



# MARINE TURTLE NESTING SURVEY AND STRANDING ASSESSMENT FROM TARTUS TO SYRIA'S BORDER WITH LEBANON

ADIB SAAD<sup>1,2</sup>, AHMAD SOULAIMAN<sup>1</sup> & HASAN ALKUSAIRY<sup>2</sup>

<sup>1</sup>Syrian Society for Aquatic Environment protection (SSAEP), Syria (e-mail: adibsaad52@gmail.com)

<sup>2</sup>Marine Sciences Laboratory, Tishreen University, P.O Box 1408, Lattakia, Syria

Saad, A., Soulaïman, A. & Alkusaïry, H.: Marine turtle nesting survey and stranding assessment from Tartus to Syria's border with Lebanon. *Nat. Croat.*, Vol. 29, Suppl. 1., 235-242, 2020, Zagreb.

The nesting of sea turtles (*Caretta caretta* and *Chelonia mydas*) was studied along the beach south of Tartus (i.e. *the Beach of Dreams "Al Ahlam"*) as far as the border of Syria and Lebanon to the south, a distance of about 40 km. It includes a length of about 10 km suitable for sea turtle nesting. The beach was divided into 7 subsections, each of them between 0.3 and 3 km long. The nesting success was 25% for the loggerhead turtle and 40% for the green turtle. A total of 106 dead marine turtles were observed, including 95 (92%) loggerhead turtles and 11 (8%) green turtles.

**Keywords:** Sea turtle nesting, stranding, threats, Tartus beach, Syria

Saad, A., Soulaïman, A. & Alkusaïry, H.: Istraživanje gniježdenja morskih kornjača i procjena nasukavanja od Tartusa do granice Sirije i Libanona. *Nat. Croat.*, Vol. 29, Suppl. 1., 235-242, 2020, Zagreb.

Istraživano je gniježđenje morskih kornjača (*Caretta caretta* i *Chelonia mydas*) od plaže južno od Tartusa (tj. *Plaža snova "Al Ahlam"*) sve do granice Sirije i Libanona na jugu, duljine od oko 40 km. To područje uključuje oko 10 km prikladnih za gniježđenje morskih kornjača. Plaža je podijeljena u 7 dijelova, svaki dugačak od 0,3 do 3 km. Uspjeh gniježđenja bio je 25% za glavatu želvu i 40% za zelenu želvu. Zabilježeno je ukupno 106 mrtvih morskih kornjača, uključujući 95 (92%) glavatih želvi i 11 (8%) zelenih želvi.

**Ključne riječi:** gniježđenje morskih kornjača, nasukavanje, ugroze, plaža Tartus, Syria

## INTRODUCTION

Three sea turtle species occur regularly in the Mediterranean; loggerhead turtle (*Caretta caretta*), green turtle (*Chelonia mydas*) and leatherback turtle (*Dermochelys coriacea*) (CASALE *et al.*, 2018; REES *et al.*, 2004; TÜRKÖZAN & KASKA, 2010). Loggerhead and green turtles both breed in the Mediterranean, while leatherback turtles from the Atlantic use the region only for foraging (KASPAREK *et al.*, 2001; MARGARITOU LIS *et al.*, 2003). The main loggerhead nesting areas are in Greece, Turkey, Cyprus, Libya and Syria (KASPAREK *et al.*, 2001; MARGARITOU LIS *et al.*, 2003; 2004; CASALE & MARGARITOU LIS, 2010; REES *et al.*, 2008) and the main foraging areas are along the North African, Adriatic and north-eastern Ionian continental shelves (CASALE & MARGARITOU LIS, 2010; STOKES *et al.*, 2015). Green turtle habitats are restricted, with a more easterly distribution. The main green turtle nesting areas are in Turkey, Cyprus and Syria (KASPAREK *et al.*, 2001; CANBO LAT, 2004; REES *et al.*, 2008; CASALE *et al.*, 2018; SAAD, 2012). The Mediterranean subpo-

pulation of loggerhead turtles was downgraded in 2015 to Least Concern (LC) from Endangered (EN) according to the IUCN red list criteria. It is assumed that the current status of the Mediterranean subpopulation represents the success of past conservation efforts at nest sites and the Mediterranean subpopulation is subsequently assessed as conservation dependent (CASALE & TUCKER, 2017). In addition, Mediterranean green turtles are ranked as part of the global classification as Endangered (SEMINOFF, 2004) and the leatherback turtle as globally Vulnerable (WALLACE *et al.*, 2004). However, the main conservation efforts were carried out on the nesting beaches of Mediterranean and the main threats in marine habitats still remain.

The presence of loggerhead (*Caretta caretta*) and green sea turtles (*Chelonia mydas*) off the coast of Syria, was first reported by GRUVEL (1931) but the nesting beaches were not indicated. The next turtle information to come out of Syria resulted from a rapid assessment survey in 1991 that identified low-level nesting concentrated on a beach south of Lattakia City (KASPAREK, 1995). Local researchers noted incidental turtle captures in beach seines, and also observed turtles stranded along the coast (SAAD *et al.*, 2003). Since 2004 a more extensive coastal survey has been undertaken, primarily to better identify Syria's actual and potential nesting populations (SAAD & REES, 2004; REES *et al.*, 2005; SAAD *et al.*, 2006; REES *et al.*, 2008). A combination of nocturnal surveys during the nesting season and co-operative efforts with fishermen afforded the first opportunities to observe turtles in the wild to obtain basic biometric data and tag the turtles before they returned to the sea after nesting or were released after being caught in fishing nets. In contrast to Lattakia Beach where nesting has been studied for 10 years (2004-2010) (SAAD *et al.*, 2010), this is the first time that nesting sites have been studied thoroughly and comprehensively on the coast stretching from the city of Tartus to the Lebanese-Syrian border.

## MATERIAL AND METHODS

The nesting and stranding of sea turtles were studied in the beach south of Tartus city (35°35'07 E; 34°51'43 N) as far as the Lebanese border in the south (35°58'24.16 E; 34°37'58.48 N), a total distance of about 40 km (Fig. 1). Assessment of marine turtle strandings was carried out by direct examination of carcasses and a questionnaire survey of fishermen to confirm their observations about the mortality of sea turtles: The study was undertaken weekly between January 2016 and December 2017. On encountering the dead turtle, the following data were recorded: Area name - date - species identification - straight carapace length (SCL) - note accompanying injury, which depends on the availability of a healthy and soft shield. Estimate the distance between dead turtles during the trip when close to each other. Turtle carapaces were painted to avoid repeat counts (GARDNER & NICHOLS, 2001). Interviews were also conducted with fishermen on the beach about the dangers facing turtles. With respect to nesting, the area was surveyed daily between 20 June to 29 August 2016. Ground patrols were carried out throughout every kilometer of the sandy coast to survey for turtles, turtle tracks and turtle nests. Nesting success and nest numbers were calculated in two ways: 1 - from initial track assessment that did not include clutch identification (Figs. 1, 2). 2 - By summing the number of nests proven by observation of eggs (Fig. 4). The stage of the mature individual and the stage of the young or non-adult individual were determined based on the body length of the dead turtle, both the loggerhead turtle and the green turtle reach sexual maturity in the Mediterranean when body length averages between 60-65 cm (<https://seaworld.org>, 2020 ; MILLER, 1997).

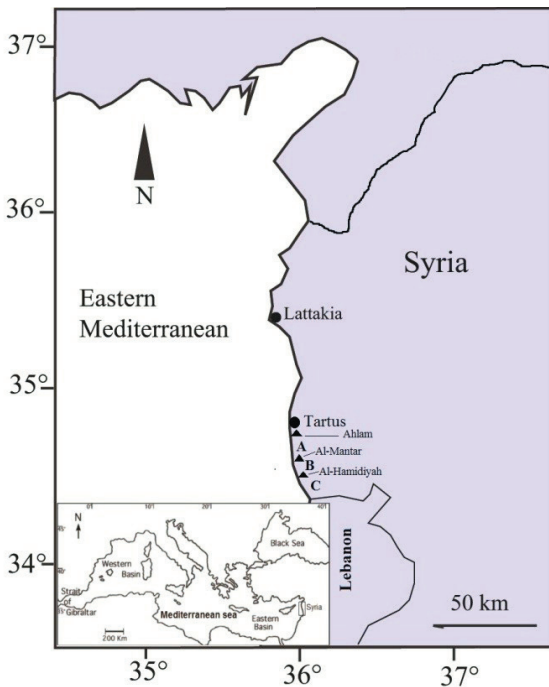


Fig. 1. Study area Between Tratus and the Lebanese border, a total distance of about 40 km



Fig. 2. Green turtle *Chelonia mydas* hatching track



Fig. 3. Track of loggerhead turtle *Caretta caretta*.

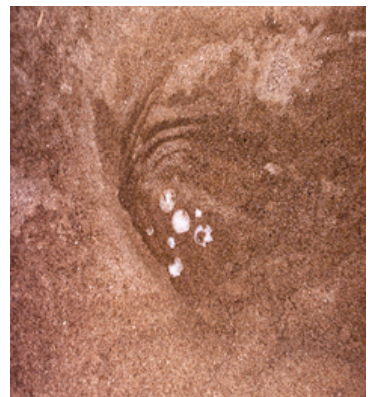


Fig. 4. Egg observation in the nest.

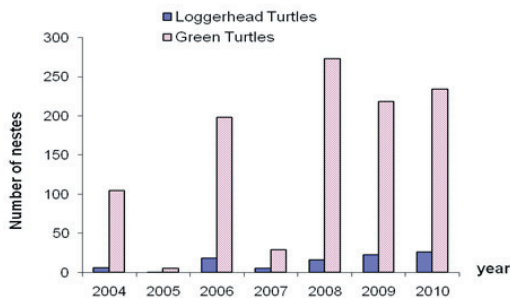
## RESULTS AND DISCUSSION

The present study provides the first sea turtle nesting and stranding data from the south of Tartus beach in Syria, and shows that a total of 36 turtle tracks including 13 nests were recorded. The majority of the nests, 11 (84%), were from the loggerhead turtle, *Caretta caretta*, and 2 (16%) were from the green turtle, *Chelonia mydas*. The nesting success rate was 25% for the loggerhead turtle and 40% for the green turtle. The nesting density at the site of the study was 1.3 nest/km, and the overall nesting success rate was 26.5%. The highest number of nests was recorded in Area A (Al Ahlam

Beach and Amrit (35°54'06 E; 34°50'08 N) (Tab. 1). The results showed that the peak of nesting occurred during the second week of July (7 nests). The results of this study reveal a reversal of species prevalence from the northern part of the country, as a similar study previously undertaken on the beach of Shkaifate, south of Lattakia (REES *et al.*, 2010; SAAD *et al.*, 2010) revealed green turtle nesting was dominant (Fig. 5).

**Tab. 1.** Monthly variation of stranding turtles number on the three areas (A,B,C)

Month	Area			Number of stranding turtles
	A	B	C	
1	1	0	0	1
2	4	0	0	4
3	1	3	2	6
4	14	9	9	32
5	9	2	0	11
6	4	6	0	10
7	0	6	4	10
8	1	1	11	13
9	1	6	2	9
10	1	2	2	5
11	0	0	0	0
12	1	1	3	5
Total	37	36	33	106



**Fig. 5.** Variation in the number of turtle nests on Lattakia beach during seven years of survey.

The strandings indicate that the loggerhead is present year-round in this area. A total of 106 dead marine turtles were observed, including 95 (92%) loggerhead turtles and 11 (8%) green turtles. The results showed that higher numbers of dead green turtles in April ( $n = 32$ ) with a mortality rate of 0.25 carcasses/km/month (Tab. 1). About 86% of all turtles found were juveniles or sub-adults. The percentage of turtles over 60 cm in length came to 56% (it is assumed that they reach sexual maturity with a length of 60 cm); individuals over 65 cm in length accounted for 28%. BASKAL *et al.* (2018) in the Fethiye-Göcek (Turkey) reported that the majority of stranded logger heads were considered to be adults (77.45%), while the majority of stranded green turtles were immature. Timing of marine turtle mortalities and visible injuries suggest that gill net and dynamite fishing were responsible for most of the deaths.

Strandings of Loggerhead turtle were more common during spring and summer. This probably coincided with the increase in fishing activities. Our data agree partially with the observations of JRIBI *et al.* (2007) in the Gulf of Gabes (Tunisia), TOMÁS *et al.* (2008) in the Valencian Community (Spain) and CARACAPPA *et al.* (2018) on the Sicilian coast. On the other hand CORSINI *et al.* (2013) reported that a higher incidence of loggerhead turtle strandings in Rhodes Island was observed in summer, while there were more green turtle strandings in winter.

Surveys indicate that there is interaction of turtles with fisheries as it is speculated that drift net fishing offshore could be the cause of the numbers of dead stranded turtles found; also, the coast is greatly affected by the presence of sea-borne plastic and other waste. The presence of large quantities of litter was noted during this survey. This waste accumulates in some areas in such quantities as to cause hindrance to turtles wishing to come ashore to nest and subsequently for the emerged hatchlings struggling to reach the sea.

Comparing the results of the current study with the results of the numerous studies carried out in other countries bordering the eastern and southern shores of the Mediterranean Sea, it becomes clear to us that the main threats to sea turtle populations are coastal development (ILGAZ *et al.*, 2007), natural predation (ERK'AKAN, 1993; BRODERICK & GODLEY, 1996; REES *et al.*, 2008; SAAD *et al.*, 2010), incidental catch and intentional killings by fishermen (CASALE, 2011), as well as collision with marine craft (CASALE & MARGARITOU, 2010). Entanglement in plastic marine debris is also likely to be a major source of mortality (DUNCAN *et al.*, 2017). Incidental catch is considered to be the main threat in the Eastern Mediterranean (TÜRKOZAN *et al.*, 2013); the results of LEVY *et al.* (2015) also show that gillnets and trawlers are the main threats to sea turtles in the Levantine basin. In addition SONMEZ (2018) reported that the Fishing activities and marine pollution is the main cause of strandings on Samandağ Beach (eastern Mediterranean coast of Turkey). Oceanic and sub-adult stage individuals were stranded in especially high numbers due to plastic Materials (SONMEZ, 2015). CASALE (2011) estimated that over 132,000 sea turtles were captured, of which 44,000 die annually in the Mediterranean Sea.

Incidental catch is considered to be the main threat in the Mediterranean and CASALE (2011) estimated that over 132,000 sea turtles were captured, of which 44,000 die annually in the region

This study confirms that south of Tartus is likely to be an important feeding and nursery ground, with the loggerhead turtle being the most common species.

## CONCLUSION

Conservation efforts on the nesting beaches should therefore not be the only criteria for assessing a population. In this case, the population status of sea turtles in marine habitats and mortality rates, according to stranding data and observations in fisheries, are needed for a comprehensive assessment, especially in Syria. The lack of data on the number of strandings and sea turtle deaths prevents us from making a proper assessment, but the available data shows that we lost at least the same number of sea turtles in the marine habitats that we protected on the nesting beaches of the Tartus beach. Thus, conservation measures should be extended to marine habitats while conservation studies on the nesting beaches must be continued.

## ACKNOWLEDGEMENT

The authors Thank the UNEP's RAC/SPA, the Bern Convention, IUCN and the 6th Mediterranean Conference on Marine Turtles for the travel grant. We also wish to thank the editors and the reviewers for their helpful comments on the manuscript.

*Received April 1, 2019*

## REFERENCES

- BAŞKALE, E., SÖZBİLEN, D., KATILMIŞ, Y., AZMAZ, M. & KASKA, Y., 2018: An evaluation of sea turtle strandings in the Fethiye-Göcek Specially Protected Area: An important foraging ground with an increasing mortality rate. *Ocean and Coastal Management* **154**, 26–33.
- BRODERICK, AC & GODLEY, BJ., 1996: Population and nesting ecology of the green turtle, *Chelonia mydas*, and the loggerhead turtle, *Caretta caretta*, in northern Cyprus. *Zool Middle East* **13**, 27–46.



- CANBOLAT, AF., 2004: A review of sea turtle nesting activity along the Mediterranean coast of Turkey. *Biol Conserv* **116**, 81–91.
- CARRERAS, C, PASCUAL M, TOMÁS J, MARCO A, HOCHSCHEID S, CASTILLO JJ, GOZALBES P, PARGA M, PIOVANO S. & CARDONA L., 2018: Sporadic nesting reveals long distance colonisation in the philopatric loggerhead sea turtle (*Caretta caretta*). *Scientific Reports* **8**(1), 1435. <https://doi.org/10.1038/s41598-018-19887-w>.
- CASALE, P., ANTONIOS D. MAZARIS, DANIELA F., CAROLA V. & ROBERTO A., 2009: Growth rates and age at adult size of loggerhead sea turtles (*Caretta caretta*) in the Mediterranean Sea, estimated through capture-mark-recapture records. *Scientia Marina* **73**(3), 589-595 doi: 10.3989/scimar.2009.73n3589.
- CASALE, P., 2011. Sea turtle by-catch in the Mediterranean. *Fish Fish* **12**, 299–316
- CASALE, P, NICOLOSI P, FREGGI D, TURCHETTO M & ARGANO R, 2003: Leatherback turtles (*Dermochelys coriacea*) in Italy and in the Mediterranean Basin. *Herpetol J.* **13**, 135–13.
- CASALE, P. & MARGARITOU LIS, D., 2010: Sea Turtles in the Mediterranean: distribution, threats and conservation priorities. IUCN/SSC Marine Turtle Specialist Group, Gland.
- CASALE, P. & TUCKER AD, 2017: *Caretta caretta*. (amended version of 2015 assessment) The IUCN Red List of Threatened Species 2017: e.T3897A119333622. <https://doi.org/10.2305/IUCN.UK.2017-2.RLTS.T3897A119333622.en>
- CASALE, P., BRODERICK A., ANTONIO J., LUIS CARDONA L., CARRERAS C., DEMETROPOULOS A., FULLER W., BRENDAN J. GODLEY B., HOCHSCHEID S., KASKA Y., LZARD B., MARGARITOU LIS D., PANAGOPOULOU, A. REES, A., TOMAS J. & TURKOZAN O., 2018: Mediterranean sea turtles: current knowledge and priorities for conservation and research. *Endangered Species Research* **36**, 229–267. <https://doi.org/10.3354/esr/00901>
- CLUSA, M, CARRERAS C, PASCUAL M, GAUGHRAN SJ *et al.*, 2014: Fine-scale distribution of juvenile Atlantic and Mediterranean loggerhead turtles (*Caretta caretta*) in the Mediterranean Sea. *Mar Biol* **161**, 509–519.
- CORSINI-FOKA, M., KONDYLATOS G. & SANTORINIOS E., 2013: Increase of sea turtles stranding records in Rhodes Island (eastern Mediterranean Sea): update of a long-term survey. *Journal of the Marine Biological Association of the United Kingdom*, Volume **93**, Issue 7, November 2013, pp. 1991–2002. DOI: <https://doi.org/10.1017/S0025315413000556>.
- DUNCAN, EM, BOTTERELL ZLR, BRODERICK AC, GALLOWAY TS, LINDEQUE PK, NUNO A & GODLEY BJ, 2017: A global review of marine turtle entanglement in anthropogenic debris: abaseline for further action. *Endang Species Res* **34**, 431–448.
- ERK'AKAN, F., 1993: Nesting biology of loggerhead turtles *Caretta caretta* L. on Dalyan beach, Mugla-Turkey. *Biol Conserv* **66**, 1-4.
- GARDNER, S.C. & NICHOLS, W.J., 2001. Assessment of sea turtle mortality rates in the Bahi'a Magdalena region, BCS, Mexico. *Chelonian Conserv. Biol.* **4**, 197–199.
- GRUVEL, A., 1931: Les Etats de Syrie. Richesses marines et fluviales. Exploitation actuelle - Avenir. - Biblioteque de la Faune des Colonies Francaises III. Paris, Societe d'Editions Geographiques, Maritimes et Coloniales
- ILGAZ, Ç, TÜRKÖZAN O, ÖZDEMİR A, KASKA Y & STACHOWITSCH M., 2007: Population decline of loggerhead turtles: two potential scenarios for Fethiye beach, Turkey. *Biodivers Conserv* **16**, 1027-1037.
- KASPAREK, M., 1995: The nesting of marine turtles on the coast of Syria. *Zoology in the Middle East* **11**, 51-62.
- JRIBI, I, BRADAI MN & BOUAIN A., 2007: Impact of trawl fishery on marine turtles in the Gulf of Gabes, Tunisia. *Herpetological Journal* **17**(2), 110–114.
- LEVY, Y., FRID O., WEINBERGER A., SADE R., ADAM Y., KANDANYAN U., BERKUN V., PERRY N., EDELIST D., GOREN M., ROTHMAN S., NIR STERN N., TCHERNOV D. & RILOV G., 2015: A small fishery with a high impact on sea turtle populations in the eastern Mediterranean. *Zoology in the Middle East* **61**(4), 300–317, <http://dx.doi.org/10.1080/09397140.2015.1101906>
- KASPAREK M, GODLEY BJ, BRODERICK AC, 2001: Nesting of the green turtle, *Chelonia mydas*, in the Mediterranean: a review of status and conservation needs. *Zool Middle East* **24**, 45–74.
- MARGARITOU LIS, D, ARGANO R, BARAN I, BENTIVEGNA F. *et al* 2003.: Loggerhead turtles in the Mediterranean Sea: present knowledge and conservation perspectives. In: BOLTEN AB & WITHERINGTON B (eds) *Loggerhead sea turtles*. Smithsonian Institution Press, Washington, DC, p 175–198.
- MILLER, J. D., 1997: Reproduction in sea turtles. In P. L. LUTZ & J. A. MUSICK (eds.). *The biology of sea turtles*, 51–80. Boca Raton, Fla.: CRC Press.
- REES, AF, A. SAAD & M. JONY, 2004: Discovery of a "major" green turtle nesting area. Marine turtle nesting survey, Syria. Second Mediterranean Conference on Marine Turtles, 4-7 May 2005, Kemer, Turkey.

- REES, A.F., SAAD, A. & JONY, M., 2008: Discovery of a regionally important green turtle *Chelonia mydas* rookery in Syria. *Oryx* **42**(3), 456-459.
- REES, A.F., SAAD, A. & JONY, M., 2010: Syria. Pp 233-243 in: CASALE, P. & MARGARITOU, D. (Eds.) *Sea turtles in the Mediterranean: Distribution, threats and conservation priorities*. Gland, Switzerland: IUCN. p. 294.
- SAAD, A., HASAN, A. & ALI, T., 2003: Status of sea turtles distribution on the Syrian coast. Final report of 5th year students at the Faculty of Agriculture, Tishreen University, 23 pp.
- SAAD, A. & REES, A., 2004: Status of Marine turtles in Syria: Focus on nesting beach investigation (Case study and recommendation for future research). Proceeding of the workshop INOC Meknas, Morocco, 2-5 November 2004.
- SAAD, A., ALI, A. & DARWICH, A., 2006: Marine turtle nesting survey, Syria 2005. P 320. In: M. FRICK, A. PANAGOPOULOU, A.F. REES & K. WILLIAMS (compilers). *Book of Abstracts of 26th Annual Symposium on Sea turtle Biology and Conservation: International Sea Turtle Society, Athens, Greece*. 376 pp.
- SAAD, A., A. REES, W. SABOUR, A. OTHMAN, C. GENAIDI & N. ALKHATEEB, 2010: Six years of Survey (2004-2009) on reproduction of sea turtles on Shkaifate Beach, Syrian Coast (Proposed As Protected Area). *CIESM Vol.* **39**, 133.
- SÖNMEZ, B., 2018: Sixteen year (2002-2017) record of sea turtle strandings on Samandağ Beach, the Eastern Mediterranean Coast of Turkey. *Zoological Studies* **57**, 53. doi:10.6620/ZS.2018.57-53
- SEMINOFF, J.A., 2004: *Chelonia mydas*. The IUCN Red List of Threatened Species. (Southwest Fisheries Science Center, U.S.). e.T4615A11037468. <https://dx.doi.org/10.2305/IUCN.UK.2004.RLTS.T4615A11037468.en>. Downloaded on 11 November 2020
- STOKES, K.L., BRODERICK A.C., CANBOLAT A.F., CANDAN O *et al.*, 2015: Migratory corridors and foraging hotspots: critical habitats identified for Mediterranean green turtles. *Divers Distrib* **21**, 665-674.
- TOMÁS, J., GOZALBES P., RAGA J.A. & GODLEY B.J., 2008: Bycatch of loggerhead sea turtles: insights from 14 years of stranding data. *Endangered Species Research* **5**(2-3), 167-169. <https://doi.org/10.3354/esr00116>
- TURKOZAN, O. & KASKA, Y., 2010: Turkey. In: CASALE, P., MARGARITOU, D. (Eds.) 2018, *Sea Turtles in the Mediterranean: Distribution, Threats and Conservation Priorities*. IUCN/SSC Marine Turtle Specialist Group, Gland, Switzerland, pp. 257-293.
- TURKOZAN, O., ÖZDİLEK S., ERGENE S., A., UÇAR A., BEKTAŞ SÖNMEZ B., YILMAZ C., KAÇAR Y. & AYMAK C., 2013: Strandings of loggerhead (*Caretta caretta*) and green (*Chelonia mydas*) sea turtles along the eastern Mediterranean coast of Turkey. *Herpetological Journal* **23**, 11-15.
- WALLACE, B.P., TIWARI, M. & GIRONDOT, M. 2013: *Dermodochelys coriacea*. The IUCN Red List of Threatened Species 2013: e.T6494A43526147. <https://dx.doi.org/10.2305/IUCN.UK.2013-2.RLTS.T6494A43526147.en>. Downloaded on 12 November 2020 <https://seaworld.org/animals/all-about/sea-turtles/reproduction/>

