MEDITERRANEAN MONK SEAL IN ALBANIA:HISTORICAL PRESENCE, SIGHTINGS AND HABITAT AVAILABILITY

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ABSTRACT

Mediterranean monk seal populations were heavily reduced in time all over its entire ancient distribution. In Albania, the species was reported to be present in the past in spite of the lack of references on specific locations, reproductive activities and numbers of individuals. It is nowadays considered to be extinct. Nonetheless, several sightings have been reported, afterward, along the country coasts. With the present project, we intended to investigate and clarify the past and present status of the species in Albania. Information on its historical presence were reviewed along with the collection and evaluation of recent sightings. Furthermore, the ~65 km of the Marine National Park of Karaburuni-Sazani coast were surveyed to check suitable habitat availability for the species (marine caves). Eight caves were mapped, two of which, the ones that presented the best characteristics for breeding, were equipped with infrared cameras. In one of those, we recovered evidence of actual use by the seals. Aside from shed light, for the first time, on the status of the species, our project has the ambition to provide insights for an effective monitoring and conservation

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strategy, to be planned on a long-timescale at a local level, and within a "region-wide approach".
Keywords: Marine mammal, Conservation, Adriatic Basin, Marine National Park, Karaburuni-Sazani

1. INTRODUCTION

The present study is a first attempt to collect all available information on theMediterranean monk seal (*Monachusmonachus*, Hermann 1779, hereafter MMS), an endangered marine mammal, in Albania, where it is supposed to be extinct. We focused our researches investigating on its past presence along with the species' current frequentation of the country coasts. Furthermore, the study has the main aim to set up the baseline for a broader time and spatial scale investigation, and highlight the conservation priorities for the species recovery at a local and regional level. A strategy for monitoring and for the conservation of this species should include the strengthening of coastal area protection, encompassing the involvement of local stakeholders. Moreover, it should be planned considering the Adriatic and Ionian Seas as a whole region of distribution and/or expansion/re-colonization for the species.

The populations of MMS were once distributed along the eastern north Atlantic coasts, the Mediterranean Sea and the Black Sea[1,2]. During the Roman Empire the species underwent through a dramatic shift, being captured for their furs, meat, oil and even for the Arena's games[2]. Their exploitation within the Mediterranean and Black seas continued during the Middle Age, Renaissance and up to the present time, further decreasing the already reduced populations[3]. Along the Atlantic the exploitation started long after the Roman Empire, during the first trips in search of new trade route through the Atlantic Ocean[3]. The left surviving reproductive nuclei of the species, today, are limited to the coast of Greece and Turkey in the Mediterranean, and to Madeira-Islas Desertas (Portugal) and Cabo Blanco (Mauritania/Western Sahara) in the Atlantic[4]. Nevertheless, sightings of seals have been reported, at least over the last two decades, from the other countries of the Mediterranean where the species is believed to have disappeared[5].

The MMS is internationally protected by the "Convention on International Trade in Endangered Species" (CITES, 1973; ratified in Albania in 2003), the "Convention on Conservation of European Wildlife and Natural Habitats" (1979; ratified in Albania in 1999), the "Convention on the Conservation of Migratory Species of Wild Animals" (CMS, 1979, ratified in Albania in 2001), and the"Convention on Biological Diversity" (1992; Albania is party since 1994). The species is also listed in the "Protocol for Specially Protected Areas and Mediterranean Biological Diversity" (1995; ratified in Albania in 2001) within the "Barcelona Convention on the Mediterranean Sea" and in the

in the European Union "Habitats Directive" (92/43/EEC) binding on all member states. In Albania is protected since the end on the '70s by decree on hunting and protected areas[1].

The MMS was acknowledged to be present in the past along the Albanian coast and is nowadays classified by the International Union for the Conservation of Nature-IUCN as Possibly Extinct[6]. However, no exhaustive biogeographical studies on the species have been performed, nor are available accurate data on presence, population numbers, or reference to reproductive activities along the country coasts. Similarly to other areas of its former distribution in the Mediterranean, as mentioned above, reports of seal sightings have been recorded also from the coasts of Albania[5].

Information derived from occasional witnesses need to be processed carefully, particularly when dealing with sightings of a rare, endangered and charismatic species. The data derived from the collection of such information can be affected by false negative (absence of information, but with effective presence of the animals) and false positive (sightings erroneously attribute to the subject of the investigation). To avoid false negative data, specifically designed and systematic surveys should be planned. This is particularly true when investigating a "cryptic" species whose presence might goes undetected. False negative can lead to under-estimation or consider the species disappeared, false positive to over-estimation and mistakenly record signs of recolonization[7,8].

MMS used beaches and marine caves to haul out, rest and give birth. Nodaway, marine caves represent the main terrestrial habitat used by the species[3]. An ideal breeding cave should have one or more entrance/s, preferably underwater (syphon), one or more internal sandy or pebbles beaches or rocky platforms above the sea level and an internal basin not directly exposed to the open sea currents and waves. Resting caves do show less restrictive parameters but with at least one or more beaches or platform above the sea level in their interior part[9].

The coastline of Albania extends for 476 km, from the eastern south Adriatic Sea, adjoining north with Montenegro, to the northern Ionian Sea, until the Greek border as southern limit. From Shengjin to the bay of Vlora, the Adriatic coastline, representing about 3/5 of the country coast length, is characterized by sandy shores. The Ionian coastline, from Vlora to the Greek border, is predominantly represented by erosive coast with occasional intrusion of pebbly or sandy beaches[10,11,12]. The island of Sazani and the Peninsula of Karaburuni, close to the south-west the bay of Vlora, and mark the physical limit between the Adriatic and the Ionian Sea. It is the part of the coast mainly characterized by steep cliffs, deep water, and is the area where are mostly concentrated marine caves. This stretch of coast was established in 2010 as the first marine protected area of the country[10,12,13].

2. MATERIALS AND METHODS

Starting in 2018, we initially reviewed all the useful available informationon the MMS carrying out a thorough bibliographical research. The research centered on retrieving historical and recent data on the species presence, sightings, and habitat use along the Albanian coasts.

Additionally, MMS sightings, reported between 2019 and 2020, were verified, checked and analyzed. In 2020 RAPA (Regional Administrate of Protected Area) Vlora, the managing authority of Marine National Park of Karaburuni-Sazani (MNP K-S), set up a network of information for marine species encounters, allowing direct communication of MMS sightings. Such networkinvolves, up tonow, 18 fishermen of the bay of Vlora. To avoid overestimation of the monk seal presence, including the chance to add bias, due to false positive, we analyzed only those for which video or photographic material was made available from the witness. The materials were organized in a database and analyzed for individual identification using the characteristics of the fur and the presence of scars.

To complete our investigation, the ~65 km of coastline of the MNP K-S were surveyed in search of suitable habitat for the species. The activities focused on marine caves, with entrance above the sea level. Additionally, following the first directly verified sightings, reported in 2019, a short survey was conducted inside the bay of Vlora. Measurements were taken for the caves that presented the morphological characteristics as suitable for the species' use, to create a database of habitat availability. A system of infrared cameras was installed in those that morphologically presented characteristics as potential breeding caves, to be able to record their effective use by the seals and collect additional materials for photo-identification.

3. RESULTS AND DISCUSSION

MMS' former presence along the coast of Albania is acknowledged in all the main documents published by official bodies, concerning the conservation and distribution of the species: IUCN, United Nations Environmental Programme/Mediterranean Action Plan-UNEP/MAP, Specially Protected Areas Regional Activity Center-SPA/RAC, and General Fisheries Commission for the Mediterranean-GFCM.

However, through the consultation of the aforementioned official documentsand the availablepublications[14,15,16,17,18,19,20,21,22,23,24], it was impossible to recover any information on the eventual presence of MMS's stable reproductive nuclei or references on specific habitats used by the species along the coast of the country. The only data, with at least general

information onthe locations and dates in which MMS' encounters took place, refer to the decades between the 40s and the 60s, and up until the 80s. All the data represent report of occasional sightings from the areas of Karavasta, Karaburuni-Sazani and Saranda[14,25,26]. In one case the information, referred to a female pup caught in afishing instrument in the area south of Saranda, close to the Greek border, in 1954. This fact was confirmed by the finding of the stuffed specimen preserved in the Museum of Natural Sciences "Sabiha Kasimati", in Tirana, documented also in bibliography[25,27]. Furthermore, vague information has been recovered, for the decade of the 90s, referring to occasional encounters of MMS specimens, concerning the southern Albanian coast, from Karaburuni-Sazani to the Greek Border[10,11,12,25,28] (figure 1b).

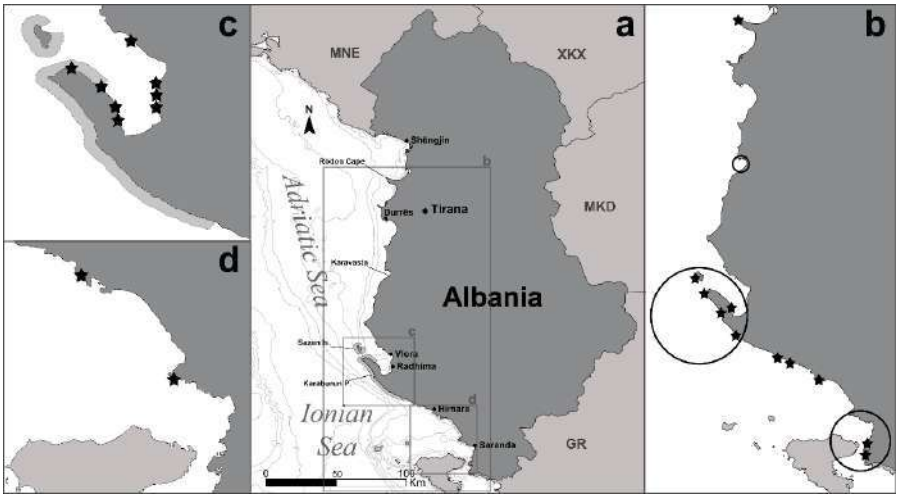

Fig. 1. (a) Map of Albania. In squares are highlighted the areas enlarged in b, c, and d. In (b) are represented the information related to monk seal presence along the country coasts reviewed from the literature. The general areas reported to be frequented by seals between the 40s and the 90s are marked with circles. The more specific information related to the sightings between 2000 and 2017, are marked with stars, and enlisted in table 1. In (c) and (d) are represented the main locations of the sightings collected and verified during the present study, marked with stars, and enlisted in table 2. In (a) and (c) is also represented the Marine National Park of Karaburuni-Sazani.

More detailed data could be retrieved for sightings reported between 2000 and 2017. A total of 11 sightings were reviewed from recently published works[5,12,29], referring to the southern Albanian coast, from Karaburuni-Sazani to the Greek border, and one from an area more in the North, in 2006. In one case it was reported the presence of more than 1 animal (in 2003). The data are enlisted, ordered by date, in table 1, indicating the main locations where the sightings were witnessed, and represented graphically in figure 1b.

Similar considerations on the consistency and on the concentration of monk seal sightings in the southern coast and particularly along the Peninsula of Karaburuni, were also outlined in a previous survey (funded by IFAW,the report is not yet available for public consultation, G. Mo *Pers. Comm*.).

Table 1. Mediterranean monk seal sightings in Albania, 2000-2017

Date	Location	Date	Locations
Summer 2000	Greek Border	April 2010	Saranda
April 2003	Karaburuni Peninsula	August 2012	Karaburuni Peninsula
September 2003	Sazani Island	12 November 2016	Karaburuni Peninsula
Summer 2004	Karaburuni Peninsula	05 May 2017	Karaburuni Peninsula
Summer 2004	Saranda	25 May 2017	Karaburuni Peninsula
Autumn 2006	Rodoni Cape		

Additionally, several sightings have been reported between 2019 and 2020 and directly collected by one of the authors (N.H.). Of the several sightings collected, 13 provided with photos/videos were analyzed in the present work. The data are enlisted, ordered by date, in table 2, indicating the main location where the sighting was recorded and represented graphically in figure 1c and 1d.

Table 2. Mediterranean monk seal sightings in Albania, 2019-2020

Date	Location	Date	Locations
19 March 2019	Vlora Bay	18 March 2020	Karaburuni Peninsula
26 March 2019	Vlora Bay	01 July 2020	North of Saranda
30 March 2019	Vlora Bay	06 August 2020	North of Saranda
31 March 2019	Vlora Bay	11 September 2020	Karaburuni Peninsula
06 April 2019	Vlora Bay	21 September 2020	Karaburuni Peninsula
17 May 2019	Vlora Bay	13 December 2020	Karaburuni Peninsula
30 July 2019	Vlora Bay		

All these documented encounters depict single animals. In most of the cases the images available represented juvenile seals, however, the quality of the images did not allow a proper individual photo-identification. Therefore, it was not possible to quantify and evaluate the number of animals encountered in 2019-2020. It should be noted that most of the previous sightings (2000-2017) could not belong to the same juvenile/srecorded in 2019-2020.

During August 2019 the ~65 km of the MNP K-S coast were surveyed to investigate suitable habitat for the MMS (marine caves). Within the present project only caves with an entrance above sea level were deeply investigated. Additionally, the area where the first sightings were recorded in 2019, between Vlora and Radhima, was checked. Measurements were recorded in those caves that presented morphological characteristics as suitable habitat for the MMS: one or more connection to sea, eventual presence of one or more syphons, and presenting in their interior at least one or more sand or pebbles beaches or rocky platforms above the sea level. Eight caves did present the mentioned characteristics. The caves were mapped to create an archive of potential habitat of the MMS for the park managing authority. Two caves, those with the best morphological characteristics as potential breeding cave, were chosen to be equipped with infrared cameras, in order to record their actual use by the species. A one- or two-months old monk seal scat was recovered in one of the internal beaches of one of them, confirming the effective use of the cave by the species. Infrared cameras were installed in the two caves only in the late winter 2020 due to difficult meteorological condition, and retrieved before summer to avoid being damage or stolen during the holiday season. The short period did not allow to confirm the presence of seals inside the caves, at least until the last camera replacement activity, carried outin the first part of December 2020; however, the cameras will be permanently available to the park to continue the monitoring activities for longer period of time.

4. CONCLUSIONS

It is not clear whether the Albanian coast has ever hosted a stable and reproductive population of MMS or represented only a natural corridor of connection between individuals and subpopulations along the Adriatic and Ionian Seas. Despite the lack of substantial biogeographical knowledge on the species' population consistency and habitat use in the past, the historical data reviewed in the present study cannot exclude either of the possibilities. Similarly, it would be misleading to interpret the recent, more substantial, availability of information relating to sightings, as proved signs of recovery and re-colonization by the species. For instance, all the sightings recorded in 2019-2020 only pictured single specimens. It is worth to mention that in a couple of occasions it was reported the presence of more than one animal, not documented by video or photo, and therefore excluded in the present analysis. Additionally, the description of these encounters was characterized by incongruency that did not allowed proper analysis of the data since it was affected by high bias and uncertainty. The analysis of the video and photographic materials collected, due to the low definition of the material

itself, did not allow to verify or affirm with certainty, if they all represent the same individual, few, or more animals that were visiting the area at different times. The major data availability referring to the last two decades (from 2000 onward) in comparison to the historical data retrieved, might reflect the higher attention towards the species, the increased diffusion of technology that allows the record and easy communication of sightings (mobile phones with camera and social networks), the overall increment of the species recorded in the known reproductive areas that might have driven some specimen to re-colonize some areas, or simply records of vagrants outside their natural range. Population numbers cannot be provided by evaluating random records of sighting, without long-term adequate and specific monitoring and conservation programs. Only extensive spatial and temporal monitoring of the habitat, and systematic photo identification of the individuals can provide actual data on the real numbers of seal that frequent an area, as has been recently begun further south for the well-known MMS' breeding population in the central Ionian Sea, Greece[30,31,32]. These methodologies will allow as well toverify the transient or permanent use of the coast, as well as acquire data to elaborate proper conservation measures.

To adequately monitor and preserve the natural biodiversity heritage, at a local level, requires the implementation and reinforcement of the structures responsible for its conservation (the MNP K-S), with the active involvement of local stakeholders (tourist sector and fishermen in particular). At a wider-area level, considering the overall monk seal situation within the Adriatic and Ionian Sea (a known reproductive population under monitoring in the central Ionian Sea, Greece, sightings recorded elsewhere in the region, and the ability of cover long distances by the species), the national commitment towards the species should be planned alongside a network of actors from the surrounding countries. A multi-national strategy commonin the region, with a swap of information, could provide more substantial and comparable data (movements and probable exchanges of animals within neighboring countries) rather than simply recording sightings. Furthermore, establishing trans-national agreements for the conservation of the species in the region, as has been accomplished for the MMS' subpopulations in the Northeast Atlantic, could contribute in the long term, with integrated and collaborative approaches, to an effective understanding of its ecology and distribution, and finally aid its recovery.

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