Marine Mammals Research Association

Annual Report

MARINE MAMMALS OF
THE NORTH LEVANTINE SEA
2016-2017

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Foreword

Marine Mammal Research Association is a non-profit organization that is based in Turkey with an aim to monitor marine mammal populations in habitats where the data is scarce as in Turkish Levantine coast and the south Dalmatian coast of the Adriatic Sea. Our purpose is to identify the population status, distribution and residency patterns and main threats towards cetaceans in order to fill in such scientific gaps of knowledge and help to implement the effective conservations actions while promoting the awareness of nature conservation initiatives.

Unfortunately, the human impact on animal survival has dramatically increased from the mountains across to the deep seas and has enlarged substantially more than ever before. Due to the boundless nature of number of impacts, inter-joint trans-boundary collaborations represent the most successful tools for implementing sustainable and effective conservation strategies, especially for such species whose persistence relies on the migration and thus, the absence of boundaries. Therefore, any requests in order to access to the data that is presented here for any research and conservation purposes are embraced by Marine Mammal Research Association.

Lastly, Marine Mammals Research Association could never be successful without the immense supports of "Turkish Marine Research Foundation", "Rufford Conservation Grant" and "Vanishing Point". Nonetheless the key success was laid in the endless effort of volunteers and interns and we were so lucky to have the best of them.

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Summary

Despite of the direct and indirect environmental obligations of the coastal countries regarding the marine-life protection, the marine mammal fauna of the Levantine Sea still stays largely unknown. Hence, this insufficient scientific knowledge embodies one of the main barriers on the effective conservation in the Levantine Sea that holds the routes of international and local shipping lines which has wide range of economical importance from marine transportation to tourism and fishery practices. Marine Mammals Research Association (DMAD) has implemented on a multi-year research with the aim of prioritizing management strategies and designating locations in order to conserve the top predators of the marine-life in the Levantine Sea.

To fill the dedicated survey gaps, 174 surveys that covers 826 hours, were conducted in the northwestern Levantine Sea between March 2015 and November 2017 with the financial support of 'Rufford Small Grant'. In addition to that, several opportunistic data have been reported from the Mersin Bay and offshore waters of Cyprus. Overall, eight marine mammal species were recorded; bottlenose dolphins (*Tursiops truncatus*) were regularly recorded in coastal and offshore waters, with higher concentration in Antalya Bay. Cuvier's beaked whale (*Ziphius cavirostris*) and Mediterranean monk seal (*Monachus monachus*) showed high site fidelity to Antalya Bay; whereas striped dolphins (*Stenella coeruleoalba*) were sighted twice and Risso's dolphins (*Grampus griseus*) only once. Opportunistic sightings of false killer whales (*Pseudorca crassidens*), rough toothed dolphins (*Steno bredanensis*) and humpback dolphins (*Sousa spp.*) also added additional knowledge on the marine mammal distribution of the Levantine Sea which altogether underlined the biological importance of the eastern basin.

However, the habitat of marine mammals which needs to be within the environmental conservation measures is highly overlapped with human activities. This is the reason why, one of the challenges of the Marine Mammals Research Association is to bridge scientific survey efforts with active conservation actions, from public awareness and citizen-science campaigns to the capacity building workshops. With a recent enrollment of Turkey to ACCOBAMS (Agreement on the Conservation of Cetaceans in the Black Sea, Mediterranean Sea and contiguous Atlantic area), inter-collaborated, multi-disciplinary and multi-year dedicated survey efforts pose vital importance not only on marine mammal conservation but also for the entire marine biodiversity that lives under their umbrella.

Contents

Introduction

The Mediterranean Sea is the largest and the deepest enclosed sea in the world (Coll *et al.* 2010), that reaches to a maximum depth of 5121 meters within an average of 2500 meters (Cartes *et al.* 2004). The basin and its surrounding lands host also wide range of hotspot for the terrestrial and marine biodiversity (Coll *et al.* 2010; 2012). At the present, Mediterranean Sea is recorded to host for more than 17,000 marine species that have been defined and it shares in approximately 7% of the world's marine biodiversity which contains at high rates of endemic species (Coll *et al.,* 2010; 2012).

According to IUCN's (2012) definition, cetaceans are a group of marine mammals that include whales, dolphins and porpoises. Twenty-one cetacean species and three subspecies have been recorded in the Mediterranean Sea and Black Sea for the time being, of which 12 of them resides in the Levantine Sea, with the only piniped species of the Mediterranean Sea, Mediterranean Monk Seals (*Monachus monachus*) (*IUCN, 2012.* Additionally, two Beluga whales (*Delphinapterus leucas)* and the common fur seal (*Arctocephalus pusillus*) were sighted in the Black Sea during the early 1990s, however is believed to be alien species that had been escaped or released from dolphinariums in Ukraine (Birkin 2002). All the mentioned species are classified as either at the risk or data deficient according to the International Union for the Conservation of Nature (Table 1) (IUCN, 2012). Due to the lack of sufficient studies or findings, which of these Mediterranean subpopulations are or were present in the Levantine Sea or whether they are resident or transient species are largely unknown.

Table 1: According to IUCN Red List, population statutes of some marine mammal species that are recorded up till now in Levantine Sea

Species	Common Name	Mediterranean Subpopulation Statues	Potential Threats
Tursiops truncatus (Montagu, 1821)	Common Bottlenose Dolphin	Vulnerable (VU)	-Overfishing -By-catch -Pollution -Live capture -Marine traffic -Habitat destruction
Delphinus delphis (Linnaeus, 1758)	Short-beaked Common Dolphin	Endangered (EN)	-Reduction in prey populations -Pollution -By-catch -Entanglement -Habitat destruction
Stenella coeruleoalba (Meyen, 1833)	Striped Dolphin	Vulnerable (VU)	-Pollution -Overfishing
Grampus griseus (G. Cuvier, 1812)	Risso's Dolphin	Data Deficient (DD)	-Entanglement -Pollution -Underwater Noise
Ziphius cavirostris (G. Cuvier, 1923)	Cuvier's Beaked Whale	Data Deficient (DD)	-Noise pollution, military sonars -Marine traffic
Physeter macrocephalus (Linnaeus, 1758)	Sperm Whale	Endangered (EN)	-Entanglement in fishing gear -Vessel strikes -Disturbance by intense boat and ship traffic

Balaenoptera physalus (Linneaus, 1758)	Fin Whale	Vulnerable (VU)	-By-catch -Ship strike -Marine traffic -Noise pollution
Pseudorca crassidens (Owen, 1846)	False Killer Whale	Data Deficient (DD)	-Pollution -Underwater Noise -Climate change
Steno bredanensis (G. Cuvier in Lesson, 1828)	Rough-toothed Dolphin	Least Concern (LC)	-By-catch
Monachus monachus (Hermann, 1779)	Mediterranean Monk Seal	Endangered (EN)	-Fishing gear -Loss of breeding and feeding habitat -Disease -Pollution -Human Disturbance

The anthropogenic impacts on marine mammals in the Mediterranean Sea have been identified as in follows: fishery mortality; prey depletion; contamination by xenobiotics; boat traffic and acoustic disturbance; climate change and live capture (Bearzi *et al. 2012*), with further studies suggesting that contributions from deliberate killings until the early 1960's and habitat degradation are the main significant drivers of population declines (Bearzi *et al.* 2004). Despite the wide range of significant threats on the populations they are already declining, the lack of in-field survey efforts are raising serious concerns on the population statues in the Levantine Sea.

The first step of producing an effective MPAs is defined as the delineations of critical habitats. According to the Endangered Species Act 1973, a critical habitat is defined as "*the specific areas within the geographical area occupied by the species, are essential to the conservation of the species and areas which may require special management considerations or protection.*" Eventually, this initiative definition has been built upon by Hoyt (2005) in order to create general and practical criteria that are to be adopted into the conservation of marine mammals. Consequently, the areas that are regularly used for feeding/hunting, calving, breeding, socializing and resting are suggested to be as in the essential localities as within the definition of critical habitats and with the involvement of the migration pathways (Hoyt, 2012). On the other hand, it has been suggested that MPAs often require reinforcement greater than the one that is applied and they are rarely incorporate within the conservation measures of the specific top predators, such as the marine mammals *(*Bearzi *et al.* 2012*)*.

Currently, there are four 'Specially Protected Areas' and only one natural park in the Turkish waters of the Aegean and Levantine Sea. In addition to that, four MPAs that are in the international waters of the Levantine Sea has been created under the Annex I of the 'Specially Protected Areas and Biological Diversity in the Mediterranean' (SPA/BD Protocol) and the 'Specially Protected Areas of Mediterranean Importance' (SPAMIs) (Hoyt, 2012). In between the thirty-four of the SPAMI's in the Mediterranean, only three of them are to be found in the Levantine Sea. This trend has also been seen in other MPA's across the Mediterranean. This is

due to the lack of studies that focuses on the Levantine Sea and most of all the reason is the general absence of funding. Additionally, the protection regarding these areas has been rarely reinforced until recently and the coastal and marine protected areas that are not required by the law as to have management plans (Gabrié *et al.* 2012). Instead, the monetary resources have been focused on the development of economy and social structure which has in turn lead to an increase in both the tourism and the trade. Eventually, both of them have a significant contribution to the habitat degradation through pollution, acoustic disturbance and marine traffic.

The North-western Levantine Sea poses an economical importance for the tourism and fishing practices that additionally holds one of the most important international and local shipping lines in the Mediterranean Sea. Yet, it also possesses an ecological importance within the whole Mediterranean Sea that sits within the "Ecologically or Biologically Significant Marine Areas (EBSA), as a part of the UNEP Mediterranean Action Plan. It also hosts several proposed "High Sea Marine Protected Areas". In regards to the previous research in the Levantine Basin, the anthropogenic impact on marine mammals had been emphasized by relatively few studies (Dede *et al.* 2012*;* Kerem *et al.* 2012*;* Danyer *et al.* 2013; Baş&Gönülal 2015; Öztürk *et al.* 2016*;* Bas *et al.* 2016a; 2016b; 2017*)*. Taking into consideration of the findings of previous researches and proposed protection statues that are coupled with the significant gaps in literature regarding of the MPAs in Turkish waters, current study holds an important role to delineate the critical habitats of sighted marine mammal species in consideration of human pressure. Consequently, current study aims to suggest prioritize locations and management strategies in order to help to protect the marine ecosystem, whilst incorporating the demands of anthropogenic factors such as trade and tourism in the Turkish waters of the Eastern Mediterranean.

Methodology

The study area had been situated on the western coast of Turkey, by the north-western Levantine Sea (Figure 1). North-western Levantine is an oligotrophic sea with a high temperature and salinity. It has a narrow continental shelf (mostly <15 km wide) which lies between 40-130 meters depth, a continental slope reaching 2000 meters and an abyssal plain that is found to be till 2600 meters of depth (Özbek&Kara, 2013). In order to collect the sighting data, three different survey sites have been selected to represent the study area (Figure 1); Antalya Bay, Finike Bay and Fethiye Bay. Eventually, the surveys had been carried out in various coastal zones, continental shelves and deep sea canyons.
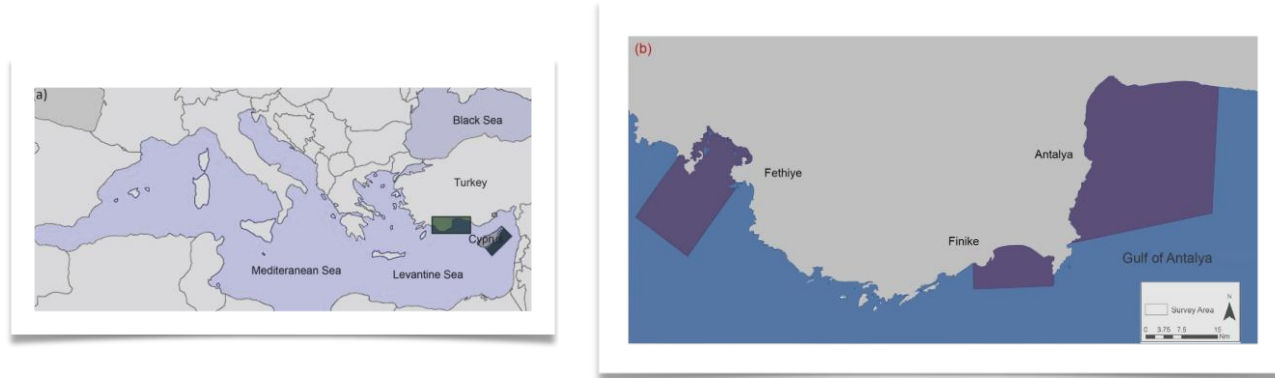

Figure 1. (a) survey area (b) survey stations (The polygons represent the survey coverage and the star in Fig 1.a. represents the opportunistic sighting of Mersin Bay.

SURVEY PLATFORMS

Land surveys (theodolite stations)

Systematic land surveys were conducted at least two times in a week between the years of September 2015 and October 2017. There were two thedolite stations in the Antalya Bay and one in Fethiye Bay. Antalya stations were visited once a week throughout the whole study period while the Fethiye Station was only visited once a month and only during the year of 2017. Survey effort in each theodolite station was alternating in between the early morning (05:30am - 11:00am) and the afternoon hours (15:30pm - 20:00pm), when the beaufort scale was between 0-3. Survey responsibilities has been delegated according to the following: Person A continuously scans the distance >500m up to the horizon using the theodolite; Person B (more than one person when possible) scans up to 500m distance from the coastline, using binoculars; Person C collects the behavioral data (regarding the species, the behavior, the group size, the number of juveniles, the behavioral responses near by marine vessels and the marine vessel density of the area) within five minutes periods whilst a cetacean group has been observed; Person D inputs the instantaneous survey data (regarding the location, the species, the behavior, the number of juveniles and the group size) that is recorded by theodolite into Pythagoras. The theodolite, version SOKKIA DT5A had been used on the land surveys in order to determine the exact coordinates of the cetaceans and marine vessels. The associated azimuth for each station and reference point was calculated and entered into Pythagoras version 1.2 (Texas A&M University, Galveston, USA) and kept constant throughout the study in order to produce accurate and consistent records of the coordinates. The coordinates for each focal group sampling were recorded by fixing the

coordinates to the center of each group and the coordinate data tried to be collected during each surfacing, if possible. The coordinates of marine vessels had also been collected throughout the survey days, independently from the marine mammal sightings. To represent an accurate route of the vessel, coordinates are recorded from the first to the last sight of the vessel in the survey area, as well as whenever the vessel changed its direction.

Boat surveys

Three different survey routes had been followed in the bays of Antalya, Fethiye and Finike. The routes in Fethiye has designed in accordance with DISTANCE and five transects with 5 km spacing between each transect was followed seasonally. In each location, boat surveys were carried out for minimum seven hours, once or three times per month, depending on the meteorological conditions and always with a beaufort below ≤3. Boat survey protocol had been rigorously followed in order to reduce the potential of disruption. The boat approached to the side or rear of a group at a speed of 3knots and remained with the group at a distance of 50 – 400 meters where possible. If the group has approached to the boat at < 50 meters, the vessel was operated within an idle speed. If the group showed a clear negative reaction to the boat, then the group was not followed in order to avoid any potential negative effects. The coordinates of the boat were recorded continuously throughout the surveys to calculate the survey effort.   During the sightings, bearing and the distance of focal group to the boat was recorded to calculate the true coordinates of the dolphins. In addition to the sighting data on the behaviour, the group cohesion, the coordinates of marine mammals and the nearest marine vessels within 100 - 400 - 1000 meters, (including the research vessel), were also recorded.

BEHAVIORAL SAMPLING

Focal groups were defined as within the aggregation of dolphins with a chain rule of less than 100 meters from the nearest individual, observed in a clearly visible constellation (less than 100 meters apart from each other), with similar behavioural activities. The method of focal group scan sampling is chosen to collect behavioural data. With scan sampling the behaviour of all the individuals in a focal group is recorded at a predetermined time interval of 5 minutes. Per each sampling unit (every 5 minutes), the present behavioural states and events and the number of individuals that are engaged with these behaviours were noted. Additionally, the dominant behavioural state that had engaged with the majority of individuals was recorded as well. Behavioural states and events are explained as in details within below:

Table 2: Ethogram of all the predetermined behavioural states and their abbreviations that are used within the study

Behavioural States	Definition
Travel (TR)	Individuals move with a constant speed in a certain direction with a diving interval between 3 and 5 seconds. They move at least 200 meters in 1 minute.
Diving (DV)	Dive periods can range from 30 seconds to several minutes. Individuals show no obvious movements and resurface at almost the same location. They move less than 200 meters in 1 minute.
Travel Diving (TR-DV)	Individuals move to a certain direction but dive for an appreciable time (<1min) and reappear at a distance. They move at least 200 meters in 1 minute.
Surface Feeding (SU-FE)	Individuals show active, rapid directional changes. The presence of birds and a lot of splashes is likely to occur.
Socialising (SOC)	Individuals show various interactive behaviours and create body contact with each other. Events like synchronized full leaps or tail slaps are likely to occur.
Resting (RE)	Individuals are drifting in a slow swimming speed near the water surface with steady and synchronous movements. Diving intervals are short. They move less than 100 meters in 1 minute
Milling (MI)	The group shows a non-directional movement and varies in its bearing but stays constant in its cohesion.
Bow-Riding (BOW)	Individuals swim in front of a boat.
Interacting with boat (IN)	Individuals swim along the sides or behind a boat.

Table 3: Ethogram of all the predetermined behavioural events and their abbreviations that are used within the study

Behavioural Events	Definition
Tail slap (TS)	Individual slaps and its fluke is on the water surface
Spy hoop (SH)	Individual raises and its head shortly comes above the surface
Breaching (BR)	Individual leaps out of the water and lets its body slap on the surface.
Belly up (BU)	Individual turns upside down with its belly up.
Full leap (FL)	Individual leaps and its complete body is above the water surface.
Fluke up (FU)	Individual protrudes and its fluke is above the water surface.

Swimming styles and group types of focal groups were also recorded. The swimming style of the focal group represents the spatial structure and formation of the group (Table 4). The group type is described depending on how the group is formatted that is based on the distance between the individuals in a group. Group type was also categorized as either "alone" (when there was one single individual) or "tight" (when the group was close together with a distance to each other below 5 meters) or "far" (for a spread group with a distance to each other above 5meters) or "mixed" (when some individuals were close to each other and others were far apart).

Table 4. Ethogram of all the predetermined swimming styles and their abbreviations that are used within the study

Swim Style	Definition
Alone (AL)	One single individual is present.
Line (LI)	Individuals swim in a line head to tail.
Circular Dives (CD)	Individuals appear in turns at the surface after each other.
Clustered (CL)	Individuals are clustered with no directional movements.
Spread (SP)	The group is spread out.
Front (FR)	Individuals swim in a line side by side.
Team (TE)	The group split up in smaller independent groups ("teams").
Kettle (KE)	Often appears while group feeds at the surface. Many splashes can be seen, water seems boiling like a kettle.
Varied (VA)	The group shows a variation of different swim styles.

Moreover, for each sampling unit (every 5 minutes) the exact time, the species, the group number and the group size were recorded, as well as the surrounding marine vessels and their estimated distance to the focal group. When an observation group was out of sight for a

timeframe of more than 20 minutes then the next sighting was considered as a new group. In case of a group that splits into subgroups then the group number of the subgroups were documented same as the previous group number only added with a letter "a" or "b" and etc...

MARINE VESSEL SAMPLING

The number, the type and the distance of present marine vessels (including the research vessel) in the vicinity of focal group were also noted. Marine vessels were categorized into ten different groups as followed by: FB (fishing boat), FV (fishing vessel), HSB (high-speed boat), RB (research boat), SB (sailing boat), FE (ferry) HSFE (high-speed ferry), CS (cargo ship), CR(cruise ship) and JET (jet-ski). The interaction zone is defined as 400 meters radius from the dolphin group. Therefore, if there was a vessel within the 400 meters radius, marine vessel presence was recorded as "Present" and if there were no vessels within the 400 meters radius, it was recorded as "Absent". Additionally, the distance of nearest marine vessels to the focal group and as well as the density of vessels within the radius of 100 meters, 400 meters, 1000 meters and more than 1000 meters from the focal group were recorded. Lastly, immediate directional changes on the swimming direction of target species were recorded. Such directional movements have been documented under the following categories: negative – a directional change away from the marine vessel; positive – a directional change towards the marine vessel; or neutral – no obvious directional change in relation to the marine vessel.

PHOTO IDENTIFICATION

Photographs of the dorsal fins, the flukes and the whole body of present dolphins were taken during the boat surveys. Photographs that have been taken using various DSLR cameras with 70-300mm and 150-600mm lenses. With an attempt to photograph all the individuals in a group, numerous photographs of both sides had taken with an obtained care in order to avoid the bias towards distinctive individuals. A blank picture had taken between focal groups so that the photos of individuals could later be assigned according to their respective focal groups.

Photographs have been post processed in three stages; storage, cataloguing and matching by using the Discovery Software. During the storage, photographs were cropped according the fin and the body of each individual. Later they were stored according to the quality rating as follows: (i) Good quality (Dorsal fin is focused, perpendicular to the camera and the entire fin is in the frame); (ii) Medium quality (Dorsal fin is focused with a satisfactory angle and the entire fin is in the frame); (iii) Bad quality (Dorsal fin is out of the focus and/or the entire fin is not in the frame); (iv) No info (Photograph doesn't hold any photo-identification value). The cataloguing stage has included only the photographs of Good and Medium quality. In addition to that, individuals have catalogued according to markings (nicks and scars) on the dorsal fin, the fin shape, and the deformities of body (*Würsig and Würsig 1977; Würsig and Jefferson 1990*). Later, each individual was classified into the one of three categories of distinctiveness; Bad, Medium, or Good. "Bad" individuals had no identifiable features/marks, "Medium" individuals had small markings or nicks that would be difficult to re-identify, and "Good" individuals had at least one permanent, clear and identifiable nick. Thus, picture distinctiveness was not in any reference of image sharpness but rather the presence or absence of the each recognisably features on the individuals. In order to avoid the mis-identification, calves and individuals that are without any distinctive markings were not included in the analysis. Photo-identification process is carried in Imatch Software.

Results

SURVEY EFFORT and RECORDED SIGHTINGS

Overall 174 survey days (826 hours) were spent in search for marine mammals in the Turkish territorial waters of the Levantine Sea between March 2015 and November 2017, of which 134 days (561 hours) represented land surveys had predominately conducted in the Antalya Bay. The 40 boat surveys (265 hours) had amounted to a total transect length of 1500 km. Throughout the study, there have been five marine mammal species that were sighted during the dedicated survey efforts in the Turkish coasts: Bottlenose dolphin (*Tursiops truncatus*), Striped dolphin (*Stenella coeruleoalba*), Cuvier's Beaked Whale (*Ziphius cavirostris*), Risso's Dolphin (*Grampus griseus)* and Mediterranean Monk Seal (*Monachus monachus*). During the opportunistic surveys, False Killer Whale (*Pseudorca crassidens*), rough toothed dolphins (*Steno bredanensis*), Cuvier's Beaked Whale, Humpback Dolphin (*Sousa spp.*), Striped and Bottlenose dolphin sightings were recorded that took place at the off south coasts of Cyprus, except the humpback dolphin sighting which was reported from the Mersin Bay.

BOTTLENOSE DOLPHINS

Bottlenose dolphins were sighted during 62 days (69 hours) of survey effort, with an overall 131 focal group encounters. 47 days (52 hours) of these sightings were from land surveys and 15 days (17 hours) were from boat surveys. Majority of the encounters (124 groups) were recorded during the Antalya Bay surveys (Figure 2), however it's important to point out the distinctive skew of survey effort to the same habitat. The time that is spent to follow an individual group had a range from 2 minutes to 210 minutes with an average of 45 minutes.
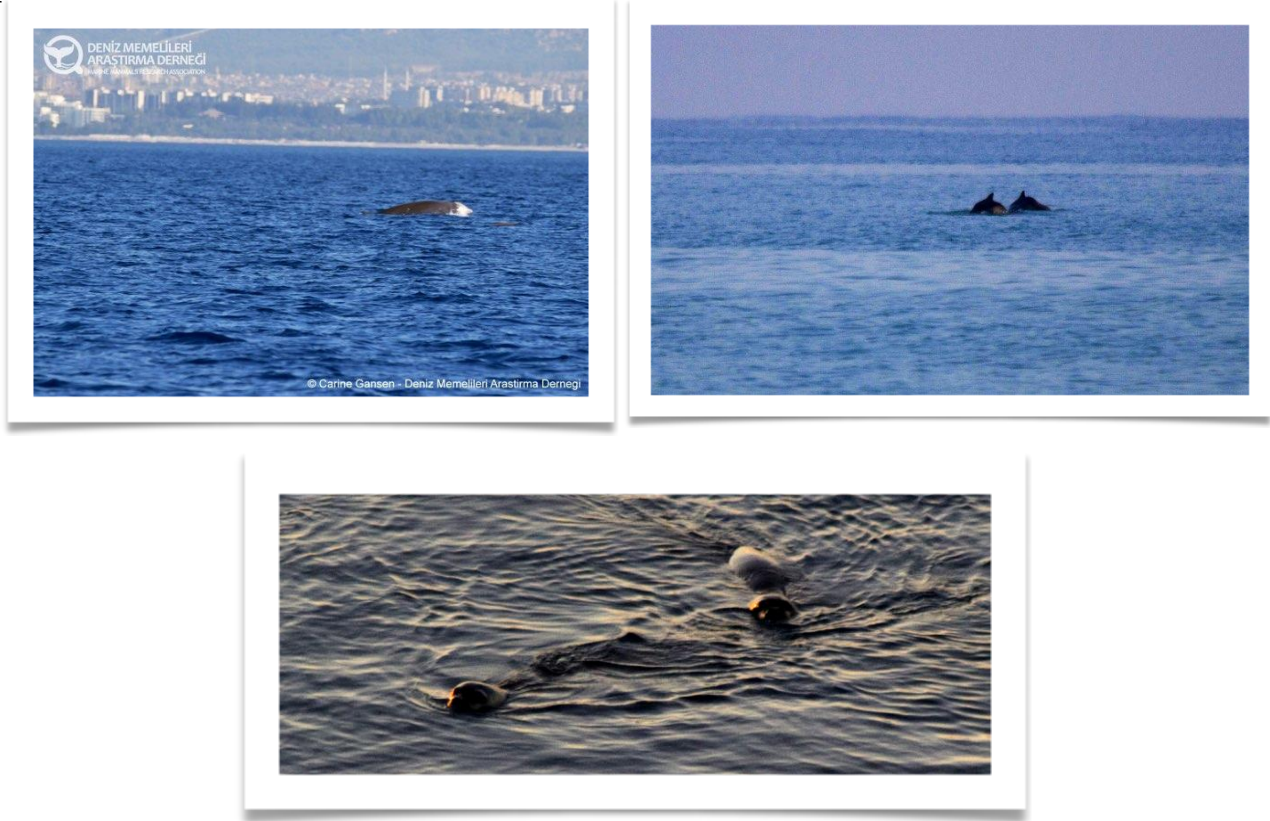

Figure 2. Sightings of bottlenose dolphin within the survey area

OTHER SPECIES

Striped dolphins were sighted on 2nd May and 21st June 2016 in Antalya Bay, while an individual **Risso's dolphin** was sighted once on 22nd September 2015 in Finike Bay. **Cuvier's beaked whales** were sighted overall in seven encounters. The sightings took place on the 4th and 18th of June 2015, 7th September 2015, 2nd May 2016, two different encounters on 13th May 2017 and the 24th July 2017. Two individual **humpback dolphins** were encountered in the Mersin Bay on 15th November 2017. **Monk seals** were sighted on eleven encounters, all from the Lara Cliffs of Antalya Bay (Picture 1). Additionally, two opportunistic sightings of one individual were reported from the Olimpos coast on 28th September 2015 and 9th June 2016. According to their sighting history, the core and buffer zones within the Antalya Coast has

been defined with a proposed "protected areas" that are vital for these endangered species (Figure 3).

Picture 1. Cuvier beaked whales in the Antalya Bay; Humpback dolphins off the coast of Mersin(photograph taken by Turan Ilca); A monk seal with her pup
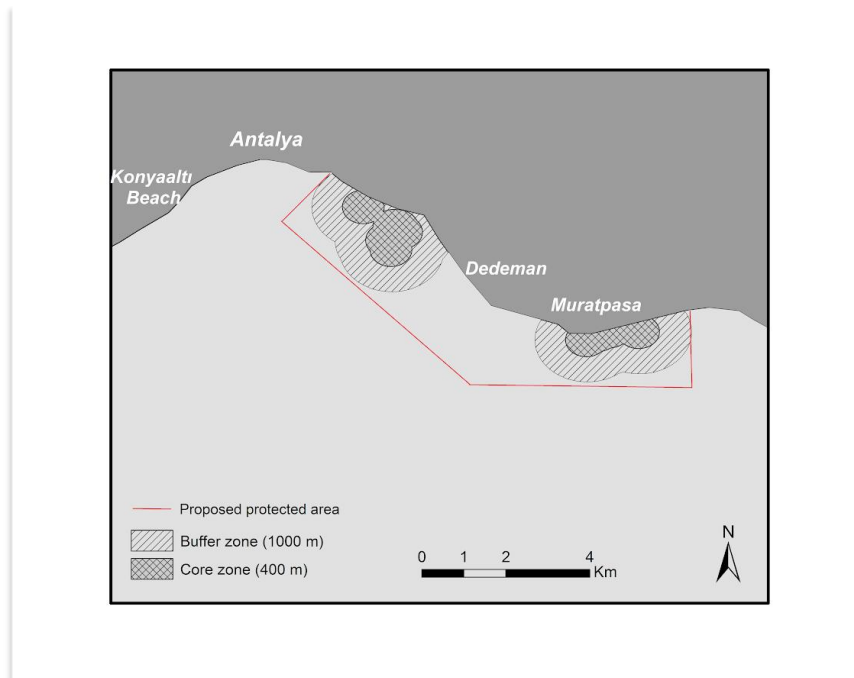

Figure 3. Core and buffer zones of monk seals within Antalya Bay, with a proposed protected area

OPPORTUNISTIC SURVEY

Bottlenose dolphins, false killer whales and Cuvier beaked whales were sighted during the ENI-Seismic Survey Effort between Cyprus and Lebanon between 2nd May and 13th May 2018 and reported by the PAM operator, Benjamin Wambergue to DMAD. The visual and acoustic report of Mr. Wambergue can be found below;

"Bottlenose dolphins were acoustically detected in two different dates; 2nd May and 9th May 2017 (Figure 4). The sighting took place amongst the depth range of 2000 meters and approximately 130 km away from the nearest coast. The sightings were confirmed to be as a group of six to eight bottlenose dolphins surfacing long enough as to be identified. The acoustic detections were consisted of a several consecutive click trains on the spectrogram yet no whistles. The click spectrum showed a typical bimodal frequency peak at 33-34 KHz and 68-70 KHz. False killer whales were first acoustically and later visually recorded on 12th May 2017 (Figure 4). Four different False killer whales' acoustic signals were detected between 00:01 and 05:30 (UTC) during the post analysis of recordings. Their click spectrum showed two peak frequencies of 25-30 KHz and 70 KHz and whistles were upsweep and flat shape in the range of 4 to 5 KHz. Both the recorded clicks and whistles showed similar waveform as for the acoustic recordings of the visual sightings of the 12th of May. Visual detection took place on 12th May 2017, between 07:37 and 07:54 within local time. The sighting was consisted of around 30 false killer whales with at least three calves. The acoustic detection of this visual sighting has shown a typical structure in the acoustic signal: upsweep and flat shape whistles from 4 to 5 KHz with harmonics (3-4 and up to 8) and clicks with frequency peak at 28-33 KHz and 68-70 KHz. All of the above recordings took place within the 2000 meters of isobaths, with a distance of around 100 km from the nearest coast. Lastly, two individuals of Cuvier's beaked whales were sighted on the 13th of May 2017, between 13:31 to 13:34 (UTC) (Figure 4). They were sighted in between 400 meters and 600 meters of a distance from the survey boat. No acoustic recordings of the individuals have been made."

The sightings of ENI-seismic effort have been mapped by the DMAD team.
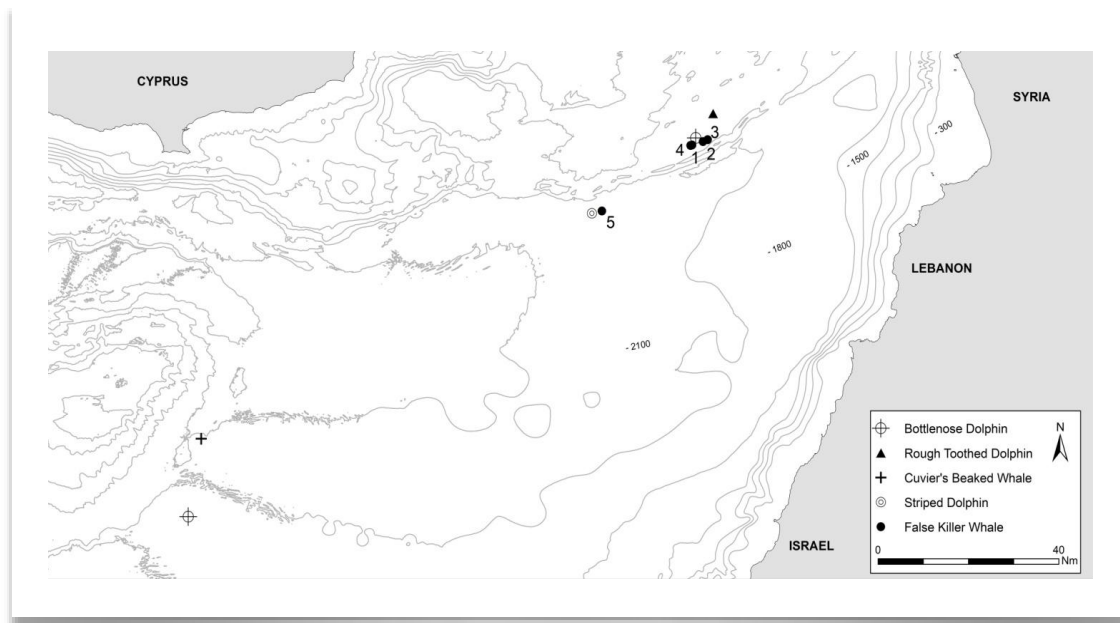

Figure 4. Opportunistic sightings (numbers under the marks represent the observation number of false killer whales)

CONSERVATION ACTIVITIES
DOLPHIN WATCH TOUR FOR CHILDREN WITH CHILDREN

In April 2nd 2017, DMAD had a dolphin survey with the children in Bosphorus, İstanbul, Turkey. Berivan Elif Aslan, Emine Ulusoy, Ayça Eleman, Dilek Şahin, İlker Kul, Mehmet Fırtın, were the team leaders. As DMAD, our aim was to show the children the amazing nature of one of the most historical places of the world, Istanbul Strait, which also suffers intense human pressure from fishery practices to the international marine transportation. In addition to the DMAD team, twenty children and their families took the part of this awareness campaign.

The information packs were distributed to the participants, which involves information about the dolphins and the wildlife of the strait, their habitats and the threats towards them. Emine provided some information to children about the three species of dolphins (*Tursiops truncatus, Delphinus delphis and Phocoena phocoena*) that live in the strait. She told them about their common names, the feeding habits of the dolphins and she continued on adding the information about the topics such as ''how many kilos they eat per day'', ''how long are their total life periods''...etc. She talked about the threats of the species such as the dolphin prisons (dolphin parks, dolphinariums), the chemical and noise pollution, the overfishing and the marine traffic. After the introduction, she asked some questions to the children and their answers were amazing. Most of them have recognized the species. Some of them saw dolphins for the first time on that survey.

For this reason, they were happy and curious to learn much more information about dolphins. They have also scream out loud on the fact that 'Dolphin parks are just a jail for the dolphins. Their real homes are the oceans'. The survey wasn't only successful with its awareness purposes, but there were also many dolphins on the sights during the talks. What we know is from now on, these children will be protecting the marine life as in the future. As DMAD, first of all we want to thank to the participated children for sharing this wonderful experience with us. Finally, we want to convey our gratitude to Dilek Şahin, İlker Kül, Mehmet Fırtın and Captain Ferhat for helping us within this activity by sharing their knowledge and expertise.

ENVIRONMENT AND ECOLOGY WORKSHOP

The third Environment and Ecology Workshop by Biology students of Marmara University was carried out. The workshop was a voluntary formation which aims to reveal the errors that is known to be as the rights in order to engrain the green consciousness in. For the

workshop the theme of ''The Ecological Balance" has been chosen for and many participants have taken a part; especially Prof. Dr. Ali Demirsoy.

As a volunteer of DMAD and a student of biology, Emine Ulusoy presented informations about the Cetacean species in general and she has mentioned about works of the association that takes place at Northwestern Levantine Sea. It is known that the marine mammals and local waters are both under the effect of population declines.

WORLD ENVIRONMENT DAY

Knowledge is transferable and the children posses one of the key elements in order to develop a green consciousness. Nowadays, most of the children grow up in big cities and homes that do not even have backyards. Thus, they are restricted to have any source to socialize with the nature. Just like all living organisms that live together, we share the mutual sources in this world and we all affect one and the other. Therefore, it is important to help children to learn about the nature and what it provides to all of us and how we can protect it. Not only the scientific studies can help the others with what that needs to be conserved, but also children can provide a long-term rudiment for the cause.

On the World Environment Day 5th June, we met the children at Konyaaltı city hall in Antalya. The presentation had the highlights including the questions of 'who are the marine mammals?', 'how can they be observed in nature?', 'why is the captivity bad for these animals', 'why do they need to be protected and how can we be effective on that?',.. etc. After a short presentation a land survey was conducted in the morning from the balcony of the building. Additionally, our volunteers Emine Ulusoy as a biology teacher and Berivan Elif Aslan as a marine biologist gave an initial presentation about how to use the binoculars and look for the dolphins with theodolite.

Children are always eager to learn new and interesting things if they can practice during their learning process. During this interactive lecture the children have obtained:

1. A general knowledge about the marine life and the part that we take in it.
2. A generic idea that we can also meet the animals in the nature and in their habitat, instead of a zoo or a dolphinarium.
3. Ideas about what can they do for the animals and how can they practically involve with.

Discussion

DMAD-Marine Mammals Research Association- builds upon one simple idea: **Nature Protection through Active Conservation Effort, Trusting Fully on Science**. To do so, since its first establishment in 2015, DMAD conducted the first ever annual survey efforts within the Turkish coast of the Levantine Sea and recently extending the coverage to the offshore waters, including the Finike Sea mounts. During the dedicated survey effort, not only the baseline cetacean knowledge of the area was collected, but also the collected data openly shared with researchers and public, with the conscious of the elements that makes research not only effective on papers but with real life outcomes that doesn't harbor any psychological or national boundaries.

The target area, Levantine Sea, is the least studied region of the entire Mediterranean Basin which eventually resulted with the general conception that both the marine mammal diversity and their population number should be low, compared to the western Basin where consisting and dedicated survey efforts were started as early as 1970s. However, according to our results, eight of 21 cetacean species, top predators of the marine environment, were present in the Levantine Sea with seasonal fluctuations. Bottlenose dolphins showed regular presence in the survey sites, with the highest sightings during the spring and summer months in Antalya Bay. The cosmopolite distribution of the species is already a known fact in the Mediterranean Sea, yet decreasing in population numbers with patches between their distribution ranges due to the unregulated human pressures (Bearzi *et al.* 2012). Therefore it's important to understand the movement ranges of bottlenose dolphins within the Levantine Sea to define the critical habitats and the connection corridors between them.

The current study highlighted that Antalya Bay, indeed holds a critical habitat of bottlenose dolphins during spring and summer, however neither Finike nor Fethiye Bay showed the similar patterns which may be linked to the low survey efforts and not really representing the natural patterns. Interestingly, the researcher of DMAD confirmed the increase sighting rates of bottlenose dolphins in Mersin Bay, during autumn and winter seasons, which covers the eastern borders of Antalya Bay. Therefore there is a likely chance that the local population(s) home range not only covers the bay itself, it is actually extending to the eastern waters. Saying this, the accurate conclusions can only be possible through consisting survey efforts that also employs photo-identification techniques which allows the comparison of individuals between the two locations.

Further, the pelagic presence of bottlenose dolphins was also documented during the current study. The current sightings were recorded with around 200 km off the closest coast and 2000 meters of water depth. However before reaching to any conclusions, these unusual sightings might be related to several factors, from the possible long distance migration patterns to the actual regular or occasional preference of deep waters (Bearzi *et al.* 2008).

Another interesting species that were regularly sighted within the Turkish coast of the Levantine Sea was the Cuvier's beaked whales, a species that is identified data deficient, and Mediterranean Monk Seals, recently downgraded to the endangered. Both of the species was sighted in Antalya Bay with juveniles, which strengthen our case on the importance of the bay for the cetacean fauna, an area that is long neglected from the conservation efforts and targeted by unregulated tourism and fishing activities. It's long known that hotspots containing 'data deficient' and 'at risk' species, such as Antalya Bay, urgently requires conservation and management strategies, in order to monitor these populations effectively and decelerate the population decline.

Last but not the least, the recordings of false killer whales, rough toothed dolphins and humpback dolphins increase our understanding on the cetacean fauna that's present in the unknown waters of the Levantine Sea. Specifically for the case of humpback dolphins, it is likely to categorize them as the Lessepsian species through Suez Channel (Coll *et al.* 2010; Zenetos *et al.* 2012).

Regarding the public awareness campaigns and capacity building activities, DMAD started the first open database photo-identification catalogue (CETAZOOM) to promote citizen science activities as well as to encourage data sharing between the institutes, NGOs and research centers. Further, regular meetings with fishermen as well as educational courses, including dolphin watch tours, in the universities and municipalities organized to seed the love of nature to the all stakeholders.

Concluding, the current study has shown that at least eight species of marine mammals is present in the Levantine Sea all either classified as "at risk", or "data deficient" by the IUCN Red List, the latter being arguably a more urgent scenario. Despite this species richness, human activities accelerated with unregulated fashion. Antalya Bay holds a critical habitat for bottlenose dolphins and beaked whales and likely to harbor nursing grounds for the only pinniped of the Mediterranean Sea. Further, the striking seasonal switch on the area usage of bottlenose dolphins between the Antalya and Mersin Bay has to be investigated in future studies as the home range of the species may cover the both waters.

Unfortunately, the majority of the human pressures on the marine environment have economic, social and cultural importance which is a fact to complicate any conservation efforts. However if these pressures continue to raise with no control mechanism, it almost certainly will have negative cumulative consequences to the crucial and complex ecosystem of Mediterranean Sea, which is, in fact, amongst the most impacted eco-regions globally (Costello *et al.* 2010). To protect what's left to us, well-coordinated research effort with international collaborations that doesn't hold any borders between the research institutes is fundamental to ensure the well-being of its marine fauna. If the scientific research gaps are appropriately recognized and filled, not only accurate conclusions on the species range, the population statues and the threat assessments can be reached, but also governmental bodies will be more capable to designate appropriate conservation measures.

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References

Abdulla, A., Gomei, M., Hyrenbach, D., Notarbartolo-di-Sciara, G., and Agardy, T. (2008) Challenges facing a network of representative marine protected areas in the Mediterranean: prioritizing the protection of underrepresented habitats. *ICES Journal of Marine Science*, 66(1), 22-28.

Aguilar, A., and Gaspari, S. (2012) Stenella coeruleoalba (Mediterranean subpopulation). *The IUCN Red List of Threatened Species*, 2012: e.T16674437A16674052.

Azzolin, M., Papale, E., Lammers, M.O., Gannier, C. and Giacoma, C. (2013) Geographical variation of whistles of the striped dolphin (Stenella ceorueoalba) within the Mediterranean Sea. *The Journal of the Acoustical Society of Amercia*, 134(1), 694-705.

Bas. A.A., Lagoa J.C., Atchoi E. (2016a). New records of Cuvier's beaked whales (Ziphius cavirostris) from the Turkish Levantine Sea. Turkish Journal of Zoology. DOI: 10.3906/zoo-1509-19

Bas. A.A., Piludu N., Atchoi E., Lagoa J.C. (2016b). Recent sightings of the critically endangered mediterranean monk seal Monachus monachus (Hermann 1779) in Antalya Bay, Turkey and implications for conservation. Monachus Guardian.

Bas, A.A., Erdoğan, M.A., Morris, N.R.C., Yeoman, K., Humphrey, O., Gaggioli, E., and Roland, C. (2017) Seasonal encounter rates and residency patterns of an unstudied population of bottlenose dolphin (Tursiops truncatus) in the northwestern Levantine Sea, Turkey. *HYLA-Herpetološki bilten,* 2016(1), pp.1-13.

 Bas, A.A. and Gönülal O. 2017. First case of whalesucker, Remora australis, in association with delphinids in Antalya Bay, Turkey. Mediterranean Marine Science. vol.18, no.3, pp.410-410

Bearzi, G., Notarbartolo-di-Sciara, G., and Politi, E. (1997) Social ecology of bottlenose dolphins in the Kvarnerić (northern Adriatic Sea). *Marine Mammal Science,* 13: 650–668. doi:10.1111/j.1748-7692.1997.tb00089.x.

Bearzi, G., Holcer, D., and Notarbartolo di Sciara, G. (2004) The role of historical dolphin takes and habitat degradation in shaping the present status of northern Adriatic cetaceans. *Aquatic Conservation: Marine and Freshwater Ecosystems*, 14(4), 363-379.

Bearzi, G., Agazzi, S., Bonizzoni, S., Costa, M., and Azzellino, A. (2008) Dolphins in a bottle: abundance, residency patterns and conservation of bottlenose dolphins Tursiops truncatus in the semi-closed eutrophic Amvrakikos Gulf, Greece. *Aquatic Conservation: Marine and Freshwater Ecosystems*, 18(2), 130-146.

Bearzi, G., Fortuna, C., and Reeves, R. (2012) Tursiops truncatus (Mediterranean subpopulation). *The IUCN Red List of Threatened Species,* Version 2014.3: e.T16369383A16369386

Boisseau, O., Lacey, C., Lewis, T., Moscrop, A., Danbolt, M., and Mclanaghan, R (2010) Encounter rates of cetaceans in the Mediterranean Sea and contiguous Atlantic area. *Journal of the Marine Biological Association of the UK,* 90 (8): 1589-1599.

Cañadas, A. (2012) Ziphius cavirostris (Mediterranean subpopulation). *The IUCN Red List of Threatened Species,* 2012: e.T16381144A16382769. **http://dx.doi.org/10.2305/IUCN.UK.2012-1.RLTS.T16381144A16382769.en**. Downloaded on 16 November 2017.

Cartes, J. E., & Carrassón, M. (2004). Influence of trophic variables on the depth-range distributions and zonation rates of deep-sea megafauna: the case of the Western Mediterranean assemblages. Deep Sea Research Part I: Oceanographic Research Papers, 51(2), 263-279.

Coll, M., Piroddi, C., Steenbeek, J., Kaschner, K., Lasram, F.B.R., Aguzzi, J., Ballesteros, E., Bianchi, C.N., Corbera, J., Dailianis, T.,Danovaro, R., Estrada, M., Froglia, C., Galil, B.S., Gasol, J.M., Gertwagen, R., Gil, J., Guilhaumon, F.,

Kesner-Reyes, K., Kitsos, M.S., Koukouras, A., Lampadariou, N., Laxamana, E., López-Fé de la Cuadra, C.M., Lotze, H.K., Martin, D., Mouillot, D., Oro, D., Raicevich, S., Rius-Barile, J., Saiz-Salinas, J.I., San Vicente, C., Somot, S., Templado, J., Turon, X., Vafidis, D., Villanueva, R., and Voultsiadou, E. (2010) The biodiversity of the Mediterranean Sea: estimates, patterns, and threats. *PloS one*, *5*(8), e11842.

Coll, M., Piroddi, C., Albouy, C., Ben Rais Lasram, F., Cheung, W.W.L., Christensen, V., Karpouzi,, V.S., Guilhaumon, F., Mouillot,, D., Paleczny, M., Palomares, M.L., Steenbeek, J., Trujillo, P., Watson, R., and Pauly, D. (2012) The Mediterranean under siege: spatial overlap between marine biodiversity, cumulative threats and marine reserves. *Global Ecology and Biogeography*. 21, 465–481. doi: 10.1111/j.1466-8238.2011.00697.x

Costello, M.J., Coll, M., Danovaro, R., Halpin, P., Ojaveer, H., and Miloslavich, P. (2010) A census of marine biodiversity knowledge, resources and future challenges,*PLoS ONE* 5:e12110. doi: 10.1371/journal.pone.0012110.

Danyer, E., Özbek, E.Ö., Aytemiz, I., Tonay, A.M. (2013) Preliminary report of a stranding case of Mediterranean Monk Seal Monachus monachus (Hermann,1779) on Antalya coast, Turkey, April 2013, J. Black Sea/Mediterr. Environ. 19(2): 278-282.

Dede, A., Saad, A., Fakhri, M., Öztürk, B. (2012): Cetacean sightings in the Eastern Mediterranean Sea during the cruise in summer 2008. Journal of Black Sea/Mediterranean Environment 18(1).
Defran, R.H., Weller, D.W., Kelly, D.L., and Espinosa, M.A. (1999) Range characteristics of Pacific coast bottlenose dolphins (Tursiops truncatus) in the Southern California Bight. *Marine Mammal Science*, 15(2), 381-393.

Endangered Species Act of (*1973) US Fish and Wildlife Service 1973. As Amended through the 108th Congress.*

Gabrié, C., Lagabrielle, E., Bissery, C., Crochelet, E., Meola, B., Webster, C., Claudet, J., Chassanite, A., Marinesque, S., Robert, P., Goutx, M., and Quod, C. (2012) The status of marine protected areas in the Mediterranean Sea 2012. *MedPAN and CAR/ASP. MedPAN Collection.*

Gannier, A., Fuchs, S. and Oswald, J. N. (2008) Pelagic delphinids of the Mediterranean Sea have different whistles. *New Trends for Environmental Monitioring Using Passive System 2008.*

General Directorate for Protection of Natural Assets. http://www.dka.gov.tr/ProjeBilgi.aspx?id=4. Downloaded on 16 November 2017.

Genov, T., Kotnjek, P., Lesjak, J., Hace, A., and Fortuna, C.M. (2008) Bottlenose dolphins (Tursiops truncatus) in Slovenian and adjacent waters (northern Adriatic Sea). In*: Annales, Series Historia Naturalis* (Vol. 18, No. 2, pp. 227-244).

Gladilina, E., Shpak, O., Serbin, V., Kryukova, A., Glazov, D., and Gol'din, P. (2016) Individual movements between local coastal populations of bottlenose dolphins (Tursiops truncatus) in the northern and eastern Black Sea. *Journal of the Marine Biological Association of the United Kingdom*, 1-7.

Gnone, G., Bellingeri, M., Dhermain, F., Dupraz, F., Nuti, S., Bedocchi, D., Moulins, A., Rosso, M., Alessi, J., McCrea, R.S., and Azzellino A. (2011) Distribution, abundance, and movements of the bottlenose dolphin (Tursiops truncatus) in the Pelagos Sanctuary MPA (northwest Mediterranean Sea). *Aquatic Conservation – Marine and Freshwater Ecosystems,* 21, 372–388.

Gregr, E.J., and Trites, A.W. (2001) Predictions of critical habitat for five whale species in the waters of coastal British Columbia. *Canadian Journal of Fisheries and Aquatic Sciences*, 58(7), 1265-1285.

Güçlüsoy, H., Kiraç, C.O., Veryeri, N.O., and Savas, Y. (2004) Status of the Mediterranean monk seal, Monachus monachus (Hermann, 1779) in the coastal waters of Turkey. *EU Journal of Fisheries & Aquatic Sciences*, 21(3-4), 201-210.

Hoyt, E. (2005) Marine Protected Areas for Whales, Dolphins and Porpoises: A world handbook for cetacean habitat conservation. In: *Earthscan*, London, U.K.

Hoyt, E. (2012) Marine Protected Areas for Whales, Dolphins and Porpoises: A world handbook for cetacean habitat conservation and planning. In: *Routledge, London, U.K.*

IUCN (2012). Marine Mammals and Sea Turtles of the Mediterranean and Black Seas. Gland, Switzerland and Malaga, Spain: *IUCN*. 32 pages.

Karamanlidis, A., and Dendrinos, P. (2015) Monachus monachus. (errata version published in 2017). *The IUCN Red List of Threatened Species 2015:* e.T13653A117647375.

Katsanevakis, S., Coll, M., Piroddi, C., Steenbeek, J., Ben Rais Lasram, F., Zenetos, A., and Cardoso, A.C. (2014) Invading the Mediterranean Sea: biodiversity patterns shaped by human activities. *Frontiers in Marine Science*, 1, 32.

Kerem, D., Hadar, N., Goffman, O., Scheinin, A., Kent, R., Boisseau, O., and Schattner, U. (2012) Update on the cetacean fauna of the Mediterranean Levantine basin. *The Open Marine Biology Journal*, 6(1).

Lejeusne, C., Chevaldonne, P., Pergent-Martini, C., Boudouresque, C.F., and Perez, T. (2010) Climate change effects on a miniature ocean: the highly diverse, highly impacted Mediterranean Sea. *Trends in Ecology and Evolution*. 25, 250–260. doi: 10.1016/j.tree.2009.10.009.

Lubchenco, J., Palumbi, S.R., Gaines, S.D., and Andelman, S. (2003) Plugging a hole in the ocean: the emerging science of marine reserves. *Ecological applications*, 13(1), S3-S7.

 Lusseau, D. (2003) Effects of tour boats on the behaviour of bottlenose dolphins: using Markov chains to model anthropogenic impacts. *Conservation Biology*, 17(6), 1785-1793.

 Micheli, F., Halpern, B.S., Walbridge, S., Ciriaco, S., Ferretti, F., Fraschetti, S., Fraschetti, S., Lewison, R., Nykjaer, L., and Rosenberg, A.A. (2013) Cumulative Human Impacts on Mediterranean and Black Sea Marine Ecosystems: Assessing Current Pressures and Opportunities. *PLoS ONE,* 8(12): e79889.

 Notarbartolo di Sciara, G. (2016) Chapter One-Marine Mammals in the Mediterranean Sea: An Overview. *Advances in marine biology*, 75(1-36).

Özbek, Ö., & Kara, A. (2013). Genetic variation in natural populations of Capparis from Turkey, as revealed by RAPD analysis. Plant systematics and evolution, 299(10), 1911-1933.

Özbilgin, Y.D., Kalecik, E., and Gücü, A.C. (2018) First Record of Humpback Dolphins in Mersin Bay, the Eastern Mediterranean, Turkey. *Turkish Journal of Fisheries and Aquatic Sciences,* 18(187-190)*.*

Öztürk, A.A., Dede A. & Tonay, A.M. (2016). Cetaceans in the Turkish waters of the   Mediterranean Sea. The Turkish Part of the Mediterranean Sea, 566.

Öztürk, A.A., Tonay, A.M., and Dede, A. (2011) Strandings of the beaked whales, Risso's dolphins, and a minke whale on the Turkish coast of the Eastern Mediterranean Sea. *Journal of Black Sea/Mediterranean Environment*, 17(3).

Podesta, M., D'Amico A., Pavan, G., Drougas, A., Komnenou, A., and Portunato, N. (2005) A review of Cuvier's beaked whale strandings in the Mediterranean Sea. *Journal of Cetacean Research and Management*, 7(3), 251.

Rankin S., Oswald J., Simonis A., E. and Barlow J. (2015) Vocalization of the rough-toothed dolphin, Steno bredanensis, in the pacific Ocean. *Marine Mammal Science*, 31(4).

Reggente M. A. L., Papale E., Anichini M., Arena N., Fedele G. Giacoma C., Galli P. and Azzolin M. (2015) Characteristics and variability of whistles emitted by striped dolphin (Stenella coeruleoalba) in the Eastern Mediterranean sea, conference paper, *European Cetacean society (ECS)*, Malta

Ryan C., Cucknell A.C., Romagosa M., Boisseau O., Moscrop A., Frantzis A. and McLanaghan R. (2014) A visual and acoustic survey for marine mammals in the eastern Mediterranean Sea during summer 2013.*Unpublished report to the International Fund for Animal Welfare, Marine Conservation Research International*, Kelvedon, UK.

Silva, M.A., Prieto, R., Magalhães, S., Seabra, M.I., Santos, R.S., and Hammond, P.S. (2008) Ranging patterns of bottlenose dolphins living in oceanic waters: implications for population structure. *Marine Biology*, 156(2), 179.

Würsig B and Jefferson TA (1990) Methods of photo-identification for small cetaceans. Reports of the International Whaling Commission 12, 43–52.
Würsig B and Würsig M (1977) The photographic determination of group size, composition, and stability of coastal porpoises (Tursiops truncatus). Science 198, 755–756.

Zenetos, A., Ballesteros, E., and Verlaque, M. (2012) Alien species in the Mediterranean Sea by 2012. A contribution to the application of European Union's Marine Strategy Framework Directive (MSFD). Part 2. Introduction

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