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RESULTS OF A FIRST FIELD MISSION IN THE NATIONAL PARK OF AL HOCEIMA, MOROCCO: MONK SEAL HABITAT SUITABILITY AND PRESENCE

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Introduction

Mediterranean monk seal distribution is, at present, mostly limited to the eastern part of the basin. Monk seals inhabiting the Turkish and Greek archipelagos are estimated at 150 to 250 individuals (Reijnders 1998a). There is, on the other hand, a significant information gap on the conservation status of the species along extensive stretches of north African coast in Mediterranean countries such as Morocco, Algeria, Tunisia and Libya (Aguilar 1998). Consideration of these small groups is most important for a correct global conservation strategy of the species in the Mediterranean (Reijnders 1998b). To this end, identification of the distribution of such individuals and scattered groups, as well as conservation measures for their recovery, should be undertaken in an effort to ensure survival of these nuclei.

Information on the historical distribution of the species along the Mediterranean Moroccan coast is not abundant. According to several authors, monk seal presence during these last decades has been limited to the area of coast extending from Al Hoceima to Cap des Trois Fourches (Avella & Gonzalez 1984, Bayed & Beaubrun 1987). According to Aguilar (1998), the recent monk seal population in this area may consist of approximately 10 individuals. During the last several years, there have been few initiatives aimed at obtaining a better estimate of the size of the population, and there is currently no monitoring effort focusing on the individuals which may inhabit this region.

The National Park of Al Hoceima is a terrestrial park, situated about 50 km from the Straits of Gibraltar and extends over approximately 40 km of coast. The park encompasses a marine zone extending 3 miles from the coast in which trawling is prohibited. A fieldwork mission was conducted in September 2002 in order to collect information on the presence of suitable monk seal coastal habitat within the park and also to collect information on any monk seal sightings made by the local communities present in the area. The mission was undertaken within the scope of a wider project involving the National Park of Al Hoceima which in turn is part of a Mediterranean project, called MedMPA (1), whose objective is the elaboration and, where possible, the implementation of management plans for several future Mediterranean marine protected areas. The creation of marine protected areas capable of guaranteeing the conservation of the monk seal, is a priority indicated by the various international action plans (e.g. 1979 Rhodes Action Plan, UNEP Mediterranean Action Plan). However, marine protected areas specifically designed to protect the monk seal are limited within the Mediterranean. The establishment of a marine protected area with a zonation and management plan, reflecting the conservation requirements of the natural components of the area within the National Park of Al Hoceima, could therefore represent a positive advance for the protection and management of *Monachus monachus* in the western Mediterranean area, where until now no protected areas have been established to counteract the decline of the species.

Methods

The coastal stretch of the National Park of Al Hoceima, which extends from Pointe Boussekour until Cala Iris (Fig. 1), was visually inspected with the aid of a small wooden boat and areas of the coast characterised by medium-high rocky cliffs were recorded in detail on a map. Details of the type of fractures observed in each area were recorded. Aquatic inspection of the coast was conducted so as to verify the presence of underwater entrances leading to caves with haul-out areas. The identified caves were positioned on the map, measured, photographed and drawn so as to

yield a horizontal cross-section drawing of each cave with details on the respective dimensions and exposure of the cave to the sea.

A fishermen survey was conducted to collect information on Mediterranean monk seal sightings witnessed by fishermen operating throughout the area, based on a questionnaire prototype already used by other working groups in other parts of the Mediterranean (see corresponding Syria and Libya survey reports, Monachus Science, this issue) and which in turn is based on a methodology proposed by Boyd and Stanfield in 1998. The strong points of the questionnaire are linked to its strict application to fishermen as well as to the use of figurative images of marine species that the fishermen are most likely to have encountered. In such a way, the interviewees do not know the purpose of the questionnaire in advance and are less inclined to intentionally deceive the questioner. The species cards which were shown to the fishermen are as follows: *Caretta caretta*, *Dermochelys coriacea*, *Cetorhinus maximus*, *Monachus monachus* adult and subadult, *Larus audouinii*, *Pandion haliaetus* and *Mullus surmuletus*.

Results

The coastal stretch of the National Park of Al Hoceima is characterised by rocky calcareous cliffs forming steep overhangs alternated to rock slides and small pebble beaches. The area is characterised by five sectors of rocky coast presenting medium-large fractures which could represent openings leading to possible monk seal shelters. The sectors identified as M1-M5 are identified in figure 1. Sectors M1, M2 and M3 are composed of compact dolomitic limestone rock while sectors M4 and M5 are of limestone rock which appears composed of bent strata of limestone. Visual external inspection of the coast suggests that sectors M4 and M5, which lie in the less compact and pleated calcareous rock, present larger fractures which could be related to the effects of marine erosion on the less compact substrate as opposed to a lower erosion effect in the harder substrate found in sectors M1-M3.

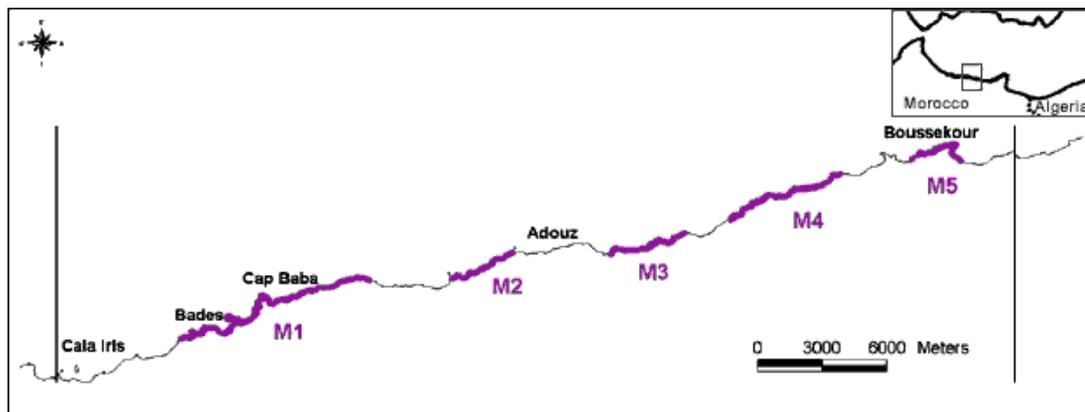


Figure 1. Localisation of rocky sectors with hypothetical caves (M1 to M5) identified in the National Park of Al Hoceima.

Due to logistical difficulties and weather conditions only 75% of coastal sectors M1 and M5 were aquatically inspected. No coastal cavity was observed in sector M1, while one cave was observed in sector M5 and another one was identified in the easternmost portion of the park's boundary (see Fig. 1). The details of the caves are as follows:

Cave 1 has an almost invisible external opening characterised by a 1m wide fracture appearing at the watermark level. A 50 meter long corridor, narrowing in at the innermost portion of the cave, leads into a small pebble beach which appears well protected from the external force of the waves.

Cave 2 has a visible external opening. A long corridor extends for almost 30 meters then bends at a 45 degree angle and leads into a large pebble beach. The latter is well elevated with respect to the watermark and a large stone at its entrance provides good protection from the sea waves.

Interviews were conducted with 30 fishermen operating out of the following ports and landing sites located within the park : 7 fishermen in Cala Iris, 3 in Bades, 2 in Tikkit, and 18 operating out of the port of Al Hoceima. The total frequency of chosen species indicates that the most frequently chosen was *Mullus surmuletus*, followed by *Caretta caretta*, *Larus audouinii*, *Pandion haliaetus*, *Monachus monachus* subadult, *Monachus monachus* adult male, *Dermochelys coriacea* and *Cetorhinus maximus*. The monk seal was recognized by 19 of the 30 interviewed fishermen and of these observations, only 4 had occurred within the last five years and specifically in the period 2001-2002. Table 1 indicates the areas in which monk seals were reported as having been observed by the interviewees. The locations are specified in greater detail in Figure 2 [note: the observation reported for Cap des Trois Fourches is recent (July 2002) and concerns an adult individual (Zine 2003)].

Date	N. of animals reported	Location of the sighting	
		Within the park	External to the park
1968-1986	1		Mestassa
1970	1		Al Hoceima port
1970	1		Al Hoceima port
1970s	3-4	Bades	
1975	1		Al Hoceima port
1981-2	1	Boussekour	
1983	1		Al Hoceima port
1983-4	1	Tala Youssef	
1985	1		Cap de l'Eau
1987	1	Cala Iris	
1987	2		Al Hoceima - Al Mahal
1990	1		Al Hoceima - Al Mahal
1992-3	1	Boussekour & Sidi Abed	
1994	1	Boussekour	
1997	1	Boussekour & Sidi Abed	
2001	1	Topos	
2002	1		Al Hoceima
2002	1		Tofino
2002	1		Sidi Fateh & Mestassa

Table 1. Monk seal sightings as reported by the fishermen interviewed in the study

Discussion

The study area seems particularly interesting in terms of the physical coastal habitat availability for *Monachus monachus*. The present work identified 5 sectors potentially characterised by the presence of coastal caves which could be used by the species. Due to logistical difficulties only two sectors were partially inspected. Two caves were found in sector M5 and its adjacent area. Each cave is characterised by an emerged internal pebble beach that is relatively well protected from sea waves. These caves are located in the sector characterised by siliceous limestone substrate which appears highly fractured. Considering the two main geological substrate typologies present in the area (western sectors characterised by compact dolomitic limestone as opposed to the eastern sectors composed of silicic limestone), and the presence of caves identified in the easternmost sector, it seems probable that the less compact limestone sectors are more likely to be characterised by the presence of coastal cavities which could be

used by monk seal individuals. This is, however, a hypothesis which would need confirmation based on further field investigations involving the remaining sectors: M2, M3 and M4.

The observations recorded during the fishermen interviews indicate the historical presence of *Monachus monachus* in the coastal stretch of the National Park of Al Hoceima. The frequency of species indicated in the fishermen's replies indicates that, overall, the monk seal subadult and the adult male were chosen from provided images less times than other species such as *Mullus surmuletus*, *Caretta caretta*, *Larus audouinii* and *Pandion haliaetus*, whose presence in the study area and along the Mediterranean Moroccan coast is widely documented. However, while the sum of the number of choices involving the monk seal subadult and the monk seal adult male is lower than the choice of *Mullus surmuletus* and *Caretta caretta*, it is higher than the total number of times that *Larus audouinii* and *Pandion haliaetus* are chosen. Both *Larus audouinii* and *Pandion haliaetus* are species which breed along the coasts of the study area but the degree of recognition of these species on the part of the fishermen may be low because fishermen may be less inclined to recognize marine avifauna than other, strictly marine, organisms. In view of the low sample size of interviewed fishermen (n=30) such considerations are, however, difficult to reinforce. Since the interview form aimed at collecting information on *Monachus monachus* is included in a more detailed interview format regarding the socio-economic aspects of the fishing community, the future planned application of this interview form to a wider sample size of fishermen operating within the study area will yield a more significant collection of information on monk seal sightings and the relative recognition rate of the species on the part of fishermen.

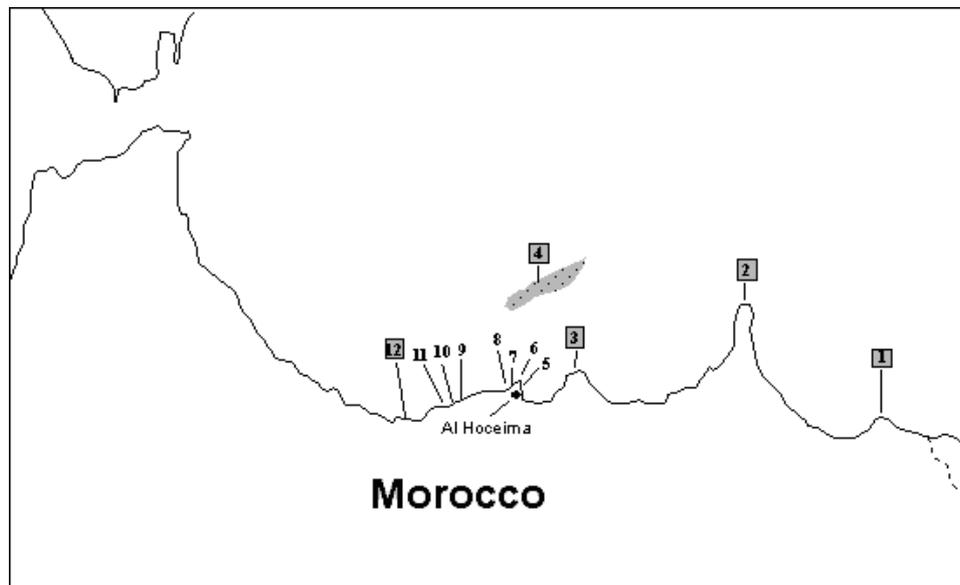


Figure 2. Monk seal sightings indicated by the interviewees. Shaded numbers indicate the areas for which sightings are reported but which lie outside the boundaries of the National Park of Al Hoceima.
1. Cap de l'eau; 2. Cap des trois fourches; 3. Cap Chelate; 4. Banc Tofino; 5. Port of Al Hoceima; 6. Sidi Abed; 7. Tala Youssef; 8. Boussekour; 9. Topos; 10. Bades; 11. Cala Iris; 12. Mestassa.
[Note: the Cap Chelate sighting does not appear in Table 1 as it was reported secondhand and not directly witnessed by the interviewee.]

The two monk seal observations recorded within the park during the last years indicate that some individuals transit and may utilise part of the coastal stretch of the study area. As such, future management plans of the marine component should contemplate conservation initiatives for the species such as monitoring, environmental awareness and protection of specific sites. Such aspects can better be defined on the basis of data to be collected during future field work, which is planned to be completed by the end of 2003. Preliminary observations collected during the field mission also indicate the presence of potential threats for the species, such as the use of illegal fishing methods such as dynamite and a rather widespread distribution of coastal fishing throughout the entire zone of the park. Such threats should be taken in consideration in the management plan of the future marine protected area, since they also indicate a possible explanation for the reduced number of recent monk seal sightings reported by the fishermen during interviews.

Several sightings were reported in areas external to the park, as east as Cap des Trois Fourches and even as far as Tofino, which is a bank located approximately 18 nautical miles to the north of Al Hoceima. This is not surprising, however, considering the observations recorded by other authors in terms of the species' movement (Adamantopolou et al. 1999) and observations of sightings in open sea (Marchessaux 1987). The localisation of sightings in areas outside the park's boundaries also highlights the need to conduct further investigations and conservation initiatives in a wider geographical scope, extending from Mestassa to Cap des Trois Fourches.

Considering the high value of the establishment of marine protected areas for the conservation of the remaining nuclei of *Monachus monachus*, and in light of the preliminary information collected during the present field campaign,

it appears very important to collect additional data on the location of the marine coastal caves present within the study area, as well as a more extensive amount of interviews aimed at the local fishing community. Such data would provide a good start towards the identification of a management and monitoring plan adequate for the species in the future marine protected area of Al Hoceima. Considering the species' movement capacity, such an approach should be extended to the wider geographic area which extends from Mestassa eastwards until the border with Algeria, a geographic area which still appears to host monk seal individuals.

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1) The MedMPA project is a European Community-funded initiative, coordinated by UNEP-MAP's RAC/SPA, whose purpose is to collect scientific information for the establishment of marine protected areas and to elaborate management and zoning plans suitable for specific contexts. The project encompasses 7 Mediterranean areas and involves collaboration schemes among different Mediterranean scientific institutions and environmental public administrations.