

The Mediterranean Monk Seal, *Monachus monachus*, in Montenegro

Aliki Panou

Archipelagos – environment and development, Greece

Dušan Varda

Mediterranean Center for Environmental Monitoring, Montenegro

Luigi Bundone

Archipelagos – ambiente e sviluppo, Italia, Italy

Abstract

The world population of the endangered Mediterranean monk seal (*Monachus monachus*) is presently estimated to consist of about 700 individuals. The species' former distribution extended throughout the Mediterranean, the Black Sea and the Atlantic coasts of NW Africa. Apart from actively reproducing populations in Greece, Turkey, Mauritania and Madeira, the species is considered extinct in large parts of its former range.

Historically, monk seals were present in Montenegro. The „last“ monk seal was killed in the Bay of Kotor in the 70's. Since this event, no further evidence of monk seal presence had been recorded and the species has been considered extinct. In 2013-2015, we recorded a total of 14 monk seal sightings covering the period 1985 - 2010 throughout the coastline of Montenegro. Our findings represent the first evidence of the species' presence in Montenegro after the 70s and indicate at least the transition of animals from neighbouring countries. We believe that monk seals might regularly use the coastline of Montenegro if adequate conservation measures including the establishment of one or more Marine Protected Areas are implemented. Furthermore, protected areas will act as a corridor for the monk seal's movements throughout the Adriatic Sea.

Keywords: Mediterranean monk seal, distribution, sightings, conservation, Adriatic Sea, Montenegro.

Introduction

The world population of the Mediterranean monk seal (*Monachus monachus*) is presently estimated to consist of 700 individuals, of which ~350 live in the Mediterranean basin (Karamanlidis *et al.* 2015). The species is classified by the International Union for the Conservation of Nature (IUCN) as Endangered (Karamanlidis & Dendrinis 2015). Furthermore, it is listed in the EU Habitats Directive (a) as a priority species in Annex II (list of species for which Special Areas of Conservation are required) and (b) in Annex IV (list of species for which strict protection is required). Its former distribution extended throughout the Mediterranean, the Black Sea and the Atlantic coasts of NW Africa. Nowadays, actively reproducing monk seal populations are found mainly in Greece and Turkey as also in Mauritania and Madeira (Notarbartolo di Sciara & Kotomatas 2016). Apart of these well-known populations, the species is considered extinct or of unknown status in large parts of its former range. However, recent sightings all over the

Mediterranean Sea indicate that the species may still exist in most of its ancient habitat where it is considered extinct or of unknown status (Bundone *et al.* 2013a). Bibliographical records of monk seal presence along the eastern Adriatic coast refer mainly to the coasts of Croatia (Ronald 1985; UNEP/MAP 1994), and Albania (UNEP/MAP 1994). Up to the present time, only scant information about the species' presence in Montenegro is available and the species is considered by the IUCN as Regionally Extinct (Karamanlidis & Dendrinis 2015).

From 2013 to 2015, three surveys were organized by the Institute for Marine Biology, Kotor, Montenegro (IBM), in collaboration with the authors of the present paper in order to record and map for the first time the marine caves with an entrance above sea level from cape Arza on the peninsula of Luštica in N. Montenegro to cape Đeran at the Albanian border (Mačić *et al.* 2014). Within this framework, we also recorded potential habitat availability for monk seals, i.e. marine caves with a beach inside suitable for resting and reproduction (Mačić *et al.* 2014; Panou *et al.* 2014). However, no signs of monk seal presence were recorded during these cave surveys. In the present work, data on monk seal presence along the coast of Montenegro over the past three decades are presented for the first time along with a review of historical records. Our findings outline the importance of the Montenegrin coast within the framework of efforts for the overall conservation of the species, and in the Adriatic Sea in particular.

Material and Methods

During the above-mentioned cave surveys, we recorded information on encounters of monk seals along the coast of the country and on relevant historical facts. Data were collected through: a) Personal interviews with the observers; b) Reports of the observers to the IBM and c) All other information available including indirect communications to local media.

The data obtained through personal interviews are considered reliable since our method follows a strict protocol accompanied by questions aimed at verifying the observers' reports. The reports to the IBM are also considered reliable since the observers were mostly fishermen. Fishermen's knowledge is being increasingly used in scientific surveys (Johannes *et al.* 2000; Maynou *et al.* 2011). Additionally, in several cases, repeated sightings at the same location during the same period or even the same day along with other details (short distance to the observer, description of morphology/behaviour, etc.) support their reliability.

Two witnesses responded directly upon the publication of a related article in the local newspaper *Vijesti* in 2013 and reported to the IBM one seal sighting in Sutomore in 1998 and one sighting in Traste in 2004. These sightings either correspond with respect to time and location to sightings of observers directly contacted by us (Sutomore) or the seal was observed more than once (Traste); thus, we tentatively conclude that both reports are reliable. We also recorded one seal sighting in 2008 close to the islet of Mamula at the mouth of the Bay of Kotor reported through the local media but this sighting is not considered to be reliable since details are missing. Finally, the available information on the historical presence of the species in Montenegro was gathered through a thorough review of the existing bibliography. Own historical records are also summarized here.

Results

The historical information about the species' presence in Montenegro we have been able to collect so far refers to a marine cave very close to the town of Petrovac generally known as the "Seal Cave" ("Tuljanova pećina") and a monk seal captured and killed in Igalo, close to the town of Herceg Novi, Bay of Kotor, on the 5th May 1969 (Figure 1) (Gamulin-Brida *et al.* 1979) (Figure 1) of which we obtained a short video. Gamulin-Brida *et al.* (1979) also mention a captured monk seal in this area but in January 1977. Bruno (1976), quoting Galvagni (1902, 1911), reports the presence of monk seals in the surroundings of the town of Budva. Furthermore, one adult seal was captured at the entrance of the Bay of Kotor in March 1933 and one seal weighing 340 kg and 2,6 metres in size was captured at the Katić islands in front of Petrovac in April 1934 (Bruno 1976).



Figure 1. Picture of the monk seal captured in the area of Herceg Novi on the 5th May 1969 (Archives MedCEM).

Through our research we recorded a total of 14 monk seal sightings throughout the Montenegrin coastline from the period 1985 to 2010, thirteen of which through direct contacts with the observers and one through the local media. The details of the sightings are described below. The entire set of data is summarized in Table 1 and in Figure 2.

Bay of Kotor: At the beginning of September 2005, a seal was observed by a Russian couple resident in the village of Bigova, Montenegro, in Svevi Stasije, very close to the town of Kotor. The seal approached the observers' vessel at a distance

of 5-7 metres. The same observers saw a seal again in the Bay of Kotor between Stoliv and Perast in mid-September. The description of the animal encountered in Sveti Stasije provided accurate details on the seal's size and characteristics and leaves no doubt that it was a subadult animal.

Table 1. Sightings of the Mediterranean monk seal, *Monachus monachus*, in Montenegro in the period 1985 – 2010. *DI*: Direct interview; *IBM*: Report to the Institute for Marine Biology, Kotor, Montenegro; *LN*: Local News; * fisherman

Year	Period	Location	Observer	Source
1985	-	Luštica	I. Bijelić*	DI
1996	July-August	Valdanos bay	V. Ljubičić	DI
1996	End August	Sutomore	R. Komnenović*	DI
1996/8	August	Sutomore	Z. Varda	DI
1996/8	August	Sutomore	D. Radivojević	DI
1998	Summer	Sutomore	Anonymous	IBM
2004	Autumn	Luštica	Anonymous	IBM
2005	~09/09/05	Bay of Kotor	D. Ryadnov	DI
2005	Mid-September	Bay of Kotor	D. Ryadnov	DI
2008	04/09/08	Bay of Kotor	Anonymous	LN
2008	May	Donji Grbalj	M. Pima*	IBM
2010	June-August	Donji Grbalj	M. Lazarević	IBM
2010	Summer	Donji Grbalj	M. Pima*	IBM
2010	Summer	Donji Grbalj	M. Tičić*	IBM

Peninsula of Luštica: In 1985, more than a decade after the „last“ monk seal was killed, a seal was observed by a fisherman in the interior of the Blue Cave (Plava Špilja). In autumn 2004, a seal was seen twice by the same observer in Traste, Dobra Luka, south of cape Macka. In 2008, one seal sighting was reported in the local media ~ 100 metres from the islet of Mamula at the mouth of the Bay of Kotor. However, no details were available about this sighting or the observer in order to contact him (sighting not reliable).

Donji Grbalj: In May 2008, one seal was observed by a fisherman in the area of Donji Grbalj, north of the town of Budva, between the cave Krekavica and the islet of Sveti Nikola, 20 metres from the shoreline and very close to the observer so that even the whiskers were clearly visible. In summer 2010 (between June and August), a resident of the village of Bigova observed a seal in the same area, again 20 metres from the shoreline, while he was bringing tourists to Sveti Nikola nearby. Two more fishermen, residents of Bigova, also reported a seal sighting each in the same period and at the same location.

Sutomore: At the end of August 1996, a seal was observed by an amateur fisherman in the area of Sutomore on three different days in (a) Štrbine bay to Golo brdo, (b) Maljevik bay and (c) Ratac. In summer 1998, a seal was observed again in Sutomore: it followed the observer's boat towards Maljevik bay for about one mile, swimming a few metres from the vessel. Finally, in August 1996 or in August 1998, a seal was observed by two different observers on the same day off Inex Zlatna resort

at Mali Ratac, Sutomore. The observers -and neighbours- could not recall the exact date/year with accuracy during the interviews but they still knew that they both saw this extraordinary event on the same day. According to one of the observers, the seal was not afraid of people and approached a woman on an inflatable mattress at a very close distance.

Valdanos bay: In 1996, a seal was observed in Valdanos bay by a diving instructor. The animal approached the observer at a distance of 1 metre while he was diving; the seal was seen also by the people on board the diving vessel.

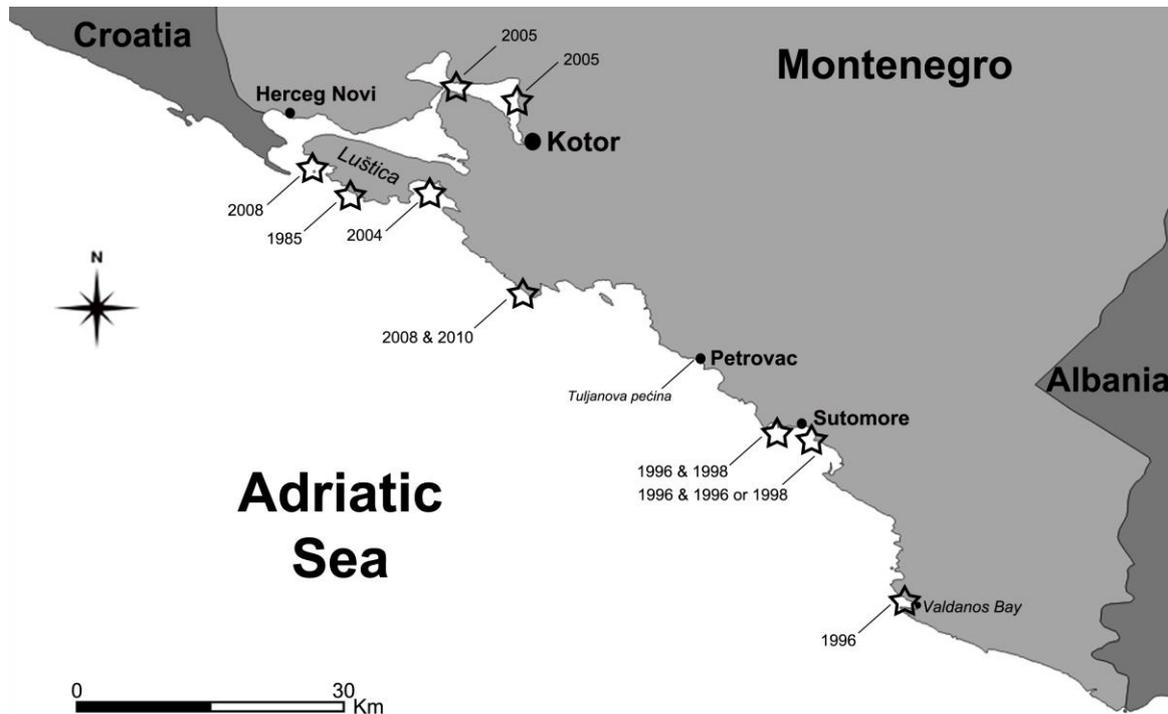


Figure 2. Locations of sightings of Mediterranean monk seals in Montenegro (1985-2010).

Discussion

Our data represent the first evidence of the species' presence in Montenegro after the 70s. The locations of the sightings collected cover the entire Montenegrin coastline. It should be stressed here that, generally, absence of seal sightings from some areas does not necessarily imply the actual absence of the species itself: it may simply indicate the absence of sufficient monitoring efforts. Through regular appeals for the reporting of sightings and through repeated contacts with local people it will be possible to better cover the area and detect the patterns of the presence of the monk seal in Montenegro.

All sightings collected referred to single animals. Obviously, repeated sightings of a seal within days or weeks in some location belong most probably to the same individual. Repeated sightings were recorded (a) in Sutomore in both years in 1996 and in 1998, (b) in Traste in 2004, (c) in the Bay of Kotor in 2005 and (d) in Donji Grbalj in 2010. This fact supports the indication that monk seals were present in the above locations for more than a few days, possibly for months or longer, at least in the above periods of time.

During our short surveys, no signs of seal presence were detected in the caves identified as potential suitable habitat for monk seals (Mačić *et al.* 2014; Panou *et al.* 2014). However, in surveys scattered in time and space, monk seal presence is sometimes simply not detected as has happened in the past (Harwood *et al.* 1984). In addition, faeces, fur and any other signs of seal presence inside the caves may be washed away due to the prevailing weather conditions. Furthermore, we did not include marine caves with an underwater entrance in our surveys which are a preferred resting and reproduction habitat of the species (Panou *et al.* 1993; Jacobs & Panou 1988; Güçü *et al.* 2004). Thus, we cannot exclude the possibility that seals may have been using underwater caves during the periods of survey. As stated by the General Fisheries Commission for the Mediterranean-GFCM (2011), "seal presence in low density areas is very cryptic and may result unrecorded in absence of scientific surveys".

The above data indicate at least the transition of animals from neighbouring countries, Croatia in particular, where the species' presence is well documented (Bundone *et al.* 2013b). Monk seal sightings were recorded elsewhere in the Adriatic Sea as well: in Albania and in Salento, southern Italy (Bundone *et al.* 2017; White *et al.* 2006; Sajmir Beqiraj, *pers. comm.*; Mario Congedo, *pers. comm.*). Furthermore, in the central Ionian Sea, Greece, an actively reproducing population is being studied since 1985 (Jacobs & Panou 1988; Archipelagos 1996; Panou 2009). Given the ability of the species to travel up to 300 km within a few months (Adamantopoulou *et al.* 2011) and even over the open sea (Ryan *et al.* 2014), we cannot exclude the possibility that monk seals from Croatia, Albania and possibly from Salento or Greece may travel into Montenegrin waters, at least periodically. Thus, protected terrestrial habitats in Montenegro would serve as corridors for the safe passage of monk seals throughout the Adriatic Sea.

Of course, the monk seal killed in the area of Herceg Novi in May 1969 may have traveled from nearby Croatia. The same applies to the two seals captured in 1933 and 1934 in northern Montenegro. However, these facts prove that, historically, there were monk seals in the country even if only in transition. The "Seal Cave" ("Tuljanova pećina") close to the town of Petrovac also indicates the historical presence of the species throughout this part of the country. Certainly, much more work is needed in order to collect more information about historical facts in Montenegro.

We believe that monk seals could regularly (re)use the coastline of Montenegro if adequate conservation measures including the establishment of one or more Marine Protected Areas are implemented ensuring safe terrestrial habitats for the species. Furthermore, protected terrestrial habitats in the country are extremely important for the general conservation of the species and the eventual (re)colonization of the coasts of the Adriatic Sea.

Acknowledgements

Our special thanks go to the company Jugopetrol AD that financed the cave surveys in 2013 -2015, by decision of its director at that time, Mr. Jannis Geroulanos, followed by Mr. Andreas Triantopoulos, and to Dr Vesna Mačić and Branislav Lazarević, Institute of Marine Biology, Kotor, Montenegro, for organizing and managing the cave surveys and for the support they provided in collecting monk seal sightings. We wish to thank Dmitry Ryadnov & Natalia Soloveva, Marko Pima, Milan Lazarević and Milan Tičić, Bigova; Ilija Bijelić, Muo/Kotor; Zvonko Varda, Đorđina Radivojević and Rade Komnenović, Sutomore, Montenegro; Valerieje Ljubičić, Belgrade, Serbia, as also two anonymous observers for their engagement and the

reporting of data of monk seal sightings. We are indebted to Mario Congedo and to Professor Sajmir Beqiraj for the information they provided on monk seal sightings along the coast of Albania.

References

- Adamantopoulou, S. Androukaki, E. Dendrinou, P. Kotomatas, S. Paravas, V. Psaradellis, M. Tounta, E. & Karamanlidis, A.A. (2011) Movements of Mediterranean monk seal (*Monachus monachus*) in the Eastern Mediterranean Sea. *Aquatic Mammals*, 37(3), 256-261.
- Archipelagos. (1996) *Monk Seal Conservation in Greece. Part 3, Central Ionian Sea*. Final Report to the European Commission, contract B4-3040/95/009/AO/D2. Archipelagos - marine and coastal management, Argostoli, Kefalonia, Greece, 44 pp + annexes.
- Bruno, S. (1976) Considerazioni sulla foca monaca mediterranea. Storia, distribuzione e stato di *Monachus monachus* (Hermann, 1779) nel Mare Adriatico (Mammalia, Pinnipedia, Phocidae). Estratto dal Volume *Scritti in memoria di Augusto Toschi*, Supplemento alle Ricerche di Biologia della Selvaggina, VII, pp. 91-110.
- Bundone, L. Panou, A. & Molinaroli, E. (2013a) Re-evaluating the actual distribution range of the Mediterranean monk seal, *Monachus monachus*. Abstract book, 27th Annual Conference of the European Cetacean Society, 8th-10th April 2013, Setúbal, Portugal, p. 104.
- Bundone, L. Antolovic, J. Coppola, E. Zalac, S. Hervat, M. Antolovic, N. & Molinaroli, E. (2013b) Habitat use, movement and sightings of monk seals in Croatia between 2010 and 2012-2013. *Rapport de la Commission internationale pour l'exploration scientifique de la Mer Méditerranée*, 40, 608.
- Bundone, L. Fai, S. Rizzo, L. De Marchi, B. Guerzoni, S. & Molinaroli, E. (2017) Sightings and historical presence of Mediterranean monk seal along the coast of Salento (Southern Italy). *Proceedings of the 45th Annual Symposium of the European Association for Aquatic Mammals*, 08-11 March 2017 Genova, Italy, p. 27.
- Gamulin-Brida, H. Mikulic, Z. & Simunovic, A. (1979) Le statut recent du phoque moine - *Monachus monachus* (Hermann 1779) en Adriatique. *Rapport de la Commission internationale pour l'exploration scientifique de la Mer Méditerranée*, 25/26(10), 141-142.
- GFCM. (2011) *Draft summary of information on monk seals in the Mediterranean and Black Sea*. FAO, General Fisheries Commission for the Mediterranean. Thirty-Fifth Session. Rome, Italy, 10 pp.
- Güçü, A.C. Güçü, G. & Orek, H. (2004) Habitat use and preliminary demographic evaluation of the critically endangered Mediterranean monk seal (*Monachus monachus*) in the Cilician Basin (Eastern Mediterranean). *Biological Conservation*, 116, 417-431.
- Harwood, J. Anderson, S.S. & Prime, J. H. (1984) *Special measures for the conservation of monk seals in the European Community*. Rep. EUR 0228 EN, DG XI of the Commission of the EC. Sea Mammal Research Unit, Cambridge, UK.
- Jacobs, J. & Panou, A. (1988) *Conservation of the Mediterranean Monk Seal, Monachus monachus, in Kefalonia, Ithaca and Lefkada Islands, Ionian Sea, Greece*. Final report for the Institut Royal des Sciences de Belgique, Brussels, as part of project A.C.E. 6611/28, "Descriptive Analysis and pilot Project for the Establishment of a Conservation Strategy for the Monk seal and its habitat", financed by the Directorate for the Environment, Consumer Protection and

- Nuclear safety of the Commission of the European Communities. December 1988. Institute of Zoology, University of Munich, Munich, Germany, 221 pp.
- Johannes, R.E. Freeman, M.M.R. & Hamilton, R.J. (2000) Ignore fishers' knowledge and miss the boat. *Fish and Fisheries*, 1, 257-271.
- Karamanlidis, A.A. & Dendrinis, P. (2015) *Monachus monachus*. The IUCN Red List of Threatened Species 2015, e.T13653A45227543. Available from: <http://www.iucnredlist.org/details/13653/0> (15 July 2017).
- Karamanlidis, A.A. Dendrinis, P. Fernández De Larrinoa, P. Güçü, A.C. Johnson, W.M. Kiraç, C.O. & Pires, R. (2015) The Mediterranean monk seal *Monachus monachus*: status, biology, threats, and conservation priorities. *Mammal Review*, 45(4), 1-14.
- Mačić, V. Panou, A. Bundone, L. & Varda, D. (2014) Contribution to the knowledge of rare and endangered habitat-marine caves (Montenegro, South East Adriatic coast). *Proceedings of the 1st Symposium on the Conservation of Dark Habitats*. Portoroz, Slovenia 31 October 2014, pp. 73-74.
- Manyou, F. Sbrana, M. Sartor, P. Maravelias, C. Kavadas, S. Damalas, D. Cartes, J.E. & Osio, G. (2011) Estimating trends of population decline in long-lived marine species in the Mediterranean Sea based on fishers' perceptions. *Plos One*, 6(7), e21818.
- Notarbartolo di Sciarra, G. & Kotomatas, S. (2016) Are Mediterranean monk seal, *Monachus monachus*, being left to save themselves from extinction? In Notarbartolo di Sciarra, G. Podestà, M. & Curry, B.E. (Eds.), *Mediterranean Marine Mammals Ecology and Conservation*. Advances in Marine Biology, 75, pp. 359-386.
- Panou, A. Jacobs, J. & Panos, D. (1993) The endangered Mediterranean monk seal *Monachus monachus* in the Ionian Sea, Greece. *Biological Conservation*, 64, 129-140.
- Panou, A. (2009) Monk seal sightings in the central Ionian Sea. A network of fishermen for the protection of the marine resources. Archipelagos – Environment and Development, Greece. Presentation at the *Who are our seals?* Workshop held in Istanbul, 28 February 2009, within the framework of the 23rd Annual Conference of the European Cetacean Society, Istanbul, Turkey, 2-4 March 2009, pp. 1-6.
- Panou, A. Bundone, L. Varda, D. & Mačić, V. (2014) Habitat availability for the Mediterranean monk seal *Monachus monachus* in Montenegro. Abstract Book. *28th Annual Conference of the European Cetacean Society*, Liege (Belgium), 5-9 April 2014, p. 205.
- Ronald, K. (1984) The recent status of the monk seal in Yugoslavia. In Ronald, K. & Duguay, R. (Eds.), *Proceedings of the Second International Conference on the Monk Seals, La Rochelle, France, 5-6 October 1984*. Annales de la Société des Sciences Naturelles de la Charente-Maritime. Supplement, Decembre 1984. Working paper n°4, pp. 48-50.
- Ryan, C. Cucknell, A.C. Romagosa, M. Boisseau, O. Moscrop, A. Frantzis, A. & McLanaghan, R. (2014) A visual and acoustic survey for marine mammals in the Eastern Mediterranean Sea during summer 2013. Final report to the International Fund for Animal Welfare, Marine Conservation Research International, Kelvedon, UK, 55 pp.
- UNEP/MAP. (1994) *Present Status and Trend of the Mediterranean Monk Seal (Monachus monachus) Populations*. Meeting of Expert on the Evaluation of the Implementation of the Action Plan for the Management of the Mediterranean Monk Seal. Rabat, Morocco, 7-9 October 1994, 66 pp.
- White, M. Haxhiu, I. Kouroutos, V. Gace, A. Vaso, A. Beqiraj, S. Plytas, A. & Dedej, Z. (2006) *Rapid Assessment Survey of important marine turtle and monk seal habitats in the coastal area of Albania, 2005*. Technical Report, 35 pp + annexes.