

Interpreting pelagic seabird population numbers in the Maltese Islands

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Abstract – The Maltese islands host three species of pelagic seabirds, namely: Scopoli's Shearwater *Calonectris diomedea*, Yelkouan Shearwater *Puffinus yelkouan* and Mediterranean Storm-petrel *Hydrobates pelagicus melitensis*. Annual censuses of the breeding population of the three species have been carried out since 1983. Seabird censuses present some of the most demanding challenges of ornithological studies, and this is exceedingly so when attempts are made in counting the breeding population of underground nesting seabirds such as the shearwaters and storm-petrels. The majority of these species visit land only during the breeding season and do so under cover of darkness. They often nest in inaccessible places or nearly so. At specific periods in the breeding year, the colonies are visited by numerous prospecting and non-breeding birds, greatly inflating the number of birds in the colony. Faced with all these variables, any figures presented from these censuses can only be considered, at best, as guesstimates. Without the necessary background knowledge of the biology and ecology of the species under study, in many cases, these censuses will result in greatly inflated figures as were recently reported for Malta, Lampedusa and Zembra. These over-estimated figures will inevitably lead to both short and long term negative implications on any conservation efforts undertaken for these species.

Key-words: pelagic seabirds, census methodologies, population estimates.

INTRODUCTION

Seabird censuses present some of the most demanding challenges of ornithological studies, and this is exceedingly so when one undertakes the counting of nesting sites of burrowing seabirds such as the shearwaters and storm-petrels. The majority of these species visit land only during the breeding season and do so under cover of darkness. They nest in narrow crevices in vertical cliff faces, among boulder screes on cliff ledges and beneath cliffs and inside sea-caves. Added to this, the breeding colonies are visited by numerous prospecting and non-breeding birds at various times of the year. Any figures presented from counts carried out in such difficult terrain can only be considered at best, as guesstimates (Borg *et al.* 2015).

Three species of pelagic seabirds, namely: Scopoli's Shearwater *Calonectris diomedea*, Yelkouan Shearwater *Puffinus yelkouan* and Mediterranean Storm-petrel *Hydrobates pelagicus melitensis* breed in the Maltese islands. Mitchell & Newton (2004) stated that "The European Storm-petrel presented the greatest challenge of all 25 species [censused] in the UK during *Seabird 2000*. In the absence of any recognized method for surveying breeding European

Storm-petrels the previous two censuses of seabirds in Britain and Ireland [Operation Seafarer 1969-70 and Seabird Colony Register 1985-88] had to largely guess at the location of the colonies, let alone their size". This situation did not improve much, as years later during *Seabird 2000* the same authors stated that "These characters of storm-petrel distribution and behavior have meant that obtaining estimates of breeding numbers has been virtually impossible".

The same difficulties encountered in the Atlantic also applied locally and the most difficult species to assess being the Storm-petrel, especially the population of Filfla, nesting deep among the boulder and rubble scree. Most of the same difficulties were also encountered in the two shearwaters. Of the two, the Yelkouan Shearwater proved to be the most difficult to estimate. This species breeds deep in caves and narrow crevices along vertical cliff faces and is also less vocal than the Scopoli's Shearwater. The latter species, although uses the same habitats as the Yelkouan Shearwater, lays the eggs in shallow cavities, therefore rendering the nesting sites more accessible than those of the Yelkouans. Scopoli's Shearwaters also form large rafts off the breeding colonies, a behavior which is not much favoured by the Yelkouan Shearwater.

Historical accounts

Past authors never presented any figures for any of our three breeding populations (Schembri 1843, Wright 1863, 1864, Despott 1917). These authors and others after them simply mention the three species as breeding in the Maltese islands without presenting any figures. The first attempts in providing some population numbers were those of Sultana *et al.* (1975) giving figures of breeding Storm-petrels on Filfla (10,000 bp), Scopoli's Shearwater at Ta'Cenc cliffs, Gozo (1,000 bp) and the Yelkouan Shearwater colony at Rđum tal-Madonna, Mellieħa (250 bp).

From 1983, an annual attempt to census the breeding population of the three species was carried out by the present author. The first results covering the years 1983-2001, presented a list of all the occupied islands in Malta and an estimate of the breeding populations for each of the three species (Borg & Sultana 2002). The gradually increasing number in breeding pairs noted in the earlier years (1983-1993) were the result of perfecting methodologies and the identification of nesting areas rather than an actual increase of the breeding population. In the following years (2001 to 2014) counts of breeding birds between each breeding year showed a high degree of variability with high and lows separated by a few thousand pairs, resulting from natural (food availability, breeding success etc) as well as negative human factors (Fig 1).

Two recent publications, namely that of Fenech (2010) and Baldacchino & Azzopardi (2012) attempted to present a "scientific" approach to the current status of the populations of *C. diomedea* and *P. yelkouan* as well as trying to raise doubts on the outcome of previous counts mentioned above. One fundamental point which these three authors failed to address was the issue of breeding and non-breeding populations; they also appear to be totally unaware of the fluctuating population numbers concept so common in pelagic seabirds (Gaston 2004). Without providing any alternative numbers or proposing any methodologies, they hastily concluded by stating that the Maltese breeding seabird populations are "heavily underestimated".

Methods for estimating numbers

The methodologies used since 1983 to estimate the breeding populations of the 3 breeding species were:

- Counting of flying and rafting birds in front of the breeding colonies in the pre-laying and again in the post-laying period;
- Direct counts of birds arriving at the colonies (visual and audio)
- Use of play-back
- Ringling and recapture of breeding and non-breeding adults and chicks at the colonies

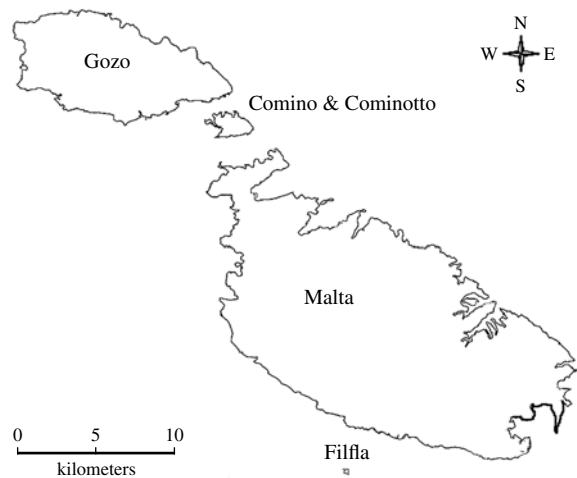


Figure 1. The Maltese Islands.

Population estimates

It is imperative to highlight the difference between figures of a whole population and numbers of a breeding population. To date no figures for the whole Maltese populations of *C. diomedea*, *P. yelkouan* and *H. pelagicus* have ever been presented and it would be highly presumptuous to do so with our current knowledge of the species. Counts carried out over a thirty year period (from 1983 to 2013) have shown several trends and changes in breeding pairs' figures.

The highest estimate breeding population (1,890 pairs) of Yelkouan Shearwater was recorded in 2008, while the lowest estimate (495 pairs) was registered in 1983. The latter figure does not reflect the true numbers of breeding pairs, as not all the colonies had yet been discovered. The average annual estimate for the thirty-year period was 1,238 breeding pairs for the whole archipelago. The annual average estimate of the breeding population of Scopoli's Shearwater in the same period of years was of 4,875 pairs. The highest estimate of 7,100 pairs was registered in 2002, while the lowest estimate (3,980 pairs) was recorded in 2013. Storm-petrel numbers appear to have remained constant during the thirty year period; 5,000 to 8,000 breeding pairs.

Changes in breeding population numbers can occur either naturally or as a result of human interference. Factors which greatly influence breeding numbers are the availability of food, disturbance of birds at the breeding colonies and the loss or changes of breeding habitat. Direct human persecution, increase in sound and light pollution and the collapse of rock faces through erosion have all been experienced locally during the past 30 years. The more colonies being discovered during the early years of the study (early

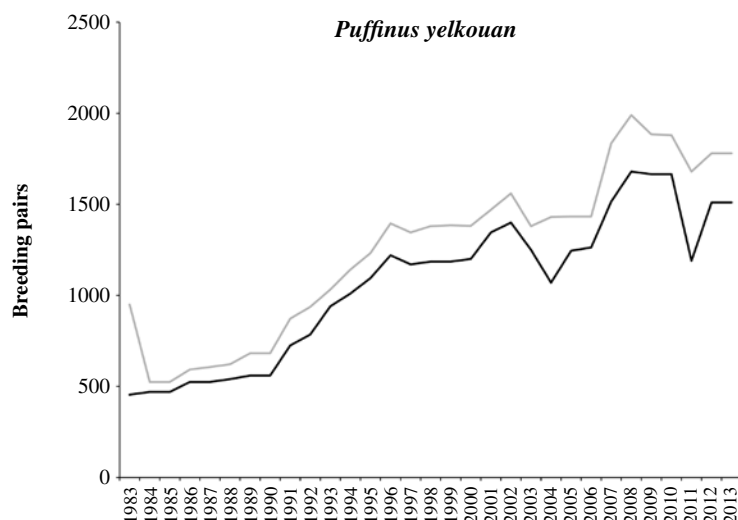


Figure 2. Estimated minimum and maximum breeding pairs of *Puffinus yelkouan* in the Maltese Islands from 1983 to 2013.

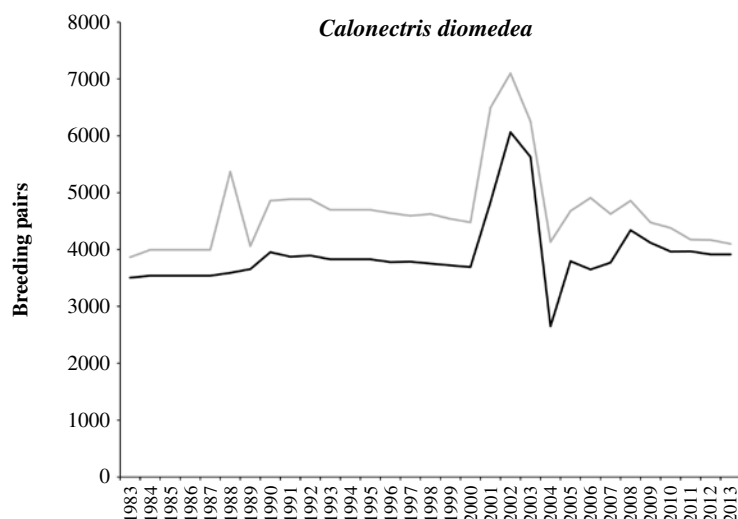


Figure 2. Estimated minimum and maximum breeding pairs of *Calonectris diomedea* in the Maltese Islands from 1983 to 2013.

1980s) resulted in an increase in the breeding number recorded, while fluctuating numbers since the 1990s were due to heavy disturbances at colonies and breeding birds failing to turn up or abandoning breeding during a particular year/s. In some cases, the constant disturbance by humans has led to the total desertion of the accessible parts of colonies, although a small number were re-occupied in later years (pers. obs.).

Undertaking a census of any kind without at least a basic knowledge of the species' biology can lead to some common pitfalls. These include: the wrong timing of the census where one has to consider the time of year it is car-

ried out, the presence of non-breeders as well as visiting individuals from neighbouring countries, meteorological conditions and the lunar phases. Short-term studies only provide a snapshot of the situation, lumping together the relatively larger number of non-breeders with the actual breeding birds and relying only on counts of offshore birds. Telemetry studies carried out in recent years have shown that large numbers seen offshore may easily be birds from colonies from other Mediterranean countries (Raine *et al.* 2012).

Defos du Rau *et al.* (2012, 2015) presented new and staggering figures for the Scopoli's Shearwater breeding

population on Zembra Island, Tunisia. In 2010 shearwater nests were counted along 174 line-transects, following a distance-sampling methodology. This effort resulted in a new estimate of 141,780 breeding pairs on Zembra Island. These new figures presenting inaccurate data on breeding populations can result in negative conservation assessments of species. This methodology alone will present incorrect figures and needs to be corroborated with other methodologies mentioned above. Also, an intense knowledge on the ecology and biology of the study subject is fundamental before executing any type of census work. Counts of incoming birds carried out on Zembra by the present author over a period of one week in May 2013 resulted in an estimated breeding population of about 30,000 pairs, a figure relatively close to those of Gaultier (1981) and Isenmann *et al.* (2005). The IUCN has recently downgraded the conservation status of the Scopoli's Shearwater to a species of Least Concern due to the figures found in Defous du Rau *et al.* (2012).

The constant annual efforts to count the breeding birds over a very long period of time, coupled with in-depth knowledge of the breeding biology of the study subjects provide us with a modest estimated number of breeding birds. Until new technologies to accurately count the burrow-nesting seabirds are available, we can only provide guesstimates of their numbers, but it is imperative to note that the publishing of unsubstantiated figures without proper studies and sound methodologies is nothing less than a disservice to ornithology.

REFERENCES

- Baldacchino A.E. & Azzopardi J., 2012. Breeding birds of the Maltese Islands - a scientific and historical review. Malta University Publ.
- Borg J.J., Canale E.D., Massa B. & Tagliavia M., 2014. The Breeding Pelagic Seabirds (Procellariiformes) of the Sicilian Channel. In Massa B. (Ed.) Reti Ecologiche transfrontaliere Malta-Sicilia (R.E.MA.SI.), Palermo.
- Borg J.J., Raine A., Raine H. & Barbara N., 2010. The EU Life funded Yelkouan Shearwater Project - Layman's Report. BirdLife Malta, 30 pp.
- Borg J.J. & Sultana J., 2002. Status and Distribution of the Breeding Procellariiformes in Malta. *il-Merill* 30: 10-14.
- Borg J.J. & Sultana J., 2004. Important Bird Areas of EU Importance in Malta. BirdLife Malta.
- Borg J.J., Sultana J., Metzger B. & Barbara N., 2016. Population estimates in Maltese pelagic breeding birds: numbers, trends and an appeal to assess these cautiously. Pp. 38-42 in: Yesou P., Sultana J., Walmsley J. & Azafzaf H., Conservation of Marine and Coastal Birds in the Mediterranean. Proceedings of the Unep-Map-Rac/Spa Symposium, Hammamet - Tunisia, 176 pp.
- Bibby C.J., Burgess N.D. & Hill D.A., 1992. Bird Census Techniques. Academic Press.
- Defous du Rau P., Bourgeois K., Ruffino L., Dromzée S., Ouni R., Abiadh A., Estève R., Durand J.-P., Anselme L., Faggio G., Yahya J.M., Peters P., Rguibi H., Renda M., Miladi B., Hamrouni H., Alilech S., Ben Dhafer A., Nefla A., Jaouadi W., Agrebi S. & Renou S., 2012. New assessment of the world's largest colony of Scopoli's Shearwater *Calonectris diomedea*. Pp. 26-28 in: Yesou P., Baccetti N. & Sultana J., Ecology and Conservation of Mediterranean Seabirds and other bird species under the Barcelona Convention. Updates and Progress. Proceedings of the 13th Medmaravis Pan-Mediterranean Symposium.
- Defous du Rau P., Bourgeois K., Thévenet M., Ruffino L., Dromzée S., Ouni R., Abiadh A., Estève R., Durand J.-P., Aselme L., Faggio G., Yahya J., Rguibi H., Renda M., Miladi B., Hamrouni H., Alilech S., Nefla A., Jaouadi W., Agrebi S. & Renou S., 2015. Reassessment of the size of the Scopoli's Shearwater population at its main breeding site resulted in a tenfold increase: implications for the species conservation. *J. Ornithol.* Online Version (DOI 10.1007/s10336-015-1187-4).
- Despott G., 1917. Notes on the ornithology of Malta. *Ibis* 10 (5): 281-349, 466-526 & App.
- Fenech N., 2010. The Complete Guide to the Birds of Malta. Midsea Books.
- Gaston A.J., 2004. Seabirds: a natural history. Yale University Press, New Haven, CT.
- Gaultier T., 1981. Contribution à l'étude de la population de Puffins cendrés (*Calonectris d. diomedea*) de l'Île de Zembra (Tunisie). Unpublished Thesis.
- Isenmann P., Gaultier T., el Hili A., Azafzaf, H., Dlenisi H. & Smart M., 2005. Oiseaux de Tunisie/Birds of Tunisia. Société d'Etudes Ornithologiques de France, Paris.
- Mitchell P.I. & Newton S.F., 2004. European Storm-petrel *Hydrobates pelagicus*. In: Mitchell P.I., Newton S.F., Ratcliffe N. & Dunn T.E., Seabird Populations of Britain and Ireland. T. & A.D. Poyser.
- Raine A., Sultana J. & Gillings S., 2009. Malta Breeding Bird Atlas 2008. BirdLife Malta, Malta.
- Raine A., Borg J.J., Raine H. & Phillips R.A., 2012. Migration strategies of the Yelkouan Shearwater *Puffinus yelkouan*. *J. Ornithol.* 154: 411-422.
- Roberts E.L., 1954. The Birds of Malta. Progress Press, Malta.
- Schembri A., 1843. Catalogo Ornitologico del Gruppo di Malta. Anglo-Maltese.
- Sultana J., Borg J.J., Gauci C. & Falzon V., 2011. The Breeding Birds of Malta. BDL/BirdLife Malta.
- Sultana J. & Gauci C., 1970. Bird Studies on Filfla. The Malta Ornithological Society.
- Sultana J., Gauci C. & Beaman M., 1975. A Guide to the Birds of Malta. MOS/Valletta.
- Trail H.A., 1949-50. Shearwaters on Filfolia Island. *Sea Swallow* 3: 12-14.
- Wright C.A., 1863. A Visit to the Islet of Filfla, on the South Coast of Malta. *Ibis* 5(4):435-440.
- Wright C.A., 1864. List of the birds observed in the Islands of Malta and Gozo. *Ibis* 6 (1-2): 42-73, 137-157.

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