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DISCOVERY
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Distribution and habitats of the Mediterranean Monk Seal (*Monachus monachus*): In the Syrian Coast (Eastern Mediterranean)

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ABSTRACT

Mediterranean Monk Seal, *Monachus monachus*, was monitored along the northern coast of Syria during the period 2001-2023, and the potential caves were identified. Thirty-four sightings were obtained in 9 different areas of the coast; three of which were photographed. In addition, sixteen caves potentially suitable as habitats were documented; they were concentrated in the area extending from Ras Al Bassit to Oum Al Tiur (9 caves) and that extending from Burj Islam to Slaib Al Turkman (7 caves). These visual sightings, in addition to existence of potential habitats, confirm that Mediterranean Monk Seal is present on the Syrian coast, either as a visitor, as a migrant transient, or as a settler. More research is need to prove the residence and breeding status on the Syrian coast.

Keywords: Monk Seal; Syrian coast; Mediterranean

1. INTRODUCTION

Mediterranean Monk Seal (MMS) is found in the Mediterranean, Black Sea and the Atlantic coasts of northwestern Africa. It is a coastal marine mammal species that stay on land when resting and pupping where it seeks refuge in inaccessible marine caves to avoid human disturbance (Alexandros et al., 2016). It has suffered dramatic declines in abundance and huge shrinks in geographical distribution ranges (Saydam and Güçlüsoy, 2023; Ibrahim et al., 2023). Recent estimations revealed that fewer than 700 individuals survive which is estimated to represent ~3% of its historic abundance. MMS is regarded as the most endangered marine species because it suffers from various stresses such as habitat degradation, destructive interactions with fishers, bycatch, inbreeding, disease endemic, prey depletion, pollution, and climate change (Ibrahim et al., 2020, Dendrinos et al., 2022, McIvor et al., 2023). Recent surveys confirmed occasional sightings of MMS in most Mediterranean coasts Bundone et al., (2019), and its presence and breeding on the coasts of several Mediterranean

countries, including Greece, Turkey and Northern Cyprus (Beton et al., 2021; Pietroluongo et al., 2022).

Along the Syrian coast, the status of MMS is even more sever to the extent that it was regarded as an extinct species since the 1950s. Considered that this could be due to a lack of surveys and/or the sharp decline in its numbers due to unsuitable environmental conditions. However, due to the geographical proximity, it is probable that MMS individuals migrate towards the Syrian coast or that the MMS itself is present somewhere on this coast. To track MMS status on the Syrian coast, a field survey was conducted during the period 3-6 October 2002 and found that the northern Syrian coast is physically suitable for the presence of MMS where sea caves are scattered in the region. As a follow up, this research was undertaken to reveal the current situation of MMS and identify the suitable habitats on the Syrian coast.

2. MATERIALS AND METHODS

Field trips were conducted during the period 2001-2023 along the Syrian coast in search of MMS individuals and their potential caves. Because it is the only part of the Syrian coast containing noticeable number of caves, the work was focused on the area extending from Al Badrosiya in the north (N35.904465 E35.889037) to the southern end of Lattakia city (N 35.496886 E35.778310). In order to collect sufficient and comprehensive data and to exchange real-time information, a communication network, an informative brochure and a working group (comprising competent fishermen, local residents and national coast guards members) were established. Sighted individuals were documented, examined and photographed when possible. Caves physically suitable for MMS were visually identified. Geographical coordinated were recorded for the MMS sighting locations and the caves from the nearest point of the coastline.

3. RESULTS AND DISCUSSION

Table 1 shows that Mediterranean Monk Seal, *Monachus monachus,* MMS, was sighted 34 times in 9 different locations of the studied area: In Al Bassit, Wadi Kandil and Lattakia port (6 sightings each), Burj Islam (5 sightings), High Institute of Marine Research (4 sightings), Oum Al Tiur and sports city (3 sightings each) and Alderast's chalets (1 sighting). Most of these sightings were in places already impacted by human activities (such as the commercial port, Umm al-Tayur, and Wadi Kandil) which may due to the intensive monitoring of such human occupied places or to food deficiency which makes MMS ventures to such unfavourable places (Jony and Ibrahim, 2006). Except two dead individuals, one was somewhat decomposed (Figure 1) and the other recently killed by a gunshot (Figure 2), all individuals encountered were alive and routinely swimming around; one of which was photographed (Figure 3).

Table 1 Time and Location of Mediterranean seals Sightings in the study area (presented in time order)

No	Data	Nearest point of the beach	Geographical coordinates (N, E)	Notes
1.	9/12/2023	High Institute of Marine Research	35.591541 35.739758	~1m calf, ruff sea conditions
2.	19/7/2023	Burj Islam	35.680863 35.782958	
3.	19/4/2023	Al Bassit	35.854445 35.801787	
4.	16/1/2023	Sports City	35.561419 35.733009	
5.	15/1/2023	Lattakia Port	35.517828 35.762516	
6.	1/8/2022	Wadi Kandil	35.723542 35.832629	
7.	18/4/2022	Al Bassit-Al Sanker	35.828965 35.820723	
8.	3/3/2022	Wadi Kandil	35.716588 35.831050	
9.	13/7/2021	Wadi Kandil	35.714989 35.830399	
10.	12/4/2021	Al Bassit Marina	35.855081 35.821534	
11.	28/1/2021	Sports city	35.554630 35.745481	225cm Dead female (Figure 1)
12.	19/12/2019	High Institute of Marine Research	35.592437 35.745235	~1m long calf
13.	5/6/2019	Sports city	35.575273 35.743280	

14.	10/3/2019	Oum Al Tiur	35.756497 35.838736	
15.	12/10/2018	Burj Islam -Slaib Al-Turkman	35.692880 35.802552	
16.	11/8/2018	Oum Al Tiur	35.740090 35.843811	
17.	7/5/2018	Oum Al Tiur	35.767719 35.840451	
18.	29/6/2016	Burj Islam	35.702390 35.812745	
19.	21/7/2013	Lattakia Port	35.512371 35.759006	230cm pregnant female, gunshot, 60cm fetus. (Figure 2)
20.	30/9/2012	Wadi Kandil	35.719520 35.830721	
21.	15/1/2011	High Institute of Marine Research	35.592819 35.740670	
22.	4/4/2010	Burj Islam	35.681948 35.787908	
23.	27/2/2010	Alderast's Chalets	35.666011 35.767605	
24.	19/9/2009	Lattakia Port	35.531117 35.754757	
25.	17/4/2008	Burj Islam	35.682879 35.792907	
26.	10/8/2007	Wadi Kandil	35.720699 35.831705	
27.	23/5/2005	High Institute of Marine Research	35.590610 35.736821	Remained in place for ~14h (Figure 3).
28.	2/7/2004	Al Bassit	35.878630 35.881729	
29.	17/10/2004	Wadi Kandil	35.722856 35.831697	
30.	21/8/2003	Lattakia Port	35.534483 35.752671	
31.	14/9/2002	Lattakia Port	35.507740 35.760842	
32.	11/7/2002	Al Bassit	35.852954 35.803475	
33.	8/7/2002	Al Bassit- Al Badrosiya	35.888446 35.884000	
34.	21/4/2001	Lattakia Port	35.530338 35.762893	

Figure 1 A 225cm long dead seal near the sports city

Figure 2 A 230cm long killed seal in Lattakia port basin (top), the head (bottom right), and the 60cm fetus (bottom left). Study team: Ibrahim, A. - Badran, M. - Mitouj, A. - Eid, A. and Jony, M.

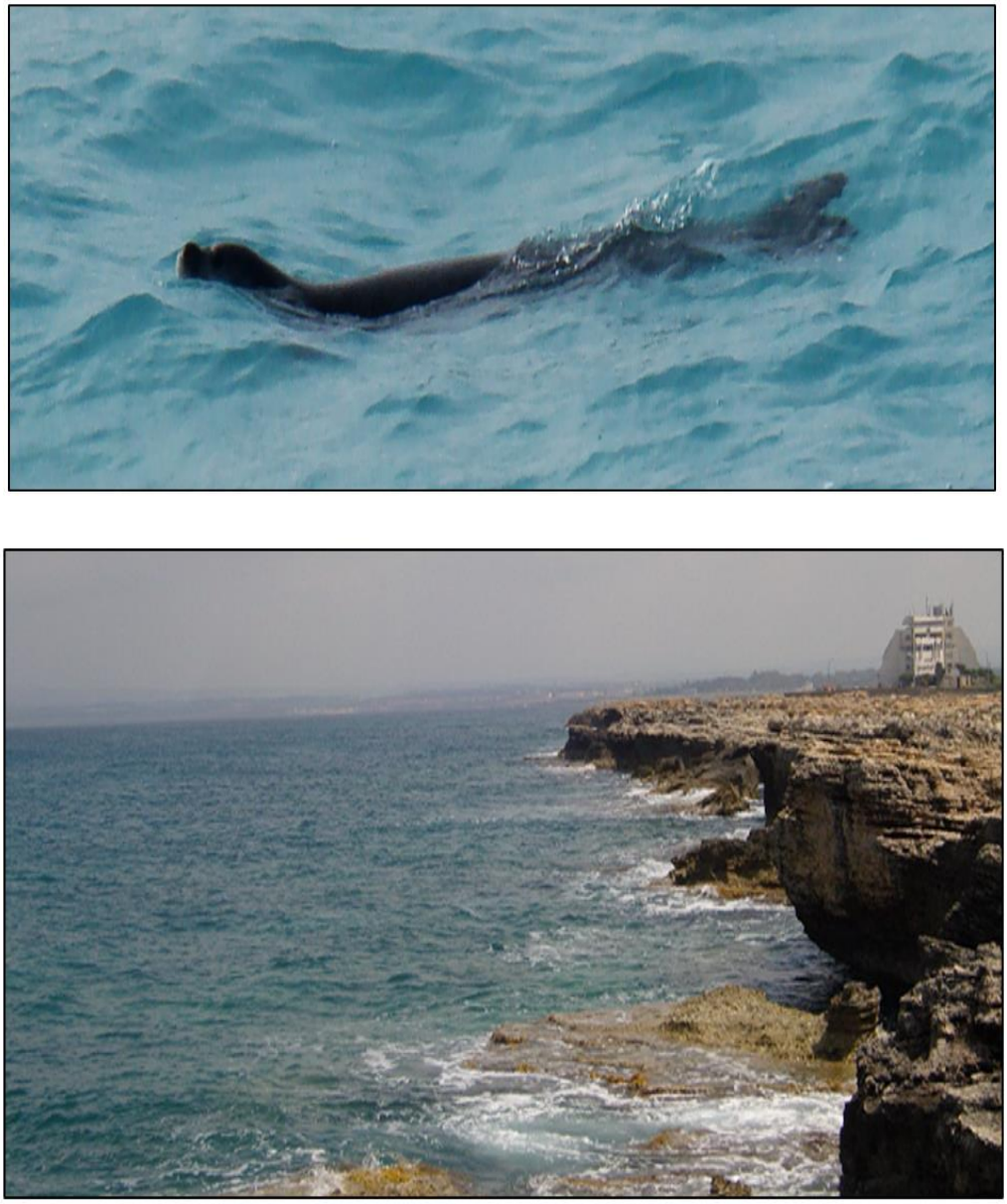

Figure 3 Mediterranean monk seal (above) facing the rocky shelf of the High Institute of Marine Research (below).

Possible caves of MMS

Sixteen caves (Table 2) are likely to be suitable as MMS habitats; They are located in two main areas; the area extending from Ras Al Bassit to Oum Al Tiur (9 caves) and that extending from Burj Islam to Slaib Al Turkman (7 caves). These areas have rocky shores with all kinds of beach caves that may be suitable as refuges for MMS.

Table 2 Caves physically suitable for MMS in the study area

No	location	Geographic coordinates (N, E)
1.		35.820969 35.826681
2.		35.821798 35.824543
3.		35.823299 35.817497

4.	Ras Al Bassit - Oum Al Tiur	35.817284 35.823466
5.		35.821939 35.814437
6.		35.834272 35.791954
7.		35.834244 35.791316
8.		35.737848 35.834389
9.		35.694766 35,804770
10.	Burj Islam - Slaib Al Turkman	35.694250 35.047381
11.		35.694478 35.044933
12.		35.688056 35.800454
13.		35 687892 35.800361
14.		35 687831 35.800508
15.		35 686779 35.799862
16.		35 682375 35.910806

An ideal cave for MMS as living and breeding site is located in Salib Al-Turkmen (N35.694250 E35.04738); it is partially covered with coarse sand and gravel granules and has 2 openings; one opens directly to land and provides adequate oxygenation (Figure 4a) and the other is partially submerged in water (Figure 4b). This cave is surrounded by clean sandy and rocky beaches that MMS prefers.

Figure 4 An ideal cave for seals in the Salib Al-Turkmen area: The cave's cavity from the land (a) and the entrance to the cave from the sea side (b).

It is well known that MMS can migrate along the coast for a distance of ~300 km Adamantopoulou et al., (2011) and move away from the coast for a distance of ~70 km over the open sea (Ryan et al., 2014). Thus, if not originally living in the area, MMS sighted in the Syrian coast may be migrating from the neighbouring coasts (Turkish or northern Cyprian coasts) Beton et al., (2021), visiting the area or passing to other areas. However, sighting of a pregnant seal and two calves (Table 1) besides the appropriate caves may indicate a high possibility MMS settling and breeding in one of the caves along the Syrian coast. Sighting of 2 pubs at 2 different occasions in the proximity of the High Institute of Marine Research (Table 1) suggests that MMS may have a breeding site nearby.

Other areas containing relatively high numbers of sightings (Al Bassit, Wadi Kandil and Lattakia port, Burj Islam, Oum Al Tiur and sports city) cannot be rolled out, especially that such areas are in the proximity of the identified caves (Table 2). It is important to track actual MMS number and the use of the existing caves in order to draw effective protection measures (Gonzalvo and Bearzi 2008; Ibrahim and Hussein, 2023). Infrared camera traps installed in caves to identify seals through images is an effective and inexpensive method (Bundone and Panou, 2022). In any case, protecting seal habitats on the Syrian coast is a must for conservation of this endangered species or facilitating safe passage to ensure gene flow between different populations (Hilty et al., 2020; Salmona et al., 2022).

4. CONCLUSION

MMS was seen 34 times in 9 different locations along the northern Syrian coast and sixteen physically suitable caves were recognised in 2 main areas: Ras Al Bassit - Oum Al Tiur and Burj Islam - Slaib Al Turkman. MMS on the Syrian coast is a frequent visitor, passing through the place, or settling in one of the caves along the coast. Basic data on abundance, precise distribution, actual use of sea caves and breeding status on the Syrian coast are still lacking. Therefore, research must continue to increase our knowledge about the biology of this species in order to develop the required protection strategy.

Authors' contributions

All authors have equal participation in this work.

Informed consent

Not applicable.

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Conflicts of interests: The authors declare that there are no conflicts of interests.

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Ethical approval

The Animal ethical guidelines are followed in the study for species observation & identification.

Data and materials availability

All data associated with this study are present in the paper.

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