

Initiating a By-Catch Monitoring Programme for Seabirds in the Aegean Sea - Turkey

Project Final Report

Author: Dilek Şahin

Project ID: 04244115

Host Country: Turkey

Project Site: Sigacik, Izmir

Fieldwork Dates: 01 December 2015 – 01 January 2017

Contact Address: Cumhuriyet Mah. Pelin Sok. No:5/9 Kucukcekmece/Istanbul -

Turkey dileksahin88@gmail.com

Project Website: <http://yelkouanshearwater.org/>

Report Date: 30 July 2017

OVERALL AIM OF THE PROJECT

Setting up a monitoring programme in long-line fisheries in the Aegean Sea, Turkey to understand the scale of and the factors contributing to the seabird by-catch problem.

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Acknowledgements

There are many people who we are grateful for their contribution to the project. We thank to (in alphabetic order) Anton Wolfaardt, Ayşe Oruç, Ben Sullivan, Danae Portolou, Emrah Çoraman, Esra Ergin, Huriye Göncüoğlu, Janice Molloy, Jose Manuel Arcos, Kirsten Crawford, Marguerite Tarzia, Nazlı Avçılar, Nuno Oliveira, Oli Yates, Onur Gönülal, Ozan Kaan Sadıklar, Ufuk Usta.

Summary

Long-line fishery is a widely recognised global threat to seabird species. The birds are accidentally entangled in fishing lines and die. Turkey holds a wide diversity of seabird species and a large artisanal long-line fishing fleet, but level of seabird mortality from long-line fisheries is unknown. This project aims to initiate a seabird by-catch monitoring programme in long-line fisheries in the Aegean Coast of Turkey. Baseline data on the fishing effort and the scale of seabird by-catch is collected in 29 cooperatives along the Aegean Coast. From there a pilot study area is selected and the team collaborated with fishermen to build out a seabird by-catch monitoring programme. The team failed to set up monitoring programme due to the lack of preliminary data, difficulties encountered in collaboration and data collection in small-scale fisheries. However the results provided valuable insights about the problem. Seabird by-catch rate is calculated as 0.5425 birds per 1000 hooks in pilot study area. Although the sample size is small to conclude, our results suggest that substantial number of seabirds might be killed annually in small-scale long-line fisheries in the Aegean Sea. This project provides important insights into seabird by-catch work in small scale fisheries in the region and therefore constitute a basis for future studies.

Introduction

Although bound to land for nesting, seabirds are marine organisms and depend on marine resources for survival. Due to their dual life on land and at sea they can cover several habitats and regions during their annual life cycle and therefore they are prime examples of being exposed to a wide range of threats at different stages (Croxall et al., 2012).

Fisheries by-catch, incidental capture of seabirds in fishing lines, occurs when seabirds attracted to the bait, get caught on the hooks and drowned underwater in long-line fisheries. BirdLife estimates that over 200.000 seabirds are killed in fishing lines in European seas annually and this mortality poses a great threat to populations (Anderson et al., 2011; Genovart et al., 2017).

This project aimed at monitoring seabird by-catch in long-line fisheries in the Aegean Sea, Turkey. Monitoring serves better planning of potential future mitigation studies by

quantifying the scale of by-catch and by identifying the factors contributing to the problem. This is the first project that focuses seabird by-catch in the country and one of the few in the Mediterranean Basin (Figure 1). As seabirds are mobile organisms and cover large areas in short time, a complete picture of seabird by-catch is required within the Mediterranean Basin. This project contributes this effort by filling a gap in the Eastern Mediterranean.



Figure 1: Map showing the relative location of study area within the Mediterranean Basin together with areas where seabird by-catch data is available (grey circles indicate areas where seabird by-catch is quantified and blue indicates study area).

The project covers the Turkish Aegean Sea, which hosts many islands and islets (Figure 2). There are diverse seabird species breeding on those islands. This species diversity also brings diversity in foraging methods (e.g. diving, plunge diving) and areas (e.g. coastal and pelagic feeders) for birds. The Aegean Sea also holds rich fish diversity with low population abundances and hence there are many different fishing methods used in the area. Long-line fishing is one of the most common methods in the region.



Figure 2: Map showing the location of pilot study area (Sigacik, Izmir) where regular fieldwork is done throughout the year.

Key partners and their role in the project is as following:

- Fishermen using long-line fisheries: the most important stakeholder. Fishermen make the largest contribution by collaborating to understand the aspects of seabird by-catch.
- Policy makers: the second most important stakeholder. In Turkey, the Ministry of Food, Agriculture and Livestock manages fisheries and the Ministry Of Environment And Urbanization manages biodiversity. The contribution of these ministries are related with making related regulations to monitor and mitigate by-catch and with the conservation of specific seabird species that might be more vulnerable to fisheries by-catch.
- Academia: In order to mitigate seabird by-catch efficiently, its scale and the factors contributing to it must be understood. The role of academic stakeholders in the project is mostly related with by-catch research (covering larger areas by conducting scientific research on the aspects of by-catch; where and when it is happening, which factors are influencing its intensity etc.).

- Local NGOs: Collaboration with local NGOs is needed during the first contact with the fisheries cooperatives and to maintain the good relationship with fishermen. The team also asked local NGOs to help in monitoring of seabird by-catch

Project Team Members

Dilek Şahin: Project leader. PhD Student on seabird ecology and conservation at Bogazici University Institute of Environmental Sciences.

Billur Bektaş: Undergraduate student in molecular biology at Istanbul Technical University. Billur aims for an academic career in ecology and conservation. She was co-leader of the project.

Özge Doruk: MSc student in sociology. Özge pursues a career in environmental sociology. She was mainly responsible for fieldwork design, data collection and communication for project activities.

Ayça Eleman: PhD student on cetacean ecology at Bogazici University Institute of Environmental Sciences. Ayca was mainly responsible for data collection.

Dilşad Dağtekin: MSc student on paleoecology at Istanbul Technical University. Dilsad was mainly responsible for data collection.

Şebnem Samsa: Ornithologist. Şebnem is working for a private company as bird scientist. She mainly contributed to organising and conducting fieldwork in northern Aegean and Fethiye (northern Mediterranean).

Nurbanu Partal: PhD student in freshwater ecology at Canakkale Onsekiz Mart University Institute of Life Sciences. She mainly contributed to the fieldwork conducted in and around Canakkale (northern Aegean).

Project Aim and Objectives

The main goal of this project is to initiate a monitoring programme for seabird by-catch along the Aegean Coast of Turkey.

The desired state to reach the main goal is as following:

1. Preliminary data on seabird by-catch in long-line fisheries in the Aegean Sea is collected
2. There is a communication infrastructure that provides seabird by-catch data flow from long-line fishermen to related groups
3. A trust relationship between fishermen and seabird researchers has built in one fishing cooperative

During project implementation period there had been some changes to the objectives because of team's capacity and members' availability. The initial objectives were also involved;

4. Seabird by-catch is adequately recognised problem among policy makers in Turkey
5. Fishermen using long-line in the Aegean coast have sufficient awareness about seabird by-catch problem

Although some activities were carried out for 4th and 5th objectives, these were smaller in scale in comparison to what has been planned. For example the team has planned a workshop on seabird by-catch for a group of policy makers but instead fewer, closely related policy makers were informed with a meeting.

Methodology

Preliminary Data Collection

With this project two kinds of data were collected; (i) baseline data on fishing effort and by-catch rate from all cooperatives using long-line fishing along the Aegean coast of Turkey and (ii) detailed data on seabird by-catch rate in pilot study area.

Baseline data collection was started with compiling available information on all fishing cooperatives in the region. Each cooperative was then contacted via telephone calls to ask the size of long-line fishing fleet and whether they are positive to take a questionnaire survey. Then, each cooperative is visited to conduct face-to-face questionnaire surveys. The questionnaire covered gear details, long-line fishing effort and by-catch frequency and species by-caught. From the results of these preliminary surveys, the cooperative that has moderate by-catch rate and high long-line effort was chosen for cooperation for detailed and systematic data collection (as the pilot study area).

Regular monthly visits were made to the pilot area for systematic data collection. Two data collection protocols were implied; on-board observations and questionnaire surveys that ask about the latest fishing operation. On-board observations were performed as the weather and fishermen allowed.

In questionnaire surveys, data on the number of seabirds by-caught and gear characteristics are collected. Seabird counts during the travel to and from the fishing area and the behaviour of birds around the boat were included to this data for on-board observations.

To quantify seabird by-catch, the suggestion of Wolfaardt & Debski (2015) is followed. First, birds killed per unit effort (BPUE) is calculated:

$$BPUE = \frac{\textit{observed bycatch}}{\textit{observed fishing effort (number of hooks)}}$$

BPUE is then extrapolated to total annual fishing effort to calculate total seabird by-catch killed in Sigacik:

$$\textit{Total Bycatch} = \textit{Observed bycatch rate} \times \textit{Annual fishing effort}$$

Trust Relationship

After advised by experienced by-catch researchers around the globe, the team adopted “being honest and open” motto to build the trust relationship with fishermen. Frequent visits were made to the pilot area in early phases to introduce the project. A booklet giving detailed information on the problem and the project has prepared and disseminated.

Communication Infrastructure

Two methods were used in building a communication infrastructure that will provide by-catch data flow to the team:

- 1- Fishermen asked to voluntarily report seabird by-catch during the absence of team members: guidelines for seabird identification and safe release of by-caught birds were prepared and distributed among fishermen. Frequent phone calls to fishermen were made to remind the project.
- 2- Local stakeholders were asked to conduct questionnaire surveys to fishermen: presentations about the project were made in two local universities to attract students towards the project. A meeting with a local NGO was organised to ask for volunteer contribution to the data collection process.

Awareness

Popular science articles that are informing about the by-catch and the project in a simple language were prepared and published for public outreach. In order to get academic support presentations were made in 3 different universities. Meetings about the problem and potential future collaborations with policy makers from two different ministries were organised.

Outputs and Results

Surveys

Between 11 to 26 December 2015, a total of 29 fishing cooperatives were visited in 4 different cities and 57 baseline questionnaire surveys have conducted to collect preliminary data. The size of the long-line fishing fleet in those cooperatives ranged from 5 to 160 fishermen (Figure 3).

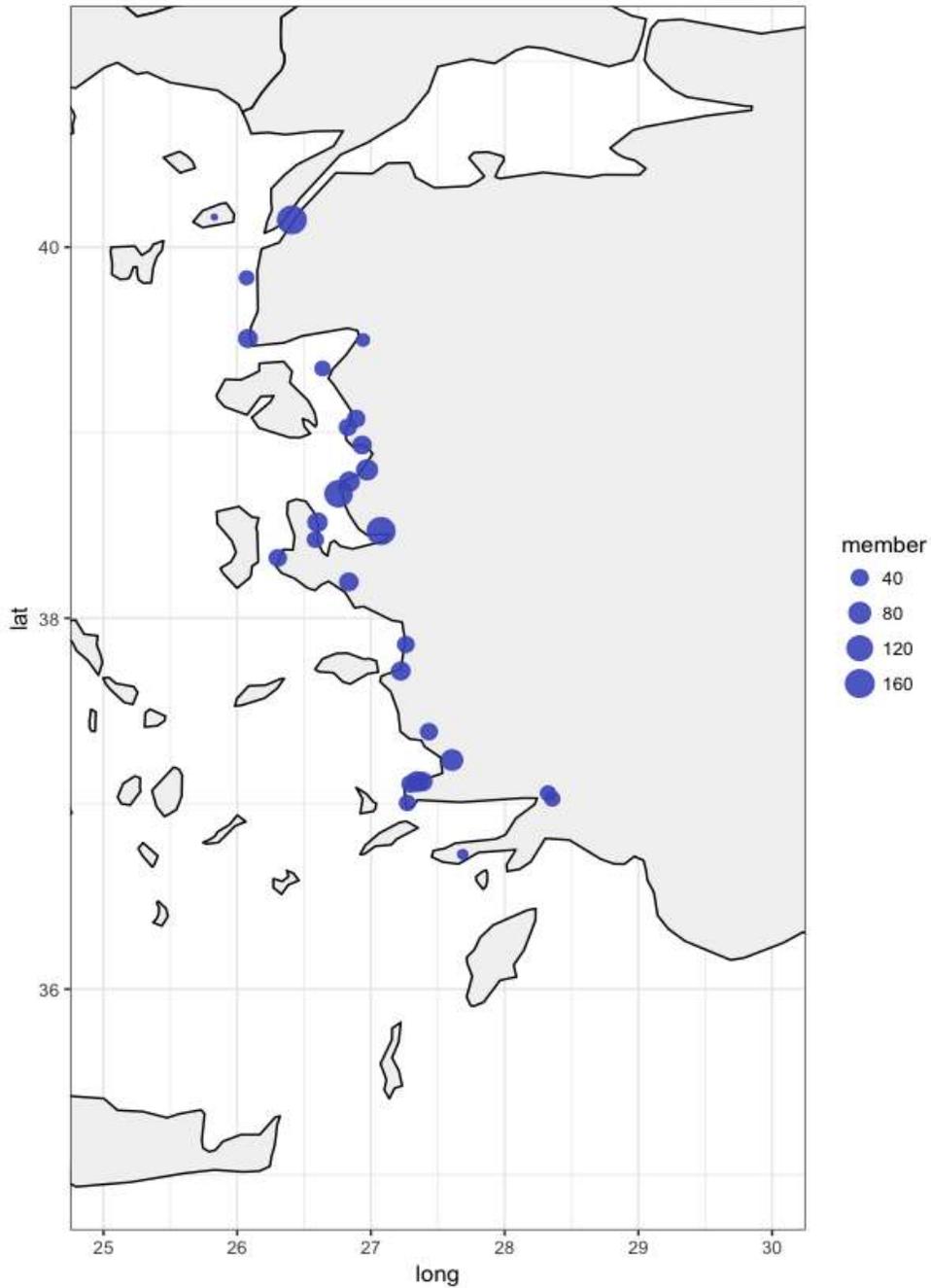


Figure 3: The size of the long-line fishing fleet in each cooperative visited during baseline survey conduction

Long-line fishing effort (number of hooks set) was highest in Cunda, Ayvalik cooperative, which is located in the northern Aegean with 30 members, followed by Sigacik, pilot study area with 50 members (Figure 4).

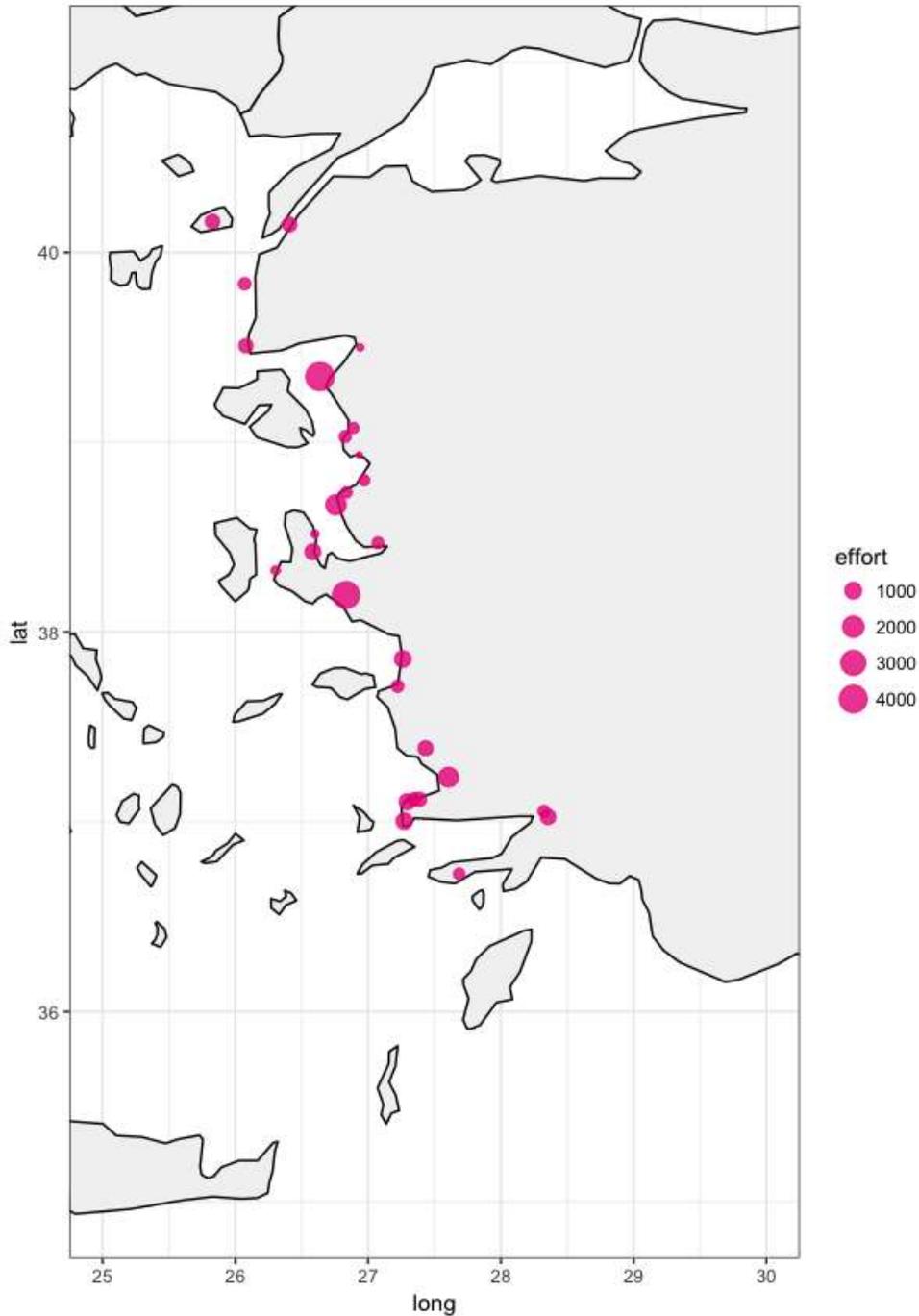


Figure 4: The effort of long-line fishing (per 1000 hooks used in fishing) in each cooperative visited during baseline surveys.

In 57 questionnaire surveys six fishermen reported that seabird by-catch has never occurred during their fishing activities –although they commented on the species often get caught in fishing lines. The majority of fishermen have reported that seabirds are

trying to attack the lines during fishing operations, which potentially indicates seabird by-catch (Figure 5).

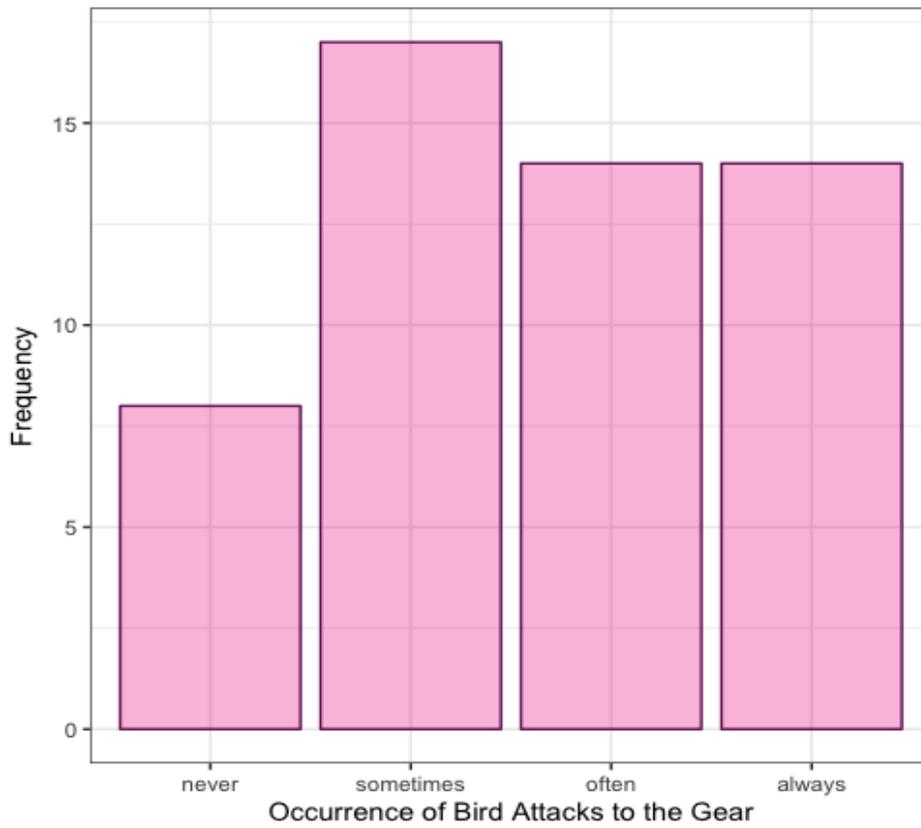


Figure 5: Reported frequency of the bird attacks to the fishing lines during fishing operations (line setting and hauling data together) along the Aegean coast

A wide range of species was reported as being caught in lines during baseline surveys (Figure 6).

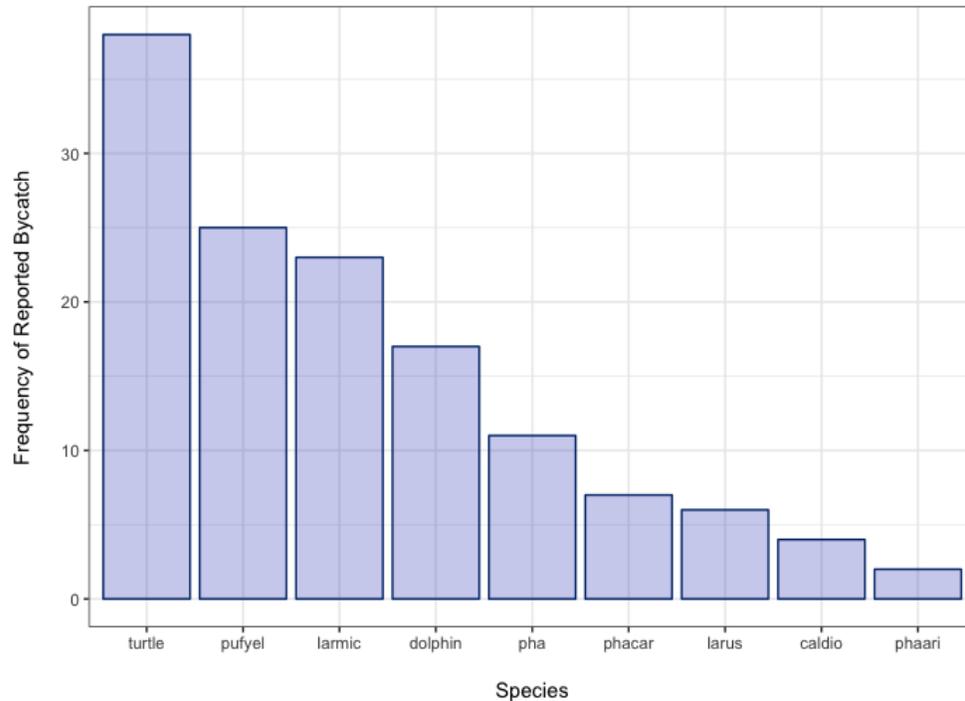


Figure 6: Reported by-caught species in fishing lines along the Aegean coast. **turtle:** Sea turtle species, **pufyel:** *Puffinus yelkouan* - Yelkouan shearwater, **larmic:** *Larus michahellis* - Yellow legged gull, **dolphin:** Cetacean species, **pha:** unidentified *Phalacrocorax* sp., **phacar:** *Phalacrocorax carbo* - Cormorant, **larus:** unidentified *Larus* sp., **caldio:** *Calonectris diomedea* - Scopoli's shearwater, **phaari:** *Phalacrocorax aristotelis* - Mediterranean shag.

According to the results of baseline surveys, the pilot study area, Sigacik, has selected. A total of 9 visits made to Sigacik and 2 on-board survey and 15 questionnaire surveys have conducted during these visits. 11 seabirds were reported as by-catch in 4 different fishing operations. The maximum number of birds by-caught in one operation was 6 birds. Birds killed per 1000 hooks (BPUE) were 0.5425 for Sigacik (Table 1).

Table 1: BPUE (Birds per unit effort) and total number of birds killed annually by long-line fishing fleet in Sigacik, Izmir. BPUE = observed by-catch/#observed hooks. Annual by-catch= BPUE*annual fishing effort

Annual Fishing Effort (#Hooks)	BPUE, birds per 1000 hooks	Seabirds Bycaught Annually
1.725.000	0.5425	935

Communication Network and Awareness

With this project a total of 97 fishermen (only those using long-line fishing) reached and informed about seabird by-catch. They were all provided with a seabird identification guide, safe seabird release guide (Figure 7) and project booklet, which provides contact

information for reporting by-catch. The team received a single return from those contacted during baseline surveys, a fisherman reporting an injured seabird due to reasons not related with by-catch.



Figure 7: Seabird Identification and Safe Seabird Release Guides prepared for fishermen. The ID guide is adopted from BirdLife Greece (Hellenic Ornithological Society) and Safe Seabird Release Guide is adopted from Southern Seabird Solutions.

To attract volunteers and promote by-catch studies in academia the team made 4 presentations in 3 different universities (Figure 8). 140 students have reached with these lectures/presentations (Ege University: 20 students, Canakkale University: 60+20 students, İstanbul-mixed from several universities: 40 students). One of the attendees informed the team that he decided to study seabird fauna and possibly by-catch for his graduate thesis in Canakkale. One of the master students who studies sea turtle ecology was keen to include seabird by-catch in his studies.



Figure 8: The team made presentations about the project in universities' related departments to increase the awareness of faculty members and attract student volunteers (Photo: Nurbanu Partal).

To promote the importance of long-term monitoring and observer programme policy makers from two related ministries were reached. Two meetings were organised where the team presented the project and asked for future collaboration opportunities to a total of 8 policy makers. The representatives of the Ministry of Environment and Urbanization offered to collaborate for creating a national action plan for the Yelkouan shearwater, one of the target species of the project. The Ministry of Food, Agriculture, and Livestock has offered with collaboration on setting a monitoring system for seabird by-catch however the representatives of the Ministry were conclude on that this is an early stage for such a programme and the Ministry still have too many critical issues to solve in fisheries before seabird by-catch.

Lay public were targeted with articles in popular journals focusing on environment, a total of 4 articles were published. Information on the problem and its effects on seabird populations and the details of the project were provided with these articles.

The project results were also reported to two senior scientists upon their request, to be used in a meeting about marine conservation with policy makers.

Achievements and Impacts

This is the first project focusing on seabird by-catch problem in Turkey. The data collected with this project -although imperfect, provides a preliminary idea about the scale of the problem and willingness of key stakeholders in collaboration.

The perception of Turkish fishermen about scientific research for conservation seems negative (pers. obs.). This might be due to high number of cases where fishermen help scientists to collect data but then rewarded with a new regulation or conservation measure that limits the activity of fishing as a result of that research. This is especially true for small-scale fishing fleet in the country. Despite this handicap the project team managed to build a positive relationship with fishermen in the pilot study area. In several cases fishermen voluntarily reported seabird by-catch to the team, which indicates that a trust relationship has built in short time period.

The preliminary data for seabird by-catch is collected along the Aegean coast, the region with the highest long-line fishing effort in the country. This data provided a wider perspective when evaluating the scale of and potential contributing factors to the problem. Although the sample size is not very high, wide variety of long-line fishing methods covered with questionnaire surveys (e.g. bottom and demersal long-lines). This data can be seen as laying the basis for more detailed studies in the region. The preliminary data also give insight about the long-line fishing effort for the region, which is not quantified or tracked by the Government.

Although the sample size is not high enough to deduce the main factors leading seabird by-catch, interviews with fishermen and detailed data collection in pilot area raised many questions regarding the factors contributing to and potential mitigation measures of seabird by-catch. Fishermen especially reported high by-catch events during the breeding season for seabirds (data not shown).

The seabird by-catch rate obtained in this study should be evaluated with caution. It is potentially highly biased towards positive cases of by-catch, as fishermen were reported mostly positive cases to help the project team. The sample size is also very small for statistically significant inference.

Fishermen in the pilot study area were very keen to help the project team from the first contact. However, this is not the case for other regions. During baseline data collection, the team encountered many fishermen who is highly suspicious about the surveys and therefore did not take the survey or otherwise probably reported unreliable data. On the other hand, there were many fishermen who were curious about the project, very positive about the surveys and keen to help. This might indicate that in case a wider by-catch research and/or mitigation studies are planned, it is possible to find collaborators

from several different regions of the Aegean coast of Turkey. Having these contacts and getting this information were one of the most valuable outputs of this project.

There was a similar curiosity in the academia as well. The objective of the team's presentations was introducing the ecosystem approach, which considers each component of the ecosystem as a network when approaching to fisheries by-catch problem. As this is a fresh perspective to the traditional scientific methods used in the country, faculty members and students were reacted positively to the talks. The participation in the presentations was high and the discussion after the talks were encouraging. However, the team still needs time and more effort to build strong bonds with academia.

The meeting with the Ministry of Food, Agriculture and Livestock was one the most difficult experiences in the project. The attendees were stated that the Ministry's capacity is pretty low with very few staff and too many big problems and seabird by-catch is not a priority for now before solving major issues. There might be two main factors supporting this vision; (i) seabird by-catch does not have a significant impact on fishermen's and Ministry's economic profit and (ii) there are no strict regulations and enforcement towards sustainable fisheries in Turkey. A closer relationship with large international conservation NGOs and EU policy makers would help to improve our Ministry's vision about sustainable fisheries.

The project team involved two projects species conservation action plans for the Yelkouan shearwater (*Puffinus yelkouan*). With the preliminary data collected through the project the team will contribute in the threats section and propose a road map for future studies on the issue.

With this project the team aimed to initiate a monitoring programme for seabird by-catch to better understand the scale of the problem and to build good relations with stakeholders for a future conservation work. However as there was no previous work on the issue this project only provided the preliminary work that helped to assess the current situation, perception of main stakeholders about the problem and potential methods for collaboration. Overall, the team failed to foresee the importance of such preliminary work before starting the project but in the end the project activities set the basis and gave strong indications about the future direction when dealing with fisheries by-catch problem.

Conclusion

This project was the very first study about the seabird by-catch in Turkey. With this project preliminary data on the scale of the problem is collected. The main stakeholders' perspectives about the problem were also evaluated and/or inferred. This information is

expected to set the basis for future -and better structured- work on the problem.

The project also provided valuable experience to the team in terms of working on such underrated and unknown conservation problems. All the experience gained during the project life provided the team a more realistic perspective about the approach needed when evaluating a conservation problem and its different components.

Problems Encountered and Lessons Learnt

This project was the first that focuses on seabird and fisheries interactions in the region and also the first middle-scale conservation project of the team. Therefore the team encountered several problems.

The most important problem was the lack of preliminary work/data both about fisheries and the problem that would help reducing the risks to the project. The team had to spend long time in understanding the schedule of the fishermen and the fishing conditions. This problem together with the distance to the project site made boat based observations impractical in many cases and resulted with small sample size in the end. As a solution, the team focused on collecting data through questionnaire surveys rather than observations. This problem impacted the first objective of the study: better quantification of the scale of by-catch in pilot study area.

The other problem that made the quantification of by-catch rates more difficult was the unavailability of fishery statistics. In small-scale fisheries, each fisherman switches among several fishing techniques according to bait availability and weather conditions. Therefore, a correct calculation of the fishing effort is problematic, which reflects back to by-catch rate calculation.

The team also had some problems as each team members were voluntarily contributing to the project and have a busy schedule. The team failed to share the duties equally and this made large part of the project dependent on one or two members. This resulted with delays and disruptions in project activities in general. The team tried to solve this problem with the involvement of enthusiastic team members (especially undergraduate students who have time) during the course of the project.

Despite the lack of any contact with any fishing cooperative before the project, the team was very successful in building the trust relationship with fishermen and establish themselves as friendly stakeholder.

Future Plans

The preliminary data collected during this project is going to be included into the national

species action plan for the endangered Yelkouan shearwater. This would allow the team to call for further seabird by-catch studies in the region, as the data proved that the problem exists.

The team will be seeking collaborations –especially with people from academia, as by-catch requires serious amount of research before taking conservation measures.

The report will be sent to related policy makers to make sure that they have the preliminary information on seabird by-catch and the team will be seeking opportunities to create a mind-set that convince the related ministries’ staff about the urgency of understanding and the mitigation of seabird by-catch.

Appendices

Appendix 1: Budget Report (excel file)

Appendix 2: Raw field data (in 3 files)

Appendix 3: Links to newspaper/magazine articles relating to the project

1. <http://www.dogadernegi.org/wp-content/uploads/2016/12/kus-sesi-04.pdf> Page 18-22
2. <https://gaiadergi.com/sekiz-kadin-bir-deniz-bir-kus/>
3. <https://yesilgazete.org/blog/2016/10/15/biz-istanbulda-deniz-kuslarini-gozleyecegiz-siz-de-gelirsiniz-degil-mi-ozge-doruk/>
4. <https://yesilgazete.org/blog/2016/03/16/yelkovan-kuslari-izleme-ekibimize-katilir-misin-ozge-doruk/>

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- Wolfaardt, A., & Debski, I. (2015). *Estimation of Seabird Bycatch Rates and Numbers*.

Web links

- Project website: <http://yelkouanshearwater.org/en/>
- BirdLife's Species Action Plan Project (Progress can be tracked): <http://www.trackingactionplans.org/SAPTT/sapTimeline/42>

Distribution List

The report will be shared with following NGOs/institutions:

- WWF Turkey
- Doga Dernegi (BirdLife Turkey)
- Ege University Faculty of Fisheries
- Canakkale Onsekiz Mart University Institute of Sciences
- Dokuz Eylul University Institute of Marine Sciences