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Mission report

Tracking the yelkouan shearwater (*Puffinus yelkouan*) wintering in the Northeast Black Sea

23 January – 2 February 2022

Authors:
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Sergey Bukreev (Severtsov Institute of Ecology and Evolution / Russian Academy of Sciences)

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1 CONTEXT

Launched in late 2020, the *CIESM Seabirds Program* aims to increase our fragmentary knowledge of the status, distribution and movement of seabirds from the Mediterranean and adjacent Seas. Field investigations started with the study of the seasonal migration of the Yelkouan Shearwater (*Puffinus yelkouan*) - a pelagic seabird endemic to the Mediterranean and Black Sea. The geographical distribution of the Yelkouan Shearwater concerns a large number of CIESM Member States, whose coordination is needed for the protection of this species classified as 'Vulnerable' by IUCN. While no breeding colony has ever been reported in the Black Sea, previous studies showed some migration movements between Mediterranean breeding sites and the Black Sea (Péron *et al.* 2013, Raine *et al.* 2012).

In June 2021, we deployed 15 GPS-GSM transmitters (Ornitrack-9, Ornitela) on adults and juveniles in Lastovo Archipelago (Croatia) with the on-site collaboration of Sven Kapelj and his team from Udruga BIOM. These very light transmitters (~12 g with epoxy coating) allow detailed live tracking for a few weeks/months without the need for recapture. We were able to establish that a third of the individuals studied travelled over 2500 km to reach the pelagic waters of the Black Sea up to the entrance of the Azov Sea (Fig. 1).

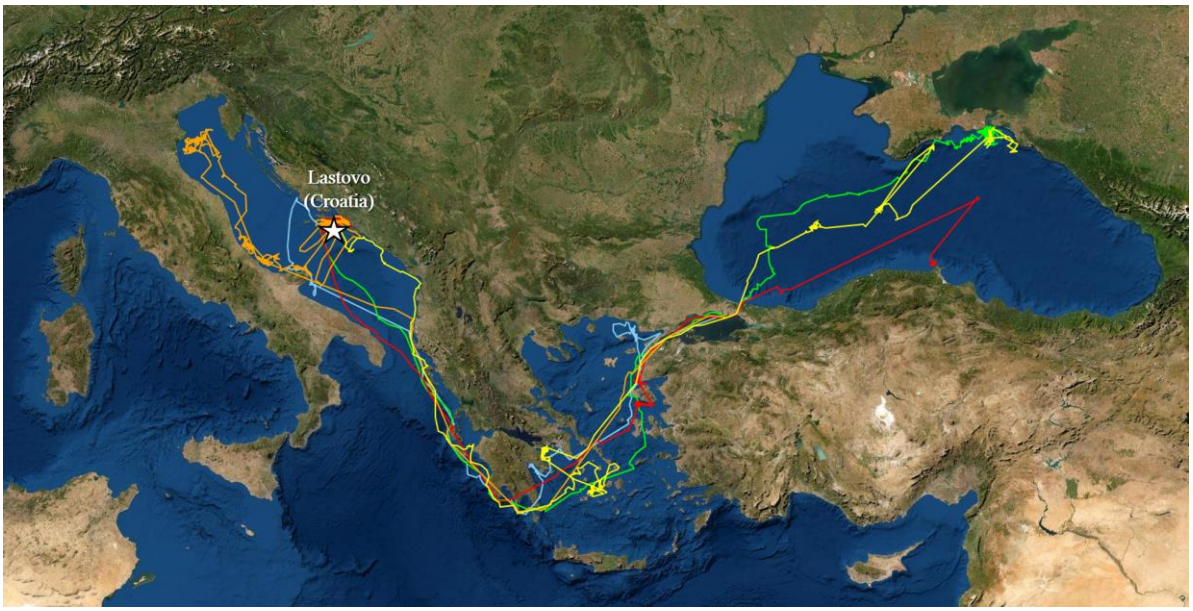

Figure 1. Individual tracks of five individuals that left their colony in Lastovo Archipelago (Croatia) to reach the Black Sea a few weeks later.

These findings stimulated several scientific questions on the migration routes and patterns of the Yelkouans shearwaters, among which:

Where do the Yelkouans wintering in the Black Sea go?
When do they return in the Mediterranean Sea for breeding?

After an extensive bibliographic review of the presence of the Yelkouan Shearwater (hereafter Yelkouan) in the Black Sea, we decided to design a study in collaboration with the Russian Academy of Sciences along the coasts of the northeastern Black Sea – close to the areas visited by the birds tracked previously from Croatia.

The timing of the mission (23 January – 2 February 2022) was determined by observations of major flocks of yelkouans in January and February in the Bosphorus just before the egg laying period (Dilek *et al.* 2012) plus a recent report (Viktor Belik 2019) and illustration (Fig. 2) of numerous yelkouans near Novorossiysk in early February.

Figure 2. The gathering of thousands of Yelkouan shearwaters near Novorossiysk, Russia (06.02.2018). Photo by A. V. Popovich.

2 COOPERATION

2.1 BACKGROUND

The Russian Federation officially joined CIESM in October 2013 as a Member State. The following year, the International Conference on East-West Cooperation in Marine Science was organized in Sochi (1-3 Dec 2014), co-chaired by Prof Frédéric Briand (CIESM Director General) and Academician Prof. Robert Nigmatulin (Director of Shirshov Institute of Oceanology). This conference emphasized the historical links with Russian scientists from Shirshov Institute of Oceanology (IO RAS) and other research Institutes whose participation in CIESM congresses and workshops dates back to several decades.

This mission was part of the further development of the collaboration between CIESM and Russia and it involved for the first time a dedicated scientific field study of seabirds in the North East Black Sea.

2.2 FIELD INVESTIGATORS

Dr Loriane Mendez (Mediterranean Science Commission - CIESM),
coordinator of CIESM Seabird Program

Dr Sergey Bukreev (Severtsov Institute of Ecology and Evolution - IPEE RAS),
ornithologist

Prof. Tamara Shiganova (Shirshov Inst.), former co-Chair of the CIESM Committee on Living Resources & Marine Ecosystems, facilitated the mission by arranging local contacts with the researchers of the Gelendzhik marine station.

2.3 SOUTHERN BRANCH OF IO RAS

A visit of the Southern Branch of Shirshov Institute of Oceanology (IO RAS) was organized in order to meet local scientists and exchange about research activities of the station and recent CIESM Programs. We discussed with Dr. Vladimir Silkin (head of Ecology Lab.) that participated to the 42nd CIESM Congress (Cascais, 2019). Dr. Valery Chasovnikov (head of Chemistry Lab.), accompanied by some present students, showed us the facilities, the station access to the sea (with research vessel under maintenance) and the engine shed (holding submarines) (Fig. 3). We are also grateful to Aleksei Vladimirovich, a doctoral student, for assisting us during our first boat survey in the Gelendzhik area.

Figure 3. Visit of the Southern Branch of Shirshov Institute of Oceanology in Gelendzhik.

3 AT-SEA SURVEYS

3.1 LOGISTICS

Accommodation:
2 nights in Gelendzhik (Hotel Samara)
6 nights in Supsekh (Guest House Roditelski Ochag)

Boat surveys (Table 1)**:**
From Gelendzhik: catamaran (rental tourist agency)
From Bolshoi Utrish: motor boat (rental of the Wildlife Preserve of Bolshoy Utrish)

Table 1. Summary of boat surveys completed

Departure point	Date	Departure time	Return time	Effort (hours)
Gelendzhik	24.01.22	10:30	14:30	4
Bolshoi Utrish	26.01.22	9:15	15:15	6
Bolshoi Utrish	27.01.22	8:30	16:30	8
Bolshoi Utrish	28.01.22	8:30	14:30	6
Bolshoi Utrish	30.01.22	9:30	13:30	4
Bolshoi Utrish	01.02.22	7:45	12:45	5
			Total	*33*

List of equipment (Fig. 4)**:**
- Cast nets (x 2)
- Dip net (2 m telescopic, 70 cm opening)
- Baits: fish from markets (whole and waste), oil fish, canned fish, popcorn
- 40 GPS/GSM transmitters (Ornitrack-9, Ornitela, Lithuania)
- Tesa tape and glue (to attach transmitters)
- Fabric bag, spring scale and caliper (to weight and measures the birds)

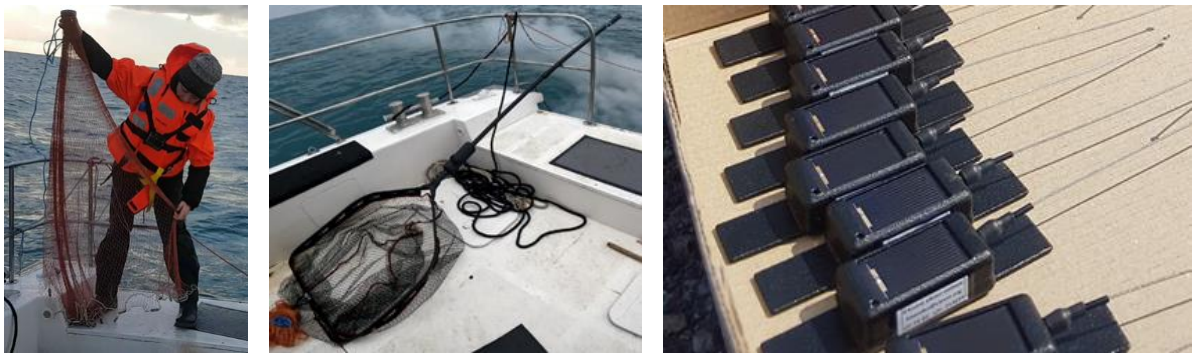

Figure 4. From left to right: cast net, dip net, GPS-GSM transmitters.

Capture and GPS deployment:

The vast majority of seabird studies are conducted during the breeding season when the birds are on land and therefore more accessible. Based on the very few studies that attempted to capture seabirds at sea, we decided to use a cast net (Bugoni *et al.* 2008, Ronconi *et al.* 2010) and a dip net (Boué *et al.* 2012, Trull *et al.* 2018) from a boat with a low deck close to the surface. A total of 40 GPS-GSM transmitters were ready to be deployed on Yelkouan shearwaters (attachment to back feathers with Tesa tape).

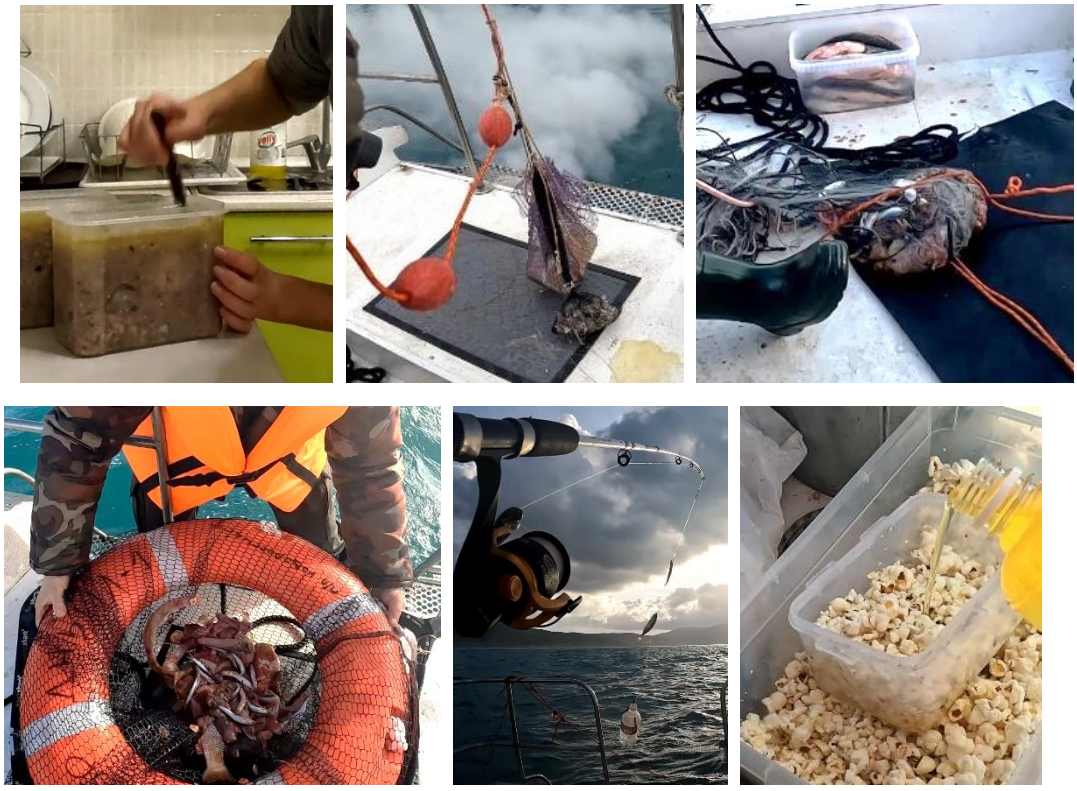

Figure 5. From top to bottom and from left to right: preparation of frozen blocks; net with frozen block; net with fish parts; dip net and lifebuoy with fish; fishing rod; popcorn and fish oil.

Chumming:

We tested different 'chumming' methods to attract seabirds close to the boat, using a combination of scent, slick and food items (Fig. 5):

- Net containing fish parts and/or small fish and/or frozen block attached to a rope behind the boat
- Head of dip net (attached to lifebuoy) containing fish parts and small fish
- Fishing line with a dozen anchovies pulled behind the boat
- Fishing rod with anchovies at the end
- Box filled with fish (visual and olfactory attraction)
- Popcorn soaked in fish oil

3.2 SURVEYS LOG AND OBSERVATIONS

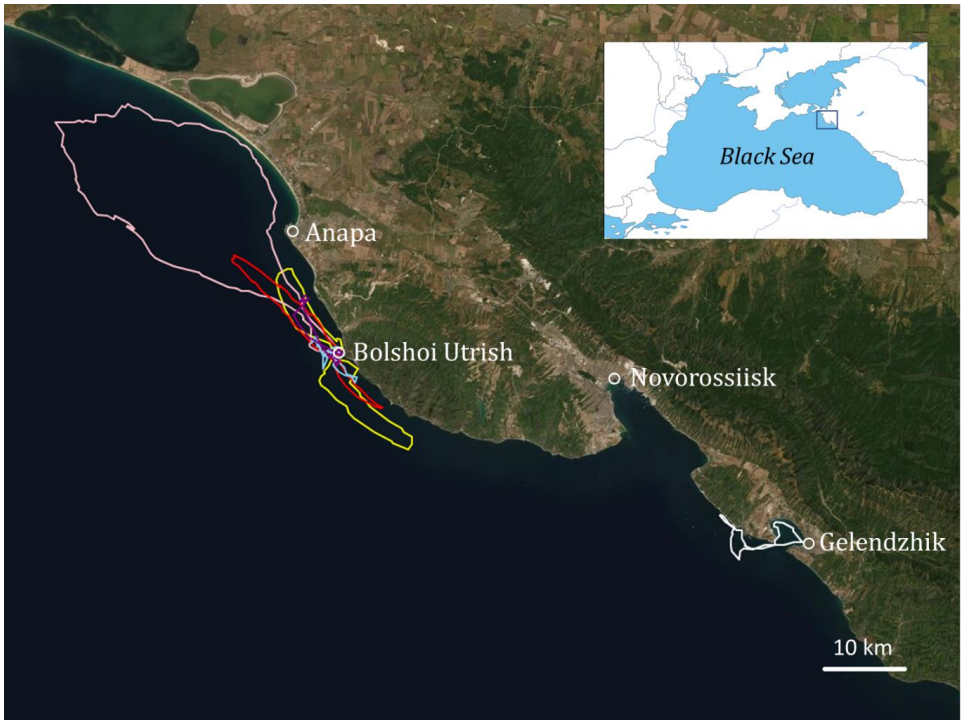

Figure 6. Map of the six boat surveys conducted during the mission.

Gelendzhik

Survey 1: A first boat at-sea survey was organized on a catamaran rented in Gelendzhik. This catamaran was not allowed to leave the bay so our route remained very restricted (see white track, Fig. 6 & 7). Sea conditions were good despite some snow, wind and rain but the survey was shortened because of approaching bad weather off the coast. The floor of the catamaran was very slippery making it difficult to move around.

Figure 7. Catamaran and track of the survey conducted from Gelendzhik.

The approach of an active fishing vessel (Fig. 8) confirmed the presence of yelkouan shearwaters in the area (2 or 3 individuals behind the boat). During this 4-hour survey, we observed a total of ~15 yelkouans flying rapidly in small groups. No capture was attempted.

Other observations: some 16 000 birds were observed from 17 seabird species (Table 2), with an uncertain identification of Armenian gull. Thirty common dolphins (*Delphinus delphis)* and 15 bottlenose dolphins (*Tursiops truncatus ponticus)* were also observed.

Figure 8. Approaching a fishing vessel in Gelendzhik Bay.

Table 2. Estimation of seabird densities observed in Gelendzhik Bay (see photos in Annex 1).

English Name	Scientific name	Russian name	Estimated densities
Anseriformes			
Mallard	*Anas platyrhynchos*	Кряква	50
Tufted Duck	*Aythya fuligula*	Хохлатая чернеть	5
Charadriiformes			
Arctic Skua	*Stercorarius parasiticus*	Короткохвостый поморник	3
Common Gull	*Larus canus*	Сизая чайка	1
Caspian Gull	*Larus cachinnans*	Хохотунья	150
Yellow-legged Gull	*Larus michahellis*	Средиземноморская чайка	
Armenian Gull	*Larus armenicus*	Армянская чайка	?
Mediterranean Gull	*Larus melanocephalus*	Черноголовая чайка	1
Common Black-headed Gull	*Larus ridibundus*	Озёрная чайка	3000
Sandwich Tern	*Thalasseus sandvicensis*	Пестроносая крачка	51
Falconiformes			
White-tailed Sea-eagle	*Haliaeetus albicilla*	Орлан-белохвост	1
Gaviiformes			
Arctic Loon	*Gavia arctica*	Чернозобая гагара	4
Gruiformes			
Common Coot	*Fulica atra*	Лысуха	2000
Pelecaniformes			
Great Cormorant	*Phalacrocorax carbo*	Большой баклан	10000
Podicipediformes			
Great Crested Grebe	*Podiceps cristatus*	Чомга	1000
Black-necked Grebe	*Podiceps nigricollis*	Черношейная поганка	50
Procellariiformes			
Yelkouan Shearwater	*Puffinus yelkouan*	Левантский буревестник	4
		Total	*16 320*

<u>Bolshoi Utrish</u>

The first three surveys (out of five in total) conducted from Bolshoi Utrish (Fig. 9 & 10) were dedicated to the exploration of the area in search of potential natural gatherings of yelkouan shearwaters. As we could not find favorable zones, we decided in the last two surveys to change strategy and to try to attract the birds with chumming less than 10 miles away from our departure point in Bolshoi Utrish.

Figure 9. Motor boat used for the survey in Bolshoi Utrish.

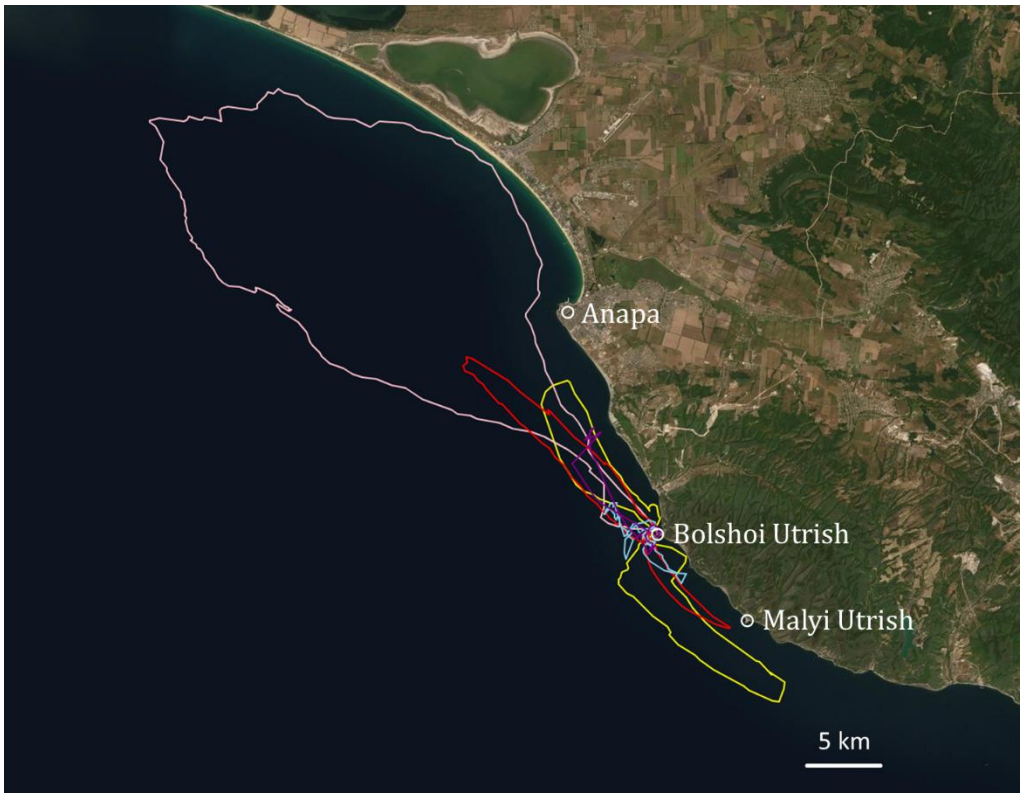

Figure 10. Tracks of the five offshore surveys conducted from Bolshoi Utrish.

Survey 2 (yellow track, Fig. 10): exploration north and south of Bolshoi Utrish. We deployed a trawl behind the boat with a net filled with pieces of fish at the end of a rope. Quickly, a yelkouan shearwater landed on the water close to the boat (Fig. 11) when our capture equipment was not yet out on the boat deck. During the 6 hour survey, ~30 yelkouans were observed alone or in small groups, flying fast and impossible to approach.

Figure 11. Yelkouan shearwater on the water close to the boat (26.01.22).

Survey 3 (pink track, Fig. 10): we took the direction of the strait of Kerch to the north but we observed no yelkouan for several hours. We used the towed net behind the boat with fish and frozen blocks (mix of smashed canned sardines, popcorn, fish part in oil fish, vegetable oil and fresh water) for chumming. Only one large group (~50) was observed on the surface near a fishing vessel but the approach was not successful. Following this observation, we decided to direct our future trips towards active fishing vessels in order to maximize our chances of catch.

Survey 4 (red track, Fig. 10): we went north near Anapa where we approached two fishing boats next to each other. Hundreds of yelkouans were observed some 100m behind the boats, including very large groups (>50 and >100 individuals) (Fig. 12). Unfortunately, they were again flying very fast and landed on the surface too rarely and too briefly for capture. They were not attracted by our boat, nor by the baits deployed at sea. Then the boat headed south again where we observed some yelkouans here and there along the trip. By then the wind force and wave height increased considerably, making working conditions difficult, and shearwaters flew even faster.

Figure 12. Hundreds of Yelkouan shearwaters close to two fishing boats off Anapa.

Survey 5 (blue track, Fig. 10): we prepared a bait with more fish (from 3 different species and sizes) in a bigger net towed behind the boat. We added a second line by fixing the head of the dip net in the lifebuoy of the boat and filling it with pieces of fresh fish and waste (head, guts). A few fish were also placed in an open box on the deck of the boat to create an additional visual and olfactory bait. A dozen gulls followed our boat, trying to catch a few pieces of fish that were getting out of the net. We also tested a fishing line with a dozen anchovies (spaced about 15 cm apart) that we put in the water behind the boat - but the anchovies did not hold very long. A lot of yelkouans were observed during the survey, including big flocks, close to Bolshoi Utrish. Unfortunately, it was again impossible to approach them. As during survey 3, the working conditions became complicated due to strong wind and rough sea.

Survey 6 (purple track, Fig. 10): we stayed close to Bolshoi Utrish where many small groups of yelkouan shearwaters were moving southwards, revealing a typically migratory behavior. Sometimes gulls followed the boat and we sent fish overboard to keep their attention in order to use their presence to attract yelkouan shearwaters in a cascade effect. In addition, we tried in vain to put an anchovy at the end of a fishing rod. The yelkouans were not at all interested in our baits. After returning to land, we went to the lighthouse in Bolshoi Utrish harbor, which is located on a small hill, and found it as an excellent place to observe groups of yelkouans - at least on days like these where many small groups were passing close to the coast on their way to south.

Other observations: over 100 000 birds were observed in total from 18 seabird species (Table 3). We observed the three species of dolphins present in these waters: the common bottlenose dolphin *Tursiops truncatus ponticus* (small groups of 5 and 10 individuals), the common dolphin *Delphinus delphis (*total of 70-80 individuals in groups of 2-3 to 10-15 between Bolshoi and Malyi Utrish) and the harbour porpoise *Phocoena phocoena relicta* (more than 100 individuals in groups from 2-3 to 20-25 in the area between Bolshoi and Malyi Utrish). Dolphins were less common between Bolshoi Utrish and Anapa (total of 9 individuals were counted in this area).

Table 3. Estimation of seabird densities observed in Anapa region (see photos in Annex 1).

English name	Scientific name	Russian name	Estimated densities
Anseriformes			
Mallard	*Anas platyrhynchos*	Кряква	5
Charadriiformes			
Arctic Skua	*Stercorarius parasiticus*	Короткохвостый поморник	8
Caspian Gull	*Larus cachinnans*	Хохотунья	3200
Yellow-legged Gull	*Larus michahellis*	Средиземноморская чайка	
Armenian Gull	*Larus armenicus*	? Армянская чайка	
Common Black-headed Gull	*Larus ridibundus*	Озёрная чайка	7670
Little Gull	*Larus minutus*	Малая чайка	2
Black-legged Kittiwake	*Rissa tridactyla*	Моевка	155
Sandwich Tern	*Thalasseus sandvicensis*	Пестроносая крачка	21
Falconiformes			
White-tailed Sea-eagle	*Haliaeetus albicilla*	Орлан-белохвост	
Gaviiformes			
Red-throated Loon	*Gavia stellata*	Краснозобая гагара	2
Arctic Loon	*Gavia arctica*	Чернозобая гагара	76
Gruiformes			
Common Coot	*Fulica atra*	Лысуха	8
Pelecaniformes			
Great Cormorant	*Phalacrocorax carbo*	Большой баклан	27630
European Shag	*Phalacrocorax aristotelis*	Хохлатый баклан	15
Podicipediformes			
Great Crested Grebe	*Podiceps cristatus*	Чомга	63350
Black-necked Grebe	*Podiceps nigricollis*	Черношейная поганка	90
Procellariiformes			
Yelkouan Shearwater	*Puffinus yelkouan*	Левантский буревестник	1978
		Total	*104 210*

3.3 SUMMARY

The sea surveys confirmed the presence of yelkouan along the northeast coast of the Black Sea at this time of the year (end of January / early February).

General behaviour of yelkouan shearwaters: they were dispersed throughout the surveyed area, mostly at a distance greater than 0.5 miles from the shore. They occurred in small groups of 2-5 individuals or in flocks of 20-50 birds, flying in all directions depending on weather conditions, particularly wind speed and direction. A large aggregation of at least 500 individuals was recorded on 28 January near two fishing seiners. In 15 minutes of observations from shore near the lighthouse at Bolshoi Utrish on 1 February, we counted approximately 500 individuals flying predominantly in the southeasterly direction (parallel to the shore) in groups of 10-50 birds.

Capture difficulties: after ascertaining the presence of the species in the area, we knew that the main difficulty would be to capture them. To our knowledge, this has never been done before for this species. Our numerous observations of yelkouans during the surveys revealed the extremely active and wild nature of these birds, which fly very fast and never approached our boat. Different baiting techniques adapted from chumming methods used to approach pelagic seabirds were tested but none proved effective for yelkouan shearwaters.

4 "LOCAL ECOLOGICAL KNOWLEDGE" – COLLABORATION WITH RUSSIAN FISHERMEN

4.1 BACKGROUND

‘‘Local Ecological Knowledge’’ (LEK) is an alternative way to collect scientific information (Azzurro et al. 2011). It takes into consideration the information that a group of people, notably fishermen, have about local ecosystems, and represents a precious complementary source of information on species presence and relative abundance in areas not often covered by scientific studies.

The CIESM Seabird Program includes a participatory science component, through the collaboration with fishermen, since shearwaters are known to follow fishing boats to feed and can be victims of bycatch (Cortés *et al.* 2017). Building alliances with fishermen can be achieved through different actions such as workshops, questionnaires, on-board observations, self-reporting logbooks and mitigation methods trials. CIESM has gained much experience in this regard in the past decade, through the collection of jellyfish bloom observations made by fishermen for the CIESM JellyWatch Program, and by relying on LEK approach to track the changes in abundance and distribution of alien and native fish in the CIESM Tropical Signals Program. In 2018, a dedicated workshop was organized on the topic ‘*Engaging marine scientists and fishers to share knowledge and*

perceptions – Early lessons' (CIESM Monograph 2018). The active community of fishermen in Bolshoi Utrish and the good relation with the nature reserve managers offered an excellent opportunity for setting up a collaboration.

4.2 METHODS

By visiting local fishermen in Bolshoi Utrish, we aimed to collect some valuable knowledge on the presence of seabirds in the area, notably yelkouan shearwaters. We used a practice commonly called "oral history". A series of questions were prepared in advance and addressed during a face-to-face, semi-structured conversation between the researcher and three fishermen.

Accompanied by the ranger of the natural reserve, we went to the fishermen' workplace on land. To communicate between French and Russian languages, we mainly used the 'Conversation' mode of the translation app 'Google Translate' on smartphone (Fig. 13).

We rapidly established a degree of trust and cordiality with the fishermen by signaling our consideration for their experience in the field. We explained why their knowledge was very important to us and started the interview with a slide show of a dozen photos of seabirds, asking them whether they could identify the species. Photos of the three species of dolphins in the area were also shown to better evaluate their identification ability (easier than for birds). Then we raised some questions and asked them to designate areas of abundance on a map by drawing circles by hand around these areas on a map displayed on the software 'Paint', directly on the computer. This method proved to be simple and quick and we recommend it for similar future uses.

Figure 13. Discussion with fishermen on their local knowledge of seabirds.

4.3 RESULTS

Interviewer: Loriane Mendez
Fishermen: Maxim (captain), Ivan (senior fisherman with 20 years of experience), Ilia (junior fisherman)
Translation assistance: Sergey Bukreev, Vitaly Kuklin

- **Can you recognize these species?** [photo slideshow on computer]

Fishermen are very familiar with dolphins, which often accompany their fishing days. They distinguish between the three species of dolphins (common dolphin, bottlenose dolphin, harbour porpoise). They seem to have mixed feelings about them, at the same time proud to show us videos of many dolphins very close to their boat, but also expressing that "they are too many now!".

They quickly identified cormorants but did not distinguish terns from gulls, considering them as small gulls. They also view the yelkouan shearwater as a small gull when it is flying or resting on the water, but correctly identify the species when they hold the bird in their hand (when they get caught in their nets) - notably because its beak has a different shape than gulls.

- **Have you noticed periods of the year when the yelkouan shearwater is present in high numbers? And when is it almost absent?**

Yelkouans are particularly present in summer, but also in spring and autumn. In winter they observe them less often.

Maxim the captain added that in winter, yelkouans usually fly at considerable distance from the boat, like cormorants. They approach their boat in the spring, when many yelkouans dive very deep and die with their head stuck in the nets.

According to Ivan, the yelkouan is seen all along the trajectory of the fishing boat up to 10 km from the coast, thus not only in the open sea but also near the coast.

- **Do you directly associate bird aggregations to the presence of schools of fish? Do you use birds as indicators of fishing locations?**

In the past, fishermen used to be "guided" by gulls: large gatherings, seen from a distance, meant undoubtedly the presence of a school of fish. Nowadays, gulls fly "anywhere" and mostly wait for the fishing boat to track the fish and feed afterwards. Fishermen said that it is because there used to be a lot more fish and schools of fish before. Maxime, the captain, thinks that since Crimea was annexed to Russia in 2014, additional fishermen from there came to the Anapa region using inappropriate methods (such as small mesh nets that catch small fish and thus destroy the stocks). We mentioned that natural causes can also impact stocks, such as the invasive ctenophore *Mnemiopsis leidyi* that entered the Black Sea in the early 1980s and decimated commercial anchovy stocks by eating up the fish larvae and other zooplankton before subsequent partial recovery of the stocks (CIESM Monograph, 2009). Fishermen were not aware of these ecological events.

- **What are the areas where you see the greatest number of yelkouan shearwaters?** [drawing on map]

See Fig. 14.

Figure 14. Areas with greatest abundance of yelkouan shearwaters according to fishermen, by decreasing order of magnitude (from 1 to 3).

- **Have you ever participated in a scientific study on biodiversity?**

They participated in scientific studies concerning fishery only.

- **Would you be willing to periodically report us seabird observations to continue our collaboration? If so, how often? Once a month, once a quarter?**

The fishermen already have a lot of work and many papers to fill but they agreed to report observations to Vitaly (ranger of the reserve of Bolshoi Utrish) as an intermediary between them and us. Vitaly volunteered to take care of the distribution of questionnaires that we would like to address to the fishermen. To begin with, we will focus on the yelkouan shearwaters.

5 CONCLUSIONS

Mission achievements:

- First CIESM fieldwork organized in Russia
- Excellent human contacts
- Freedom of organization on a "day to day" basis
- 33 hours of at-sea observations of the seabird diversity along the Russian northeast coast of the Black Sea: 22 seabird species recorded; plus three dolphins species
- Confirmation of the presence of yelkouan shearwater in high numbers and observations of their behavior at sea during wintering
- Test of several 'chumming' techniques for capture at sea
- Fruitful meeting with local fishermen initiating collaboration to monitor the presence and distribution of yelkouan shearwaters
- Future collaborative projects to come (a survey questionnaire for fishermen of the area is in preparation)

Mission difficulties:

- Language barrier between English and Russian
- Weather conditions (impacting the possibilities of going out at sea and the comfort of working at sea)
- Yelkouan shearwaters fly too quickly, often in small groups, almost never resting on the water → failure of capture

We warmly thank all the people who helped us in the achievement of this study.

Sergey Bukreev & Loriane Mendez

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7 APPENDICES

Annex 1. Photos of observed seabirds during boat surveys (by scientific names in alphabetical order)

Anas platyrhynchos

Aythya fuligula

Fulica atra

Gavia arctica

Gavia stellata

Haliaeetus albicilla

Larus armenicus

Larus cachinnans

Larus canus

Larus michahellis

Larus melanocephalus

Larus ridibundus

Phalacrocorax carbo

Podiceps cristatus

Podiceps nigricollis

Puffinus yelkouan

Stercorarius parasiticus

Rissa tridactyla (juvenile)

Rissa tridactyla (adult)

Thalasseus sandvicensis