

Strasbourg, 1 March 2012
[files05e_2012.doc]

T-PVS/Files (2012) 5

CONVENTION ON THE CONSERVATION OF EUROPEAN WILDLIFE
AND NATURAL HABITATS

Standing Committee

32nd meeting
Strasbourg, 27-30 November 2012

Possible file

**THREAT TO THE MEDITERRANEAN MONK SEAL
(*MONACHUS MONACHUS*)
IN TURKEY**

REPORT BY THE PLAINTIFF

*Document prepared by
The Middle East Technical University (Institute of Marine Sciences)*

***MONK SEAL POPULATION LIKELY TO BE AFFECTED BY THE MARINE TERMINAL
PLANED FOR YEŞİLOVACIK, MERSIN, TURKEY.***

By

Ali Cemal GÜCÜ

Middle East Technical University, Institute of Marine Sciences

The following report has been compiled from the project outputs listed below:

1994 – 1999 “*Conservation of the Mediterranean Monk Seal in Turkey - Cilician Basin*”, WWF-International

1996 – 1998 “*Monk Seal Conservation Project in the Cilician Basin - Socio-Economic Aspects - (Northeastern Mediterranean Sea)*”, Royal Netherlands Embassy, Office of the Counselor for Agriculture, Nature Management and Fisheries.

1996-2000 “*Observing in-cave behavior of the Mediterranean Monk Seal using Infrared monitor*”, PADI Foundation US.

2003 – 2006 “*Investigations on the Mediterranean monk seal in the Gulf of Iskenderun*”, BTC – Pipeline Co. Turkish Branch.

2004 – 2007 “*Investigations on the changing impacts on Kızılıman Marine Protected Area and responses of the ecosystem*”, Turkish Scientific and Technical Research Council (TUBITAK).

2006 – 2007 “*Investigations on the Mediterranean Monk Seal inhabiting TRNC and on the possible interactions with Anatolian Colony*”, Turkish Scientific and Technical Research Council (TUBITAK).

2008 – “*Investigations on the Mediterranean Monk Seal on the coast of Antalya*”, Turkish Scientific and Technical Research Council (TUBITAK).

2010 – “*Mediterranean monk seal monitoring project in Turkey*”, UNEP-RAC/SPA

* * *

In the seventies, it was believed that there were 600-1000 individual in the Mediterranean Sea (Sergeant et al., 1978; Marchessaux, 1989). However, in 1997, approximately 200 seals died (Harwood et al., 1998). After this loss, other reproductive colonies in Madera (Neves and Pires, 2000), Alonissos (HSSPMS, 1995; Dendinos et al., 1996), Kefalonia (Jacobs and Panou, 1988), Foca (Guclusoy and Kence, 2001) as well as the less known, small fragmented groups scattered in few remote locations such as in Mersin, gathered substantial attention.

In general, there are two distinct populations of the species. One of these populations which largely occupies the Mauritanian coast is the Atlantic population. The other, the Mediterranean population is found almost exclusively on the coast of Greece and Turkey. It was estimated that the Atlantic population is represented by around 155 individuals. However given the cryptic and elusive behavior of the species, it is almost impossible to assess the size of the fragmented seal colony inhabiting the Mediterranean Sea. With the best estimate available it may be argued that the entire Mediterranean population is around 350 individuals (Table 1). Turkey is certainly one of the two last holds of the species however the actual numbers still surviving along the coast of the country is not clearly known. The reasons for uncertainty are the fact that the seals on the Aegean coast are transboundary and move between Greece and Turkey. As a matter of fact, there are no field based population census has ever made for the Mediterranean population. The population estimates such as the one given above (Table 1) were produced by *personal communications* and, to a great extent, based on guesses of the seal experts - sometimes - without any evidence reported (see the reference column given in Table 1). Even in the countries where the core of the surviving population is hosted,

such as Turkey and Greece, the actual population size and the range of monk seal habitat is not clearly known. For example, there is EU PROPOSAL on fisheries measures for the conservation of the Mediterranean monk seal (*Monachus monachus*) in the GFCM area to achieve very low and close to 0 risk of monk seals incidental taking and mortality in fishing activities. This proposal urges the members and cooperating non-members of GFCM to provide maps and geographical positions identifying the location of already known, past and current, monk seal caves. However the results indicated that the information available is very scarce and the existing knowledge on the seal habitats are hardly verified by first hand reports. Therefore identified seal habitats and particularly the caves in which crucial biological requirements of the species are fulfilled, should be the main target of conservation actions.

Table 1. Mediterranean monk seal populations remaining in the World (RAC/SPA, 2005)

Population	Estimate	Last report	Last birth	Source of information
West Sahara coast	+130	2005	2004	Aguilar pers. com. Gonzalez pers.com.
Canaries	Vanished	1992	1441	Monod 1948; I.R.S.N.B. & S.M.R.U. 1993
Madeira (Desertas)	23	2003	2002	Costa-Neves pers. Com
Mediterranean				
Morocco	Vanished?	2004	1981	RAC/SPA 2004; Mo et al 2004
Chafarinas islands	Vanished?	2001	2000	González 1989; Cebrian pers. com.
Algeria	10	1993	1989	Lefevre et al. 1989, Boutiba 1993 La Galite Vanished 1986 1983 Gonzalez 1989
Mainland Tunisia	Vanished	1986	1975	Gonzalez 1989; Ktari-Chakroun 1978
Libya	+2	2002	1968	Norris 1972, Boutiba 1993, Mo et al 2002
Egypt	Vanished	1981	No records	Norris 1972; Marchessaux 1989
Israel	Vanished	1968	around 1928	Bertram 1943; Marchessaux 1989
Lebanon	Vagrants	1997	No records	Marchessaux 1989, RAC/SPA 2003
Syria	Vagrants	2003	No records	RAC/SPA 2003
Cyprus	+ 2	2003	1994?	Hadjichristophorou & Dimitropoulos 1994; Ozturk 1994. Cebrian pers. com.
Turkey	100 ¹	2003	2001	Gucu et al 2004; Guclusoy et al 2004
Russia	No records	No records		Cebrian 1998
Ukraine	Vanished	No records	No records	Ozturk 1994
Romania	Vanished	1960	No records	Schnapp et al. 1962; Ozturk 1994
Bulgaria	Vanished	1975	1950-60	Schnapp et al. 1962; Avellá 1987; Ozturk 1994
Greece	250 ²	2005	2004	Cebrian 1998; Cebrian and Gonzalez, pers. com.
Albania	Vanished?	80's	1944	Lamani pers. com. ; Vaso pers. com.
Serbia & Montenegro	Vanished	No records	No records	Cebrian 1995
Bosnia	Vanished	No records	No records	Cebrian 1995
Croatia	Vanished	1993		Cebrian 1995
Slovenia	Vanished	No records	No records	Cebrian 1995
Mainland Italy	Vagrants	2003	1976	Di Turo 1984; Marini 1994; RAC/SPA 2003
Sicily - Pantelleria	Vagrants	1998	No records	González 1989; Marini 1994; RAC/SPA 2003
Sardinia	Vagrants	2001	1986	Marchessaux 1989; Marini 1994; Mo pers. com.
Malta	Vanished	1997	No records	Marchessaux 1989; Mo pers. com.
Mainland France	Vanished	1990	1930-35	Duguay y Cheylan 1978; Maigret 1990
Corse	Vanished	1982	1947	Troitzky 1953; Marchessaux 1989
Mainland Spain	Vanished	1984	1950	Avellá 1987; Marchessaux 1989
Balearics	Vanished	1977	1951	Avellá 1987
Mainland Portugal	Vanished	1817	1797	Avellá 1987

1. overlap with Greece
2. overlap with Turkey

The monk seal population size on the Mediterranean coast of Turkey was estimated as 35 individuals at the end of 1970's. Later, in a study carried out between 1987 and 1994 a total of 45 individuals were identified along the entire extent of the Turkish coast, including the Black Sea and the Sea of Marmara. In that study number of seals inhabiting the south coast of Turkey was given as 11 individuals (Öztürk,1994). In early 2000's, Güçlüsoy et al. (2004) estimated the monk seal population size utilizing the first hand sighting reports and recent research studies and reported 104 individuals, 37 of them inhabiting the south coast of Turkey. Finally in 2007, the population size estimated for the narrower coastal band between Antalya and Syria was given as 38 (Gucu et al., 2009a and 2009b). As can be noted, the number of individuals reported in the literature points out an increase in the survivors rather than a decline. Whatever the actual number is, the size of the monk seal population is low enough to put the Mediterranean monk seal in the list of the most endangered species.

A detailed study carried out between 1994 and 1996, represented that the largest and the only vital (retaining reproductive ability) colony of monk seals on the Turkish coast inhabits the west coast of Mersin (Figure 1; Gucu et al., 2004). The study showed that, consistent with monk seal behavior in other parts of the Mediterranean, whelping occurred strictly in caves and all monk seal pups were born in caves. This finding is consistent with reports of monk seal whelping sites in other parts of the Mediterranean and the Atlantic (Sergeant et al., 1978). The nearest surviving congeneric of Mediterranean monk seal, the Hawaiian monk seal *Monachus schauinslandii* still breeds mainly on beaches (Gilmartin and Eberhardt, 1995). However, according to recent historical evidence, gathered from local fishermen indicates that monk seals parturition does not occur outside the caves. Some authors (Scoullou et al., 1994) believe that the monk seal was forced to abandon beach habitat due to harassment, habitat destruction and human disturbance. Similar evidence for other species (e.g., Guadalupe fur seal, *Arctocephalus philippi*) indicates that the females retreated from open beaches in to caves for reproduction due to intense hunting and disturbance (Hubbs, 1956). In the case of the Mersin colony, cave preference for whelping may be due to anthropogenic as well as morphology of the coast.

In the same study mentioned above, all the caves used by the seals for resting or breeding were discovered. Distribution of the caves by localities is given in Table 2.

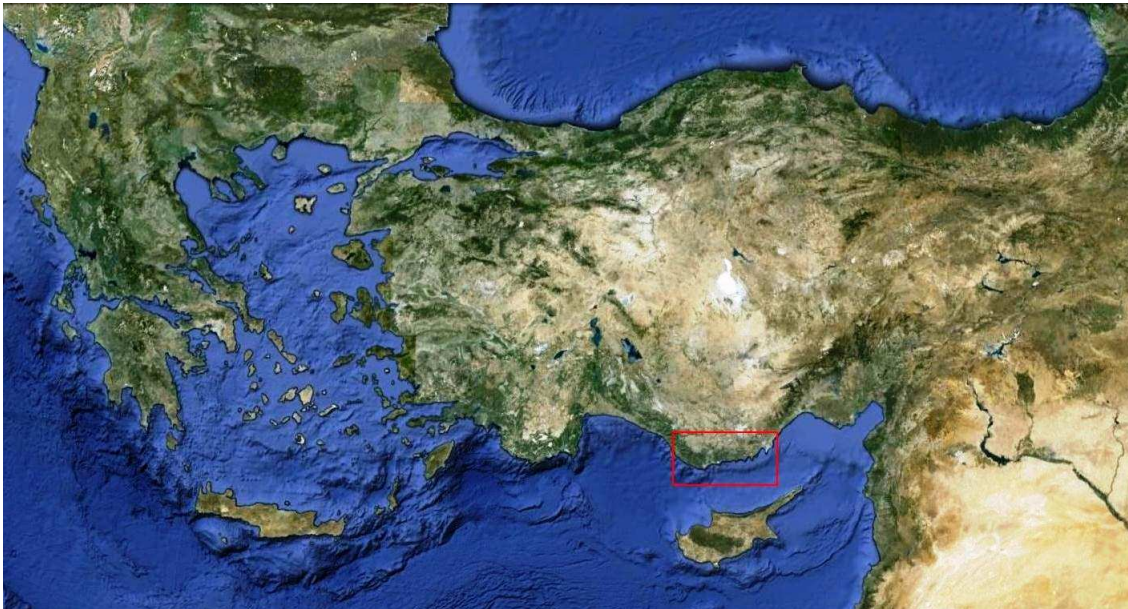


Figure 1. The region used by the Mersin seal colony (eastern Mediterranean)

Table 2. Distribution of seal caves found in the Cilician Basin (see Figure 2 for the location of the names) Shaded sub-region is the one where the marine terminal is planned

Region/Cave	Breeding	Active	Potential	Abandoned	Total
Erdemli – Tasucu	-	-	-	2	2
Tasucu - Aydincik	1	2	4	-	7
Aydincik – Gozce	-	5	3	-	8
Gozce - Anamur	1	4	4	-	9
Anamur - Gazipasa	1	5	7	-	13
Total	3	16	18	2	39

Following the study mentioned above, the importance of Mersin (Cilician) coast for the survival of the species has been recognized and the area has been set aside for conservation in 1997. The surroundings of the identified breeding caves, and the foraging areas has been designated as “No-take-zone” in the sea and on the land as “1st Degree Natural Asset”. A follow up study conducted after the conservation remedies were enforced, indicated that the protected area hosted a breeding colony composed of 24 individuals. It was also observed that certain seals were using only certain caves. Therefore the region was subdivided into territories based on the home ranges of the territorial males. The habitat partitioning of the colony is represented in Figure 2.

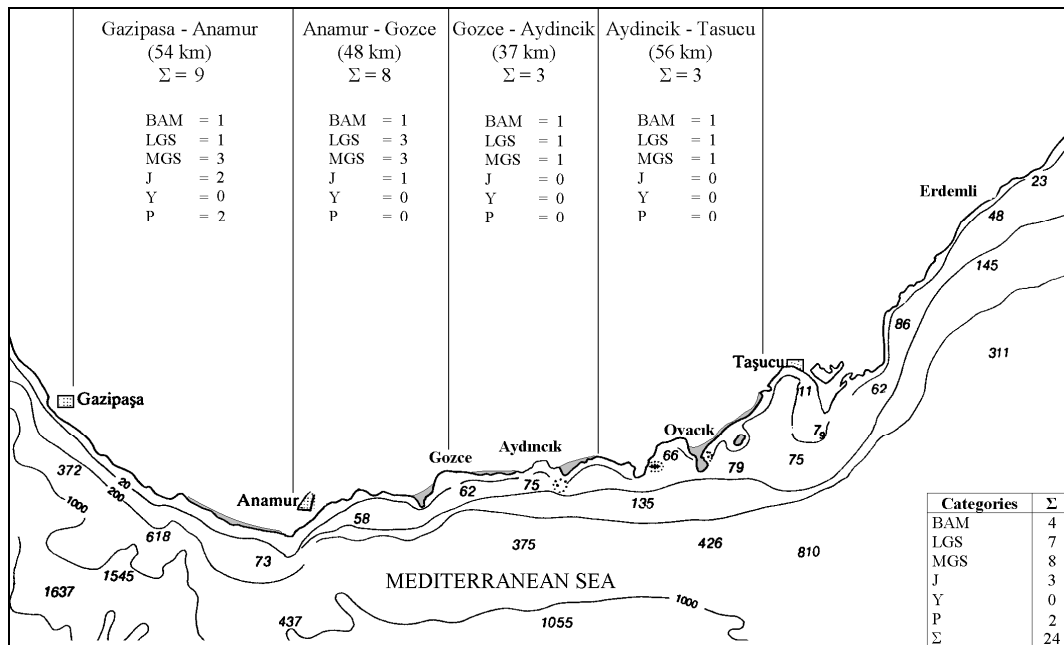


Figure 2. Distribution of the seals along the Cilician Basin with the arbitrary ranges of the sub-regions, the total number of seal individuals using each sub-region and the sub-group category compositions. The data presented on the bottom right corner summarizes the total numbers of seals in each category.

Among these sub-groups the fewest individuals were found in Taşucu and Aydincik. Moreover, it was realized that the subgroup in this area did not breed throughout the study. In the same study, the ages of the seals were also estimated (Table 3). The demographic structure of the colony at the time of census (Figure 3) reflects an unusual adult dominated structure which indicated a very low reproductive success. Within the period between 1994 and 2000, six dead seals were found. As the locals of the region have reported this number might have been as high as 10 seals. These losses explain the abnormal demography in the colony. In ecological terms, this is a typical case of Allee effect (under-population effect) in which the number of individuals are so low that reproductive (and some social) activities does not take place only because the individuals are not paired. The loss of harem forming dominant males had significant impact on the colony and reproduction has almost ceased. Consequently, despite the conservation efforts and positive response of the colony to the protective measure the sub-group inhabiting the coast between Taşucu and Aydincik is still under risk and this sub-region hosts the bay where marine terminal is planned.

Table 3. Identified individuals of the Cilician monk seal colony, their sex, category and estimated age. BAM = Black Adult Male; LGS = Large Grey Seal; MGS = Medium Grey Seal; J = Juvenile; Y = Youngster; P = Pup; † = Deceased; ? = Unknown; ages at September 2001.

† = Deceased; ? = Unknown; ages at December 2001.

Seal ID	Identified On	Sex	Categories at first encounter	Age (years)
I - M1	16-Apr-95	M	BAM	14.7
I - F1	23-Jul-95	F	LGS	13.4
I - P1	30-Jul-95	?	Y	6.6
II - M1	19-Aug-98	M	BAM	11.4
II - F1	11-Oct-97	F	LGS	11.2
II - X1	11-Oct-97	?	J	5.2
III - M1	10-May-97	M	BAM	12.6
III - F1	24-Apr-96	F	MGS	8.2
III - F2	04-Aug-96	F	LGS	12.4
III - F3	21-Aug-96	F	LGS	12.4
III - P1	21-Aug-96	F	P	†
III - P2	15-Nov-96	M	J	6.1
III - P3	02-Dec-96	M	Y	5.2
III - P4	09-Nov-97	M	P	4.1
III - P5	24-Oct-99	F	P	2.2
IV - M1	24-Aug-96	M	BAM	13.4
IV - F1	20-Aug-98	F	LGS	10.4
IV - F2	13-Mar-99	F	MGS	5.3
IV - P1	20-Aug-98	F	P	3.4
IV - P2	23-Oct-99	F	P	2.2
IV - P3	09-Nov-00	M	Y	1.3
IV - P4	29-Aug-01	?	P	0.3
IV - P5	29-Aug-01	?	P	0.3
IV - X1	18-Oct-98	?	J	4.2
X - X1	10-Mar-98	?	LGS	10.8

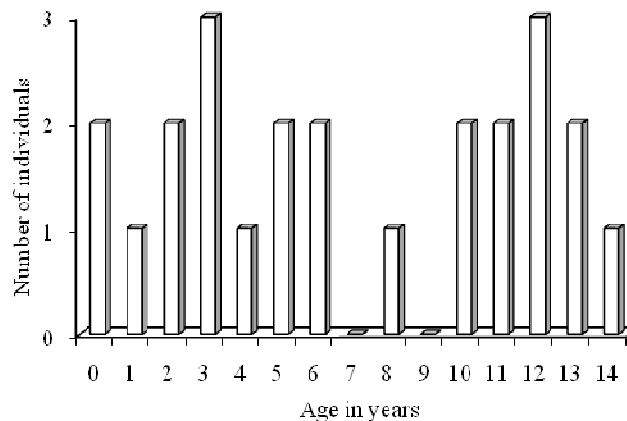


Figure 3. Estimated demographic structure of the seals in the Cilician Basin

In the same study it was found out that the seals partition the caves and the total number of suitable caves is one of the major factors limiting the size of the colony. All the caves discovered on the entire coast are presented in Table 4. The total number of suitable caves is only 37. Out of this number only 7 caves remains with the coast between Tasucu - Aydıncık and only one of them, Balıklı has the morphology suitable for whelping and hence used by pregnant mothers.

The frequency of cave use between 1996 and 2000 is presented in Table 4. In the same table the number of seals sighted during the cave surveys was also given. The rows marked in grey are the cave located between Tasucu and Aydıncık. These caves were checked 22 times during the study and 11 times a seal was sighted in the caves. As presented by the table, Balıklı cave is actively used by the seals during the study and the maximum number of seals sighted at a time was 2 individuals, one being a new born pup (Table 5).

Table 4. In-cave seal sightings between March 1995-October 1999; showing the total number of visits to each cave; the number of times a seal/seals were sighted; the total number of seals sighted; the maximum number of seal sighted at one time (see also figure 1); * indicates breeding cave; ** indicates the cave located 500 meters to the planned marine terminal.

Caves	# of visits	# of sightings	Σ seal sighted	Max
Balıklı**	13	7	8	2
Besparmak	4	2	2	1
Soguksu	5	1	1	1
Charlie	11	4	7	2
Boklu	38	11	11	1
Catlak	12	1	1	1
Boz*	45	10	16	2
Dehliz	87	51	73	3
Piramit*	14	10	16	3
Selale	1	1	1	1
Havuz	2	1	1	1

Table 5. The active caves and their usage by each of the identified seal (marked by X sign). Seal names in underlined bold indicate BAMs and the names in *italic* represent female LGSs. The horizontal dark lines indicate presumed sub-groups and vertical dark lines show sub-regions.

Seal ID / Caves	Balıklı	Besparmak	Soguksu	Charlie	Dehliz	Boz	Boklu	Makale	Piramit	Havuzlu	Selale
I – M1		X									
<i>I – F1</i>	X										
I – P1	X										
II – M1			X	X							
II – X1				X							
<i>II – F1</i>				X							
III – M1					X		X				
<i>III – F1</i>					X	X	X				
<i>III – F1</i>					X	X	X				
<i>III – F3</i>					X	X	X				
III – P2					X	X	X	X			
III – P3					X	X	X				
III – P4					X	X	X				
III – P5					X	X					
IV – M1									X		
IV – P1									X		
IV – F1											X
<i>IV – P1</i>									X		
IV – P2									X		
IV – P3									X		
IV – P4									X		
IV – P5									X		
IV – X1										X	
X – X1	Not sighted within a cave. Observed all along the basin										

The further studies carried out right after the enforcement of conservation measures represented that the response of the seals in Mersin has been very positive. The breeding success which had been drastically reduced at the end of 1990's, has significantly increased after 2002 and reached to 5 pups per year (Table 6 and Figure 4) and so that the size of the colony has increased from 24 to 30. Gucu and Ok (2006) have analyzed the viability of the population based on population parameters presented by the colony before and after the protection. According to the analysis, the colony would not have survived if the protection had not been established. The risk of extinction within 10 year was almost 100% with the fecundity and mortality rates presented by the colony before the protection. After protection these rates have significantly modifies in favor of the species and as of today, the risk of extinction within the next 50 years is below 30%. However this estimation does not mean that the monk seal population on the west coast of Mersin is in safe. With the increase in the population size, the pup mortality has increased remarkably. The major causes of pup mortality are entanglement in the fishing nets and being born in an unsuitable cave exposed to open sea. The mortality of the pups born

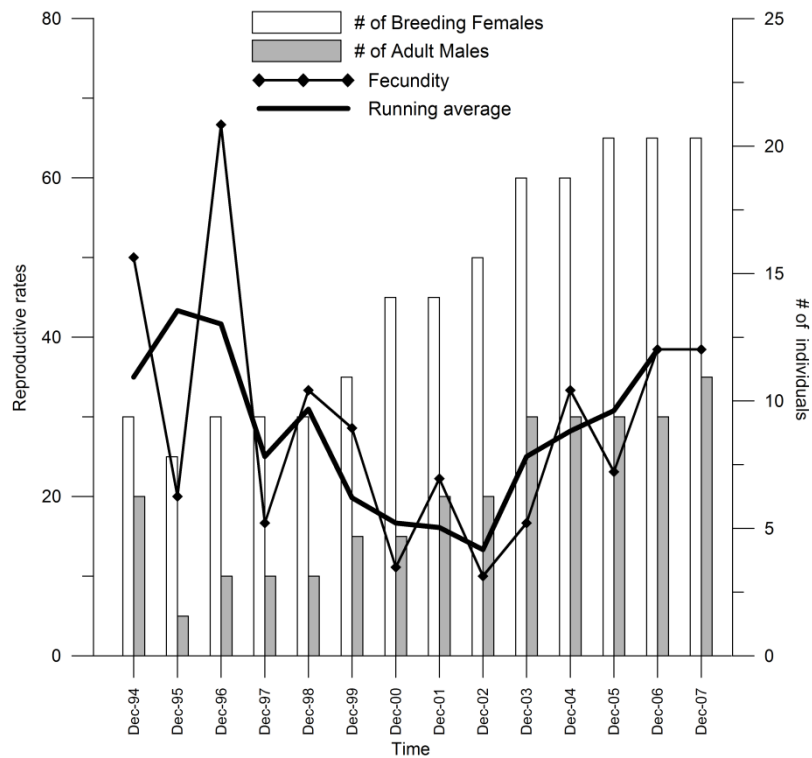


Figure 4. Reproductive activities in P1

Further studies indicated existence of a small segregated breeding population of seals inhabiting the steep rocky coast at *i*) Turkish/Syrian border (P2), *ii*) north Cyprus (P3) and *iii*) Antalya (P4) (Figure 5). Three years after conservation, a young female was sighted between P1 and P2. The same individual frequented a formerly “abandoned” cave which had not been used by the seals within the previous 25 years (Gucu et al., 2004). Later, a male sighted within P1 moved beyond the anticipated migration limits (Gucu and OK, 2004). Finally a dominant male of P1 sighted in Cyprus (Gucu et al., 2009a). All these individual events demonstrated that the P1 tended to further expand with the enlargement of the population size and the sub-region between Taşucu and Aydıncık mentioned above play a crucial role bridging the main colony (P1) with those found in Cyprus (P3) and in the Gulf of Iskenderun (P2)

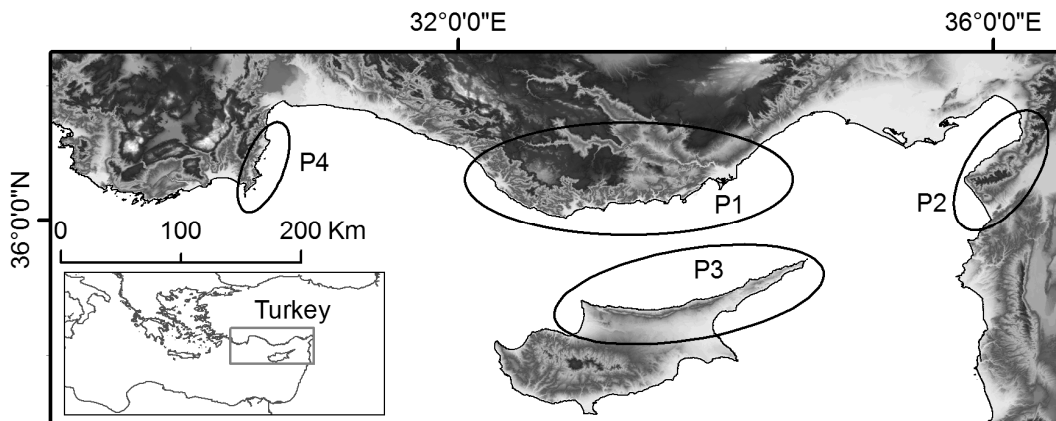


Figure 5. The regions used by the respective seal populations

Estimated overall demographic structures of the populations in the northeastern Mediterranean were given in Table 6 and 7. A total of 69 individuals are involved in the tables and as of year 2008, 50 individuals are believed to survive in four populations.

Table 7. Demography table of the monk seal populations in the northeastern Mediterranean; underlined italic numbers are back-calculated ages, horizontal arrows show the dispersed individuals.

Sex	Code	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	
P2 (estimated using the data in Ok (2006))																	
M	Olen-1	<u>3.0</u>	<u>4.0</u>	<u>5.0</u>	<u>6.0</u>	<u>7.0</u>	<u>8.0</u>	†									
F	Olen-2			<u>0.0</u>	<u>1.0</u>	<u>2.0</u>	<u>3.0</u>	<u>4.0</u>	<u>5.0</u>	<u>6.0</u>	†						
F	Firtına							<u>0.0</u>	<u>1.0</u>	<u>2.0</u>	<u>3.0</u>	<u>4.0</u>	<u>5.0</u>	6.0	7.0	8.0	
F	Arap										→	8.3	9.3	10.3	11.3	12.3	
F	Kınalı										<u>0.0</u>	<u>1.0</u>	<u>2.0</u>	3.0	4.0	5.0	
M	Rüzgar													0.1	1.1	2.1	
F	Ali Eksi-1														0.1	†	
M	Ali Eksi-2														0.1	†	
P3 (estimated using the data in Gucu et al. (2009a))																	
M	Bombacı													→	19.39	20.39	21.39
F	YediDalga							<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	6	7.00	8.00	
F	Karpaz							<u>0</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	6.00	7.00	8.00	
F	Karpaz J												<u>0.8</u>	1.80	2.80	3.80	
F	Karpaz P													0.80	1.80	2.80	
P4 (estimated using the data in Gucu et al. (2009b))																	
F	Cıralı	<u>0.20</u>	<u>1.20</u>	<u>2.20</u>	†												
F	Emine									<u>0.00</u>	<u>1.00</u>	<u>2.00</u>	<u>3.00</u>	<u>4.00</u>	<u>5.00</u>	6.00	
M	IFAW-1					<u>0.00</u>	<u>1.00</u>	<u>2.00</u>	<u>3.00</u>	<u>4.00</u>	<u>5.00</u>	<u>6.00</u>	<u>7.00</u>	8.00	8.00	9.00	
M	IFAW-2					<u>0.00</u>	<u>1.00</u>	<u>2.00</u>	<u>3.00</u>	<u>4.00</u>	<u>5.00</u>	<u>6.00</u>	<u>7.00</u>	8.00	8.00	9.00	
F	ÜçAdalar									<u>0.00</u>	<u>1.00</u>	<u>2.00</u>	<u>3.00</u>	<u>4.00</u>	<u>5.00</u>	6.00	
F	Adrasan													<u>0.50</u>	<u>1.50</u>	2.50	
M	Erkek														<u>0.60</u>	1.60	

It is very likely that there was one single and large seal population in the past covering the entire extent of the northeastern Mediterranean. Later, because of intensive urbanization and industrialization within their habitat, and also because of deliberate killings, the population became fragmented into smaller isolated populations suggested in Figure 5 by the early 1980s. Today, the seals dispersed to Syria, Cyprus, the Gulf of Iskenderun and all along the northeastern Mediterranean may be the relicts of the same historical population. Depending on the level of disturbance and the size of the fragments, some groups may maintain their biological and social functions, as on the Cilician coast. Due to steep and mountainous topography on the west coast of Mersin, human pressure and, in turn, habitat fragmentation, has not been as severe as on the east coast, as indicated by continued reproductive ability of the colony inhabiting there. However, the fate of the small colony in the Gulf of Iskenderun is uncertain, especially when the genetic bottleneck is considered — i.e. the probability of extinction may increase due to reduced genetic variability.

The evaluation of survey results, however, reveals that the situation in the eastern Mediterranean is not as bad as first feared — and may even be promising. It is evident that the colony on the west coast of Mersin is increasing, and is also following an expanding trend. The caves recently repopulated by the seals are located right in the middle of the two fragmented colonies. At the moment we are not sure if there is sufficient genetic movement between these fragments. However, if the habitat and the caves used by the seals in particular, are kept intact it is very likely that there will certainly be a bridge between isolated populations. In fact, it seems that this is the only chance of the small colony in the Gulf of Iskenderun and Cyprus to survive. On the other hand if only one of the breeding caves in P1 is lost, that would certainly mean a disaster not only for the population in question, but also for the neighboring populations where breeding success depends on migratory individuals originated from P1.

In general, the main accumulation of the seals is observed at the sites where the human interference is minimal, especially at the spots the main road is not in the near proximity. Therefore it would be wrong to conclude that the habitat preferences of the seals are driven by human activities around; the sites with dense human activities are avoided. As given above, the largest and the only viable seal colony inhabiting the east coast of Mersin dwell in a very delicate social structure. The caves that serve to fulfill significant biological requirements, such as resting and breeding play crucial role within this structure. Although karstic morphology on the land permits formation of coastal caves, number of caves bearing certain peculiarities sought by the seals is extremely limited. With this respect the caves, and especially the one near to the planned marine terminal in Yeşilovacık has critical importance on the persistence of the colony on this region.

Competition for breeding habitat among Mediterranean monk seal females has never been reported. Moreover, it was observed that two different mothers gave birth in the same cave within the P1 (one month apart) in 2005 and 2006. However it was also observed that two pups died because they were given birth in unfavorable caves (Gucu, 2008). Figure 6 shows the relation between number of pups and the pup mortality. In general high pup mortalities were observed when more than 2 pups were born in a harem in a year. Therefore it may be postulated that in addition to the number of suitable breeding caves, the maximum number of pups that can be born in a cave during a whelping season may be a limiting factor determining the reproductive success.

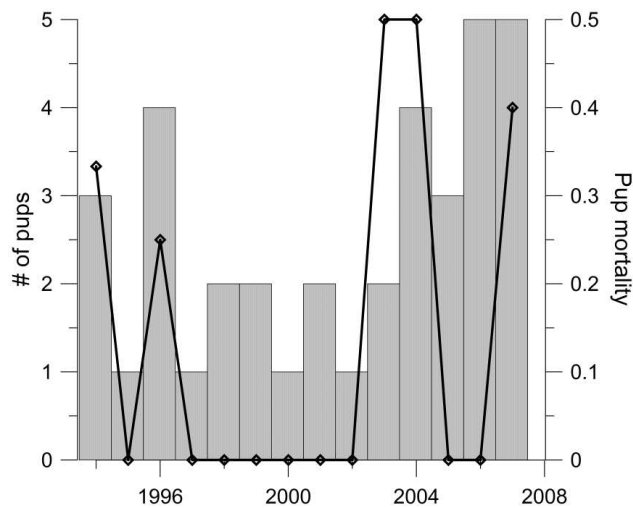


Figure 6. Number of pups (bars) and pup mortality (line)

The morphology of the habitat under threat

The west of Mersin coast (Cilician basin) is characterized by ruggedness with steep mountain sand shoreline cliffs plunging into the Mediterranean. The geography on the coast is dominated by karst topography; but also characterized by sand and sedimentary rocks. On the karstic outcrops meeting the sea there are several caves carved by CO₂ bearing groundwater dived in the inner Anatolian Plato. There are also some other coastal caves found in the sheltered inner parts of the small bays located near to the seaward opening of valleys eroded by ancient river. As oppose to the karstic caves, these caves are built by soft material mainly deposition of soil at the outskirts of the coastal ridge and therefore has a very fragile structure. The majority of the breeding caves and particularly the one in question (Balıklı) are of latter group with very delicate ceiling and eventually a part of Balıklı cave recently collapsed during the construction of a trail in the forest overtopping the cave.

The area where the Balıklı Cave is located in is a small bay protected from prevailing winds. There is a wide 0.8m x 3m underwater entrance to the cave. The opening the cave provides an excellent shelter for the seals; even in stormy weather. A shallow pool is located inside the cave and it is circled from right to left with a small platform, a beach, and some flat-topped rock blocks. The seals were observed mainly on these stone blocks. Evidence of seal use included tracks and depressions on the sandy beach and remains of mucous, fur, and faces on the platform. The cave interior is always very dark. Moreover, as being breeding cave Balıklı has another important characteristic. The

prevailing winds gradually change direction from the summer Westerlies into the winter Easterlies. When the change in the wind direction does not affect two of the active breeding caves, namely Balıklı and Piramit (see Table 4), with south-facing entrances, the third one, Boz is affected due to its location on the eastern side of a cape. During the summer it is sheltered against the Westerly winds, but by the end of the whelping season its entrance becomes extremely exposed to the winter Easterlies. Therefore the mother giving birth to a pup must carry the pup to the opposite site of the cap before winter; otherwise, as experienced several times, the pup may be wounded or die during very harsh winter storms. Such an even has never been observed in cave Balıklı.

Northeastern Mediterranean Sea hosts one of the last and continuously breeding populations of monk seal in the Mediterranean Sea. In early 1990s, following a troubled period during which at least six seals were deliberately killed, the population represented an isolated nature, confined to limited home ranges with an alarmingly low breeding success (Gucu et al., 2004). The results of numerous fisheries surveys also show that commercial fish species had been drastically reduced by at least ten fold compared to the 1980's (Gucu and Erkan, 1999). By 1999 the ecosystem of the region had become so fragile that monk seals and local artisanal fishermen were facing starvation due to lack of fish. This was actually the main reason catalyzing the anger of the fishermen against seals and possibly minimizing the reproductive ability of the females. On the other hand the breeding sites of the Cilician monk seal colony have peculiar characteristics; such as an entrance with a barrier against strong waves; a deep and wide beach located at the very far end; and a shallow protected pool in front (Gucu et al., 2004). The caves having these characteristics are very few and therefore it seemed that the number and size of suitable caves are limiting factors for reproduction success.

The scarcity and importance of breeding caves and the dwindling state of the fish stocks were the main concerns for the survival of the population. In such a situation the best solution seemed be enforcement of a conservation strategy which protects the breeding habitats and reduces the fishing pressure on main food source of the monk seal. Eventually an area covering 16x12 nautical miles that is off-limits to large-scale fisheries, and also incorporates a network of small, no-take-zones in front of the monk seal breeding caves were designated for monk seal conservation in 1999. On land, a 75 km coastal band has also been set aside as a 1st degree natural asset, offering effective terrestrial habitat protection. Although some illegal trawling still occurs, the previously observed heavy fishing pressure on fish stocks has also been remarkably reduced. More importantly, the local small-scale fishermen, who are indebted to the seals for their exclusive coastal resource use rights, no longer see the seals as a pest to exterminate.

REFERENCES

- Dendrinou, P., Kotomatas S. and Tounta, E. (1996). Monk Seal Pup Production in the National Marine Park of Alonissos—N. Sporades. International Zoological Congress of the Hellenic Zoological Society, Athens, Greece.
- Gilmartin, W. G. and Eberhardt, L. L. (1995). Status of the Hawaiian monk seal (*Monachus schauinslandi*) population. Canadian Journal of Zoology 73, 1185–1190.
- Guclusoy, H. and Kence, A. (2001). Foca OCKA'nda Akdeniz foku koruma calismalarinin verimlilikinin degerlendirilmesi. In: Özhan, E., Yuksel, Y., (Eds.), Turkiye'nin Kiyi ve Deniz Alanlari III. Ulusal Konferansi, Turkiye Kiyilari 01 Konferansi Kitabi; 26-29 Haziran 2001; Istanbul, pp. 345–355.
- Gucu, A. C., Ok, M. and Sakinan, S. (2009a). A survey of the critically endangered Mediterranean Monk seal, *Monachus monachus* (Hermann, 1779) along the coast of northern Cyprus. *Israel Journal Of Ecology & Evolution*, 55, 77–82. doi: 10.1560/IJEE.55.1.77
- Gucu, A. C., Sakinan, S. and Ok, M. (2009b). On the occurrence of the critically endangered Mediterranean Monk Seal, *Monachus monachus* (Hermann, 1779a) at Olympos-Beydaglari National Park, Antalya, Turkey and its interaction with tourism. *Zoology in Middle East*. 46: 3-8.
- Gucu, A.C. (2004). Is the broken link between two isolated colonies in the northeastern Mediterranean re-establishing? *The Monachus Guardian* 7(2), Retrieved from <http://monachus-guardian.org/mguard14/1422infocu2.htm>

- Gucu A.C. and Ok M. (2006). How far the Cilician monk seal colony will go with the existing regulations?. Proceedings of the conference on monk seal conservation organized by United Nations Environment Programme [UNEP], Mediterranean Action Plan [MAP] and Regional Activity, Centre For Specially Protected Areas [RAC/SPA], Antalya, Turkey.
- Gucu, A.C. (2008). Dead pup found on Cilician coast. *The Monachus Guardian*, 11 (2). Retrieved from
- Gucu, A.C. and Ok, M. (2004). Arab The Pilgrim. *The Monachus Guardian*, 7(1). Retrieved from www.monachus-guardian.org/mguard13/1321covsto.htm.
- Gucu, A.C. and Erkan, F. (1999). Preliminary survey report of the monitoring project on the recovery rate of a once deteriorated ecosystem recently designated as a protected area - Phase I. Detrimental effects of trawl fishery on the fish stocks on a narrow continental shelf. Unpublished report to Turkish Ministry of Agriculture and Rural Affairs (in Turkish).
- Gucu, A.C., Gucu, G. and 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.
- Güçlüsoy, H., Kırış, C. O., Veryeri, N. O. and Savaş, Y. (2004). Status of the Mediterranean Monk Seal, *Monachus monachus* (Hermann, 1779) in the Coastal Waters of Turkey. E.U. Journal of Fisheries & Aquatic Sciences 2004, Volume 21, Issue (3-4): 201–210.
- Harwood, J. Lavigne, D. and Reijnders, P. (1998). Workshop on the causes and consequences of the 1997 mass mortality of Mediterranean monk seals in the western Sahara Amsterdam 11–14 December 1997. IBN Scientific Contributions 11,1–32.
- HSSPMS, (1995). Continuation of the monitoring of the monk seals in the National Marine Park of the Northern Sporades, 1995. Final report for the European Commission Project 4-3010 (92),7829. <http://www.monachus-guardian.org/mguard22/2216mednew.htm#Turkey>.
- Hubbs, C. L. (1956). Back from oblivion. Guadalupe fur seal: Still a living species. *Pacific Discovery* 9 (6),14–21.
- Jacobs, J. and Panou, A. (1988). Conservation of the Mediterranean monk seal, *Monachus monachus*, in Kefalonia, Ithaca and Lefkada Isl., Ionian Sea, Greece, Report to the Insitut Royale des Siences Naturelles de Belgique, Project A.C.E. 6611/28.
- Marchessaux, D. (1989). The Biology, Status and Conservation of the Monk Seal, *Monachus monachus*. Final Report to the Council of Europe. Nature and Environment Series 41. Strasbourg
- Neves, H.C. and Pires, R. (2000). O Lobo Marinho no Arquipelago da Maderia, Parque Natural da Maderia.
- Ok, M. (2006). Past, present Status and future of the Mediterranean Monk Seal (*Monachus monachus*, Hermann 1779) in the Northeastern Mediterranean (Master's thesis, Middle East Technical University, Institute of Marine Sciences, Mersin, Turkey, 114pp).
- Öztürk, B. (1994). Evaluation of the present status and trend of monk seal populations in Turkey. In: Present Status and Trend of the Mediterranean Monk Seal (*Monachus monachus*) Populations. RAC/SPA (UNEP), Tunis, UNEP (OCA) /MED WG.87/4, p.33.
- RAC/SPA. 2005. Information report on the status of the monk seal in the Mediterranean. Seventh Meeting of National Focal Points for SPAs, Seville, 31 May - 3 June 2005. UNEP/MAP, UNEP (DEC)/MED WG.268/Inf.3: 1-45.
- Scoullou, M., Mantzara, M., and Constantianos, V. (1994). The Book-Directory for the Mediterranean Monk Seal (*Monachus monachus*) in Greece: Contract with the C.E.U., DG XI,4-3010(92)78 29.
- Sergeant, D., Ronald, K., Boulva, J. and Berkes, F. (1978). The recent status of *Monachus monachus* Mediterranean monk seal. *Biological Conservation* 14,259–287 .