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Il-Merill is the ornithological journal of **BirdLife Malta**. It serves as a medium for the publication of articles and short notes dealing with any aspect of ornithology having a bearing on the Maltese Islands and the Mediterranean. It also carries systematic lists of birds recorded in the Maltese Islands as well as bird ringing reports. Articles and short notes for publication should be addressed to:

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Advice and instructions to contributors

The Editor welcomes articles and short notes for publication. Information contained in the contribution should be original and based on personal research. Papers should be concise and factual, taking full account of previous literature and avoiding repetition as much as possible. Opinions should be based on adequate evidence. Authors are encouraged to submit their work to other ornithologists for critical assessment and comment prior to submission. Authors of major articles are required to include an abstract of their article of up to 120 words. Apart from the author's name, the name of university/institute and/or home address, telephone number, and email address are also required. The Editorial board does not undertake to return rejected manuscripts.

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BIRDLIFE MALTA was founded as The Malta Ornithological Society (MOS) in 1962 to work for the protection and study of birds and their habitats in Malta. **BIRDLIFE MALTA** is a partner of **BirdLife International** and it is the oldest and largest environmental NGO in the country. Among its commitments, the Society coordinates bird studies in Malta. The group also runs the **BirdLife Malta Bird Ringing Scheme**, which is a member of **EURING**.

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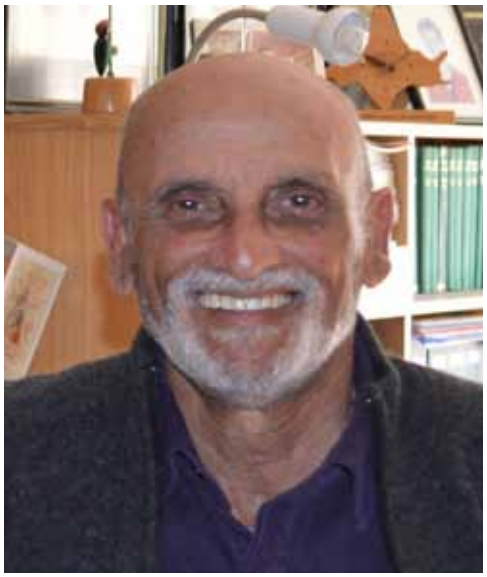
Remembering…

Joe Sultana

11 November 1939 – 11 September 2018

Written by John J. Borg



On 11 September 2018 Joe Sultana passed away at the age of 78 on his home island of Gozo.

Joe was continuously involved in the Malta Ornithological Society since its inception in 1962. He was the Society's secretary for ten years and its president for a further 12 years. He was Malta's first bird ringer and helped in the setting up of the Malta Bird Ringing Scheme in 1965. He was instrumental in the setting up of the two nature reserves Għadira (1980) and Is-Simar (1993); and for over 45 years he organised and led bird ringing visits to the island of Filfla, where he was also involved in the protection of the islet, which was being used as a bombing target by the British Forces up until 1970.

Joe served as Chairman of the European Section of BirdLife International as well as council member of the BirdLife International Executive Committee for six years. Since 1982 he represented the Maltese Government on the Steering Committee on Conservation and Management of the Environment and Natural Habitats of the Council of Europe in Strasbourg, where he was also appointed Chairman of the Naturopa Centre as well as a member of the

Organising Committee for the European Conservation Year 1995. Joe was also Chairman of MEDMARAVIS for over 20 years.

Throughout his life, he worked tirelessly and meticulously. His countless achievements are testimony to this. Joe was an accomplished author of numerous publications including several scientific papers as well as major publications such as *A Guide to the Birds of Malta* (1975) together with Charles Gauci and Mark Beaman, *L-Agħsafar* (1975) and *A New Guide to the Birds of Malta* both co-authored with Charles Gauci. Together we also wrote *The Breeding Birds of Malta* with Charles Gauci and Victor Falzon (2011) and *History of Ornithology in Malta* (2015). In 2018 BirdLife Malta published a compendium of Joe's articles about the natural environment of Gozo.

Throughout his life, Joe Sultana was the recipient of many awards, including the Maltese Best Publication award for the book *L-Agħsafar* (1975), the Maltese literacy award, the Royal Society for the Protection of Birds (RSPB) medal (1996), the Gouden Lepelaar from Vogelbescherming Nederland, honourary life membership of the British Ornithologists' Union (BOU) (1999) and Member of Honour of BirdLife International (1999). In 2016 he was awarded Ġieħ Għawdex and in 2018 he received the Buonamico Award from the President of Malta on behalf of the Environment and Resources Authority (ERA). Later this same year he was also awarded Ġieħ ix-Xagħra, an honour bestowed by his home town of Xagħra.

One of Joe's many gifts was his ability to touch people's lives and their choices. He inspired many of us youngsters to invest our time and energy – for some our entire careers – in the pursuit of nature protection. He had the ability to make you stand up and fight to make this world a better place and he made it sound like the biggest and most rewarding adventure you would ever embark on. His personality, his energy and untiring enthusiasm changed the bigger choices people made, and by changing people's minds and hearts he brought about real, lasting change.

Our deepest sympathy goes to his wife Lucy, his daughter Ruth, his son Mark and four grandchildren.

Tributes received from other friends of Joe:

Denis Cachia:

"My 40-year contact with Joe Sultana is full of admiration for his never-ending enthusiasm for bird study, bird protection and the organisation he co-founded and dedicated his life to – BirdLife Malta. He was an outstanding person who inspired so many more people to follow his vision of appreciating birds the proper way."

Desirée and Victor Falzon:

"Joe was a constant inspiration in all we did and do for nature. We are honoured and grateful to have known him, worked with him and shared with him the joys and frustrations that come with fighting for nature protection. We shall always remember Joe's passion for learning and teaching, his fierce protection of our beloved BirdLife, his infectious laughter and his great hospitality. He was our mentor, our teacher, our guide, and a true friend. May his love for nature live on and spread among the people whose hearts he touched."

Richard Cachia-Zammit:

"In 1973, I had a school projects and contacted BirdLife Malta (then MOS) for some information. I received a reply from Joe Sultana, who at that time was Secretary General of the organisation. He sent me a copy of the latest ornithological journal *Il-Merill* as well as a free membership for a year. I attended my first outing on 1 May of that year and suddenly I had found a new hobby. From then on Joe first became my mentor when I started to train as a bird ringer but this evolved into a real friendship. We might have not agreed on everything but we always respected each other's opinion. Definitely Joe Sultana is one of those people in my life whose influence reflects the person I am now."

Mario Gauci:

"I consider Joe Sultana as the father of bird conservation in Malta. His energy and determination to push his ideals as president of the then Malta Ornithological Society achieved positive results in the field of bird protection. But perhaps most importantly, he was an inspiration to so many young people, with whom he unselfishly shared his knowledge and who today form the bulk of the conservation movement in Malta. I have known Joe for the past 44 years, when as a sixteen

year old I started to train as a bird ringer under his guidance and will forever be grateful to him for his friendship and for instilling in me the strong ideals that make me what I am today."

Victor Cilia:

"My greatest tribute to Joe is not grief but gratitude for injecting me with the love of birds and nature. RIP Joe."

Mark Gauci:

"When my dad stepped down as ringing secretary of the then Malta Ornithological Society ringing group, Joe Sultana, who at the time served as Head of the Ringing Scheme, was instrumental in ushering me and training me in this new role. As a newcomer to this role I looked to gain as much experience as possible from Joe and listened and observed in awe at Joe's interventions in the various EURING meetings I was lucky enough to attend with him. I cannot forget the occasional disagreements we had and the pure passion with which he defended his opinion... passion which lest we forget was instrumental in the setting up of the local ringing scheme and fending off the various vicious attacks on the same scheme. Ringing meetings, visits to the island of Filfla and BirdLife Malta annual general meetings will never the same without Joe, who was always at the centre of a gathering recounting past events and finding the time to share his knowledge and expertise. Rest in peace dear friend and mentor."

Raymond Galea:

"Joe was an energetic person, transmitting his energy to all of us who knew him. I learned a lot from his knowledge about the birds of Malta. One of his passions was to travel all around the world to watch, study and learn about his beloved birds. I remember my first birding trip abroad with him in Tunisia in 1979 when I was still a teenager. From there onwards I was hooked to travelling myself all around the globe to watch birds and other wildlife. His enthusiasm when ringing, watching birds and wildlife, during meetings, writing articles, papers and books was inspirational to me and to others who knew him well. He was behind the publication of *Il-Merill* and was always involved in its editing in every issue since its inception in 1970. Joe was a good companion and a true friend, which I will cherish and miss. Thanks Joe."

Remembering…

Martin Thake

1 January 1954 – 27 November 2018

Written by John J. Borg

Martin Thake's name is synonymous with raptor migration. He was the go to person in the 1970s and 1980s when it came to anything related to raptors. During the months of September and October many of us, now old timers, remember Martin sitting on the roof of the Tal-Ispirtu Farmhouse smack in the middle of Buskett observing the raptors passing overhead. Martin was a scientist and he approached ornithology with a scientific frame of mind. His numerous publications on the migratory habits of the Honey Buzzard and other raptors are testimony to this. Later in the years, Martin shifted his ornithological interest towards pollen and nectar-feeding in passerine birds as well as many other topics. Martin contributed regularly to the bird sightings log and for a number of years he served on the Malta Ornithological Society (BirdLife Malta) rarities committee.

His research work featured regularly in *Il-Merill* but also in foreign journals such as *Rivista Italiana di Ornitologia* and many others. Martin's interests spanned over many topics including paleontology where he studied the large terrestrial tortoises of the Pleistocene as well as his excellent contributions on the Mollusca, in particular the Clausiliidae land snails of the Maltese Islands.

Martin was also a teacher and he lectured at the Junior College, when in 1991 he was seconded as a museum educator at the National Museum of Natural History in Mdina. Martin lectured thousands of schoolchildren during his time at the museum from 1991 to 2002 and was also instrumental in the setting up of the Human Evolution display. He passed away on 27 November 2018, aged 64.

Martin, a passionate naturalist and avid scientist, will be sorely missed.

Nest boxes as a tool for the monitoring of vulnerable Yelkouan Shearwaters in the Maltese Islands

Martin Austad, Paulo Lago, Juan Salvador Santiago Cabello, Benjamin Metzger

Abstract

Yelkouan Shearwaters nest in largely inaccessible crevices and caves making monitoring efforts time-consuming and prone to low sample sizes. Here we describe the first successful nesting of Yelkouan Shearwaters in artificial nests in the Maltese Islands. Nest boxes were made of marine plywood, with a nesting chamber separated from an entrance corridor, providing a relatively cheap conservation and monitoring tool. The design used is also different to other artificial nesting chambers used elsewhere for the species, providing several advantages. Out of two deployed in 2013 and 81 deployed in 2016–2018; 17 nest boxes have showed prospecting activity and of these seven have been occupied by breeding pairs as of the 2019 breeding period. The fact that 20% of boxes showed signs of activity within only three years of deployment is very encouraging and shows that Yelkouan Shearwaters will use this design for breeding purposes. It seems likely that occupation rates will continue to increase in following years. Apart from providing more data on suitable locations for deployment (not only locally but also at a regional level), occupied nest boxes can be an important additional conservation action as well as providing easy access to breeding phenology data when compared with natural nests.

Introduction

The majority of Procellariiform seabirds nest in colonies on remote offshore islands, many of them in steep cliffs or boulder scree slopes. Especially in the small and medium-sized species, their nests tend to be hidden away in burrows, caves, cracks and crevices to avoid predation, often making them inaccessible to researchers (Bourgeois & Vidal 2007, Madeiros *et al.* 2012). This is true for the Yelkouan Shearwater *Puffinus yelkouan* [or Garnija in Maltese (Acerbi 1827)], which is endemic to the Mediterranean basin and the Black Sea. In the breeding colonies, which the birds attend from October to July, Yelkouan Shearwaters are strictly nocturnal (Bourgeois *et al.* 2008; Oppel *et al.* 2011). During the day, the birds are found out at sea, far offshore, sometimes hundreds

of kilometres away from their nest site (Metzger *et al.* 2016). These behavioural characteristics add to the difficulties of monitoring. The species has undergone a population decline in recent decades and is currently listed as 'vulnerable' (BirdLife International 2018). With an estimate of 1795 to 2635 breeding pairs (Austad *et al.* 2019), the Maltese Islands host up to 9% of the global population of the species. Assessing the demographic parameters such as reproductive success as well as the major threats that the species is facing at each colony site and throughout its life cycle, are crucial steps on the way of implementing informed conservation actions aiming at reversing the negative trend (Bourgeois & Vidal 2008). In cryptic species such as the Yelkouan Shearwater which predominantly nests in inaccessible areas this is not an easy task.

Artificial nesting chambers have been shown to facilitate conservation and monitoring efforts in many different hole-nesting and crevice-nesting birds (Katzner *et al.* 2005), including seabird species (Madeiros *et al.* 2012, Bourgeois *et al.* 2015, Bedolla-Guzman *et al.* 2016) even leading to higher reproductive success (Bolton *et al.* 2004, Sherley *et al.* 2012) and higher adult survival (Libois *et al.* 2012). These results show that artificial chambers often provide better protection to nest contents than natural nests, not only from predators but also from interference and egg damage caused by neighbouring nesting pairs or prospectors especially in dense seabird colonies (Ramos *et al.* 1997, Bourgeois *et al.* 2015).

Substantial colony assessment effort via three EU-funded LIFE projects (2006 to present) and prior work, has led to an increasing number of discovered natural nests (with a maximum of 137 in the 2018 breeding season), that have been identified for long-term monitoring and are visited regularly (≥ three times per year). However, while the nest contents of these are visible, the nests themselves are not necessarily accessible. This leads to several disadvantages such as having to use a burrow-scope or digital camera to view nest contents. Natural nests may also alter position, either because of natural erosion or due to adults digging further into soft substrate making them harder to view and leading to difficulties in comparison between years. Moreover adults or chicks of several nests are not accessible for ringing and therefore data on nest site and pair fidelity cannot be obtained. Out of the 137 monitored natural nests in 2018, birds at the nest were only accessible for handling in 61 nests (45%). Even for the latter natural nests reaching birds for handling requires considerably higher effort compared to that of a nest box. It has been recognised in other cavity-

nesting seabird species that monitoring efforts using artificial burrows not only facilitates research but also reduces disturbance to birds (Gummer *et al.* 2015).

Therefore, we rationalised that with the additional installation of nest boxes we could further increase the number of monitored nests significantly. Furthermore, with birds in these nest boxes being easier accessible, the monitoring itself could be improved and facilitated. Here we present preliminary results of a large scale nest box programme for Yelkouan Shearwaters in the Maltese Islands. This nest box programme has been developed and tested during two EU LIFE funded projects on seabird conservation.

Material and methods

The Yelkouan Shearwater colonies in Malta

The Maltese breeding population of Yelkouan Shearwaters are spread along cliffs of the three main islands of the Maltese archipelago in colonies of varying sizes (Sultana *et al.* 2011) as well as on the islets Gżejjer ta' San Pawl and Kemmunett (Metzger *et al.* 2015). Several of these colonies have not yet been accessed or precisely pinpointed due to being found at cliffs of over 100 metres. The largest colony is at L-Irdum tal-Madonna in the northeast of the island, discovered in 1969 and is estimated to have around 500 pairs (Sultana *et al.* 2011, Austad *et al.* 2019). The second largest accessed and monitored colony (since 2013) with an estimated 220-320 pairs is at Majjistral Nature and History Park in the northwest of Malta (Austad *et al.* 2019). In order to increase the number of nests for which important factors such as reproductive success rates, colony attendance, site fidelity and other variables can be monitored, we set up nest boxes at suitable locations along the cliffs, mainly at existing accessible colonies and in the vicinity of occupied nests.

Nest box design and setup, trial phase

Trial nest boxes were built of 12mm marine plywood, 0.6m length x 0.4m width x 0.3m height, entrance hole 0.15m x 0.15m. A partition wall with another entrance hole 0.15m x 0.15m was inserted creating a 0.2m wide entrance corridor and a dark nest chamber 0.4m x 0.4m. The lid consisted of a 0.6m x 0.40m sheet made of the same material. Four small, square plywood plates where screwed to the bottom side of the lid, one in each corner, leaving a gap of approximately 15mm from the lid borders. In this setup, the lid can be easily placed on top of the box with the

square plates sliding into the box, holding the lid in place. The lid can also be easily and quickly removed to get access to the nest chamber when monitoring the nest.

We used brazen screws or screws made of marine graded stainless steel (3.5x20mm and 3.5x30mm) to build the nest boxes, due to most nest sites being exposed to sea spray in rough weather. For the same reason and to reduce costs we decided against hinges to fix the lid to the nest box. Our nest box design does not have a ground sheet meaning that birds nest directly on the ground (sand, compacted soil, clay, shingle, or bare rock). This was in order to save on material and allow for easier placement on irregular ground. Moreover, even when deployed on sand or soil, in the places of deployment these substrates were not deep enough to allow digging nest boxes into the ground, meaning that addition of artificial substrate into a closed-bottomed nest box would not be efficient due to constant material loss. The plywood was not further treated with varnish or paint to avoid smell and to reduce costs, but each nest box was marked with a project stamp and individually labelled upon installation. Two trial nest boxes of the above given size were installed at L-Irdum tal-Madonna colony on 1 January 2013 in a small ravine. In the same ravine there are natural nest entrances.

Nest box design and setup, implementation phase

The widely used nest boxes that were built and installed in the implementation phase of the LIFE Arċipelagu Garnija project from 2016 onward used the same materials and followed the same design but had slightly smaller measurements: 0.5m length x 0.4m width x 0.25m height, entrance hole 0.1m x 0.1m. A partition wall with another entrance hole 0.1m x 0.1m was inserted creating an approximately 0.13m wide entrance corridor and a dark nest chamber 0.38m x 0.33m (Figure 1). The lid consisted of a 0.5m x 0.4m sheet made of the same material, using the same system to keep it in place as the trial version nest boxes. Deployment of these started during October and November 2016 and were therefore available for the 2017 breeding season, again at the end of 2017 prior to the 2018 breeding season and finally in September and October 2018 before the start of the 2019 breeding season.

The calculated costs per nest box (material: plywood and screws), including the cutting by a professional carpenter at the time of implementation was €16/box. The boxes were assembled in

the field making use of a cordless screwdriver. The lids of all boxes where weighed down with larger stones found at site.

57, 70 and 81 nest boxes were available for the 2017, 2018 and 2019 breeding periods respectively, distributed over six locations in the Maltese archipelago: L-Irdum tal-Madonna, Majjistral Nature & History Park, Kemmuna (Comino), Gżejjer ta' San Pawl (St Paul's Islands), Ta' Ċenċ and Miġra l-Ferħa. A further 20 nest boxes that had been deployed in the same locations were either washed out by strong winter storms or removed to avoid being lost to further storms. Therefore, they were not available for breeding and are not included in this analysis.

Ringing and monitoring

All nest boxes were checked each breeding season. If evidence of prospecting defined as footprints, faeces, or nesting material inside the nesting chamber, or nesting were recorded further visits were made, including at least twice during pre-incubation or incubation to increase the chance to handle both adults on the nest, a third time at early chick rearing and a fourth during late chick rearing, when the nestlings are at an age where they can be ringed. At least one visit at the fledging period was conducted to nest boxes where nesting had taken place to confirm that the nestling reached this stage. New adult birds caught on the nest were ringed and recaptures registered.

Results

Trial phase nest boxes

In the trial phase, during the 2013 breeding season in which the two nest boxes had been setup, both nest boxes showed signs of prospecting adults such as footprints inside the nest box and nesting material that had been carried in by these prospecting birds. In the consecutive season (2014) one of the two nest boxes was occupied, while the other nest box showed signs of prospecting activity. A pair laid an egg exceptionally late in the season at the end of April, and the chick successfully fledged in the last week of July. This first occupied nest box has been occupied every breeding season (2014–2019) since then and successfully fledged a chick each season. The second nest box has been prospected in every year since deployment but to date no pair bred in it.

Implementation phase nest boxes

In the first breeding season of the implementation phase (2017), we found signs of birds prospecting in four of the 57 newly set up boxes, all at L-Irdum tal-Madonna, one of which was occupied by a breeding pair that successfully raised a nestling to fledging.

In the second breeding season of the implementation phase (2018), 13 nest boxes of the total of 70 showed signs of prospecting at two colonies: L-Irdum tal-Madonna and Gżejjer ta' San Pawl. These include three nest boxes at L-Irdum tal-Madonna in which we found incubating birds, including the one in which nesting occurred in 2017. From these three occupied nest boxes, two were successful and nestlings reached the age of fledging, while in one the egg was abandoned.

In the third breeding season of the implementation phase (2019), 12 nest boxes of the total of 81 showed signs of prospecting activity, 10 at L-Irdum tal-Madonna and two at Gżejjer ta' San Pawl. Incubating Yelkouan Shearwaters were recorded in five nest boxes, four at L-Irdum tal-Madonna and in one on Gżejjer ta' San Pawl. In one nest box, two nesting attempts were made, with a second egg laid a maximum of 26 days after the first egg was found broken indicating that a second pair attempted to breed in the same box. The second attempt was successful as were the attempts in three of the other boxes. In the fifth occupied box, the chick had been light weight throughout the chick-rearing period and did not survive until fledging.

Nest box use summary across trial and implementation phases

In total between 2013 and 2019, 17 different nest boxes from the trial and implementation phases have been prospected and successful nesting attempts have occurred in 7 of these nest boxes (Table 1). One implementation phase nest box occupied in 2017 and 2018 was not occupied in 2019. All the 6 nest boxes that have been occupied by breeding pairs at L-Irdum tal-Madonna are situated in the same ravine where the trial nest boxes were deployed.

Table 1. *Change in activity in artificial nest boxes over the trial and implementation periods (2013-2019).*

Year	Total # artificial nest boxes	Total with activity (% of total available for breeding season)	Total with breeding pairs (% of total available for breeding season)
2013	2	2 (100%)	0
2014	2	2 (100%)	1 (50%)
2015	2	2 (100%)	1 (50%)
2016	2	2 (100%)	1 (50%)
2017	59	6 (10.2%)	2 (3.4%)
2018	72	15 (20.8%)	4 (5.5%)
2019	83	14 (16.9%)	6 (7.2%)

Ringing and monitoring of birds in trial and implementation phase nest boxes

At L-Irdum tal-Madonna a total of 16 adult individual Yelkouan Shearwaters have been ringed/recaptured in the occupied trial phase nest box and the five occupied implementation phase ones. These include 14 breeders, two of them only recorded in one season (2015 & 2017 respectively), and two prospecting birds which have not been recorded breeding yet. All these adult birds were not previously ringed when they were first found prospecting or breeding in a nest box, with the exception of one male. This male had up until 2016 nested for at least three years in a monitored natural nest close to the nest boxes but shifted when its previous partner did not return. In 2017 this male was found inside nest boxes with two different prospecting females on two different dates. In 2018 and 2019 it nested successfully with one of the two females in a nest box. In total, four birds have so far been recorded prospecting the same nest box a year prior to first time nesting. Moreover, one bird that nested for the first time in 2019, was in the same year also found prospecting with another bird in another nest box. Finally, the nest box that was bred in

successfully in 2017 and unsuccessfully in 2018, had new prospecting birds in 2019, while one member of the previously occupying pair was found prospecting a yet unoccupied nest box.

The pair nesting for the first time in a nest box on Gżejjer ta' San Pawl in 2019 were also not previously ringed.

To date, the nest box programme has successfully fledged 13 Yelkouan Shearwater chicks, all of which were ringed before fledging.

Discussion and conclusions

The initial trial phase has shown that it is possible to get Yelkouan Shearwaters nesting successfully in nest boxes made of plywood following the above described design. To our knowledge, this is a first for the Central Mediterranean, although in the same year (2014) the first artificial nest (design not specified) was also occupied successfully in the Tuscany Archipelago (LIFE Montecristo, LIFE08 NAT/IT/000353) and a long-term artificial nest programme for Yelkouan Shearwaters has been conducted in the Hyères archipelago, France, albeit with completely different design and materials (Bourgeois *et al.* 2015). In our opinion, the fact that prospecting in our boxes and nesting in one of the implementation phase nest boxes occurred the very first season of setup, with more records of successful breeding in the following years shows that this system can be a powerful tool to facilitate future monitoring as well as being a potentially important management tool. It might also indicate that in some areas of the colonies there is a surplus of prospecting birds, which are limited by suitable nest sites and therefore relatively swiftly occupy the nest boxes, as concluded in other studies of artificial burrow use (Ramos *et al.* 1997). We will be able to assess these possibilities in future seasons.

The bird laying her egg into the trial nest box for the first time did so late in the season as compared with the mean laying date (approximately two to three weeks later). We therefore believe that the bird was an inexperienced first-time breeder, an assumption which is further supported by the high site fidelity of established pairs (Sultana *et al*. 2011, Bourgeois *et al.* 2015, BM; PL; MA pers. obs.). Moreover, the fact that all except one of the adult birds found in nest boxes were not ringed before in a location with intensive monitoring work indicates that the nest boxes are mainly occupied by first-time breeders. The nest box programme is in fact starting to shed light on

prospecting behaviour, partner and nest site selection, which have been previously understudied in this species.

While the reason for the egg abandonment in one of the nest boxes in 2018 and the death of a chick in another nest box in 2019 could not be determined, this can be regularly observed in natural nests as well. In 2018 eggs were abandoned in at least 3% of natural nests (N=137) and in 2019 dead chicks without signs of predation were found in 4.8% of natural nests (N =124). One possibility is that one member of a pair from a failed nest could have died due to the threats faced at sea such as fishing by-catch or illegal hunting. In fact Oppel *et al.* (2011) found low adult survival rates in the species. We believe that facilitated capture-mark-recapture monitoring through the nest box programme can provide more data on this issue in the long-term. Another possibility is that some Yelkouan Shearwaters have low foraging success, due to for example over-fishing (Croxall *et al.* 2012, Gaudard 2018), and are therefore unable to maintain long incubation bouts or to feed their chick sufficiently. It has also been shown in other seabird species that inexperienced, first-attempt breeders have a lower reproductive success (Wooller *et al.* 1990). We expect to be able to explore this further on our sample of pairs establishing in nest boxes.

While establishing the programme, we also used nest boxes for two additional purposes: (1) We used the first Maltese Yelkouan Shearwater successfully occupying a nest box for reproduction to raise the profile of the species and increase education and awareness about seabird conservation. We installed a motion-sensor triggered infrared nest camera inside the nest box and compiled the footage of 'Jack in the box' - the first Maltese Yelkouan Shearwater to hatch in an artificial nest. This was shared on the Malta Seabird Project social media platform: http://maltaseabirdproject.wordpress.com/2014/06/24/jack-in-the-box/. (2) One nest box from our trial phase that had not been set up previously was further installed temporarily and used as a base during fledging to wean off and release two orphaned, translocated, and hand-raised Yelkouan Shearwater chicks at L-Irdum tal-Madonna (Piludu *et al.* 2018).

There are several reasons why we decided to slightly modify the nest box sizes after the trial phase. First of all, the smaller nest boxes have a smaller footprint and therefore allowed us to set up more boxes per site as most suitable ledges and sea caves are limited by size or a low roof. Secondly, a smaller box uses less material, which allows saving some resources and in fact, with €16 per box our nest boxes are very cost-efficient. Furthermore, it is easier to transport the cut sheets down

cliff faces onto ledges and into sea caves when they are smaller. For the same reasons of space and weight, the separated nest-chamber and the entrance corridor opted for in the design here has the advantage of creating a dark nest chamber without the use of protruding entrance pipes or tunnels. The latter were used in artificial nests for the same species by Bourgeois *et al.* (2015). At the same time the design presented here still protects the nests from predators such as Yellow-legged Gulls *Larus michahellis* which are known to take adult seabirds as well as their eggs and nestlings (Oro & Martínez-Abraín 2007, Sanz-Aguilar *et al.* 2009, Sultana *et al.* 2011).

One small but important difference between the trial nest boxes and the ones being used in the main phase of the project concerns the dimensions of the entrance holes (first entrance into the corridor and entrance into the nest chamber). The Scopoli's Shearwater *Calonectris diomedea*, is a larger and stronger Procellariiform species which nests in the Maltese Islands in larger numbers (Sultana *et al.* 2011) and is currently listed as Least Concern (BirdLife International 2018). The nesting habitat and the timing of nest site occupancy of the two species overlap to some extent. According to Borg & Mallia (1995), Sultana *et al.* (2011) and Bourgeois *et al.* (2015) the bigger and stronger Scopoli's Shearwater can outcompete the smaller Yelkouan Shearwater and expel it from its nest. At some sites this might restrict the latter to the smaller crevices in which Scopoli's Shearwaters do not fit. This is the main reason for choice of nest box entrance hole dimensions that allows the Yelkouan Shearwater to easily enter but excludes the Scopoli's Shearwaters.

We chose untreated marine plywood as a cost-efficient alternative to artificial nests made of PVC or other plastic as it is to a much larger degree biodegradable. Of course, this might be a disadvantage in that it could compromise the long-term durability of our nest boxes in comparison with natural nests (as opposed by Bourgeois *et al.* 2015) or artificial nests made of other materials (Bedolla-Guzman *et al.* 2016). However, we suggest that replacing an old nest box at the end of its lifespan with a new one at the same location might not discourage nesting by the same pair. Wooden nest boxes have also been shown to be less damp than plastic chambers (Gummer *et al.* 2015). Nevertheless, we did find mould in some of our wooden nest boxes, and we will therefore explore whether drilling small holes in the sides of the box helps to improve air circulation while still keeping the nest boxes dark enough for birds to occupy. In locations were access for deployment is easy and there is enough space, the use of stronger materials such as wood-concrete will be explored (Bedolla-Guzman *et al.* 2016).

It can be assumed that in line with other nest box projects on seabirds, the occupancy rate of our nest boxes will increase slowly in the first years of setting them up. We also expect some of the successfully fledged young from nest boxes to return when mature and perhaps occupy nest boxes close by due to the high natal philopatry shown especially in males of the species (Sultana *et al.* 2011). However, we do not expect that all nest boxes will be occupied in the future. Some of the sites we chose turned out to be unsuitable for nest boxes. For example, if the boxes are exposed to direct sunlight for extended parts of the day during the breeding period (something that might not have been evident on deployment during winter) the nest chamber might warm up above a tolerable level. At other sites, strong swell during storm events washed away some of the nest boxes and this cannot be excluded to happen again in the future. Another cause of nest box loss might be rock falls or cliff slides, as has happened before with natural nest sites e.g. at L-Irdum tal-Madonna (Borg & Mallia 1995).

The fact that all nest boxes occupied to the date are in the same ravine at L-Irdum tal-Madonna and as of 2019 on Gżejjer ta' San Pawl, shows that there might be other factors making nest boxes deployed in other locations unsuitable for occupation that are as yet unclear, but might be revealed in the future when more nest boxes are occupied and a sufficient sample size is obtained for comparisons. For example, all occupied nest boxes are on a compacted ground (either dry clay or a mix of sand and soil substrate) without any bare rock areas or loose sand. However, such a substrate is difficult to find in shaded areas big enough to deploy a nest box. Other nest boxes, as yet unoccupied, have been deployed on a less compacted sandy substrate, shingle, or bare rock. Natural nests are found to different extents on all the latter substrates, both locally but also in other Mediterranean colonies (Bourgeois & Vidal 2007). We will continue to deploy nest boxes if further suitable sites are discovered. One site with a considerable potential for large scale deployment of nest boxes is Għar Ħasan cave due to apparently suitable substrate, easy access and sufficient space. Yelkouan Shearwaters prospect and potentially nest in the eastern part of the cave (John J. Borg pers. comm. & MA pers. obs.). However, due to the same easy access, unless relevant authorities close off parts of the cave system to the public, nest box deployment cannot be carried out.

We are hoping to be able to compare the Maltese programme at a later stage of the project with similar nest box programmes for Yelkouan Shearwaters elsewhere in the Mediterranean, especially

in relation to occupation rates presented by Bourgeois *et al.* (2015). We are confident that at a later stage of the project we will be able to conclude whether reproductive output will differ between natural and artificial nests, i.e. if samples including the nest boxes are representative for an entire colony. If that is the case, the nest boxes will facilitate long-term monitoring of the vulnerable Yelkouan Shearwater population as for instance stipulated by the EU Marine Strategy Framework Directive (MSFD) as well as any further research endeavours on the species. With the high nest site fidelity of the species, we can expect that an increase in occupied nest boxes is likely to reflect an actual increase in the population of this vulnerable seabird species. This will allow us to measure the actual impact (success or otherwise) of conservation measures implemented in order to improve the status of the species.

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We thank all volunteers and staff of BirdLife Malta who helped in the deployment and monitoring of the nest boxes. We also thank Marte Bjørnstad Andressen for the illustrations presented here depicting the nest box design. The Yelkouan Shearwater nest box programme has been developed and tested during BirdLife Malta's LIFE+ Seabird Project (LIFE10NAT/MT/090) and then implemented as part of LIFE Arċipelagu Garnija (LIFE14NAT/MT/000991), both co-funded by the LIFE programme of the European Commission and the Maltese Ministry for the Environment, Sustainable Development and Climate Change, in partnership with the RSPB, SPEA and Transport Malta. All nest boxes were installed and all birds were handled by trained BLM staff under the licences of the Environment and Resources Authority (ERA) and the Wild Bird Regulation Unit (WBRU).

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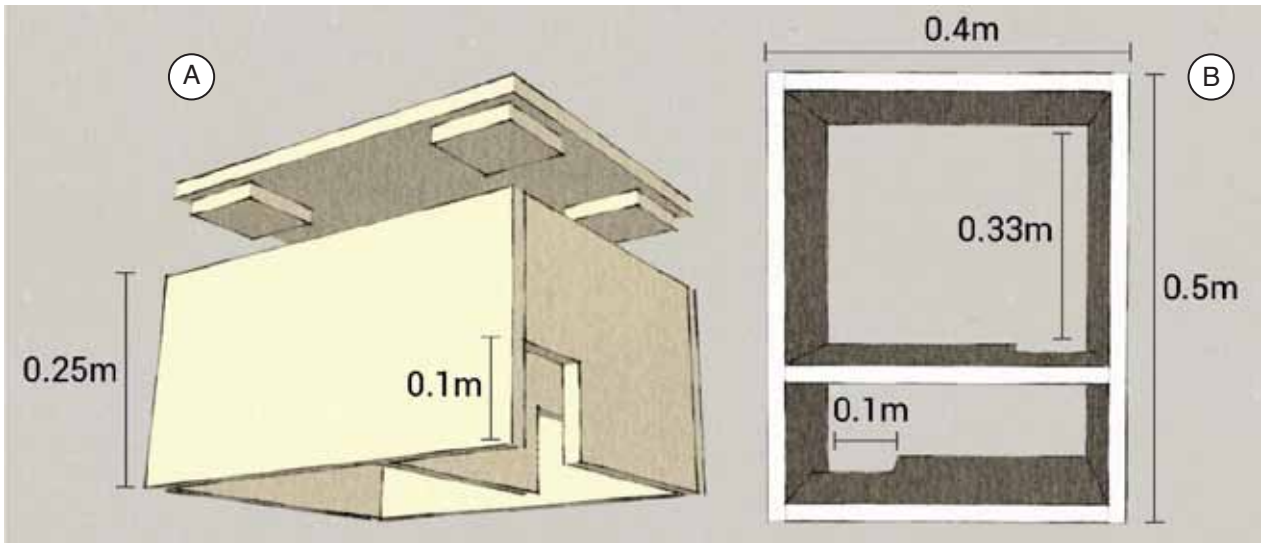

Figure 1. *Nest box design used in implementation phase with relevant measurements. (A) Box is shown from side with lid elevated – The four small squares on underside of lid keep it in place. (B) Box as seen from above with lid removed, showing also lack of ground sheet. The two entrance holes are set on opposite sides to create a dark nest chamber.*

Identifying light-induced grounding hotspots for Maltese seabirds

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Abstract

Light pollution is a well-documented threat to seabirds worldwide. Light pollution in the Maltese Islands has been attributed to the contraction of seabird breeding colonies and the direct cause of grounding events. Using a long-term database of reported light-induced grounding cases, we have identified the major locations, or 'hotspots' for light-induced seabird groundings in the Maltese Islands. Four main hotspots accounting for almost half of all grounding cases were identified. Close to 100% of all grounding cases involved fledglings. Identification of these areas will serve as a valuable tool in the conservation of Maltese seabirds through focusing rescue efforts and prioritising light pollution mitigation measures.

Introduction

Almost all life on Earth has evolved with a cycle of day and night. Important behavioural, biochemical and ecological processes depend on the natural rhythm of light and dark. Substantial ecological disruption can result where this cycle is disturbed by the alteration of natural light levels due to artificial light at night, or light pollution. Despite recent reports advancing our understanding of the potential impacts of light pollution, it remains an often overlooked cause of environmental disturbance, affecting the health and behavioural patterns of individual organisms that can have significant implications at a population level (Rich & Longcore 2006).

Seabirds are directly impacted by light pollution, primarily through their attraction or repulsion and subsequent displacement or disturbance (Rich & Longcore 2004, Montevecchi 2006, Guilford *et al.* 2019). Indirect impacts are also evident for example, in competition with nocturnal fisheries (Arcos & Oro 2002, Rich & Longcore 2004) and the increased risk of predation (Oro *et al.* 2005). Procellariiform seabirds are intensely sensitive to artificial light (Imber, 1975; Reed *et al.,* 1985). Species-specific and even age-specific sensitivities to artificial light are evident with the greatest negative consequences for young birds of nocturnally-active species (Montevecchi, 2006). Despite

these phenomena being well-documented, the mechanisms behind them are not yet fully understood (Rich & Longcore 2006, Hölker *et al.* 2010a, b).

Perhaps the most immediate and lethal effect of light pollution for seabirds is their disorientation by and attraction towards sources of artificial light (Telfer *et al.* 1987, Le Corre *et al.* 2002, Rodríguez & Rodríguez 2009, Merkel 2010, Troy et al. 2011, Day et al. 2015, Rodriguez et al. 2019). Where this phenomenon occurs close to breeding colonies of seabirds, fledglings often become stuck on land (Rodriguez *et al.* 2017a,b) after exhausting themselves or colliding with structures (Montevecchi 2006, Miles *et al.* 2010), a process known as light-induced grounding or "fallout" (Reed *et al.* 1985, Ainley *et al.* 2001).When grounded, birds are unlikely to become airborne again and are vulnerable to predation, illegal taking by humans, traffic collisions, exposure, dehydration and starvation (Telfer 1987; Montevecchi 2006, Raine *et al.* 2007, Rodriguez *et al.* 2017a). Worldwide, at least 56 species of procellariiform seabird have been recorded in light-induced grounding events due to light pollution (Rodriguez *et al.* 2017a). This process primarily affects young individuals: global records of light-induced groundings involving shearwater species show a disproportionate percentage of recently fledged birds recovered, ranging from 73.7 to 98.9% (Rodriguez *et al.* 2017a). For some populations of seabirds, light-induced groundings are a leading cause of juvenile mortality (Ainley *et al.* 1997; Le Corre *et al.* 2002).

Light pollution near nesting colonies is one of the prime recognised threats that Procellariiform seabirds face during their breeding season (Podolsky *et al.* 1998, Day *et al.* 2003, Fontaine 2011). Most Procellariiform species rely on the cover of darkness to visit their nesting areas in cliffs as a strategy to avoid predation and, therefore, darkness is a key habitat quality for these species (Montevecchi 2006). Parental attendance is reduced where colony sites are exposed to light pollution as the perceived risk of predation is increased (Oro *et al.* 2005). In extreme cases of persistent and permanent light pollution, breeding pairs are forced to abandon their nests which could lead to the abandonment of entire breeding colonies (Wolf *et al.* 1999, Sultana *et al.* 2011).

Figure 1. *Light pollution in the Central Mediterranean with the Maltese Islands in the foreground as seen from space. Image courtesy of the Earth Science and Remote Sensing Unit, NASA Johnson Space Center, ISS025-E-10429, http://eol.jsc.nasa.gov*

The intensive and ongoing coastal development established in Malta since the early 1980s, mainly for the tourism industry, has turned the islands into a literal spotlight in the Mediterranean (Figure 1). Poorly designed outdoor lighting schemes utilising an excessive number of bright-white lights has recently resulted in Malta being ranked as the 17th worst light polluted country in the world (Falchi *et al.* 2016).Light pollution has long been identified as a problem for Maltese breeding seabirds, as documented by Sultana *et al.* (1975, 2011), leading to the contraction of breeding colonies or their eventual abandonment. Over the last four decades, BirdLife Malta has recorded a significant number of reports from the public regarding light-induced groundings of seabirds primarily in coastal locations around Malta, Gozo and Comino. The three species recorded include the Yelkouan Shearwater *Puffinus yelkouan*, the Scopoli's Shearwater *Calonectris diomedea* and the Mediterranean Storm-petrel *Hydrobates pelagicus melitensis.* The number of light-induced grounding cases varies between years and is likely dependent on numerous environmental factors

(Syposz *et al.* 2018) and public awareness, with more birds being reported as a result of successful media campaigns (Rodriguez *et al.* 2011)). Given the life histories of these three species, being philopatric, slow-breeding and long-lived seabirds with delayed maturity and low-fecundity (Sultana *et al.* 2011), juvenile mortality caused by light-induced groundings can have a significant impact on the resident population, especially when considering the low reproductive output due to other threats in Maltese colonies (Lago *et al.* 2019).

Here we provide an update on light-induced groundings of seabirds reported over a period of four decades with the aim to identify hotspots in the Maltese Islands which, as a consequence of light pollution, impose an increased risk of mortality. The results can serve as a suitable insight to the effects of light pollution on Maltese seabirds, shedding some light on the causes behind fallout and revealing the areas in highest need of urgent remedial action.

Methods

Light-induced groundings

Data on grounding cases of Yelkouan Shearwaters, Scopoli's Shearwaters and Mediterranean Storm-petrels were collected from two sources; (i) personal records from John J. Borg and (ii) a database of light-induced grounding reports given to BirdLife Malta, mainly by members of the public, during the period 1978 - 2018 (41 years). For the BirdLife Malta database, each documented case included information on location, date, species, age, ring number (if ringed) and identity of the reporter, among other details. When possible, birds were ringed by a licensed ringer prior to release.

The reported cases include only individuals encountered on land or close to shore without any signs of water-logged plumage (Rodriguez *et al.* 2017b), with no specific ailments relating to causes other than being grounded or collision. Cases related to illegal killing (evident from injuries related to lead-shot use or other injuries inflicted by humans, see Raine *et al.* (2016) for discussion on the impact of illegal hunting on Maltese birds including seabirds), birds found offshore or lacking essential information such as location have been excluded as such cases cannot be directly associated with light pollution.

For readability and identification purposes, locations were grouped by proximity and similarity of the characteristics of each grounding area - as an example, those cases reported from Buġibba, Qawra, or St. Paul's Bay were grouped together in one cluster point with its epicentre in the Qawra peninsula.

Public awareness

To account for the effect that media campaigns about light pollution may have on the number of light-induced grounding cases reported, public awareness was quantified for the years 2017 and 2018 when similar levels of media effort were undertaken. Public awareness was measured as the total number of engagements generated by social media posts issued by BirdLife Malta on the subject of light-induced groundings. Data were taken from the social media accounts of the LIFE Arċipelagu Garnija project; Facebook, Twitter and YouTube. These figures represent the number of times each post was viewed and are not representative of the total number of people reached.

Results

Trend in number of light-induced groundings and hotspot identification

Over the last 41 years a total of 269 cases of grounded seabirds (57 Yelkouan Shearwater, 193 Scopoli's Shearwater and 19 Mediterranean Storm-petrel) have been reported to BirdLife Malta. The number of grounded birds reported is on the rise, with a particularly dramatic increase since 2014 (Figure 2) with almost 20 to 40 times more grounded birds reported compared to four decades ago. The trend indicates a growth in the amount of cases close to an exponential fit ($R^2 = 0.56$, obtained by adding a constant (1) to the y-variable).

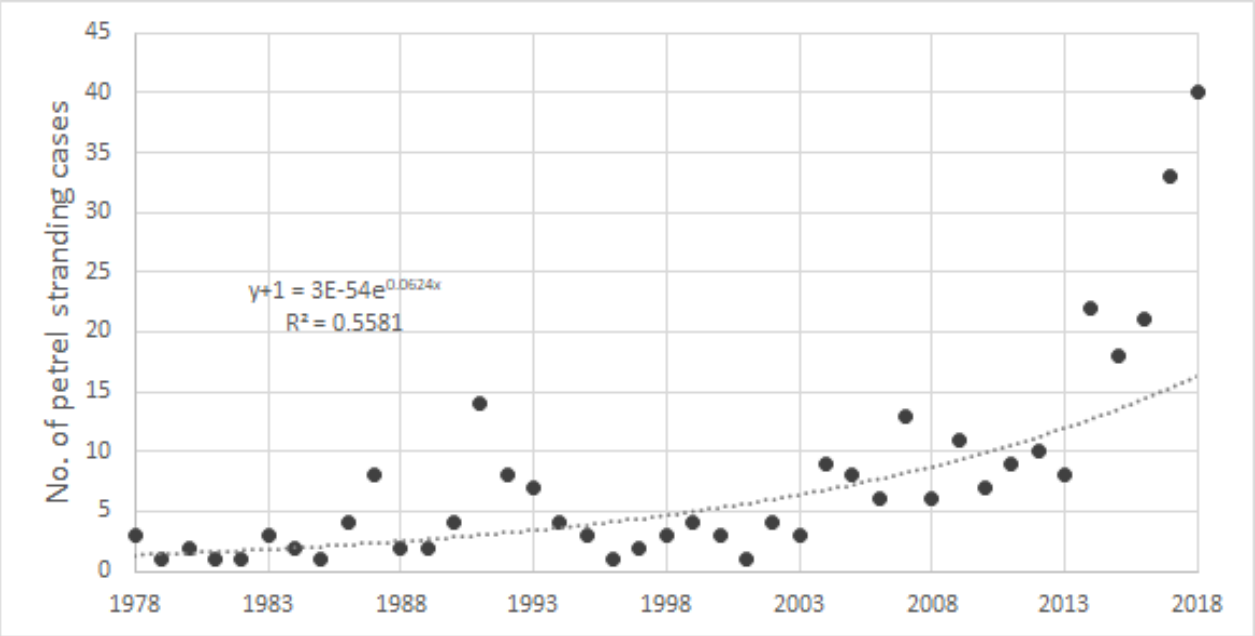

Figure 2. *Yearly light-induced grounding cases for Yelkouan Shearwater, Scopoli's Shearwater and Mediterranean Storm-petrel recorded in the Maltese Islands from 1978 to 2018 as reported to BirdLife Malta. A constant (1) was added to the number of cases each year (y) to create the exponential trendline.*

The exponential trend is stronger when considering the years covered by EU LIFE projects (R^2 = 0.70) (Figure 3).

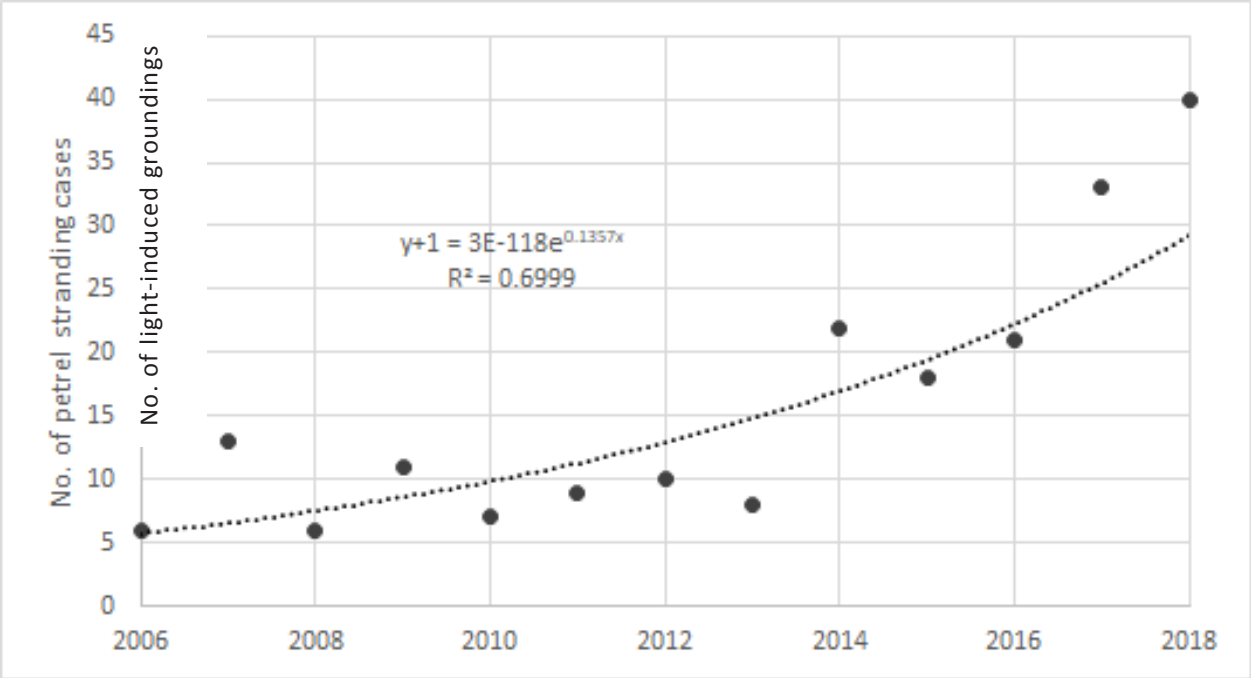

Figure 3. *Yearly light-induced grounding cases of Yelkouan Shearwater, Scopoli's Shearwater and Mediterranean Storm-petrel recorded in the Maltese Islands during successive EU LIFE projects managed by BirdLife Malta from 2006 to 2018. A constant (1) was added to the number of cases each year (y) to create the exponential trendline.*

After mapping and clustering the reports by location, we identified 29 different areas each with at least one documented case. The vast majority of light-induced groundings are located close to the sea with the exception of the localities of Victoria and Xewkija in Gozo as inland hotspots. Identified areas are widely scattered around the coast of Malta, Gozo and Comino, as shown in Table 1, but we highlight four areas as the main hotspots, responsible for nearly half (47.6%) of all cases. These areas include, Xlendi Bay in Gozo (50 cases, 18.6%), St Paul's Bay to Qawra (27 cases, 10.4%), Ħal Far industrial estate (26 cases, 9.7%), and Marsaxlokk to Freeport (24 cases, 8.9%).

Table 1. *Top ten areas reporting numbers of light-induced grounding incidents.*

Location	Mediterranean Storm-petrel	Scopoli's Shearwater	Yelkouan Shearwater	TOTAL	% TOTAL
Xlendi		50		50	18.6
St Paul's Bay to Qawra		8	20	28	10.4
Ħal Far		26		26	9.7
Marsaxlokk - Freeport	6	15	3	25	8.9
Għadira Bay/Mellieħa		5	9	14	5.2
Ċirkewwa	1	8	3	12	4.4
Ġnejna to Golden Bay/Manikata		8	3	11	4.1
Victoria		10		10	3.7
Żurrieq/Wied iż-Żurrieq	5	5		10	3.7
Marsalforn	1	6	1	8	3.0

Reports of grounded Yelkouan Shearwaters (57 cases, 21.2%) are mainly concentrated in the northeastern coast of Malta (Table 1). The peak number (20 cases) occurs in one of the four major hotspots, the area St. Paul's Bay to Qawra. Other locations include Għadira Bay/Mellieħa (nine cases) and scattered points in developed coastal areas and urban areas of Malta with a bias towards the northeastern to central coast: Salini (four cases), Ċirkewwa (three cases), Ġnejna to Golden Bay/Manikata (three cases), Marfa/Armier (three cases), Sliema/St Julian's (three cases), Marsaxlokk – Freeport (three cases), Grand Harbour area (two cases), Santa Venera/Msida/Qormi (one case), Naxxar (one case). The island of Comino records two cases, while Gozo has relatively few groundings of Yelkouan Shearwater with Qala/Nadur, Marsalforn and another unspecified location all with one case each (Figure 4).

Light-induced groundings involving Scopoli's Shearwaters represent the majority of documented cases (193 cases, 71.7%). Xlendi Bay and Ħal Far, both identified as two of the four major hotspots around the islands, exclusively involve incidents with Scopoli's Shearwaters and account for 39.4% (76 cases) of all recorded grounded Scopoli's Shearwater (Table 1). The other incidents of this species are spread around Gozo with many inland cases and various coastal locations of Malta (Figure 4).

Reports of grounded Mediterranean Storm-petrel account only for a small fraction of the total of incidents (19 cases, 7.2%), concentrating in the south sector of Malta (Figure 4).

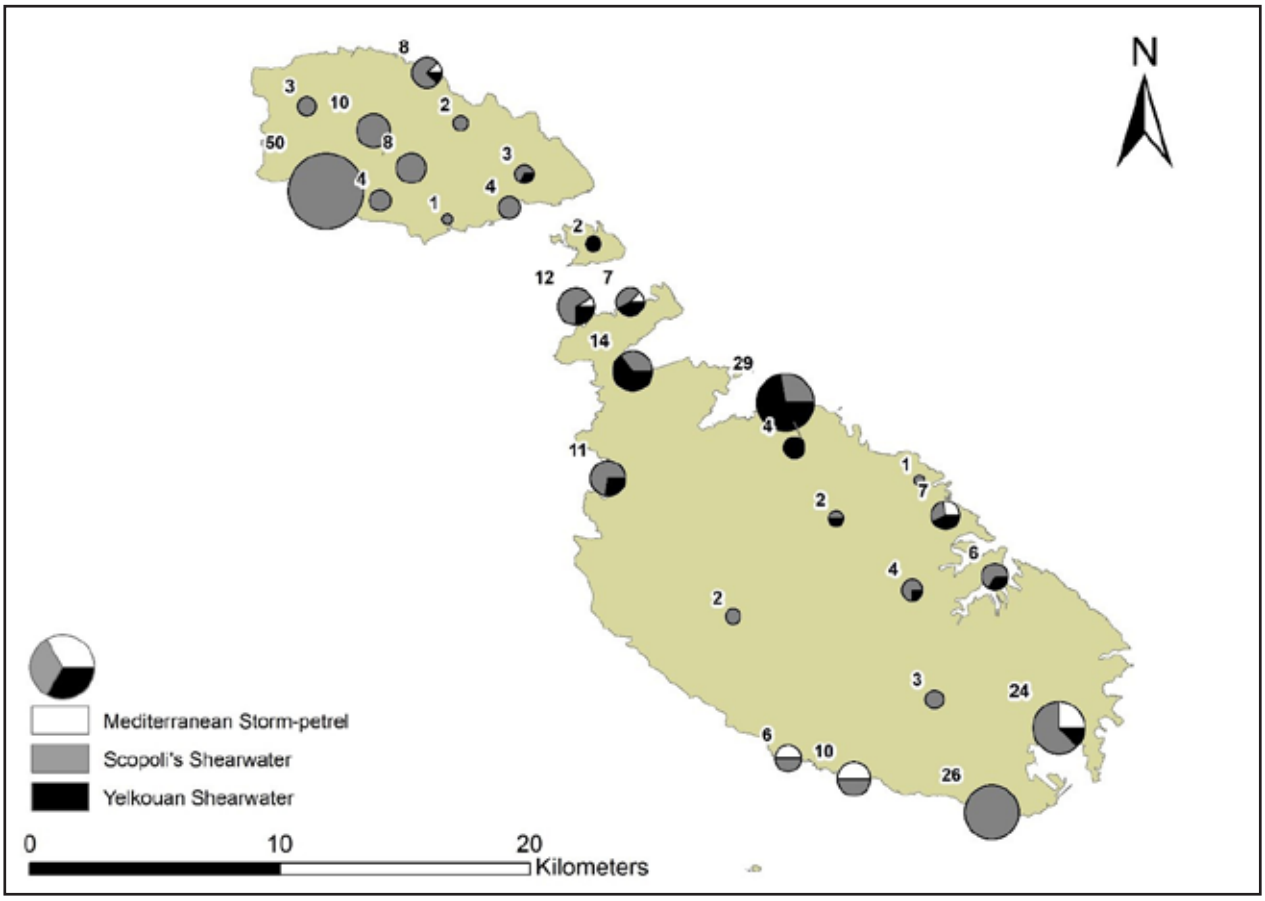

Figure 4. *Locations of recorded light-induced grounding cases per species. White = Mediterranean Storm-petrel; grey = Scopoli's Shearwater; black = Yelkouan Shearwater. Size of pie chart is relative to total number of grounded birds found at each location.*

Age of grounded birds

Grounded seabirds recovered by BirdLife Malta were processed and their age recorded. In some cases, age of the recovered bird could not be determined or was not recorded – these are represented as 'Unknown age' (Table 2).

Table 2. *Age of grounded seabirds recovered in the Maltese Islands 1978–2018.*

Species	Adult	Fledgling	Unknown age	TOTAL	% Fledgling
Yelkouan Shearwater	0	57	0	57	100
Scopoli's Shearwater	3	189	1	192	98.4
Mediterranean Storm-petrel	2	14	3	16	87.5
TOTAL	**5**	**260**	**4**	**269**	**97.7**

The percentage of grounded birds identified as fledglings was calculated from those recoveries where the age of the bird could be determined as either fledgling or adult. Individuals of unknown age were discounted from analysis.

All reported light-induced grounding cases involving Yelkouan Shearwater were fledglings with the earliest recorded grounding case in any year reported on 19 June and the latest on 29 July.

Light-induced grounding incidents involving Scopoli's Shearwater fledglings account for 98.4% of all grounding cases for this species with the earliest confirmed grounding of a fledgling in any given year on 22 September and the latest on 8 November. Three adult Scopoli's Shearwaters were recovered at times of year well outside of the fledgling season, July, August and early September. Of these birds, two were recovered from the localities of Ħal Far and Marsaxlokk – Freeport; areas directly adjacent to large colonies of Scopoli's Shearwaters. The third, positively identified as an adult by experienced BirdLife Malta staff, was recovered from Msida, an area with fewer than six reported groundings in total.

Mediterranean Storm-petrel grounding cases again mostly involve fledglings with 87.5% of all cases. The earliest fledgling Storm-petrel grounding in any given year was on 11 August and the latest on 11 November.

Overall, 97.7% of birds involved in light-induced groundings were fledglings.

Mortality of grounded fledglings

Rescued birds were recorded as dead or alive on recovery. Birds that could be identified as dead fledglings on recovery without obvious cause of death, were assumed to have died as a result of being grounded. The outcome of each grounding case involving fledglings recovered alive was recorded as released (successful) or died (unsuccessful) (Table 3) Mortality % of grounding cases was calculated as the percentage of fledglings of that were found dead or later died as a result of their being grounded.

Table 3. *Mortality of stranded seabird fledglings in the Maltese Islands 1978-2018*

Species	Died	Successfully released	Total	Mortality %
Yelkouan Shearwater	6	51	57	10.5
Scopoli's Shearwater	7	182	189	3.9
Mediterranean Storm-petrel	0	14	14	0

Grounded Yelkouan Shearwaters experience the highest mortality rate with 10.5% of recovered birds dying as a result of their grounding. No Yelkouan fledglings were found dead; however, those that died did so shortly after being recovered, apparently as a result of injuries sustained.

Of the 189 Scopoli's Shearwater fledglings recovered only one was found dead, the other six died as a result of injuries sustained – this represents a mortality of 3.7%.

No fledgling Storm-petrel was found dead or later died after recovery, a mortality of 0%.

There is little information on the type of injuries sustained by fledglings as no post-mortems are conducted. In those few cases where injuries could easily be detected, three had head injuries, four with wing injuries, one with a leg injury, one with a spinal injury, three were hit by traffic and one injured by cat or dog (Table 4). Internal injuries could not be assessed by BirdLife Malta but stress and dehydration are likely large factors in mortality associated with light-induced grounding.

So far, no grounded shearwater has ever been recaptured at a colony after their release. However, an adult Storm-petrel grounded in Sliema and released at Miġra l-Ferħa on 25 May 2017 was recaptured on 14 June 2017 during a ringing session on Filfla.

Table 4. *Summary of the injuries sustained by grounded fledglings*

Species	Head injury	Wing injury	Leg injury	Spinal injury	Hit by traffic	Injured by Cat or dog
Yelkouan Shearwater	1	0	0	1	2	0
Scopoli's Shearwater	2	4	1	0	1	1
Mediterranean Storm-petrel	0	0	0	0	0	0
TOTAL	3	4	1	1	3	1

Public awareness

Media posts made by the LIFE Arċipelagu Garnija Project 2017-2018 were analysed to calculate their reach which was used as an index for public awareness (Table 5). The total number of times each post was viewed was denoted as 'Reach'.

Table 5. *Reach of social media posts relating to the light-induced grounding of seabirds 2017-2018*

	2017				2018			
Social Media	**Total posts**	**Total reach**	**Max reach**	**Mean reach**	**Total posts**	**Total reach**	**Max reach**	**Mean reach**
Facebook	4	7007	3757	1752	8	14037	3444	1755
Twitter	3	1814	933	605	8	21222	5287	2653
YouTube	2	919	678	460	2	386	241	193
TOTAL	**9**	**9740**	**3757**	**1082**	**18**	**35645**	**5287**	**1980**

In the period 2017-2018, a total of 27 posts about grounded seabirds were made on social media being viewed 45,385 times. The total number of posts about grounded birds doubled between 2017 and 2018, reflected in twice as many views for Facebook posts during that period (2017: 7,007; 2018: 14,037). Reach of Twitter posts increased by nearly 12 times from 1,814 views in 2017 to

21,222 views in 2018. The reach of YouTube videos decreased by a factor of 2.4 (2017: 919; 2018: 386).

Discussion

This study has identified hotspots for the light-induced grounding of seabirds in the Maltese Islands, providing a valuable tool to help conserve these species and prioritise future light pollution mitigation measures.

Although not investigated by this paper, it is likely that risk of seabird fallout in the Maltese Islands is dependent on various factors as described for other procellariiform seabirds (Rodriguez & Rodriguez 2009, Syposz *et al.* 2018). Further analysis of the BirdLife Malta database will help to determine which factors are most influential in the context of the Maltese Islands and further increase understanding of light-induced groundings.

According to our results, areas of concern where most light-induced groundings of seabirds were reported accumulate in the coastal areas in the south and northeast of Malta, as well as in the west of Gozo. The main hotspots reveal a close connection between areas with a high concentration of settlements or industrial sites producing a large amount of light pollution, and the number of grounded birds. The four most prominent areas, Xlendi, St Paul's to Qawra, Marsaxlokk-Freeport and Ħal Far industrial estate, are examples of coastal locations that stay well-lit overnight, either because of the tourism oriented businesses or industrial activities. This strong correlation has been clearly documented before in the Maltese Islands (e.g. Raine *et al.,* 2007, Rodríguez *et al.* 2012, Mula-Laguna *et al.* 2014).

It is surprising not to find more grounded birds in the highly urbanised areas of the central east coast of Malta such as Valletta or St Julian's. We therefore believe that there are other important variables driving the number of incidences at certain areas. Not surprisingly, all main hotspots identified are in relatively close proximity to a sizeable seabird colony. Both Xlendi Bay and Ħal Far, which register a high number of incidents exclusively involving Scopoli's Shearwaters, have major breeding colonies of this species in their vicinities (Sultana *et al.* 2011). Some of the largest Scopoli's Shearwater colonies in Gozo are located in a range of less than four kilometres around Xlendi, namely in Wardija (ca 700 pairs) and Ta' Ċenċ (ca 1000 pairs). In the case of Ħal Far, a colony of around 800 pairs of Scopoli's Shearwater is found on the cliffs around one hundred

metres from well-illuminated factories. Similarly, the bias towards the northeast of Malta for light-induced grounding hotspots of Yelkouan Shearwater may be attributed to the presence of the largest colony of this species at L-Irdum tal-Madonna, ca 500 pairs (Sultana *et al.* 2011). Lastly, the Storm-petrel colonies are limited to the islet of Filfla and some locations along the west cliffs of Gozo. The locations with most light induced grounding cases of Storm-petrel, Għar Lapsi and Wied iż-Żurrieq, are situated directly opposite the islet of Filfla and show a similar trend to hotspots for the two shearwater species.

Results for all three species show a strong bias towards fledglings to become grounded as 97.7% of all reported grounding cases involved fledglings. This supports the findings of other studies as reported by Rodriguez *et al.* (2017a). Grounding cases involving adults were few, only three Scopoli's Shearwaters could be identified as adults and two of these were recovered from localities located in the immediate surrounds of their colonies. Disorientation of adult shearwaters by light sources in the immediate vicinity of their colonies has been recorded (Guilford *et al.* 2019) although, as adults make up a small percentage of grounded birds worldwide, data is understandably deficient. Our results do not attempt to describe the mechanism through which fledglings are more attracted to artificial lights at night - indeed the exact mechanisms through which light-induced groundings occur remain unknown. Leading hypothesis suggest that fledglings use natural light sources, like the moon and stars, to orientate themselves before leaving on their maiden flight (Telfer *et al.* 1987; Reed *et al.* 1985). Where these natural light sources are dominated by artificial light sources, fledglings may mistakenly orientate themselves towards the more intense artificial lights and fly towards them. This hypothesis is supported by the reduction in light-induced groundings during the full moon, when the moon is brightest (Rodriguez & Rodriguez 2009, Syposz *et al.* 2018).

The low number of groundings outside of immediate coastal areas may be in part due to the fact that breeding colonies of seabirds in the Maltese Islands do not occur far inland. It is likely that many fledglings leave directly out to sea when leaving their respective colony sites and are attracted to the lights of coastal developments (Rodriguez *et al.* 2015).

It is important to acknowledge that the origin of the data at our disposal, based on opportunistic reports, can introduce a certain degree of bias in the identification of the main grounding hotspots. Probabilities of encountering grounded birds in less urbanised or sparsely populated areas is likely

to be significantly lower compared to more active zones. This might produce a feedback effect in which grounding incidents occurring within less populated areas, where light pollution tends to be lower, are further under-reported. Numbers of grounded birds are further under-reported as already deceased birds, either hit by traffic or killed by domestic and feral cats and dogs, are less likely to be reported. This, together with the unknown level of illegal taking of grounded birds by humans leads to an underestimation of the true scale of light-induced groundings in Maltese seabirds. Although these factors must certainly lead to an under-representation of the total number of cases recorded, we do not expect it to significantly influence the correct identification of the main hotspots.

A similar mechanism of under-representation is expected to influence the overall low number of grounded Mediterranean Storm-petrel among the grand total. The proportion of grounded shearwaters seems to be related to population sizes of either species. Scopoli's Shearwater numbers are roughly three times higher when compared to Yelkouan Shearwaters, both in estimated population sizes (Sultana *et al.* 2011) and in grounding cases (Scopoli's ca 5000 pairs, 193 cases; Yelkouans 1190-1680 pairs, 57 cases). However, this rule does not seem to apply for the Storm-petrels, as their estimated population size is between 5000 and 8000 breeding pairs, but during the period of 41 years only 19 grounding cases were reported. It may be assumed that, given the small and inconspicuous nature of this species, the chances of encountering grounded Storm-petrels are much lower than for the larger shearwaters. Similarly, it is more likely that grounded Storm-petrels are predated more by cats, dogs, rats and gulls. This may go some way to explaining the apparently low number of Storm-petrel groundings recorded in the Maltese Islands.

The number of cases is increasing alarmingly in what seems to be an exponential trend while at the same time population sizes of the two shearwater species have been documented as decreasing (Sultana *et al.* 2011, Borg 2017). This trend is even more distinct when considering the years during EU LIFE projects managed by BirdLife Malta (2006 – present). This may be, in part, due to the rise of public awareness to grounded seabirds leading the public to report more incidents. Media campaigns appealing to the public for help in rescuing grounded birds started in the 1980s focusing on Scopoli's Shearwaters. These campaigns intensified during the successive EU LIFE projects run by BirdLife Malta: LIFE Yelkouan Shearwater Project (2006–2010); LIFE+ Malta Seabird Project (2011–2016) and the LIFE Arċipelagu Garnija Project (2016–2020). Since 2016,

local press releases appealing for the help of the public to rescue grounded birds have been issued twice per year, once prior to the Yelkouan Shearwater fledging period and again before the corresponding period for Scopoli's Shearwaters. Additionally, other press releases on the number of rescued birds after the season have been issued, together with online posts on social media. Unfortunately, data for social media post impact was not retrievable before 2017. Furthermore, no data could be obtained for media featured on television news channels. The public awareness data presented in this paper may serve as a baseline for future study. In recent years, BirdLife Malta have noted an increase in knowledge about the affected species and wider light pollution problem among those reporting grounded seabirds.

The extent and steepness of the increment of cases in the last decade highlights the fact that the sources of light pollution are not being properly addressed, and therefore the impacts on seabirds are still increasing. In fact, record numbers of grounded Yelkouan and Scopoli's Shearwaters were recorded successively in 2017 and 2018. As our results show, the mortality of grounded fledglings, Yelkouan Shearwaters in particular (10.5%), is worrying when considering the multiple other threats that this species faces leading to its classification as Vulnerable to extinction (BirdLife International 2018). The true figure for the mortality of grounded fledglings is expected to be higher as many are never found and are likely predated by feral cats or dogs or succumb to injury whilst on land (Rodriguez *et al.* 2017a). The fate of successfully released petrels remains unknown since the chance of recapture using conventional ringing methods is very small. Further investigation into their fate post-release is needed to ascertain whether recovery and rehabilitation of grounded fledglings is a viable conservation tool. In the absence of such knowledge, recovery and release campaigns of grounded fledglings must continue. Meanwhile, the intensification of long-term capture-mark-recapture effort within seabird colonies close to grounding hotspots will increase the recapture probability of returning birds. Tracking grounded birds post-release could be achieved using Platform Transmitter Terminals (PTTs); however, consideration should be given to the body condition of potential negative impacts such a device could have on an already rehabilitated bird.

We conclude that this problem, which should be acknowledged according to the important role of Malta in the conservation of these species on a global level, is in need of immediate action in order to reduce the existing levels of light pollution both through corrective and preventive measures.

The issue has been exposed and addressed with specific solutions in a comprehensive report produced by BirdLife Malta (Raine *et al.* 2007), with a recent data update by Mula-Laguna *et al.* (2014) and here including the latest data from 2014–2018. A recent report by Brincat & Pace (2018) includes suggested mitigation measures to reduce light pollution at and in the vicinity of colony sites affected by light pollution across the Maltese Islands. These mitigation measures are often simple and inexpensive; implementing them would not only reduce the impacts on Malta's avifauna, but also be beneficial for human health and reduce energy expenditure and improve the carbon footprint for both the private sector and the government (Pace 2002).

Our findings suggest that any action plan for light pollution reduction should focus on the major light-induced grounding hotspots identified here. Overall, a reduction of Malta's light pollution problem is believed to be a crucial conservation measure to safeguard the future of Malta's seabirds. Judicious planning and preventative policies that look at the problem holistically are much needed to avoid repeating the mistakes of the past. Environmental Impact Assessments for developments in coastal areas, protected sites or areas with good levels of natural darkness should feature seabirds prominently.

The ultimate responsibility for applying the principles of sensitive development and taking the appropriate measures falls on the shoulders of policy makers, planners and enforcement agents, as well as private initiatives, all of whom hold the power to prevent or rectify the negative consequences of light pollution. We expect that the work outlined here can serve as a tool for decision-makers in the process of taking focussed action, quickly and efficiently targeting the areas revealed as most problematic.

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Review of the diet and foraging behaviour of three species of tubenoses breeding in the Maltese Islands

Paulo Lago & Benjamin Metzger

Introduction

Malta holds globally important breeding populations of Scopoli's Shearwater *Calonectris diomedea*, Yelkouan Shearwater *Puffinus yelkouan*, and Mediterranean Storm-petrel *Hydrobates pelagicus melitensis*. The three species of Procellariiformes are highly pelagic seabirds that feed exclusively at sea, making use of Maltese waters for foraging, but also forage in high sea areas and in Italian, Libyan and Tunisian waters during the breeding season. The EU LIFE+ Malta Seabird Project (2011-2016) LIFE10 NAT/MT/090 and the EU LIFE Yelkouan Shearwater Project (2006-2010) LIFE06/NAT/MT/097 have identified Marine Important Bird Areas for the Maltese populations of these three species of tubenoses, including their foraging hotspots in the Maltese Fishing Management Zone (25 nm). However, it is also crucial to identify the relevant prey the birds are taking from these areas, especially for assessing interactions with fisheries and aquaculture. Here we present a review of the diet and foraging behaviour of the three aforementioned species. In combination with information on key areas at sea that these species use, information on important food sources and foraging behaviour are important further steps in assessing (and if necessary) mitigating threats imposed on these seabirds by fisheries.

Material and methods

We carried out a desk study, reviewing thoroughly all accessible and most relevant publications on the diet and foraging behaviour of the three seabird species (two for Mediterranean Storm-petrel, one for European Storm-petrel *Hydrobates pelagicus pelagicus,* three for Yelkouan Shearwater, one for Scopoli's Shearwater and three for Cory's Shearwater *Calonectris borealis*). Additionally, we included data collected as part of the EU LIFE+ Malta Seabird Project carried

out between 2011–2016, personal observations of BirdLife Malta staff and other Maltese seabird researchers.

Results

We compiled the results of diet studies and feeding behaviour for the three seabird species. Diet was analysed by identifying prey species from regurgitated samples or stomach content and by isotope analysis of feathers.

- **Mediterranean Storm-petrel** *Hydrobates pelagicus melitensis*

The Mediterranean Storm-petrel is a pelagic seabird endemic to the Mediterranean that feeds on marine food sources (Table 1). Mediterranean Storm-petrels are present throughout Maltese waters during the breeding season as suggested by the telemetry using radio tracking and vessel based observations during the 2012 and 2013 breeding seasons under the EU LIFE + Malta Seabird Project.

Mediterranean Storm-petrels dive for their prey to a mean depth of 146cm and up to 500cm depth (Albores-Barajas *et al.* 2011). Mediterranean Storm-petrel feeding during the breeding season may alternate long trips spending all day out feeding at sea, and short trips feeding close to the colony during the night (Albores-Barajas *et al.* 2011, B. Metzger obs.). This behaviour has also been recorded in the Atlantic populations (D'Elbee & Hemery 1998).

Based on this review, European Storm-petrels typically feed on small fish, crustaceans etc. Tuna fish farms are a seasonal supplementary food source in Malta. During vessel-based observations conducted by the EU LIFE + Malta Seabird Project and observations by Maltese birders Mediterranean Storm-petrels were regularly seen around Bluefin Tuna fish pens in the southeast of Malta, 6–9km off Marsaskala. The Bluefin Tuna *Thunnus thynnus* are fed with a mixture of mashed small pelagic fish, squid and shrimp, which produce a dense oil-slick sometimes extending for several kilometres over the surface. This attracts considerable numbers of Mediterranean Storm-petrels (Borg 2012).

Table 1. *Diet of the European Storm-petrel (Mediterranean and Atlantic subspecies)*

Study	Location	Main prey	Methodology
Albores-Barajas *et al.* 2011	Marettimo Island (Italy)	Fish (in volume and number). Mainly Mediterranean sand eel *Gymnammodites cicerellus* around 4 cm. Opossum Shrimps (Misydacea) when feed close to the colony.	Regurgitate samples (25 samples) 2007–2009
D'Elbee & Hemery 1998	Bay of Biscay (France). Atlantic populations	Fish main prey in volume (Gadidae, Gobiidae, Myctophidae and Ammodytidae). Microzooplankton (Copepoda, Euphausiacea, Chaetognatha, Anthomedusae, and meroplanktonic Larvae), and suprabenthic intertidal organisms (mainly isopods Cirolanidae) present. In volume Zooplankton (52%) and littoral and intertidal benthic organisms (37%).	Regurgitate samples (76 samples) 1984–1991
J.J. Borg pers. comm.	Filfla (Malta)	Small fish and crustaceans	Regurgitate samples (12 samples) 2009-2011
B. Metzger obs.	Filfla (Malta)	Small fish	Opportunistic regurgitate samples 2012–2014

- **Yelkouan Shearwater** *Puffinus yelkouan*

The Yelkouan Shearwater is a pelagic seabird endemic to the Mediterranean that feeds on marine food sources. It preys mainly on sardines and anchovies (Table 2). Yelkouan Shearwater has a wide diet (Peron *et al.* 2013) that can change along the breeding season (Bourgeois *et al.* 2011). It benefits from fishing activities and follows trawlers discarding fish (Arcos *et al.* 2001). Yelkouan Shearwaters can dive to a maximum depth of 30m, with frequent dives deeper than 10m (Peron *et al.* 2013).

Based on this review, Yelkouan Shearwaters typically feed on small fish, crustaceans and cephalopods in variable proportions depending on the breeding stage.

Table 2. *Diet of the Yelkouan Shearwater.*

Study	Location	Main prey	Methodology
Zotier 1997	Provence coast (France)	Equal relative occurrence of fish: Clupeids (*S. pilchardus* (sardine) and *Sprattus sprattus*), Engraulids (*E. encrasicolus* (anchovy), and Scombrids (*Scomber sp*. (mackerel)); and crustaceans (*Meganyctiphanes sp.*) Crustaceans more abundant during the pre-laying period and fish during the chick rearing.	Unknown
Bourgeois *et al.* 2011	Hyères archipelago (Provence coast, France)	Fish is the main prey, both in terms of relative occurrence (84.6%) and relative biomass (99.7%): epipelagic fish as main prey Clupeids (mainly *S. pilchardus* (sardine)), Engraulids (*E. encrasicolus* (anchovy) and mesopelagic and demersal species (Gadids and *Scomber sp.*) as secondary fish prey types. Crustaceans (Euphasiacea and Decapoda) main prey type in terms of relative number (63.2%), but with low relative occurrence (19.2%) low biomass. Crustaceans major prey type during the pre-laying period (relative number: 88.8%) but low biomass.	Stomach contents and regurgitates (26 samples) 2004–2007
Peron *et al.* 2013	Hyères archipelago (Provence coast, France)	Range from being exclusively zooplankton-based to exclusively fish-based during the breeding season.	Stable isotopic analyses (70 first primary feathers (P1) and 72 cover feathers) 2011–2012
B. Metzger obs.	Maltese archipelago	Small fish and squid till 4–5cm long	Opportunistic regurgitates samples 2012–2016

- **Scopoli's Shearwater** *Calonectris diomedea*

Scopoli's Shearwater is a pelagic seabird endemic to the Mediterranean that feeds on marine food sources (Table 3). It preys mainly on medium-sized to small fish 4–25cm and squid 2–15cm. (UNEP-MAP-RAC/SPA 2014, Sara 1989). They obtained the prey from active catch or opportunistically from fishery discards. Scopoli's Shearwater rarely dives more than 4m (Péron C., unpublished results).

It was considered as a subspecies of Cory's Shearwater *Calonectris diomedea diomedea* until 2014 (del Hoyo *et al.* 2014). The studies available are focussed on the closely related Cory's Shearwater *Calonectris borealis* that breeds and feeds mainly in the Atlantic. The only diet studies available for Scopoli's Shearwater we are aware of are from Maurizio Sara in the 1980s in the central Mediterranean.

Scopoli's Shearwater feeds alone or in association with tuna schools and cetaceans. (UNEP-MAP-RAC/SPA 2014, Sara 1989). It follows trawlers to benefit from fishing discards and longline vessels (Sara 1989, Laneri *et al.* 2010). Fishing discards are an important source of food and modifies their foraging behaviour (Bartumeus *et al.* 2010).

In Cory's Shearwater diet depends on food availability. The diet varies between years (Granadeiro *et al.,* 1998; Xavier *et al.,* 2011; Neves *et al.,* 2012) and the breeding cycle (Neves *et al.,* 2012). Change in diet generally reflects a change in prey abundance or access to prey (Xavier *et al.* 2011).

Based on this review, Scopoli's Shearwater typically feed on pelagic fish and cephalopods.

Table 3. *Diet of Scopoli's and Cory's Shearwater*

Study	Location	Main prey	Methodology
Sara 1989 Scopoli's Shearwater	Linosa	Mainly pelagic fish (63.4%): Blue whiting (*Micromesistius poutassou*), Mackerel (*Trachurus trachurus)*, European anchovy (*Engraulis encrasicolus*), Silver scabbardfish (*Lepidopus caudatus*), Cephalopoda (26.7%), and Crustacean (Euphasiacea)	Stomach contents (9 samples) and regurgitations (64 samples) 1983, 1986–1987

Afan *et al.* 2014 Scopoli's and Cory's Shearwaters	Chafarinas Archipelago	Mainly pelagic fish	Stable isotope analysis of feathers (26 Scopoli's Shearwaters and 5 Cory's Shearwaters) 2011
Alonso *et al.* 2012 Cory's Shearwater	Berlengas island (Continental Portugal) and Selvagem islands (Atlantic Ocean)	Mainly fish: mixture of shelf pelagic fish (*Scomber colias*, *Sardina pilchardus*, and *Belone belone*) and offshore pelagic fish (*Naucrates ductor* and Exocoetidae). Cephalopods very frequent	Stomach contents (88 samples) 2010
Neves *et al.* 2012 Cory's Shearwater	Azores	Mainly fish: Blue jack mackerel *Trachurus picturatus* the most abundant, and *Cubiceps gracilis, Scomberesox saurus* and *Maurolicus muellerii.* Cephalopod (Histioteuthidae, Ommastrephidae and Cranchiidae)	Stomach contents (959 samples) 1998–2000, 2002

Discussion

Mediterranean Storm-petrel, Scopoli's Shearwater and Yelkouan Shearwater feed mainly on fish, crustacean and squid. It is likely Scopoli's Shearwater has a similar diet in terms of species groups and similar foraging behaviour to Cory's Shearwater. Cory's Shearwater and Yelkouan Shearwater vary their diet along the breeding season and between years. This means that they could have flexible feeding strategies depending on the resources availability, and it is proved the habitat quality is a key factor for the dual foraging strategy (Cecere 2014). It is known that they feed in high productivity areas that may coincide with fishing areas.

The knowledge of the prey species of Scopoli's Shearwater, Yelkouan Shearwater, and Mediterranean Storm-petrel combined with the foraging areas is a key element to identify the

important foraging areas. This allows identifying possible conflicts and interactions with human activities such as fisheries.

There are few studies that focus on this subject and some of them are not from the Mediterranean populations. A diet study of the three species is necessary to be carried out in Malta. Moreover, determining interactions between fisheries and seabirds in the Maltese waters as well as in important foraging areas outside Maltese waters, mainly South of Sicily, Gulf of Gabès in Tunisia and North of Libya, should be a priority in the coming years. This would allow for assessment of threats faced by birds at sea.

In 2016, the Maltese government has designated eight marine Special Protection Areas (mSPAs) under the Birds Directive in order to protect the important areas at sea for Scopoli's Shearwater, Yelkouan Shearwater, and Mediterranean Storm-petrel. The assessment of fisheries and their interaction with seabirds will be crucial to secure a correct management of the protected areas.

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Is sex-specific longevity evident in Scopoli's Shearwater *Calonectris diomedea?*

Dietrich Ristow

Breeding colonies of Scopoli's Shearwater *Calonectris diomedea* are on remote, typically uninhabited islets which often are of limestone or volcanic morphology. Nests can be under dense shrub, between roots of juniper, in rabbit holes on flat ground, in crevices on slopes, or in slots of cliffs. Depending on what the island surface offers, nests can be spaced just a few metres or more than a hundred metres apart. Irrespective of the size of an entrance to a spacious cave, be its ceiling just of a foot or of a man's height, several nests may be in corners close to the cave entrance or many metres deep inside the rock. It is therefore the skill of the investigator with his tools to reach a high degree of retrap-completeness when doing a population study in a given plot for determining survival rates.

Jenouvrier *et al.* (2009) modeled survival rate at six colonies of Scopoli's Shearwater spread across 4600 km during nine consecutive years. As one of the minor results in this intensive study, mean adult survival rates differed between sexes for birds breeding in Crete whereas such a difference was not detected at the other study colonies. An explanation as to why females in Crete seem to live longer was not given because this topic was not the main theme of the publication, and this short note aims to address this. Field work at that colony off Crete had been terminated by the Cretan co-author in 2001. However, in 2009 this islet was revisited by a team of the Hellenic Ornithological Society (HOS) for another marine project. Among the 154 adult shearwaters checked within the former study plot there were 70 males and 84 females, and about half of each cohort (35 and 41 individuals respectively) wore rings from the previous field activities. Among the 13 birds who had been ringed there at least 20 years ago, there were only three males as compared to ten females. Furthermore, in this species prospectors or first-time breeders show up in the breeding colony at five years of age or even later. Hence, to obtain a guild of birds which are 20 years of age or older, it is reasonable to include all individuals which had been ringed as adults at least 15 years ago. For this guild then, there were four males compared to 22 females. This ratio in favour of females confirms the former result from Crete that mean adult survival is

greater for females. Of course, it is likely that this sex dependent difference is also present at the other colonies and that rather an artifact had been involved during sampling at the various sites. This aspect needs to be looked at in a discussion to avoid biasing by inadequate field methods. The six field workers for the data in Jenouvrier *et al.* (2009) had not intended their comparison when starting their field work, so that their capture-recapture methods differed among populations, disturbance levels differed, and their modeling efforts did not address biases which might be introduced by nest quality in relation to nest site tenacity, i.e. to progressing experience of individuals in this long-lived seabird. To incorporate the sexual survival difference into the population dynamics and achieve equilibrium of the two genders amongst the breeders, three factors seem to be involved: (a) There is a higher frequency and greater dispersal of female prospectors (Ristow 1999); (b) Males are recruited at a younger age into the breeding population than females (Ristow 1999); (c) More males than females fledge. The suggestion of an equal sex ratio among nestlings (Genovart *et al.* 2005) is unlikely to meet details. Experienced pairs return earlier, acquire the better nest crevices (i.e. less accessible for the investigator), and lay eggs earlier than inexperienced pairs. They also preferentially invest into the heavier and rarer gender. Therefore, this tendency results in more male offspring hatching in inaccessible nests earlier in the breeding season (Ristow & Wink 2004) and escape the attention of the investigator, whilst inexperienced pairs tend to breed later in more readily accessible borrows and produce more female offspring.

The next discussion topic on the potential causes and consequences of a bias in survival rates towards females is a bit speculative. External factors such as sexual differences in nutriments, wintering areas, fishery by-catch etc. are unlikely explanations. It seems more reasonable instead to look into the species' behaviour. The density of nests and their large variety of structural properties, as well as the high frequency ratio of prospectors as compared to the number of breeders (Ristow 1999) suggest that nest sites are scarce and the competition for one is fierce. It is primarily the task of the male to seize the nest burrow and defend it. Shearwaters have a forcible bill to catch their slippery food, but on the other hand their bill is a perilous weapon, too, so that in wrestling fights for burrows the competitors may get bleeding wounds; fights can result in fatalities during the early nest occupancy phase (Ristow 2010), and bones are frequently found in burrows, indicative of fights in former years. The competition between males contributes to their lower survival rate. Adult males become the rarer gender, and, thus, if they are successful to reproduce,

they do so at a younger age than females. In this context it is remarkable that experienced breeders show a tendency to invest into male progeny, despite them being the larger gender and likely to demand a greater effort for raising the nestling.

To satisfy the curiosity of the reader, a description about the life of the oldest individual is added here. One female was caught for the first time on June 16, 1978 at a nest entrance. She was re-trapped six times when breeding less than ten metres away from the first capture site in two nests during 1988-1996. When captured again July 17, 2009 she was 50 metres away prospecting at another active nest and not breeding, her age being somewhere beyond 31 years. As compared to the other presumably younger individuals who had been re-trapped in the study plot in up to ten or even fifteen different years, the re-capture frequency of this oldest female appears to be low, what suggests that she had bred in a near-by, inaccessible nest during most years.

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Observations of nesting Little Ringed Plovers at Għadira Nature Reserve in 2011–2012

Alex Casha

The Little Ringed Plover *Charadrius dubius* (Scopoli, 1786) is a common passage migrant from early March to late May and from late July to early November, generally in singles or in small flocks, but sometimes flocks of up to 25 or even occasionally up to 50 birds have been recorded (Sultana *et al.* 2011). The Little Ringed Plover is mainly seen in Malta in the few wetlands such as Għadira nature reserve (largest wetland area in the Maltese Islands), saltpans and also in open grassy areas including the Malta International Airport (Sultana *et al.* 2011). The species nests on bare ground often on terrain covered with sand, shingle or gravel (Sultana *et al.* 2011); at Għadira nesting habitat was created in 1980 with patches of shingle on some of the islands.

A study of the Little Ringed Plover was carried out by the author through observation at Għadira nature reserve in a two year period (2011–2012). Six pairs nested in 2011 and four pairs nested in 2012. In this paper pairs are given numbers but pair 1 of 2011 does not necessarily mean that it is the same pair 1 as in 2012.

The Little Ringed Plover started nesting at the reserve in 1995 (Gauci & Sultana 1999; Raine *et al.* 2009). Generally pairs have two broods, sometimes three. Four to five breeding pairs normally nest at Għadira, but eight pairs nested in 2008 (Raine *et al.* 2008).

Nesting in 2011

In 2011 a total of six pairs were observed nesting. Five pairs had chicks from the first brood. A sixth pair was seen incubating but the nest failed. Four pairs made a second brood, but only one chick fledged from these. A third brood of one pair was unsuccessful.

Pair 1: Nested on the western side of island 16 (see Fig. 1). On 28 April four chicks were seen. Chicks remained on the shore of the island and after a few days started crossing over to island 25 and to the opposite main shoreline. By late May three chicks had fledged. This pair nested again on the same island, a short distance away from the first nest and had a second brood. It was observed incubating on 27 May. The pair was disturbed by the presence of a Grey Heron *Ardea*

cinerea, as well as by a pair of Black-winged Stilts *Himantopus himantopus* (that nested in 2011 on island 6). The adult Little Ringed Plovers were often seen trying to chase away or distract the attention of the two larger birds on island 16 by flying low above them, by alighting nearby and crouching or by putting up a broken-wing display. This was not successful with the Grey Heron, which ignored the plovers and their displays. Eventually one of the parent Little Ringed Plovers sat on the eggs with the heron very close by. Four Little Ringed Plover chicks hatched on 19 June, and were still present by 21 June. By 23 June two chicks disappeared and eventually only one chick survived. It was the only chick that fledged successfully from all second broods in 2011. At this time of the year the water level is very low and islands 16-21-23-24-25 are connected to the main shore, and the young bird was seen to move freely in this area especially island 16, island 25 and main shore.

Pair 2: Nested on island 6, and had four chicks on 6 May. By 17 May only two chicks survived. They fledged in late May/early June. Chicks crossed from island 6 to the opposite main shore and also to island 2. Their second brood of four chicks failed. This pair had a third brood of four chicks which hatched on 3 July (D. Cachia pers. comm.). The next day only three chicks were seen on the island. One chick was last seen on 6 July on island 2.

Pair 3: Nested on island 6 ca 20 metres away (more east) from pair 1. One chick hatched on 12 May and fledged in early June. This pair had a second brood on the same island and was still incubating by 21 June. However, two days later the nest was abandoned probably due to the presence of a Grey Heron and a pair of Black-winged Stilt (with young). The parents had been frequently seen earlier putting up injured bird displays attempting to chase the heron and the stilts, thus leaving the eggs exposed and unattended. The Black-winged Stilts, having their own young, were also aggressive towards the pair of Little Ringed Plovers

Pair 4: Observed incubating on island 11 in late April, and was still incubating on 17 May. Four chicks were seen on 21 May. Six days later the parents encouraged the chicks to cross over to island 10, where at least three chicks were still present on 2 June. By 6 June three chicks were on three different islands (10, 11 and 7) respectively. In spite of being 15 days old the parents were still occasionally brooding them. The chicks were very vocal. When one of them was heard continuously calling (on island 10) one of the parents immediately went to brood it. On 14 June

one chick was still on island 10 while the other two were on island 11. Eventually the three birds fledged successfully. This pair did not have a second brood.

Pair 5: Noted with three chicks on island 14 on 17 May. On 25 May there were four chicks running on the island. These remained there and eventually all four fledged. There was no second brood.

Pair 6: Noted incubating on island 7 on 25 May. Nest failed.

On 11 July four chicks were observed by D. Cachia (pers. comm.), one was last seen on 12 July. This must have been the second or third brood of one of the above pairs.

Nesting in 2012

The breeding season started later than 2011, and this was most likely due to the relatively harsh winter. A pair was seen copulating in mid-March. The first pair was observed incubating in late April. A total of four pairs nested on four different islands.

Pair 1: Nest on patch of gravel on island 16. A brood of three chicks was first observed on the 6 May (D. Cachia pers. comm.). The chicks were last seen on 8 May. The young birds were not seen again a few days after hatching; one possible reason is the chicks drowned when trying to cross to other islands. The pair nested again on the island shortly after losing the chicks. Three chicks from the second brood were seen on 13 June. Before they disappeared on 15 June they were observed moving from one island to another, the last time on island 22 where one parent was calling them. The pair had its third nest with at least three eggs on nearby island 18 and was noted incubating on 28 June. One of the parents kept incubating the eggs up until 3 September when the nest was finally abandoned. The eggs were sometimes left unattended when the adult bird went to feed, or preening nearby.

Pair 2: Nested on island 6 and four hatchlings were observed on 1 June. Two of the chicks seemed very weak and unable to stand up, as they had just hatched. These two chicks which were a short distance away from each other were brooded by one of the adults, first by attending to one young and then hurrying to brood the other, alternating between the two. Later on the same day they were observed running along the shore of the island. The next day the parents called them continuously and encouraged them to cross over to the main shoreline, and later to island 2. In the next few days

they moved from island to another (mainly islands 1, 2, 4 and 6) as well as to the main shore. Eventually they fledged successfully.

Pair 3: Four chicks were first seen on 8 July on island 14 (D. Cachia pers. comm.). From the next day they started moving to other islands as well as to the main shore and by 11 July only two chicks remained, one of which was weak and with its feet clogged with mud. Only one chick eventually survived and fledged by early August, observed flying on 8 August. This young bird kept moving between island 14, 15 and the shoreline before fledging, and was brooded in early morning even when 25 days old. It was observed running and flapping its wings on a number of occasions while still unable to fly. It is to be noted that at the time of hatching and in the next days the temperatures soared up to 45°C in mid-day.

Pair 4: Nested on island 1. Two chicks hatched on 21 May, but four chicks were observed the following day. After a few days the chicks crossed over to shoreline beneath the birdwatching hide and to island 10. Three chicks eventually crossed back to "their" island and one chick remained on island 10. They all fledged successfully by around mid-June.

Table 1. *Number of nesting pairs and breeding success in 2011 and 2012*

Year	2011	2012
Number of pairs	6	4
Number of chicks hatched	33	18
Number of chicks that fledged successfully	14	9
Percentage successful rate	42.42%	50%

Table 2. *Comparative results between first and second/third broods of fledged young in 2011 and 2012*

Year	2011	2012
Chicks hatched from first brood	17	15
Chicks survived and fledged from first brood	13	9
Percentage survival of first brood	76.47%	60%
Chicks hatched from second /third brood	16	3
Chicks survived and fledged from second/third brood	1	0
Percentage survival of second/third brood	6.25%	0%

Table 3. *Comparative results between first and second/third broods of fledged young from all chicks hatched in 2011 and 2012*

Year	2011	2012
Percentage survival of chicks of first brood from all chicks hatched	13 from 33= 39.39%	9 from 18= 50.00%

Percentage survival of chicks of second/third broods from all chicks hatched	1 from 33= 3.03%	0 from 18= 0.00%
Total	42.42 %	50%

Discussion

Territorial behaviour and chicks: The Little Ringed Plover has been observed to be a highly territorial and aggressive bird during breeding at Għadira nature reserve. It chases off other conspecifics as well as other birds including waders and Common Moorhen *Gallinula chloropus*. This territorial behaviour is also noted by Wiersma (1996) and Hayman *et al.* (1986). However, as their chicks grow, the adult birds become more tolerant although they remain aggressive to other adult and juvenile Little Ringed Plovers, and normally chase them off their territory. On the other hand, nesting Little Ringed Plovers sometimes flock together to attack predators or larger birds. On the 23 June 2011 four Little Ringed Plovers (and two Black-winged Stilts) flocked together to mob and chase off a Little Egret *Egretta garzetta* in flight. A similar behaviour was observed reported by C. Gauci (pers. comm.) on 18 June 2011 when around ten Little Ringed Plovers mobbed and chased off a Little Egret.

Hayman *et al.* (1986) also reports that the Little Ringed Plover may nest semi-colonially with nests just nine metres apart. This has not been observed at Għadira.

The number of eggs laid at Għadira is generally four which appears to be the average number for this species (Robinson, 2005). Incubation is carried out by both parents. Wiersma (1996) reports that incubation lasts 22–28 days, which is more or less similar for Għadira, where incubation was noted to begin when the last or penultimate egg is laid, and takes an average of 24–25 days (Sultana *et al.* 2011).

Wiersma (1996) also states that chicks fledge between 24–29 days old, with a fledging success of 26%-64%. Walter (1960) carried out a study and found that out of 35 Little Ringed Plover chicks, 11 or 12 of these fledged, which is a success rate of 31%–34%. Walter was unable to confirm the

cause of mortality, but a number of these chicks died a few days after hatching following a spell of bad weather. Table 1 shows that the success rates for fledged chicks for Għadira were 42.42% in 2011, and 50% in 2012, making the average success rates for these two years 46.21%. This success rate compares well with both Wiersma and Walter's estimates. However, due to the current limiting size of Għadira, the numbers of pairs nesting there will remain low; this means that the species is in danger of being exterminated as a breeding species due to inbreeding and other factors mentioned in this study.

The chicks leave the nest after hatching, and they can wander, under the guidance of the parents away from the nesting territory. The adult birds normally decide whether the chicks remain on the island were they hatched or swim to another island or to the main shore. The adult birds encourage the chicks to cross by calling them. The chicks normally start to congregate at the point of crossing, and after some hesitation they swim to join the adults. During windy days when the water can be turbulent chicks have been seen to swim with great difficulty and sometimes swim back to the original point of departure. Vegetation in the water particularly along the shore also provide extra difficulties for the young chicks. While the young are crossing the parents often engage in a low flight above them while encouraging them continuously with their calls. As soon as they reach a shore the chicks normally go immediately near one of their parents to be brooded. The parents sometimes encourage their young to leave their island because of predators or other large birds. One particular case was pair 4 nesting on island 11 in 2011. The chicks remained on the same island for a week but after the frequent presence of Common Moorhen, Grey Heron, Little Egret and Black-winged Stilt on this small island, the pair became very agitated and made the chicks cross to the nearby island 10, which had lots of vegetation where the young could hide.

Movements of adults with young can also have a regular pattern. In 2010 the pair that nested on island 11 used to take the four chicks from island 11 to the main shoreline beneath the birdwatching hide and move them along the whole length of the western shore, sometimes also taking them to island 20. This daily journey of the family party used to start in the morning. Then late in the evening the parent birds always brought them back to island 11, sometimes reaching it by almost nightfall. These chicks eventually fledged successfully.

Threats to young birds and mortality: During the two year period (2011–2012) as well as in previous years several factors were identified that could be among the causes affecting mortality of the young birds especially in their early days. These are:

- Chick crossings. This can lead to exhaustion of the chicks, especially if the chicks are encouraged to cross by the parents from one island to another by swimming shortly after they have hatched.
- Territorial conflicts. Adult birds have been seen attacking a chick of another pair, when it was not attended by its parents. This occurred in 2008 when there were eight nesting pairs. Għadira nature reserve is a relatively small area and territories overlap. This causes conflicts among the nesting pairs, which uses up efforts that could be used on chick rearing, but are instead used on chasing their conspecifics away.
- Chicks' feet clogged with mud. In summer the substrate of the centre of the islands is normally very dry and fine. This adheres very easily to the young birds' wet feet, which become clogged with mud balls, making it difficult for them to walk. This has been observed on a number of chicks, especially in later broods.
- Extremely high temperature. In summer the chicks, particularly of later broods have to face high temperatures for long periods.
- Predators. These include snakes, weasels and feral cats. The chicks are very vulnerable to predators particularly when they move away from the islands, or when the water is too shallow. Wiersma (1996) states that Little Ringed Plovers "frequently breed in the vicinity of aggressive or demonstrative species resulting in less egg loss due to predators; associations at least sometimes deliberately sought". One explanation for choosing to breed in the vicinity of potential predators is that these predators may in turn help to keep other species away from their nest, therefore providing a kind of security for the plovers.
- High salinity. The salinity levels of the water at Għadira nature reserve in summer are very high, e.g. highest average recorded in June 2011 was 77ppt (V. Falzon pers. comm.). This can cause further problems to the young chicks. Research carried out in other locations backs this up; Hannam *et al.,* 2002 stated that American Avocet *Recurvirostra americana* chicks that were raised in areas of high salinity showed signs of decreased feeding and preening, and suffered from significant weight loss and dehydration. This particular study, as well as others, conclude that waterbirds in general suffer adverse effects when living in

high saline environments, with no access to freshwater. It is important for the management of Għadira that the salinity levels of the water are closely controlled, in order to maximise the nesting survival rates of the waders there.

It has been noted that higher mortalities among chicks and nest losses occur mostly in the second or later broods. This accounts for the relatively low figures of success rates of nesting Little Ringed Plovers at Għadira (see Table 1, 2 and 3).

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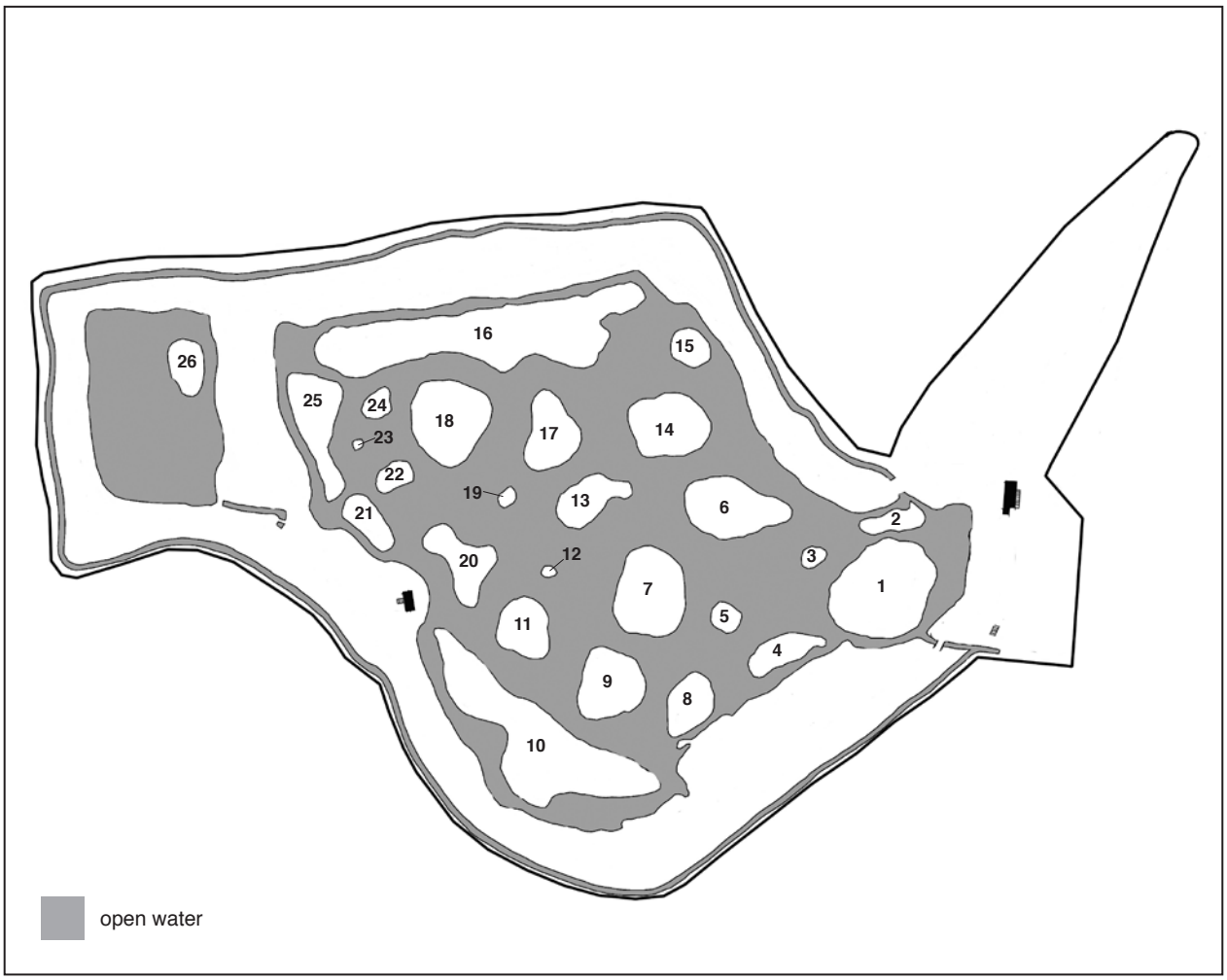

Figure 1. *Map showing layout of Għadira Nature Reserve and the islands with designated numbers*

Spotting sparrows: Using a citizen science-based approach to research Spanish Sparrow roosts and promote urban conservation in Malta

Nicola Piludu & Jennifer Law

Introduction

The involvement of untrained volunteers from local communities to perform conservation research can be traced back to at least 1900, when the National Audubon Society started its annual Christmas bird count (Cohn 2008). Under the name of citizen science the practice has in recent years become a popular approach, with thousands of projects currently active around the world (Bonney *et al.* 2014). While the validity of data collected by citizen scientists has often come into question (Cohn 2008), the approach is generally recognised to have the advantage of allowing research at a very fine scale while engaging local communities in conservation (Dickinson *et al.* 2012).

The Spanish Sparrow *Passer hispaniolensis* (Temminck, 1820) is one of the most abundant breeding birds in Malta (Sultana *et al.* 2011). The species is perfectly adapted to urban habitats and is widely distributed in cities and towns across the country, which is reflected in its Maltese name *għasfur tal-bejt*, "house bird" (Sultana *et al.* 2011). Spanish Sparrows are arguably the species with which the Maltese community is the most familiar, and was selected as the object of a citizen science project called "Spot a Sparrow" (SaS). BirdLife Malta led the project in partnership with The Inspire Foundation (from now on, "Inspire"), the leading Maltese charity working for people with disabilities.

SaS was launched in October 2014, and addressed a number of environmental and social issues. The project's main objective was to map Spanish Sparrow roost sites, particularly in urban areas, in order to ensure their protection by local councils. The secondary objectives were to raise awareness about urban wildlife in Malta, to develop a sense of community in urban areas, and to promote integration between several groups, especially those with disabilities and mental health issues.

Methods

Spanish Sparrows roost communally in large-crowned trees (*e.g. Ficus* sp., *Quercus* sp.) in urban areas, with larger roosts counting up to 30,000 birds (Sultana *et al.* 2011). Their roosts are easy to identify by the public, as birds can be spotted as they congregate in the canopy. Additionally, roosting Spanish Sparrows engage in very loud vocalisations that can be heard from a large distance, further simplifying the identification process by untrained citizen scientists.

A dedicated website was designed as the main data-collecting tool for the project. The website was based on the map application Google Maps (Google 2015), displaying an interactive map of the Maltese Islands with the location of identified roosts marked by small project logos. Buttons placed on the right-hand side of the map guided citizen scientists through the identification and reporting processes. Citizen scientists were instructed to visit green urban areas at sundown to look for large trees; trees were to be considered roost sites if large numbers of sparrows were seen flying towards them or loud chirping was heard coming from them. Once a roost site was identified, citizen scientists were asked to report it by pinpointing the exact location on the interactive map, and were given the option to provide comments and to attach a photograph of the site.

Reported roosts were automatically entered in an online database, which was only accessible from the back end of the website and could be downloaded as a spreadsheet. Based on the provided coordinates, the website automatically assigned the reported roost site to a specific district and city. Reported roost sites were visited by teams from BirdLife Malta or Inspire in order to confirm their identification before they could be uploaded on the map. BirdLife Malta provided a training session to Inspire educators, who then took their clients on fieldtrips to verify roosts. The training and participation of Inspire in field surveys was arranged so as to address the second objective of the project: promoting the integration of people with disabilities. Data was collected between 28 November 2015 and 6 December 2016.

Results

A total of 147 roost sites were recorded and confirmed. Roost sites were identified in all six districts in Malta, covering 45 local councils (Table 1). The northern district had the highest number of roost sites (43), while the district of Gozo and Comino had the lowest (12); no records

have been submitted for Comino (Table 1). The councils of San Pawl Il-Baħar (15) and Rabat (11) were the ones with the highest number of roosts reported.

Table 1. *Number of roost sites in each district and local council*

District	Town		District	Town	
Southern Harbour (22)	Bormla	2	Western (27)	Attard	3
	Floriana	2		Iklin	2
	Kalkara	1		Lija	2
	Luqa	3		Mdina	3
	Marsa	2		Mtarfa	2
	Paola	3		Rabat	11
	Tarxien	4		Siġġiewi	2
	Valletta	2		Żebbuġ	2
	Żabbar	3	Northern (43)	Burmarrad	4
Northern Harbour (20)	Birkirkara	5		Għargħur	3
	Gżira	1		Magħtab	1
	Ħamrun	3		Mellieħa	9
	Qormi	3		Mġarr	2
	Msida	1		Mosta	2
	Santa Venera	1		Naxxar	7
	Sliema	5		San Pawl Il-Baħar	15
	St. Julian's	1	Gozo and Comino (12)	Għajnsielem	1
South Eastern (23)	Birżebbuġa	3		Nadur	1
	Gudja	1		Victoria	7
	Għaxaq	7		Xlendi	3
	Marsaskala	4			
	Marsaxlokk	3			
	Qrendi	1			
	Żejtun	1			
	Żurrieq	3			

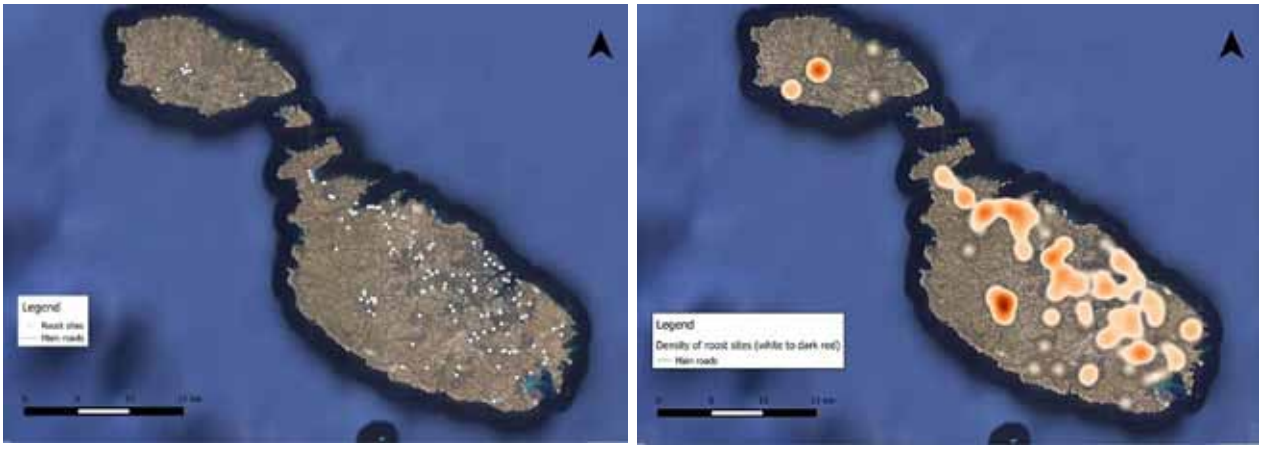

Figure 1. *Location of sparrow roost sites (left) and heat map showing density (right)*

Discussion

While data collection was open to the general public, the project made a specific effort to engage the urban community. Most supporting events were carried out in cities, and the great majority of roost sites were recorded in the large urban area that runs in parallel to Malta's northeastern coast. Outside of this, a high concentration of roost sites was recorded in the historic towns of Mdina and Rabat in Malta, and Victoria in Gozo. Conversely very few roost sites were identified in the predominantly rural Gozo and the southwestern coast of Malta. This is not entirely reflected in the numbers at district level, as the lack of roost sites in the larger northern district is balanced out by the high number of roost sites in the Rabat-Mdina urban area.

The aim of the project was to collect data on the location of important roost sites to protect urban trees, which is why the data was made available to relevant authorities, as well as guidelines for bird-friendly tree management. It is relevant to note that as part of SaS, and in parallel with a similar initiative focussed on White Wagtails *Motacilla alba*, BirdLife Malta discussed with Valletta Local Council the management of their urban trees. Several clusters of trees in the city are important roost sites for both Spanish Sparrows and White Wagtails, and following meetings with BirdLife Malta pruning of one of the main sites on Triq ir-Repubblika was carried out according to the provided guidelines. Opportunistic observations in December 2015 suggest that proper pruning is indeed resulting in higher numbers of birds roosting in the city; however, it is recognised that a more standardised effort needs to be employed to verify this and further research is recommended.

As previously mentioned, the validity of the data collected through citizen science projects is often questioned. This was carefully considered when designing the methodology, and in order to make sure that the highest possible number of records was approved it was decided that data collected be kept as simple as possible. For this reason the public were asked only to record the roost site location, and to disregard the collection of other data (e.g. weather, tree species, other bird species present), ultimately resulting in very simple data that does not allow for stronger analyses. We believe that this resulted as well in a higher number of roosts being properly identified, which was the primary objective of the project. This notwithstanding, we believe that the project provides a strong starting point, and that further effort is employed in researching roost sites across the Maltese Islands.

Conclusion

Overall, a large quantity of data has been obtained from across a considerable area, and at a minimal cost. The easy identification of sparrow roosts allows for high public participation and ensures that data is largely reliable. As such it may be concluded that citizen science proved to be an effective method for data collection regarding Spanish Sparrow roosts in Malta. That being said, further research using more robust methodologies, such as systematic counts of major roosts, is recommended. From a conservation perspective, the project succeeded in engaging the Maltese community in urban wildlife, integrating people with disabilities in the research project, and improving the management of urban trees, and we encourage the development of similar initiatives in the Maltese Islands.

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New breeding sites of Yellow-legged Gull around the Maltese Islands

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The Yellow-legged Gull *Larus michahellis* (Naumann, 1840) has been recorded as a breeding species in Malta since 1843 (Schembri 1843), breeding exclusively at mainland sites before colonising Filfla in the 1930s (Sultana & Gauci 1970). The largest colony, approximately 202±24 apparently occupied nests (5-year mean, apparently occupied nest defined as well-constructed nests capable of holding at least one egg), is now located on Filfla (BirdLife Malta unpublished data 2013-2018). Sultana *et al.* (2011) describe three smaller colonies present on high cliff ledges along the west coasts of Malta and Gozo, namely Dingli, Ta' Ċenċ and Wardija. There are indications that these mainland sites underwent a decline during the 1990s (Borg & Cachia Zammit 1998). However, recent data show that colonies at Ta' Ċenċ, Dingli and Wardija may have expanded. The monitoring of these established colonies on Gozo and Malta is beyond the scope of this short note.

Comino

On 1 May 2014, one nest containing a single egg was discovered on the south face of the island. The site was visited twice whilst at egg stage with an adult observed incubating the egg on 4 May 2014 (Figure 1). However, no further visits were undertaken and the nest was assumed to be unsuccessful.

One nest was located on 21 April 2017 on the east cliffs of Comino, with four eggs (Figure 2). This contrasts to the normal clutch size found on Filfla (two to three eggs) and, to the best of our knowledge, is the first record of a nest containing more than three eggs in the Maltese Islands. The adults were attending the nest on at least one more date after discovery but successful hatching was not confirmed.

One unattended nest with a single egg and an adult in incubation posture were recorded on the east cliffs on 6 June 2018. The nest contents for the latter were not visible but the adult gull soon started mobbing the observers suggesting the presence of an active nest.

Two nests were recorded on 9 May on the cliffs of the southeast corner of Comino. Both of these nests contained two eggs. It is likely that there were more nests not visible from the cliff top as around 20 adult gulls were in the area behaving aggressively. No subsequent visit was made to assess whether the two visible nests were successful.

These records give credence to the claim by Bannerman and Vella-Gaffeiro (1976) that Yellow-legged Gulls may once have bred on Comino. However, no confirmed breeding attempts were recorded in the decades following their report (Sultana *et al.* 2011).

Għarb

A small colony was discovered on high cliff ledges at Għarb on 19 June 2018. A single chick was observed on the first visit and was heard begging for food from adult gulls close by. The site was revisited on 21 June. On both visits to the colony ten adult gulls were observed in the area, suggesting that the colony held a maximum of five pairs. Although only a single juvenile was observed on either visit, considering the date of the colony discovery, it is possible that other young had already fledged and left the colony.

St Paul's Island

The Yellow-legged Gull was confirmed as a new breeding species for St Paul's Island on 14 May 2018 (Figure 3). The first nest containing a single egg was found on the north side of the larger islet during fieldwork by the LIFE Arċipelagu Garnija Project team. The nest appeared abandoned and the egg was cold. Subsequent visits to the island recorded a further five nests, an unfinished nest on the south side of the larger islet and four nests - two with single eggs and two with no eggs - near the centre of the smaller islet. Although no chicks were found, one broken egg with a well-developed chick inside was noted. Eggshell fragments were found in the remains of some nests. From their appearance, it is most likely that eggs from these nests were predated by other gulls on the island.

Inspection of the site in 2019 revealed that Yellow-legged Gulls were breeding on the island once again. Seven apparently occupied nests were recorded on 22 May and their position marked with GPS. Two of these nests contained eggs. The first of these two nests had apparently failed at hatching as two well developed chicks were found inside half-hatched eggs. The second nest contained a successfully hatched chick as well as a second egg.

A second visit to the emerging colony was made on 6 June. All seven nests were re-inspected but no additional eggs were found and all nests were empty. However, two large chicks were found close to the nest that had contained the successfully hatched chick and egg (Figure 4). Both chicks still retained some down but many of their juvenile flight feathers had grown in with the larger of the two displaying almost full-length primary feathers. The two chicks were seen again on a subsequent visit on 19 June, both flying with adults.

Another fledgling was found on the larger islet on 19 June, close to where adult gulls had been observed showing defensive behaviour in previous months. Although the nest was not found, it can be safely assumed that this chick had hatched on the larger islet and had not moved from the smaller islet.

All three chicks were fitted with a BirdLife Malta metal ring, each bearing a unique code, on the left tarsus.

Other sites in Malta and Gozo

Newly discovered small colonies were identified on mainland cliffs in 2017 during monitoring of shearwater spp. colonies and 2018 as part of a nationwide census of breeding birds. Due to the difficulties in accessing and observation of these cliff areas, the presence of breeding Yellow-legged Gulls in these locations was inferred from adults in incubation posture, defensive behaviour and presence of young. Locations include (minimum number of breeding pairs); Mtaħleb, Malta (5 pairs); Fawwara, Malta (10 pairs); and Xlendi/Sanap Gozo (2 pairs).

Factors affecting colonisation

The global Yellow-legged Gull population is increasing (BirdLife International 2018). This is due to a number of factors but principally among them the increased abundance of accessible anthropogenic food sources across their breeding range. The presence of newly established colonies on the small islets of the Maltese archipelago and expanding mainland colonies indicate an increasing national breeding population. Whether the observed changes in the Maltese population is a result of local recruitment, or from the Mediterranean meta-population or both remains unknown. A colour ringing programme could be established to investigate the nature of recruitment occurring. Further studies can be conducted on Filfla to assess whether this islet has reached maximum colony capacity which would favour range expansion to other sites in the Maltese Islands.

The Yellow-legged Gulls of St Paul's Island and Comino may be benefitting from aquaculture close to both of these islands. The fish farms provide an easy source of food. Numerous Yellow-legged Gulls were observed feeding on discards from the fish farms close to St Paul's Island in 2018 (pers. obs.). Moreover, several regurgitates containing plastic and glass were found, indicating that the gulls might be scavenging at the Magħtab landfill. Increased availability of anthropogenic food sources has been shown to exert a strong positive influence on nearby Yellow-legged Gull populations (Duhem *et al.* 2008). As a note of interest, a gull regurgitate containing a Mediterranean Storm-petrel *Hydrobates pelagicus melitensis* was found on the smaller islet of St Paul's Island on 1 June 2018.

Failure of nests on St Paul's Island and Comino in 2018 might be due to a number of factors. Most likely is the high levels of anthropogenic disturbance on both islands throughout the tourist season, which coincides with the nesting period of Yellow-legged Gulls. High levels of anthropogenic disturbance at gull colonies has long been known to negatively impact reproductive success (Burger 1981). It is unknown whether the gulls at the newly identified colonies are experienced breeders from pre-established colonies or first-time breeders following natal dispersal. The low reproductive success suggests they are the latter. However, other factors, such as intra-specific competition, may also be influencing the reproductive success. Like many gull species, Yellow-legged Gulls have been recorded to predate the nest contents of conspecifics (Marin *et al.* 1995). Although this behaviour is seen more often in colonies with high nest density, studies in Herring Gull *Larus argentatus* have shown that intrusion by non-breeding individuals at nest sites and the subsequent disturbance of parent birds to be a common occurrence, even at low colony density (Henzi *et al.* 1990).

The reduction of parental attendance either through human presence or intrusion of conspecifics may help to explain the low reproductive success of the St Paul's Islands and Comino nests. Despite a high density of rats recorded on both islands prior to a rat control programme implemented in 2018 (Lago *et al.*), it is unlikely that the nest contents of Yellow-legged Gulls were depredated by rats. A 2003 study (Prieto *et al.*) suggests that rats only marginally affect Yellow-legged Gull productivity for two reasons. Firstly, rats seldom predate intact gull eggs due to either physical limitations, jaw-gape vs. egg-size or bite force, or the lack of acquired predatory

skills when predating intact eggs. Secondly, gull nest contents are often protected by parents. Large Laridae gulls, including Yellow-legged Gulls, are particularly strong nest defenders and have high parental attendance. As a result, ground nesting large Laridae gulls, appear to be less susceptible to nest content predation by rats compared to smaller burrow-nesting species, such as shearwaters and petrels (Martin *et al.* 2000, Prieto *et al.* 2003, Jones *et al.* 2008). However, Latorre *et al.* (2011) report that although risk of egg depredation is diminished with increasing egg size, even large eggs experience high rates of depredation by rats when left unattended. Rats on St Paul's Island are known to depredate eggs of Yelkouan Shearwater *Puffinus yelkouan,* as such, it can be assumed that they have acquired skills necessary to predate large eggs. The combination of low-parental attendance and high rat abundance may explain the absence of breeding Yellow-legged Gull on St Paul's Island pre-2018. A further study into the interactions of rat presence at Yellow-legged Gull colonies in the Maltese Islands is needed.

Yellow-legged Gulls are frequently targeted by illegal hunters, particularly during the winter, which may have prevented expansion of existing colonies in the past and made the establishment of new colonies impossible. An abatement in hunting pressure may be a contributing factor in the observed changes in existing and newly established colony sites. However, there is no evident trend in the numbers of illegally shot specimens recovered between 2007 and 2018 (BirdLife Malta unpublished data).

The success of several nests on St Paul's Island in 2019 is certainly an historic record. There are no mentions of Yellow-legged Gulls breeding on St Paul's Island in the literature and, therefore, the three chicks ringed in 2019 are the first to have hatched on these island. However, the productivity of this colony and other establishing colonies remains low. Should these colonies persist, they may experience a period of exponential growth and high productivity as the breeding pairs capitalise on the low competition for the best nesting sites (Kildaw *et al.* 2005, Skórka *et al.* 2005). Therefore, the continued monitoring of all establishing and newly emerging colonies is important in order to evaluate the possible increase in predation risk they might pose to Yelkouan Shearwater colonies in their respective vicinities. Monitoring may be achieved through initial site visits at each colony location during the egg laying period to count apparently occupied nests and numbers of eggs with subsequent visits during the chick rearing period (2–3 per season) to assess

productivity. The establishment of new colonies in accessible sites as opposed to the steep cliffs of Malta and Gozo, also gives opportunity for dietary comparisons with the Filfla colony.

The nests on St Paul's Island were found during fieldwork by the LIFE Arċipelagu Garnija Project team under the ERA permits NP0003/18 and NP0432/18.

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Raymond Galea

Figure 1. *Adult Yellow-legged Gull incubating a single egg. Comino 4 May 2014*

Martin Austad

Figure 2. *Yellow-legged Gull nest with four eggs. Comino 17 April 2018*

James Crymble

Figure 3. *Yellow-legged Gull nest on main islet of St. Paul's Island 14 May 2018*

James Crymble

Figure 4. *The first recorded Yellow-legged Gull chick to have hatched successfully on St Paul's Island*

Breeding Population of Barn Swallows in Gozo

Adin Vella

The Barn Swallow *Hirundo rustica* (Linnaeus, 1758) is a very common passage migrant in the Maltese Islands, both in spring and in autumn. They start arriving from late February to mid-May, and also from late August until early November (Raine 2011; Sultana 2015).

Occasional pairs have bred in the past, with the first documented breeding record for mainland Malta occurring in 1974 when a pair of Barn Swallows bred in a house in the middle of Mqabba. Moreover, the second record of such a breeding pair took place in a derelict farmhouse in the limits of Bidnija in the summer of 1995, where a nest containing four fully-grown young was found on 28 July, a day before they fledged. Additionally, the preceding record, reported also on mainland Malta, occurred in 2004 (Sultana *et al.* 2011).

The first breeding record for Gozo was confirmed in 2006. A family party of five birds was observed at Ta' Gajdoru in Xagħra, Gozo (J. Sultana, G. Haber). Furthermore, the following year, a pair was found breeding in a shed surrounded by horse stables in Sannat. In fact, a female was observed brooding three newly hatchlings. After having consecutive years of successful breeding attempts, the population had increased to four pairs in Sannat by 2011.

Also in 2011, there were breeding Barn Swallows confirmed in Sannat, Xewkija, Kerċem and Għajnsielem, along with a small population of three pairs in Victoria. Between 2016 and 2019, the population of Barn Swallows in Gozo expanded; by 2018, new pairs and locations were found with a total of 24 pairs confirmed breeding in six Gozitan villages, namely: Kerċem (eight pairs), Xewkija (five pairs), Victoria (four pairs), Sannat (three pairs), Għarb (three pairs) and Għasri (one pair), including a potential breeding pair in Fontana.

In 2019, 32 pairs were confirmed. Breeding birds were found for the first time in Nadur as well, with two nests. Between 20 May and 31 August 2019, a total of 77 Barn Swallows were ringed; 19 were ringed as pulli in their nests, whilst the other 58 were caught at a registered bird ringing site in Mġarr ix-Xini. Four of the 77 birds ringed were adults, which were local breeding birds. Two of the pulli that were ringed in Victoria were later controlled at Mġarr ix-Xini.

In the past 12 years, 207 pulli were ringed; this excludes chicks that were present in unreachable nests and/or present in dangerous structures.

One theory to suggest why the numbers of breeding Barn Swallow pairs is increasing on Gozo could be because the existing established pairs were once juvenile birds that were raised in these areas, particularly in Sannat where there have been breeding pairs since 2007. These birds may be returning to the same areas to breed, thus resulting in an expansion of territories across Gozo. The chicks and adults that have been ringed previously will hopefully be able to prove, or disprove, this theory in the future.

Another theory to suggest why Barn Swallows are doing so well as a breeding species on Gozo, compared to Malta, could be because Gozo is still relatively rural with many farms, small hamlets and derelict buildings. Farms provide the birds with areas to find nesting materials and mud for constructing the nests, and the derelict buildings provide them with areas in which to build their nests. In Malta, overdevelopment and the construction of high-rise apartments is becoming more commonplace, which in turn reduces nesting opportunities for Barn Swallows.

However, the current situation for Gozo augurs a bright future for this species, and the Barn Swallow will hopefully retain its status as a regular breeder in the Maltese Islands.

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First record of Ménétries's Warbler *Sylvia mystacea* (Ménétries, 1832) in Malta

Mario V. Gauci & Mark Gauci

The Ménétries's Warbler *Sylvia mystacea* is a *Sylvia* warbler similar to the Sardinian Warbler *Sylvia melanocephala* but it is slightly smaller and shorter-tailed. Its breeding range is southwest Asia and winters southwards as far as northeast Africa. The winter range covers southern Iraq, Arabia and northeast Africa from Sudan to Somalia. A few birds pass through Israel and Jordan on migration. In Europe it has been recorded as a vagrant in Portugal and Spain (BirdLife International European Red List of Birds 2015).

During a bird ringing session at Saqqajja, Rabat, on 21 August 2011, a bird was netted close to a playback lure for Subalpine Warbler *Sylvia cantillans*. The ringing site consists mainly of uncultivated fields overgrown with almond *Prunus* sp. and pomegranate trees *Punica granatum*. On examination the bird looked like a cross between a male Subalpine Warbler and a female Sardinian Warbler, especially due to the pinkish tinge on the breast and the dirty greyish head, reminiscent of an adult female Sardinian Warbler. The bill was evidently too strong for a Subalpine Warbler.

After the bird was ringed, its wing length, weight, and other notes were recorded, as follows: wing length: 59mm; weight: 10.7g; fat score: 4; muscle score: 2; 6th primary emarginated; wing tip fell between the 4th and 5th primaries; and six primary tips projected beyond the tertials.

The bird had a greyish head, bordering on the blackish/grey with particularly blackish lores. A white moustachial stripe was very evident and the throat was white with a pinkish/buff colour on the breast extending to the flanks and side of the breast. A reddish eye ring was also evident. The upper mandible was dark whilst the lower mandible had a pinkish/pale patch at the thick end.
The back was brownish/grey in colour while the wings showed a mixture of old unmoulted feathers (brownish) and fresh feathers (dark grey as in male Sardinian Warbler). Two tertials and the

secondary coverts were all moulted and coloured dark grey with a lighter diffused fringe, denoting that the bird was a first year bird. The alula was long and dark, with a whitish fringe. The tail was squarish, darkish black on top with one moulted feather having a white tip, the rest of the rectrices were unmoulted.

At this stage Sardinian Warbler was obviously discounted. Later in the morning upon consulting the *Collins Bird Guide* (1999) it became evident that the bird could potentially be a Ménétries's Warbler; a species previously unrecorded in the Maltese Islands. This was indeed confirmed when photos were circulated to Lars Svensson and to Itai Shanni (Israel Ornithological Centre), to whom we are very grateful.

This record was submitted to the Malta Rarities and Records Committee and was accepted on 7 November 2012 (Bonavia 2017).

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The first record of Brown Shrike *Lanius cristatus* (Linnaeus, 1758) in Malta

Edward Bonavia

In the evening of 2 November 2017, the author was forwarded a couple of photos of a claimed Red-backed Shrike *Lanius collurio* taken at Il-Magħluq, Marsaxlokk by bird photographer Benny Scerri. It was immediately noticed that the bird was in fact a first winter Brown Shrike *Lanius cristatus*. Since this species was never recorded in Malta, the author visited the site early the following morning, along with a considerable number of local birdwatchers including Nicholas Galea, Raymond Galea, Martin Austad, Adin Vella, and Luke Vella amongst others.

The bird was instantly spotted and all typical identification features of Brown Shrike were observed, including uniform dark brown colouration on upperparts and tail (no contrast unlike Red-tailed Shrike *Lanius phoenicuroides*); narrow long tail; dark mask; some barring on sides of breast and flanks; heavy bill, pale supercilium; darkish centred tertials; buff on lower breast; and the strongly graduated tail were all easily noted.

The bird was heard calling and also briefly singing. It was seen feeding on a shrew, grasshoppers/locusts, dragonflies and other insects. It also showed territorial behaviour as it mobbed Common Stonechats *Saxicola torquatus* and Spanish Sparrows *Passer hispaniolensis* on a number of occasions.

The bird remained in the same area up until it was last seen on the 19 November 2017 by John Attard Montalto.

Brown Shrikes breed in central and eastern Siberia, west to middle Irtysh and Tomsk, Mongolia, Manchuria, Sakhalin, northern Japan, and China. The birds winter in India and southeast Asia (Cramp & Perrins, 1993). There are four races described and *cristatus* has straggled several times to Europe (Shirihai & Svensson, 2018) including one record each in Italy (2002) and Spain (2014). Most European records of this species are in the autumn or winter months.

This record was accepted by the Malta Rarities and Records Committee on 15 February 2018 and this is the first confirmed record of the species in the Maltese Islands.

The Maltese name given to Brown Shrike is *Kaċċamendula tal-Asja* given by the late Joe Sultana.

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Aron Tanti

Figure 4. *Photo of the first Brown Shrike recorded on Malta*

First confirmed record of Eastern Imperial Eagle *Aquila heliaca* (Savigny, 1809) in Malta

Edward Bonavia

Whilst monitoring raptors at Buskett at 14.50 CET on 3 November 2015, the author spotted a large *Aquila sp.* over Żebbuġ heading towards the Buskett observation post. After focussing a telescope on the bird, the author was surprised that it was not a Lesser Spotted Eagle *Clanga pomarina* but was either a juvenile Eastern Imperial Eagle *Aquila heliaca* or juvenile Steppe Eagle *Aquila nipalensis* due to size and general colouration. Furthermore, its upperparts had broad and uniform pale tips to greater coverts and a continuous white trailing edge to wing and tail. It then started soaring which presented its underparts, eliminating Steppe Eagle as all typical features of a juvenile Eastern Imperial Eagle were noted. These features included the streaked breast collar separating the pale head from the pale rear body, uniform pale underwing coverts (unlike in Steppe which has a broad white band) giving the bird a two-toned appearance to darker flight feathers and a pale window on the inner hand. Again the white trailing edge to wing and tail was also visible. At that moment the author contacted other birdwatchers to come to Buskett to observe this bird.

Apart from the above mentioned features, the author also noted the short tail, and the arched wings with a conspicuous broom to their tip.

The bird then flew towards Fawwara where it was lost behind a ridge at 15.05. The author then contacted local birdwatcher Stephen Cilia to direct him to a spot in Fawwara where he assumed the bird might have gone. At 15.45, the author re-sighted the bird again, over Fawwara where it had been seen last, this time together with local birders Raymond Galea and Charles Coleiro. The

bird was lost again behind the ridge after a couple of minutes, however Stephen Cilia was at the right spot at Fawwara and managed to take a number of good photographs of the bird. He also confirmed that the bird was carrying a GPS-GSM satellite tag.

Following email correspondence and studying the photos of the satellite tag, it was concluded that the bird was from Austria. Further confirmation was obtained a week later when the mobile phone company confirmed that this bird's satellite tracker had sent the last two location messages via an operator from Malta. The previous day the tag had lost its connection to a mobile network provider about 100km south of the Peloponnese off the southern coast of Greece. It was at the time heading S/SSW and erroneously ended up in Malta the following day with the prevailing easterly wind. This bird, named "NPDA2", hatched around 3 May 2015 in the National Park Donau-Auen in the east of Vienna and was tagged in the nest (together with another chick) on 25 June. The main goal of this particular project was to inform the ongoing planning and development of windfarms in Austria on the habitat use of this species to mitigate any conflicts between this species and wind farms. The project was financed by a group of wind farm companies.

In addition, there is still the threat of illegal persecution of Eastern Imperial Eagles in Austria and the neighbouring countries, and therefore these trackers provide an important tool for monitoring the extent of this threat. For this particular eagle, it would appear that this was the case; after Stephen Cilia lost sight of the bird, six shots were heard shortly after.

Eastern Imperial Eagles breed in a wide zone from Austria, Slovakia and Hungary in the west through southern Russia to Lake Baikal and N. Pakistan in the east (Forsman 1999). They are a partly migratory species, with adults wintering close to their breeding grounds, also within Europe. Juveniles and subadults, but also some adults of the European population, migrate along the Eastern Mediterranean Flyway to wintering quarters in the Middle East and North Africa. Autumn migration in the Middle East peaks in late October to early November (BirdLife International, 2019) and the occurrence of the bird in Malta falls into this period.

Although Schembri never saw an Eastern Imperial Eagle in Malta, he was informed by Dr. Grech Delicata that he had observed one in October 1842. Gulia (1858–1863) was assured that it was observed many times in Gozo, while Giglioli (1886) and Arrigoni degli Oddi (1929) doubted its occurrence in Malta, suspecting that observations might refer to Golden Eagle *Aquila chrysaetos*. Sultana *et al.* (1975; 1982) thus concluded that 'in view of the lack of supporting evidence this

species should be rejected.' Taking this into account, the observation at hand constitutes the first confirmed record of the species in Malta, and the Malta Rarities and Records Committee accepted the record on 2 February 2016.

The Maltese name is *Ajkla Imperjali* given by Despott in his *Notes on the Ornithology of Malta* (1917).

Acknowledgements

I would like to thank Nicholas Barbara from BirdLife Malta, Matthias Schmidt from BirdLife Austria and András Kovács from the Imperial Eagle Foundation for their assistance in finding the origin and history of this bird.

I would also like to thank Stephen Cilia, who was able to provide the photographic evidence needed to identify this individual.

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First occurrence of Long-billed Dowitcher *Limnodromus scolopaceus* (Say, 1823) in the Maltese Islands

Charles Coleiro & Nicholas Galea

Waders are well known long-distance migrants and it is not infrequent that some individuals overshoot their designated destination and arrive in areas where they do not normally occur, sometimes even on another continent. On 5 October 2012 at Simar Nature Reserve, a small wetland along the northeastern coast of Malta, a long-billed medium sized wader was noticed feeding along one of the shorelines within the wetland. At first glance it resembled a Bar-tailed Godwit *Limosa lapponica* but the curved bill was unlike that of any *Limosa* sp. The apparent long bill pointed to a Long-billed Dowitcher *Limnodromus scolopaceus*, which was further confirmed by its short and sharp shrill call uttered whilst flying around. It also had a broad and rather distinct supercilium, thus suggesting a dowitcher species. Further indication of this bird being a Long-billed Dowitcher were the tertials which had plain grey centres. The overall plumage suggested a first winter bird where the scapular and covert feathers had buffish fringes. This constituted the first ever sighting of this species in the Maltese Islands, and the record was accepted by the Malta Rarities and Records Committee on 7 July 2012, after a description of the bird and photographs were submitted. The bird stayed for 20 days in the nature reserve up until 25 October.

The Long-billed Dowitcher is migratory, wintering (apparently including Siberian breeders) from southern USA (California east to Florida) south to Guatemala. Their main southward passage is between July and September, and some birds make long southeastern movements towards the Atlantic coast. Long-billed Dowitchers breed in northern Siberia tundra from the Chukotskiy peninsula (south into Koryak Highlands) west to Lena Delta, and also in western and northern Alaska and extreme northwest Canada (Snow & Perrins 1998; Vans Gils *et al.* 2019).

Single birds have been recorded in Quebec, Sable Island (Nova Scotia), and W Europe between Finland and Spain; juveniles are virtually annual in Britain and Ireland from 20 September onwards, and sometimes overwinter (Hayman, Marchant & Prater 1986). There have been seven accepted records in Italy, including one in Sicily. The Sicilian record, a first winter bird, was

present at the Augusta Saltpans on the eastern coast, from 20 December 2006 to late February 2007. This is also the only wintering record of this species in Italy (Brichetti & Fracasso 2018).

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The first confirmed record of Citrine Wagtail *Motacilla citreola* (Pallas, 1776) in Malta

Edward Bonavia

On 12 August 2012, local birdwatcher Stephen Cilia found and photographed a juvenile Citrine Wagtail *Motacilla citreola* at Wied Il-Kbir, Qormi. The bird was not seen on the following two days, but then early on the 15 August the wagtail was relocated again by Stephen Cilia, who was also with Charles Coleiro. At 10.15 CET I visited the place and immediately found the bird actively feeding along a freshwater pool in the valley.

All diagnostic features of this species were noticed, including the double broad white wing bar and white undertail coverts; greyish upperparts; palish lores and front of forehead; pale circle to cheeks; and darkish bill. The tail length measured something in between Grey and Yellow Wagtails – seemed longer than in Yellow *(Motacilla flava)* and shorter than in Grey Wagtail *(Motacilla cinerea)*.

The wagtail was easily approached, and I managed to get to within around three metres of the bird. It was heard calling a few times; the call was similar to that of a Yellow Wagtail but seemed a bit louder. Two Grey Wagtails were also present for comparison.

Following my sighting, a few other birdwatchers went to see it the following day (16 August).

The Citrine Wagtail breeds on wet meadows and taiga bogs, at lakesides and along rivers primarily in Asia, but its distribution stretches also far west into Eastern Europe where it has expanded its range westwards in recent decades. It winters in the Middle East, Eastern Arabia and Southern Asia. (Shirihai H. & Svensson L. 2018). This species was an expected rarity to be observed in Malta after increasing numbers of this bird have been reported in Western Europe, including Italy and Sicily over the past 15 years or so. Since this first sighting of this species another nine records (mostly juveniles) of Citrine Wagtails were recorded in Malta.

The Malta Rarities and Records Committee assessed this observation and confirmed it as the first record on 7 November 2012.

The Maltese name given to Citrine Wagtail is *Zakak tal-Lvant*.

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Figure 1. *Citrine Wagtail as seen in Qormi*

First record of Mountain Chiffchaff *Phylloscopus sindianus lorenzii* (Brooks, 1880) in the Maltese Islands

David Attard, Charles Gauci, Raymond Vella

The Mountain Chiffchaff *Phylloscopus sindianus* is found in the Caucasus (*P.s.lorenzii*) and the Himalayas (*P.s.sindianus*).

On 17 November 2015 at 07.40 CET, a *Phylloscopus* type warbler was mist netted and ringed at Għadira Nature Reserve. Upon first examination it was immediately evident that the bird was not a Common Chiffchaff *Phylloscopus collybita*. The face showed dark ear coverts, dark lores, a broad whitish eye stripe and brown cap (see Fig. 1). The breast and flanks were pale greyish buff with a paler chin (see Fig. 2) and lacking any yellow hues on the breast or belly, as in *P. collybita*. The bird's upperparts were of a plain brownish colour with darker wing primaries and tail (see Fig. 3) and lacking any yellowish hue as in *P. collybita* or the greenish hue on the wings as in *P. tristis*.

The bird had emarginated 4th-5th-6th primaries. Wing point 4=5. 1st primary was 8+pc; 3rd primary -1. Tail length was 45mm; bill to skull 13mm; and bill to feathers 8mm.

One of the authors (C. Gauci) had seen and photographed this species in Kazbegi (Georgia) the previous year.

The Chairman of the Malta Rarities and Records Committee (MRRC), Raymond Galea, sent photos of the bird to Lars Svensson who has extensive experience of the species. Mr Svensson had no doubt that the bird in question was indeed a Mountain Chiffchaff.

The description as well as photographs of the bird were sent to the MRRC and it was accepted on 2 February 2016 (Bonavia E. Malta Rarities and Records Committee-Malta. 2nd Report *Il-Merill* 33:40-47.) This constituted the first record of the Mountain Chiffchaff in the Maltese Islands.

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Figure 1. *Overall appearance of the Mountain Chiffchaff ringed at Għadira*

David Attard

Figure 2. *Greyish buff breast and flanks contrasting with pale/white belly*

David Attard

Figure 3. *Dark/brown upperparts and tail*

The first occurrence of Levant Sparrowhawk *Accipiter brevipes* (Severtzov, 1850) in Malta

Edward Bonavia

Whilst monitoring the annual autumn raptor migration at Buskett at around 14.30 CET on 27 September 2016, the author spotted a sparrowhawk at moderate height coming over Buskett against the NE wind. The author immediately noted that the bird had features pointing towards Levant Sparrowhawk *Accipiter brevipes* due to shape of the wings, which had pointed wing-tips rather than rounded as in Eurasian Sparrowhawk *Accipiter nisus*. The bird also had a boldly streaked breast and dark wing-tips (fingers), and at this point called the attention of local birdwatcher Raymond Galea to observe it. Unfortunately the bird immediately stooped and alighted in the Verdala Palace grounds and therefore at this stage, due to only watching it for a few seconds and in unfavourable conditions (as bird was flying away), the identification of the bird was not confirmed.

At 16.00 (joined by another local birdwatcher Charles Coleiro) the Levant Sparrowhawk was found again soaring low above Bosk Iż-Żgħir and then soared low over us. It was then that the author confirmed identification and some record photos of the bird were taken. The bird was identified as a juvenile and all features of Levant were seen including the features mentioned above, as well as the typical dark central throat stripe of this species. The dark eye could also be seen in the record photos.

The Levant Sparrowhawk roosted at Buskett that night. It is likely that the same bird was seen and photographed five days later by birdwatcher Raymond Testa at Buskett on the 1 October 2016.

The description was submitted to the Malta Rarities and Records Committee (MRRC) and it was accepted on 21 February 2017, based on the description and photographic evidence, a requisite considering that this is the first record for the Maltese Islands. Fenech (2010 & 2017) mentions a few records of this species but most seem to be based on preserved specimens in local taxidermy collections. These are therefore all hearsay records with no photographic evidence or description

and never officially submitted to the MRRC. Even if they are found in local collections as stated they could have easily been imported from elsewhere.

The suggested Maltese name is *Sparvier tal-Lvant*.

The breeding range of Levant Sparrowhawk is confined to the Western Palearctic. It breeds from the Balkans eastwards, with the majority in areas north of the Black Sea. Unlike the Eurasian Sparrowhawk, all migrate and is highly gregarious during migration, occurring in dense flocks of up to hundreds of birds in areas along the eastern flyway along the Bosporus and in Israel. Autumn movement starts mid-August, with marked peak during latter half of September (which coincides perfectly with this bird) and ceasing during first half of October.

In nearby Tunisia there are at least six records of this species (Isenmann *et al*. 2005) and in Italy there are 13 accepted records, 11 of which since 2000 including six records in the Strait of Messina and one at Pantelleria (Brichetti & Fracasso 2018).

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Raymond Galea

Figure 1. *Photo of Levant Sparrowhawk taken on 27 September 2016*

The first record of Black-throated (Seebohm's) Wheatear *Oenanthe seebohmi* (Dixon, 1882) in Malta

Edward Bonavia

Local photographer and birdwatcher Aron Tanti took photos of a male Black-throated Wheatear *Oenanthe seebohmi,* which he found in Xrobb L-Għaġin Park, along the southeastern coast of Malta, on 30 March 2016. Aron sent his photos to me, and I visited the park with my father, Norman Bonavia, who is also a birdwatcher, on the same day. The bird was located actively feeding in the patch exactly next to the main building of Xrobb L-Għaġin park, together with a number of Northern Wheatears *Oenanthe oenanthe* and a couple of Black-eared Wheatears *Oenanthe hispanica.* The Black-throated Wheatear was very tame and easily approachable.

All diagnostic features of this species were noted, including the large black throat-patch extending to the cheeks, ash-grey upperparts, very broad white supercilium and forehead and pure white underparts. In flight it showed the typical solid black underwing coverts contrasting strongly with the pale underside of the flight feathers.

Presumably the wheatear continued its migration overnight, as birdwatchers who visited the area the following day were unable to locate it.

The Black-throated Wheatear is a localised summer visitor to the Atlas Mountains of Morocco and Algeria. It is a relatively short-distance migrant as it winters mainly close to the Atlantic coast (BirdLife International 2019). Apart from being recorded a few times in Tunisia and Libya, it has been recorded once each in Egypt, Gibraltar, Canary Islands, and recently (2017) in the Netherlands.

The sighting was submitted to the Malta Rarities and Records Committee, who accepted this as a first record on 21 February 2017. The Maltese name given to Black-throated Wheatear is *Kuda tal-Atlas*.

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Figure 1. *Black-throated Wheatear as seen on 30 March 2016 in Xrobb L-Għaġin*

First confirmed record of Black-winged Kite *Elanus caeruleus* (Desfontaines, 1789) in Malta

Fabian Karwinkel & Alexander Heyd

On 14 April 2017 at 18.15 CET, the authors observed a Black-winged Kite *Elanus caeruleus* at Buskett. The location where the observation took place was on the road east of Verdala Palace, 100 metres east of the chapel Il-Kappella ta' San Nikola u Santa Luċija. The bird flew from Verdala Palace at a height of roughly 30 to 40 metres, and headed east towards Żebbuġ/Siggiewi. It was observed for about 30 seconds with binoculars. In the bright sunlight the silvery-grey plumage, black wingtips and black shoulders of an adult specimen were clearly visible. The closest distance between the observers and the bird was approximately 100 metres. One of the authors managed to record a short video of the bird in flight. Alexander Heyd knows the species from several birding trips to Spain, Morocco and Egypt, as well as from a recent holiday in January 2017 to South Africa. Fabian Karwinkel had no previous experience with the species, but was able to identify it easily due to the clearly visible characteristics. The authors submitted their observation to the Malta Rarities and Records Committee (MRRC), and the record was accepted on the 15 February 2018.

Fenech (2010, 2017) had mentioned two previous sightings and one "confirmed record" in the Maltese Islands in 2016. However, these records were not backed up with any photographic evidence or descriptions, nor were the records officially submitted to the MRRC. Therefore, the observation at hand constitutes the first confirmed record of the species for the Maltese Islands.

The nominate race of the Black-winged Kite is native to the Western Iberian Peninsula, SW France, as well as Northern and Sub-Saharan Africa. The breeding grounds of the species closest to Malta are located in Tunisia. Rather than being migratory or sedentary, Black-winged Kites are known to perform nomadic movements according to abundance and distribution of their prey. They have been reported as vagrants in a number of European countries outside their breeding range (Kemp *et al.* 2019).

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First record of Red-tailed Shrike *Lanius phoenicuroides* (Schalow, 1875) in Malta

Martin Austad

The Red-tailed Shrike *Lanius phoenicuroides* was first spotted on Comino, east of the cemetery, on 20 April 2013 at 11.30 CET while I was scanning the garrigue with binoculars. Its pale features were very striking and although I had not seen this species before, I was able to connect the bird in front of me to images I had seen previously in reference books and on the Internet. I could exclude Woodchat Shrike *Lanius senator*, Red-backed Shrike *Lanius collurio* and one of the grey shrike species, all species I am familiar with, due to obvious plumage differences. At this point, the bird was not identified with certainty, but Isabelline Shrike *Lanius isabellinus* was suspected.

It was feeding on insects, moving from perch to perch and also landing on the ground. In flight a white primary patch was very visible, as well as a rufous tail which contrasted against the grey-brown back. Its pale colour meant it was surprisingly difficult to spot in the shade of the giant fennel *Ferula communis* flowers where it sometimes perched. When perched on top of bushes, its white underparts, black lores and ear coverts creating a mask, as well as a thin white supercilium was noted. Moreover the crown was of a different colour than the grey back and had a warmer brown tone.

I had observed the bird for around ten minutes when I lost it from sight as it went behind a rubble wall. Two other observers were present and saw the bird, Luca Pisani and Michael Saliba, both relatively new to birdwatching. Later, several very experienced birdwatchers joined, including Nicholas Galea, Adin Vella and Anne-Marie Austad. The area was searched thoroughly to relocate the bird, and after 30 minutes it was found feeding on a dragonfly close to the spot where it was first found. All observers got very good views of the shrike. After around ten minutes of viewing, all features relevant for identification had been noted and all observers left the area.

From the features noted in the field, as well as from the photographs taken, other shrike species vagrant to Europe could be safely excluded. Brown Shrike *Lanius cristatus* was excluded due to the presence of a prominent white primary patch and white underparts; Brown Shrikes only show a very small patch if present and buff underparts. The white underparts also excluded Isabelline Shrike *Lanius isabellinus* as well as the lack of a white supercilium in this species. According to

plumage characteristics, the bird seen on Comino was identified as an adult male (Duivendijk 2011).

A detailed description of the observation including photographs was submitted to the Malta Rarities and Records Committee, which approved the sighting on 20 February 2014 as the first confirmed record for Malta.

The breeding range of the Red-tailed Shrike spans from central and eastern Kazakhstan to Transcaspia, Iran, Afghanistan, Pakistan and also reaches NW China (del Hoyo *et al.* 2019). It is migratory and spends the non-breeding period mainly in Arabia and northeast and east Africa, with some also wintering as far west as in West Africa. Its current conservation status is least concern (LC) (BirdLife International 2019).

Red-tailed Shrikes are vagrants in Europe and seen in a number of countries especially in Britain. The majority are found in autumn, especially October, but also between late April to early June (van der Laan & CDNA 2008).

The Maltese name of the Red-tailed Shrike is *Kaċċamendula Denbha Aħmar*.

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Malta Rarities and Records Committee

3rd Report

Preamble

This is the third report of the Malta Rarities and Records Committee (MRRC) covering the years 2016, 2017 and first six weeks of 2018. The previous reports appeared in *Il-Merill* (2010) and *Il-Merill* (2017). This report reviews three committee meetings which were held at the National Museum of Natural History on 21.02.2017, 15.02.2018, and 31.07.2018. Discussions and decisions on some of the submitted records were also carried out online between committee members when appropriate.

The members serving on the Committee were: Raymond Galea (Chairman), Edward Bonavia (Secretary), John J. Borg (representing the National Museum of Natural History), and Martin Austad (2018), Ian Balzan, Denis Cachia, Caldon Mercieca and Joe Sultana (2017) as members. The Committee sought the advice of international experts before taking a decision on some of the records.

Regulations

The regulations which appeared in the first report together with the update in the second report were retained.

Nomenclature adopted for the official Malta Bird List

In the MRRC meeting of 15.02.18, it was decided to adopt the HBW/BirdLife World bird list as from 01.01.18 since the MRRC is part of BirdLife Malta and the following institutions are also using this list: EU, AEWA, CMS, and IUCN.

Species requiring a description by the Malta Rarities and Records Committee

Ideally all records of very scarce species should be submitted to the MRRC with a field description and, when available, with a photograph. Species, which have been recorded less than 20 times (including new species) in the Maltese Islands, require a description. However there are some species listed below that, in spite of being recorded more than 20 times, still require a description

to be officially accepted as these are very difficult to identify in the field. The MRRC may also ask for a description of other species when it deems necessary.

The following is the updated list of species that require a description:

White-headed Duck *Oxyura leucocephala*

Red-breasted Goose *Branta ruficollis*

Bean Goose *Anser fabalis*

Greater White-fronted Goose *Anser albifrons*

Common Scoter *Melanitta nigra*

Common Goldeneye *Bucephala clangula*

Smew *Mergellus albellus*

Goosander *Mergus merganser*

Ruddy Shelduck *Tadorna ferruginea*

Marbled Teal *Marmaronetta angustirostris*

Red-crested Pochard *Netta rufina*

Tufted Duck *Aythya fuligula*

Greater Scaup *Aythya marila*

Blue-winged Teal *Anas discors*

Laughing Dove *Streptopelia senegalensis*

Black-bellied Sandgrouse *Pterocles orientalis*

Pin-tailed Sandgrouse *Pterocles alchata*

Red-necked Nightjar *Caprimulgus ruficollis*

Egyptian Nightjar *Caprimulgus aegyptius*

White-throated Needletail *Hirundapus caudacutus*

White-rumped Swift *Apus caffer*

Little Swift *Apus affinis*

Baillon's Crake *Zapornia pusilla*

Striped Crake *Aenigmatolimnas marginalis*

Purple Swamphen *Porphyrio porphyrio*

Allen's Gallinule *Porphyrio alleni*

Red-knobbed Coot *Fulica cristata*

Demoiselle Crane *Grus virgo*

Little Bustard *Tetrax tetrax*

Great Bustard *Otis tarda*

African Houbara *Chlamydotis undulata*

Red-throated Loon *Gavia stellate*

Leach's Storm-petrel *Oceanodroma leucorhoa*

Sooty Shearwater *Puffinus griseus*

Manx Shearwater *Puffinus puffinus*

Balearic Shearwater *Puffinus mauretanicus*

Western Reef-egret *Egretta gularis*

Great White Pelican *Pelecanus onocrotalus*

Pygmy Cormorant *Phalacrocorax pygmeus*

European Shag *Phalacrocorax aristotelis*

Pacific Golden Plover *Pluvialis fulva*

Greater Sandplover *Anarhynchus leschenaultii*

Caspian Plover *Anarhynchus asiaticus*

Spur-winged Lapwing *Vanellus spinosus*

Sociable Lapwing *Vanellus gregarius*

White-tailed Lapwing *Vanellus leucurus*

Upland Sandpiper *Bartramia longicauda*

Slender-billed Curlew *Numenius tenuirostris*

Red Knot *Calidris canutus*

Broad-billed Sandpiper *Calidris falcinellus*

Purple Sandpiper *Calidris maritima*

Buff-breasted Sandpiper *Calidris subruficollis*

Pectoral Sandpiper *Calidris melanotos*

Long-billed Dowitcher *Limnodromus scolopaceus*

Red-necked Phalarope *Phalaropus lobatus*

Red Phalarope *Phalaropus fulicarius*

Terek Sandpiper *Xenus cinereus*

Pallas's Gull *Larus ichthyaetus*

European Herring Gull *Larus argentatus*

Caspian Gull *Larus cachinnans*

Glaucous Gull *Larus hyperboreus*

Roseate Tern *Sterna dougallii*

Arctic Tern *Sterna paradisaea*

Lesser Crested Tern *Sterna bengalensis*

Long-tailed Jaeger *Stercorarius longicaudus*

Arctic Jaeger *Stercorarius parasiticus*

Atlantic Puffin *Fratercula arctica*

Razorbill *Alca torda*

Little Auk *Alle alle*

Common Murre *Uria aalge*

Little Owl *Athene noctua*

Black-winged Kite *Elanus caeruleus*

Griffon Vulture *Gyps fulvus*

Eastern Imperial Eagle *Aquila heliaca*

Golden Eagle *Aquila chrysaetos*

Levant Sparrowhawk *Accipiter brevipes*

White-tailed Sea-eagle *Haliaeetus albicilla*

Red Kite *Milvus milvus*

Rough-legged Buzzard *Buteo lagopus*

Long-legged Buzzard *Buteo rufinus*

Blue-cheeked Bee-eater *Merops persicus*

American Kestrel *Falco sparverius*

Sooty Falcon *Falco concolor*

Lanner Falcon *Falco biarmicus*

Peregrine Falcon *ssp. Falco peregrinus pelegrinoides* (Barbary Falcon)

Red-eyed Vireo *Vireo olivaceus*

Brown Shrike *Lanius cristatus*

Red-tailed Shrike *Lanius phoenicuroides*

Great Grey Shrike *Lanius excubitor*

Masked Shrike *Lanius nubicus*

Eurasian Jackdaw *Corvus monedula*

Rook *Corvus frugilegus*

Common Raven *Corvus corax*

Carrion Crow *Corvus corone*

Eurasian Blue Tit *Cyanistes caeruleus*

Great Tit *Parus major*

Greater Hoopoe-lark *Alaemon alaudipes*

Bar-tailed Lark *Ammomanes cinctura*

Dupont's Lark *Chersophilus duponti*

Lesser Short-toed Lark *Alaudala rufescens*

Black Lark *Melanocorypha yeltoniensis*

Temminck's Lark *Eremophila bilopha*

Horned Lark *Eremophila alpestris*

White-winged Lark *Alauda leucoptera*

Crested Lark *Galerida cristata*

Booted Warbler *Iduna caligata*

Olivaceous Warbler *Iduna pallida*

Isabelline Warbler *Iduna opaca*

Melodious Warbler *Hippolais polyglotta*

Aquatic Warbler *Acrocephalus paludicola*

Blyth's Reed-warbler *Acrocephalus dumetorum*

Marsh Warbler *Acrocephalus palustris*

Paddyfield Warbler *Acrocephalus agricola*

River Warbler *Locustella fluviatilis*

Common Grasshopper-warbler *Locustella naevia*

Pallas's Leaf-warbler *Phylloscopus proregulus*

Dusky Warbler *Phylloscopus fuscatus*

Iberian Chiffchaff *Phylloscopus ibericus*

Mountain Chiffchaff *Phylloscopus sindianus*

Radde's Warbler *Phylloscopus schwarzi*

Greenish Warbler *Phylloscopus trochiloides*

Arctic Warbler *Phylloscopus borealis*

African Desert Warbler *Sylvia deserti*

Barred Warbler *Sylvia nisoria*

Western Orphean Warbler *Sylvia hortensis*

Ménétries's Warbler *Sylvia mystacea*

Moltoni's Warbler *Sylvia subalpina*

Rüppell's Warbler *Sylvia rueppelli*

Marmora's Warbler *Sylvia sarda*

Tristram's Warbler *Sylvia deserticola*

Wallcreeper *Tichodroma muraria*

White-throated Dipper *Cinclus cinclus*

Spotless Starling *Sturnus unicolor*

Rosy Starling *Pastor roseus*

Siberian Thrush *Geokichla sibirica*

Eyebrowed Thrush *Turdus obscurus*

Thrush Nightingale *Luscinia luscinia*

Siberian Rubythroat *Calliope calliope*

Orange-flanked Bush-robin *Tarsiger cyanurus*

European Pied Flycatcher *ssp. Ficedula hypoleuca speculigera* (Atlas Flycatcher)

Moussier's Redstart *Phoenicurus moussieri*

Black-throated Wheatear *Oenanthe seebohmi*

Desert Wheatear *Oenanthe deserti*

Pied Wheatear *Oenanthe pleschanka*

Black Wheatear *Oenanthe leucura*

White-crowned Wheatear *Oenanthe leucopyga*

Bohemian Waxwing *Bombycilla garrulous*

Alpine Accentor *Prunella collaris*

Rock Sparrow *Petronia petronia*

White-winged Snowfinch *Montifringilla nivalis*

Olive-backed Pipit *Anthus hodgsoni*

Rock Pipit *Anthus petrosus*

Citrine Wagtail *Motacilla citreola*

Common Rosefinch *Carpodacus erythrina*

Eurasian Bullfinch *Pyrrhula pyrrhula*

Redpoll *Acanthis flammea*

Lapland Longspur *Calcarius lapponicus*

Snow Bunting *Plectrophenax nivalis*

Black-headed Bunting *Emberiza melanocephala*

Rock Bunting *Emberiza cia*

Cretzschmar's Bunting *Emberiza caesia*

Cirl Bunting *Emberiza cirlus*

Yellowhammer *Emberiza citrinella*

Pine Bunting *Emberiza leucocephalos*

Yellow-breasted Bunting *Emberiza aureola*

Rustic Bunting *Emberiza rustica*

Little Bunting *Emberiza pusilla*

Chestnut Bunting *Emberiza rutila*

White-throated Sparrow *Zonotrichia albicollis*

Rose-breasted Grosbeak *Pheucticus ludovicianus*

Category D species (i.e. species that there is reasonable doubt that they have ever occurred in a natural state) do not form part of the Malta list and therefore are not found in the above list.

Accepted Records

The following records have been discussed either during meetings of the MRRC or by discussions online. A few of these accepted records appeared in social media and were also discussed by the MRRC. Six species are new to the Malta Bird List. All records include the name of the observers.

Little Swift *Apus affinis*: 1 on 18.05.2016 at Victoria Cittadella Gozo (John J. Borg).

European Herring Gull *Larus argentatus*: 1 2nd winter on 18.12.2017 and 29-30.12.2017 at Salina (Stefano Miceli, Alex Casha, Raymond Galea, Mario V. Gauci).

Caspian Gull *Larus cachinnans*: 1 1st winter on 30.12.2017 (photographs and information obtained from a public Facebook group) **(1st record for Malta)**; 1 1st winter on 03.01.2018 at Tas-Safra (Luke Vella); 1 1st winter in mid-Jan 2018 (photographs and information obtained from a public Facebook group); 2 on 27.01.2018 at Salina (Aron Tanti, Stefano Miceli); 1 2nd winter

on 10.02.2018 (photographs and information obtained from a public Facebook group); 1 2nd winter on 14.02.2018 at Salina (Edward Bonavia). See short note on Caspian Gulls in Malta in this report.

Lesser Crested Tern *Thalasseus bengalensis*: 1 on 20.08.2017 at Tas-Safra (Stefano Miceli, Chris Carbone).

Long-tailed Jaeger (Skua) *Stercorarius longicaudus*: 1 15 miles off Xlendi Gozo on 18.05 or 19.05.2017 (photographs and information obtained from a public Facebook group).

Arctic Jaeger (Skua) *Stercorarius parasiticus*: 1 adult dark phase at Ċirkewwa on 19.03.2016 (Edward Bonavia, Charles Coleiro).

Black-winged Kite *Elanus caeruleus*: 1 on 14.04.2017 at l/o Buskett (Alexander Heyd, Fabian Karwinkel) **(1st record for Malta)**.

Red Kite *Milvus milvus*: 1 on 24.09.2016 at Buskett (Edward Bonavia, Nicholas Galea, Raymond Galea *et al*.).

Griffon Vulture *Gyps fulvus*: 1 on 03.06.2016 at Freeport **(ship-assisted**) (Nicholas Barbara, Edward Bonavia, Denis Cachia).

Levant Sparrowhawk *Accipiter brevipes*: 1 juv on 27.09.2016 at Buskett (Edward Bonavia, Raymond Galea, Charles Coleiro) **(1st record for Malta)** and most probably the same bird on 01.10.2016 at same place (Raymond Testa).

Brown Shrike *Lanius cristatus*: 1 from 02.11 to 19.11.2017 at Il-Magħluq Marsaxlokk (Benny Scerri, Edward Bonavia, Nicholas Galea, Raymond Galea, Martin Austad, Adin Vella, Aron Tanti, John Attard Montalto, James Aquilina, Stephen Cilia *et al*.) **(1st record for Malta)**.

Great Grey Shrike *Lanius excubitor elegans*: 1 on 09-10.03.2016 at Ta' Ċenċ (Benjamin Metzger, Edward Jenkins, Edward Bonavia).

Rook *Corvus frugilegus*: 1 on 11.04.2017 at Luqa Airport (James Aquilina).

Carrion (Hooded) Crow *Corvus corone cornix*: 1 on 19–20.05.2016 at Kalkara & Ħal Far (photographs and information obtained from a public Facebook group); 1 on 24.04.2017 at Comino (Victor Cilia) and Foresta 2000 (Raymond Vella) flying south; 1 probably same bird at Floriana

from 24–27.04.2017 (Adin Vella, Edward Bonavia, Raymond Galea); 1 possibly same bird at Għadira flying north on 14.05.2017 (David Attard).

Eurasian Blue Tit *Cyanistes caeruleus*: 1 ringed at Simar on 15.01.2018 (Charles Coleiro).

Isabelline Warbler *Hippolais opaca:* 1 ringed on 30.04.2016 and re-trapped on 04.05.2016 at Għadira (David Attard, Charles Gauci, Edward Bonavia).

Melodious Warbler *Hippolais polyglotta*: 1 ringed at Comino on 01.05.2017 (Raymond Galea, Nicholas Galea, Martin Austad, Timmy Micallef *et al*.).

Paddyfield Warbler *Acrocephalus agricola*: 1 ringed at Comino on 04.09.2016 (Roger Short).

Common Grasshopper-warbler *Locustella naevia*: 1 ringed on 05.09.2016 at Comino (Roger Short).

Pallas's Leaf-warbler *Phylloscopus proregulus*: 1 ringed at Għadira on 05.11.2016 (Raymond Galea, Charles Gauci *et al*.).

Dusky Warbler *Phylloscopus fuscatus*: 1 ringed at Simar on 17.11.2016 (Charles Coleiro, Edward Bonavia, Raymond Galea); 1 ringed at Mġarr Ix-Xini on 26.10.2017 (Adin Vella).

African Desert Warbler *Sylvia deserti*: 1 on 11.04.2016 at Xagħra L-Ħamra (Robert Margolis).

Moltoni's Warbler *Sylvia subalpina*: 1 ringed at Comino on 26.04.2013 (Raymond Galea) (**1st record for Malta**); 1 ringed on 21.05.2016 at Għadira (Raymond Galea).

Rüppell's Warbler *Sylvia rueppelli*: 1 female at Xagħra l-Ħamra on 22.03.2017 (photographs and information obtained from a public Facebook group); 1 male at Xagħra l-Ħamra on 23.03.2017 (photographs and information obtained from a public Facebook group).

Marmora's Warbler *Sylvia sarda*: 1 ringed on 21.10.2016 at Comino (Martin Austad); 1 from 29.01.2017 to 05.02.2017 at Dwejra (Gozo) (Martin Austad, Adin Vella, Edward Bonavia, Raymond Galea, Nicholas Galea).

Moussier's Redstart *Phoenicurus moussieri***:** 1 female from 01–12.01.2017 at Sanap Cliffs, Gozo (Adin Vella, Raymond Galea, Nicholas Galea, Edward Bonavia, Gilbert Haber *et al*.); 1 female ringed on 04.11.2017 at Mġarr Ix-Xini (Adin Vella).

Black-throated (Seebohm's) Wheatear *Oenanthe seebohmi*: 1 at Xrobb l-Għaġin on 30.03.2016 (Aron Tanti, Edward Bonavia) **(1st record for Malta)**.

White-crowned Wheatear *Oenanthe leucopyga:* 1 on 25.03.2016 at Xagħra l-Ħamra (Benjamin Metzger, Edward Jenkins, Edward Bonavia, Raymond Vella, Ian Balzan, Charles Coleiro).

Alpine Accentor *Prunella collaris*: 1 on 03.11.2016 at Nadur Gozo (photographs and information obtained from a public Facebook group).

Olive-backed Pipit *Anthus hodsgoni:* 1 from 07.12.2016 to 21.02.2017 at Ta' Qali (Eman Portelli, Edward Bonavia, David Attard, Raymond Galea, Nicholas Galea, Martin Austad, Adin Vella, Aron Tanti, Denis Cachia *et al.*).

Citrine Wagtail *Motacilla citreola*: 1 adult summer plumage in May 2017 (photographs and information obtained from a public Facebook group); 1 adult winter plumage on 14.10.2017 at Għadira (Aron Tanti).

Common Rosefinch *Carpodacus erythrina*: 1 2nd cy male on 21.05.2017 at Buskett (Raymond Galea); 1 juv. on 10.10.2017 at Għadira (David Attard); 1 juv. trapped at Kerċem in end October 2017 (reported by Adin Vella).

Little Bunting *Emberiza pusilla*: 1 ringed on 13.10.2016 at Għadira (David Attard, Edward Bonavia); 1 on 20.10.2016 at Nadur Gozo (photographs and information obtained from a public Facebook group); 1 ringed on 10.10.2017 at Għadira (David Attard).

The following record was accepted but will be placed in **Category D**:

Cape Teal *Anas capensis*: 1 on 28.01.2018 at Simar (Raymond Galea, Alex Casha, Noel Camilleri).

Rejected Records

The following records have been discussed during meetings of the MRRC and rejected as they were not felt to have had sufficient evidence to be accepted under the criteria of the AERC and the MRRC. In some cases, submissions with the descriptions were sent to experts abroad for their comment before a final decision was taken. The submitters and the reasons for refusals are not included in this report.

Western Reef-egret *Egretta gularis*: 1 dark morph on 28.05.2017 at Għajn Tuffieħa.

Caspian Gull *Larus cachinnans*: 1 2nd cy at Salina on 02.04.2015; 1 1st winter on 13.12.2016 at Tas-Safra.

Long-legged Buzzard *Buteo rufinus*: 1 on 15.10.2017 at Comino.

Olive-backed Pipit *Anthus hodgsoni*: 1 heard on 21.10.2016 and on 30.10.2016 at Buskett.

Yellowhammer *Emberiza citrinella*: 1 juv/female trapped in south of Malta on 05.11.2017.

Caspian Gulls in Malta

Sammut & Azzopardi (2010) wrote a short paper entitled 'The Status of Caspian Gull in Malta' in *British Birds*. In it they mention a number of records for Malta including the first record of this species seen by one of the authors off Qawra on 27.03.2001. Unfortunately these records were either never submitted to the MRRC or rejected and the MRRC is not aware of any photographs that would prove some of these claimed records. Due to this the first accepted records of this species for Malta are those published in this report.

Records in the public domain

As mentioned in the previous rarities report, during this review period, a number of rarities have been in the public domain either in the press, online or in birding journals. Additionally a separate MRRC meeting was held on 31.07.18 to discuss all published 1st records for Malta in Fenech's two books: *A Complete Guide to the Birds of Malta* published in 2010 and *Birds of the Maltese Islands* published in 2017.

The following records were discussed and **rejected**:

i) Northern Bobwhite *Colinus virginianus*: 1998–2005 Comino
There was never a self-sustaining population of this species on Comino so it cannot be placed on the official Malta bird list.

ii) Golden Pheasant *Chrysolphus pictus*: 1998–2005 Comino
There was never a self-sustaining population of this species on Comino so it cannot be placed on the official Malta bird list.

iii) Barnacle Goose *Branta leucopsis:* 2 shot at Marsascala on 18.05.07; 7 (6 shot) off Pembroke on 11.12.12; 2 at Qawra on 12.12.12 (1 shot)

1st record could have easily been escapees due to date and the birds of Pembroke and Qawra are hearsay records with no photographic evidence or description and never officially submitted to the MRRC thus all records of this species are rejected.

iv) Pink-footed Goose *Anser brachyrhynchus*: 1 at Gozo on 20.12.01

Hearsay record with no photographic evidence or description and never officially submitted to the MRRC thus this record is rejected.

v) Common Eider *Somateria mollissima*: 1 male at St Elmo Pt. on 19.12.12

Hearsay record with no photographic evidence or description and never officially submitted to the MRRC thus this record is rejected.

vi) Red-necked Grebe *Podiceps grisegena*: 1 imm shot l/o Bengħajsa end Oct 2008

Hearsay record with no photographic evidence or description and never officially submitted to the MRRC thus this record is rejected.

vii) Oriental Turtle-dove *Streptopelia orientalis*: 1 juv. seen at Ħal Far on 08.11.14 and subsequently shot a day later in Gozo on 01.01.16

As can be seen there is a mix up of dates. Additionally this record/s are hearsay records with no photographic evidence or description and never officially submitted to the MRRC thus this record/s is rejected.

viii) African Collared-dove *Streptopelia risoria*: Feral species breeding in various areas

Barbary Doves are the domesticated form of African Collared-dove so not a pure species by itself and therefore cannot be included in the official Malta Bird List.

ix) Spotted Sandgrouse *Pterocles senegallus*: 1 at Qawra on 26.12.00 probable same bird shot same day in Burmarrad; 1 at Aħrax on 07.04.12

1st record was rejected by Charles Coleiro (the other observer) and second record is a hearsay record with no photographic evidence or description and never officially submitted to the MRRC thus this record is rejected.

x) Yellow-billed Cuckoo *Coccyzus americanus*: 1 male at Aħrax on 11.94; 1 at Marsascala in Oct early 90s; 3 (in collections), no dates and locations, but all local.

These are all hearsay records with no photographic evidence or description and never officially submitted to the MRRC. Even if these specimens were seen at taxidermists

they could have easily been imported from North America. The chance of getting this species wild as a vagrant from N America to Malta is highly unlikely and even birds that reach UK for example are extremely weak and most die after a few days. Due to this these records cannot be accepted and are thus rejected.

xi) Cory's Shearwater *Calonectris borealis*: 2 records no details given

Hearsay records with no photographic evidence or description and never officially submitted to the MRRC thus these records are rejected.

xii) Great Shearwater *Puffinus gravis*: 1 taken late summer 1983; 1 taken 04.07.84; 1 taken off Malta in Sep 06; 1 off Sliema on 25.02.15

Hearsay records with no photographic evidence or description and never officially submitted to the MRRC. Even if found in local collections one cannot be sure that they were caught in Maltese territorial waters. In view of this these records are rejected.

xiii) Greater Yellowlegs *Tringa melanoleuca*: 1 shot in Gozo Jun 13

Hearsay records with no photographic evidence or description and never officially submitted to the MRRC. Even if this species was seen in a local collection it could have easily been imported from North America. Thus this record was rejected.

xiv) Bonaparte's Gull *Chroicocephalus philadelphia*: 1 imm at Pembroke on 11.11.12

Hearsay record with no photographic evidence or description and never officially submitted to the MRRC thus this record is rejected.

xv) Laughing Gull *Larus atricilla*: 1 2nd year at Grand Harbour on 01–02.09.07; 1 imm at Grand Harbour on 11.09.10

Hearsay records with no photographic evidence or description and never officially submitted to the MRRC thus these records are rejected.

xvi) Great Black-backed Gull *Larus marinus*: 1 ad at Grand Harbour on 31.12.02; 1 ad at Baħar Iċ-Ċagħaq on 13.12.05; 1 at Rinella/Grand Harbour on 25.01.09 (and again on later dates); 1 3rd/4th year at Grand Harbour on 24.01.10

All hearsay records with no photographic evidence or description and never officially submitted to the MRRC thus these records are rejected.

1 1st winter on 02.01.2018 posted in a public Facebook group. The Committee decided that the photo could have been taken abroad and not in Malta and thus was rejected.

xvii) Royal Tern *Sterna maxima albidorsalis*: 1 taken on 26.07.79

Hearsay record with no photographic evidence or description and never officially submitted to the MRRC. Even if found in a local collection one cannot be sure that it was caught in Maltese territorial waters. In view of this, this record is rejected.

xviii) Swallow-tailed Kite *Elanoides forficatus*: 1 shot between Malta and Pantelleria in 1884 as recorded in literature

One cannot be sure that it was caught in Maltese territorial waters. In view of this, this record is rejected.

xix) Greater Spotted Eagle *Aquila clanga*: 1 imm. shot at Mġarr (M) on 20.10.82; 1 shot at Żonqor Point in Oct 2000

Hearsay records with no photographic evidence or description and never officially submitted to the MRRC thus these records are rejected.

xx) Steppe Eagle *Aquila nipalensis*: 1 at Għajn Tuffieħa on 02.04.2016.

The Committee decided that the photo could have been taken abroad and not in Malta and thus was rejected. Additionally in a public Facebook group a number of people (presumably hunters) commented that it is strange that such a bird was not seen by anyone else, further questioning the authenticity of this record.

xxi) Amur Falcon *Falco amurensis*: 1 ad. fem. shot at Żabbar on 15.11.12 (in collections); 1 imm. shot at Dwejra (M) on 14.01.13 (in collections); 1 fem. at Dingli Cliffs on 19.11.16

Hearsay records with no photographic evidence or description and never officially submitted to the MRRC. Even if they are found in local collections as stated they could have easily been imported. In view of this these records are rejected.

xxii) Isabelline Shrike *Lanius isabellinus*: 1 taken at Marnisi l/o Marsaxlokk in Oct 1984 (in collections); 1 taken at Ballut, Marsaxlokk on 27.04.1986 (in collections); 1 at Mtarfa in Nov 11

Hearsay records with no photographic evidence or description and never officially submitted to the MRRC. Even if they are found in local collections as stated they could have easily been imported. In view of this these records are rejected.

xxiii) Red-billed Chough *Pyrrhocorax pyrrhocorax*: 1 shot at Tas-Silġ on 10.11.75

Hearsay record with no photographic evidence or description and never officially submitted to the MRRC thus this records is rejected.

xxiv) Eurasian Magpie *Pica pica*: 1 at Madliena on 11.11.10; 1 at Madliena on 09.09.11

Hearsay records with no photographic evidence or description and never officially submitted to the MRRC. Additionally possibility of being escapees cannot be excluded. In view of this these records are rejected.

xxv) Bimaculated Lark *Melanocorypha bimaculata*: 7 known records on strength of records by some local collections

Hearsay records with no photographic evidence or description and never officially submitted to the MRRC. Even if they are found in local collections as stated they could have easily been imported. In view of this these records are rejected.

xxvi) Hume's Leaf Warbler *Phylloscopus humei*: 1 ringed at Salina on 10.11.12

This refers to a Yellow-browed Warbler ringed by MVG and therefore this record is rejected.

xxvii) Eastern Orphean Warbler *Sylvia crassirostris*: five nests in 1907 (Despott); 1 fem. at Ħal Far taken on 31.03.81; 1 male at Mġiebaħ on 31.03.02; 1 male at Dingli Cliffs on 31.05.15

Despott did not include the five nests reported in 1907 in his later works while the other records are hearsay records with no photographic evidence or description and never officially submitted to the MRRC. Even if the 1981 bird is found in a local collection as stated they could have easily been imported. In view of this these records are rejected.

xxviii) Brahminy Starling *Sturnia pagodarum*: 1 of 3 birds shot at Dingli on 19.03.65 (approx. date)

Since this species is regularly kept in captivity this species is a Category D species and thus does not form part of the official Malta Bird List.

xxix) White's Thrush *Zoothera aurea*: 1 at Siggiewi on 13.11.84; 1 at Baħar Iċ-Ċagħaq on 10.10.03; 2 at Miżieb in Nov 2003; 1 at San Lawrenz Gozo on 28.10.08; 1 at Pembroke on 22.11.13

Hearsay records with no photographic evidence or description and never officially submitted to the MRRC thus these records are rejected.

xxx) Tickell's Thrush *Turdus unicolor*: 1 male at Tal-Azzard (between Birżebbuġa and Għaxaq) on 31.10.90

Hearsay record with no photographic evidence or description and never officially submitted to the MRRC thus this record is rejected.

xxxi) Naumann's Thrush *Turdus naumanni*: 1 trapped at Buskett on 24.12.56

Hearsay record with no photographic evidence or description and never officially submitted to the MRRC thus this record is rejected.

xxxii) Black-throated Thrush *Turdus atrogularis*: 1 male at Marsascala on 27.04.14

Hearsay record with no photographic evidence or description and never officially submitted to the MRRC thus this record is rejected.

xxxiii) Siberian Stonechat *Saxicola maurus*: 1 male on 23.03.80; 1 fem. at Bidnija from 28.02 until 02.03.04; 1 fem at Salina on 05.03.06; 1 on 05.03 & 16.03.12

Hearsay records with no photographic evidence or description and never officially submitted to the MRRC thus these records are rejected.

xxxiv) Blyth's Pipit *Anthus godlewskii*: 2 shot at Ħal Far in Nov 2016

Hearsay record with no photographic evidence or description and never officially submitted to the MRRC thus this record is rejected.

xxxv) Twite *Linaria flavirostris*: 1 male at St Elmo Pt on 20.01.13; 1 at St Elmo Pt on 11.01.15

Hearsay records with no photographic evidence or description and never officially submitted to the MRRC thus these records are rejected.

xxxvi) Redpoll *Acanthis flammea*: 1 on 12.01.2017 at an undisclosed location.

The state of the bird in the photo and how the photo was taken seems to indicate a captive bird. Due to this and the relative popularity of this species locally in captivity this record was rejected.

xxxvii) Red-headed Bunting *Emberiza bruniceps*: 1 trapped at Aħrax early 80s (in collection); 1 male trapped in autumn 1999 or 2000; 1 trapped at Marsascala on 12.10.04; 1 male at Dingli on 08.09.15

Hearsay records with no photographic evidence or description and never officially submitted to the MRRC. Even if some are found in local collections as stated they could have easily been imported. In view of this these records are rejected.

xxxviii) Bobolink *Dolichonyx oryzivorus*: 1 fem. trapped at Bengħajsa on 19.10.10

Hearsay records with no photographic evidence or description and never officially submitted to the MRRC thus these records are rejected.

Since the MRRC criteria are based on objective verification and publicly accessible and verifiable evidence, it is important to note that should the MRRC receive more details and information on any of the above rejected records they will be discussed again accordingly.

The following published 1st records for Malta in Fenech's books are still **pending**:

African Blue Tit *Cyanistes teneriffae:* 1 caught 1908 (Despott 1917)

Thick-billed Lark *Rhanphocoris clotbey*: 1 shot at Għajn Tuffieħa in October 1980

Eastern Orphean Warbler *Sylvia crassirostris*: 1 in 1843 (Schembri); 1 in 1858 (Wright)

Mongolian Finch *Bucanetes mongolicus*: 1 1st year male trapped at Miġra l-Ferħa on 15.11.13

The following species published in Fenech's books were placed in **Category D** in past MRRC meetings and thus do not form part of the official Malta Bird List:

i) Bar-headed Goose
ii) Egyptian Goose
iii) Baikal Teal
iv) Falcated Duck
v) American Purple Gallinule
vi) Eurasian Jay
vii) Superb Starling

The following list of species published in Fenech's books were already **rejected** in the past:

i) Dwarf Bittern (MRRC meeting)
ii) Lesser Yellowlegs (MRRC meeting)
iii) Sabine's Gull (MRRC meeting)
iv) Eurasian Eagle-owl (Sultana & Gauci 1982)
v) Hooded Vulture (*History of Ornithology in Malta*, Sultana & Borg 2015)
vi) Bonelli's Eagle (MRRC meeting)

vii) Brahminy Kite (Sultana & Gauci 1982)

viii) Asian Desert Warbler (MRRC meeting)

ix) Yellow-throated Sparrow (Sultana & Gauci 1982)

The following **two records** were also discussed:

i) **Blue-winged Teal** *Spatula discors*: 1 fem. shot at Qawra on 19.11.1980 (original record submitted and examined by John J. Borg).

Although this record was accepted in a past MRRC meeting, in Fenech's *Birds of the Maltese Islands* the author states that "after asking the collector who had it and whose name still appears with the specimen, it resulted that the specimen had been imported". Since this bird (which is found in the National Museum of Natural History collections) has a data label attached to it and the data was entered in the accession book of the museum and the catalogue of the collection by Joe Vella Gaffiero, the Committee has no reason to reject this record and thus unless the Committee receives any other evidence showing that this bird was imported (as Fenech states) it should remain in the official Malta bird list.

ii) **Little Egret** *Egretta garzetta* breeding at the private bird park at Salina from 2007 onwards.

It was decided that the **Little Egret breeding record** at Salina Bird Park (outside aviary) published in *Il-Merill* 32 (2010) could have been **both wild birds or intentionally released birds** from the owner of the Bird Park who has released a number of Little Egrets, Cattle Egrets, Black-Crowned Night-herons and Common Moorhens amongst other species in the past.

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I would like to thank all local and foreign birdwatchers who submitted records with descriptions and photos to the MRRC. I would also like to thank Raymond Galea (the MRRC Chairman) and all the other members in the Committee for examining in detail all submissions and for all the interesting discussions and comments that followed. I would also like to thank the following

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Malta Rarities and Records Committee Secretary

Ringing Report for 2017–2018

Mark Gauci

The report covers the ringing activities of the BirdLife Malta Bird Ringing Scheme for the years 2017 and 2018. During the years under review the licensed ringers were: John Attard Montalto, James Aquilina, Martin Austad, John J. Borg, Denis Cachia, Victor Cilia, Charles Coleiro, James Crymble, Jean Paul Farrugia, Nicholas Galea, Raymond Galea, Charles Gauci, Mario V. Gauci, Mark Gauci, John Grech, Emanuel Mallia, Joseph M. Mangion, Glenn Micallef, Tim Micallef, Patrick Sammut, Alice Tribe and Adin Vella.

The ringing group lost one of its mentors and founders when Joe Sultana passed away in 2018 after having given up his ringing licence in 2017. The ringing group will always be indebted to Joe's work and dedication towards the setting up and the running of the ringing scheme.

Ringing Totals

In terms of ringing totals the figures of 14,440 birds ringed of 106 species for 2017 and 14,990 birds ringed of 111 species for 2018 respectively rank as the lowest recorded for the past five years. Whilst the effort from the ringers remained constant the low figures recorded were the result of poor migration and low numbers of wintering species.

Year	Number of Birds Ringed	Number of Species
2017	14459	106
2018	14990	111
Grand Total 1965– 2018	616,017	226 + 2 hybrids

In terms of new additions to the ringing list two Greater Flamingos in 2017 and a further five in 2018 were all ringed and released after a brief rehabilitation period. The same story applies for the 1st Audouin's Gull ringed in 2018. The final addition to the ringing list was a Bar-tailed Godwit ringed at Għadira Nature Reserve in 2018 where it stayed for over one month. The first Western

Orphean Warbler ringed since this species was sub-divided was ringed in 2018. This would make it the 6th local Orphean Warbler ringed. Additionally a number of scarce migrants or vagrants were ringed, namely the 2nd Eurasian Blue Tit, the 3rd Moussier's Redstart, the 8th, 9th and 10th Melodious Warbler, the 9th Dusky Warbler, the 4th Blyth's Reed-warbler, the 2nd Cattle Egret, the 2nd European Roller and the 5th Eurasian Sparrowhawk. Worth noting were also a couple of Rufous-tailed Scrub-robin, a Little Bunting, a Rustic Bunting and ten Lesser Whitethroat. Wader species registered good totals for 2017 with all ringed at Għadira and Simar Nature Reserves; 2018 was poorer since ringing waders at Għadira was not possible due to number of Greater Flamingos on site. Good totals for Common Swift and Pallid Swift were also recorded with most ringed at their breeding site in Mosta. Most of the birds of prey recorded in the ringing list were all released after having been rehabilitated.

Ringing Sites

The sites in use were Għadira Nature Reserve and Simar Nature Reserve with these sites used as constant effort sites. Wied l-Aħmar in Comino was used as usual for the spring and autumn projects. Other sites used sparingly were Rabat, Buskett, Tarġa Gap (Mosta), Salina, Mtaħleb and Wied Għollieqa Nature Reserve in San Ġwann.

Several seabird colonies, including Filfla Island, were monitored as part of the obligations under the Arċipelagu Garnija Life project.

RINGING RECOVERIES

Key to symbols and terms used in the recovery list

Arrangement of entry

Recoveries are arranged by species and within species usually by date of the recovery letter. Ringing details are given on the first line and recovery data on the second.

Ring number

A ring in italics indicates that the ring has been returned and verified.

Age code

1 pullus; young bird ringed in the nest. A number in brackets beside this age code indicates brood size.

2 fully grown; year of hatching quite unknown.

3 definitely hatched during current calendar year.

3J as in 3, but bird still partly or totally in juvenile body plumage.

4 hatched before current calendar year - exact year unknown.

5 definitely hatched during last calendar year.

Sex

M male

F female.

Date of recovery

Where this is unknown the date of the reporting letter is given instead and is shown in brackets. A 00 in the date indicates that the exact day or month are unknown.

Manner of recovery

v caught or trapped, and released with ring (controlled)

+ shot or killed by man

x found dead or dying

xA found long dead

( ) caught or trapped alive and not released, or released but with ring removed

B breeding when recovered

C recovered at colony

R recovered in roost

S Sight record (Colour ring)

/?/ manner of recovery unknown.

FOREIGN-RINGED BIRDS RECOVERED IN MALTA

Greater Flamingo *Phoenicopterus roseus*

E15734	1	04.08.2018	Stagno di Molentargius: 39°13'N; 09°08'E, Cagliari, Sardegna, **Italy**
Black WJVV on white	S	07.12.2018	Salina, l/o St Paul's Bay – (sight record)

Black-headed Gull *Larus ridibundus*

TR11	3	05.10.2016	Zachodniopomoskie: 53.34'N; 15.00'E Stargard Szczecinski Os Chopina, **Poland**
Yellow colour ring	S	08.01.2017	Marsaxlokk: 35.84'N; 15.00'E Malta
K002558	1	08.06.2017	Cherkasi: 49.22'N; 32.12'E, Chervona Slobada, **Ukraine**
	S	11.02.2018	Salina salt pans: 35.56'N; 14.25'E, limits of Naxxar, Malta
	S	27.12.2018	Salina salt pans: 35.56'N; 14.25'E, limits of Naxxar, Malta

Mediterranean Gull *Larus melanocephalus*

SH03993	1	15.06.2017	Szeged: 46.20'N; 20.04'E, Csongrád (HG43), **Hungary**
Colour HFM1	S	19.11.2017	Salina salt pans, limits of Naxxar

European Nightjar *Caprimulgus europaeus*

W132968	4F	05.05.2013	I Zannone, 40.58'N; 13.03'E, Ponza (Latina), **Italy**
	v	06.10.2017	Buskett, Rabat

Common Kingfisher *Alcedo atthis*

EA14850	3	28.08.2018	Vransko Lake, 43.56'N; 15.30'E, Pakostone (HR05), **Croatia**
	v	14.09.2018	Għadira Nature Reserve, Mellieħa

Barn Swallow *Hirundo rustica*

S771928	3	28.06.2016	Krepenice, 49.42'N; 14.20'E, Stredocesky kraj a Praha, **Czech Republic**
	v	02.10.2017	Għadira Nature Reserve, Mellieħa

Garden Warbler *Sylvia borin*

K677861	3	26.08.2016	Piliszanto 47.39'N; 18.53'E, Bodzas, Pest, **Hungary**
	v	29.04.2017	Mtaħleb, 35.52'N; 14.21'E, limits of Rabat, Malta

Common Chiffchaff *Phylloscopus collybita*

R51278	4	21.09.2017	Krebsgarden, Agerso: 55.13'N; 11.11'E, Sjaelland, **Denmark**
	v	11.11.2017	Għadira Nature Reserve, Mellieħa
F200458	3	31.08.2018	Divice, 49.06'N; 14.18''E, Jihocesky kray (CZ10), **Czech Republic**
	v	26.10.2018	Simar Nature Reserve, St Paul's Bay

Willow Warbler *Phylloscopus trochilus*

AL8659	3	01.08.2016	Col de Bretolet 46.03'N; 06.47'E, Valais, **Switzerland**
	v	18.04.2017	Wied l-Aħmar, Comino

Eurasian Penduline-tit *Remiz pendulinus*

K7K4607	3	09.08.2016	ZB Siemianowka: 52.90'N; 23.86'E , Nrweka, Podalskie, **Poland**
	v	08.02.2017	Għadira Nature Reserve, Mellieħa

European Greenfinch *Chloris chloris*

CA163450	5F	29.03.2017	Savica: 45.50'N; 16.00'E, Zagreb (HR01), **Croatia**
	v	18.11.2017	Bengħajsa 35.48'N; 14.31'E, Birżebbuġa, Malta

Eurasian Siskin *Spinus spinus*

XE99463	3M	16.09.2017	Ventes Ragas 55.20'N; 21.11'E, Silutes r, **Lithuania**
	( )	25.10.2017	Madliena 35.57'N; 14.19'E, Malta

MALTA-RINGED BIRDS RECOVERED ABROAD

Barn Swallow *Hirundo rustica*

278390	4	01.05.2017	Simar Nature Reserve, St Paul's Bay
	v	10.09.2017	Mas-Thibert-Marais du Vigueret-Pisci sud: 43.21'N; 04.45'E, Arles Bouches-du-Rhone, Provence Alpes Cote d'Azur, **France**
320398	4F	29.04.2017	Għadira Nature Reserve, Mellieħa
	v	14.04.2018	Eilat ringing station: 29.34'N; 34.58'E, **Israel**

Bluethroat *Cyanecula svecica*

300606	3M	12.10.2015	Simar Nature Reserve, St Paul's Bay
		20.10.2015	Simar Nature Reserve, St Paul's Bay
	v	14.04.2017	Smrzov: 49.04'N; 14.41'E, Jihocesky kray (CZ10), **Czech Republic**

Garden Warbler *Sylvia borin*

317014	4	17.09.2016	Buskett, Rabat
	v	20.07.2017	Rakutowo, 52.32'N; 19.13'E, Kujawsko-Pomorskie, **Poland**

Eurasian Blackcap *Sylvia atricapilla*

319264	3M	06.12.2016	Għadira Nature Reserve, Mellieħa
	v	20.07.2017	Dranse, 53.12'N; 12.37'E, Ostpringnitz-Ruppin,

Whinchat *Saxicola rubetra*

302841	5F	20.04.2015	Wied l-Aħmar, Comino
	v	04.09.2017	Pulgoja: 58.06'N; 24.28'E, Parnumaa, **Estonia**

Common Chiffchaff *Phylloscopus collybita*

26P810	3	05.11.2016	Għadira Nature Reserve, Mellieħa
	v	09.07.2017	Chlum u Trebone, 48.59'N; 14.52'E, Jihocesky kray, **Czech Republic**
35P835	3	01.11.2016	Simar Nature Reserve, St Paul's Bay
	v	26.03.2017	Stribrna Skalice 49.54'N; 14.49'E; Stredocesky kraj a Praha, **Czech Republic**

EURING NUMBER	MALTA SPECIES LIST	Total ringed 1965 to 2016	2017	2018	Total ringed 1965 to 2018
01790	Eurasian Wigeon *Anas penelope*	1	0	0	1
01840	Common Teal *Anas crecca*	1	0	0	1
01860	Mallard *Anas platyrhynchos*	5	0	0	5
01890	Northern Pintail *Anas acuta*	1	0	0	1
01910	Garganey *Spatula querquedula*	2	0	0	2
03700	Common Quail *Coturnix coturnix*	49	0	1	50
03550	Chukar *Alectoris chukar*	29	0	0	29
00360	Scopoli's Shearwater *Calonectris diomedea*	3523	73	108	3704
00460	Manx Shearwater *Puffinus puffinus*	1	0	0	1
00462	Yelkouan Shearwater *Puffinus yelkouan*	2043	322	394	2759
00520	European Storm-petrel *Hydrobates pelagicus*	30368	1171	787	32326
00950	Eurasian Bittern *Botaurus stellaris*	4	0	0	4
00980	Common Little Bittern *Ixobrychus minutus*	132	1	2	135
01040	Black-crowned Night-heron *Nycticorax nycticorax*	24	1	0	25
01080	Squacco Heron *Ardeola ralloides*	5	0	0	5
01110	Cattle Egret *Bubulcus ibis*	1	1	0	2
01190	Little Egret *Egretta garzetta*	6	0	0	6
01220	Grey Heron *Ardea cinerea*	3	0	0	3
01240	Purple Heron *Ardea purpurea*	1	0	0	1
01440	Eurasian Spoonbill *Platalea leucorodia*	1	0	0	1
01470	Greater Flamingo *Phoenicopterus roseus*	0	2	5	7

00070	Little Grebe *Tachybaptus ruficollis*	3	0	0	3
00090	Great Crested Grebe *Podiceps cristatus*	1	0	0	1
00120	Black-necked Grebe *Podiceps nigricollis*	30	4	0	34
02310	European Honey-buzzard *Pernis apivorus*	2	1	4	7
02380	Black Kite *Milvus migrans*	1	1	0	2
02600	Western Marsh-harrier *Circus aeruginosus*	6	3	3	12
12620	Pallid Harrier *Circus macrourus*	2	0	0	2
02630	Montagu's Harrier *Circus pygargus*	2	0	0	2
02690	Eurasian Sparrowhawk *Accipiter nisus*	4	0	1	5
04070	Western Water Rail *Rallus aquaticus*	302	10	5	317
04080	Spotted Crake *Porzana porzana*	83	1	0	84
04100	Little Crake *Zapornia parva*	54	0	0	54
04110	Baillon's Crake *Zapornia pusilla*	4	0	0	4
04210	Corncrake *Crex crex*	1	0	0	1
04240	Common Moorhen *Gallinula chloropus*	644	4	6	654
04250	Allen's Gallinule *Porphyrio alleni*	1	0	0	1
04290	Common Coot *Fulica atra*	16	0	0	16
04590	Eurasian Thick-knee *Burhinus oedicnemus*	2	0	0	2
04550	Black-winged Stilt *Himantopus himantopus*	6	0	0	6
04860	Grey Plover *Pluvialis squatarola*	3	0	0	3
04850	Eurasian Golden Plover *Pluvialis apricaria*	1	0	0	1
04820	Eurasian Dotterel *Eudromias morinellus*	10	0	0	10
04700	Common Ringed Plover *Charadrius hiaticula*	102	5	0	107

04690	Little Ringed Plover *Charadrius dubius*	421	5	0	426
04930	Northern Lapwing *Vanellus vanellus*	1	0	0	1
04770	Kentish Plover *Charadrius alexandrinus*	6	0	0	6
05380	Whimbrel *Numenius phaeopus*	1	0	0	1
05320	Black-tailed Godwit *Limosa limosa*	1	0	0	1
05340	Bar-tailed Godwit *Limosa lapponica*	0	0	1	1
05610	Ruddy Turnstone *Arenaria interpres*	7	0	0	7
05170	Ruff *Calidris pugnax*	99	1	0	100
05140	Broad-billed Sandpiper *Calidris falcinellus*	2	0	0	2
05090	Curlew Sandpiper *Calidris ferruginea*	202	0	1	203
05020	Temminck's Stint *Calidris temminckii*	95	1	0	96
05120	Dunlin *Calidris alpina*	500	6	2	508
05010	Little Stint *Calidris minuta*	3267	84	21	3372
05560	Common Sandpiper *Actitis hypoleucos*	1314	55	35	1404
05530	Green Sandpiper *Tringa ochropus*	76	7	2	85
05450	Spotted Redshank *Tringa erythropus*	3	0	0	3
05480	Common Greenshank *Tringa nebularia*	7	0	0	7
05470	Marsh Sandpiper *Tringa stagnatilis*	3	0	0	3
05540	Wood Sandpiper *Tringa glareola*	370	27	3	400
05460	Common Redshank *Tringa totanus*	58	0	1	59
05180	Jack Snipe *Lymnocryptes minimus*	35	0	0	35
05290	Eurasian Woodcock *Scolopax rusticola*	16	2	0	18
05190	Common Snipe *Gallinago gallinago*	185	1	0	186

05200	Great Snipe *Gallinago media*	16	0	0	16
06270	Black Tern *Chlidonias niger*	1	0	0	1
06280	White-winged Tern *Chlidonias leucopterus*	1	0	0	1
06110	Sandwich Tern *Thalasseus sandvicensis*	1	0	0	1
05820	Black-headed Gull *Larus ridibundus*	1	0	0	1
05850	Slender-billed Gull *Larus genei*	1	0	0	1
05750	Mediterranean Gull *Larus melanocephalus*	3	0	1	4
05880	Audouin's Gull *Larus audouinii*	0	0	1	1
05927	Yellow-legged Gull *Larus michahellis*	2247	99	88	2434
06840	Eurasian Collared-dove *Streptopelia decaocto*	120	38	22	180
06870	European Turtle-dove *Streptopelia turtur*	399	14	13	426
06900	Laughing Dove *Streptopelia senegalensis*	1	0	0	1
07160	Great Spotted Cuckoo *Clamator glandarius*	1	0	0	1
07240	Common Cuckoo *Cuculus canorus*	120	4	2	126
07350	Common Barn-owl *Tyto alba*	2	0	0	2
07390	Eurasian Scops-owl *Otus scops*	570	21	4	595
07670	Northern Long-eared Owl *Asio otus*	1	0	0	1
07680	Short-eared Owl *Asio flammeus*	13	0	0	13
07780	European Nightjar *Caprimulgus europaeus*	560	41	19	620
07950	Common Swift *Apus apus*	278	225	288	791
07960	Pallid Swift *Apus pallidus*	86	41	36	163
08460	Common Hoopoe *Upupa epops*	306	21	7	334
08400	European Bee-eater *Merops apiaster*	184	9	2	195

08410	European Roller *Coracias garrulus*	1	0	1	2
08310	Common Kingfisher *Alcedo atthis*	973	32	46	1051
08480	Eurasian Wryneck *Jynx torquilla*	1548	55	29	1632
03030	Lesser Kestrel *Falco naumanni*	2	0	0	2
03040	Common Kestrel *Falco tinnunculus*	78	4	4	86
03090	Merlin *Falco columbarius*	2	0	0	2
03100	Eurasian Hobby *Falco subbuteo*	6	0	1	7
16330	Red-eyed Vireo *Vireo olivaceus*	1	0	0	1
15080	Eurasian Golden Oriole *Oriolus oriolus*	1014	46	8	1068
15200	Great Grey Shrike *Lanius excubitor*	1	0	0	1
15150	Red-backed Shrike *Lanius collurio*	139	0	0	139
32910	Iberian Grey Shrike *Lanius meridionalis*	1	0	0	1
15230	Woodchat Shrike *Lanius senator*	1917	45	16	1978
13140	Goldcrest *Regulus regulus*	779	42	3	824
13150	Common Firecrest *Regulus ignicapilla*	723	13	6	742
14900	Eurasian Penduline-tit *Remiz pendulinus*	106	1	2	109
14620	Eurasian Blue Tit *Cyanistes caeruleus*	1	0	1	2
14640	Great Tit *Parus major*	2	0	0	2
09740	Woodlark *Lullula arborea*	2	0	0	2
09760	Eurasian Skylark *Alauda arvensis*	275	11	3	289
09680	Greater Short-toed Lark *Calandrella brachydactyla*	327	6	1	334
09810	Collared Sand Martin *Riparia riparia*	13235	10	22	13267
09920	Barn Swallow *Hirundo rustica*	51747	521	592	52860

10010	Northern House Martin *Delichon urbicum*	11488	1	8	11497
09950	Red-rumped Swallow *Cecropis daurica*	192	1	12	205
12200	Cetti's Warbler *Cettia cetti*	4723	134	80	4937
12930	Greenish Warbler *Phylloscopus trochiloides*	1	0	0	1
12950	Arctic Warbler *Phylloscopus borealis*	5	0	0	5
12980	Pallas's Leaf-warbler *Phylloscopus proregulus*	3	0	0	3
13000	Yellow-browed Warbler *Phylloscopus inornatus*	197	15	51	263
13010	Radde's Warbler *Phylloscopus schwarzi*	2	0	0	2
13030	Dusky Warbler *Phylloscopus fuscatus*	8	1	0	9
13071	Western Bonelli's Warbler *Phylloscopus bonelli*	32	2	1	35
13072	Eastern Bonelli's Warbler *Phylloscopus orientalis*	61	7	1	69
13070	Western/Eastern Bonelli's Warbler *Phylloscopus bonelli/orientalis*	177	0	0	177
13080	Wood Warbler *Phylloscopus sibilatrix*	21775	478	346	22599
13110	Common Chiffchaff *Phylloscopus collybita*	63455	1457	1854	66766
13100	Mountain Chiffchaff *Phylloscopus sindianus*	1	0	0	1
13120	Willow Warbler *Phylloscopus trochilus*	13741	245	333	14319
12770	Eurasian Blackcap *Sylvia atricapilla*	26496	866	1176	28538
12760	Garden Warbler *Sylvia borin*	36952	1193	1470	39615
12730	Barred Warbler *Sylvia nisoria*	3	0	0	3
12740	Lesser Whitethroat *Sylvia curruca*	92	4	6	102
12721	Western Orphean Warbler *Sylvia hortensis hortensis*	0	0	1	1
12720	Western/Eastern Orphean Warbler *Sylvia hortensis/crassirostris*	5	0	0	5

20280	Ménétries's Warbler *Sylvia mystacea*	1	0	0	1
12690	Rüppell's Warbler *Sylvia rueppelli*	2	0	0	2
12670	Sardinian Warbler *Sylvia melanocephala*	25554	480	584	26618
12652	Moltoni's Warbler *Sylvia subalpina*	1	0	0	1
12650	Subalpine Warbler *Sylvia cantillans*	12536	306	332	13174
12750	Common Whitethroat *Sylvia communis*	12212	573	229	13014
12640	Spectacled Warbler *Sylvia conspicillata*	1543	6	11	1560
12620	Dartford Warbler *Sylvia undata*	43	0	0	43
12360	Common Grasshopper-warbler *Locustella naevia*	12	0	0	12
12370	River Warbler *Locustella fluviatilis*	3	0	0	3
12380	Savi's Warbler *Locustella luscinioides*	81	0	3	84
12551	Olivaceous Warbler *Iduna pallida*	3	0	0	3
12552	Isabelline Warbler *Iduna opaca*	11	0	2	13
12550	Olivaceous/Isabelline Warbler *Iduna pallida/opaca*	5	0	0	5
12590	Icterine Warbler *Hippolais icterina*	4427	116	165	4708
12600	Melodious Warbler *Hippolais polyglotta*	7	1	2	10
12410	Moustached Warbler *Acrocephalus melanopogon*	195	0	1	196
12430	Sedge Warbler *Acrocephalus schoenobaenus*	6023	164	115	6302
12470	Paddyfield Warbler *Acrocephalus agricola*	5	0	0	5
12480	Blyth's Reed-warbler *Acrocephalus dumetorum*	3	0	1	4
12500	Marsh Warbler *Acrocephalus palustris*	65	0	0	65
12510	Common Reed-warbler *Acrocephalus scirpaceus*	4112	81	65	4258

12530	Great Reed-warbler *Acrocephalus arundinaceus*	2915	70	52	3037
12260	Zitting Cisticola *Cisticola juncidis*	10131	43	50	10224
10660	Northern Wren *Troglodytes troglodytes*	24	0	0	24
15820	Common Starling *Sturnus vulgaris*	1072	6	37	1115
11860	Ring Ouzel *Turdus torquatus*	7	0	0	7
11870	Eurasian Blackbird *Turdus merula*	428	16	6	450
11980	Fieldfare *Turdus pilaris*	4	0	0	4
12000	Song Thrush *Turdus philomelos*	3561	118	118	3797
12010	Redwing *Turdus iliacus*	37	0	1	38
10950	Rufous-tailed Scrub-robin *Cercotrichas galactotes*	16	2	0	18
13350	Spotted Flycatcher *Muscicapa striata*	5133	189	130	5452
10990	European Robin *Erithacus rubecula*	90198	1589	2516	94303
11030	Thrush Nightingale *Luscinia luscinia*	5	0	0	5
11040	Common Nightingale *Luscinia megarhynchos*	3680	61	30	3771
11060	Bluethroat *Cyanecula svecica*	38	3	4	45
11050	Siberian Rubythroat *Calliope calliope*	1	0	0	1
11130	Orange-flanked Bush-robin *Tarsiger cyanurus*	1	0	0	1
13430	Red-breasted Flycatcher *Ficedula parva*	157	0	7	164
13470	Semi-collared Flycatcher *Ficedula semitorquata*	64	2	0	66
13480	Collared Flycatcher *Ficedula albicollis*	1753	87	43	1883
13490	European Pied Flycatcher *Ficedula hypoleuca*	8114	504	171	8789
13493	Atlas Flycatcher *Ficedula hypoleuca speculigera*	1	0	0	1

11210	Black Redstart *Phoenicurus ochruros*	1507	33	39	1579
11220	Common Redstart *Phoenicurus phoenicurus*	5055	123	158	5336
11270	Moussier's Redstart *Phoenicurus moussieri*	2	1	0	3
11620	Rufous-tailed Rock-thrush *Monticola saxatilis*	24	0	0	24
11660	Blue Rock-thrush *Monticola solitarius*	338	21	11	370
11370	Whinchat *Saxicola rubetra*	5170	174	107	5451
11390	Common Stonechat *Saxicola rubicola*	4640	72	72	4784
11460	Northern Wheatear *Oenanthe oenanthe*	467	17	14	498
11440	Isabelline Wheatear *Oenanthe isabellina*	7	0	0	7
11480	Black-eared Wheatear *Oenanthe hispanica*	92	3	2	97
10840	Dunnock *Prunella modularis*	5786	611	471	6868
15920	Spanish Sparrow *Passer hispaniolensis*	42345	1022	878	44245
15980	Eurasian Tree Sparrow *Passer montanus*	2442	124	71	2637
10170	Western Yellow Wagtail *Motacilla flava*	6589	47	84	6720
10190	Grey Wagtail *Motacilla cinerea*	884	4	3	891
10200	White Wagtail / Pied Wagtail *Motacilla alba*	2456	15	61	2532
10020	Richard's Pipit *Anthus richardi*	1	0	0	1
10050	Tawny Pipit *Anthus campestris*	28	3	0	31
10080	Olive-backed Pipit *Anthus hodgsoni*	11	0	0	11
10090	Tree Pipit *Anthus trivialis*	3314	133	123	3570
10110	Meadow Pipit *Anthus pratensis*	5187	85	119	5391
10120	Red-throated Pipit *Anthus cervinus*	83	0	1	84

10140	Water Pipit *Anthus spinoletta*	22	0	0	22
10142	Rock Pipit *Anthus petrosus*	2	0	0	2
16380	Brambling *Fringilla montifringilla*	12	0	1	13
16360	Common Chaffinch *Fringilla coelebs*	1476	38	27	1541
17170	Hawfinch *Coccothraustes coccothraustes*	103	2	1	106
16790	Common Rosefinch *Carpodacus erythrina*	11	0	1	12
16490	European Greenfinch *Chloris chloris*	449	3	34	486
16600	Common Linnet *Linaria cannabina*	957	0	7	964
16660	Red Crossbill *Loxia curvirostra*	26	0	0	26
16530	European Goldfinch *Carduelis carduelis*	56	2	79	137
16400	European Serin *Serinus serinus*	340	4	1	345
16540	Eurasian Siskin *Spinus spinus*	24	1	4	29
18470	Lapland Longspur *Calcarius lapponicus*	1	0	0	1
16820	Corn Bunting *Emberiza calandra*	449	0	0	449
18680	Cretzschmar's Bunting *Emberiza caesia*	1	0	0	1
18660	Ortolan Bunting *Emberiza hortulana*	12	0	0	12
18560	Pine Bunting *Emberiza leucocephala*	1	0	0	1
18580	Cirl Bunting *Emberiza cirlus*	1	0	0	1
18570	Yellowhammer *Emberiza citrinella*	1	0	0	1
18770	Reed Bunting *Emberiza schoeniclus*	617	11	6	634
18760	Yellow-breasted Bunting *Emberiza aureola*	1	0	0	1
18750	Chestnut Bunting *Emberiza rutila*	1	0	0	1
18740	Little Bunting *Emberiza pusilla*	16	1	0	17

18730	Rustic Bunting *Emberiza rustica*	19	0	1	20
	Barn Swallow *Hirundo rustica* X Northern House Martin *Delichon urbicum*	6	0	0	6
	Eurasian Tree Sparrow *Passer montanus* X Spanish Sparrow *Passer hispaniolensis*	2	0	0	2
TOTAL		**586,567**	**14,459**	**14,990**	**616,017**

CONTENTS

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