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MUĞLA VALİLİĞİ

MUĞLA GOVERNORSHIP

DEKAMER

CARETTA CARETTA

FOR SUSTAINABLE SEAS PLEASE HELP PROJECT THE CARETTA CARETTA

YAŞANABİLİR BİR DÜNYA İÇİN
DENİZ KAPLUMBAĞALARINI KORUYALIM

DEKAMER-TURKEY

MONITORING AND CONSERVATION STUDIES OF SEA TURTLES *(Caretta caretta)* DURING THE 2016 NESTING SEASON ON MUĞLA SEA TURTLE NESTING BEACHES

ACKNOWLEDGMENTS

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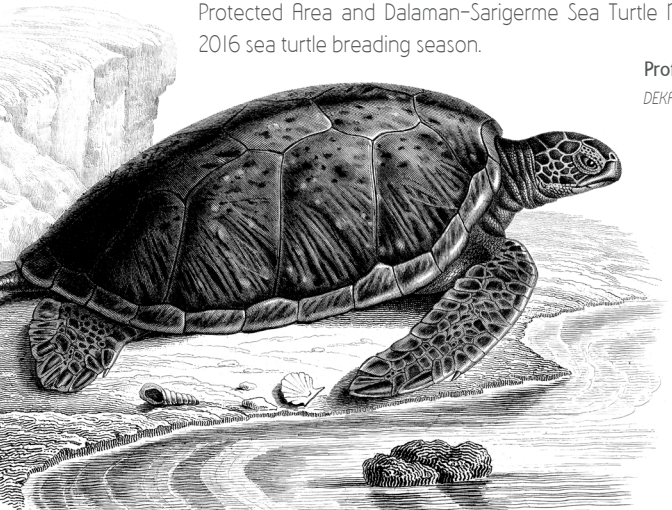


I. SEA TURTLES

There are 8 species of sea turtles are living in the world (Lutz & Musick, 1997).

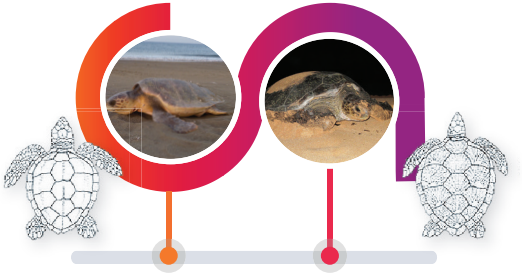
Table I: Sea turtle species of the world

Species	English Name
Caretta caretta	Loggerhead Turtle
Chelonia mydas	Green Turtle
Chelonia agassizi	Black Turtle
Dermochelys coriacea	Leatherback Turtle
Eretmochelys imbricata	Hawksbill Turtle
Lepidochelys olivacea	Olive Ridley
Lepidochelys kempii	Kemp's Ridley
Natator depressus	Flatback Turtle

The nesting beaches of sea turtles, which have managed to survive since dinosaurs have dominated the earth, are slowly disappearing. The main reason for this disappearance is the increasing rate of human activities. The injuries and deaths of turtles and plundering of their nests in large numbers have remained a major reason for the decline of populations. Another reason of decline in sea turtle populations has been due to random deaths in uncontrolled hunting and fishing activities for personal or commercial purposes (Lutz & Musick, 1997).

The survivorship of sea turtle populations depends primarily on the conservation of the their nesting beaches they use for reproduction and maintain the mating, feeding, wintering and migratory habitats in their natural ecosystems. Therefore, the beaches in Turkey are of great importance for the Mediterranean population (Başoğlu & Baran, 1982; Baran & Kasparek, 1989; Baran, 1990; Baran et.al., 1992).

NESTING SPECIES IN THE MEDITERRANEAN



Caretta caretta
İribaş Deniz Kaplumbağası
Loggerhead Turtle

Chelonia mydas
Yeşil Deniz Kaplumbağası
Green Turtle

NON-NESTING SPECIES IN THE MEDITERRANEAN

Dermochelys coriacea
Deri Sırtlı Deniz Kaplumbağası
Leatherback Turtle

Lepidochelys kempii
Gündüz Yuvalayan Deniz Kaplumbağası
Kemp's Ridley

Eretmochelys imbricata
Atmaca Gagalı Deniz Kaplumbağası
Hawksbill Turtle

SPECIES NOT RECORDED IN THE MEDITERRANEAN

Lepidochelys olivacea
Zeytin Yeşili Deniz Kaplumbağası
Olive Ridley

Natator depressus
Düz Kabuklu Deniz Kaplumbağası
Flatback Turtle

Chelonia agassizii
Siyah Deniz Kaplumbağası
Black Turtle

Figure I: Sea turtle species

SOME INTERESTING CHARACTERISTICS OF SEA TURTLES

1. Sea turtles show natal homing instincts that bring them back to beaches where they were born to nest.

2. Females nest 3-5 times in every 2-3 years. Interval between each nest is about 15 days.

3. Loggerhead (*Caretta caretta*) turtles build their nests at about 50-60 cm depth on the beach, green (*Chelonia mydas*) turtles at about 90-100 cm depth

4. Clutches of eggs are between 50-100 and each egg is about the size of a ping-pong ball. The incubation period is between 45-65 days. Sexual maturity takes 25-30 years in sea turtles. Only 3-5 of every thousand hatchlings can survive until full maturity.

5. The sex of sea turtles is 'temperature dependent'; higher temperatures (32°C) produce females and lower temperatures (26°C) males.

6. *Caretta caretta* is carnivorous and can dive up to 200 meters sea depth while *Chelonia mydas* is herbivorous and can swim at a depth of 20-50 meters. Sea turtles are 'ecotransformers'. They eat and live in water but move to the land and deposit their eggs.

7. Sea turtles don't have teeth, but they have very strong jaws and saw-shaped palate.

8. They tear and crush food and thereby create small particles of food for other animals.

9. Some sea turtles feed on jellyfishes. They sometimes eat plastic bags instead of jellyfish by mistake, they can suffocate and die.

10. Newly hatched turtles orientate towards reflection of moon and reach to the sea, but they become disorientated when they see any light other than from the sea.

I. I. Life Cycle of Mediterranean Sea Turtles

Sea turtles maintain a very short period of their lives dependent on the land. Sea turtles mate in the calm waters in the regions close to the nesting beaches in April – May. Sea turtles come to the beach where they borne and lay their eggs between May and August.

The eggs are about the size of a ping pong ball and average 70 eggs in a clutch. The depths of the nests are about 50 cm for loggerhead turtles and relatively deeper for green turtles. The female turtle returns to the sea after leaving her eggs to the beach.

After mating near the nesting beach, the males migrate again to the foraging area. The females return to the foraging and wintering areas after laying their eggs. The offspring are hatched and emerged from the egg at the end of the incubation period of about 2 months. The young offspring travel towards the sea and spends 25–30 years for sexual maturation to come back to the beach where they born (Figure 2).

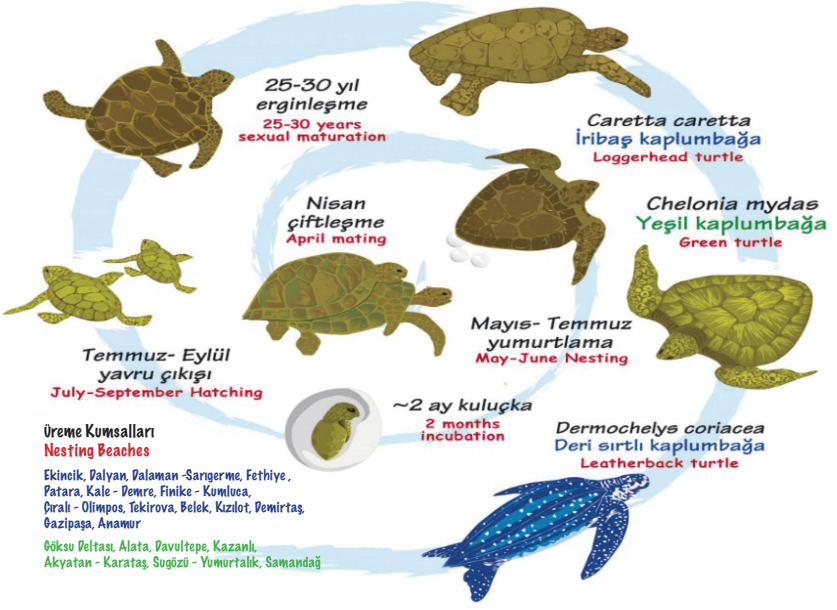


Figure 2: Life cycle of sea turtles

Sea turtles mate in April and May in shallow waters close to their nesting sites.

Sea turtles lay their eggs between May and August. The size of the egg is similar to size of a ping-pong ball. There are approximately 70 eggs in a nest. The depth of the nests is around 50cm.

Hatchlings emerge from the nests after 2 months of incubation period.

Hatchlings, when they reach the sea, spends around 25 years in the sea and never comes to the beach. Only females come to lay their eggs when they get sexually mature at the age of 25 years.

The number of sea turtles in the world is gradually decreasing. Over the last 500 years, the consumption of sea turtles' meats, eggs, shells, oil, and skin has led these species in danger of extinction. Thousands of sea turtles are drowned each year due to shrimp nets, trawl nets and longlines (Ripple, 1996). Especially the translucent plastic debris are resembled to the jellyfish and being eaten by sea turtles causes deaths or injuries. In addition, collusion with marine vehicles cause deaths of mature and juvenile sea turtles.

One of the problems that adult sea turtles have experienced on land is the occupation of the nesting beaches in recent years and as a result, the generations of sea turtles, which have been living for millions of years, are getting more and more threatened every day. In this way, the usage plans of the coastal habitats which are used as nesting beaches by sea turtles have changed, and as a result, they have become endangered (Ozaner, 1991).

In recent years, the predation of nests by predator animals such as foxes, badgers, dogs and crabs has increased considerably and the measures taken have not been able to respond in a good level. In addition, due to the effect of the artificial lights behind the beaches, the hatchlings are disoriented by these lights and lost their ways and die without finding the sea (Witherington & Bjorndal, 1991). The nests close to the sea can face the danger of inundation, and as a result, the hatchlings die before they complete their embryonic development. Another factor affecting turtle nests is the activity of insects that invade nests. Marine pollution also affects juvenile turtles as adult turtles. The predation usually observed on sea turtle eggs and their hatchlings. Foxes, badgers and crabs are main predators in Turkish beaches. Fox and badger predation directly affect the nest and damage the eggs.

In nesting beaches, another factor damaging sea turtle eggs and hatchlings is humans. Digging sand may damage the eggs and also the holes dug by people becomes a trap for hatchlings. When they fall into these holes they can't reach to the sea and eventually die or predated by other animals.

Another factor is use of sun umbrellas (parasols) use on the nesting beaches. When eggs are found in areas where the parasols are used, the eggs may be damaged directly. In addition, the use of fire at night and heavy vehicles on the beach are also negative factors that caused by people.

I. 2. Sea Turtles in The Mediterranean and Turkey

Five sea turtle species *(C. caretta, C. mydas, E. imbricata, D. coriacea and L. kempii)* were reported in previous studies (Başoğlu, 1973; Groombridge, 1990). Of these, only *C. caretta* and *C. mydas* are nesting in Turkey (Baran, 1990; Baran et.al., 1992; Baran & Kasperek, 1989; Başoğlu, 1973; Canbolat, 1991; Geldiay, 1983, 1984; Geldiay & Koray, 1982; Hathaway, 1972). In addition, there are a few stranding reports about *D. coriacea* but all specimens found dead (Baran et.al., 1998; Taşkavak et.al., 1998; Sönmez et.al., 2008).

The number of adult female loggerheads in the world are estimated as 60.000. Only 2.000 of them are living in the Mediterranean and 450-900 females are nesting in Turkey. Adult female green turtle population is estimated to be 200.000 in the world while only 500 of them are living in the Mediterranean and 230-380 of them are nesting in Turkey.

I. 3. Sea Turtle Studies in Turkey and Muğla Beaches

Approximately 30% to 50% of loggerheads and 70% to 80% of green turtles that are living in the Mediterranean are nesting on the coasts of Turkey. There are 21 main sea turtle nesting beaches in Turkey. These beaches from west to east are; Ekincik, Dalyan, Dalaman-Sarıgerme, Fethiye, Patara, Kale-Demre, Finike-Kumluca, Çıralı-Olimpos, Tekirova, Belek, Kızılot, Demirtaş, Gazipaşa, Anamur, Göksu Deltası, Alata, Davultepe, Kazanlı, Akyatan-Karataş, Sugözü-Yumurtalık and Samandağ (Figure 3). The annual number of nests on these beaches are given in Table 2.

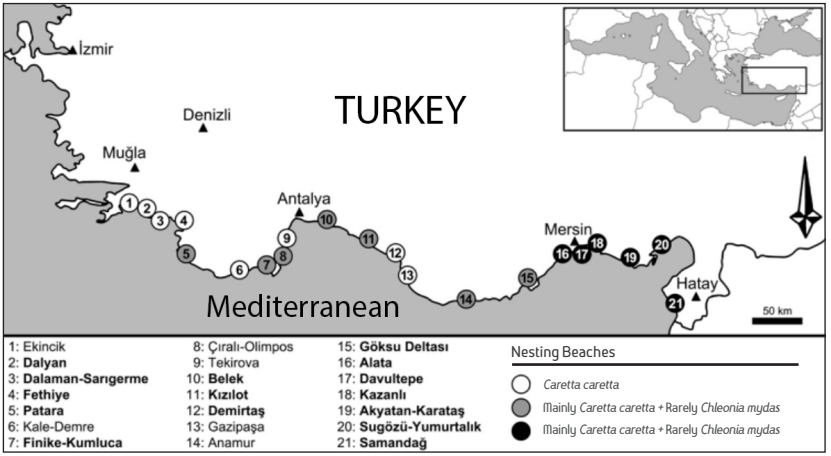


Figure 3 : Main sea turtle nesting beaches in Turkey.
(Highlighted nesting beach names are indicating main nesting beaches in Turkey)

Table 2: The number of nest range of C. caretta and C. mydas on nesting beaches.

Beach Number	Beach Name	Length of the beach (km)	The range of nests numbers	
			C. caretta	*C. mydas*
1	Ekincik	1	9-12	
2	Dalyan	4.7	57-658	
3	Dalaman-Sarıgerme	10.4	69-112	
4	Fethiye	8.3	72-191	
5	Patara	14	35-127	2-2
6	Kale-Demre	8.5	39-109	
7	Finike-Kumluca	21	75-305	0-7
8	Çıralı-Olimpos	3.2	23-139	
9	Tekirova	3.7	4-23	
10	Belek	29.3	68-1900	2-8
11	Kızılot	16.1	50-270	0-3
12	Demirtaş	7.8	41-137	
13	Gazipaşa	6.8	14-53	
14	Anamur	12.2	146-1240	1-3
15	Göksu Deltası	25.6	36-254	3-20
16	Alata	3	16-32	20-356
17	Davultepe	1.8	2-11	86-126
18	Kazanlı	4.5	2-26	73-856
19	Akyatan-Karataş	22	3-31	108-735
20	Sugözü-Yumurtalık	9.4	1-2	126-213
21	Samandağ	14.2	7-20	40-1172

The number of nests obtained from the conservation and monitoring studies since the beginning of 90's were given for Dalyan, Dalaman-Sarıgerme and Fethiye beaches in Muğla. In general, the average of annual number of nests on these three main nesting beaches in Muğla since 2002 is 511 (Figure 4).

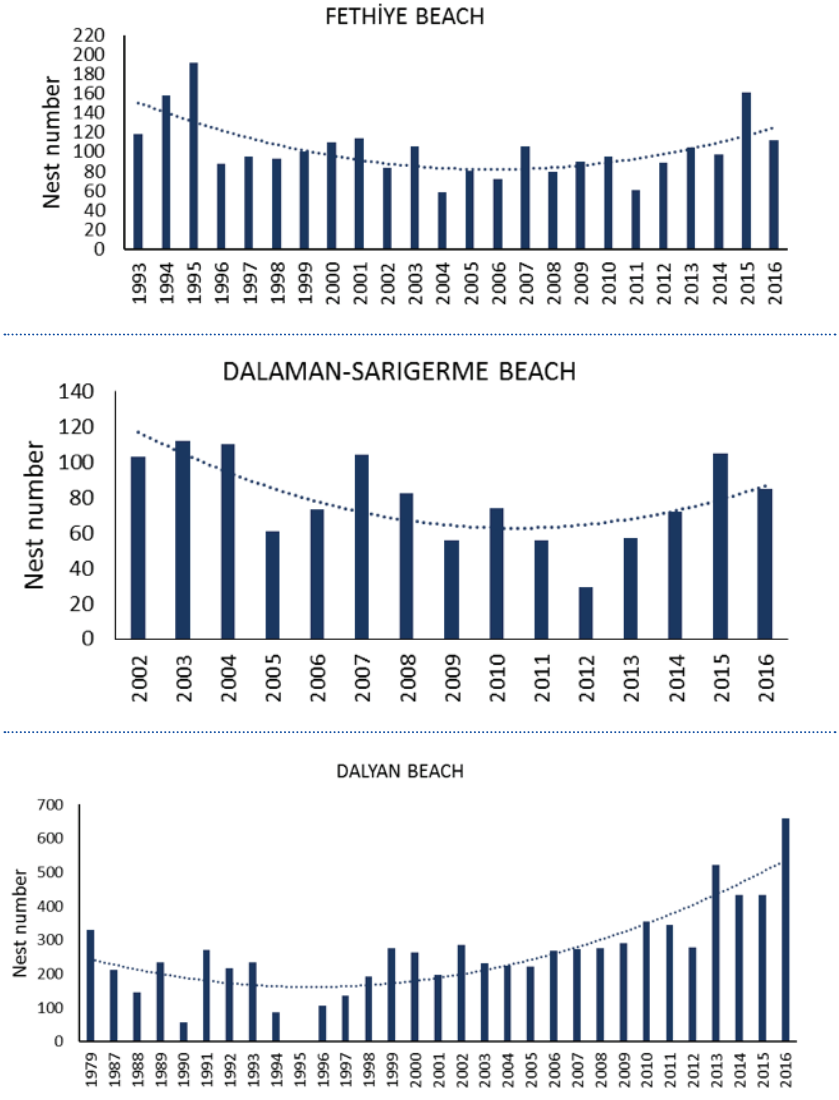


Figure 4 : Annual nest numbers on three nesting beaches of Muğla

(Geldiay et.al. (1982); Canbolat (1991); Erk'akan (1993); Baran et.al. 1992, Canbolat (1997, 2001c, 2002, 2003, 2004, 2006, 2007); Yerli and Demirayak, (1996); Baran at.al. (1996); Ilgaz and Baran (2001); Yerli and Canbolat (1998b), Türkozan and Yılmaz (2008); Kaska et. al. (2008); Durmuş and Güçlü (2009); Kaska et. al. (2010, 2011, 2012, 2013, 2014, 2015, 2016) Fethiye – (Türkozan & Baran, 1996; Baran & Türkozan, 1996; Türkozan, 2000, 2006; Yerli & Canbolat, 1998; Ilgaz et.al., 2007; Canbolat, 2006, 2007; Takva, 2008, 2009; Canbolat et.al., 2010; Başkale et.al., 2012, 2013, 2016; Hoş et.al., 2014; Yerli et.al., 2015; Kaska et.al., 2016)

2. MATERIAL AND METHODS – 2. 1. Study Areas

Figure5: Satellite images of three nesting beaches in Muğla

2. 2. Methodology

The methodology for determining and recording nests was used according to the previous published studies (Kaska et.al., 1998; Başkale & Kaska, 2005; Türkozan & Kaska, 2010). A few photographs showing our studies are given below (Figure 6-10).

Figure 6: Some pictures from field studies

Figure 7: Examples of caging of nests
(grid cages against fox predation, on the left, and prisma cages for people attention, on the right)

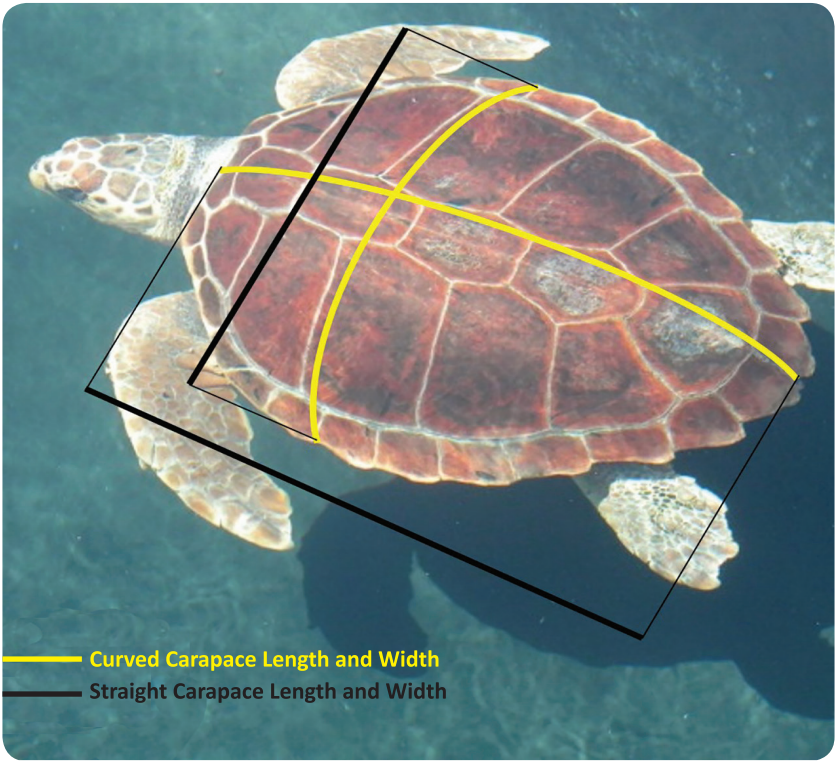


Figure 8 : Measurements of turtle carapace

Figure 9: Some pictures from field studies

Figure 10: Process of picking up, carrying, measuring of the injured or dead sea turtles

3. RESULTS

3. I. Results of Sea Turtle Activities

All sea turtle nests spotted on Muğla beaches were belong to loggerhead turtle. A total of 658 nests found on Dalyan beach, while 85 nests on Dalaman-Sarıgerme beach and 112 nests on Fethiye beach. The number of nests found on Dalyan beach has reached the highest number in 2016. GPS coordinates of all nests were taken, the distance from the sea of all nests were also measured and recorded. Nest density on these beaches are; 146.2 nest/km on Dalyan beach, 8.2 nests/km on Dalaman-Sarıgerme beach and 13.5 nests/km on Fethiye beach. The total nest density on these three beaches is 36.54 nests/km in 23.4 km long study area.

A total of 698 nests (81.6%) were screened with grid and prism cages against predation and possible human damages. Of the total nests, a hundred of them (11.7%) were fully predated while 78 of them (9.1%) were half-predated. A total of 677 nests (79.2%) were successfully (without predation) protected.

During 2016 breeding season, a total of 62522 eggs were laid and 42746 hatchlings hatched from these eggs and of these hatchlings, 38193 (89.3%) of them reached to the sea. After hatchling emergences, all nests were uncovered for control to gather data about the nests by the research team (Figure 11). During these controls, a total of 4083 unhatched eggs were identified as unfertilized, 6230 eggs were found with dead embryos in the egg shell. Remaining 9453 eggs were predated by different predators.

Figure 11: Excavation of a nest after hatching

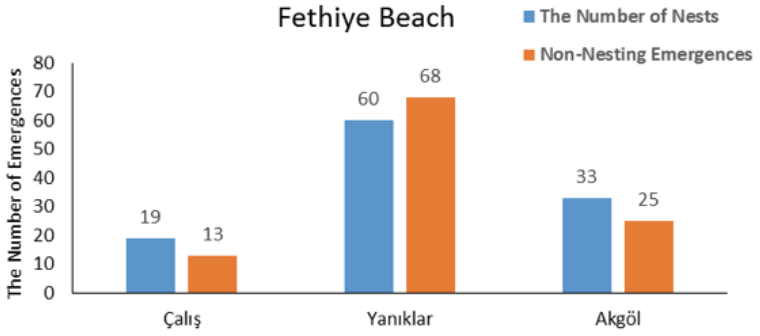
3.2. Temporal and Spatial Distribution of Turtle Activities

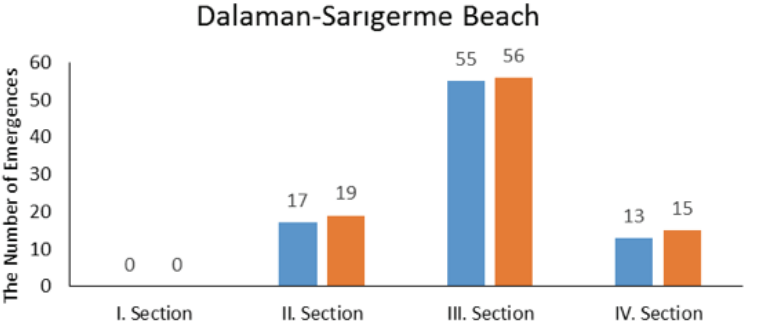
Evaluating the study results under subsection scale for all three beaches will give more detailed information about turtle activities. Nest number were given under subsections for all three beaches.

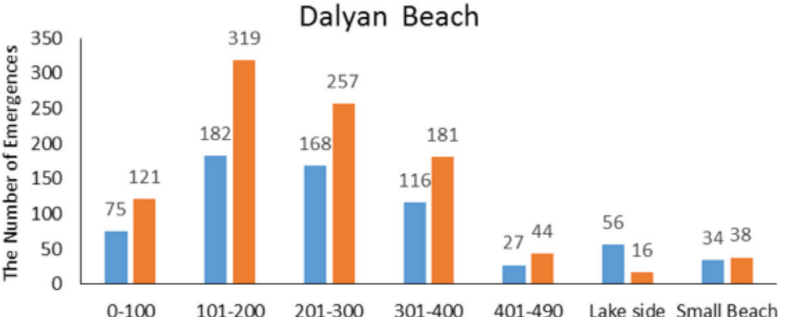
In 2016 breeding season, the earliest known sea turtle nesting record for the entire Mediterranean until now was observed on Dalyan Beach on April 25th.The number of nesting activities on Dalyan beach was higher than previous nesting seasons in April and May (19,9%). In general, it is seen that the majority of the nests were made in June. According to this results, the number of nests were six in April (only on Dalyan beach), 164 in May, 459 in June, 221 in July and 5 in August (only on Dalyan beach).

The majority of the nests were made in 10 to 20 m zone from the sea for Dalyan and Fethiye beaches. Nest density is increasing after 20 m from the sea for Dalaman-Sarıgerme. This result shows how important the beach structure is in nest-site selection for the same species' individuals and the importance of making a separate assessment for each beach.

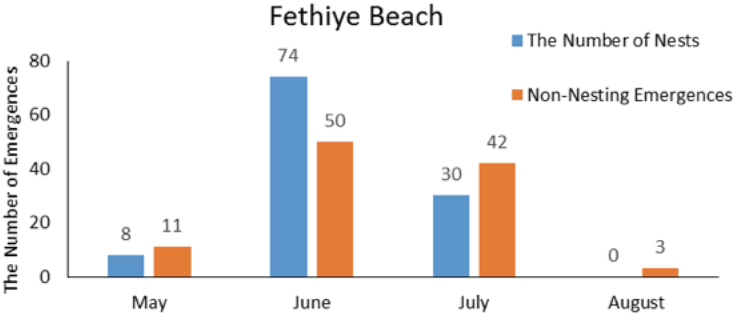
The Number of Nests and Non-nesting Emergences on the Nesting Beaches of Muğla

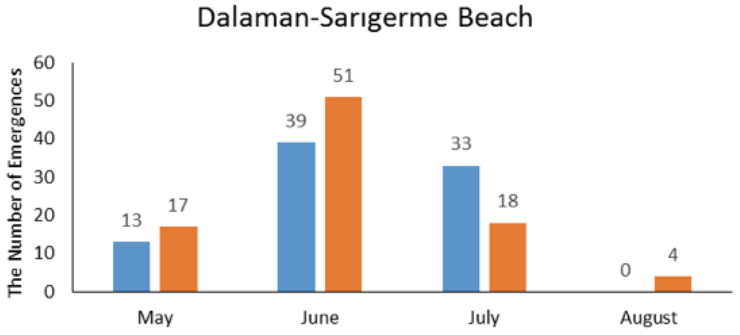


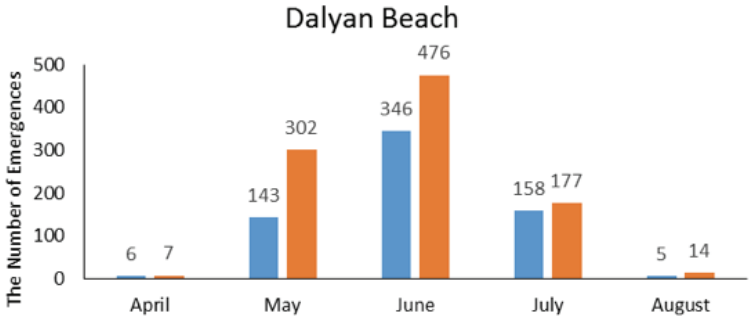




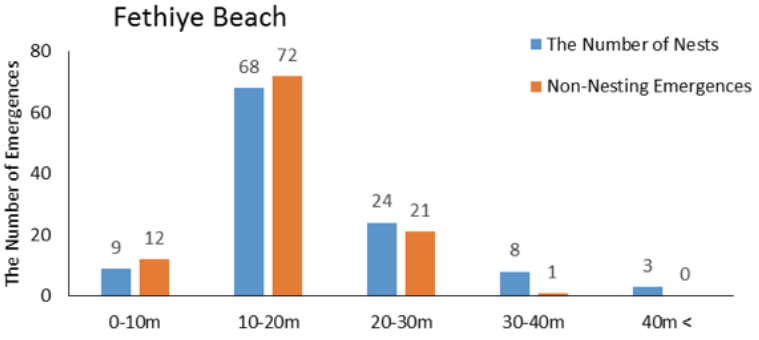
Temporal Distribution of Nests and Non-nesting Emergences on the Nesting Beaches of Muğla

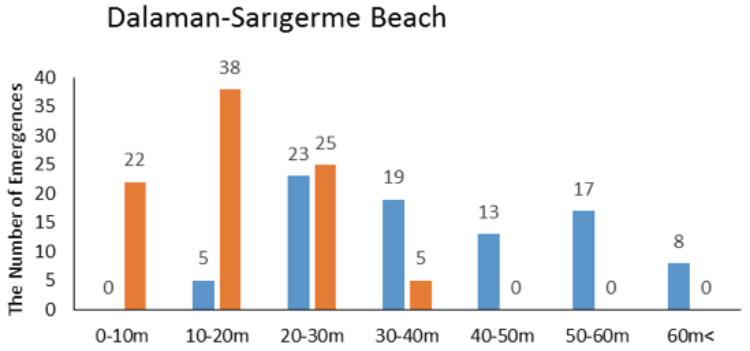


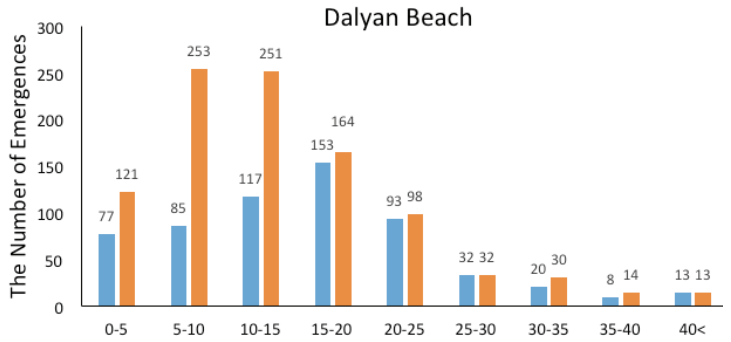




Nest and Non-nesting Emergence Distributions According to the Distance from the Sea on the Nesting Beaches of Muğla







The Maps of Nest Locations According to the GPS Coordinates

Sea turtles tend to make their nests in areas that the beach topography allows the highest hatching success. Therefore, the length of the wet and semi-wet area where the sand is washed by the waves is a very important parameter for determining the safe nesting zone. In 2016 breeding season, the sum of the length of the wet sand (WSL) and the length of the semi-wet are that has inundation risk was measured as 8.6 m for Dalyan, 5.2 m for Dalaman-Sarıgerme and 5.0 m for Fethiye beaches. The mean distance from the sea of the nests was 15.5m for Dalyan, 39.6 m for Dalaman-Sarıgerme and 19.0 m for Fethiye. This is another indicator showing the importance of separate evaluation for each beach.

3.3. Results of Tagging and Morphometric Measurements

During night patrols, a total of 165 turtles were encountered on the beaches of Muğla. Of these turtles, 127 of them were tagged during field studies (Dalyan 119; Fethiye 8). Remaning 38 turtles were recaptures from previous years (Dalyan 37; Fethiye 1) (Figure 12).

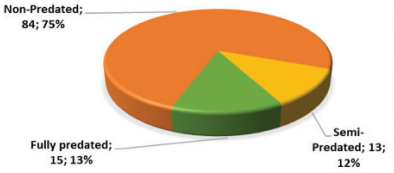
Figure 12 : Measuring a loggerhead turtle carapace

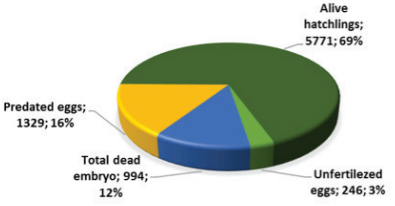
3. 4. Results of Nest Protection and Nest Success

A total of 2.027 sea turtle activities were observed on three nesting beaches in Muğla and 855 of them resulted with nest. Of these nests, 658 of them were determined on Dalyan beach while 85 on Dalaman-Sarıgerme beach and 112 on Fethiye beach. Of these nests, 677 of them were protected. A total of 62.522 eggs were deposited to these nests and 42.746 hatchling were produced on three nesting beaches in Muğla. The information about the nests are given below.

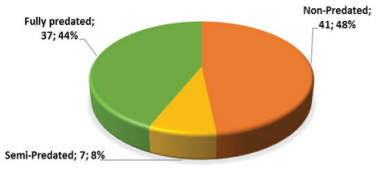
Information about Nest Protection (left figures) and Fate of Eggs (right)

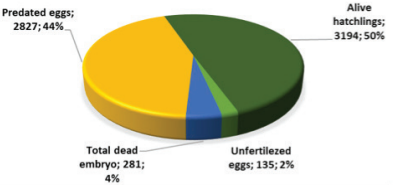
Fethiye Beach



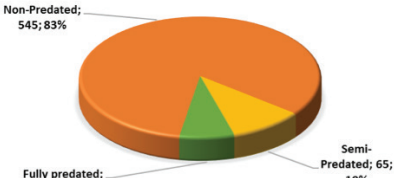


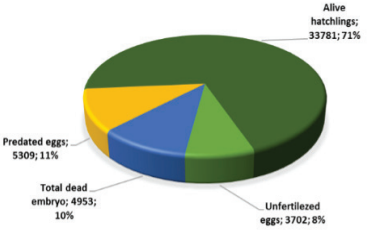
Dalaman - Sarıgerme Beach





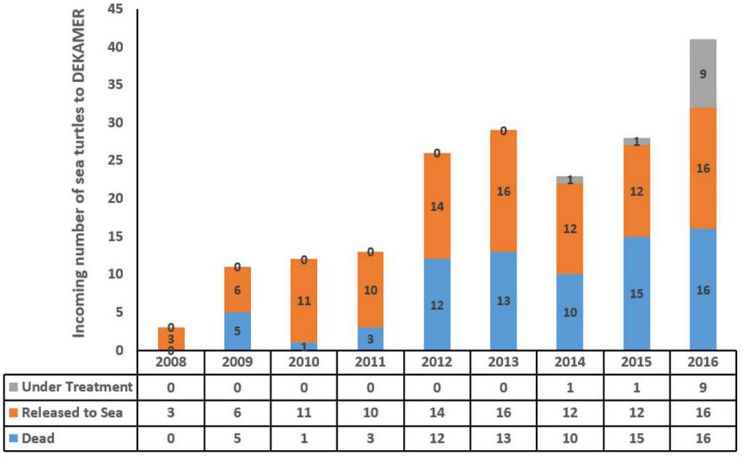
Dalyan Beach





3.5. Sea Turtle Rescue and Rehabilitation

During 2016, a total of 41 sea turtles were admitted to DEKAMER (Sea Turtle Research, Rescue and Rehabilitation Center). Of these, 16 turtles were released back to the sea after successful treatment. Rehabilitation process of 9 turtles are still on going. The number of annual injured turtles admitted to DEKAMER and the cause of injuries are given below (Figure 13-14).



	2008	2009	2010	2011	2012	2013	2014	2015	2016
Under Treatment	0	0	0	0	0	0	1	1	9
Released to Sea	3	6	11	10	14	16	12	12	16
Dead	0	5	1	3	12	13	10	15	16

Figure 13: The number of annual injured turtles admitted to DEKAMER

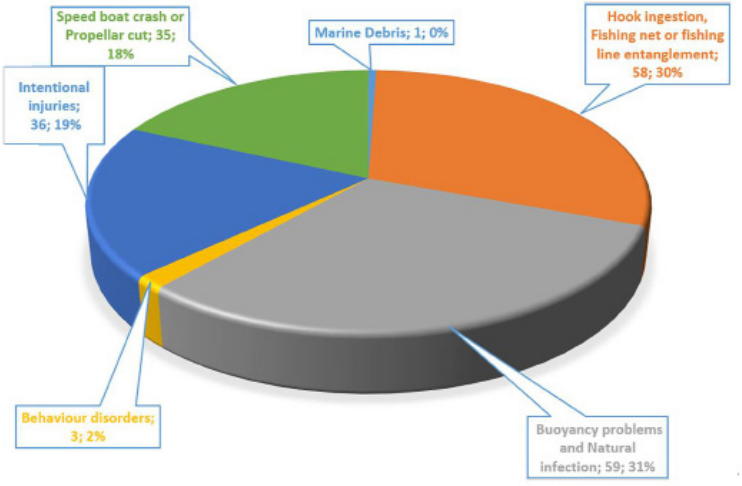


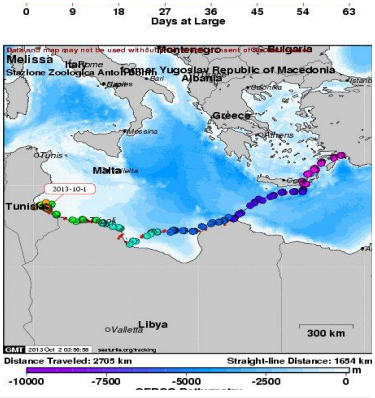
Figure 14: Cause of Injuries of the Sea Turtles Admitted to DEKAMER

Treatment and Operation Process of Injured Turtles at DEKAMER

Routine Tank Cleaning Process by Volunteers and Testing Turtles with Alive Preys

Observing Turtles in the Diving Tanks after Treatment

RELEASING TURTLES AFTER TREATMENT AND TRACKING WITH SATELLITE TRANSMITTERS



4. PUBLIC AWARENESS STUDIES

Most intensive tourism activities are seen in Dalyan and Fethiye among the nesting beaches of Muğla. Locals, foreign tourists, tourism enterprises in the region and NGO's were informed by project teams and volunteers during the studies.

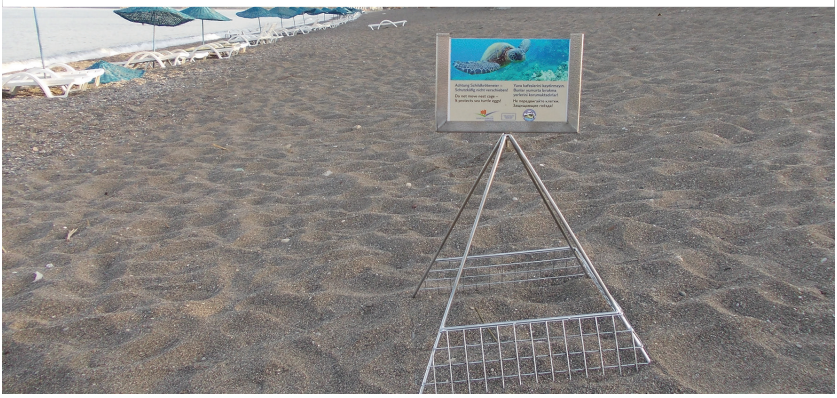
Public awareness activities on the Dalyan Beach have been made directly to the visitors of DEKAMER and reached to approximately 50,000 people in 2016. Questions about protection sea turtles and of injured turtles have been answered by the DEKAMER staff and volunteers. In addition, the signboards in the center have been renovated and visuals like brochures and booklets have been distributed to visitors. In addition to this, an introduction documentary film about DEKAMER has been shown continuously in the center.

In Fethiye Beach, awareness studies were carried out by distributing hand brochures to the local and foreign beach users in order to protect sea turtles and new warning signs were placed. In addition to this, presentations about sea turtles and biodiversity were made in order to inform the guests and to train the managers and staff of the tourism facilities in Fethiye.

Between June and September, about 100 visitors were informed by the project team and volunteers every evening between 21: 00–23: 30 hours in the information office on Calis Beach. Over 12,000 local and foreign tourists have been informed as a result of public awareness studies during 2016 in Fethiye. A total of 4,000 brochures were also distributed to local and foreign tourists at the information office and during the hotel seminars that held in the hotels.

In addition to this, we interviewed the managers of the tourism facilities and non-governmental organizations in the region and exchanged ideas for the solutions of problems on the beach in order to protect the sea turtle nests.

INFORMATION TABLES AND INFORMATION SIGNS ON PRISM CAGES ON THE NESTING BEACHES



WE CAN PROTECT SEA TURTLES IF ONLY THE NEW GENERATION LOVES THEM

PUBLIC AWARENESS STUDIES

PHOTOGRAPHS OF VOLUNTEERS AND THE PROJECT TEAM

5. EVALUATION, RESULTS AND RECOMMENDATIONS

5. I. Evaluation the Results of Sea Turtle Monitoring and Conservation Studies

Dalyan, Dalaman-Sarigerme and Fethiye beaches are the most intense areas among the sea turtle nesting areas in Muğla. A total of 855 nests were made in 2016 in these beaches in Muğla, of these 658 nests in Dalyan was the highest number of nests ever reached. When we look at the results of 24 years of conservation studies for Fethiye, it is seen that the average number of nests is 102, and this year it has reached to above this average with 112 nests. In Dalaman-Sarigerme, the number of nests has been reached in the average of previous years. The increasing annual nest numbers, especially on Dalyan Beach, can be seen as a result of conservation studies that have been applied for many years but it can be called early to reach a final judgment. Further studies for finding out the other causes of this increase in nest numbers has a great importance in this sense.

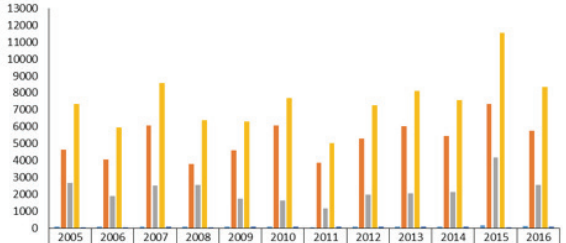
While the nest success shows similar characteristics to the previous years for all the beaches, the number of hatchlings reached to the sea has been kept at the same success level achieved in recent years through the intensive conservation efforts on predation in Dalyan. The fox predation was higher in comparison with previous years in Fethiye in 2016 season. Therefore, priority was given to nest caging efforts. In Dalaman-Sarigerme, it can be said that predation continues as an important problem which reduces the nest success.

Spatial distribution of the nests shows a big variation between nesting zones and each beach's subsections among three different nesting beaches. When the nest densities are considered according to the distances from the sea, the closest nests are made in Dalyan while the farthest nests are made in Dalaman-Sarigerme. Thus, the conservation measures should be taken by evaluating each nesting beach separately and it should be avoided taking specific conservation measure for all beaches.

These results are important for the regulation of conservation measures and indicate that conservation & monitoring studies should be continued every year.

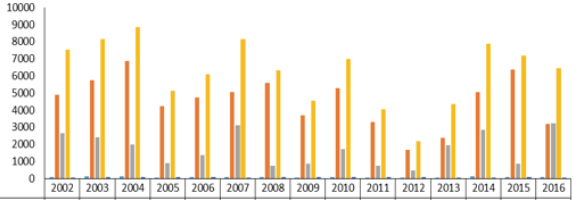
The Annual Number of Eggs and Hatching Success in Muğla Nesting Beaches

Fethiye Beach



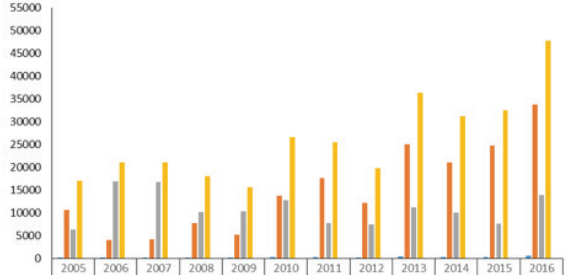
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
The Number of Nests	80	72	106	79	90	95	60	89	104	97	161	112
The Number of Hatchlings	4659	4080	6059	3807	4584	6072	3854	5287	6036	5451	7344	5771
The Number of Dead Embryo	2681	1885	2509	2559	1729	1623	1161	1978	2068	2115	4191	2569
Total egg number	7340	5965	8568	6366	6313	7695	5015	7265	8104	7566	11535	8340
Hatching Success (%)	63	68	71	60	73	79	77	73	74	72	64	69

Dalaman- Sarıgerme Beach



	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
The Number of Nests	103	112	110	61	73	104	82	56	74	56	29	57	107	105	85
The Number of Hatchlings	4882	5750	6859	4242	4749	5041	5590	3698	5293	3321	1687	2392	5054	6350	3194
The Number of Dead Embryo	2644	2402	1974	894	1363	3116	726	844	1700	738	476	1957	2843	849	3243
Total egg number	7526	8159	8833	5136	6112	8157	6316	4552	6993	4059	2163	4349	7897	7199	6437
Hatching Success (%)	65	71	78	83	78	62	89	82	76	77	78	55	64	88	49

Dalyan Beach

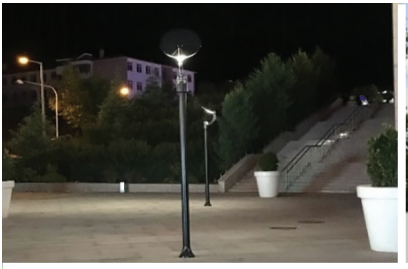


	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
The Number of Nests	221	269	274	277	291	354	345	278	522	433	432	658
The Number of Hatchlings	10619	4044	4215	7782	5227	13815	17632	12302	25024	21054	24841	33781
The Number of Dead Embryo	6446	16984	16816	10269	10366	12867	7859	7557	11282	10149	7690	13964
Total egg number	17065	21028	21031	18051	15593	26682	25491	19859	36306	31203	32531	47745
Hatching Success (%)	62	19	20	43	34	52	69	62	69	67	76	71

5. 2. Suggestions for Nesting Beaches of Muğla

Muğla is one of the most important tourism regions in Turkey. Therefore, the beach and marine area usage is at very high level. Considering that the sea turtles are actively using the coasts of Muğla during summer as breeding and foraging areas, human and sea turtles are facing in many situations. For this reason, conservation and monitoring studies should be continued in all regions and high attention should be given to public information activities. Suggestions for solutions to the problems encountered during the conservation and monitoring studies are given below for each region.

Correct Light Usage at Nesting Beaches



SUGGESTION

THE ARTIFICIAL LIGHT SOURCES BEHIND THE NESTING BEACHES IN FETHIYE, PARTICULARLY IN THE HOTELS REGION AND WALKWAYS WHERE INTENSIVE PEOPLE USAGE IS SEEN SHOULD BE CHANGED WITH THE PROPOSED LAMB MODEL GIVEN IN THE FIGURES. LOW SODIUM PRESSURIZED RED LIGHT LAMBS SHOULD BE USED AS LIGHT SOURCE.

Vehicle Use on the Beach

SUGGESTION

ALL VEHICLE USAGE ON THE NESTING BEACHES SHOULD BE FORBIDDEN BETWEEN MAY AND SEPTEMBER. ALL KIND OF WORKS THAT REQUIRES VEHICLE USE SHOULD BE COMPLETED BEFORE APRIL.

Use of Sunbeds on the Nesting Beaches

SUGGESTION

TOURISM FACILITIES ON THE BEACH SHOULD FOLLOW THE SUNBED USAGE REGULATIONS. FACILITIES THAT DO NOT COMPLY WITH THE RULES SHOULD BE PENALIZED BY THE AUTHORITIES. ALSO, LOCALS AND TOURISTS ARE PUTTING THEIR UMBRELLAS. AT LEAST TWO PERSONNEL SHOULD BE CHARGED TO CONTROL THE REGULATIONS TO PREVENT ANY POSSIBLE NEGATIVE ACTIVITIES ON THE BEACH. IN ADDITION, PLACEMENT OF ANY CARPET, WOODEN PLATFORMS ETC. ON THE NESTING BEACHES SHOULD BE PREVENTED.

Speed Boat Use in the Sea

SUGGESTION

SPEED BOAT USE IN THE SEA SPEED LIMITS SHOULD BE APPLIED TO PREVENT SEA TURTLES FROM BEING DAMAGED FROM SPEED BOATS, AND APPROPRIATE AREAS FOR PERFORMING THESE ACTIVITIES SHOULD BE DETERMINED. NIGHT ACTIVITIES WITH SPEED BOATS SHOULD BE FORBIDDEN. LOCAL TOURISM ENTERPRISES AND FISHERMEN WERE ENCOURAGED TO USE THEIR MARINE VEHICLES IN APPROPRIATE AREAS IN THE LEGAL SPEED LIMITS ACCORDING TO THE LEGISLATIONS.

Litters on the Beaches

SUGGESTION

LITTERS ON THE BEACH SHOULD BE CLEANED PERIODICALLY AND WARNING SIGNS AND TRASHCANS SHOULD BE PLACED IN APPROPRIATE AREAS ON THE BEACH. USAGE OF PLASTIC BAGS SHOULD BE LIMITED AND PEOPLE SHOULD BE INFORMED ABOUT PLASTIC BAG USAGE.

MEDASSET
Mediterranean Association to Save the Sea Turtles
www.medasset.org

DEKAMER
www.dekamer.org.tr

Fox and Dog Predation on Sea Turtle Nests

For more effective conservation applications, nests that under risk of inundation (identified in Section 3.2) or in the areas with high predation, the following measures should be applied:

- Nests that under risk of inundation should be altered to safe areas
- All nests should be screened against predation with grid 1 m wide cages
- Cages should be strengthened with 4 metal stakes on their corners
- Using of 25 cm side-cages around the grid cages should be continued
- The conservation studies has to start on April 15, taking into account the early start of the nesting season

SUGGESTION

SCREENING OF THE NESTS WITH GRID CAGES AGAINST FOX AND DOG PREDATION SHOULD BE CONTINUED AND THE NESTS AT HIGH INUNDATION RISK SHOULD BE ALTERED TO SAFER PLACES BY THE EXPERTS.

Shower Waters Running Toward the Beach

SUGGESTION

THE WATER RUNNING FROM THE SHOWERS ARE WETTING THE BEACH AND THREATENING THE SEA TURTLE NESTS. THESE SHOWERS SHOULD BE MOVED ACROSS THE ROAD OR WATER OUTLETS SHOULD BE MADE.

Feeding Sea Turtles by Hand

SUGGESTION

BLUE CRAB, ONE OF THE FOOD SOURCES OF LOGGERHEAD TURTLES ARE BEİNG CAUGHT AT NIGHT IN THE LAGOON BEHIND THE DALYAN BEACH. THIS IS CAUSİNG LİGHT POLLUTİON ON THE BEACH. ALSO, LOCALS ARE USING THESE CRABS FOR TOURISTIC SHOWS TO FEED TURTLES BY HAND. SOME TOURISM AGENCIES ARE PROMISES TO SHOW SEA TURTLES IN THEIR PROGRAM AND FEEDING SEA TURTLES BY HAND REGULARLY. THIS IS AFFECTING TURTLES NEGATIVELY. TURTLES OWN THE AREA AND CHANGE THEIR BEHAVIOR. SOME TURTLES STOP MIGRATING TO THEIR WINTERING AREAS. IN SOME CASES, TURTLES ARE FED BY CHICKEN SKIN INSTEAD OF CRAB OR FISH WHICH CHANGE THEIR DIET AND AFFECTS THEM NEGATIVELY. ALSO, THE CHANGE IN THEIR FEEDING BEHAVIOR AND EXPOSURE TO CONSTANT STRESS IN A CROWDED AREA IS LEADING THEM TO SECONDARY PROBLEMS. IN SOME CASES, TURTLES CAN BITE PEOPLE FROM THEIR LEGS. THUS, FEEDING TURTLES BY HAND SHOULD BE FORBIDDEN AND TOURISTS SHOULD BE INFORMED ABOUT THE NEGATIVE EFFECTS OF THESE ACTIVITIES. EVENTHOUGH THE HAND FEEDING ACTIVITIES WERE BANNED AT THE END OF THE SEASON, SOME TURTLES CONTINUED TO BITE PEOPLE AFTER THE ALTERATION OF THEIR BEHAVIOR.

Rehabilitation of Sea Turtles in Sea-Pens

SUGGESTION

TWO SEA-PENS WERE PLACED 1 MILE FROM THE BEACH TO OBSERVE REHABILITATED SEA TURTLES DIVING BEHAVIOR AND ADAPTATION TO NATURAL ENVIRONMENT BEFORE RELEASE. THESE SEA-PENS ARE 8 TO 10 M DEEP AND THE DIAMETERS ARE 9 AND 15 M. THESE SEA-PENS CAN ALSO BE USED FOR REHABILITATION OF BITING TURTLES AFTER ALTERED BEHAVIOR AS A RESULT OF HAND FEEDING ACTIVITIES. IN THESE SEA-PENS, SEA TURTLES DO NOT FACE WITH PEOPLE AND MARINE VEHICLE AND THEY ARE KEPT IN A REDUCED STRESS CONDITIONS.

WHAT TO DO WHEN AN INJURED OR DEAD TURTLE IS ENCOUNTERED

During on-site controls, it is very important to understand the situation of a turtle that drifts on the sea surface or is stranded to the shore. If the condition of turtle is well examined, the effectiveness of following process will be increased.

When a drifting turtle is encountered on the surface of the sea, it must be taken onboard carefully and transported to a safe place.

Turtle should not be exposed to sun light to prevent rapid body temperature change and should be kept wet to prevent dehydration.

The species of the turtle identified and if possible, measurements should be taken (measurement methodology was described in methodology). Turtle should be checked for tags. If a tag is found, the serial number and the address should be noted.

If turtle is injured, wound area should be identified rapidly and the wound should be cleaned. If this process takes a long time, turtle can be fed.

If a fishing-line is detected, line should not be pulled. If the turtle is found in a remote area with a fishing-line or a hook and the turtle looks healthy, line and hook can be cut after taking measurements and tag controls.

Turtles do not have teeth but they have very strong jaws. Do not put your hand into their mouth.

WHAT TO DO WHEN AN INJURED OR DEAD TURTLE IS ENCOUNTERED

If the hook is ingested and hooked to esophagus; If the hook is visible, mouth can be open with a hard material and the hook can be cut and removed from the esophagus. Sharp hook should be cut from the feathered edge. A strong pliers can be used to cut the hook. After this operation, turtle should be released when it looks vigorous.

If turtle is not active, it should be kept in a shaded and wet environment. Back of the turtle should be lifted about 20 cm and kept at least 30 minute in this situation. If turtle is not active, it should not be put in the water. If you rescued the turtle from drowning, putting back in the water may cause death. Lifting posterior part of the turtle help removing water from their lungs.

During these process, you can touch turtle's eyelid to check its reflex. If turtle reacts, you have an alive one. Sometimes it may take 24 hours to recover and get reflex. If turtle is not responding and body starts to harden, turtle is dead.

Sometimes turtles can be entangled to trawl nets. If you notice a sea turtle in the trawl net, be careful while depositing the net. If turtle is active, you can release.

In some cases, turtle can be found with small scratches. If turtle is active and wounds are on the body surface, you can release the turtle. If turtle has a head damage, you should keep it. You may apply antibiotic ointment regularly.

WHAT TO DO WHEN AN INJURED OR DEAD TURTLE IS ENCOUNTERED

If you have to keep turtle for treatment, food and water needs should be met. If turtle starts to lift its head while breathing, it is a good sign. When you hold its flippers, if turtle resist this is again a good sign about its health condition. Another signs of a good health are; when you put turtle on the floor, if it starts to crawl or when you lift in the air if it starts to flap its flipper continuously you can say the turtle is healthy. You can release the turtle as soon as possible if turtle shows these signs.

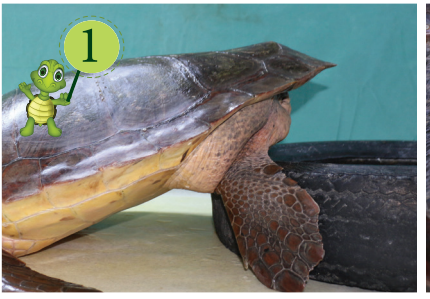
When you lift the turtle, if the head and the limbs fall and it does not move, it means turtle is injured or, sick or dead. You should check its reflex to understand its state. If turtle is not reacting anything, you can touch its tail (cloaca).

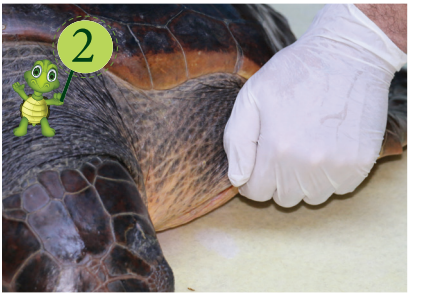
If the turtle is swelled and different animals started to grow on its body, turtle is already dead. You can check for tags, tags have very valuable information for their conservation.

Date, location, species name, genders, ages (juvanile, subadult or adult) and morphological deformation can be seen at first glance of dead turtles should be recorded, and If possible, body size measurements such as curved carapace length and width using a tape measure from the longest parts of the carapace should be taken.

RECOMMENDATIONS FOR USING TECHNIQUES

WHILE APPLYING THE TECHNIQUES, EXAMINE THE SEA TURTLE CLOSELY, HOLD IT TIGHT BUT GENTLY WITHOUT INJURING OR DAMAGING IT. THE TECHNIQUES CAN BE USED QUICKLY, BUT CAN BE REPEATED TWICE SUCCESSIVELY IF THE FIRST ONE IS SUCCESSFUL. IF THERE IS NO CERTAINTY ABOUT TURTLE'S REACTIONS, WAIT 10 MINUTES BETWEEN THE FIRST AND SECOND TRIAL.





1

If a turtle is found in the net, lift the posterior

2

If turtle is active, hold the turtle from the front flippers as it is seen in the figure to stabilize for examining. Do not hold from the tip of the flippers

3

Turtle shell should be measured with a tape measure as it is seen in the figure

4

If turtle is still, you can touch its eyelid as it is seen in the figure

5

If you don't get a response from the eye, you can touch its tail to get response

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