

First confirmed records of white-coat pups of the Endangered Caspian seal *Pusa caspica* on the coast of Iran

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Abstract The endemic Caspian seal *Pusa caspica* breeds on land-fast ice or stable drift ice in the northern Caspian Sea. Breeding has rarely been reported in the ice-free south-eastern Caspian Sea. Five carcasses of white-coat Caspian seal pups were recovered from the southern Caspian Sea, Iran, during 2019–2022. From survey interviews, two white-coat Caspian seal pups were also observed in Amirabad and between Ghorogh and Rudsar. These records represent very late pupping dates compared to normal pupping periods. Coastal Iran should be surveyed annually for Caspian seal pups to determine frequency of breeding and areas of importance identified in the Iran Caspian Seal Action Plan.

Keywords Breeding, Caspian Sea, Caspian seal, conservation, Iran, *Pusa caspica*, stranding, white lanugo

The endemic Caspian seal *Pusa caspica* is the only marine mammal species occurring in the Caspian Sea. It has declined by more than 90% since 1900 and is categorized as Endangered on the IUCN Red List (Goodman & Dmitrieva, 2016). The decline in population size is thought to be because of increasing negative anthropogenic impacts including climate change, fisheries bycatch, anthropogenic disturbance, pollution and loss of habitat. Many of these threats are considered to be related to increased exploration and exploitation by the oil and gas industry (Härkönen et al., 2008; Dmitrieva et al., 2013; Volodina et al., 2018; Tasmagambetova et al., 2019). There was a documented minimum bycatch of 1,215 seals in the 2008–2009 fishing season, 93% of which occurred in illegal sturgeon fisheries (Dmitrieva et al., 2013).

Caspian seals predominantly breed on land-fast ice or stable drift ice, with pups born on the ice sheets of the northern Caspian Sea during January–early March (Härkönen et al., 2008; Wilson et al., 2017). Pups are born with white

lanugo coats and do not normally enter the water until the lanugo coat is moulted at 6 weeks of age (Wilson et al., 2017). The majority of Caspian seals (c. 34,000 breeding females; Goodman & Dmitrieva, 2016) migrate north in autumn to give birth in northern ice areas; however, breeding has been reported in the southern Caspian Sea on Ogurchinsky Island, Turkmenistan, in 1982 and 2001 (location 8, Fig. 1; Krylov, 1990; World Bank, 2002). These southern records report breeding on sandy peninsulas that are readily accessible from the sea and free from human disturbance (Krylov, 1990). It has been reported that of 10,000–13,000 seals in the vicinity of Ogurchinsky Island during spring moult, there were c. 50 breeding females in 1982 (Krylov, 1990). Therefore, it is considered that breeding in the southern areas of the Caspian Sea has always been rare, representing < 1% of the total breeding population (Goodman & Dmitrieva, 2016). Here we report new records of Caspian seal pups with white lanugo coats in the southern area of the Caspian Sea off the Iran coast during 2019–2022.

We collected data opportunistically using a network of > 200 local fishermen and experts who had been trained in seal identification and how to rescue seals from fishing nets, through workshops in Gilan, Mazandaran and Golestan provinces during 2011–2019 (Shirazi & Mirshekar, 2013). We necropsied carcasses of Caspian seal pups found in coastal areas of the south-western Caspian Sea following standard protocols (Geraci & Lounsbury, 2005) after transferring them to the Caspian Seal Conservation Center. The purpose of the necropsies was to record morphometrics of the pups (standard length, girth and carcass weight; Table 1; Geraci & Lounsbury, 2005) and to investigate the cause of death, stomach contents and blubber thickness (Pugliarès et al., 2007). To investigate the frequency of sightings of Caspian seal pups in Iranian waters, we surveyed current and retired fishermen from settlements in the coastal provinces, with at least 20 years of experience, during 2017–2018. Interviews recorded dates, locations and the number of Caspian seal pups encountered by fishermen and whether pups in white lanugo fur were observed.

During 2019–2022, we observed and measured a total of five Caspian seal pup carcasses from Rudsar and Sangachin in Gilan province and Khajeh Nafas in Golestan province, Iran (Fig. 1, Plate 1, Table 1). The results from the necropsies of the first, second and fifth pups showed water-filled and

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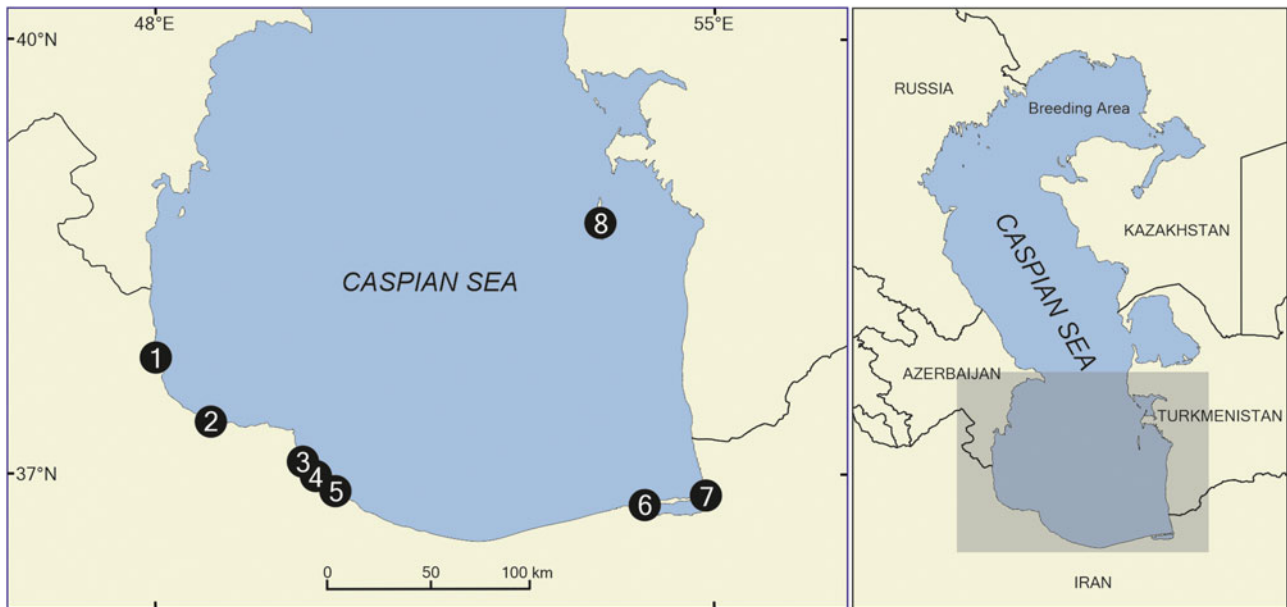


FIG. 1 Details and locations of Caspian seal *Pusa caspica* pup records in the southern Caspian Sea (Table 1; details of records 1, 6 and 8 in text).

TABLE 1 Date, location, morphological and necropsy details for the five Caspian seal pups found on the Iranian coast during 2019–2022. Location numbers refer to the numbering in Fig. 1.

	First pup	Second pup	Third pup	Fourth pup	Fifth pup
Date	26 Mar. 2019	28 Mar. 2019	5 May 2020	29 Apr. 2021	29 Mar. 2022
Location	Gasgar Mahaleh, Rudsar, 37.123354° N, 50.334970° E (location 4)	Kelachay, Rudsar, 37.081527° N, 50.399304° E (location 5)	Sangachin, 37.511752° N, 49.338047° E (location 2)	Rudsar, 37.171821° N, 50.291332° E (location 3)	Khajeh Nafas, 36.965251° N, 54.002935° E (location 7)
Sex	Female	Male	Male	Unknown	Female
Standard length (cm)	80	88	89	Not available	70
Girth (cm)	61	61	88 ¹	Not available	41
Blubber thickness (cm)	2.80	2.60	3.00	Not available	0.75
Weight (kg)	13.46	14.10	Not available	Not available	Not available
Carcass status	Stranded, drowning confirmed, white lanugo, no moulting signs, water-filled, congested lungs	Recovered from an active fishing seine net, white lanugo, moulting on the snout, head and ventral surface of flippers, water-filled, congested lungs, fishtail remains and hard plastic material (2.5 × 3.0 cm) in gut	Stranded, sloughing white lanugo, no scars, bruises or signs of trauma to skull or body	Stranded, decomposing, identified only because of the white lanugo	Recovered from a fishing net, fresh, age c. 60 days, white lanugo on ventral surface, a scar on right front flipper, water-filled, congested lungs, empty gut
Cause of death	Bycatch or natural exhaustion	Bycatch	Unknown	Unknown	Bycatch

¹Carcass distended because of partial decomposition and gas accumulation in the body.

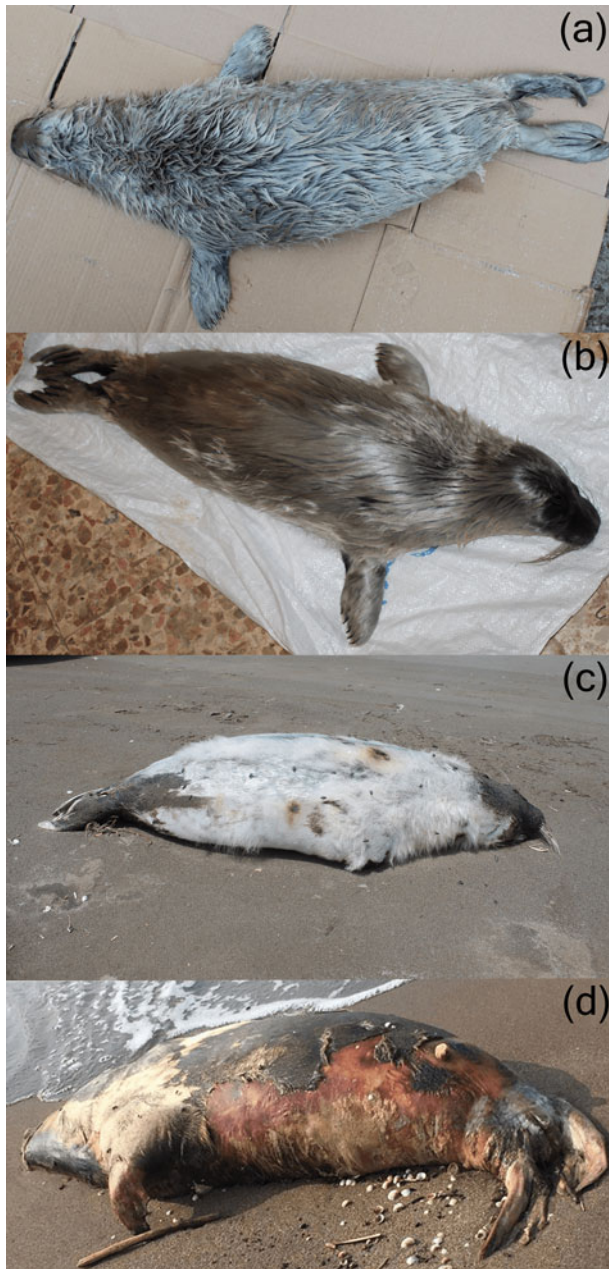


PLATE 1 Caspian seal *Pusa caspica* pups (a–d: 1st–4th pups, respectively; Table 1) from the southern Caspian Sea. Photos: Samaneh Faezi.

congested lungs, indicating the pups had died of suffocation and drowning. The cause of death of the third and fourth pups could not be determined as the carcasses were decomposing and were not necropsied (Table 1). In 37 interview surveys with experienced fishermen, two previous observations of live pups in Iranian waters were recorded: a female and her pup in Amirabad (36.850528° N, 53.328424° E; location 6, Fig. 1) in Mazandaran province during the winter of 1988, and a pup with white lanugo coat near fishing nets between Ghorogh (37.836111° N, 48.974167° E; location 1, Fig. 1) and Rudsar in Gilan province during the winter of 1999.

The weight of a new-born Caspian seal pup is c. 5 kg and they gain weight at 0.5–0.8 kg per day (Wilson et al., 2017). Both necropsied pups in March 2019 appear to have gained 8–9 kg over their birth weight (c. 14 kg) and had blubber thicknesses of c. 2.6–2.8 cm (Table 1), suggesting they were c. 2–3 weeks old and therefore born in the first or second week of March or later for the third and fourth pups. They appeared to have died recently and had not moulted their lanugo.

We could not determine whether the first necropsied pup had drowned because of bycatch or natural exhaustion and drowning, given that white-coat pups are not capable of swimming or diving for a sustained period at such a young age (Fig. 1). As bycatch in fisheries is considered the most serious conservation threat to the Caspian seal, as well as a major welfare issue (Dmitrieva et al., 2013), it is an important aspect of the record that an unmoulted lanugo pup was bycaught in a fishing net. Normally lanugo pups would be expected to be reluctant to enter the water (Wilson et al., 2017).

There is no indication of where these pups may have originated. They might have been carried westwards on the prevailing current from Turkmenistan, the only area in the southern Caspian Sea with historical records of occasional Caspian seal births (Krylov, 1990). Separation of Caspian seal pups from their mothers is most likely to occur either in the immediate postnatal period (although the pups in this study were past that age) or because of storms, human disturbance or injury. These pups did not appear to be injured, so a storm or anthropogenic disturbance are the most likely causes. We suggest hypothermia could still be a risk for pups that are so young, even with blubber thicknesses of 2–3 cm, despite water temperatures in the southern parts of the Caspian Sea being 8–11°C in March 2019 (SeaTemperature.info, 2023). Even at these temperatures, extended immersion would mean the pups rapidly become compromised energetically without sustenance from their mother. The age of the pups found in Iran also suggests a very late pupping date (mid March or later based on development stage) compared to the normal peak period before mid February on the northern ice. However, small numbers of new-born and unmoulted pups have been recorded on the northern ice during early March (Wilson et al., 2017).

As climate change and loss of ice sheets in the north of the Caspian Sea affect Caspian seal breeding areas, they could increase the risk of parturition away from ice sheets, such as breeding on Ogurchinsky Island (location 8, Fig. 1) or the shorelines of the southern parts of the Caspian Sea. Although the Caspian seal is thought to be a facultative rather than an obligatory ice breeder, being able to raise pups at terrestrial sites, breeding success has never been documented in such locations (Jüssi et al., 2008).

If Caspian seals start pupping in the Iranian area of the Caspian Sea, there are some coastal protected areas close to where we documented pups that could form Special Protected Areas for Seals as indicated under the Caspian

Seal Conservation Action Plan (Wilson et al., 2007). These include Lavandevil Wildlife Refuge (coastline length 9 km), Lisar Protected Area (coastline length 7 km), and Bujagh National Park (coastline length 15 km) in Gilan province, Miankaleh Wildlife Refuge (coastline length 100 km) in Mazandaran province, and Gomishan coastal wetland (coastline length 22 km), a Ramsar site and no-hunting area in Golestan province. There is an additional 10 km stretch of coast under the management of the Port of Amirabad in Mazandaran province that could support breeding Caspian seals. This area does not have boat traffic, fishing is prohibited and its physical features, including natural and human-made bays and a sandy peninsula, could be suitable for the Caspian seal, but this area is not formally protected at present. The Iran Caspian Seal Action Plan, currently being written, should identify these protected areas as locations requiring annual surveys for Caspian seal pups, particularly during the breeding season, to investigate whether pupping is occurring.

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Conflicts of interest None.

Ethical standards This research abided by the *Oryx* guidelines on ethical standards.

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