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Preliminary data on bycatch and stranding of marine turtles in Al Hoceima, Morocco

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ABSTRACT

The area of Al Hoceima in Morocco occupies a strategic biological position concerning the trajectory of migratory species. Bycatch and standing data in this area are still lacking. However, knowledge of the number of stranded individuals/species and the bycatch rate/total catch for each fishing gear is crucial to adopting more effective conservation stratégies. Given this lack of information, monitoring of total standing and bycatch data was conducted from January To June 2021. Two different approaches were used in this study: on-board observation of longline, trawlers, and seiner vessels for bycatch rate and monitoring of the torture standing area through self-déclaration by sensitized fishermen. The results showed the existence of two species. Dermochelys Caracas (Vandelli, 1761) (1 individual) was stranded on Calabonita beach, and Caretta-Caretta (Linnaeus, 1758) was caught in longliners (two individuals) and trawlers (three individuals). No individuals were reported in purse seiners. For the first time, preliminary data on the bycatch and standing of tortures in Al Hoceima have been determined and this information is vital To implementing future conservation measures.

INTRODUCTION

Globally, fishing activity is one of the threats to sea turtles **(Lewison & Crowder, 2007; Casale, 2011; Wallace *et al*., 2013)**. It has been estimated that approximately 85,000 turtles were incidentally caught between 1990 and 2008 in fishing operations **(Wallace *et al*., 2010)**. In the Mediterranean, **Casale (2011)** mentioned more than 132,000 captures per year and probably more than 44,000 incidental deaths per year were estimated. Due to

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the presence of an active fishing industry that results in many interactions with sea turtles **(Casale *et al.*, 2007; Nada & Casale, 2011)**. The mortality rate of turtles in the Mediterranean is higher compared to other countries in the world **(Finkbeiner *et al.*, 2011).**

Morocco is located at the western end of the Mediterranean and occupies a very strategic position as it is not only the migration corridor for loggerhead and *Dermochelys coriacea* (Vandelli, 1761) between the Atlantic and the Mediterranean **(Casale *et al.*, 2003; Revelles *et al.*, 2007; Casale & Margaritoulis, 2010)**, but it is also a region of high biological diversity characterized by the presence of migratory species of high commercial value such as tuna and swordfish. This encourages fishing activity in this area. fishermen declaring regular encounters with turtles at sea and frequently catching them in their fishing gear **(Tiwari *et al.*, 2001; Benhardouze, 2009)**. In this sense, several studies **(Benhardouze, 2004; Tiwari *et al.*, 2006; Benhardouze *et al.*, 2009; Aksissou *et al.*, 2010; Benhardouze *et al.*, 2012)**, and surveys **(Chahban *et al.*, 2017; Kaddouri *et al.*, 2018)** are conducted with fishermen reporting the presence of *Caretta caretta*, *Dermochelys coriacea* and *Chelonia mydas* (Linnaeus,1758). **Casale (2011)** reported that this fishing activity accidentally captured more than 10,000 turtles in the Moroccan Mediterranean. Another complementary study carried out at the level of Tangier reported a total of 73 turtles captured in driftnets during a four-year study **(Benhardouze *et al.*, 2012)**.

The district of Al Hoceima is located in the western Mediterranean and is characterized by the presence of a national park that promotes marine biodiversity **(IUCN, 2012; Keznine *et al.*, 2021)**. Many habitats in the district of Al Hoceima are of conservation interest in the Mediterranean and are listed in many international conventions and agreements **(IUCN, 2012)**. In this area, sea turtle species are sometimes observed at sea, captured accidentally, or beached. To increase the knowledge on the distribution and biology of this species in the Mediterranean Sea, it is important to update the data on discoveries or strands.

This work aims to identify the status and rate of the catch of turtles by the different gears used by the vessels in Al Hoceima.

MATERIALS AND METHODS

1- Study area

The study area is located in Al Hoceima western Mediterranean sea, in the Alboran Sea. The area is characterized by the passage of many migratory animals between the Atlantic and the Mediterranean and is also an essential area for commercial fishing. The study area extends from Al Hoceima to about 150 km east of the Strait of Gibraltar and is bounded on the west by the National Park of Al Hoceima, this area is characterized by the presence of significant marine biodiversity **(Fig.1)**

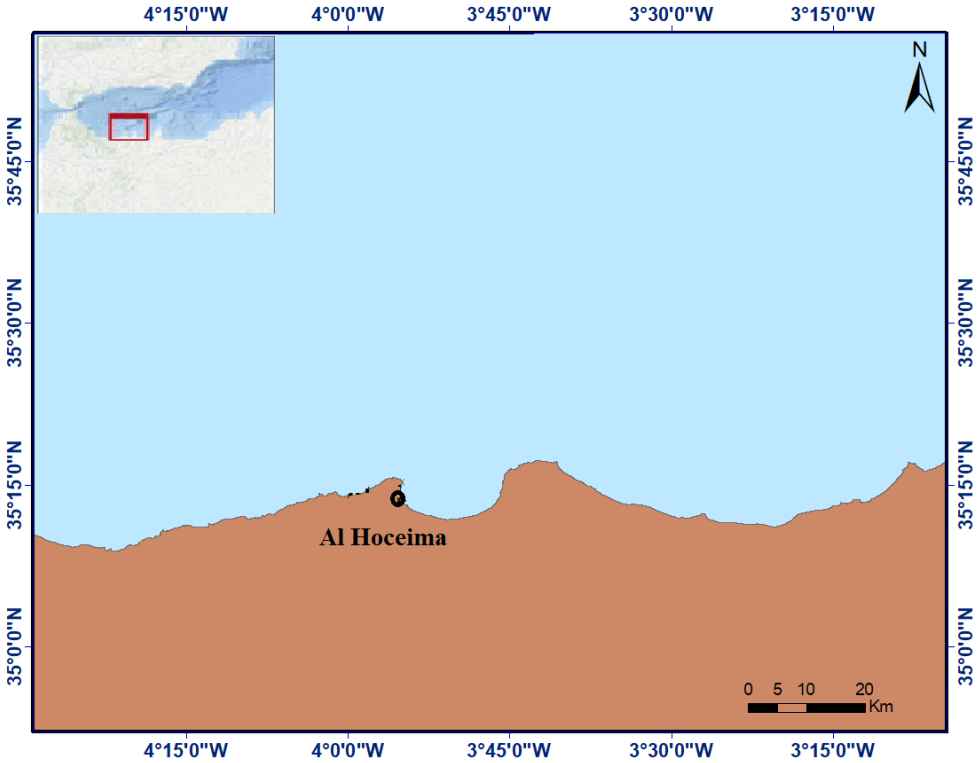

Figure 1: Location of the study area Al Hoceima

2- Data collection

This study was conducted from January to June 2021, using two approaches: The first approach focuses on the onboard observer method in which we trained and sensitized 15 onboard fishermen, respectively five fishermen on longliners, trawlers, and seiners. **(Fig.2)**

Figure 2: Training and awareness workshop for fishermen

The second approach, the second one consists of the self-declaration of the local population in the zones of strands of the turtles at the level of Al Hoceima. Thirty fishermen were sensitized and prepared to declare the stranded species in the area.

RESULTS AND DISCUSSION

1- Stranding of *Dermochelys coriacea*

For *D. coriacea*, no individuals were reported on board the three gears (trawl, seine and longline) durant the study period. This can be explained by the small size of the population in the area which reduces incidental fishing with vessel gear, also this can be justified by the absence of nesting areas in the region and the presence only of sub-adults and adults **(Tiwari *et al*., 2001; Casale & Margaritoulis, 2010)**, but further studies are needed to confirm this hypothesis.

On 18 March 2021, an individual was stranded on the beach of Calabonita, Al Hoceima **(Fig. 3).** The species had its left anterior fin cut off, which made the turtle immobile. The condition of the animal shows that it had probably remained attached to these nets for a long time. The morphological characteristics of the animal were a total length of 2m and a curved, width of the carapace of 90 cm, and a weight of more than 150 kg **(Fig. 3).**

The stranding of *D. coriacea* course in the Al Hoceima area is affirmative of previous data on the stranding status of this species in Morocco **(Masski & Tai, 2017).** This species appears to be present every month of the year in the Alboran Sea **(Rojo-Nieto *et al*., 2011)**. But, few leatherback standing has been documented along the entire Moroccan coast, which may be due partly to underreporting (**Masski & Tai, 2017)**. Stranded leatherback turtles show signs of interaction with fishing gear. Lost nets at sea remain among the direct threats to turtles in Morocco. But, the cause(s) of leatherback strands remain widely unknown **(Nicolau *et al*., 2016)**. More consistent and standardized reporting of stranded marine turtles in Morocco could help better characterize the occurrence of leatherback turtles in Moroccan seas, and the threats they face.

Figure 3: *Dermochelys coriacea* stranded at the beach of Calabonita Al hoceima 2021.

2- Bycatch of *Caretta caretta*

For *C. careta*, no strandings were reported in the study area. The results were reported only on vessels (3 ind/96 observations onboard trawlers and 2 ind/60 observations on board for longliners). No individuals were caught by purse seiners.

The body condition of the turtles did not show any marks or sweeps from the fishing gear or propeller. The effect of finding this species young off Al Hoceima indicates the importance of the abundance of this species in this area. The same results were found by several authors **(Tiwari *et al*., 2001; Tomas *et al*., 2001; Ocaña *et al*., 2005).** The number of turtles accidentally caught in Morocco is very low currently compared to previous years in which fishermen use drift gillnets. **Casale (2011)** classified Morocco as one of the countries in the Mediterranean Sea with a high rate of turtle bycatch (estimated at more than 10,000 turtles per year). This excellent handling to save the turtle gives us reflections to organize more awareness activities to fishermen to improve their knowledge on the handling techniques of the species captured accidentally to bring it back to the sea alive and in good condition.

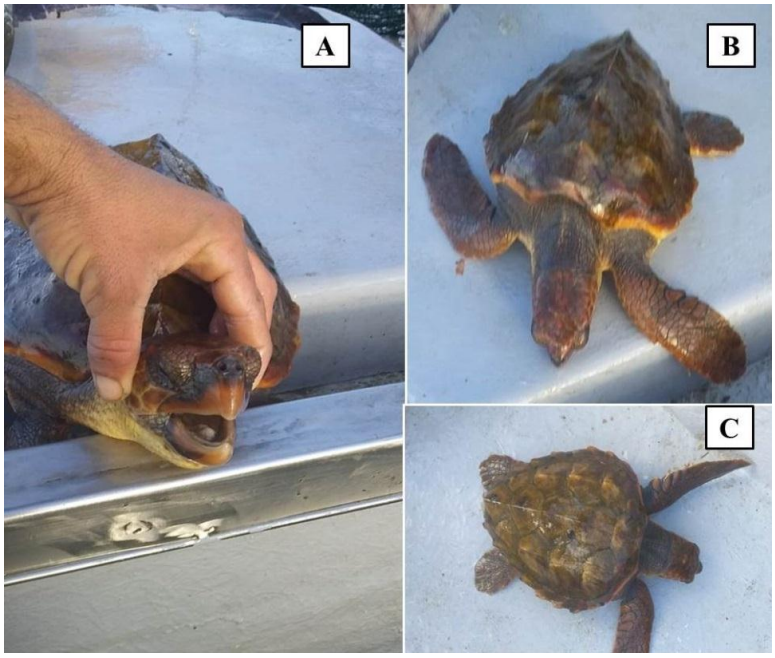

Figure 4: *Caretta caretta* captured accidentally off Al Hoceima: **A**. During the release of the turtle. **B-C**. After the care of the turtle.

The analysis and processing of the results of the surveys carried out among the 30 active fishermen in the port of Al Hoceima. Show that during the last 10 years, the accidental catches of turtles are low and have rarely been caught accidentally. But they mentioned that each time they saw turtles swimming on the surface of Al Hoceima, near the Alboran Sea when they were targeting swordfish. Other studies in other Mediterranean countries mention that bycatch is low lately **(Caracappa *et al.*, 2017).** These results signify the greater sensitivity of fishermen by environmental associations in the Mediterranean. In Morocco, there are several associations active in the Moroccan Mediterranean coastline such as the association of young people of the sea for sustainable development in Al Hoceima. These non-governmental organizations work with fishermen throughout the year to raise awareness of the importance of turtle conservation to maintain marine biodiversity. Training and awareness session for coastal fishermen. Successful marine turtle conservation requires the integration of social, economic, cultural, and political issues with ecosystem-based fisheries management **(Casale, 2011).**

CONCLUSION

In conclusion, Al Hoceima Bay is an important area for several marine species, including sea turtles. To ensure the conservation of marine biodiversity in this area, we monitored the interactions of marine turtles with the coastal fleet.

Our study showed the existence of two species, *Dermochelys coriacea* (Vandelli, 1761) (1 individual) stranded on Calabonita beach and *Caretta caretta* (Linnaeus, 1758) were caught by longliners (two individuals) and trawlers (three individuals), while no individuals were reported in purse seiners.

These results provide preliminary data on turtle bycatch and strandings in Al Hoceima and this information is essential to implement future conservation measures.

REFERENCES

Aksissou, M.; Tiwari, M.; Benhardouze, W. and Matthew, H.G. (2010). In: Casale, P., Margaritoulis, D. (Eds.), Morocco. Sea Turtles in the Mediterranean: Distribution, Threats and Conservation Priorities. http://iucn-mtsg.org/publications/medreport/.

Benhardouze, W. (2004). Tortues marines *Caretta caretta*: interaction avec les pêcheries, échouages et utilisation. Mémoire de DESA, Université Abdelmalek Essaâdi, Faculté des Sciences de Tetouan, 98 pp.

Benhardouze, W. (2009). Statut et conservation des tortues marines au Maroc. Thèse de Doctorat en Sciences Biologiques. Université Abdelmalek Esaadi de Tétouan (Maroc), 165 pp.

Benhardouze, W.; Aksissou, M.; and Tiwari M. (2012). Incidental captures of sea turtles in the driftnet and longline fisheries in northwestern Morocco. Fisheries Research., 127: 125-132.

Caracappa, S.; Persichetti, M. F.; Gentile, A.; Caracappa, G.; Curro, V.; Freggi, D.; and Arculeo, M. (2017). New records of leatherback sea turtle, Dermochelys coriacea (Vandelli, 1761) (Testudines: Dermochelyidae) in the Strait of Sicily. Cah Biol Mar, 58, 353-357. DOI: 10.21411/CBM.A.CFDE6C66.

Casale, P. (2011). Sea turtle by-catch in the Mediterranean. Fish Fish., 12: 299–316. https://doi.org/10.1111/j.1467-2979.2010.00394.x.

Casale, P. and Margaritoulis, D. (Eds.). (2010). Sea Turtles in the Mediterranean: Distribution, threats and conservation priorities. IUCN.

Casale, P.; Cattarino, L.; Freggi, D.; Rocco, M. and Argano, R. (2007). Incidental catch of marine turtles by Italian trawlers and longliners in the central Mediterranean. Aquat. Conserv.: Mar. Freshw. Ecosyst., 17: 686–701. DOI: 10.1002/aqc.841.

Casale, P.; Nicolosi, P.; Freggi, D.; Turchetto, M. and Argano, R. (2003). Leatherback turtles (Dermochelys coriacea) in Italy and in the Mediterranean basin. Herpetological Journal., 13: 135- 139.

Chahban, K.; Aksissou, M. and Benhardouze, W. (2017). Capture accidentelle des tortues marines en Méditerranée orientale du Maroc. African Sea Turtle Newsletter., 8: 25-31.

Finkbeiner, E.M.; Wallace, B.P.; Moore, J.E.; Lewinson, R.L. and Crowder, L.B. (2011). Cumulative estimates of sea turtle bycatch and mortality in USA fisheries between 1990 and 2007. Biol. Conserv., 144: 2719–2727. https://doi.org/ 10.1016/ j.biocon.2011.07.033

IUCN. (2012). Atlas du Parc National d'Al Hoceima. Gland, Suisse et Malaga, Espagne: UICN-Centre de Coopération pour la Méditerranée. 104 pp.

Kaddouri, A.; Analla, M. and Aksissou, M. (2018). Interaction entre les pêcheries et les tortues marines dans la région de M'diq-Martil au nord-ouest du Maroc. African Sea Turtle Newsletter., 10: 14–20.

Keznine, M.; Benaissa, H.; Barylo, Y.; Loboiko, Y; Aksissou, M.; and Analla, M. (2021). The coastal fleet of the Moroccan Mediterranean: the sea of Al Hoceima as a case study. Egyptian Journal of Aquatic Biology and Fisheries., 25: 37–47. DOI: 10.21608/ejabf.2021.157313.

Lewison, R.L. and Crowder, L.B. (2007). Putting longline bycatch of sea turtles into perspective. Conserv. Biol., 21: 79–86. https://doi.org/10.1111/j.1523-1739.2006.00592.x.

Masski, H. and Tai, I. (2017). Exceptional leatherback turtle stranding event in the Moroccan Atlantic during 2015. Marine Turtle Newsletter, (153), 11.

Nada, M. and Casale, P. (2011). Sea turtle bycatch and consumption in Egypt threatens Mediterranean turtle populations. Oryx., 45 (1): 143–149. https://doi.org/10.1017/S0030605310001286.

Nicolau, L.; Marçalo, A.; Ferreira, M.; Sá, S.; Vingada, J. and Eira, C. (2016). Ingestion of marine litter by loggerhead sea turtles, Caretta caretta, in Portuguese continental waters. Marine pollution bulletin., 103(1-2): 179-185.

Ocaña, O.; García De Los Ríos, P.; Los Huertos, A. and Brito, A. (2005). The crab Polybius henslowii (Decapoda: Brachyura) as a main resource in the loggerhead turtle (Caretta caretta) diet from North Africa. Revista de la Academia Canaria de Ciencias., 17(4): 103-116.

Revelles, M.; Carreras, C.; Cardona, L.; Marco, A.; Bentivegna, F.; Castillo, J.J. and De Martino. (2007). Threats and Conservation Priorities, IUCN/SSC Marine Turtle Specialist Group. IUCN, Gland, Switzerland, 294pp.

Rojo–Nieto, E.; Álvarez–Díaz, P. D.; Morote, E.; Burgos–Martín, M.; Montoto–Martínez, T.; Sáez–Jiménez, J. and Toledano, F. (2011). Strandings of cetaceans and sea turtles in the Alboran Sea and Strait of Gibraltar: a long–term glimpse at the north coast (Spain) and the south coast (Morocco). Animal Biodiversity and Conservation., 34(1): 151-163.

Tiwari, M.; Aksissou, M.; Semmoumy, S. and Ouakka, K. (2006). Rapport pour l'Institut National de Recherche Halieutique. Recherche des tortues marines au sud du Maroc (Plage Blanche – Porto Rico) en Juillet, Casablanca, Maroc.

Tiwari, M.; Moumni, A.; Chfiri, H. and El Habouz, H. (2001). A report on sea turtle nesting activity in the kingdom of Morocco. B.C.G. Testudo., 5 (3): 71–77.

Tomas, J.; Aznar, F.J. and Raga, J.A. (2001). Feeding ecology of loggerhead turtle Caretta caretta in the Western Mediterranean. J. Zool., Lond., 255: 525–532. https://doi.org/10.1017/S0952836901001613.

Wallace, B. P.; Lewison, R. L.; McDonald, S. L.; McDonald, R. K.; Kot, C. Y.; Kelez, S.; ... and Crowder, L. B. (2010). Global patterns of marine turtle bycatch. Conservation letters., 3(3): 131-142. https://doi.org/10.1111/j.1755-263X. 2010. 00105.x.

Wallace, B.P.; Tiwari, M. and Girondot, M. (2013). Dermochelys coriacea: The IUCN Red List of Threatened Species 2013: e.T6494A43526147, Version 2014.3. IUCN.