Thermaikos Dolphin Project

Final Report

January – December 2022

iSea

Non Profit Non-Governmental Organisation for the Preservation of the Aquatic Ecosystems

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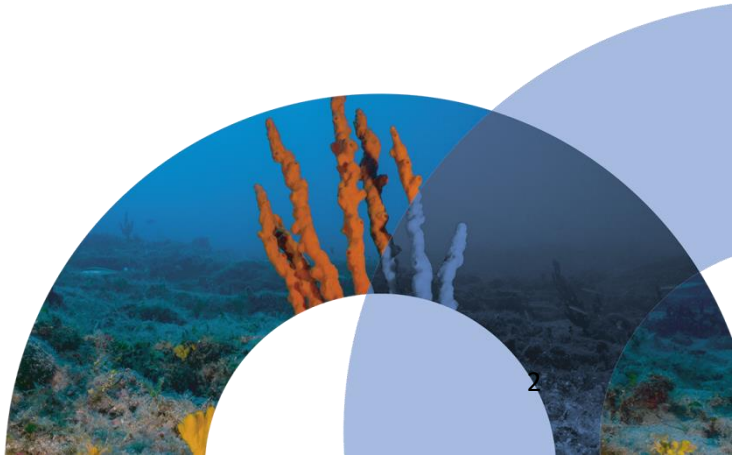

iSea & Vulnerable Species Pillar

iSea is a Not for Profit Non-Governmental Organisation founded in March 2016, in Greece, with the aim to preserve, protect and restore the precious heritage of the aquatic environment. The organisation consists of a team of young, yet experienced scientists and professionals of various disciplines from marine biologists to specialists in environmental management and educators. The organisation strives to shed light on the foremost issues affecting our oceans and propose alternatives for a sustainable future. Its activities focus on 4 main pillars: Vulnerable species, Citizen Science, Human and Aquatic Ecosystems, and Aquatic litter. The tools utilised by iSea vary from scientific research to citizen science and environmental education and awareness. Biodiversity is fundamental for healthy ecosystems. Limited knowledge of Mediterranean species populations indicates the problem, as 1/3 of marine species cannot be assessed due to insufficient data. According to the United Nations Sustainable Development Goal 14, "Life on Water", sustainable management and protection measures for marine and coastal ecosystems must be taken for achieving the goal of healthy and productive oceans. In this context, iSea aims to increase and disseminate existing knowledge about vulnerable species in order to enhance scientific-based management and ensure their conservation, protection, and restoration to the extent that they fulfill their ecological role in achieving healthy and functional ecosystems. One taxonomic group of vulnerable species is Cetaceans and hence iSea developed Thermaikos Dolphin project.

Thermaikos Dolphin Project

THERMAIKOS DOLPHIN PROJECT

The project finishing the 2nd year of implementation is the first systematic effort to monitor the populations of cetaceans in the area of Thermaikos Gulf, which is heavily understudied in terms of cetaceans, and it is likely to be a key region for them. In Greece there are 8 resident cetacean species: the fin whale (*Balaenoptera physalus*), the sperm whale (*Physeter macrocephalus*), the Cuvier's beaked whale (*Ziphius cavirostris*), the Risso's dolphin (*Grampus griseus*), the bottlenose dolphin (*Tursiops truncatus*), the common short-beaked dolphin (*Delphinus delphis*), the striped dolphin (*Stenella coeruleoalba*) and the harbor porpoise (*Phocoena phocoena*). Through Thermaikos Dolphin Project, the area's

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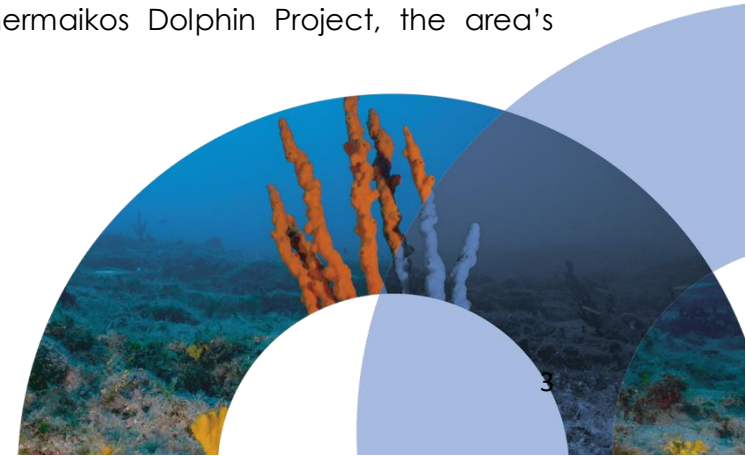

dolphin populations' abundance and distribution are studied, for species that regularly or occasionally occur in the gulf with the use of Photo-identification. The research effort to better understand the local populations of these animals is complemented with educational activities in an effort to inspire the next generation and provide valuable knowledge on the importance of preserving the aquatic ecosystems and the biodiversity they host. Educational activities also focus on promoting collaboration, inclusion and acceptance through games and activities inspired by the behavioural characteristics of these highly social animals. Information about the different cetaceans' species, their characteristics, and the main threats they face are also communicated, targeting different ages of participants. All the activities were conducted in SANI resort. The project is implemented by iSea with the support of Sani Resort and in collaboration with the Tethys Research Institute, the University of Patras and ARION.

Surveys

Photo 1: Collecting photos of dolphins for photo ID during a survey

For the surveys, iSea used the speedboat of SANI resort and a high resolution DSLR camera. The methodology used was developed in accordance with the protocol used by Tethys, in the Ionian Dolphin Project.

The sampling procedure involves performing transects with a speedboat to spot dolphins. Once individuals are spotted, the field team records the location of the boat where the cetaceans are observed and then the location of the cetacean group (GPS). The field team follows the dolphin group and conducts photo-identification effort and behavioural data collection, at 5-minute intervals, throughout the duration of the sighting (Stockin *et al.* 2006) (Table 1). The dolphins are approached with a speedboat following the SMART protocol of the ACCOBAMS.

Photo-identification is consistently based on long-term natural marks such as notches and nicks in the dolphins' dorsal fins (Wilson et al., 1997; Würsig and Würsig, 1979)

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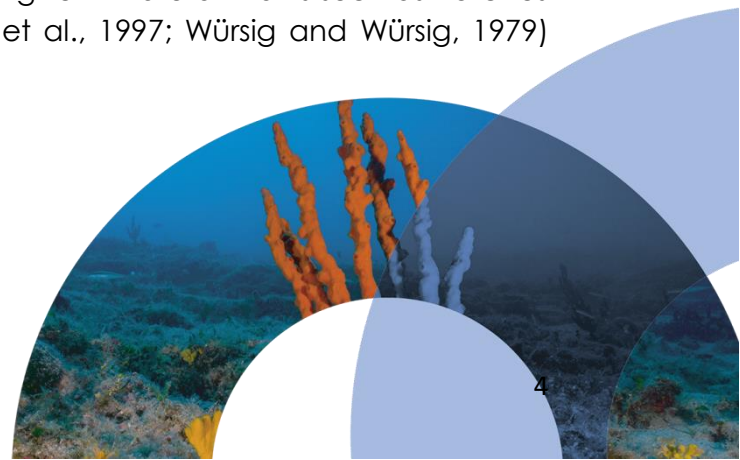

(Figure 1), as well as on any additional marks in other body parts. By being able to differentiate every single individual within a dolphin group and create a photo-identification catalogue we are able to shed light on the dolphin's population size, their site fidelity and other important ecological information (Wilson *et al.* 1999). The presence of marks of anthropogenic origin, such as scars or injuries caused by a propeller or fishing gear are also evaluated to help identify different types of potential threats that the local population may be facing.

Table 1: Behavior's status of dolphins adjusted from Stockin et al., (2006).

Behavioural status category	Description
Foraging	Dolphins observed in an effort to capture and consume prey, as evidenced by prey pursuit and/or fish tosses.
Normal Swim	Dolphins involved in steady movement, with regular and constant surfacing within the same regular and constant surfacing within the same area. Movements are slower and less consistent then those in travelling behaviour.
Travelling	Dolphins involved in persistent directional movement, often fast and occasionally porpoising clear of the water, and/or involving boat-riding.
Mill	Dolphins showing non-directional slow movement, usually staying close to the surface, and no apparent physical contact between individuals.
Socialising	Dolphins observed chasing and/or engaged in body contact with each other, including breaching and aspects of play and/or mating with other dolphins.
Resting	Dolphins observed at the surface but showing no movements, and often observed within tight group. Resting lacks the active components of the other behaviours.

For the data analysis, all the photo-identification photos taken would be sorted for blur pictures. Then the staff member would crop the photos, focusing on the dorsal fin. Then the photos from each sampling were matched, additionally they would be

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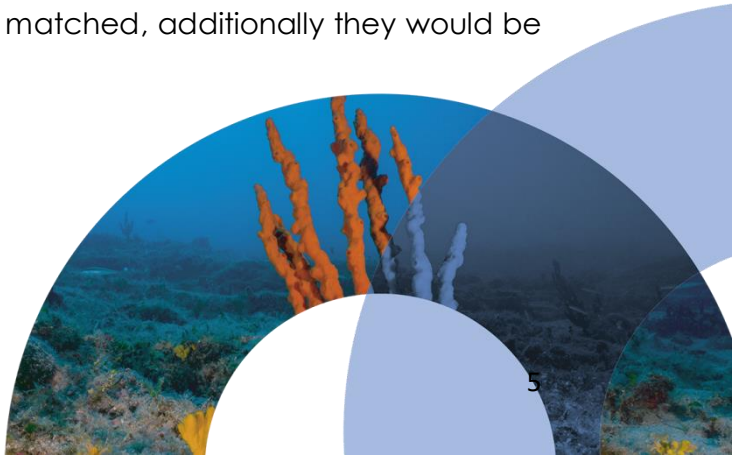

compared with other individuals from other surveys. This allowed the creation of a catalogue with all the observed individuals as the dorsal fin of each dolphin is unique, and this facilitates its identification to the individual level. Each photo was given a different name such as "TT_THE_20220625_002_012", where TT indicates the species (i.e., *Tursiops truncatus*), then the location was in this instance the same (i.e., Thermaikos), the date, the number of dolphins "002" (i.e., second in the pod), and finally the number of the picture "012" (i.e., the twelfth picture). These codes were attributed to the registration of the dolphin observed along with the coordinates and the other environmental variables observed in the field.

Figure 1: The dorsal fin of a Dolphin with the identifying marks, the yellow arrows indicate the notches., and the violet the scars.

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Results

Survey effort

In total during 2022, 9 surveys were conducted (Table 2). The starting and ending point of the surveys was always the Sani's Marina (40°05'56.5"N, 23°18'39.5"E), from where iSea team followed routes alternately from south to north to study the area's dolphin populations' abundance and distribution systematically. In 3 out of 9 surveys (33%) the presence of dolphins was recorded.

Table 2: the number of surveys conducted during May to December, along with information about the presence/absence of dolphins and the sampling effort.

N° Survey	Date	Presence/absence	Observation effort (mins)	Species encountered	Group size
1	16/3/2022	ABSE	-	-	-
2	27/3/2022	ABSE	-	-	-
3	13/4/2022	PRE	88	Bottlenose dolphin	5
4	20/4/2022	PRE	58	Bottlenose dolphin	7
5	27/4/2022	ABSE	-	-	-
6	3/6/2022	ABSE	-	-	-
7	24/6/2022	ABSE	-	-	-
8	25/6/2022	PRE	60	Bottlenose dolphin	8
9	27/6/2022	ABSE	-	-	-

During the surveys, one dolphin species was encountered, the Bottlenose dolphin (*Tursiops truncatus*). The total number of individual dolphin observations were 20. The most common behaviour observed was "Travelling", but also other behaviours were noted such as "socialising".

Photo 2: Juvenile bottlenose dolphin with mother

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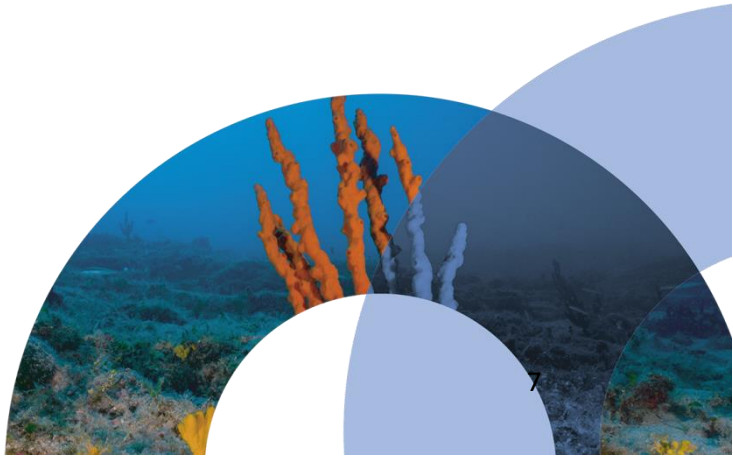

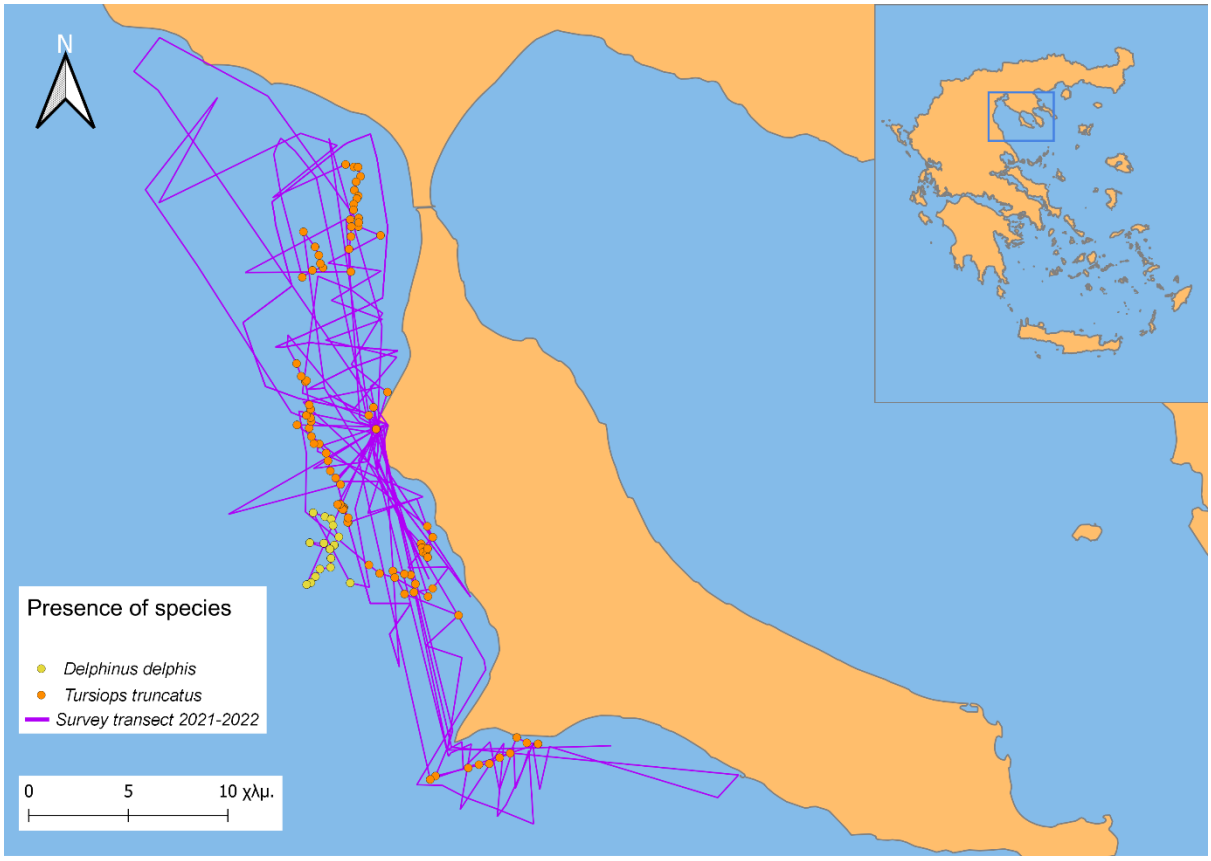

Figure 2: The survey effort 2021-2022 visualised in ArcGIS, with the locations of the dolphin pods identified by the dots; the survey transects in lines.

The map above (Figure 2), demonstrates the survey effort of iSea team and the dolphin sightings through the period of January to December 2022.

A preliminary estimation of the frequency of dolphins' sightings and number of individuals per 60 min of search effort by month (table 3).

Table 3: SPUE, number of sightings per 60min search effort; IPUE, number of observed individuals per 60min search effort

Month	*Tursiops truncatus*		*Delphinus delphis*	
	SPUE	IPUE	SPUE	IPUE
April	0,40	2.44	0.18	0.5
June	0.17	1.43	-	-
Total	0.15	0.60	0.29	1.57

Catalogue

During the year of 2022 the team of iSea focused on the analysis of photos both from 2021 and 2022 to create a catalog of individuals for each species. Because of

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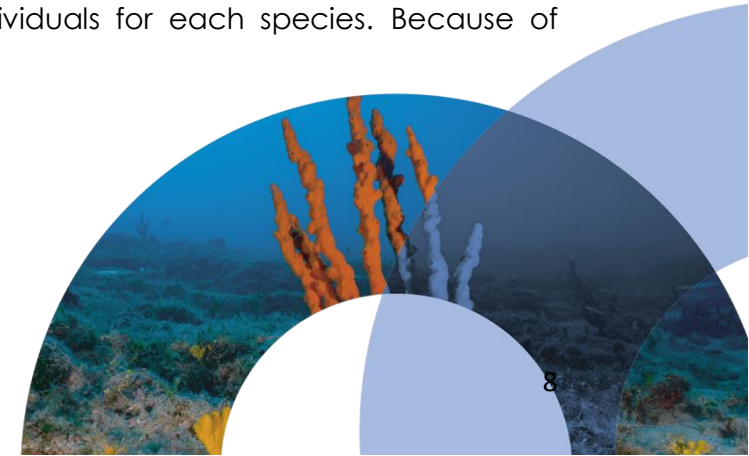

ambiguities like bad weather conditions and technical boat issues only 9 surveys were conducted. In Figure 3, 4 one can see the photos of the catalogue that help us identify each individual. These 2 catalogs contain 33 Bottlenose dolphin (*Tursiops truncatus*) individuals and 16 Common short-beaked dolphin (*Delphinus delphis*) individuals. The long-term monitoring of the local dolphin populations with the use of the catalogue produced will help identify site fidelity of the individuals as well as ecological information on the species. The catalogue allowed us to identify the presence of 4 dolphins (21003, 21003-SON1, 21004, 21013) that were recorded also in 2021. The catalogue is updated after each survey and new individuals are added. During 2022 14 new individuals were added to the catalogue of Bottlenose dolphins.

The protocol followed (Tethys protocol) was also updated to ensure quality of data and set solid foundations for a systematic long-term monitoring. Thermaikos Dolphin Project is now at a stage to efficiently record, analyze and present results from a high frequency of surveys in the future.

Figures 3, 4: Photos from the catalogue of Delphinus delphis individuals identified (left), photos from the catalogue of Tursiops truncatus individuals identified (right)

Discussion

Thermaikos Gulf, part of the North Aegean open sea, hosts a great biodiversity of marine life, with 3 species of dolphins present in the area (Giannoulaki et al 2017). Following a systematic sampling effort, it is expected to also record the presence of the Striped dolphin (Stenella coeruleoalba) as well as other species of cetaceans present in the North Aegean Sea, such as the Cuvier's beaked whale (Ziphius cavirostris) and the Sperm whale (Physeter macrocephalus, Linnaeus 1758, Φυσητήρας) (Frantzis et al. 2003). This project is born as a long-term systematic study to understand the diversity of cetaceans, their ecology and to determine their site-fidelity towards this area.

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Educational activities

Photo 3: Kids club educational activities, Photo ID game

In order to raise awareness about the rich biodiversity of the Greek seas and mainly about cetaceans, our project included educational activities for teenagers and younger children. A variety of activities were based on an advanced training booklet with the aim to provide information about the different cetaceans' species, their characteristics, and the main threats they face. All the activities were based on the "Ocean Literacy" principles to make participants aware of human interaction with the sea.

Environmental games and their guidelines, as well as all the baseline information on the topic and the necessary materials for the activities, were provided from iSea to the staff of the kids' club, so they could also organise and implement the activities.

Photo 3: Kids club educational activities, echo location game

A total number of 21 visits were implemented from iSea. From May to October the educational activities were implemented outdoors with the participation of the kids' clubs. A total number of 454 children from the kids' clubs participated in the outdoor educational activities during May – October 2022.

The activitities included table puzzles and games, presentation of informative material from different cetacean species and their characteristics, photo ID activities from the catalogue of Thermaikos Dolphin Project and coloring pages.

iSea produced hard copies of scientific illustrations of the cetaceans of the Greek Seas to complement the educational activities, in order for the children to idenitify differences in shapes and colors of the animals from scientifically correct illustrations.

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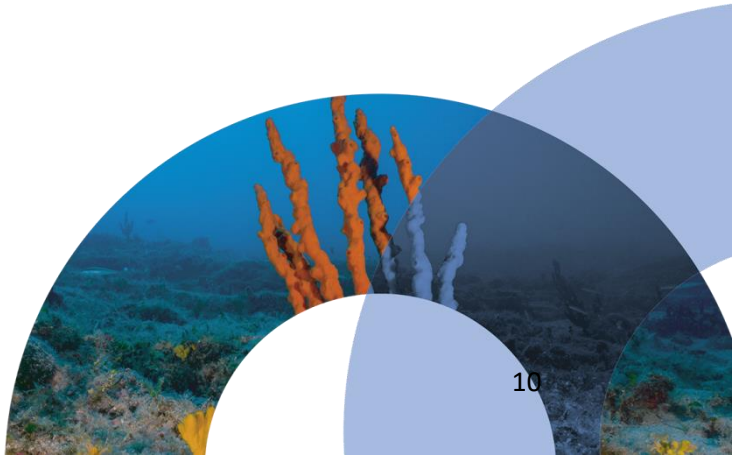

The team of iSea is also communicating new research on dolphin biology and behaviour with children of all ages.

In addition, based on the materials and activities implemented for Thermaikos Dolphin Project, iSea participated in 4 open public awareness raising events for kids. In particular:

- On the 7th of June, presentation organised by the Directorate of Primary Education of Western Thessaloniki during which 9 schools pf primary education were informed and 35 kids participated in the activities.
- On the 28th of June, Abbahouse Thessaloniki Kids Summer Festival, during which more than 20 kids were informed.
- On the 8th and 9th of October, 4th KIDOT Festival, during which more than 500 kids were informed.
- On the 6th of November, 2nd Scouting Safari, during which more than 150 kids were informed.

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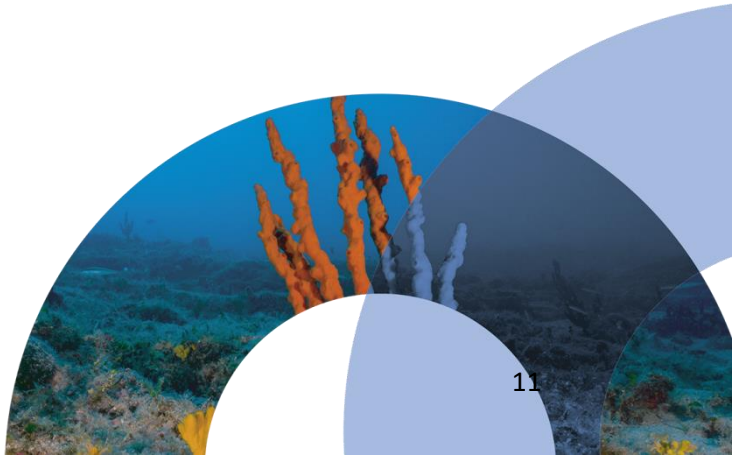

Communication

Photo 4: Facebook post on the biology of the Bottlenose Dolphin

For the effective communication of the project we continued posting on iSea's social media platforms (Facebook, Instagram, Twitter & Linkedin) in order to outreach more people and inform them about the progress of the program. In total 6 posts were created (Photo 4) on iSea's social media platforms reaching more than 9,000 users each. In addition, during every survey field trip and educational activity, iSea, posted at least one story with snapshots of the day. Sani resort was refered as a funder in every communication of the project.

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Furthermore, iSea participated in the 18th Panhellenic Ichthyologists Conference at Mesologgi, Greece with a poster regarding Thermaikos Dolphin Project(Photo 5).

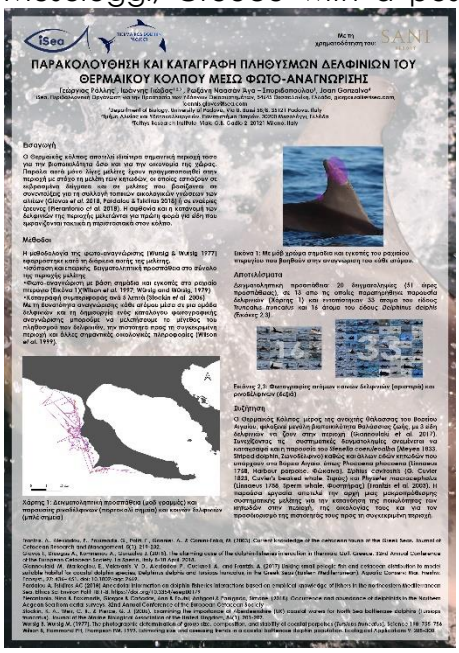
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Photo 5: iSea poster at the 18th Panhellenic Ichthyologists Conference

Communication materials

Photos for communication can be found here:
https://drive.google.com/drive/folders/1E1tFhF2rAaRJxfZMWOWciO_-W3LywIKe?usp=sharing

Also a video edit was created using footage from the surveys conducted, you can see the video following this link
https://www.youtube.com/watch?v=Jm3gnWZJ53Q&ab_channel=iSeaOrg

A poster of all the marine mammals of Greece is also being produced using the scientific illustrations obtained to help in correct reporting of marine mammal sightings by boats or land observers, containing also a QR code link to the iNaturalist Thermaikos Dolphin Project group as a platform to collect all marine mammal observations.

Financial report

In the table below all the expences done for Thermaikos Dolphin project are listed in a chronological order.