.14	0.38	0.757	292
25-May-11	0.67	2.00	0.541	2455
26-May-11	0.00	0.00	1.357	0
27-May-11	0.00	0.00	0.772	0
28-May-11	0.38	0.74	0.525	1265
Estimated Total Influx				**22,699**

4. APPRAISAL

The data obtained from the present survey provides some evidence, albeit a snapshot indication, of numbers of Turtle Dove and Common Quail, recorded in May 2011 following the brief open season of the same year. When comparing the results of the present survey with those from Thomaidis' (nd) surveys held in 2008 and 2009 for the same period, similar counts are note overall. However, in the case of Common Quail, there is a tendency for overall higher counts recorded during the present survey. Therefore, no decreased influx of migratory Turtle Doves and Common Quail is evident when comparing the results of the present study with those from Thomaidis' (nd) 2008 and 2009 surveys. However, there are a number of constraints which should be borne in mind when interpreting the results from the present study:

- The survey commenced late during the migratory season; it effectively incorporates only the tail end of the Turtle Dove migratory season and essentially misses the peak period of Quail migration (which, as highlighted above, generally occurs between mid-March and mid-late April). The data set from the present 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 present study is reflected in the obtained high standard deviation values (tables 4 and 5). Inasmuch, the extrapolations made in the present study have been estimated using limited count data and the stated estimates of total influx should therefore be treated as indicative, and used with caution.
- The data provided 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 In the present study, 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 this report are therefore intended to be purely indicative.

Overall, therefore, 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 stations. Nevertheless, the data from the present study can provide a useful indication of influx of status of influx of Turtle Dove and Common Quail, provided that results are interpreted in the context of these limitations.

Turtle dove

Raw counts for Turtle Dove recorded from the 24 stations during the present study vary between a minimum of 0 and a maximum of 14 (see Appendix 1). However, mean daily counts range between 0.38 and 4.25 (Table 4); it is be noted that raw counts from different stations incorporate peaks (such as a count of 14 at one station on 9th May, and another count of 13 at a different station on 13th May), which are generally uncharacteristic of overall records. With extrapolation, daily mean figures translate to an estimated daily influx ranging between 0 and 4639 individuals, with a total influx over the survey period of 21 days of 18, 057 individuals.

The recorded counts also varied appreciably between the different stations. At the lower end, at grid location 5064 (see Figure 3), only a single Turtle Dove was recorded throughout the survey period. At the higher end, comparatively high counts were recorded for stations at grid locations 3292 (28 individuals), 4070 (22 individuals), 4283 (26 individuals) and 6064 (35 individuals).

Such variation is to be expected in studies such as the present, given that it is entirely normal for birds to have a strong influx 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. Considerations of habitat and land cover apply only to a degree, since birds also fly over urban and other built-up areas. Another consideration worthy of mention is the fact that some birds may also pass overhead, maintaining high altitude and avoiding landfall. The value of these figures therefore lies primarily in their providing a basis for future comparison, rather than in the counts per se, which in any study of this type can only be indicative.

The recorded counts for Turtle Dove from the present study do not appear to differ markedly from those reported by Thomaidis (nd) for the years 2008 and 2009.

Common Quail

Raw counts for Common Quail recorded from the 24 stations during the present study vary between a minimum of 0 and a maximum of 11 (see Appendix 1). No Common Quail individuals were recorded at 13 of the 24 stations, on any of the survey dates. At 8 of the stations, counts recorded over the entire survey period ranged between 1 and 2 individuals, while higher counts were recorded at stations within grid locations 4666 (37 individuals), 4070 (14 individuals) and 2892 (6 individuals). The former two comprise stations along coastal stretches between Mtahleb and Migra l-Ferha, and Lapsi and Fawwara, whilst the latter lies on the northern coast of Gozo. Notwithstanding the differences noted between the count stations, 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. Additionally, and as already highlighted above, it was not possible to ascertain whether high numbers of Common Quail individuals recorded successively at the same station included fresh migratory individuals, or whether comprised included individuals already included in counts from previous days.

Mean daily counts for the Common Quail ranged between 0 and 1.38. Through extrapolation, this translates to a total influx of 22, 699 over the survey period of 21 days.

The present survey has contributed to data on influx of the Common Quail *Coturnix coturnix coturnix* and the European Turtle Dove *Streptopelia turtur turtur*, following the 2011 spring hunting open season, which the Government had conceded between 13 and 30 April 2011. The present data can be used for comparison with data collected in the future, to assess the trend in influx of these two migratory species.

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APPENDIX I - Raw counts

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

Ecoserv Sample Reference Code	B-016-11	B-017-11	B-018-11	B-019-11	B-020-11	B-021-11	B-022-11	B-023-11	B-024-11	B-025-11	B-026-11	B-027-11
Grid Location	**3690**	**2888**	**4283**	**4077**	**4070**	**5064**	**6069**	**5277**	**2892**	**3286**	**4085**	**4079**
8-May-11	0	4		0	3	0	1	1				
9-May-11			14						2	3	5	4
10-May-11												
11-May-11	0	0	2	0	3	1	1	0				
12-May-11									0	2	0	1
13-May-11												
14-May-11	4	2	2	0	4	0	4	3				
15-May-11									2	2	0	0
16-May-11												
17-May-11	4	1	2	3	5	0	0	1				
18-May-11									6	0	0	0
19-May-11												
20-May-11	3	0	2	0	1	0	0	3				
21-May-11									0	9	1	0
22-May-11												
23-May-11	1	0	4	0	3	0	1	1				
24-May-11									1	0	0	0
25-May-11												
26-May-11	1	0	0	0	3	0	4	0				
27-May-11									1	2	0	0
28-May-11												

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

Ecoserv Sample Reference Code	B-028-11	B-029-11	B-030-11	B-031-11	B-032-11	B-033-11	B-034-11	B-035-11	B-036-11	B-037-11	B-038-11	B-039-11
Grid Location	**4268**	**5663**	**6067**	**4878**	**3292**	**3887**	**3881**	**4480**	**4073**	**4666**	**6064**	**5872**
8-May-11												
9-May-11	3	3		0								
10-May-11					2	3	1	1	0	7	7	0
11-May-11												
12-May-11	0	2	1	2								
13-May-11					13	4	2	0	0	3	4	3
14-May-11												
15-May-11	0	0	1	1								
16-May-11					1	4	0	0	0	0	7	2
17-May-11												
18-May-11	3	0	2	0								
19-May-11					2	3	1	0	3	0	4	2
20-May-11												
21-May-11	1	0	0	0								
22-May-11					2	2	2	0	0	0	1	0
23-May-11												
24-May-11		2	1	0								
25-May-11	3				8	1	0	0	1	1	9	0
26-May-11												
27-May-11	0	0	0	0								
28-May-11					0	0	0	0	0	0	3	0

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

Ecoserv Sample Reference Code	B-016-11	B-017-11	B-018-11	B-019-11	B-020-11	B-021-11	B-022-11	B-023-11	B-024-11	B-025-11	B-026-11	B-027-11
Grid Location	**3690**	**2888**	**4283**	**4077**	**4070**	**5064**	**6069**	**5277**	**2892**	**3286**	**4085**	**4079**
Surveyed Area (km^2)	0.2862	0.0698	0.074	0.0213	0.0538	0.1436	0.2223	0.4862	0.0313	0.1315	0.2791	0.0398
8-May-11	0	2		0	2	0	1	0				
9-May-11			0						1	1	0	0
10-May-11												
11-May-11	0	0	0	0	1	0	0	0				
12-May-11									2	0	0	0
13-May-11												
14-May-11	0	0	0	0	3	0	0	0				
15-May-11									0	0	0	0
16-May-11												
17-May-11	0	0	0	0	0	0	0	1				
18-May-11									2	0	0	0
19-May-11												
20-May-11	0	0	0	0	2	0	1	1				
21-May-11									0	0	0	0
22-May-11												
23-May-11	0	0	0	0	6	0	0	0				
24-May-11									1	0	0	0
25-May-11												
26-May-11	0	0	0	0	0	0	0	0				
27-May-11									0	0	0	0
28-May-11												

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

Ecoserv Sample Reference Code	B-028-11	B-029-11	B-030-11	B-031-11	B-032-11	B-033-11	B-034-11	B-035-11	B-036-11	B-037-11	B-038-11	B-039-11
Grid Location	**4268**	**5663**	**6067**	**4878**	**3292**	**3887**	**3881**	**4480**	**4073**	**4666**	**6064**	**5872**
Surveyed Area (km^2)	0.0152	0.029	0.081	0.1649	0.0262	0.0149	0.1991	0.0729	0.1096	0.0198	0.0591	0.0237
8-May-11												
9-May-11	0	1		0								
10-May-11					0	0	0	0	0	11	0	0
11-May-11												
12-May-11	0	0	1	0								
13-May-11					0	0	0	0	0	9	0	0
14-May-11												
15-May-11	0	0	0	0								
16-May-11					0	0	1	0	0	0	1	0
17-May-11												
18-May-11	0	0	0	0								
19-May-11					0	0	0	0	0	6	0	0
20-May-11												
21-May-11	0	0	0	0								
22-May-11					0	0	0	0	0	3	0	0
23-May-11												
24-May-11		0	0	0								
25-May-11	0				0	0	0	0	0	6	0	0
26-May-11												
27-May-11	0	0	0	0								
28-May-11					0	0	1	0	0	2	0	0