



## Short Note

## Occurrence of false killer whales *Pseudorca crassidens* pod in the Ligurian Sea and review of Mediterranean records

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### Keywords:

ecology  
Mediterranean sea  
Ligurian sea  
false killer whales  
*Pseudorca crassidens*  
visitors  
Pelagos sanctuary

### Abstract

We report the sightings of false killer whales *Pseudorca crassidens* in the Ligurian Sea in September 2020. A list of 45 records from other sightings, bycatching and strandings is presented. This species is classified as “visitor” in the Mediterranean because of occasional sightings but a lack of breeding records. However, the last sightings in the 2019-2020 with juveniles and calves suggest that this species may reproduce within the Mediterranean. Further studies are needed to improve our knowledge on distribution and movement of the false killer whales.

### Article history:

Received: 05 March 2021

Accepted: 11 June 2021

### Acknowledgements

We are grateful to Niccolò Roccatagliata (Menkab), Alessandro Verga (Golfo Paradiso Whale Watching), Michele Cassinelli (Motonave Creuza da ma), Antoine Drochon and Patrice Garziglia (whalewatching.fr) and Federico Magione for reporting sightings; Salvatore Romano and Giuseppe Paolillo (WWF), Barbara Mussi (Oceano Mare Delphis), Nicola Maio (University of Naples), Clara Monaco (Marecamp), Oliver Boisseau, Conor Ryan and Anna Moscrop (MCR), Stefania Giglio (Associazione Mare Calabria), Guilherme Estrella (Ocean emotion) and Rui Peres dos Santos (Iturismo Azores Whale Watching) for their personal communications and for sharing insights concerning their respective data sets; Tobia Tudino for proofreading; Oliver Boisseau and an anonymous reviewer for revisions and improvement of the manuscript. We are also grateful to Genoa University and SLAM to fund our research activities, and Bergeggi Marine Protected Area to support Menkab projects.

False killer whale *Pseudorca crassidens* (Owen, 1846) is one of the larger dolphin species within the Delphinidae family (Baird et al., 2008), found from tropical to warm temperate zones in all oceans (Baird, 2018) both in offshore and inshore areas (Baird, 2018). As a social species, false killer whales live in big groups of 20 to 100 individuals, with strong bonds and long-term associations (Baird et al., 2008). On the IUCN Red List, it is classified as *Near Threatened* in part because of incidental mortality during fishery operations (i.e. bycatch) (Baird, 2018). Within the Mediterranean Sea, this species has been classified with a status of “visitor” as it is seen only occasionally with no evidence of breeding activity (Reeves and Notarbartolo di Sciara, 2006; Notarbartolo di Sciara and Birkun, 2010). However, our knowledge on the occurrence of this species is still scarce.

In this short communication, we report four opportunistic sightings of false killer whales in the Ligurian Sea over four days in September 2020 and update the total records in the Mediterranean Sea (Fig. 1, Tab. 1).

The first record (listed as 41 in Fig. 1, Tab. 1) was collected by the *Menkab* team on September 17, 2020 at 1:30 a.m., 2 nm off the coast of Savona and Vado, (Fig. 2a, b). A pod of about 30 individuals was heading in a southwesterly west direction, in a nearshore area, before stopping in near a rocky spur (*Mantice Spur* with peak at -86 m) probably to feed. As soon as the group was sighted, it dispersed into 3 small sub-groups of 8–10 individuals each. While two groups kept their dis-

tance from the boat at about half a mile, the third group with 5 to 10 adults and juveniles approached the *Menkab* boat (Fig. 2 c, d). Photos and underwater videos were taken. Nine adults have subsequently been identified using natural marks and dorsal fin shape (Sánchez-Robledo et al., 2020). No calves were observed, but considering that 2/3 of the pod were elusive, we cannot exclude the presence of calf. On September 19, 2020 the second and third records (listed as 42 and 43) were reported by members of the public: at 2 p.m. a group of ~6 individuals half a mile off S. Fruttuoso and at 7 p.m. a group of ~20 individuals off Varazze. In both sightings, the groups occurred in shallow waters (~100 m) and were heading West. No photos useful for identification were taken in S. Fruttuoso, while two of the individuals sighted in Savona have subsequently been identified in a video recorded in Varazze. The fourth record (listed as 44) was reported at 11 a.m. on September 20, 2020 by whale watchers in Mentone. A pod of about 20 individuals had been sighted close to a rocky spur (*Barban Spur* with peak at -87 m) (Fig. 2a). No good-quality images were available for this sighting, although the time frame and the travel route allow speculation that this may have been the same pod sighted in previous days. Assuming that, it covered respectively S. Fruttuoso-Varazze distance (about 46 km in straight line) in 5 hours with a mean horizontal speed of 9 km h<sup>-1</sup> (2.5 m s<sup>-1</sup>), and Varazze-Mentone distance (about 117 km in straight line) in 15 hours with a mean horizontal speed of 7.8 km h<sup>-1</sup> (2.1 m s<sup>-1</sup>). Those values are in concordance with Rohr et al. (2002) results, on *Tursiops*, *Delphinus* and *Pseudorca*, who assessed burst swim speed rang up to 28–32 km h<sup>-1</sup> (8–9 m s<sup>-1</sup>).

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**Table 1** – Chronological list of false killer whales records in the Mediterranean Sea from stranding (S), bycatching (BC) and free-ranging (F) events (extended from Reeves and Notarbartolo di Sciarra, 2006; Notarbartolo di Sciarra and Birkun, 2010; Cagnolaro et al., 2015; Rodrigues et al., 2016). \*Records within the Pelagos Sanctuary.

Record	Date	Location	West/East Mediterranean	Record category and notes	Reference
1*	1787 (22 Jun)	France: Gulf of Saint Tropez	West	BC01: Several specimen captured from a large pod	Paulus 1963 Paulus 1963 quoting van Beneden and Gervais
2	1857 (Jun)	France: Elne	West	S01: Stranded juvenile	Riggio 1882 in Cagnolaro et al., 1989; Giglioli 1882
3	1877	Italy: Palermo	West	S02: Skull collected; possibly same as 4 m long specimen stranded in June 1876 near Trabia, Sicily, quoted by Giglioli 1882	Vinciguerra 1926, Paulus 1963, Arbocco 1969
4*	1893 (8 Feb)	Italy: Camogli Genoa	West	S03: Stranded (female, 4m). Skeleton in Genoa museum	Paulus 1963, Vinciguerra 1926, Arbocco 1969
5	1900	Italy: Sicilian waters Italy: Catona,	West	BC02: Two specimens captured. Skulls preserved at Pisa museum	Vinciguerra 1926, Vinciguerra 1926,
6	1926 (Apr)	Calabria	West	S04: Stranded	Paulus 1963 Paulus 1963,
7	1930 (Jul)	Spain: Marbella	West	S05: Stranded	Castells and Mayo 1994
8	1933 (Feb)	Italy: Strait of Messina	West	BC03: Pod of 30 individuals preying on bluefin tuna;	Beltrame 1933,
9	1936 (27 Oct)	Croatia: Korčula	East	two captured. BC04: Bycaught (180 cm)	Orsi Relini and Cagnolaro 1996
10	1939 (Feb)	Italy: Strait of Messina	West	F01: Pod of about 100 sighted, preying on bluefin tuna	Hirtz 1937
11	1943 (16 Mar)	Spain: Majorca	West	BC05: Captured (4,41 m)	Scordia 1939
12	1948 (Nov)	France: Marseille	West	BC06: Captured in tuna net (4,8 m)	Castells and Mayo 1994
13*	1951 (Aug)	France: Ile du Levant	West	S06: Stranded.	Paulus 1963
14	1955 (31 Jul)	Malta: Malta fish market	West	BC07: Taken and sold as bait for £1	Lanfranco 1969
15	1955	Egypt: Nile's Delta	East	S07: Fragment of skull found on beach BC08: From a pod of 30-40	Wassif 1956
16	Between 1959 and 1961	Italy: Northern Adriatic Sea	East	a group of 7 captured; 4 escaped, and 2 were killed.	Stanzani and Piermarocchi 1992 Busnel and Dziedzic 1968, Castells and Mayo 1994
17	1966 (3 Sep)	Spain: 20 nm East of Marbella	West	F02: Pod of about 20 individuals BC09: Two specimens captured	Di Natale and Mangano 1983
18	Between 1978 and 1982	Italy: Tyrrhenian Calabria coast	West	in drifting longline	Castells and Mayo 1994
19	1988 (Mar)	Spain: Majorca	West	S08: adult	Cagnolaro et al., 1989
20	1988 (20 May)	Italy: Gela	West	S09: Stranded (Male – 4.6 m)	Centro Studi Cetacei 1991
21	1989 (22 Nov)	Italy: Santa Margherita di Pula	West	F03: Pod of about 15 individuals	Castells and Mayo 1994
22	1989	Gibraltar: Strait of Gibraltar	West	S10: Stranded (Female – 4 m)	Castells and Mayo 1994
23	1991 (1 May)	Italy: Capriccioli	West	S11: Stranded in advanced decomposition (about 6 m)	Castells and Mayo 1994
24	1991 (22 Jun)	Syria: Few km South of Lattakia Greece/Turkey:	East	S12: Skull found on beach	Kasperek 1997
25	1992	Between Chios Island and Chesme	East	F04: Pod of more than 7 individuals	Frantzis et al., 2003
26	1993	Greece: Argolikos Gulf, Aegean Sea	East	S13: Stranded	Frantzis et al., 2003
27	1995	Turkey: Izmir Bay	East	S14: Stranded alive and died afterwards	Öztürk B. and Öztürk A.A., 1998
28	1995 (3 Sep)	Spain: Carboneras, Andalusia	West	F05: Pod of 8 sighted	Sagarminaga and Cañadas, 1997
29	2003 (28 Mar)	Israel: 70 nm West	East	F06: Pod of about 20 individuals	Kerem et al., 2012
30	2004 (30 Jun)	Israel: Nature reserve of Habonim	East	S15: Stranded in advanced decomposition	Kerem et al., 2012
31	2005 (24 Apr)	Israel: 50 nm West of Haifa	East	F07: Pod sighted and filmed	Kerem et al., 2012
32	2006 (26 May)	Israel: 20 nm North West	East	F08: Two sighted. F09: 2-3 individuals,	Kerem et al., 2012
33	2007 (17 June)	Cyprus: West of Cyprus	East	one of them with bent dorsal fin. Photo-identification images taken.	Boisseau et al., 2010
34	2010 (July)	Israel: 30 nm west of Haifa	East	F10: Pod of 3 individuals	A. Scheinin, in litt.
35	2013 (24 Aug)	Cyprus: South of Cyprus	East	F11: Pod of 3-5 individuals	Ryan et al. 2013
36	2019 (1 Apr)	Italy: Belvedere Marittimo	West	S16: Stranded neonate. F13: Big pod with calves and juveniles	G. Stefania (Unpublished data)
37	2019 (26 Apr)	Italy: Amalfi	West	sighted nearshore heading South	Maio et al., 2019
38	2019 (2 June)	Italy: Gulf of Catania	East	F12: Pod of about 50 individuals	Pers. comm. by C. Monaco <sup>5</sup>
39	2020 (21 Jan)	Turkey: Gökçeada Island	East	F14: Pod sighted with juvenile F15: Big pod sighted	Dede et al., 2020
40	2020 (11 Sept)	Italy: Praiano	West	nearshore heading North F16: Pod of about 30 individuals with juveniles. Photo-identification catalogue available.	Pers. comm. by B. Mussi <sup>6</sup>
41*	2020 (17 Sept)	Italy: Savona	West	F17: Pod of about 6 individuals,	This Study
42*	2020 (19 Sept)	Italy: S. Fruttuoso, Portofino	West	half mile from the coast, swimming west F18: Pod of about 6 individuals, half mile from the coast, swimming west.	This Study
43*	2020 (19 Sept)	Italy: Varazze	West	Two individuals have been matched with Record 41st	This Study
44*	2020 (20 Sept)	France: Mentone	West	F19: Pod with juveniles F20: Pod of 30-50 individuals sighted with juveniles. Swimming NE,	This Study
45	2020 (12 Oct)	Italy: Tropea	West	close to the coast with a sea depth of 40m	S. Romano and G. Paolillo <sup>7</sup> pers. comm.

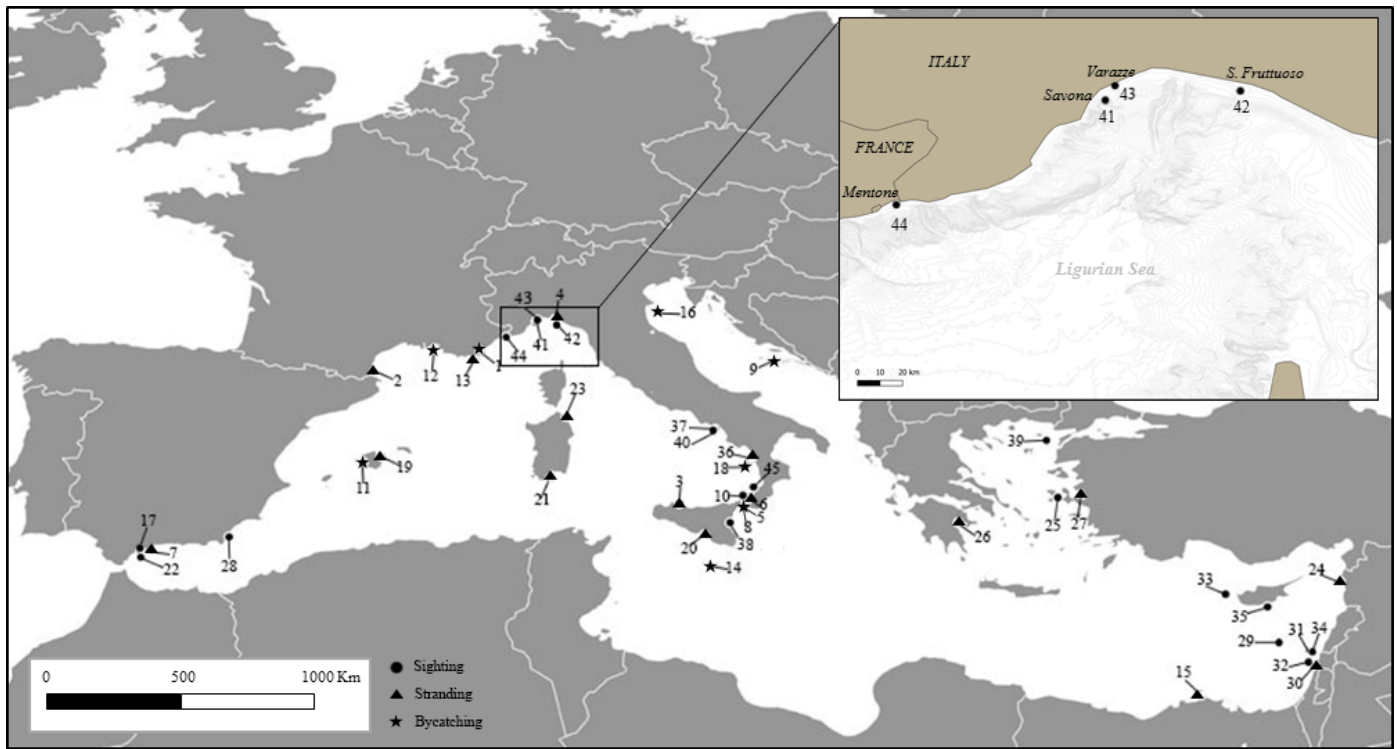


Figure 1 – Map of sightings in Ligurian Sea and of the Mediterranean Sea as reported in Tab. 1. Circles for sightings, triangles for strandings and stars for bycatching records.

This note represents the first report of living false killer whales in the Ligurian Sea and Pelagos Sanctuary. Before these sightings, only three records (see Tab. 1) had been reported in this area. The opportunistic photographic recapture of two individuals between Savona and Varazze encounters suggests that the pod was locally resident for at least two days. The nearshore occurrence may be linked to the search for prey in coastal areas and it has been similarly documented in recent sightings (see Tab. 1), but also out of the Mediterranean (i.e. Hawaii, Baird, 2018; off Gabon and Cote d'Ivoire, Weir et al., 2013). Nine individuals have been identified, but no other photo-identification catalogues of this species are available in the Mediterranean Sea. No positive matches were made when examining images taken during two separate sightings that occurred to the south of Cyprus in 2007 and in the contiguous region off Gibraltar in 2013 (Oliver Boisseau, Anna Moscrop, Conor Ryan *pers. comm.*) and with two catalogues from the eastern Atlantic: Azores to Madeira (Guilherme Estrela *pers. comm.*) and with Pico Island in the Azores (Rui Peres dos Santos *pers. comm.*). However, we are not able to draw robust conclusions from photo-identification because of the opportunistic nature of our sightings and the low numbers of individuals.

To date, 45 records of false killer whales have been documented in the Mediterranean Sea (summarised in Tab. 1, Fig. 1) from strandings, bycatchings and sightings (Tab. 2). The majority of these have been in the Western Basin (29/45=64.4%) and may reflect a movement from Atlantic (see Reeves and Notarbartolo di Sciara, 2006), as recently described for other visitor species (i.e. killer whales, Mrusczok et al., 2021; humpback whales, Violi et al., 2021). Records in the Eastern Basin (16/45=35.6%) may be a result of interbasin movement, given

the records in the corridor areas of the Strait of Messina (4/45=8.8%) and of the Sicilian Channel (2/45=4.4%), but could also be due to individuals straying from the Red Sea, as speculated by Boisseau et al. (2010). It is important to point out that, these records derive from occasional sightings, and that throughout the Mediterranean a heterogeneity of research effort exists, with focus on coastal regions/summer months and large data gaps in the eastern and southern Mediterranean (Mannocci et al., 2018). The distribution shown in Tab. 1 and Fig. 1 partially reflect these data gaps.

Worldwide interaction with fishing gear have been documented for this species throughout its known range (Baird, 2018). Within the Mediterranean, bycatches have also been recorded (9/45=20%) and in the Savona and Varazze sightings, we observed an individual with a dorsal fin shape anomaly (Fig. 2e), possibly due to fishing gear interaction or a propeller strike.

Of the 20 sightings to date (20/45=44.4%), nine have been made since 2019 and at least five have included juveniles and/or calves in the pod. Furthermore, among the known strandings to date (16/45=35.5%), a neonate has been found stranded along Calabrian coastline (S. Giglio; *unpublished data*). These records may provide proof of calving events within the central Mediterranean Sea.

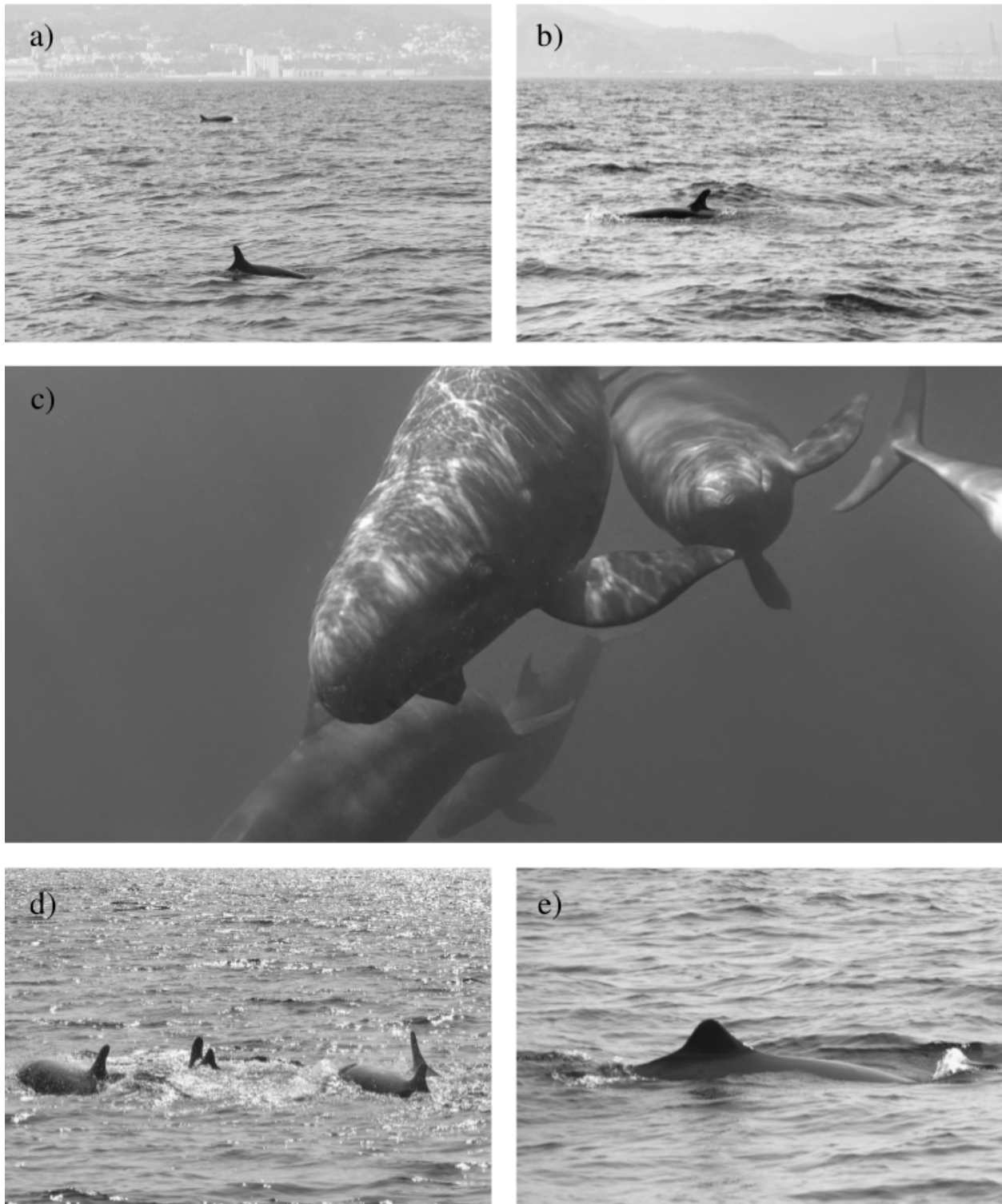
In this context, we highlight the importance of further studies and genetic analyses to clarify if a local small Mediterranean population exists. The presence of breeding may suggest false killer whales in the Mediterranean are a regularly occurring species, rather than a *visitor*; the IUCN currently defines a *visitor* as “a *taxon* that does not reproduce within a region but regularly occurs within its boundaries either now or during some period of the last century” (IUCN, 2012). Due to the scarcity of sightings of this species in the Mediterranean, we strongly advocate for enhanced monitoring programs that can clarify the distribution patterns of false killer whales, assess local densities and generate a regional protection plan. ☞

Table 2 – Stranding, bycatching and freeranging numbers and percentages in the Mediterranean Sea Basins.

	Western Mediterranean	Eastern Mediterranean	Whole Mediterranean
Stranding	11 (24.5%)	5 (11.1%)	16 (35.6%)
Bycatching	7 (15.5%)	2 (4.5%)	9 (20.0%)
Freeranging	11 (24.4%)	9 (20.0%)	20 (44.4%)
Total records	29 (64.4%)	16 (35.6%)	45 (100.0%)

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**Figure 2** – False killer whales pod on September 17, 2020. (a,b) Pod in front of Vado and Savona; (c) underwater frame while approached the boat; (d) pod at surface; (e) individual MKFKW05 “Hook” with dorsal fin shape anomaly.

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Associate Editor: S. Grignolio