

**PRELIMINARY DATA ON SEABIRD BY-CATCH FROM THE MALTESE LONG  
LINE FISHERY  
(CENTRAL MEDITERRANEAN).**

Mark Dimech<sup>1</sup>, Michael Darmanin<sup>1</sup>, Raymond Caruana<sup>1</sup>, Helen Raine<sup>2</sup>.

1. Malta Centre for Fisheries Sciences (MCFS), Fort San Lucjan, Marsaxlokk BBG 1283, Malta  
email: mark.dimech@gov.mt, michael-j.darmanin@gov.mt, raymond.caruana@gov.mt
2. Birdlife Malta, 57/28, Marina Court, Abate Rigord Street, Ta' Xbiex MSD12, Malta  
email:helen.raine@birdlifemalta.org

*SUMMARY*

Mortality in long line fisheries is the most critical global threat to a number of bird species (Cooper *et al.*, 2003). In Malta, data on seabird by-catch is lacking although indications point to Cory's Shearwater (*Calonectris diomedea*) and the Yelkouan Shearwater (*Puffinus yelkouan*) as the main seabird by-catch species. This study was conducted as part of the EU LIFE Yelkouan Shearwater Project to assess the impact of the Maltese fishery on seabird populations. A questionnaire was designed to evaluate the awareness of the Maltese fishers about the project and to undertake a preliminary assessment of seabird by-catch by the fishers. A total of 146 full-time and part-time fishers were interviewed. The fishing activity responsible for the highest seabird by-catch was found to be bottom long lining, with each fisher who uses this gear catching an average of 1.41 *Calonectris diomedea* annually with minimal catches of *Puffinus yelkouan* reported. As these results are based on questionnaires and not direct data, they need to be considered with caution. However it does suggest that the issue of by-catch could have a significant effect on mortality rates of shearwaters, particularly *C. diomedea* and this should be further investigated using other methodologies to have more detailed results. The importance of better informing fishers on seabird bycatch mitigation measures was also stressed

*KEYWORDS*

Seabird by-catch, *Calonectris diomedea*, *Puffinus yelkouan*, long lining, shearwater.

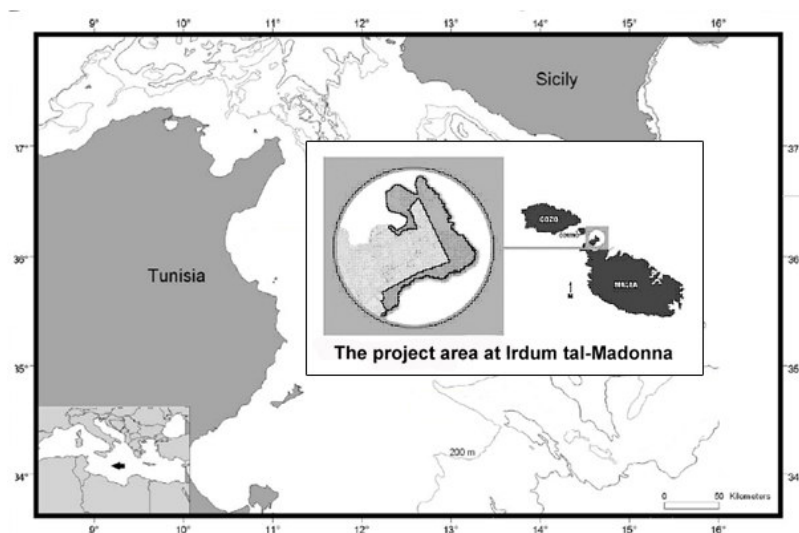
## Introduction

Mortality in long line fisheries is the most critical global threat to a number of bird species (Gilman, 2001; Cooper *et al.*, 2003). Studies carried out mainly in the north-west Mediterranean have revealed strong and complex interactions of worldwide interest. The effects of fishing on bird populations are directly responsible for mortality by low selective fishing practices (Cooper *et al.*, 2003). One of the key features affecting seabird populations is precisely mortality rate induced by incidental by-catches. Procellariiforms, as well as Pelecaniforms and Laridae species are generally long-lived and their populations are highly sensitive to changes in adult survival. The additional mortality induced by accidental captures in fisheries is therefore a significant danger to them (Lebreton, 2000).

Data on mortality levels exist only for Spanish fisheries, Spain being only one of the 12 Mediterranean countries known to undertake long line fishing (Cooper *et al.*, 2003). A specific study addressing the impact of long lines on Mediterranean seabird species has been carried out in the Spanish fishery around the Columbretes Islands, in the north-west Mediterranean (Martí, 1998). Incidental catches affected mostly *Calonectris diomedea*, accounting for 77% of the total bird by-catch, followed by the Yellow-legged Gull (*Larus cachinnans*) (14%) and the Northern Gannet (*Morus bassanus*) (9%). The incidence was higher for bottom long lining (0.72 birds caught per 1,000 hooks, against only 0.22 for surface long-lining) (Martí, 1998).

In Malta, *Puffinus yelkouan*, a pelagic seabird, is becoming increasingly threatened due to various natural and human disturbances such as predation on the chicks by rats and weasels (Sultana & Gauci, 1982), light and noise pollution near the nesting sites and incidental capture by fishers (Borg and Cachia Zammit, 1998). This species, which is listed in the IUCN (International Union for Conservation of Nature) Red data list of threatened species, listed in Appendix II of the Bern Convention, Annex II of the Barcelona Convention and listed in Schedule 1 of the Maltese Conservation of Wild Birds Regulations of 2006, has a population of approximately 1,500 pairs breeding in burrows in the Maltese coastal cliffs, which accounts for approximately 10% of the species world population (Borg & Sultana, 2002).

The largest population of Maltese *Puffinus yelkouan* is resident at Rđum tal-Madonna, situated in the North of Malta (Figure 1) and designated as a Special Protection Area (SPA) and a Special Area of Conservation (cSAC) under the Natura 2000 EU programme. It is home to approximately 500 pairs of *Puffinus yelkouan* – about 33% of the Maltese population (Borg & Sultana 2002). The birds return to the cliffs every year to breed and rear their young from October to mid-July (Borg *et al.*, 2002). This study is part of an EU LIFE project and aims to assess the perceptions of fishers on seabird by-catch and to undertake a preliminary evaluation of the impact of the Maltese fishing fleet on incidental by-catches of birds using a questionnaire survey.



**Fig 1.** Showing the project site where the resident colony of *Puffinus yelkouan* is present

## Methodology

A questionnaire was designed to evaluate the awareness of the Maltese fishers about the project and to provide a preliminary assessment of seabird by-catch by the fishers. A random sample of fishers was surveyed by means of direct interview between October and December 2007 and represented the population of both full-time and part-time fishermen. The fishers were asked for full cooperation and the survey was kept as simple as possible, so as not to take up too much of their time.

The questionnaire consisted of ten simple questions. Seven of the questions (yes/no) dealt with fishers' awareness of seabird by-catch (Table 1), whereas the other three obtained quantitative information by species caught and gear used (Table 2). The questions relating to the number of seabirds incidentally caught was specifically addressed to the number caught in 2006. Apart from the information requested from respondents, many interesting points/comments were recorded to increase our knowledge of fishermen – seabird interactions. Interview transcripts were entered into a Microsoft Excel database.

Questions about awareness of the project were converted into numerical scores, and percentage responses for each question were calculated. From the results obtained, the total number and mean of by-catch by species (*Calonectris diomedea* and *Puffinus yelkouan*) and by gear (surface and bottom longlines) was calculated. Since Malta has recently conducted a study on the activity of the Maltese fishing fleet by gear (Darmanin and Dimech, 2007) an estimate catch of each species by gear could be extrapolated for the whole fishing fleet.

## Results

A total of 146 full-time and part-time fishers were interviewed (10% of the population). The results (Table 1) of the questions pertaining to awareness of seabird by-catch by fishers in Malta indicate that though 26.7% are aware of the EU Community Plan of Action, only 16.4 % are aware of the EU-LIFE Yelkouan Shearwater project, with just 4.8% being aware of the fact that Malta has around 10% of the world population of this species. There is also a poor awareness (10.3%) of simple measures to prevent seabird by-catch. However over half (58.2%) of respondents indicated a willingness to use mitigating measures to reduce seabird by-catch. This together with the fact that 35.6% are willing to be involved in the project augurs well for the success of this initiative.

The interviews suggest that the fishing activity responsible for the highest seabird by-catch is bottom long lining. The number of birds reported incidentally caught per year ranged from 0 to 50, a large range which is likely to in part reflect the stochastic nature of seabird by-catch. This figure would represent an average of 1.41 *C. diomedea* per bottom longline fisher per year (Table 2). The estimates here must be considered as only very provisional, since they are based on interviews rather than direct data. However, these would suggest an estimated total annual incidental by-catch of *C. diomedea* by all the Maltese fishing vessels of 1220 birds, of which the vast majority (1214), would be caught with bottom long lines (Table 2). On the other hand, the estimated total annual incidental by-catch of *Puffinus yelkouan* by all the Maltese fishing vessels would be 17 birds which are only reported by bottom long lines (Table 3). 68% of the respondents declared that the incidental captures occurred both at dawn and at dusk, while 18% declared that the captures occurred mostly at dawn and 14 % at dusk.

Fishers also recorded occasional catches of *Calonectris diomedea* with trolling lines (2 individuals in the whole sample), one individual of *Larus* sp. with trolling lines and one with surface longlines. Fishers did not report any incidental catches with other gears including trawling, trammel and gill nets.

**Table 1.** Results of the questions pertaining to seabird by-catch awareness in Malta.  
<sup>A</sup> - Fishers that use gears such as trawling, trammel nets or pots which do not catch seabirds;  
<sup>B</sup> - Fishers who have never caught seabirds so the question is not applicable.

Question asked	% Yes	% No	% No response	% hesitant
Are you aware that the EU is developing a Community Plan of Action to reduce seabird by-catch?	26.7	71.2	2.1	
Did you know that the EU-LIFE Yelkouan Shearwater project was launched in March 2007 with the aim of reducing the by-catch of these birds?	16.4	81.5	2.1	
Are you aware that Malta is home to 10% of the world's Yelkouan shearwaters' population?	4.8	93.2	2.1	
Do you know that there are simple, cheap and effective means of minimizing the number of seabird by-catch?	10.3	87.7	2.1	
Do you accidentally catch seabirds?	18.5	74.7	6.9 <sup>A</sup>	
Are you willing to use simple mitigation measures to catch less seabirds?	58.2	15.1	17.8 <sup>B</sup>	8.9
Would you like to be more directly involved in this project by helping the Fisheries Department in their studies?	35.6	43.8	8.2	12.3

**Table 2.** Annual Seabird by-catch by species and gear for the sample analysed.  
 BLL – Bottom long line, SLL – Surface long line.  
 Questions asked to fishers:

1. Do you lay your long lines at dawn, dusk or both?
2. How many seabirds, and of which species do you catch in a year?
3. With which gear do you catch them?

Species	Gear	No. of responses	Total no. of individuals	Mean per fisher	s.d.
<i>Calonectris diomedea</i>	BLL	90	127	1.41	6.59
<i>Calonectris diomedea</i>	SLL	67	2	0.03	0.24
<i>Puffinus yelkouan</i>	BLL	99	2	0.02	0.14
<i>Puffinus yelkouan</i>	SLL	57	0	0	0

**Table 3.** Estimated total Annual seabird by-catch by species and gear for all the Maltese fishing vessels. BLL – Bottom longline, SLL – Surface longline.

Species	Gear	No of Vessels	Mean per vessel	Annual Total
<i>Calonectris diomedea</i>	BLL	861	1.41	1214
<i>Calonectris diomedea</i>	SLL	187	0.03	6
				<b>1220</b>
<i>Puffinus yelkouan</i>	BLL	861	0.02	17
<i>Puffinus yelkouan</i>	SLL	187	0	0

## Discussion

The results of the awareness survey indicate that there is a need to increase awareness among fishers, with only 16.4% of respondents being aware of the EU LIFE Yelkouan Shearwater Project after a year of activity and an even smaller proportion (4.8%) being aware of the importance of Malta for these breeding birds, since around 10% of the world's population breeds here. This result is not unexpected, given the fact that media work to date has not targeted fishermen specifically. The recent publication and distribution of a Seabird Guide for Fishers to all Maltese fishers (in March 2008) as part of this project, will help to address this issue, as will planned direct communication between MCFS and fishers and via the co-operatives. It is equally important to raise awareness of the simple measures that can minimize seabird by-catch, especially since a good proportion of fishers (58%) have indicated that they are willing to undertake these measures. The project will now amend the communication strategy for fishers to take these results into account and commence targeted communications activities to raise awareness of the project, by-catch issues and the steps that fishers can take to reduce by-catch.

Results also indicate that seabird mortality in the Maltese Islands is predominantly due to bottom long lines (from comments obtained from the fishers) and mostly by bottom long lining targeting demersal elasmobranchs including *Squalus blainvillei*, *Mustelus* spp. and *Raja* spp at a depth range from 150 – 400m. As the large number of *Calonectris diomedea* caught annually seems high, it is therefore particularly relevant to highlight the fact that the data was skewed by occasional high catches by single fishers and that it is these catches that cause the most serious impacts on the shearwaters. For example, of the 127 individuals of *Calonectris diomedea* reported as caught during the survey, 100 were attributed to just three fishers (note high s.d. = 6.59; Table 2). One fisher reported catching 50 individuals of *Calonectris diomedea* in one fishing trip. As these results are based on questionnaires and not direct data, they need to be considered with caution (Sciberras *et al.*, 2007). These 'one-off' incidents are similar to those reported in other countries. In the North-Western Mediterranean 200 Balearic shearwater (*Puffinus mauretanicus*) were reported to have been caught during a single bottom long line setting in 1997 (Martí, 1998). This pattern appears to be repeated throughout the world's fisheries (Hackwell, 2007).

The breeding population of *Calonectris diomedea* in the Maltese Islands is approximately 6090 - 7130 pairs (Borg & Sultana 2002) and, if the results of this survey are indicative of the overall impact of the Maltese fishing fleet on this species, then the rate of by-catch could range from 8.5-10% of the population being incidentally caught each year. However it should also be noted that incidental captures of *Calonectris diomedea* by the Maltese fleet may consist of birds from other colonies in the Sicilian channel since the Maltese bottom long line fleet may fish up to 100 nautical miles from the Maltese islands. At the same time, this study does not take into account the impact of Sicilian vessels on Maltese colonies. The overall results do however suggest that by-catch may be a significant cause of mortality for *Calonectris diomedea*. It is therefore essential to look at ways to reduce bycatch that will benefit both the birds and the fishers and to assess the sustainability of incidental captures of *C. diomedea* on the seabirds' population. The estimated number of *Puffinus yelkouan* accidentally caught is very low (17 individuals). With a breeding population of about 1,500 pairs on the Maltese islands (Borg and Sultana 2002), an estimated 0.01% of the breeding population is caught by the Maltese fishing fleet every year. However, it is possible that not all fishermen differentiate between the two species, hence the actual numbers of *Puffinus yelkouan* caught could be higher.

During the questionnaire survey, these findings were confirmed by the fishers, who pointed out that the species they predominantly catch incidentally are *Calonectris diomedea* with very rare occasional catches of *Puffinus yelkouan*. The fishers also stated that mitigation measure to reduce incidental by-catch of seabird have been implemented for more than 30 years in order to reduce losses of bait. Mitigation measures used by the Maltese fishers include side-setting and the use of small weights on branch lines within 1 metre of the hook.

The results indicate that *Calonectris diomedea* is the most severely impacted seabird in this fishery. In order to assess the overall impact of the Maltese fishing fleet on the *Calonectris diomedea* populations, additional studies need to be undertaken. Other research areas that should be investigated include the possibility that trawlers may provide an incidental food supply to foraging shearwaters (as has been demonstrated in the Northwestern Mediterranean (Abello *et al* 2000) and, at the same time, the impact of fishing fleets on food sources of shearwaters, that might negatively affect their food supplies. These areas must be investigated in the Sicilian channel and especially in the Maltese territorial waters. Further studies with direct methods such as data recording by fishers and independent onboard observers are required in order to assess fully the impact of long lining on seabird populations.

### **Acknowledgements**

We would like to thank the fishers who took part in this study, the field recorders that conducted the interviews and Ms Francesca Gravino that coordinated the questionnaire survey. We would also like to thank Dr. Andre Raine of BirdLife Malta, Dr. Cleo Small and Dr. Andy Black of RSPB and particularly Mr. John J Borg of Heritage Malta for their comments in improving the manuscript. This research was funded by the EU-LIFE Yelkouan Shearwater project and by research funds from the Ministry for Rural Affairs and the Environment.

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