# The Rufford Foundation
# Final Report

Congratulations on the completion of your project that was supported by The Rufford Foundation.

We ask all grant recipients to complete a Final Report Form that helps us to gauge the success of our grant giving. The Final Report must be sent in **word format** and not PDF format or any other format. We understand that projects often do not follow the predicted course but knowledge of your experiences is valuable to us and others who may be undertaking similar work. Please be as honest as you can in answering the questions – remember that negative experiences are just as valuable as positive ones if they help others to learn from them.

Please complete the form in English and be as clear and concise as you can. Please note that the information may be edited for clarity. We will ask for further information if required. If you have any other materials produced by the project, particularly a few relevant photographs, please send these to us separately.

Please submit your final report to jane@rufford.org.

Thank you for your help.

**Josh Cole, Grants Director**

| **Grant Recipient Details** | |
|---|---|
| **Your name** | Elizabeth Grace Tunka BENGİL |
| **Project title** | Is opportunistic sampling enough? Shark and ray population genetics and bioecology in Eastern Mediterranean, Turkey |
| **RSG reference** | 20115-2 |
| **Reporting period** | Final Report |
| **Amount of grant** | £4,850 |
| **Your email address** | tunkaeronat@hotmail.com |
| **Date of this report** | 21.08.2017 |

**1. Please indicate the level of achievement of the project's original objectives and include any relevant comments on factors affecting this.**

| Objective | Not achieved | Partially achieved | Fully achieved | Comments |
|---|---|---|---|---|
| Obtaining as much species and individuals as possible by using opportunistic methodology | | | ■ | Due to opportunistic method' nature obtaining many individuals was limited. However, we obtained a lot of individuals on a species to investigate more thoroughly. |
| Improve the network with fisherman and fisherwomen | | | ■ | We improve our network with fisherman and fisherwomen, especially in Gediz Lagoon and Gökova Bay. |
| Produce information and data on genetic diversity, reproduction system and feeding habits on chondrichthyans of Turkey | | ■ | | We produce detailed information on one species' biology. But due to lack of sufficient individual count we weren't able to produce scientifically enough data on other species. Histological observations, only few samples were good enough for preparation since either samples were send frozen, to young or were too decomposed to analyses. DNA sequences were obtained. |
| Produce information on endangered species egg laying areas | | ■ | | Even though the fisherwomen and fisherman were keen on helping and share the information on tangled egg cases either they did not notice them on the nets or did not bother with it. Among many fisherman and fisherwomen, few tangled egg cases were reported. |
| Educational activities | | | ■ | We reach out too many fishers and shared information on species and first project. National tourists were also interested in the project, especially university students. |

**2. Please explain any unforeseen difficulties that arose during the project and how these were tackled (if relevant).**

Fisherwomen and fisherman were not able to fish as much as their average in previous years due to harsh autumn and winter in Turkey this year. Even though the

nature of opportunistic methodology limits the number of individuals obtained this situation limited as a little more. But, we had enough samples for DNA analysis because of our effective network with fisherman and fisherwoman. However, the egg case work package were only partially achieved because of lack of observations or few reports. Their limited presence is most probably due to unforeseen difficulties such as bad weather or less fisheries effort. We tried to tackle this difficulty by visiting the fisherwomen and the fisherman more frequently however, we probably missed the gestation period or the fishing areas were not used by the species for laying ground during our intense visits. Tourist education was not satisfactory since not everyone was willing to learn about chondrichtyans during their short vacation time. We decided to change our approach and targeted people who were university students and who were highly interested in the project. Besides these difficulties as a result of the military coup attempt in 2016 many of our travels had to be delayed or shortened since one of the project area (Gokova) was one of the main action point during the coup attempt. And people and fishers were a little withdrawn to speak with us thinking that the project was about something else. But we tried to explain ourselves as much and as possible as we can and because of it we minimised this effect. On the other hand, we also had problems reaching out the authorities during this period, and we tackle this we send out our results to necessary places but had no response.

**3. Briefly describe the three most important outcomes of your project.**

- **Chondrichthyan diversity**

Eleven species were obtained through out the project. Critically Endangered *Squatina, Isurus oxyrinchus, Gymnura altavela*; Endangered *Rhinobatos cemiculus*; Vulnerable *Mustelus*; Near Threatened *Raja clavata, Dasyatis pastinaca,* and *Myliobatis aquila*; a Least Concern *Raja miraletus* and Data Deficient Species *Raja radula* and *Aetomylaeus bovinus*. Even though we could not reach the samples, we also know that a large group of *Mobular mobular* was caught in the southern coasts of Turkey. This unfortunate catch also showed us to give more importance to increase awareness of fishermen and fisherwomen who fish in the coasts of the Turkish Mediterranean.

- **Producing Information on Bio-ecology of Chondrichthyans**

When the stomach contents were identified and analysed similar to previous result were observed that shark species mainly consume bony fish but some species preferences or priority changes to crustacean or cephalopods. During the course of the project we obtained a lot of *Rhinobatos cemiculus* individuals that were enough to analyse extensively their dietary compositions of this species. We observed that this species main food item is *Carcinus aestuarii,* a crab species, and mainly prefer crustaceans We also estimated the trophic level of all the species we had according to two different methods and results showed us trophic levels of these species distribute between 2.4 and 3.5 in the eastern Mediterranean. When the results are compared with other species, even though the individual count is not as much as *R. cemiculus,* the trophic level of this species is one of the higher residents even among other flat bodied cartilaginous species such as marbled electric ray and rough ray.

Figure 1. *Isurus oxyrinchus* individual obtained from Gökova.

Figure 2. On the left *R. miraletus* individual and on the right T. *marmorata* caught during the trawling.

Histological preparations were only possible for *S. canicula.* Even though fresh individuals were obtained, they were either too young to observe a clear gonad or decomposed. Since we had experience with *S. canicula* from previous project, we done the sections and tried on *R. radula*. Sections from *S. canicula* are given in Figure 3. During the dissection process, even we did not observe any egg cases in the ovaries, it is clear from photos that she was capable of producing eggs. In *R. radula* individuals case we observed egg case formations but were not able to get a clear slide since the shell of the case was hard and kept breaking during the procedures.

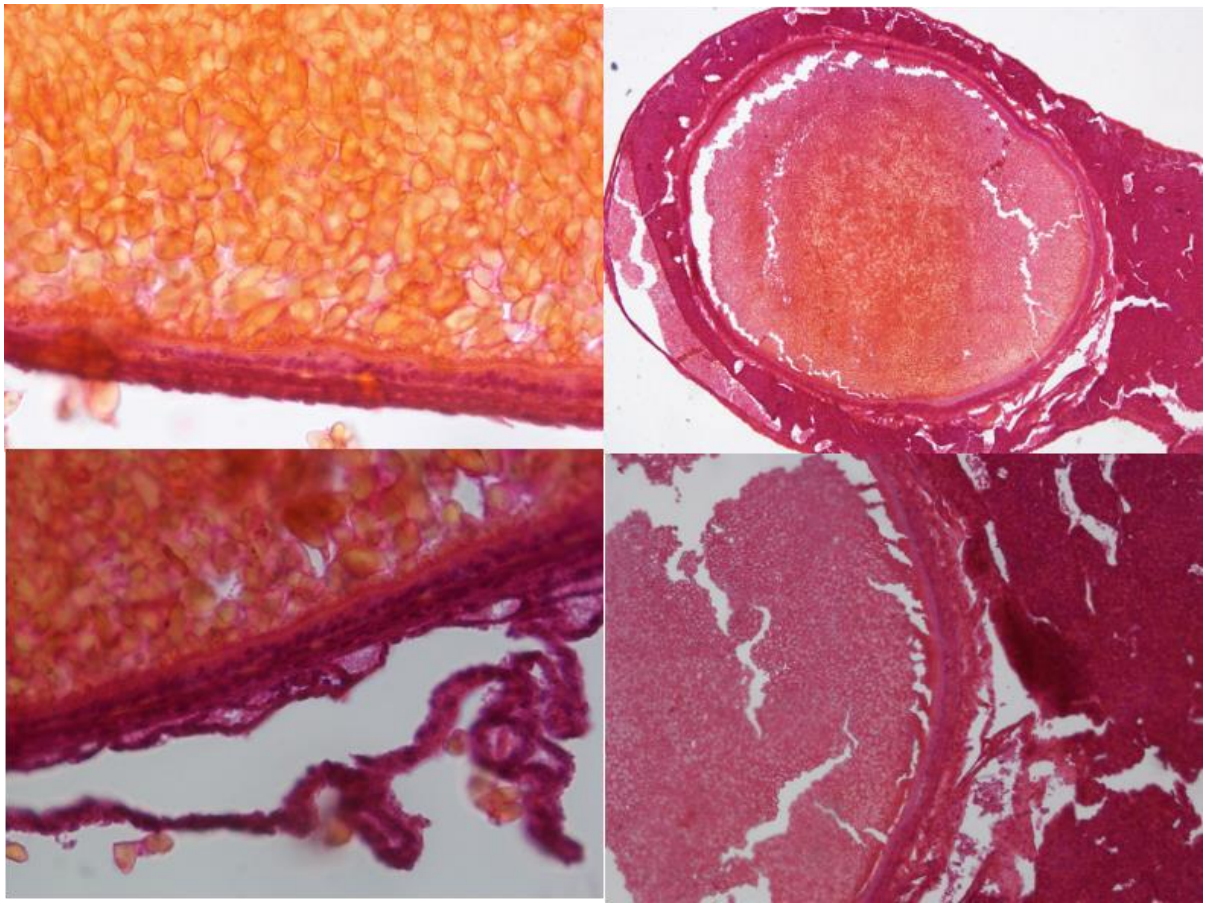

Figure 3. Egg photos from *S. canicula*.

We have started preparing the DNA samples before the project update report since we had experience with problems in previous project. In Table 1 can be seen the species send to sequencing and the samples were send for sequencing in batches. Some of the send samples belongs to same species form different areas they were obtained. Most of the DNA samples were clear or gave results during sequencing. The sequences we got were compared with BLAST analyses in GenBANK system to make sure the species identification was correct and see the relations with other samples. For now, only two samples are in GenBANK but rest will be uploaded to the system after their approvals. Uploaded two *Squatina squatina* DNA sequences can be reached with code names "KY216165 and KY216166". As a result of our Blast analysis we found out that the species we obtain had relations from Canary Islands, Britannia Islands, Peru, and India to Africa, besides previous few samples uploaded from Turkey. These results we obtain also corresponds with general ecology of species such as *Isurus oxyrinchus*, a migratory species with a wide range of distribution.

Table 1. Species send for DNA sequencing

| **Species** | |
|---|---|
| *Isurus oxyrinchus* | *Dasyatis pastinaca* |
| *Rhinobatos cemiculus* | *Aetomylaeus bovinus* |
| *Mustelus mustelus* | *Myliobatis aquila* |
| *Torpedo marmorata* | *Gymnura altavela* |
| *Raja radula* | *Squatina squatina* |
| *Scyliorhinus canicula* | |

- **Awareness and Networking**

During the project, we used different materials to attract, promote people' help and interest. We wanted to give out objects especially to fishermen and fisherwomen in the network to say thank you and make them fill more part of the project. We produced stickers, magnets and t-shirts to reach this purpose. We talked and presented the project and hanged some posters to bars and restaurants. Interestingly, in one of our visits, while we were waiting the bus in the center of Marmaris (close to Gökova), a university student came and asked about the t-shirts we were wearing. We explained and talked about the project but the bus time came we had to leave. He asked for a t-shirt but we did not have his size with us, so we exchanged information and sent him a t-shirt. A week later he sent a photo of him wearing the t-shirt and after that started to help us during his stay in Marmaris (Figure 4). This event was a beautiful thing for us which showed that products we made (magnets, stickers and t-shirts) really works. People are attracted to items but after explaining what we are working on they want to learn more.

Figure 4&5. The university student from Marmaris, who ask for a t-shirt and send a photo to us and some photos taken during our visits and interviews.

**4. Briefly describe the involvement of local communities and how they have benefitted from the project (if relevant).**

As in the first project, we were able to reach local people of the stations we visited. Additionally, we were in close contact with the local universities around Izmir, and Iskenderun Bays. We also presented our previous findings and project plans in these universities. Even we did not reach to as much tourist as we expected, the university students on vacations were eager to hear and learn about the species in Turkey and in the region as well as some their biology. Fisherwomen and fishermen which were already in the network were pleased to see the information produced in previous project and appreciated the return and sharing information. Even some skeptical fishermen were really gratefully of the communication continuation since from their previous experiences let them believe that people of science or environmental NGO volunteers only reach out to them for their needs but don't share the knowledge. Our close contacts also pointed out that local people as well as fishermen and fisherwomen, as observers and users of the sea, are important data source for the ecological knowledge in view of citizen-science.

**5. Are there any plans to continue this work?**

With the previous project, we have mainly focused on to produce as much information on chondrichthyans as we can without increasing the pressure on the species. We have been using opportunistic methods to obtain our species such as going to fishermen and fisherwomen periodically, go through every fish markets we found in the areas and other components in the network. Now we are planning to focus more on promoting protection actions and measure and increase knowledge among different groups by citizen science. Our experience after the first and the second project indicated us that fisherwomen and fishermen are important data source on ecological knowledge of the coasts of Turkey as well as sample providers. To obtain information from their knowledge, it is also required to use systematical approaches. We plan to have target groups and trough questionnaires we can collect data to increase level of biological knowledge on sharks and rays such as their catch records and mostly which species are effected in the areas. The plan is to have some target groups to obtain data, increasing understanding for conservation approach; for instance, fishermen and fisherwomen, local businesses, and university students. By doing this we will have an up to date catch record information, level of knowledge on the species before our presentations and after the projects and understand point of view of difference users of coastal zones for effective conservational approaches. Besides this new approach, we also plan to continue collecting info on their biology but the main focuses will be on the questionnaires and citizen science. Additionally, we are planning to add some art to our project by promoting shark and ray conservation trough photos, drawings or even in different art form of the species by contacting local artists.

**6. How do you plan to share the results of your work with others?**

We have already planned to share the results with the universities in the areas and have already conducted some presentations on our preliminary results. We had

many meetings with fishermen and fisherwomen to collect data and share our findings during the project. We also put posters and fliers for the local communities and tourists. We have already finished and ready to submit a scientific article on *S. squatina* genetic identification. We are planning to write three more scientific articles, on *R. cemiculus* biology, *I. oxyrinchus* neonites, and phylogenetic of chondrichthyans in Turkish coasts of the eastern Mediterranean.

**7. Timescale: Over what period was The Rufford Foundation grant used? How does this compare to the anticipated or actual length of the project?**

The grant was used trough out the length of the project. As proposed first we improved already existing network of fisherwomen-fisherman. At the same time sampling started and some were send by the fisherwomen-fisherman. During the samples dissection where possible tissue samples were preserved and morphological measurements, food contents and where possible information on their reproduction biology was collected. Tissue sample preparations started for DNA extraction in October and was sent in groups for barcoding after all DNA samples were ready in each group. As well as producing info on the species we have also have had made t-shirts, magnets and stickers to promote the project and give out to the fishers.

**8. Budget: Please provide a breakdown of budgeted versus actual expenditure and the reasons for any differences. All figures should be in £ sterling, indicating the local exchange rate used.**

| Item | Budgeted Amount | Actual Amount | Difference | Comments |
|---|---|---|---|---|
| Presentation, poster, fliers, other publications and t-shirts | 75 | 103 | -28 | We added more products to publicize the project such as magnets and stickers. Also, we had to print more t-shirts than we planned. |
| DNA sequencing services | 500 | 613 | -113 | Due to unsuccessful sequences during services we had to increase replications |
| DNA isolation, preparation and purification kits | 2000 | 1891 | 109 | We were able to use some of the left-over consumables from previous and another project which reduced our costs |
| Staining chemicals | 400 | 402 | -2 | |
| Histological preparation equipment & Substances | 300 | 300 | 0 | |
| Accommodation expenses | 400 | 534 | -134 | We had to travel more than anticipated especially during tourism season our |

| | | | | |
|---|---|---|---|---|
| | | | | accommodation cost increased |
| Postal services | 75 | 47 | 28 | Due to extra traveling, we did not need as much postal service as we anticipated |
| Travel expenses | 400 | 485 | -85 | We had to travel to some areas more frequently since the fisherman-fisherwomen were not able to either preserve the individuals, were not able to send us or to strengthen the network. |
| Payment for buying commercially valued species | 700 | 540 | 160 | Due to exchange rates, we did not need as much as we planned and we were able to reduce some of the prices with the help of fisherman in our network |
| **Total** | 4850 | 4915 | -65 | |

**9. Looking ahead, what do you feel are the important next steps?**

As this second project came to an end we believe that we should continue our efforts on collecting data to increase understanding on these threatened species by using fishermen and fisherwomen as well as samples provided by them. To make an example for future projects by showing how different or less orthodox methods can also be useful and effective on obtaining information and for conservation of these species. We should promote people to use less destructive or harmful methods and utilize as much as we can with as little as we have.

**10. Did you use The Rufford Foundation logo in any materials produced in relation to this project? Did the RSGF receive any publicity during the course of your work?**

Yes, we have used the logo on every material we used for publicity such as our t-shirts, fliers, posters, magnets and stickers. We especially used rays and different species since most people don't realize that there are flat bodied cartilaginous species. We gave out stickers to the people who were willing to listen us and magnets and stickers to the fisherman and fisherwomen who have help us. You can see the designs and photos of the stickers, magnets and t-shirts.

Figure 6&7. Designs of the stickers we had it made. Each one was printed separately. These stickers were given to the people we talked and the fisherwomen and fisherman and design of the magnet we prepared. These magnets were given to the fisherman and fisherwomen.


Figure 8&9. Design of the t-shirts we prepared. T-shirts were given to the fisherman and fisherwomen as well as the team. The t-shirt says in Turkish, "Don't let them be drawings in memories save sharks and rays" and design of other t-shirts we prepared. These t-shirts were worn by team members.


Figure 10. Fliers and posters, we used during our visits and presentations. The poster on the right was also used during the first project but this version has been updated.