

Seabirds

1.1 Introduction

This report provides a description of the population and status of seabirds occurring in the Maltese Islands in line with the requirements of Article 8 (1) and associated Annex III of the EU Marine Strategy Framework Directive.

Research on the bird populations of the Maltese Islands was spearheaded by BirdLife Malta and individual experts who initiated regular monitoring on a voluntary basis in the 1980s. Such monitoring focused on breeding colonies of seabirds in 155 accessible nests at 17 different sites. This report is based on the published and unpublished data resulting from this regular monitoring and has been compiled in consultation with Mr. John J. Borg, an expert with vast experience in monitoring of seabird populations.

1.1.1 General Description

The Maltese archipelago attracts birds crossing between the two continents in their spring and autumn journeys. Malta thus hosts internationally important bird species throughout their migration and breeding seasons.

In accordance with the functional groups identified by the Commission Staff Working Paper¹, seabirds occurring on the Maltese Islands can be separated into inshore feeding or offshore feeding birds. About 120 inshore feeding bird species occur regularly for a short term throughout the year. Among these, 52 species stay on island for wintering (October – March), while 18 species breed regularly in Malta^{2,3}. These regularly occurring birds include ducks, herons, raptors, rails, waders and passerines, and are generally associated with coastal wetlands. Coastal wetlands are restricted to a few pockets on the Maltese Islands, all of which have been significantly engineered or altered by anthropogenic interference⁴. The wetlands at L-Għadira and Is-Simar are considered to be the most important areas for inshore feeding birds in Malta. The pools and canals edged with thickets of vegetation in these areas provide adequate habitat for a number of migratory species especially moorhens and warblers. Both sites have been included in the Natura 2000 network

¹ European Commission. 2011. Commission Staff Working Paper: Relationship between the initial assessment of marine waters and the criteria for good environmental status. SEC(2011)1255 final.

² Sultana, J. & Borg, J.J., Coastal Zone Management Subject Plan – Ornithology (First Draft). Malta Environment and Planning Authority.

³ Sultana, J., Borg, J., Gauci, C. & Falzon, V. 2011 *The Breeding Birds of Malta*. BirdLifeMalta, Malta

⁴ Borg, J.A. & Schembri, P.J. (2002) Alignment of marine habitat data of the Maltese Islands to conform to the requirements of the EU habitats directive (Council Directive 92/43/EEC). [Report Commissioned by the Malta Environment and Planning Authority]. Malta: Independent Consultants; 136pp + Figs 1-23

as Special Protection Areas⁵ and are declared Ramsar sites under the Ramsar Convention⁶.

Offshore feeding birds occur regularly in Malta and aggregations of seabird species are regularly observed on coastal waters during spring and autumn migrations or during winter. Coastal cliffs and screes, which predominate along the Southwestern coast of the Maltese Islands, provide shelter and a breeding habitat to offshore pelagic feeding birds, namely Scopoli's Shearwater *Calonectris diomedea*, Yelkouan Shearwater *Puffinus yelkouan* and the European Storm Petrel *Hydrobates pelagicus*. Malta is deemed to be an internationally important breeding location for all three species. Coastal cliffs are also important for the Yellow Legged Gull, *Larus michahellis*; an inshore feeding bird which breeds and occurs in significant numbers around the Maltese Islands.

Given the importance of the Maltese Islands to breeding offshore feeding birds, data available to date pertains to the three breeding seabirds: *Calonectris diomedea*, *Puffinus yelkouan* and *Hydrobates pelagicus*. This data scenario precludes the possibility to assess status of seabirds in terms of functional groups identified by the Commission Staff Working Paper. Accordingly, this report will focus on the three seabird species which breed regularly on the Maltese Islands.

1.2 Relevant Legislation and/or Management Activities

This section outlines the existing policies targeted at the protection and/or conservation of bird species and which are thus of relevance to the implementation of the MSFD with respect to seabirds.

Table 1 lists bird species included in existing policies.

EC Birds Directive

The Council Directive on the Conservation of Wild Birds in 1979 (79/409/EEC), as later codified by Directive 2009/147/EC, is the main European legislation targeted at the conservation and protection of bird species. This Directive was transposed into national legislation through Legal Notice 79 of 2006 entitled 'Conservation of Wild Birds Regulations'.

The Birds Directive calls for the protection and management of all naturally occurring birds, their eggs, nests and habitats within all EU Member States. Within this context, Member States shall take the requisite measures to maintain the population

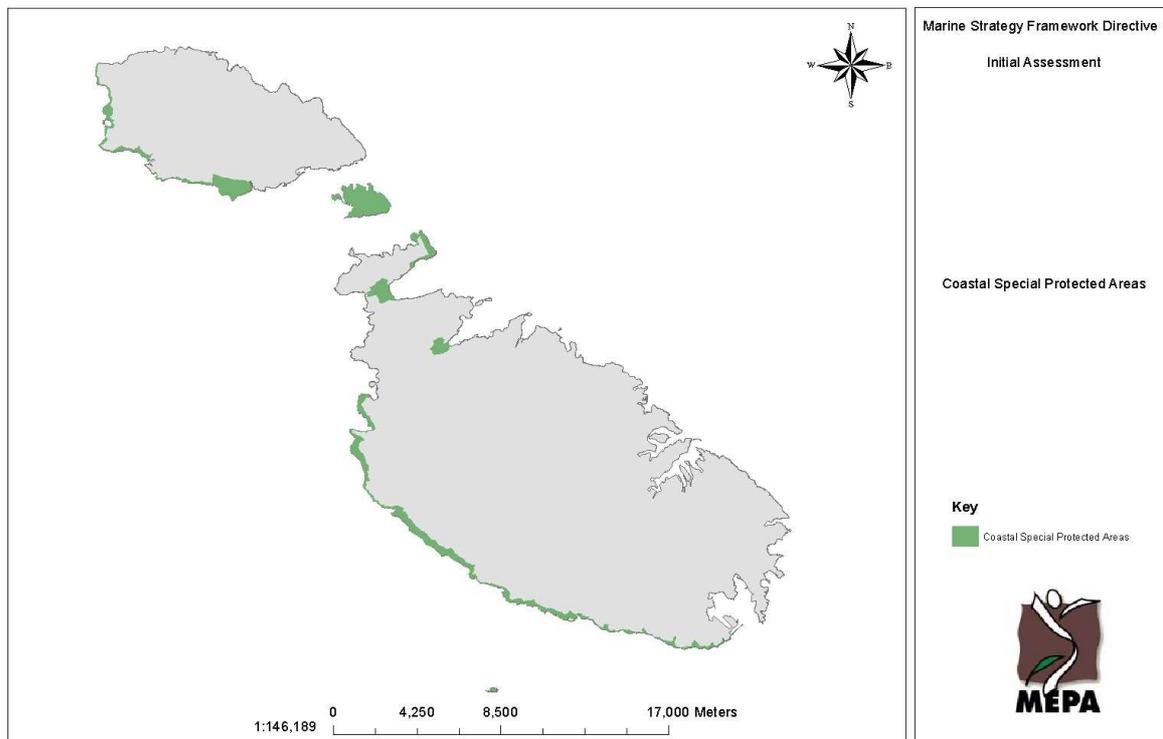
⁵ European Commission. 2012. Commission Implementing Decision adopting a sixth updated list of sites of Community importance for the Mediterranean biogeographical region. C(2012) 8233 final

⁶ The Convention on Wetlands of International Importance

of these species at a level which corresponds in particular to ecological, scientific and cultural requirements. Member States are also required to establish a network of Special Protection Areas (SPAs) harbouring important habitats for all breeding, wintering and migrating birds listed in Annex I of the Directive. Such Special Protection Areas would form part of the Natura 2000 European Network of protected sites.

Twelve sites along the coast of the Maltese Islands have been designated as Special Protection Areas aimed at the protection and conservation of Annex I bird species. Figure 1 shows these protected areas on the Maltese Islands.

Figure 1: Special Protection Areas on the coast of the Maltese Islands designated in terms of the Birds Directive as transposed through LN 79 of 2006 and LN 311 of 2006



The EU Biodiversity Strategy 2020

The EU Biodiversity Strategy 2020 targets the maintenance of biodiversity and reduction in species extinction rates. It calls for the fulfilment of the Habitats and Birds Directive with a view to halt the deterioration in the status of all species and habitats covered by EU nature legislation and achieve a significant and measurable improvement in their status so that by 2020, 100% more habitat assessments and 50% more species assessments under the Habitats Directive show an improved conservation status, and 50% more species assessments under the Birds Directive show a secure or improved status.

Convention on the Conservation of European Wildlife and Natural Habitats (Bern)

Malta has ratified the Bern Convention in 1993. Parties to this Convention aim to conserve wild flora and fauna and their natural habitats giving particular importance to the protection of endangered natural habitats and endangered vulnerable species, including migratory ones.

Contracting parties shall ensure the conservation of habitats of wild fauna (including birds) listed as 'strictly protected fauna species' in Appendix II to the Convention. Parties are also required to take appropriate and necessary legislative and administrative measures to ensure protection of these species.

Special attention should be given to the protection of areas that are of importance to migratory species specified in Appendices II and III (protected fauna species), and which are situated in relation to migratory routes, as wintering, staging, feeding, breeding or moulting areas. Any exploitation of wild fauna specified in Appendix III shall be regulated in order to keep the populations out of danger, taking into account the requirements of Article 2.

The provisions of the Bern Convention are covered by Legal Notice 311 of 2006.

The Convention for the Protection of the Mediterranean Sea against Pollution (Barcelona Convention)

The Barcelona Convention led to a protocol concerning Mediterranean Specially Protected Areas in 1982, which was amended and renamed the Protocol for Specially Protected Areas and Biodiversity in the Mediterranean (SPABIM) in 1995. Endangered or threatened bird species are listed in Annex II to this protocol. Contracting parties shall ensure the maximum possible protection and recovery of species listed in this Annex by adopting protection measures at a National level.

Convention on Conservation of Migratory Species of Wild Animals (Bonn Convention)

This Convention, aiming at the conservation of migratory species and their habitats, was adopted in Bonn in 1979 and came into force in 1985.

Species listed in Appendix I of this Convention are migratory species deemed to be in danger of extinction throughout all or a significant proportion of their range. Parties to the Convention shall seek the strict protection of these animals, conserving or restoring the habitats in which they live, mitigating obstacles to migration and controlling other factors that might endanger them.

Appendix II of the Convention lists migratory species that have an unfavourable conservation status or would benefit significantly from international co-operation. The Convention encourages the contracting parties to conclude global or regional agreements for the conservation and management of individual species or, more often, of a group of species listed on Appendix II.

Table 1: Bird species occurring on the Maltese Islands as listed in the existing policies or are otherwise deemed to be of National importance [*Regular Breeding; **Irregular Breeding Birds; ***Non-breeding Birds]

Offshore feeding birds	Birds Directive	Bern Convention	Barcelona Convention	Bonn Convention
<i>Calonectris diomedea</i> *	Annex I	App. II	Annex. II	
<i>Chlidonias niger niger</i> ***	Annex I	App. II		App. II
<i>Chlidonias leucopterus</i> ***		App. II		App. II
<i>Hydrobates pelagicus</i> *	Annex I	App. II	Annex II	
<i>Puffinus yelkouan</i> *	Annex I	App. II	Annex II	

Inshore feeding birds	Birds Directive	Bern Convention	Barcelona Convention	Bonn Convention
<i>Larus audouinii</i> ***	Annex I	App. II	Annex II	App. I & II
<i>Larus fuscus</i> ***	Annex II	App. III		
<i>Larus melanocephalus</i> ***	Annex I	App. II	Annex II	App. II
<i>Larus minutus</i> ***	Annex I	App. II		
<i>Larus michahellis</i> *	Annex II	App. III		
<i>Sterna albifrons</i> ***	Annex I	App. II	Annex II	App. II
<i>Sterna caspia</i> ***	Annex I	App. III	Annex II	App. II
<i>Sterna nilotica nilotica</i> ***	Annex I	App. III	Annex II	App. II
<i>Sterna sandvicensis</i> ***	Annex I	App. II	Annex II	App. II
<i>Chroicocephalus genei</i> ***	Annex I	App. II	Annex II	App. II
<i>Chroicocephalus ridibundus</i> ***	Annex II	App. II		

Inshore feeding birds (coastal wetlands)	Birds Directive	Bern Convention	Barcelona Convention	Bonn Convention
<i>Acrocephalus scirpaceus</i> *		App. III		
<i>Charadrius dubius</i> *		App. II		App. II
<i>Egretta garzetta</i> **	Annex I	App. II		
<i>Fulica atra</i> **	Annex II	App. III		App. III
<i>Gallinula chloropus</i> *	Annex II	App. III		

Other Conservation Initiatives

Filfla Nature Reserve Act (Act XV of 1988)

Filfla is a small islet off the Southwestern coast of mainland Malta, which hosts important seabird colonies. This islet is protected through the *Filfla Nature Reserve Act* issued under the Environment Protection Act in 1988. Through this Act, access to Filfla is only permitted for research and scientific purposes by the Ministry responsible for the environment.

Notice to Mariners 16 of 1987 also prohibited berthing or navigation of crafts, fishing, trawling, swimming, diving and any other associated activities within a one Nautical Mile radius around Filfla. This notice was superseded by Government Notice No. 173 of 1990 which permits fishing from surface vessels within one nautical mile off Filfla.

In addition to the above-mentioned protection, Filfla has been designated as a Bird Sanctuary through the Conservation of Wild Birds Regulations (Legal Notice 79 of 2006) as amended), a Specially Protected Area under the Protocol for Specially Protected Areas (Barcelona Convention) and as a Special Protection Area (SPA) under the EC Birds Directive.

EU LIFE Yelkouan shearwater project (2007-2010)

The EU LIFE Yelkouan shearwater project aimed at reversing the decline of the *Puffinus yelkouan* population through protection of its main breeding site: Rđum tal-Madonna Special Protection Area. This project was concluded in 2010.

BirdLife Malta, through this project, has put forward a number of recommended conservation measures compiled within a management plan for the site in question. Details of this project can be viewed at:

<http://www.birdlifemalta.org/Content/LIFEPROJECTS/maltaseabirdproject/1115/>

One of the conservation measures put forward through this project was the identification of a restriction area in the marine area adjacent to Rđum tal-Madonna. This restriction area was delineated through Notice to Mariners No 2 of 2010 issued by the Ports and Yachting Directorate of Transport Malta. A buffer zone has been designated at about 1.1 Nautical Mile from the shores of the Rđum tal-Madonna Special Protection Area. In line with this Notice to Mariners, all crafts and vessels including 'Floating Discos' transiting the area between 1 February and 30 July, between 2 hours before sunset till two hours after sunrise, shall switch off all lights and loud noises, or else avoid the area. The buffer zone to the SPA is also a 'no stopping zone' for all vessels excluding for fishing vessels carrying out fishing activities.

Other prohibited activities within this restriction area include the use of lights from all vessels except for safety reasons, boat parties, fishing using lights (lampara) and the letting off of petards and fireworks from sea.

EU LIFE+ Malta Seabird Project

The EU LIFE+ Malta Seabird Project aims at identifying Marine Important Bird Areas for the three predominant seabirds, *Puffinus yelkouan*, *Calonectris diomedea* and *Hydrobates pelagicus*. Through this project, which is expected to be completed in 2016, Birdlife Malta will be providing the Government Authorities with a candidate list of marine Special Protection Areas.

1.3 Scopoli's Shearwater - *Calonectris diomedea*

1.3.1 Distribution and Population abundance

Scopoli's shearwater, *Calonectris diomedea* is confined to the Mediterranean basin, with a population estimate of 62,000-73,000 pairs⁷. This value excludes the shearwaters' populations occurring in the Adriatic and eastern Mediterranean, for which no populations estimates are available yet.

The main breeding colonies of *C. diomedea* in Malta are distributed along the Southern and South-western cliffs of the main islands of the archipelago, with large colonies situated from Bengħisa to Għar Lapsi cliffs in Malta and a high concentration of breeding pairs at Ta' Ċenċ cliffs in Gozo⁸. Other breeding colonies are scattered on the smaller islands, Kemmuna and Filfla, and in the 1980s another breeding colony was confirmed on the islet Fungus Rock⁹. In the last decade, breeding of this species at Rdum tal-Madonna, which is also the main breeding site for *Puffinus yelkouan*, was confirmed¹⁰.

The distribution of the breeding colonies of *Calonectris diomedea* is shown in Figure 2. All these sites are included within the boundaries of Special Protection Areas.

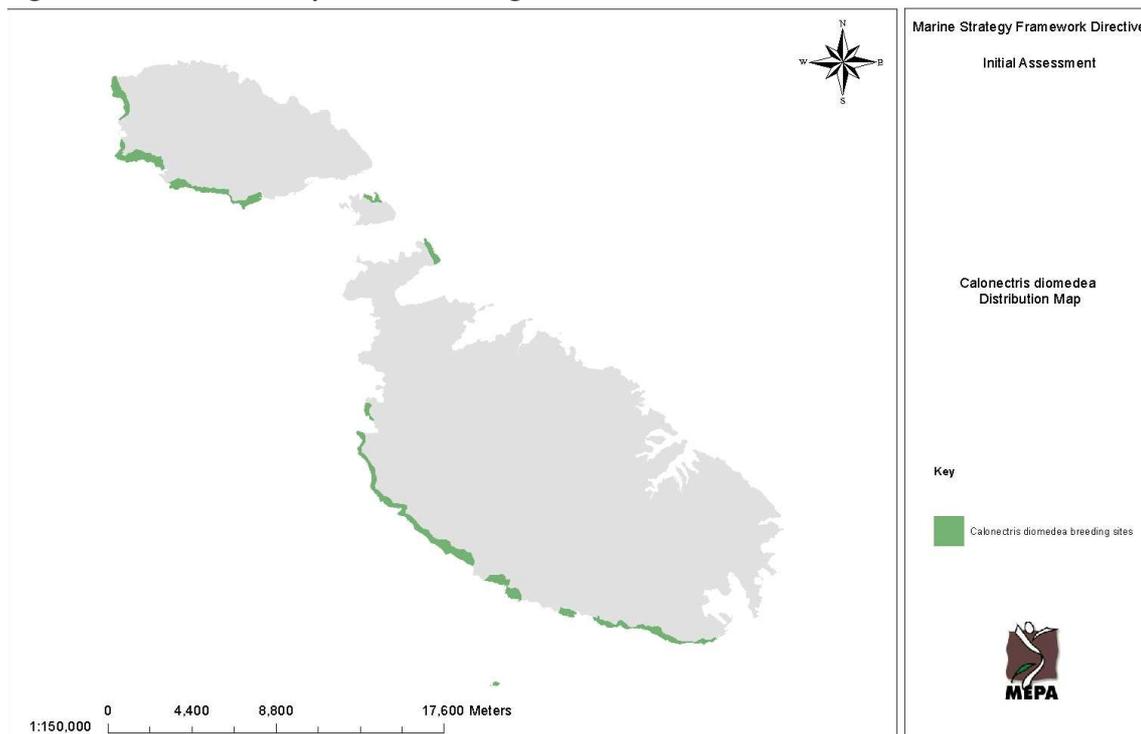
⁷ Sultana, J., Borg, J., Gauci, C. & Falzon, V. 2011 *The Breeding Birds of Malta*. BirdLifeMalta, Malta

⁸ ditto

⁹ Sultana, J. & Cachia Zammit, R. 1988. Cory Shearwater *Calonectris diomedea* breeding in Hagret il-General. *Il-Merill* **25**: 12

¹⁰ Borg, J.J. & Mallia, M. 1992-1994. Cory Shearwater *Calonectris diomedea* found breeding on the east coast of Malta. *Il-Merill* **28**: 23

Figure 2: Distribution map of the breeding colonies of *Calonectris diomedea*¹¹



Up to 2004, the breeding population of *C. diomedea* along the coastal cliffs of the Maltese Islands was estimated at about 7,000 breeding pairs^{12,13,14}. However a census carried out in 2010 revealed a decline in breeding pairs, particularly along the Southern cliffs of Malta. Population size is currently estimated at less than 5,000 pairs¹⁵ (c. 4340 – 4860 pairs quoted in Raine *et al.*, 2008¹⁶).

Such decline corroborates the negative trend reported by the Birds in Europe II for *C. diomedea* for the period between 1990-2002. However experts indicate that this decline does not necessarily reflect a declining trend in the population size of this species, since such trends can only be verified through long-term data (J.J. Borg, personal communication). Furthermore, at this stage, a declining trend is deemed to be reversible should current pressures on the seabird populations be addressed (J.J. Borg, personal communication).

Trends in the density of breeding adults across its range are indicated in Figure 3. The distribution of breeding pairs was generally stable throughout the years, with the exception of a marked decrease in the breeding population recorded in the

¹¹ Sultana, J., Borg, J., Gauci. C. & Falzon, V. 2011 *The Breeding Birds of Malta*. BirdLifeMalta, Malta

¹² Borg, J.J. & Sultana, J. 2000. Aspects on the breeding biology of Cory's Shearwater *Calonectris diomedea* in the Maltese Islands; *Die Vogelwarte*; **40**: 258-264

¹³ Borg, J.J. & Sultana, J. 2002. Status and Distribution of the Breeding Procellariiformes in Malta. *Il-Merill* **30**: 10-14

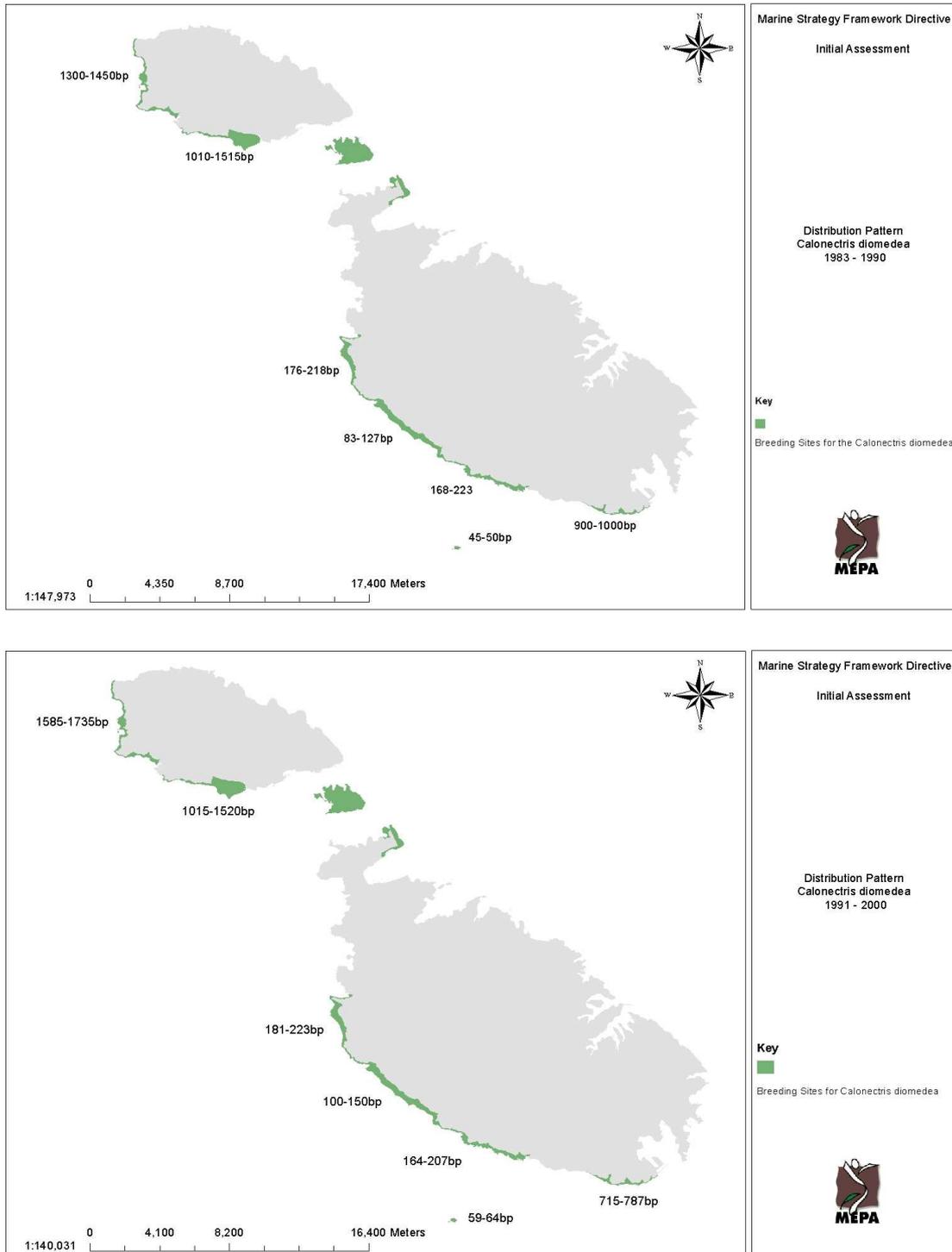
¹⁴ Borg, J.J. & Sultana, J. 2004. *Important Bird Areas of EU importance in Malta*. BirdLife Malta, RSPB, UK in Sultana, J., Borg, J., Gauci. C. & Falzon, V. 2011 *The Breeding Birds of Malta*. BirdLifeMalta, Malta

¹⁵ Sultana, J., Borg, J., Gauci. C. & Falzon, V. 2011 *The Breeding Birds of Malta*. BirdLifeMalta, Malta

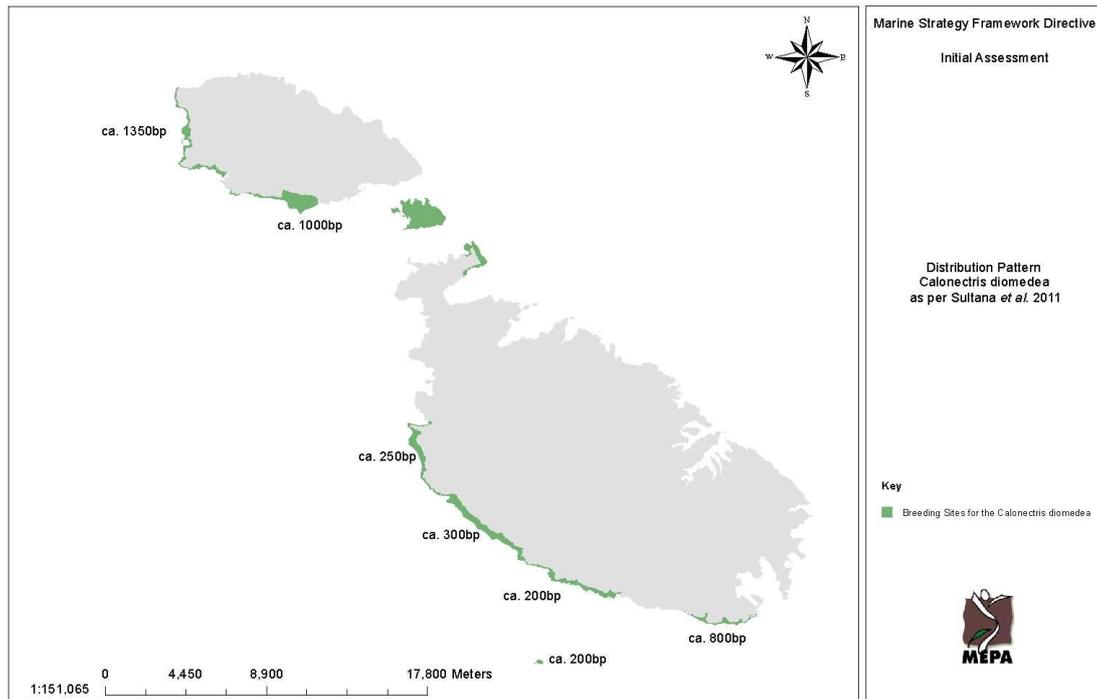
¹⁶ Raine, A., Sultana, J. & Gillings, S. 2009. *Malta Breeding Bird Atlas 2008*. Malta: BirdLife Malta.

Bengħisa to Għar Lapsi cliffs (Southwestern cliffs on mainland Malta), which decrease is attributed to a decrease in the vertical extent of the cliffs occupied by breeding seabirds. Until the 1980s, Scopoli's shearwater used to breed freely on top of cliff ledges in this area, however following encroachment of development onto the cliff edge, the birds shifted to about 15m below the ledge thus leading to a reduction in the extent of the occupied cliffs.

Figure 3: Trends in distribution pattern of *Calonectris diomedea* based on mean estimates of breeding pairs within specific locations along the coast in the periods 1983-1990 and 1990-2000 (unpublished data provided by John J. Borg) and as published in Sultana *et al.* (2011)¹⁷. N/A implies that estimates for that particular location are not available for the time period under consideration. Interpretation of these maps should acknowledge the different levels of research efforts throughout the years, as well as different interpretation of localities to which unpublished and published data refer.



¹⁷ Sultana, J., Borg, J., Gauci, C. & Falzon, V. 2011 *The Breeding Birds of Malta*. BirdLifeMalta, Malta



While this report is focusing on the breeding distribution of *C. diomedea* along the coastal cliffs, it should be acknowledged that shearwaters, particularly Scopoli's shearwaters, are known to aggregate on coastal waters prior to entering their nest to feed their chicks. Such coastal waters are known as 'rafting areas' and although the purpose of the birds' behaviour is not yet known, the rafting areas are deemed to be a seaward extension to the distribution of the breeding colonies (J.J. Borg, personal communication).

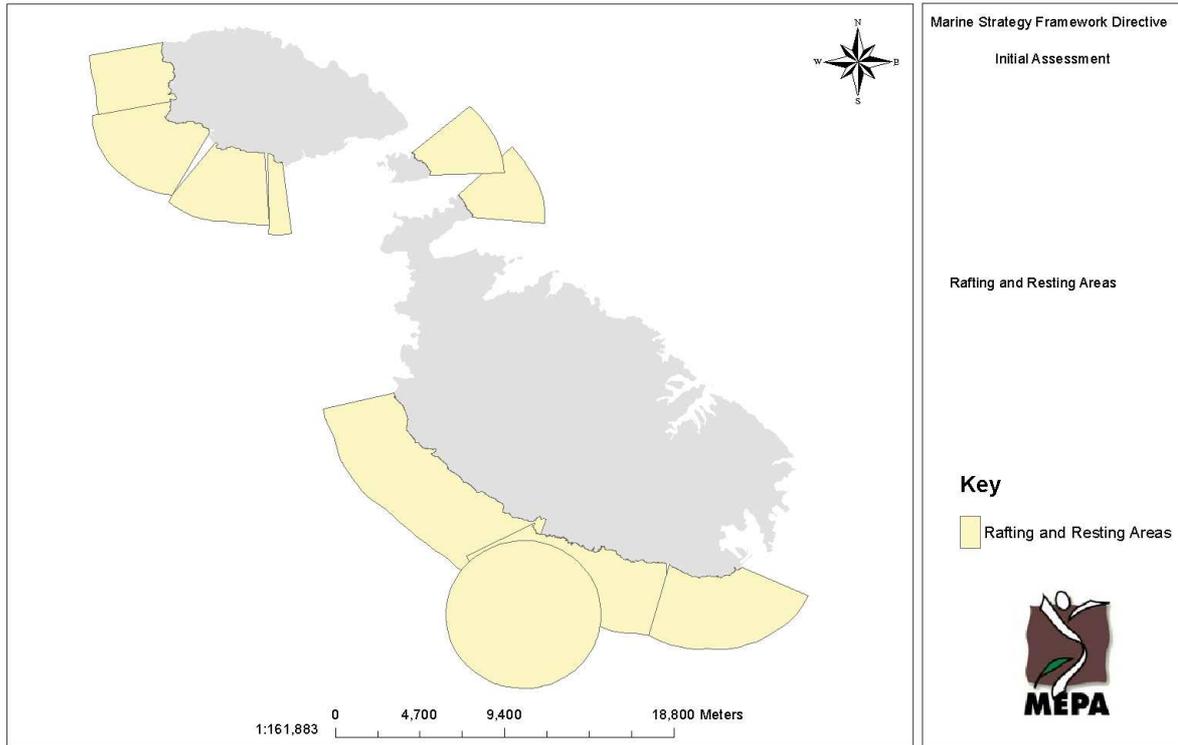
There are currently different schools of thought with respect to the purpose of the birds' behaviour and rafting areas. It is undoubtedly an essential activity for these birds due to the fact that a large number of birds engage in this behaviour and rafts are recurrent. Many hypothesize that rafting zones functionally support social interaction and protection¹⁸ and are considered to be part of the distributional range of seabirds. Borg & Sultana (2004)¹⁹ provide an indication of these rafting areas for the Scopoli's shearwaters (Figure 4). However, marine areas used by seabirds for foraging/resting extend further to the indicative rafting zones. Reference is hereby made to Figure 11 indicating marine areas used by a specific colony of *Puffinus yelkouan* at Rđum tal-Madonna. These marine areas could also be used by *C. diomedea*, as indicated by a recent environmental assessment report²⁰.

¹⁸ <http://www.welshwildlife.org/wp-content/uploads/2011/07/FAQ.pdf>

¹⁹ Borg, J.J. & Sultana, J. 2004. Important Bird Areas of EU importance in Malta, BirdLife Malta, RSPB.

²⁰ AIS Environmental. 2012. Sikka I-Bajda proposed offshore wind energy development. Appropriate Assessment of four Special Protection Areas. SLR Ref 408-0082-00019

Figure 4: Rafting areas defined for *Calonectris diomedea* as indicated in Borg & Sultana, 2004²¹



²¹ Borg, J.J. & Sultana, J. 2004. Important Bird Areas of EU importance in Malta, BirdLife Malta, RSPB.

1.3.2 Population Demographic Characteristics

Population demographic characteristics for *Calonectris diomedea* can be described through the adult annual survival rates and the hatching and fledging success as indicators of fecundity rates. In general, *C. diomedea* is a long-lived species, characterised by low fecundity rates with a single egg laid per female adult per year, low first-year survival and also delayed sexual maturity²².

Between 1989 and 1997 six populations of *Calonectris diomedea* across six islands from the eastern Atlantic to eastern Mediterranean were studied, with a view to compare adult survival rates²³. In Malta, this study was based a random sample of 155 nests around the archipelago. Mean annual adult survival rate calculated through this analysis was 0.83 ± 0.0016 (mean \pm relative process variance) for both males and females in Malta²⁴. When compared to annual adult survival rates estimated for undisturbed colonies of shearwaters, the value estimated for Maltese populations is considered to be slightly below average. Nevertheless these parameters are based on accessible nests, hence those nests which are most likely to be subject to anthropogenic disturbance (J.J. Borg, personal communication). Seabird populations on vertical cliffs would generally show higher survival rates (John J. Borg, personal communication).

Figure 5 indicates the hatching and fledging success of *Calonectris diomedea* between 1983 and 2007²⁵. With the exception of a sharp drop recorded in 1996-1997, the hatching and fledging success are considered relatively stable throughout this period. Unpublished data on hatching and fledging success for the period 2008-2012 corroborates this trend (J.J. Borg, personal communication). From the 155 accessible nests that were under observation along the Maltese cliffs in the period 1983 to 2012, the average rate of hatched eggs was 82% and 70.53% of the hatched eggs were successfully fledged. The unpublished data for 2008-2012 was taken into consideration when calculating the mean hatching and breeding success given that this period shows a continuation of trend when compared to the earlier years.

According to Sultana *et al.* (2011)²⁶, it was postulated that the sharp drop in 1996/1997 was due to direct persecution of the birds by humans. In 1996, 31 nests out of 155 under observation were occupied by incubating birds. Successful hatching

²² Jenouvrier, S.; Thibault, J.C.; Viallefont, A.; Vidal, P.; Ristow, D.; Mougin, J.L.; Brichetti, P.; Borg, J.J. & Bretagnolle, V. 2009. Global climate patterns explain range-wide synchronicity in survival of a migratory seabird. *Global Change Biology*. 15, 268-279.

²³ Jenouvrier, S.; Thibault, J.C.; Viallefont, A.; Vidal, P.; Ristow, D.; Mougin, J.L.; Brichetti, P.; Borg, J.J. & Bretagnolle, V. 2009. Global climate patterns explain range-wide synchronicity in survival of a migratory seabird. *Global Change Biology*. 15, 268-279.

²⁴ Jenouvrier, S.; Thibault, J.C.; Viallefont, A.; Vidal, P.; Ristow, D.; Mougin, J.L.; Brichetti, P.; Borg, J.J. & Bretagnolle, V. 2009. Global climate patterns explain range-wide synchronicity in survival of a migratory seabird. *Global Change Biology*. 15, 268-279.

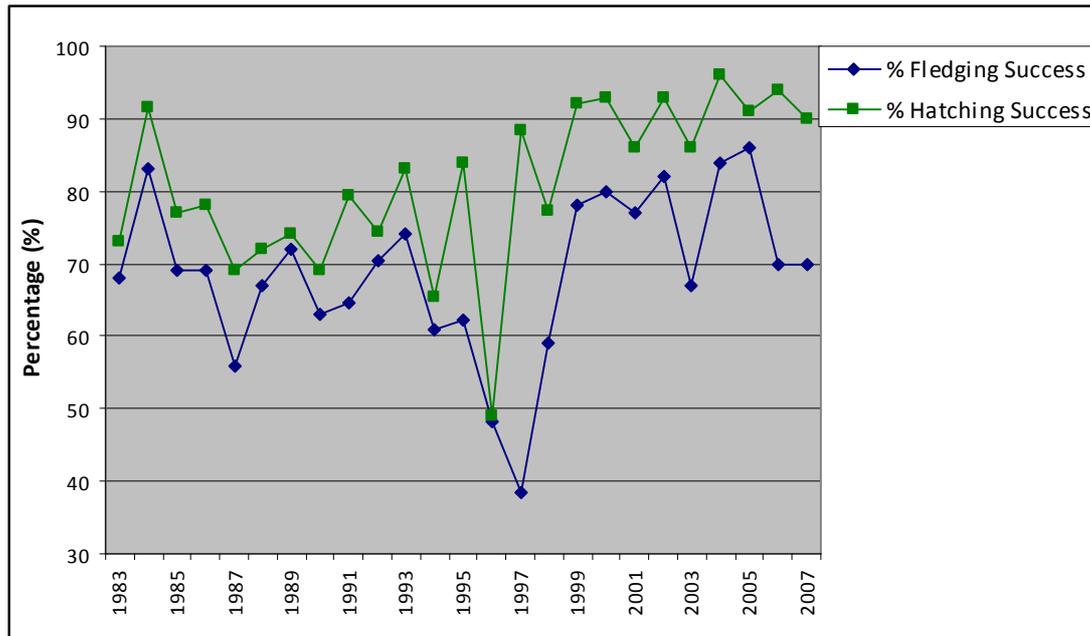
²⁵ Sultana, J., Borg, J., Gauci, C. & Falzon, V. 2011 *The Breeding Birds of Malta*. BirdLifeMalta, Malta

²⁶ Sultana, J., Borg, J., Gauci, C. & Falzon, V. 2011 *The Breeding Birds of Malta*. BirdLifeMalta, Malta

was 49% and 48.3% of the hatched eggs, were successfully fledged. The low breeding success in 1996 was reflected in the following year²⁷.

The fecundity rate is also likely to be affected by external factors such as productivity of the marine environment in foraging areas, habitat quality, level of predation and human disturbance amongst others. Fledging success of hatched eggs is thus likely to be higher for inaccessible nests.

Figure 5: Trends in hatching and fledging success of *Calonectris diomedea* between 1983-2007 (data extracted from Sultana *et al.*, 2011²⁸)



1.3.3 Pressures

The main pressures on populations of *Calonectris diomedea* are mainly attributed to disturbance from anthropogenic activities. Encroachment by development onto the coastline is considered to be a major source of disturbance, which has particularly affected one of the breeding colonies of *Calonectris diomedea* along the Southwestern cliffs of mainland Malta. The breeding population at this site has declined due to abandonment of nests along the cliff tops as a result of disturbance, particularly through light pollution, from the main industrial area developed along the coastal cliffs in the ‘Hal Far’ area. This has also resulted in a reduction in the vertical extent of the cliff faces occupied by breeding birds.

Boating activities held during the night in rafting areas are also known to disturb *C. diomedea* through the generation of noise and light.

²⁷ Sultana, J., Borg, J., Gauci, C. & Falzon, V. 2011 *The Breeding Birds of Malta*. BirdLifeMalta, Malta

²⁸ Sultana, J., Borg, J., Gauci, C. & Falzon, V. 2011 *The Breeding Birds of Malta*. BirdLifeMalta, Malta

Biological disturbance, mainly through predation by rats and domestic animals such as cats and dogs is also considered to be a significant pressure on *C. diomedea*. Extraction of species as a result of illegal taking of adult birds and their eggs may also constitute a threat, as indicated by the significant drops in the hatching and fledging success of *Calonectris diomedea* in 1996/1997 (Figure 5)²⁹.

Fishing practices which may constitute a pressure on Scopoli's shearwaters include both offshore and onshore fishing, the latter mainly through long-vertical trap-lines from the top of ledges which may affect flying seabirds³⁰. Fishery by-catch mainly from longline fishing is considered to be a significant pressure on seabirds in the Mediterranean region³¹. An investigation by Cooper *et al.* (2003)³² based on questionnaires, reported mortality of 36 Scopoli's shearwaters from longlining during a period from March to August 2000, most of which were caught in June. Mortality of *Calonectris diomedea* from accidental by-catch by fisheries in Malta is documented in Dimech *et al.* (2008)³³ and Darmanin *et al.* (2010)³⁴. A summary of these studies is given in

Table 2.

Table 2: Summary of the results for seabird bycatch by surface and bottom long-lining as reported in Dimech *et al.* (2008)³⁵ and Darmanin *et al.* (2010)³⁶

Source	Methodology	Sample	Period	By-catch reported	Limitations of study
Dimech <i>et al.</i> (2008) ³⁷	Questionnaire	146 full-time and part-time fishers interviewed	Oct – Dec 2007	Annual incident by-catch of <i>C. diomedea</i> : 1,214 birds from bottom long-lining; 6 from surface long-lining translating into an average of 1.41 <i>C.</i>	Data needs to be considered with caution since it is based on questionnaires and not direct data; incidental capture may

²⁹ Sultana, J., Borg, J., Gauci, C. & Falzon, V. 2011 *The Breeding Birds of Malta*. BirdLifeMalta, Malta

³⁰ Borg, J.J. & Cachia-Zammit, R. 1995. Monitoring Cory's Shearwater *Calonectris diomedea* colonies in a hostile environment – Malta pp. 31-47

³¹ Oppel, S., Raine.A.F., Borg, J.J, Raine, H., Bonnaud, E., Bourgeois, K., Breton A.R. .2011. Is the Yelkouan shearwater *Puffinus yelkouan* threatened by low adult survival probabilities? *Biological Conservation* **144**: 2255-2263

³² Cooper, J.; Bacetti, N., Belda, E.J., Borg, J.J., Oro, D., Papaconstantinou, C. & Sanchez, A. 2003. Seabird mortality from longline fishing in the Mediterranean Sea and Macaronesian waters: a review and a way forward. *Scientia Marina*, **67** (Suppl. 2): 57-64

³³ Dimech M., Darmanin M., Caruana C., Raine H (2008) Preliminary data on seabird by-catch from the Maltese long-line fishery. ICCAT SCRS/2008/027.

³⁴ Darmanin, M., Caruana, R. & Dimech, M. 2010. Report on Studies to Investigate Seabird By-Catch by Maltese Fishers. Report by the Capture Fisheries Branch for the EU LIFE Yelkouan Shearwater Project LIFE06 NAT/MT/000097

³⁵ Dimech M., Darmanin M., Caruana C., Raine H (2008) Preliminary data on seabird by-catch from the Maltese long-line fishery. ICCAT SCRS/2008/027.

³⁶ Darmanin, M., Caruana, R. & Dimech, M. 2010. Report on Studies to Investigate Seabird By-Catch by Maltese Fishers. Report by the Capture Fisheries Branch for the EU LIFE Yelkouan Shearwater Project LIFE06 NAT/MT/000097

³⁷ Dimech M., Darmanin M., Caruana C., Raine H (2008) Preliminary data on seabird by-catch from the Maltese long-line fishery. ICCAT SCRS/2008/027.MM

				<i>diomedea</i> per bottom long-line fisher per year.	consist of birds from colonies other than Maltese.
Darmanin <i>et al.</i> (2010) ³⁸	Self sampling by Fishers	9 vessels operated by 7 fishers; 443 trips sampled; 280 trips bottom long-lining; 163 trips Drifting surface long-lining	May 2008 – Apr 2010	1 <i>C. diomedea</i> caught with drifting surface long-lines; 1 <i>C. diomedea</i> caught with bottom long-lines. Overall this study concluded that the number of seabirds caught annually is in the region of 94 seabirds with bottom long-lining and 52 seabirds with drifting surface long-lining.	Annual seabird bycatch is an estimate.
Darmanin <i>et al.</i> (2010) ³⁹	Field observations	6 long-line vessels; total fishing effort of 109, 155 hooks and an average of 1284 hooks/day. Target species Bluefin Tuna (surface long-lining).	30 April – 30 June 2008	No seabird bycatch recorded.	N/A

Figure 6 - Figure 8 indicate the fishing effort of surface and bottom long-lining and tuna fisheries in Malta superimposed on rafting/resting areas. It should be acknowledged that marine areas used by *C. diomedea* are much wider than the indicated rafting/resting areas. It should be noted that the Maltese bottom longline fleet is already making use of a number of mitigation measures, including including side setting, weight on snood and using bait that has been defrosted. These mitigation measures in use for bottom longlining are deemed effective in reducing seabird by-catch.

³⁸ Darmanin, M., Caruana, R. & Dimech, M. 2010. Report on Studies to Investigate Seabird By-Catch by Maltese Fishers. Report by the Capture Fisheries Branch for the EU LIFE Yelkouan Shearwater Project LIFE06 NAT/MT/000097

³⁹ Darmanin, M., Caruana, R. & Dimech, M. 2010. Report on Studies to Investigate Seabird By-Catch by Maltese Fishers. Report by the Capture Fisheries Branch for the EU LIFE Yelkouan Shearwater Project LIFE06 NAT/MT/000097

Figure 6: Indication of fishing effort through surface long-lining (2009) superimposed on indicative rafting/resting areas for *C. diomedea*. Fisheries data⁴⁰ is based on aggregated VMS data, providing information on fishing activity and making way.

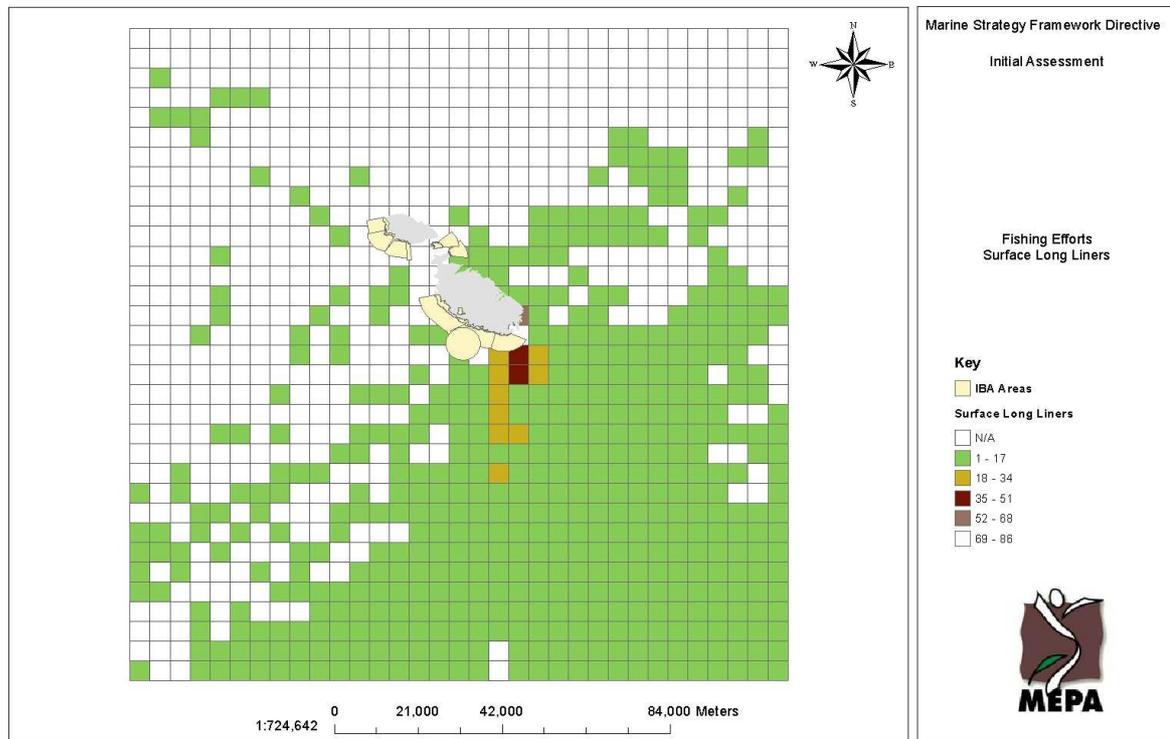


Figure 7: Indication of fishing effort through tuna fishing superimposed on indicative rafting/resting areas for *C. diomedea*. Fisheries data⁴¹ is based on aggregated VMS data, providing information on fishing activity and making way.

⁴⁰ Data provided by the Fisheries Control Directorate

⁴¹ Data provided by the Fisheries Control Directorate

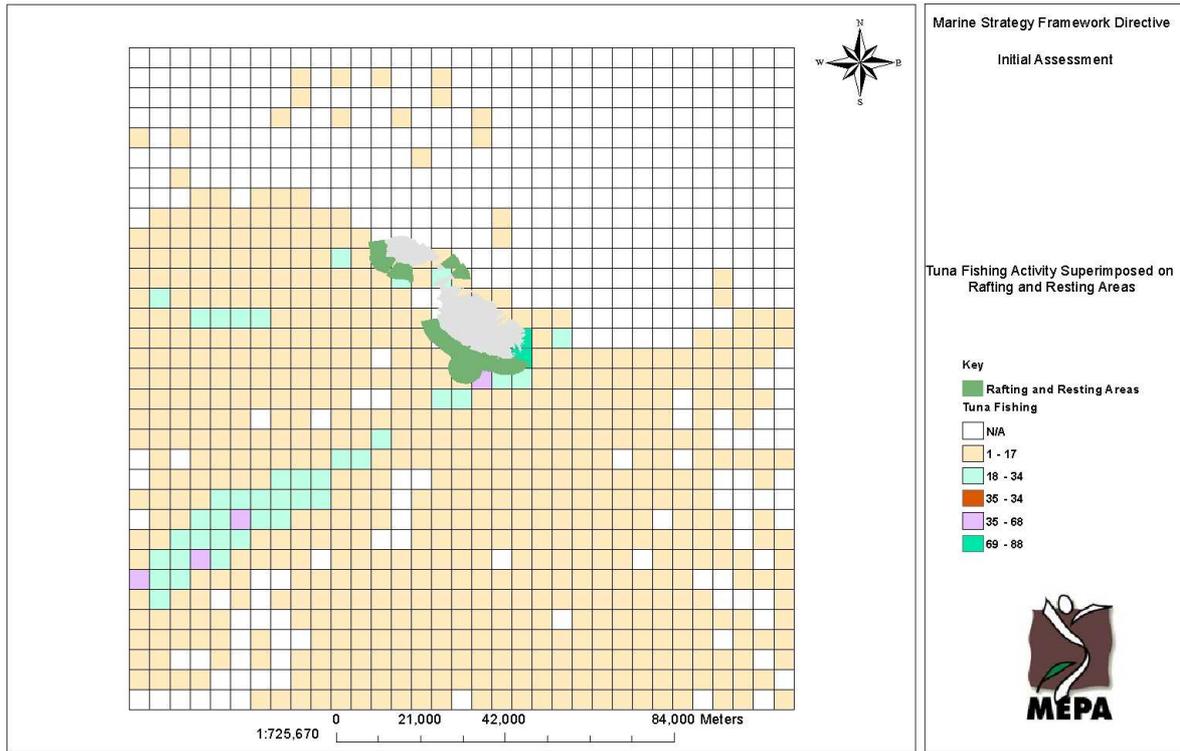
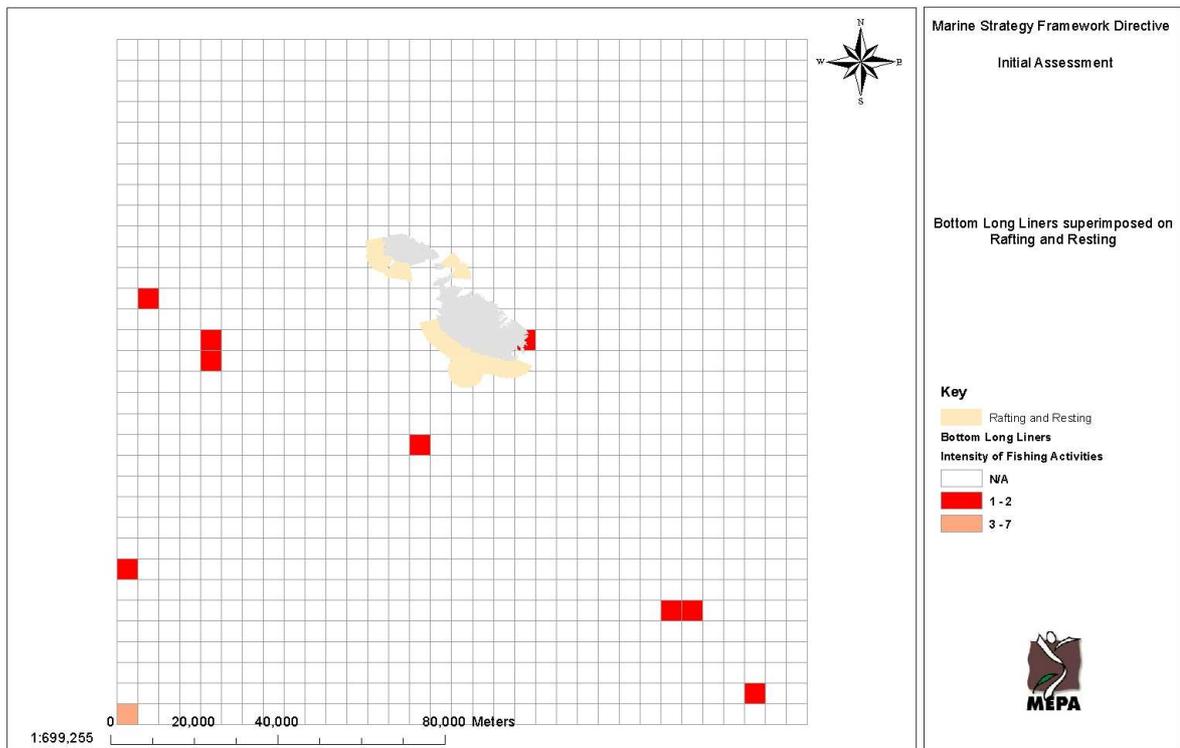


Figure 8: Indication of fishing effort through bottom long-lining superimposed on indicative rafting/resting areas for *C. diomedea*. Fisheries data⁴² is based on aggregated VMS data, providing information on fishing activity and making way.



⁴² Data provided by the Fisheries Control Directorate

1.4 Yelkouan Shearwater: *Puffinus yelkouan*

1.4.1 Distribution and Population abundance

The Yelkouan Shearwater, *Puffinus yelkouan*, is endemic to the Mediterranean basin, occurring mostly in the central Mediterranean region. The current global population of *Puffinus yelkouan* is estimated at 13,000 – 33,000 pairs⁴³. More than 95% of the total global population of this species breeds along the Mediterranean shores of Southern European countries⁴⁴. The main breeding colonies are in the central Mediterranean and Ionian region (Table 3).

Table 3: Population estimates for the main breeding sites of *Puffinus yelkouan* in the Central Mediterranean and Ionian Region

Country	Population in Breeding Pairs
Italy	9,000 – 20,000 ⁴⁵
Greece	4,000 – 7,000 ⁴⁶
Malta	1,660 – 1,980 ⁴⁷

Breeding colonies of *Puffinus yelkouan* are scattered along the coastal cliffs or boulder screes of the Maltese Islands (Figure 9). It is generally found nesting in deep crevices, holes, rabbit burrows, caves and screes. The largest population of this species (398-602 breeding pairs⁴⁸), is resident at Rdum tal-Madonna, on the Northeastern part of mainland Malta, which breeding colony was discovered in 1969. Another important colony at Ta' Ċenċ (Gozo) was discovered later in 1997. Most of the current breeding sites of *Puffinus yelkouan* are designated as Special Protection Areas.

In the past, this species also used to breed on two islets of the Maltese archipelago: Filfla and Selmunett. During the 1960s and 1970s, the Filfla colony declined, mainly due to the bombing practice targeted at this islet in the 1960s and the increase in the breeding population of the Yellow-legged Gull *Larus michahellis* on the islet in the 1970s. This Yellow-legged Gull may have threatened the last few breeding pairs and *Puffinus yelkouan* has not been recorded on Filfla since early 1980s⁴⁹.

⁴³ Sultana, J., Borg, J., Gauci. C. & Falzon, V. 2011 *The Breeding Birds of Malta*. BirdLifeMalta, Malta

⁴⁴ ditto

⁴⁵ BirdLife International; 2013. Species factsheet: *Puffinus yelkouan*. downloaded from <http://www.birdlife.org>

⁴⁶ ditto

⁴⁷ Borg, J.J., Raine, H., Raine, A. F. & Barbara, N. (2010) *Protecting Malta's wind chaser: The EU LIFE Yelkouan Shearwater Project Report*. Malta: EU LIFE Yelkouan Shearwater Project.

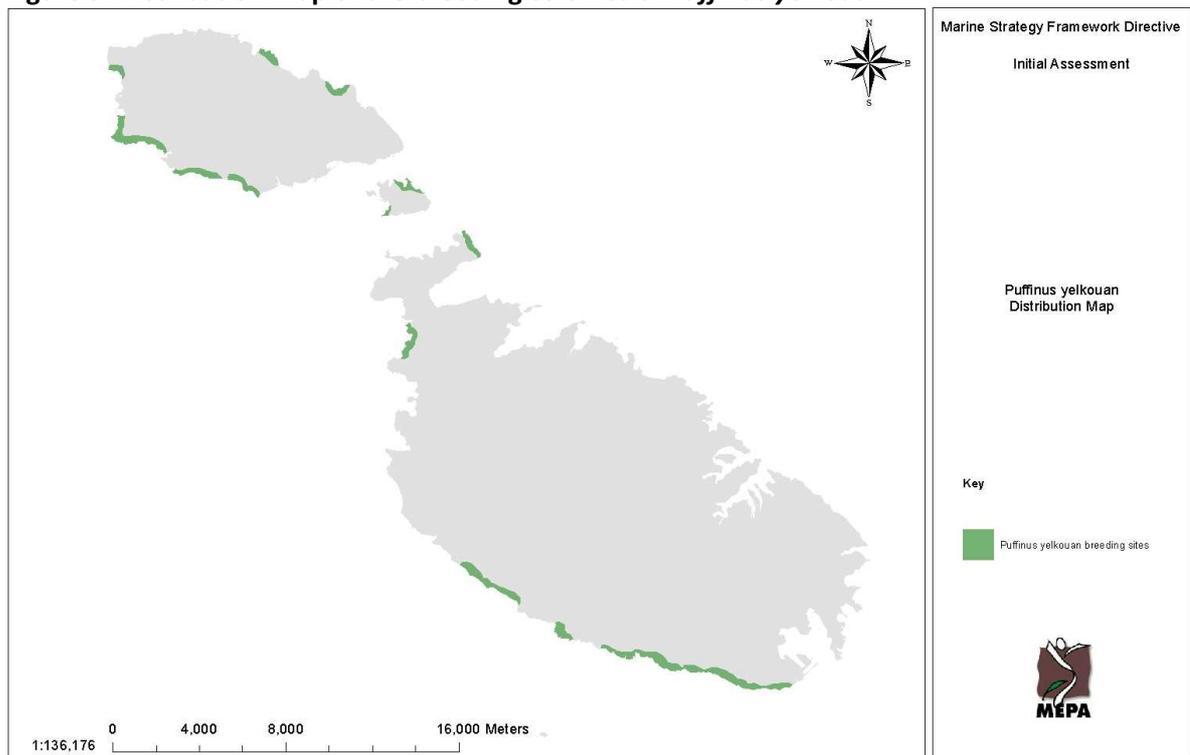
⁴⁸ Opper, S., Raine.A.F., Borg, J.J, Raine, H., Bonnaud, E., Bourgeois, K., Breton A.R. 2011. Is the Yelkouan shearwater *Puffinus yelkouan* threatened by low adult survival probabilities? *Biological Conservation* **144**: 2255-2263pp

⁴⁹ Sultana, J., Borg, J., Gauci. C. & Falzon, V. 2011 *The Breeding Birds of Malta*. BirdLifeMalta, Malta

Records of breeding on Selmunett islet are based on the correspondence by John H. Stenhouse to F.C.R. Jourdain dated 26 August 1907 (ms. At Alexander Library Edward Grey Institute, Oxford)⁵⁰. However, this species has not been recently recorded on this islet.

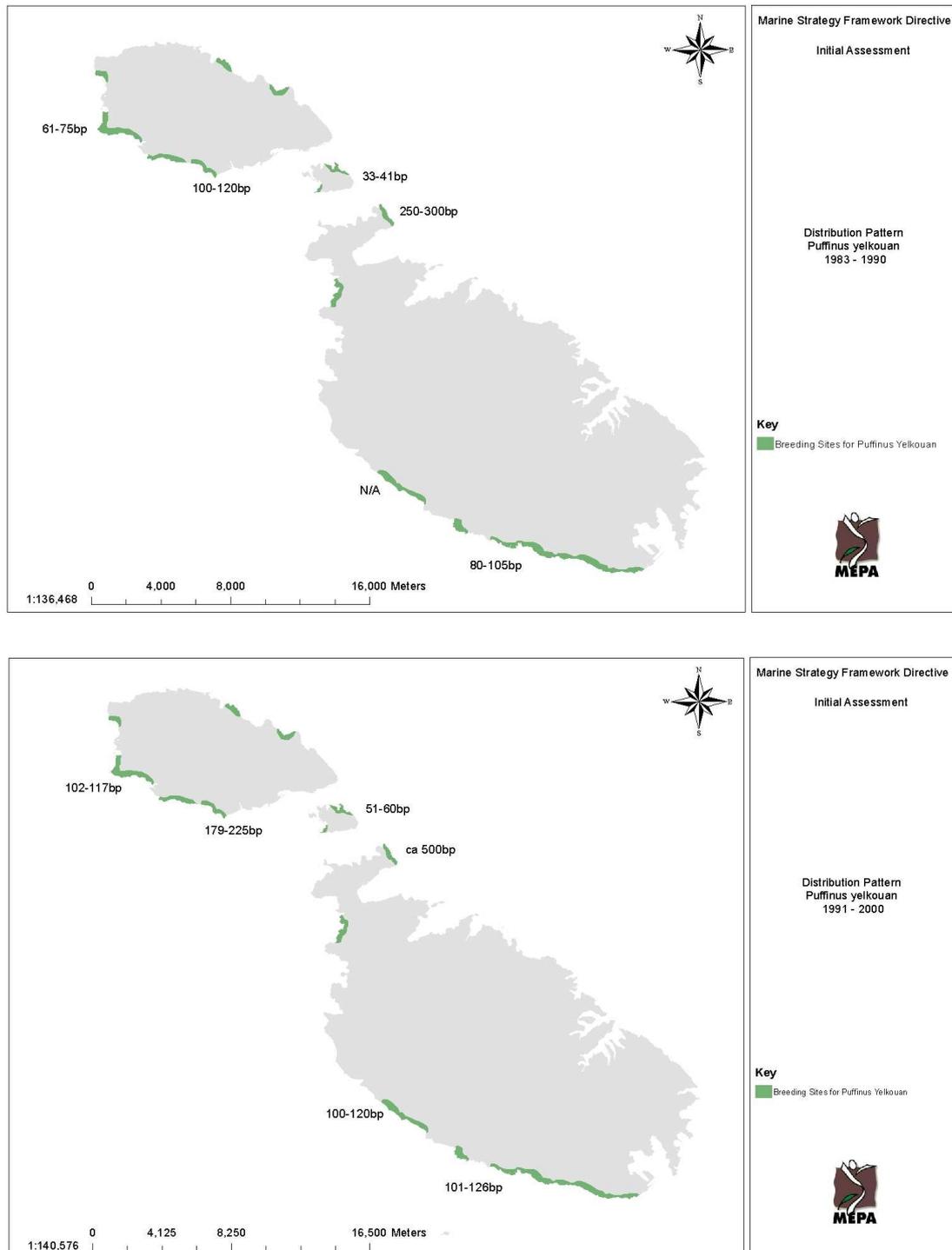
Trends in the distribution pattern of *Puffinus yelkouan* are indicated in Figure 10. These trends are indicative of a general increase in the number of breeding pairs at most localities throughout the years, however this increase may be mostly due to an increase in research efforts.

Figure 9: Distribution Map of the breeding colonies of *Puffinus yelkouan*

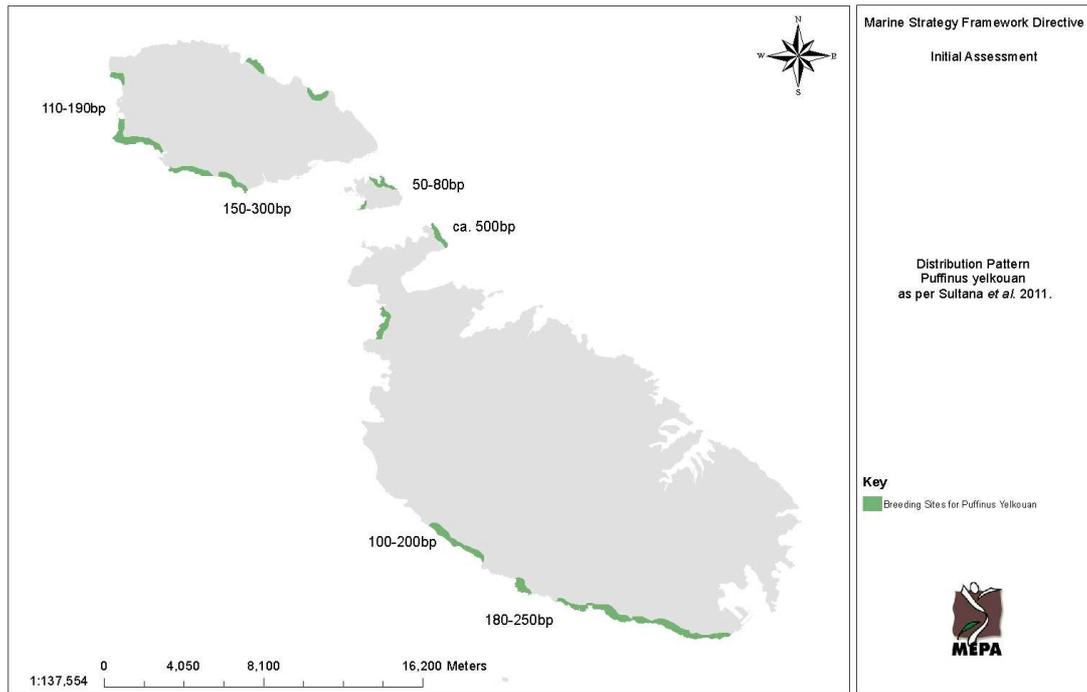


⁵⁰ Sultana, J., Borg, J., Gauci, C. & Falzon, V. 2011 *The Breeding Birds of Malta*. BirdLifeMalta, Malta

Figure 10: Trends in distribution pattern of *Puffinus yelkouan* based on mean estimates of breeding pairs within specific locations along the coast in the periods 1983-1990 and 1990-2000 (unpublished data provided by John J. Borg) and as published in Sultana *et al.* (2011)⁵¹. N/A implies that estimates for that particular location are not available for the time period under consideration. Interpretation of these maps should acknowledge the different levels of research efforts throughout the years, as well as different interpretation of localities to which unpublished and published data refer.



⁵¹ Sultana, J., Borg, J., Gauci, C. & Falzon, V. 2011 *The Breeding Birds of Malta*. BirdLifeMalta, Malta



Puffinus yelkouan is a gregarious seabird that can be encountered in large flocks out at sea, often with *Calonectris diomedea*. Although this species is present all year round in Malta, it is mainly seen offshore between December to July, with largest flocks occurring between February and April⁵². Data loggers on adult birds from the colony at Rđum tal-Madonna showed that these birds forage over a wide area, including areas at 285km to the south east of their colony and areas to the North near the Sicilian shores⁵³ (Figure 11).

Resting areas on marine waters used by the breeding colony of *Puffinus yelkouan* at Rđum tal-Madonna were specifically studied with the help of GPS data logger tags to determine the position and behaviour of the species (Figure 11: **Inshore marine areas used by *Puffinus yelkouan* as recorded from 31 GPS data loggers, extracted from Borg et al. (2010)**)

⁵² Sultana, J., Borg, J., Gauci. C. & Falzon, V. 2011 *The Breeding Birds of Malta*. BirdLifeMalta, Malta

⁵³ Borg, J.J., Raine, H., Raine, A.F., Barbara, N. 2010 *Protecting Malta's Wind Chaser: The EU LIFE Yelkouan Shearwater Project Report*, Malta, EU LIFE Yelkouan Shearwater Project in European Commission - *Contribution to the preparation of a Plan of Action for Seabirds* (2011) Final Report

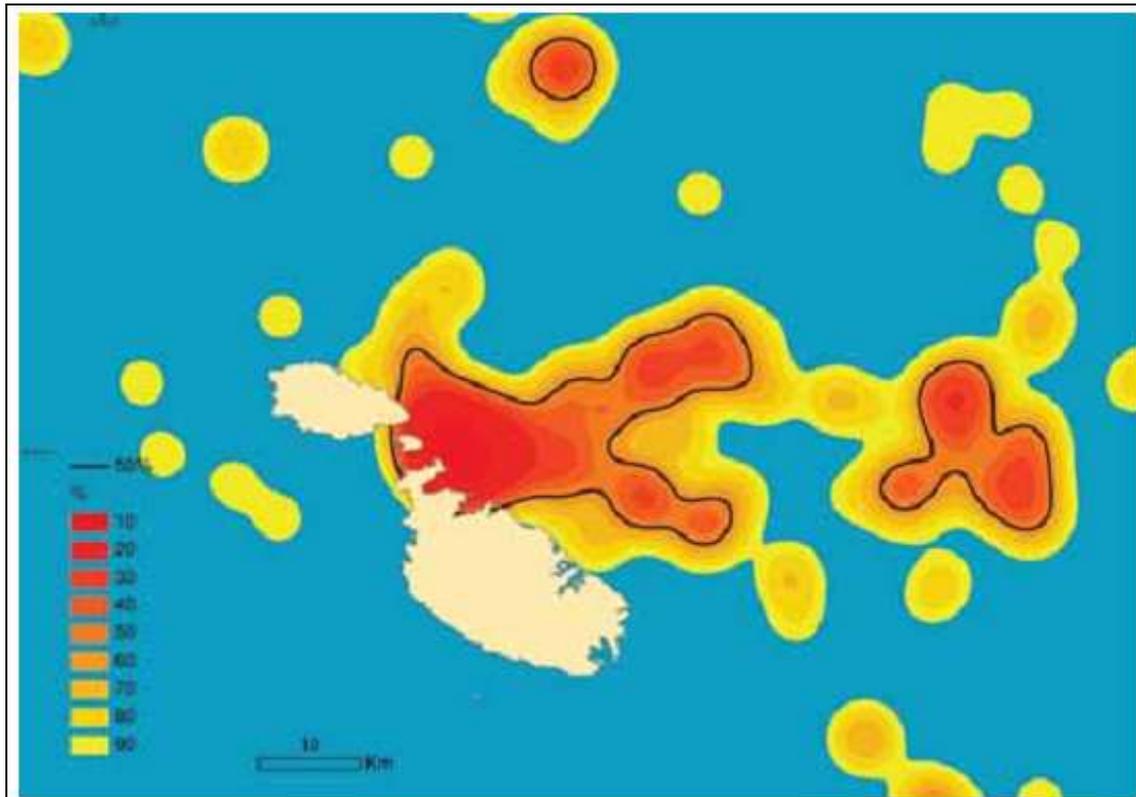


Figure 12). This resting area covers a 7km stretch of waters adjacent to the site, extending outward to sea up to 4km from the coast. This area has been declared as a 'restricted area' within which fishing activities using strong lights are prohibited between the beginning of February and the end of July⁵⁴.

⁵⁴ Notice to Mariners No. 2 of 2010

Figure 11: Inshore marine areas used by *Puffinus yelkouan* as recorded from 31 GPS data loggers, extracted from Borg *et al.* (2010)⁵⁵

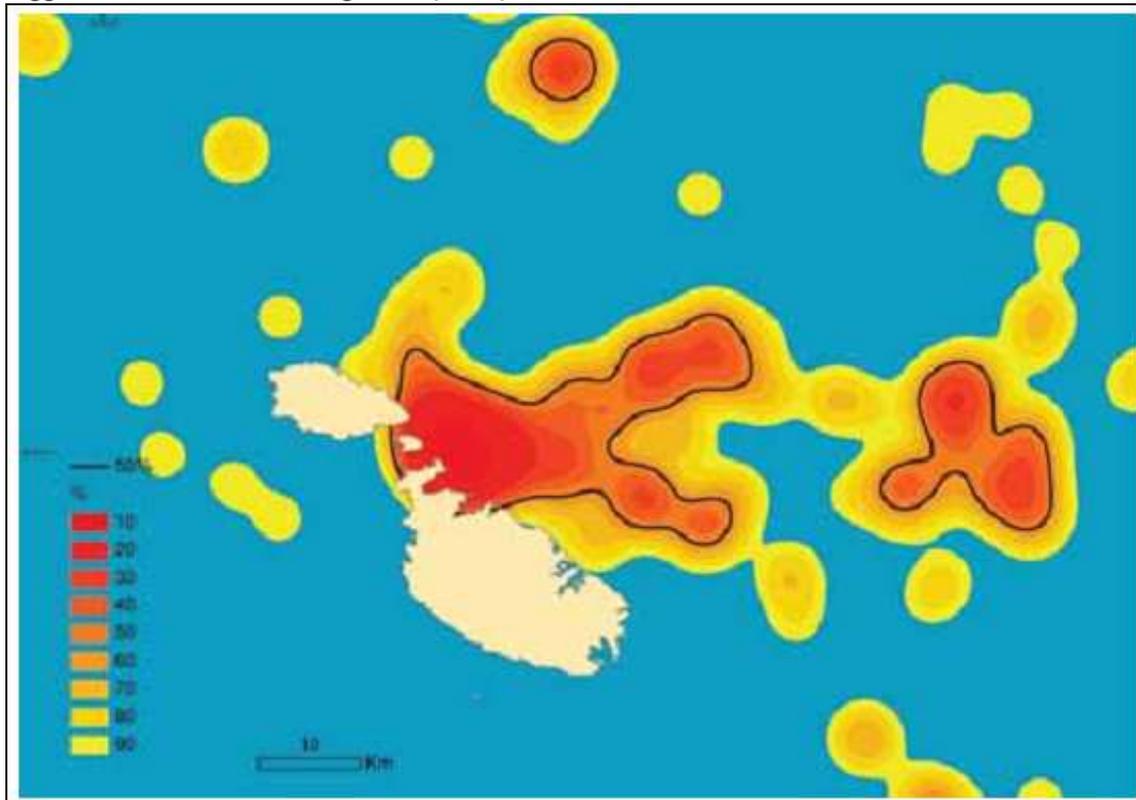
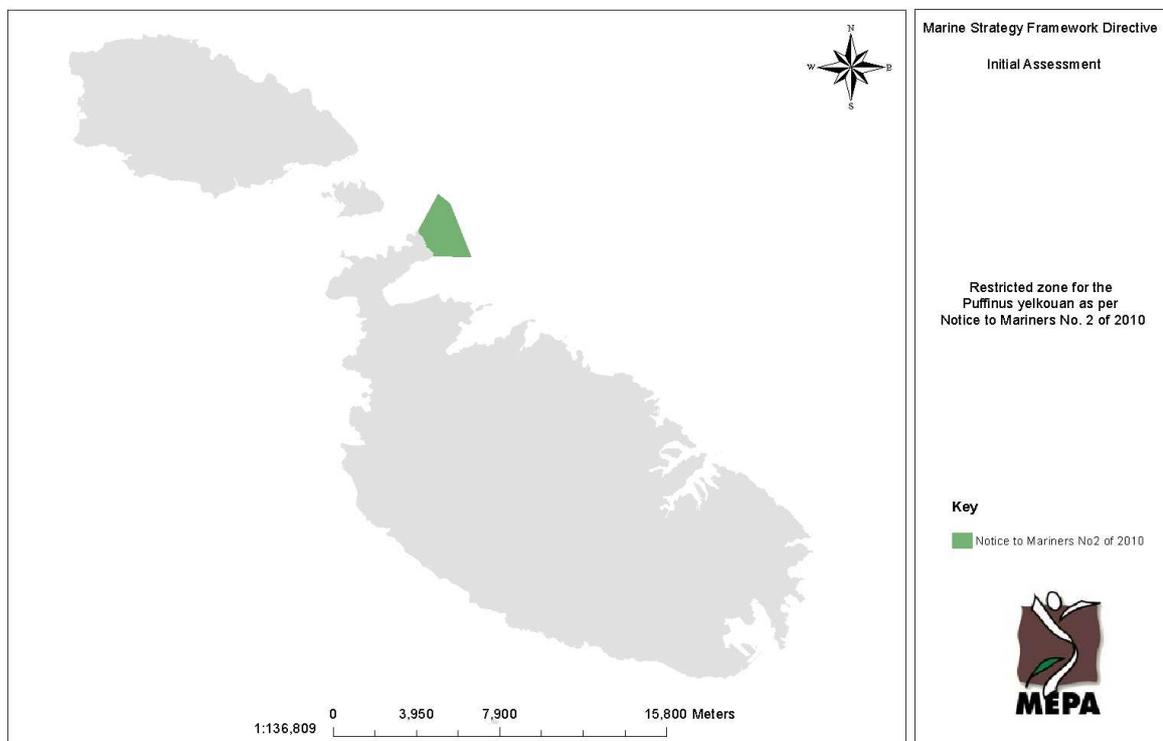


Figure 12: Rđum tal-Madonna resting area for *P. yelkouan* as per Notice to Mariners 2 of 2010 and 'restricted zone'



⁵⁵ Borg, J.J., Raine, H., Raine, A.F. & Barbara, N. 2010. Protecting Malta's wind chaser: The EU LIFE yelkouan Shearwater Report. Malta: EU LIFE Yelkouan Project

In terms of population abundance, Malta supports an internationally important breeding population of this species, with an estimate of 1,660 - 1,980 breeding pairs, equivalent to approximately 10% of the world's population⁵⁶. This estimate is higher than that reported in the Birds in Europe II, in which the breeding population for the period between 1990-2002 was estimated at 1,400 - 1,560 breeding pairs. This data may imply an increase in population size or an increase in research effort.

Nevertheless, in recent years, the colony of *Puffinus yelkouan* at Rđum tal-Madonna has been reported to be declining^{57,58}. Such decline is attributed to anthropogenic disturbance particularly at Rđum tal-Madonna which hosts the main colony of this species. Disturbance is mainly associated with an increase in recreational activities at this site since the late 1990s, which led to a significant number of rodents being attracted by litter and regularly predated on chicks and eggs.

In addition to predation, death of adult birds between 2000 and 2006 was also attributed to direct persecution. Missing long axillary feathers were found on dead specimens, which feathers were possibly used as baits for line-fishing⁵⁹. Figure 13 indicates the loss of *P. yelkouan* adults, eggs and chicks from its main breeding colony at Rđum tal-Madonna between 2000 and 2006.

Between 2006 and 2010, targeted conservation measures were carried out as part of the EU LIFE *Puffinus yelkouan* Project⁶⁰ to improve breeding and survival conditions at Rđum tal-Madonna. Several practical actions have been undertaken both on land and at sea for the conservation of the species, including:

- Eradication of *Rattus rattus* and *Rattus norvegicus* with the aim to increase breeding success and reduce rates of premature mortality;
- Legal amendments to modify recreational activities and potential infrastructure to reduce human disturbance at nesting sites and avoid further loss of breeding habitat

Experts confirmed that following the implementation of such conservation measures, the *Puffinus yelkouan* population at Rđum tal-Madonna has slightly increased⁶¹. Borg *et al.* (2010)⁶² indicate that there were no further records of chicks or eggs being eaten by rats from 2007 onwards.

⁵⁶ Borg, J.J., Raine, H., Raine, A.F., Barbara, N. 2010 Protecting Malta's Wind Chaser: The EU LIFE Yelkouan Shearwater Project Report, Malta, EU LIFE Yelkouan Shearwater Project in European Commission - Contribution to the preparation of a Plan of Action for Seabirds (2011) Final Report

⁵⁷ Borg, J.J., Raine, H., Raine, A.F., Barbara, N. 2010 Protecting Malta's Wind Chaser: The EU LIFE Yelkouan Shearwater Project Report, Malta, EU LIFE Yelkouan Shearwater Project in European Commission - Contribution to the preparation of a Plan of Action for Seabirds (2011) Final Report

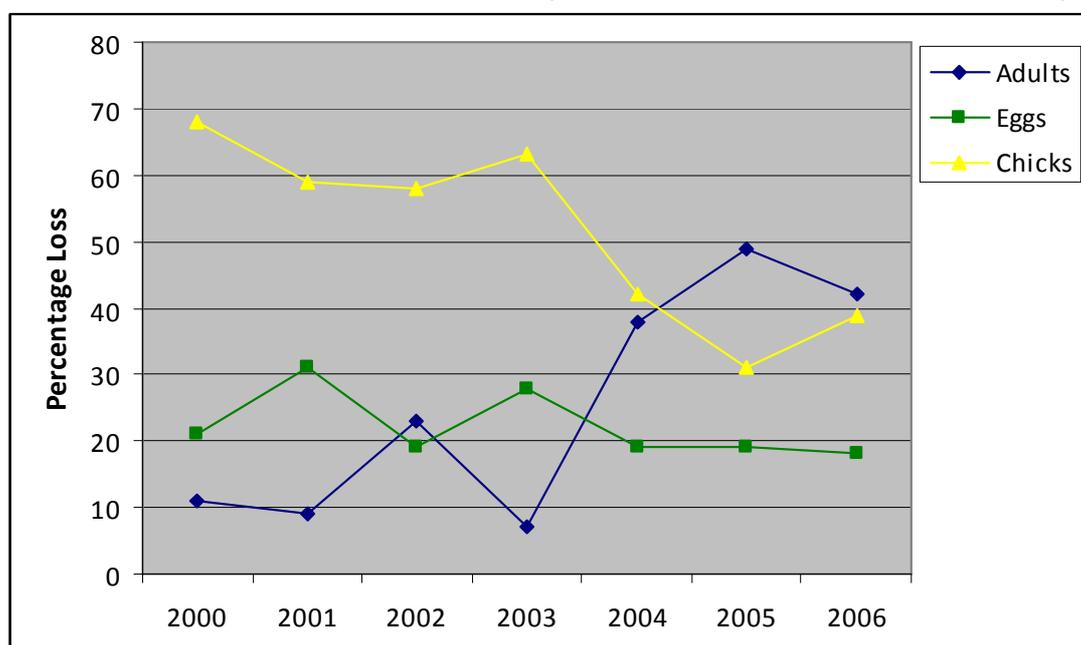
⁵⁸ Raine, A., Sultana, J. & Gillings, S. 2009. *Malta Breeding Bird Atlas 2008*. Malta: BirdLife Malta.

⁵⁹ Sultana, J., Borg, J., Gauci, C. & Falzon, V. 2011 *The Breeding Birds of Malta*. BirdLifeMalta, Malta

⁶⁰ <http://www.lifeshhearwaterproject.org.mt/>

⁶¹ Borg, J.J., Raine, H., Raine, A.F. & Barbara, N. 2010. Protecting Malta's wind chaser: The EU LIFE yelkouan Shearwater Report. Malta: EU LIFE Yelkouan Project

Figure 13: Loss of Yelkouan Shearwater adults, eggs and chicks at its main breeding colony, Rđum tal-Madonna between 2000 and 2006 (data extracted from Sultana *et al.*, 2011⁶³)



1.4.2 Population Demographic Characteristics

Most of the data available pertaining to the population characteristics of *Puffinus yelkouan* originates from studies carried out throughout the years on the main breeding colony at Rđum tal-Madonna. Studies at this site have been carried out at two different cliff ledges and a natural rock cave at the base of the same cliffs. Throughout this period, part of the cliff face collapsed which led to a shift in the study areas along the same cliff face. Studies were intensified between 2007-2010 as part of the EU LIFE Yelkouan Shearwater project.

In 2010 a study to update population models for this species was carried out jointly by Malta and France⁶⁴. In Malta, the mean annual adult survival probabilities were estimated through studies of the main breeding colony during the periods 1969-1994 and 2007-2010. In the period between 1969-1994 the annual survival for adult birds (unknown breeding status) was estimated at an average of 0.74 (95% confidence interval: 0.69–0.80). Anthropogenic pressures such as direct disturbance, light pollution and fisheries by-catch are potential causes of this low adult survival rate. The mean annual adult survival probabilities of *Puffinus yelkouan* (breeders) in

⁶² Borg, J.J., Raine, H., Raine, A.F. & Barbara, N. 2010. Protecting Malta's wind chaser: The EU LIFE yelkouan Shearwater Report. Malta: EU LIFE Yelkouan Project

⁶³ Sultana, J., Borg, J., Gauci, C. & Falzon, V. 2011 *The Breeding Birds of Malta*. BirdLifeMalta, Malta

⁶⁴ Oppel, S., Raine, A.F., Borg, J.J., Raine, H., Bonnaud, E., Bourgeois, K., Breton A.R. (2011) Is the Yelkouan shearwater *Puffinus yelkouan* threatened by low adult survival probabilities? *Biological Conservation* **144**: 2255-2263pp

accessible nests on the cliff ledges between 2007 and 2010 was estimated at 0.85⁶⁵. Oppel *et al.* (2011)⁶⁶ indicate that annual survival probabilities <0.90 are generally considered unsustainable for shearwater populations.

Following the completion of the EU LIFE project and the implementation of the above-mentioned conservation measures at Rđum tal-Madonna, there are indications that the mean adult survival rates have improved (J. J. Borg personal communication)

1.4.3 Pressures

Biological disturbance through predation is considered to be one of the major pressures on *Puffinus yelkouan*, which is subject to predation by rats *Rattus rattus* (J.J. Borg, personal communication). Rats have radically increased at Rđum tal-Madonna since the late 1990s mainly due to increased use of site for recreational purposes. These activities resulted in food litter which attracted more rodents to the site in question. Prior the conservation project, studies indicated that rodents used to result in an average loss of 300 eggs or chicks every year⁶⁷. Rodent eradication from the project site resulted in higher breeding success of this species⁶⁸. Nevertheless, predation by domesticated animals might still occur.

Direct human disturbance may also be a threat to *Puffinus yelkouan*, and these activities, which may include illegal hunting⁶⁹, ferreting⁷⁰, collection of adults or unintentional disturbance may have contributed to depressed adult survival and breeding success of this species. Such threats induced Yelkouan Shearwater to choose deeper, safer cavities⁷¹.

Pressures on *Puffinus yelkouan* through light pollution were assessed through the EU LIFE project for the Rđum tal-Madonna Special Protection Area. This assessment concluded that light pollution particularly from coastal conurbation is detrimental to this species. It is known that bright lights regularly disorient juvenile birds and have a negative impact on these light sensitive birds⁷². Land and sea-based noise pollution in the vicinity of the seabird colonies is also known to disturb inexperienced birds⁷³.

⁶⁵ Oppel, S., Raine.A.F., Borg, J.J., Raine, H., Bonnaud, E., Bourgeois, K., Breton A.R. (2011) Is the Yelkouan shearwater *Puffinus yelkouan* threatened by low adult survival probabilities? *Biological Conservation* **144**: 2255-2263pp

⁶⁶ ditto

⁶⁷ BirdLife Malta. 2006. EU LIFE Yelkouan shearwater - Description of the Project, LIFE – NATURE 2006-C5/1

⁶⁸ Sultana, J., Borg, J.J., Gauci, C. & Falzon, V. 2011. *The Breeding Birds of Malta*. BirdLife Malta, Malta

⁶⁹ Borg, J.J., Raine, H., Raine, A.F. & Barbara, N. 2010. Protecting Malta's wind chaser: The EU LIFE yelkouan Shearwater Report. Malta: EU LIFE Yelkouan Project

⁷⁰ Borg, J.J., Raine, H., Raine, A.F. & Barbara, N. 2010. Protecting Malta's wind chaser: The EU LIFE yelkouan Shearwater Report. Malta: EU LIFE Yelkouan Project

⁷¹ Sultana, J., Borg, J.J., Gauci, C. & Falzon, V. 2011. *The Breeding Birds of Malta*. BirdLife Malta, Malta

⁷² Raine, H., Borg, John J., Raine, A., Bairner, S., Borg Cardona, M. 2007. *Light pollution and its effect on Yelkouan Shearwater in Malta, causes and solutions*. Unpublished report by BirdLife Malta & National Museum of Natural History

⁷³ Sultana, J., Borg, J.J., Gauci, C. & Falzon, V., 2011. *The Breeding Birds of Malta*. BirdLife Malta, Malta

Puffinus yelkouan is also subject to light disturbance through bunkering activities taking place at night, specifically within bunkering Areas 1 and 6 indicated in Figure 14. These bunkering areas are located in close vicinity to the cliffs harbouring breeding populations of *Puffinus yelkouan*, thus leading to disturbance through flood lighting used during such activities. The frequency of bunkering activities taking place within these areas is indicated in Figure 15.

Figure 14: Location of bunkering areas 1 & 6

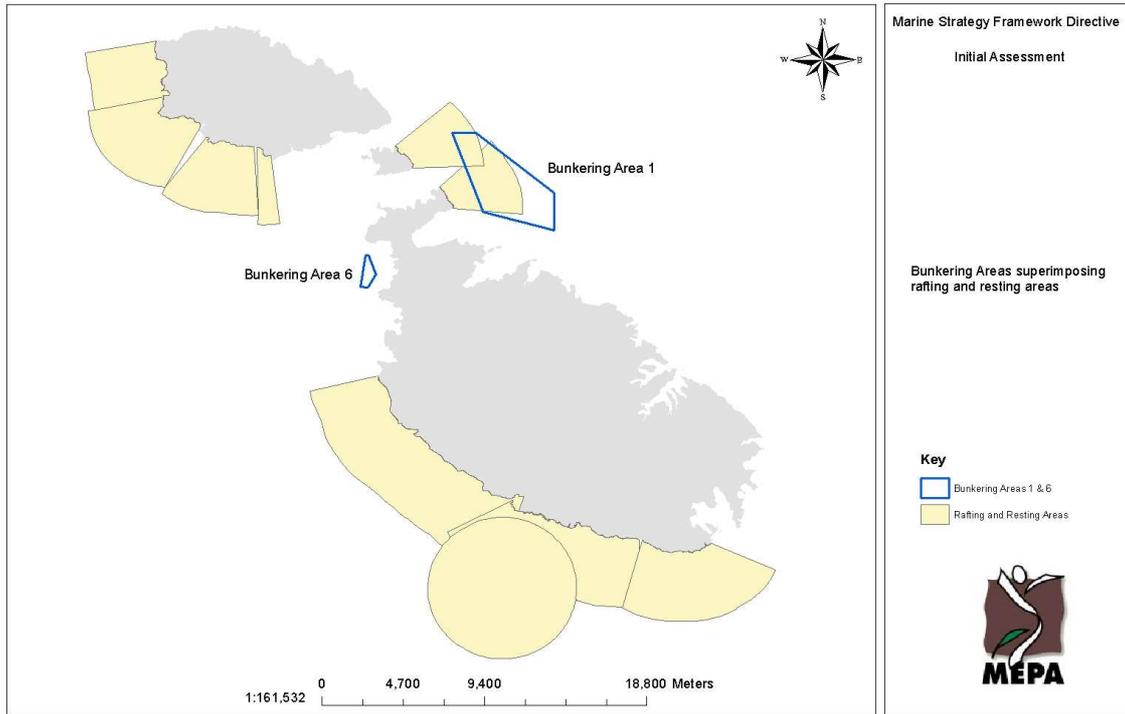
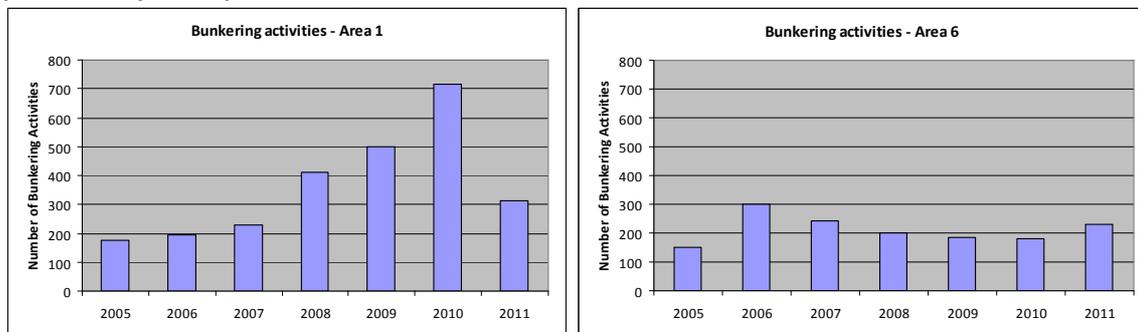


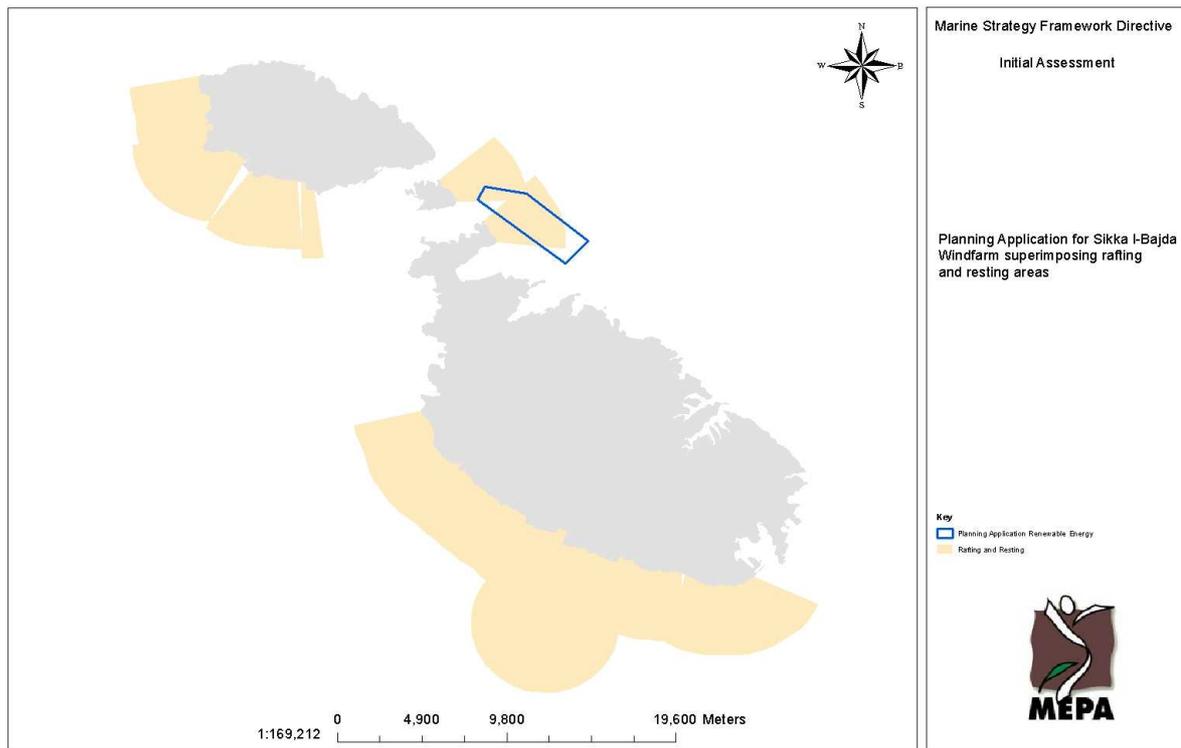
Figure 15 a & b: Frequency of bunkering activities taking place at Areas 1 & 6 (data provided by Transport Malta, Maritime)



Offshore wind farms are also known to constitute a pressure on seabirds mainly through physical disturbance. Although there are no offshore windfarms in Malta to date, a proposal for an offshore windfarm off the Northeastern coast of Malta is currently being assessed. The location of this proposal lies at 1.5km from Rđum tal-Madonna Special Protection Area, which is the main breeding colony for *Puffinus yelkouan* (

Figure 16). The proposal overlaps with the indicative rafting area for the breeding colonies, hence there might be a risk of collision for seabirds utilising this area, particularly *P. yelkouan* and *Calonectris diomedea*.

Figure 16: Planned offshore wind farm in relation to rafting/resting areas at Rđum tal-Madonna and Comino



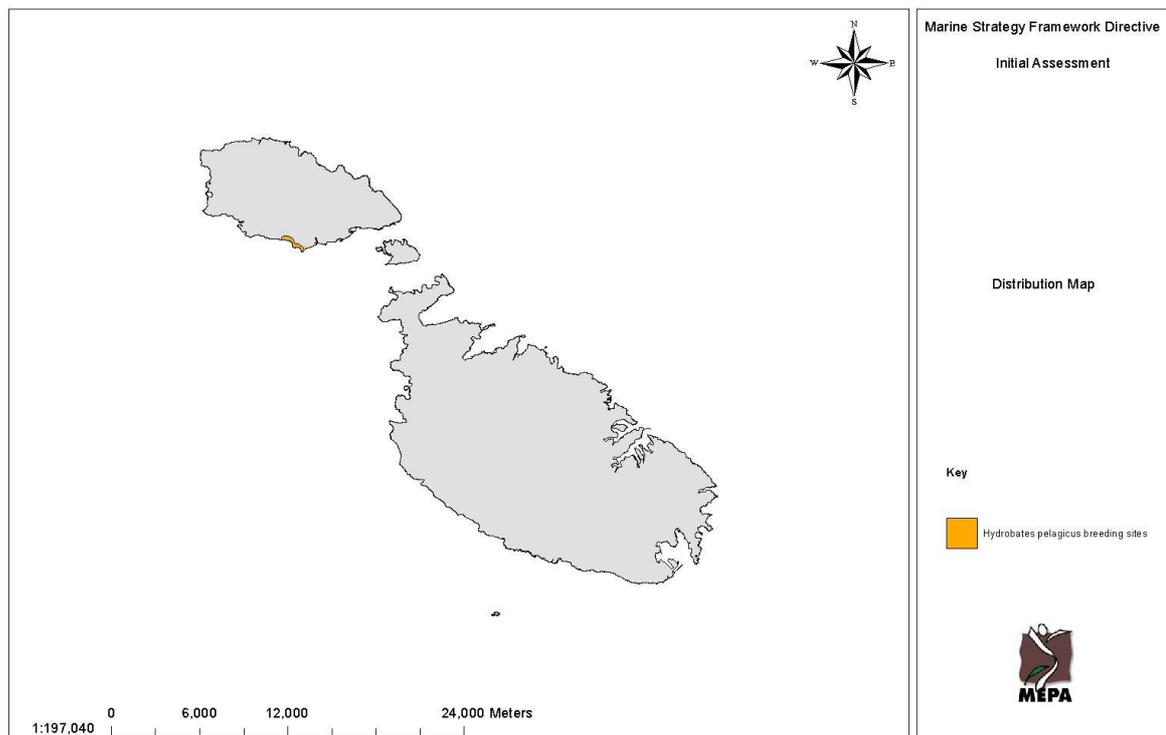
1.5 European Storm-petrel – *Hydrobates pelagicus*

1.5.1 Distribution and Population Abundance

The European Storm-petrel, *Hydrobates pelagicus* breeds in the Mediterranean with the most important colonies occurring in the central and western Mediterranean region, particularly in Malta, Sicily and the Balearic Islands. The Mediterranean population is estimated at less than 16,000 pairs⁷⁴. However this population estimate excludes populations of this species occurring in other Mediterranean areas such as the Adriatic region.

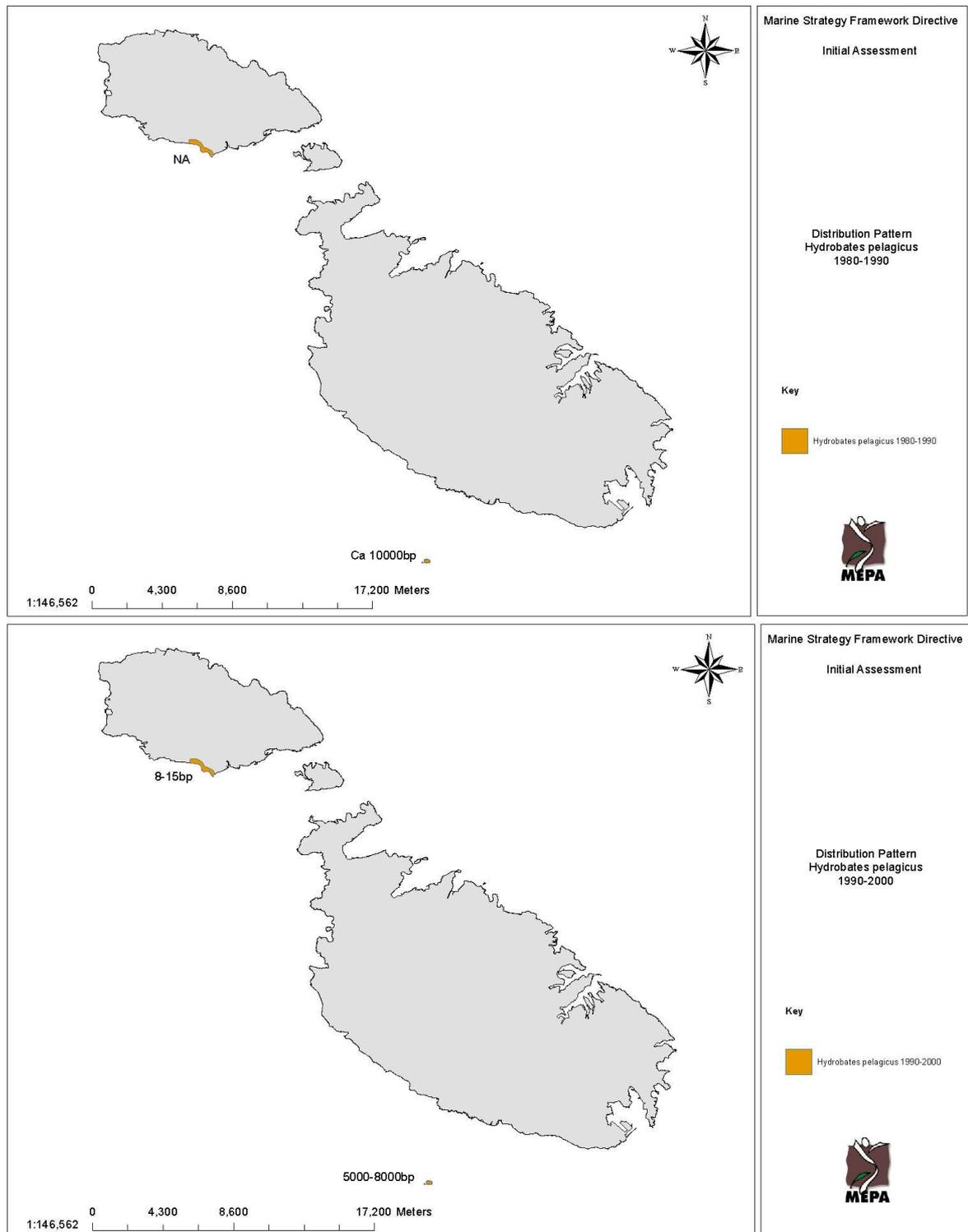
Malta supports the largest breeding colony of *Hydrobates pelagicus* in the Mediterranean. The resident population of *H. pelagicus* on the Maltese Islands is very localised with the main population breeding regularly on the small uninhabited islet of Filfla (Figure 17). Bird ringing activities in 2007 also confirmed the presence of *Hydrobates pelagicus* at Rđum tal-Madonna, the site harbouring the largest population of *Puffinus yelkouan*. However breeding of *H. pelagicus* at this site has not yet been confirmed and adult birds are deemed to be ‘prospecting’.

Figure 17 : Distribution Map of the breeding colonies of *Hydrobates pelagicus*

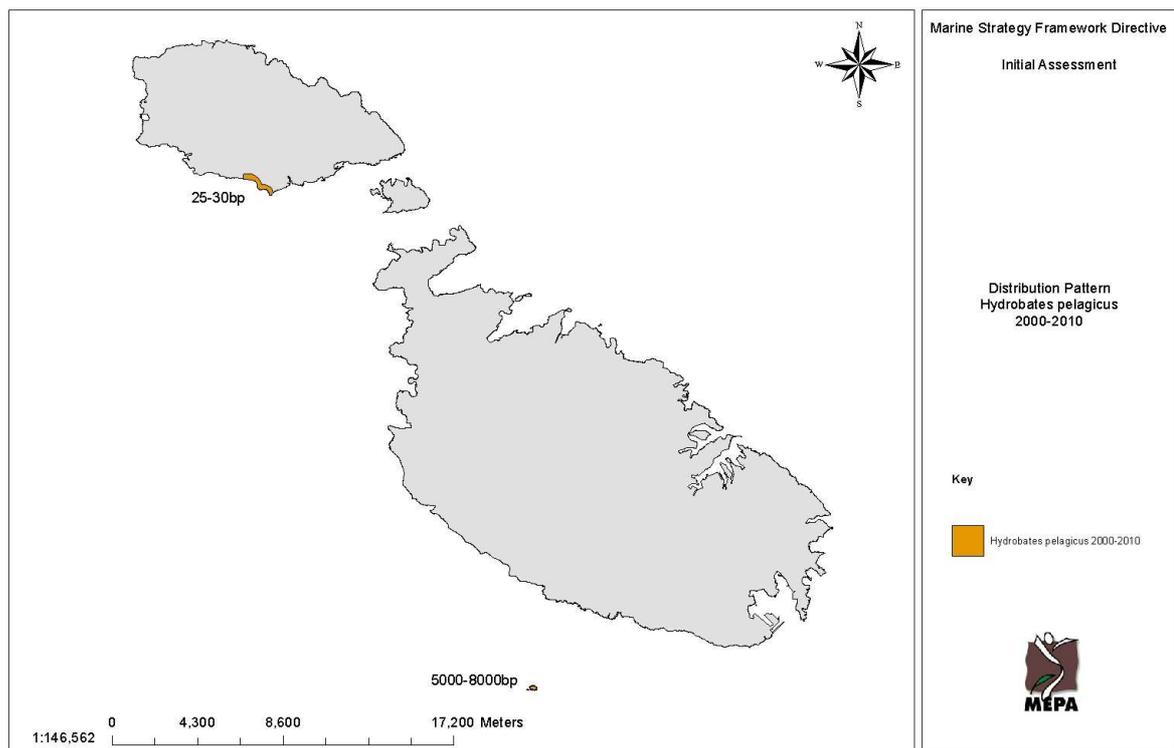


⁷⁴ Mante A. & Debize, E. 2012. Mediterranean Storm Petrel *Hydrobates pelagicus melitensis*, Updated state of knowledge & conservation of the nesting populations of the Mediterranean Small Island. Initiative PIM. 20pp.

Figure 18: Trends in distribution pattern of *Hydrobates pelagicus* based on estimates of breeding pairs within specific locations along the coast in the periods 1983-1990 and 1990-2000 (unpublished data provided by John J. Borg) and published data in Sultana *et al.* (2011)⁷⁵. Interpretation of these maps should acknowledge the different levels of research efforts throughout the years, as well as different interpretation of localities to which unpublished and published data refer.



⁷⁵ Sultana, J., Borg, J., Gauci, C. & Falzon, V. 2011 *The Breeding Birds of Malta*. BirdLifeMalta, Malta



The current population of *H. pelagicus* in Malta is estimated at 5,000-8,000 pairs on Filfla, and 25+ pairs in another colony at Ta' Cenc, Gozo^{76,77}. Studies of *Hydrobates pelagicus* on Filfla have been carried out since 1968⁷⁸. Until the mid 1980s, the Filfla colony was estimated at 10,000 pairs. During the past decade however only 5,000-8,000 pairs of *H. pelagicus* were estimated at their colony^{79,80}. The decline in the population of this species on Filfla is mainly attributed to the loss of nesting sites after storms washed away some of the rubble screens below the cliffs, as well as to an increase in predation by the Yellow-legged gull (*Larus michahellis*).

⁷⁶ Borg, J.J. & Sultana, J. 2002. Status and Distribution of the Breeding Procellariiformes in Malta. *Il-Merill* **30**: 10-15

⁷⁷ Borg, J.J. & Sultana, J. 2004. Important Bird Areas of EU Importance in Malta. BirdLife Malta, RSPB, UK

⁷⁸ Studies on the breeding biology of the *Hydrobates pelagicus* are hard to undertake mainly due to adverse weather conditions during winter making it difficult for scientists to land on the small islet (Filfla). Furthermore, locating nesting sites in large numbers is unattainable given the rugged terrain of this islet.

⁷⁹ Borg, J.J. & Sultana, J. 2004. Important Bird Areas of EU Importance in Malta. BirdLife Malta, RSPB, UK

⁸⁰ Raine A., Sultana J. & Gillings S., 2009 *Malta Breeding Atlas 2008* - BirdLife Malta, Malta

1.5.2 Population Demographic Characteristics

To date, *Hydrobates pelagicus* has not been studied in enough detail in terms of its population demographic characteristics. Therefore assessment of status for this species could not be carried out on the basis of population demographics.

1.5.3 Pressures

The main pressures on *Hydrobates pelagicus* are biological disturbance through predation and physical loss of its habitat.

Habitat loss is mainly attributed to the natural process of erosion on the islet of Filfla, which hosts the main breeding colony of this species. Most islets are very vulnerable to erosion and Filfla is no exception. Bombing practices on Filfla in the period between 1942 and 1971 have drastically reduced the land mass of the islet and rendered it further susceptible to erosion. Habitat loss is thus one of the major causes of reduction in breeding area and seabird population on Filfla, which cause cannot be reversed or managed.

Hydrobates pelagicus is also subject to predation by Yellow-legged Gulls (*Larus michahellis*)⁸¹. The number of Yellow-legged Gulls on Filfla in 1980s is reported at 150 breeding pairs. At present, the population of this species is estimated around 200 breeding pairs. This increase in Filfla's gull population is proving detrimental to the storm-petrel colony. Gulls have been observed to be active in moonlit nights chasing and harrasing storm-petrels as they arrived on Filfla⁸². It has been observed that gulls prey storm-petrels mostly during the gull's chick-rearing period.

Accidentally or intentionally introduced rats on Filfla are likely to have significant impact on *Hydrobates pelagicus*. Rodents can be easily introduced should any sea craft containing rats is intenionally or accidentally in the vicinity of the islet. Rats are known to have relatively high breeding success and may likely invade the islet and its species to extinction, particularly *H. pelagicus*. To the contrary of the yellow-legged gull, introduced rodents can predate on hidden eggs in burrows, consequently resulting in a drastic reduction in fecundity, in particular hatching and/or fledging success.

⁸¹ Borg, J.J., Sultana, J. & Cachia-Zammit, R. (1992-1994) Predation by the Yellow-Legged Gull *Larus cachinnans* on Storm Petrels *Hydrobates pelagicus* on Filfla. *Il-Merill* **28**: 19-21

⁸² ditto

Hydrobates pelagicus is also known to be disorientated or attracted to onshore and offshore by lights at night, causing bird impact. Adult *Hydrobates pelagicus* are frequently attracted to the lights of squid fishing boats. Fishermen indicated that when fishing by night with powerful lights mainly off the southern coasts petrels are attracted and some alight on boats.

1.6 Assessment of Status

The data available for the three species of seabirds was used for the determination of status of each species. In view of the limited number of species of seabirds assessed, as well as the similar ecological role of the species in question, the application of the MSFD criteria and indicators for assessment of status at the ‘functional group’ level was not possible at this stage. On the other hand, an attempt was made to extrapolate the status as determined for each species to determine the status of the ‘species group’ rather than the ‘functional group’. The effectiveness of using three species to assess the status of the seabird species group is still debatable. However the current data scenario precludes the possibility of considering additional bird species for the purposes of the required assessment.

Assessment of status for each species in question is based on the criteria and indicators stipulated for Descriptor 1 by Commission Decision 2010/477/EU. In view of the fact that parameters addressing population dynamics have not been consistently monitored for all three species under consideration, this assessment is strongly based on expert judgement. Table 4 provides an indication of the MSFD criteria and indicators which could be applied for the assessment of status.

The assessment of status on the basis of the MSFD criteria and indicators was further supplemented by consideration of the pressures and impacts as described in previous sections.

Table 4: Criteria and Indicators used for assessment of status of seabirds in Malta

MSFD Criteria and Indicators	<i>Calonectris diomedea</i>	<i>Puffinus yelkouan</i>	<i>Hydrobates pelagicus</i>	Functional Group
Species distribution – Distributional Range (1.1.1)	✓	✓	✓	
Species distribution – Distributional Pattern within the latter, where appropriate (1.1.2)	✗	✗	✗	
Population Size – Population abundance and/or biomass, as appropriate (1.2.1)	✓	✓	✓	
Population Condition – Population demographic characteristics (e.g. body size or age class structure, sex ration, fecundity rates, survival/mortality rates) (1.3.1)	✓	✓	✗	
Condition of typical species and communities (1.6.1)				✗
Relative abundance and/or biomass as appropriate (1.6.2)				✗

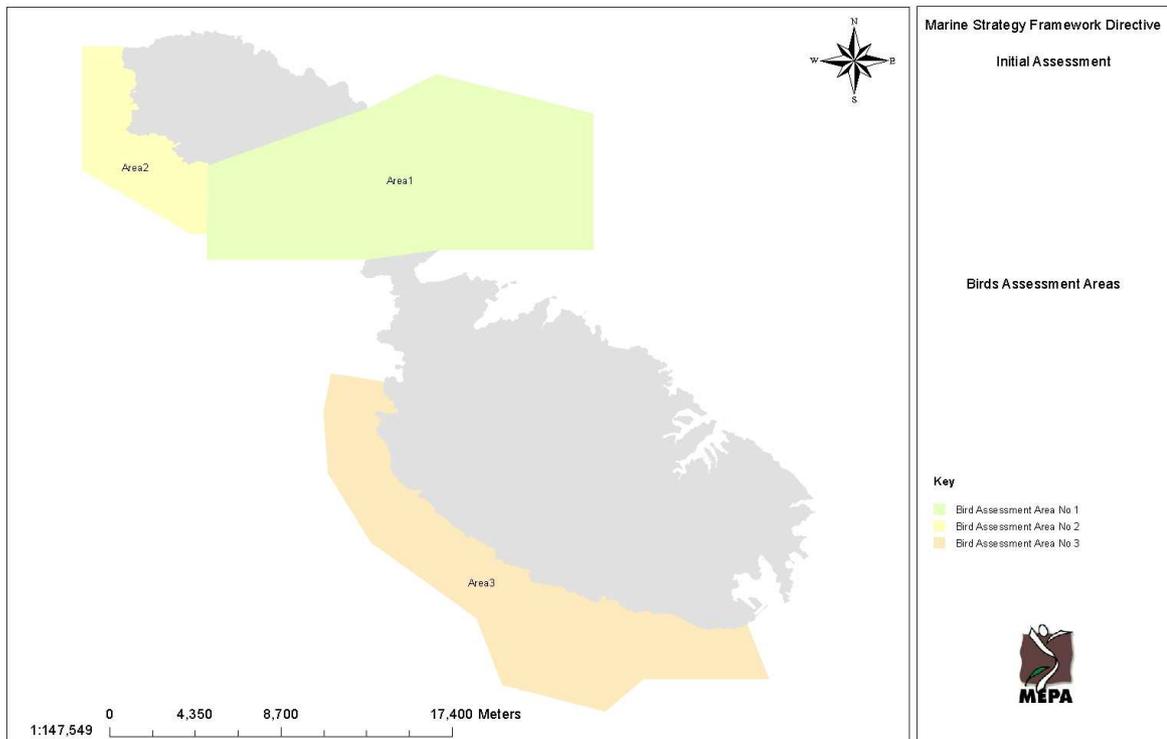
1.6.1 Assessment Areas

The assessment areas identified for the purposes of assessment of status of the three seabird species are indicated in Figure 19.

Delineation of these assessment areas was based on the location of the breeding colonies of the three seabirds under consideration, as well as the boundaries of the Special Protection Areas as designated for the purposes of the EC Birds Directive. These assessment areas cover the majority of the breeding colonies of the three seabird species. Other minor colonies may occur outside these areas.

In general assessment of status for each species was carried out taking into consideration all three assessment areas. Nevertheless, it should be noted that some assessment areas might be more important to one species than another.

Figure 19: Assessment Areas identified for the purposes of the MSFD Initial Assessment on seabirds



1.6.2 Methodologies

Standard methodologies for the application of the relevant MSFD criteria and indicators are only available for determination of distributional range and population abundance. These methodologies have been defined for the purposes of the Birds Directive as per Article 12 guidance document⁸³.

⁸³ European Commission. 2011. Assessment and reporting under Article 12 of the Birds Directive; Explanatory Notes & Guidelines for the period 2008-2012. Final Version.

As indicated by the Article 12 guidance document, assessment in terms of 'distributional range' should follow the guidance for determining the range of species and habitats listed in the Habitats Directive⁸⁴. Nevertheless, distributional range of the seabirds in this case will only be taking into consideration the breeding sites of the species in question, excluding the marine areas used by the species in view of the currently limited data scenario on this aspect.

According to the Habitats Directive guidance document, the evaluation of the status of species' range should include the status of the range in relation to the size of the Favourable Reference Range (a threshold value) and the range trend. Determination of Favourable Reference Ranges at this stage is difficult, especially in view of the fact that further knowledge would be required in terms of areas used by the species throughout their life cycle. Nevertheless, expert judgement has been applied to determine the status of the current range occupied by all three species and any known changes of such range through time.

There are no standard methodologies which could be applied in assessing status in terms of population condition. Such assessment is heavily based on expert judgement, taking into consideration trends where available and future prospects.

With respect to the boundaries between 'Good' status and 'Not Good', the thresholds for such boundaries were determined on a case by case basis through expert advice. However a general indication of the basis of such thresholds is provided in Table 5.

⁸⁴ Evans, D. & Arvela, M. 2011. Assessment and Reporting under Article 17 of the Habitats Directive; Explanatory Notes & Guidelines for the period 2007 – 2012.

Table 5: Indication of the general meaning of Good, Moderate and Poor Status for the criteria and indicators used for the purpose of assessing status

Criteria	Indicators	Good Status	Moderate Status	Poor Status
Species Distribution (1.1)	Distributional range (1.1.1)	The distributional range of the species is stable and future prospects ⁸⁵ for maintenance of this range are good subject to management of pressures.	The distributional range of the species shows slight decline through time however future prospects ⁸⁶ for maintenance of this range are good subject to management of pressures.	The distributional range of the species has been significantly affected by anthropogenic factors in a manner which puts the long term viability of the species at risk.
Population Size (1.2)	Population abundance and/or biomass as appropriate (1.2.1)	The population abundance is stable or increasing over time and future prospects for maintenance of the population are good.	The population abundance is indicative of slight decline throughout the past years but future prospects for maintenance of the population are good.	The population abundance has been declining for the past years and future prospects are poor.
Habitat Condition (1.6)	Condition of the typical species and communities (1.6.1)	Integrate status defined for above two parameters.		
	Relative abundance and/or biomass as appropriate (1.6.1)			

⁸⁵ As defined in Evans, D. & Arvela, M. 2011. Assessment and Reporting under Article 17 of the Habitats Directive; Explanatory Notes & Guidelines for the period 2007 – 2012, future prospects could be evaluated using expert judgement. It is recommended that future prospects are evaluated by considering the future trends and likely future status of the parameters under consideration. Future trends of habitats and species are dependent on threats which will have a negative influence and action plans, conservation measures and other provisions which can have a positive influence. The future status can be evaluated by calculation or estimation via expert judgement using available information.

⁸⁶ As defined in Evans, D. & Arvela, M. 2011. Assessment and Reporting under Article 17 of the Habitats Directive; Explanatory Notes & Guidelines for the period 2007 – 2012.

1.6.3 Assessment

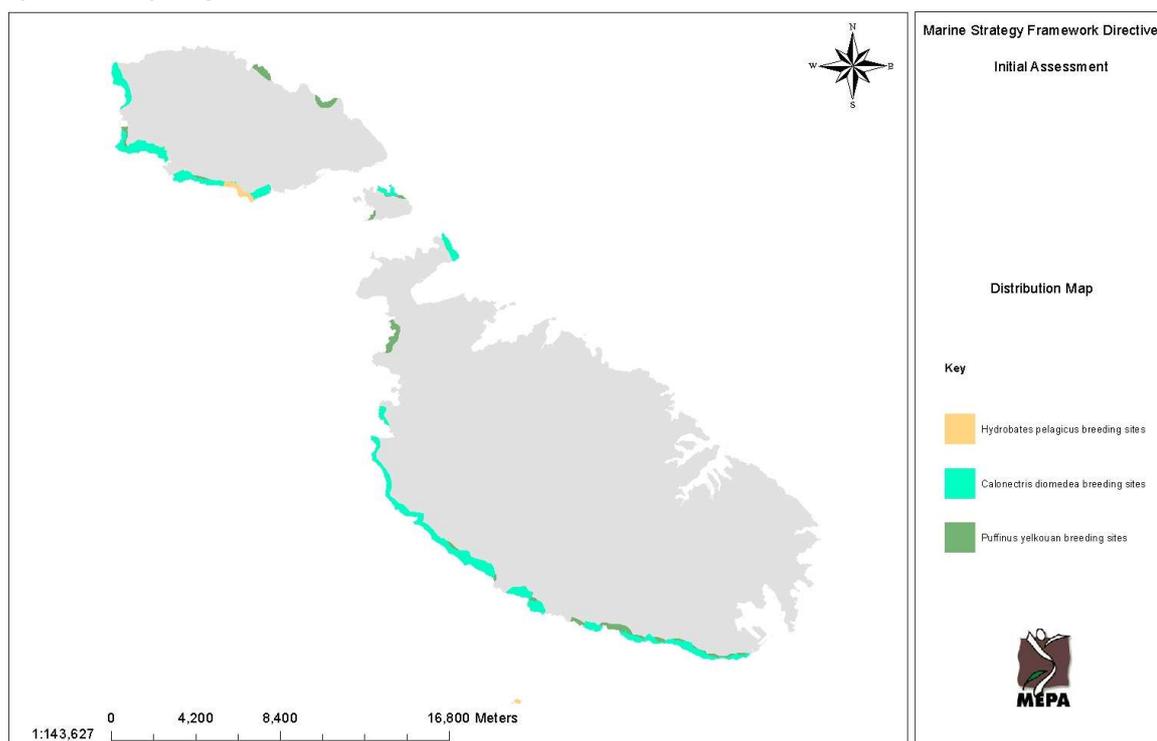
Species Distribution – Distributional Range (1.1.1)

The overall distributional range of the three seabird species under consideration is indicated in Figure 20.

With the exception of the loss of a breeding site of *Puffinus yelkouan* on the islet of Filfla prior to the 1980s, there were no significant changes in the lateral extent of the coastal areas used for breeding by *Calonectris diomedea*, *Puffinus yelkouan* and *Hydrobates pelagicus*. Bird ringing activities in 2007 confirmed the presence of *H. pelagicus* at Rdum tal-Madonna, however these individuals are considered to be 'prospecting' rather than breeding at this site.

For all three species, status in terms of distributional range is considered to be good in view of the stability in the lateral extents of breeding sites post 1980s.

Figure 20: Distributional Range of *Calonectris diomedea*, *Puffinus yelkouan* and *Hydrobates pelagicus*



Population size (1.2)

All three species seem to have suffered a decline in number of breeding pairs throughout the past decades, which decline can be attributed to the different pressures each species is subject to, particularly anthropogenic disturbance and predation. Such decline is deemed to be reversible should the current pressures be addressed, as verified for *Puffinus yelkouan* following implementation of conservation measures at Rdum tal-Madonna.

It should be noted that all three species are long-lived species. Any lost breeding pairs could in the short to medium term be replaced by the surplus non-breeding birds. Nevertheless, should the current disturbances persist, the surplus birds will eventually be depleted and hence long-term effects on the seabird populations would be highly likely.

The status for each species in terms of population abundance is considered to be moderate, which status is taking into consideration the reversibility of the recorded declines. This can be extrapolated as the overall status of seabirds as a 'species group' in terms of population abundance. It should be acknowledged however that this extrapolation is not applicable to MSFD criterion 1.6.2 (Relative abundance and/or biomass as appropriate).

Population Condition (1.3)

The current data scenario did not allow application of the MSFD criteria on population condition for all three species. Annual adult survival rates and fecundity rates (measured in terms of successful hatching and successful fledging) were used for assessing status of *Calonectris diomedea* in terms of population demographic characteristics. However only annual adult survival rates were available for *Puffinus yelkouan* and none of these parameters could be assessed for *Hydrobates pelagicus*. The population condition for the latter species was assessed on the basis of the habitat condition for the largest breeding population on the islet of Filfla.

While the successful hatching and successful fledging for *C. diomedea* are deemed to be quite stable throughout the past decades, the annual survival rates for both *C. diomedea* and *Puffinus yelkouan* are deemed to be below that recorded for seabird populations in undisturbed conditions. Based on expert judgement, the adult survival rates and breeding success of *Hydrobates pelagicus* seem to be declining as a result of the deterioration in habitat condition.

Based on current data and expert judgement, the population condition of each seabird species is considered to be moderate, once again taking into consideration the potential recovery of such condition should the identified pressures be addressed. This status does not necessarily apply to MSFD indicator 1.6.1 (condition of the typical species and communities) for seabirds as a 'functional' or 'species'

group, since it is reflecting the condition of each species under consideration rather than the species composition of the group.

1.7 Data Gaps and Further Work

At present, data gathered on a voluntary basis, is mainly available for the three breeding seabirds, *Calonectris diomedea*, *Puffinus yelkouan* and *Hydrobates pelagicus*. The level of knowledge on other birds which might represent the seabird 'functional group' as per MSFD requirements is limited, thus limiting current assessment of status for the three main breeding seabirds.

The major data gaps for these three species mainly pertain to the population demographic characteristics, particularly for *Hydrobates pelagicus*. However the major concern in terms of data gaps is the fact that the data available is generated on a voluntary basis. Sustained monitoring of seabirds should be ensured through the implementation of the EU Acquis, including the MSFD monitoring programme.