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Short Note

Historic and recent occurrences of pinnipeds in the Archipelago of the Azores

Mónica A. Silva[1,2,*], Cristina Brito[3,4], Sara. V. Santos[5] and João Pedro Barreiros[6]

[1] Centro do Instituto do Mar (IMAR) da Universidade dos Açores, Departamento de Oceanografia e Pescas, Associated Laboratory – Institute of Systems and Robotics (ISR), 9901-862 Horta, Portugal, e-mail: monica@uac.pt
[2] Biology Department, MS#33, Woods Hole Oceanographic Institution, Woods Hole, MA 02543, USA
[3] Escola de Mar, Rua Actriz Virgínia, 17 C, 1900-026 Lisboa, Portugal
[4] CHAM, Centro de História de Além-Mar, Faculdade de Ciências Sociais e Humanas, Universidade Nova de Lisboa, Avenida de Berna, 26 C, 1069-061 Lisboa, Portugal
[5] Direcção Regional do Ambiente, Rua Cônsul Dabney, Colónia Alemã, Apartado 140, 9900-014 Horta, Portugal
[6] Departamento de Ciências Agrárias and ImarAçores, Universidade dos Açores, 9701-851 Angra do Heroísmo, Portugal

*Corresponding author

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The Archipelago of the Azores (Portugal) is located between 37° and 41°N and 25° and 31°W and crosses the Mid-Atlantic Ridge. It is the most isolated archipelago in the Atlantic, situated 1600 km west of mainland Portugal and 3500 km from the eastern coast of the United States of America. At present, the only population of seals occurring in the Portuguese territory is found on Desertas Islands, Archipelago of Madeira, where a colony of 24 Mediterranean monk seals, *Monachus monachus* (Hermann, 1779), still persists (Pires and Neves 2001). Nonetheless, historical accounts reported by Frutuoso (1983) dating from the early to late 1500s mention sightings of "sea wolves" (the old Portuguese folk term for the Mediterranean monk seal) at several sites along the Azorean Island of Santa Maria. Little is known about the occurrence of monk seals in this area over the past five centuries, but the species certainly did not escape deliberate killing by the first settlers. While the early monk seal reports by Frutuoso (1983) are the only reports referring to the presence of colonies of seals in the Azores, more recently several sightings and strandings of vagrant seals of other species have been noted. Here, we summarize historical knowledge describing colonies of Mediterranean monk seals in the Azores, review published records of pinnipeds from the 20th century and report new sightings and strandings of seals in the Azores.

We reviewed historical references of pinnipeds in the Azores to determine time and location of pinniped occurrence and where possible identified the species. All the information from the early period was taken from the work of Gaspar Frutuoso, an Azorean naturalist who lived between 1522 and 1591. For the more recent period, we reviewed published and gray literature, personal communications, and data collected by the Azorean Cetacean Stranding Network (RACA). In most cases, identification was confirmed through photographs or collected skeletal parts. Photographs and biological material belong to the archives of RACA, Environment Directorate of the Azores Regional Government. However, biological material is usually kept at the University of the Azores because RACA lacks adequate facilities.

Historic and recent sightings of pinnipeds in the Azores are summarized in Table 1. Frutuoso (1983) provides the only first-hand reports of monk seals in the Azores ranging from the middle 1500s to the late 1600s (our translation from Portuguese): "*There are many and big sea wolves along the coast* [*of the island of Santa Maria*]*, and sometimes they* [*fishermen*] *take them from the caves, where they sleep, and this is the reason why, on this island, fishermen do not use bottom traps to catch lobsters (because they* [*sea wolves*] *damage them).*" (Frutuoso 1983, vol. III, p. 108). Although this author provides no information on the date of these sightings, we know Frutuoso began writing this manuscript in 1582 and finished a few months before dying in 1591. On this basis we can place his sightings between those dates. In addition to reports of live monk seals, Frutuoso (1983) also mentions three different caves in the island of Santa Maria where monk seals rested and slept and where they were often seen arriving or leaving. The last reliable observation of monk seals in the region, from this period, was in 1680 as reported by Anonymous (1994).

There are no records of seals in the Azores from the late 1600s to the early 20th century. However, within the past several decades new accounts of monk seals have come to light, the last one in 1974 (Reiner 1981, Jurado et al. 1995), and vagrant arctic or subarctic/temperate seals have been reported (Table 1). In November 1970, a small ringed seal (*Pusa hispida*, Schreber, 1775), was captured on the island of Graciosa (Le Grand 1981). In March of 1988, there was a live stranding of a harbor seal (*Phoca vitulina*) in the island of San Miguel (F. Martins personal communication).

Three seal species previously unrecorded in the Azores have been documented since the beginning of the 21st century: hooded seal (*Cystophora cristata*, Erxleben, 1777), gray seal (*Halichoerus grypus*, Fabricius, 1791), and harp seal (*Pagophilus groenlandicus*, Erxleben, 1777)

Table 1 Historic and recent records of pinnipeds in the Azores.

Date	Species	Island (latitude/longitude)	Condition found[a]	Type of record[b]	Notes	Source
1582–1590	*Monachus monachus*	Santa Maria (N37°16′ W24°16′)	1	1	Single individual repeatedly sighted	Frutuoso (1983)
1582–1590	*Monachus monachus*	Santa Maria (N36°56′ W25°09′)	1	1	14 individuals	Frutuoso (1983)
1582–1590	*Monachus monachus*	Santa Maria (N37°00′ W25°05′)	1	1	Several individuals	Frutuoso (1983)
1680	*Monachus monachus*		1	1	Last observation of live specimen	Anonymous (1994)
27 May 1905	*Monachus monachus*	Flores (N39°26′ W31°11′)		1		Reiner (1981)
1964	*Monachus monachus*	Graciosa (N39°03′ W28°01′)		1		Reiner (1981)
20 Nov 1970	*Pusa hispida*	Graciosa (N39°03′ W28°01′)	1	2	Live capture	Le Grand (1981)
1974	*Monachus monachus*	Flores (N39°26′ W31°11′)	1			Jurado et al. (1995)
Mar 1988	*Phoca vitulina*	São Miguel (N37°43′ W25°38′)	1	1		F. Martins (personal communication)
9 Jul 2002	*Pagophilus groenlandicus*	Pico (N38°28′ W28°31′)	2	2	Subadult (172 cm)	This study
Jul–Sep 2005	*Phoca* sp.	Flores (N39°26′ W31°11′)	3			This study
16 Jul 2006	*Cystophora cristata*	São Jorge (N38°40′ W28°12′)	1	2	Calf	This study
30 Aug 2006	*Phoca* sp.	São Miguel (N37°42′ W25°29′)	1	1		This study
11 Jan 2007	*Halichoerus grypus*	São Miguel (N37°49′ W25°08′)	1	2	Calf	This study
11 Jan 2007	*Phoca vitulina*	São Miguel (N37°44′ W25°40′)	1	2	Calf (approximately 60 cm)	This study
26 Apr 2007	*Halichoerus grypus*	Terceira (N38°47′ W27°15′)	3	2, 3	Calf (89 cm) Hgr/01/2007 LAV-DCA/UAç	This study
25 Aug 2008	*Cystophora cristata*	Faial (N38°31′ W28°37′)	1	2	Calf (80–100 cm)	This study

[a]Condition found: 1 – live specimen; 2 – recent death; 3 – initial decomposition.
[b]Type of record: 1 – description of sighting; 2 – photo/video; 3 – skull.

(Table 1). On July 9th, 2002, the carcass of a harp seal was found on the island of Pico. Numerous photographs were taken but no biological material was collected from this specimen. Another dead seal was found stranded on the island of Flores in the summer of 2005, but unfortunately there are no details of this event.

On August 30th, 2006, fishermen reported a live seal swimming near the Caloura harbor in São Miguel. The animal was seen repeatedly during the day on different beaches and harbors along the coast, but species identification was not possible. The seal was reported as being in good physical condition and feeding on small fishes.

On July 16th, 2006, a hooded seal calf was sighted on São Jorge Island. The animal spent the whole day inside the harbor of Velas, alternating between periods of active swimming and diving and haul-out periods. Apart from an extensive but superficial wound in the thorax and another superficial cut on the muzzle, possibly caused by fishing gear, the individual appeared to be in reasonable condition (R. Dijkema, Seal Rehabilitation and Research Center, Pieterburen, personal communication). In January 2007, a gray seal calf and a harbor seal calf were seen on the same day in the Island of São Miguel. The gray seal had no obvious injuries, but the photographs suggested the calf was emaciated. The harbor seal was seen for the first time by fishermen in the afternoon of January 11, swimming inside the harbor and trying to haul-out unsuccessfully on the rocks. The animal was last seen inside the commercial port on January 13th. In April 2007, a decomposed carcass of a seal was found in Terceira Island. The animal was identified through its dental formulae and skull measurements as a calf of a gray seal (skeletal material kept in the University of the Azores, Hgr/01/2007 LAV-DCA/UAç). It is possible that this was the same animal observed in São Miguel in January.

On August 25th, 2008, a hooded seal calf was seen swimming along a rocky beach on the island of Faial. The animal had several deep wounds in the back resembling shark bite wounds, but apart from that appeared to be in good condition (Mónica A. Silva, personal observation). The seal left the beach during the night and was not seen again.

The descriptions of “sea wolves” in the island of Santa Maria can clearly be referred to the monk seal. In addition to sightings, Frutuoso (1983) also refers to three caves in the island of Santa Maria where monk seals rested and slept. Although we cannot be certain if these were breeding colonies, reports by Frutuoso (1983) do suggest that monk seals were once abundant on this Azorean Island. We believe these are the most offshore records for the Mediterranean monk seal. Interestingly, the author also documents one of the first cases of interaction between monk seals and fisheries, suggesting that the failure of the bottom-trap lobster fishery in Santa Maria was largely due to the great abundance of seals around this island. We found no definite historic evidence of the occurrence of monk seals in other Azorean islands. However, Frutuoso (1978) does refer to a natural harbor on the island of Faial called “Wolves’ Chamber”. This is the toponym of an embayment in Madeira. It was named by the

Portuguese navigators who discovered the island, apparently because they were amazed by the large number of "sea wolves" found there (Frutuoso 1983), indicating that the monk seal may have been more widely distributed in the Azores than the historic literature suggests. While it is not possible to determine the precise timing of the extinction of the monk seal in the Azores, the last report of this seal as a locally established species was in the late 17th century. Contrary to Madeira, where a few monk seals found refuge on three uninhabited islands, we hypothesize that monk seals in the Azores were unable to find a suitable sheltered habitat to escape direct hunting. We suggest that this, and the effects of disturbance and habitat destruction from a growing human population, led to the species demise in the Azores. The origin of the vagrant monk seals recorded during the 20th century remains unknown, but they possibly came from the population on nearby Madeira.

The first time a pinniped other than a monk seal was identified in the Azores was in 1970. Since then, ten seals belonging to five species have been recorded. The increase in the number of occurrences of seals in recent years is certainly related to the implementation of a stranding network in the Azores and to the increase in public awareness. Among the six strandings for which age class was known, one involved a subadult and five involved small calves. There was no evident pattern in the spatial or temporal occurrence of any of the species and none of the strandings or sightings was related to unusual oceanographic events or severe weather conditions in the region.

The archipelago of the Azores is far outside what is considered the normal range for all these species. Ringed, harp, and hooded seals occur in arctic and subarctic waters and their distribution is strongly associated with pack-ice. In recent years, an increase in extralimital occurrences of harp and hooded seals has been documented on both sides of the Atlantic (van Bree 1997, Derix and van Bree 1997, McAlpine et al. 1999). It has been suggested that the increase in extralimital occurrences of these ice-breeding seals is related to the depletion of fish stocks in their usual foraging grounds, which may be forcing seals (especially young animals) into marginal feeding areas (McAlpine et al. 1999). However, it seems unlikely that these extralimital seals appearing in the Azores swam more than 2300 km across open waters and against dominant surface currents from the nearest colonies in Newfoundland and Labrador, Canada. It is more likely that vagrant harp and hooded seals found along the Atlantic coast of the United States have travelled eastwards, reaching the Azores aided by the Gulf Stream and Azores Current. Harbor and gray seals range from subarctic to cold temperate coastal regions, but gray seals have a more restricted distribution (Jefferson et al. 1993). Given the shortest distance separating the Azores from the European coastal margin, it seems plausible that gray and harbor seals found in the Azores belong to colonies located in the British Isles or in France. However, even if young seals may have strayed away from these colonies, surface currents would tend to drive them away from the Azores. Without further information on the morphometrics and genetics of these animals, we can only speculate on the population of origin or the route taken by vagrant seals stranded in the Azores.

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