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Calf-Snatching among Cetaceans? Interspecific Associations of Adult Bottlenose Dolphins with Common and Striped Dolphin Calves in Southern Portugal

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Research Article

Keywords: Interspecies interaction, alloparental care, delphinids, Tursiops truncatus, Delphinus delphis, Stenella coeruleoalba

Posted Date: November 10th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-10934810/v1

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Additional Declarations: No competing interests reported.

Abstract

Interspecific interactions among cetaceans are diverse and have been reported on numerous occasions. However, interspecific alloparental care (an adult exhibiting nurturant behavior towards a non-descendant young of a different species) is rarely documented. Here, we describe multiple calf-directed interspecific associations, including one apparent instance of prolonged interspecific alloparental care, along the southern coast of Portugal. This behavior was directed by adult common bottlenose dolphins (*Tursiops truncatus*) towards six common dolphin (*Delphinus delphis*) calves and one striped dolphin (*Stenella coeruleoalba*) calf. Out of these calves five were classified as neonates. Observations occurred during both dedicated and opportunistic boat-based surveys. In total, 14 sightings were documented between 2016 and 2025. In 13 of these sightings, the heterospecific calf was observed swimming in echelon position alongside an adult bottlenose dolphin, and antagonistic behaviors by adult bottlenose dolphins towards the calves were observed during three encounters. Photo-identification confirmed the involvement of 94 adult bottlenose dolphins throughout all encounters, with the recurring presence of 39 individuals (41.5%). Three observations revealed a consistent pairing between one adult bottlenose dolphin and a common dolphin neonate, which persisted for nearly one month in 2024, with no other adult swimming with a heterospecific calf more than once. Although the exact reasons behind these interactions remain unclear, this study provides a unique insight into the social dynamics between different cetacean species, spanning from antagonistic to seemingly care-giving behavior. Moreover, it documents the first instance of prolonged interspecific alloparental care among cetaceans along the coast of mainland Portugal.

Introduction

Interspecific interactions are common among a wide range of cetacean species (Herzing and Johnson 1997; Frantzis and Herzing 2002; Cotter et al. 2012; Methion and Lopez 2021), encompassing behaviors that range from antagonistic to affiliative (Jefferson et al. 1991; Acevedo-Gutierrez et al. 2005; Melillo et al. 2009). Interspecific antagonistic behaviors often stem from competition for prey, play or practice fighting, feeding interference, or sexual frustration (Ross and Wilson 1996). In contrast, positive or affiliative interspecific behavior brings antipredator, hydrodynamic, foraging, and non-aggressive social advantages within the mixed-species groups (Herzing and Johnson 1997; Stensland et al. 2003; Wang et al. 2013; Visona-Kelly and Barrett-Lennard 2025). A notable interspecific behavior among cetaceans is interspecific alloparental care, which involves an adult exhibiting nurturant behavior towards a non-descendant young of a different species (Woodroffe and Vincent 1994).

Alloparental care is an apparent altruistic behavior in which a recipient benefits from the care received at the expense of an individual other than the biological parent, defined as the alloparent (Riedman 1982). However, despite the energetic investment, it is assumed that alloparental care in mammals may also bring selective advantages for the alloparent. These advantages include increased parental experience in particular for younger individuals, and reciprocal altruism (Riedman 1982; Mrusczok et al. 2023). However, alloparental care, and especially interspecific alloparental care, is rarely reported among cetaceans with only a few cases known.

Documented cases of interspecific alloparental care among cetaceans involve Pacific white-sided dolphins (*Aethalodelphis obliquidens*) interacting with a harbor porpoise (*Phocoena phocoena*) neonate (Baird 1998), Atlantic white-sided dolphins (*Leucopleurus acutus*) associating with an immature long-finned pilot whale (*Globicephala melas*) over multiple years (Baraff and Asmutis-Silva 1998), killer whales (*Orcinus orca*) with neonate long-finned pilot whales swimming in echelon position (Mrusczok et al. 2023; Baumgartner et al. 2025), adult Atlantic spotted dolphins (*Stenella frontalis*) exhibiting care towards a common bottlenose dolphin (*Tursiops truncatus*) calf (Herzing and Johnson 1997), and a group of Indo-Pacific bottlenose dolphins (*Tursiops aduncus*) traveling with an Indo-Pacific humpback dolphin (*Sousa chinensis*) calf (Stensland et al. 2003). Additionally, multiple cases of adult Indo-Pacific humpback dolphins having interspecific associations have been reported, including interactions with a common bottlenose dolphin calf (Karczmarski et al. 1997), an Irrawaddy dolphin (*Orcaella brevirostris*) calf (Kamaruzzan and Jaaman 2013), and a finless porpoise (*Neophocaena phocaenoides sunameri*) calf (Wang et al. 2013). A different case describes an Indian Ocean humpback dolphin (*Sousa plumbea*) adult female swimming with two different heterospecific calves during different events, in which she was first seen with her biological offspring and an Indo-Pacific bottlenose dolphin calf and later her biological offspring and a common dolphin (*Delphinus delphis*) neonate (Conry et al. 2022).

Another species that has previously been observed engaging in interspecific alloparental care is the common bottlenose dolphin (Carzon et al. 2019; Ramos et al. 2024). In Carzon et al. (2019), an adult female common bottlenose dolphin was seen with a melon-headed whale (*Peponocephala electra*) neonate while also caring for her biological offspring. Although the conspecific offspring disappeared after 1.5 years, the association with the melon-headed whale calf persisted for four years before this calf live-stranded (Carzon et al. 2019). In Ramos et al. (2024), seven different cases of interactions between bottlenose dolphins and Antillean manatees (*Trichechus manatus manatus*) in the wild are described. Here, both affiliative interactions including swimming in echelon position by the calf and antagonistic behavior including harassment and ramming were observed in addition to one observation of a separation event of a manatee calf from its mother by bottlenose dolphins (Ramos et al. 2024). Together, these cases show the variability of interspecific interactions involving adult bottlenose dolphins, pointing to a behavioral complexity that remains poorly understood.

In the Algarve, southern Portugal, the common bottlenose dolphin is one of the most frequently observed dolphin species together with the common dolphin (Castro 2010; Morais et al. 2021; Silva et al. 2024). Common bottlenose dolphin groups in this region typically range from 1 to 55 individuals with an average group size of 13 individuals, and all *T. truncatus* age classes (adult, juvenile, calf, neonate) are observed (Vizeu-Pinheiro et al. 2025). A recent SCANS-IV survey resulted in an estimated abundance of 1431 (CV = 0.839) *T. truncatus* in this region (Gilles et al. 2023), however there is still very little known about their behavior and social structure.

In this study, we describe multiple instances of calf-directed interspecific interactions by adult common bottlenose dolphins (hereafter “bottlenose dolphin”) towards common dolphin and striped dolphin (*Stenella coeruleoalba*) calves along the southern coast of Portugal.

Materials and methods

Data collection took place between 2016 and 2025 along the southern coast of Portugal, between Sagres (37°1.35'N, 8°59.81'W) and Olhão (37°1.56'N, 7°50.54'W; Fig. 1). Data were collected during dedicated boat-based surveys aboard a research vessel, a 6.7m long rigid hull inflatable boat (RHIB) powered by a single outboard engine, and aboard platforms of opportunity - dolphin watching vessels. All marine mammal sightings were documented through direct observation, recording behavior, group size and social structure. Whenever possible, photo-identification images were collected using DSLR and mirrorless cameras paired with telephoto lenses. Subsequently, all encounters of calf-directed interspecific interactions by adult common bottlenose dolphins were examined and it was determined whether the calves involved could be categorized as a calf or neonate based on their size and the presence of fetal folds (Neumann and Orams 2005; Castro et al. 2020). Bottlenose dolphins were identified with photo-identification and resightings were confirmed only when a clear match could be made. Given the infrequency of calf-directed interspecific interactions, calves or neonates were considered likely to be the same individual when they exhibited distinctive coloration patterns, consistent body size, and were accompanied by recurring bottlenose dolphins within the mixed-species groups.

Figure SEQ Figure * ARABIC 1. Echelon swimming of a heterospecific calf next to a bottlenose dolphin adult: (A) A common dolphin neonate on 18 July, 2024. (B) A striped dolphin calf on 18 July, 2024. (Photos courtesy of AIMM – Associação para a Investigação do Meio Marinho)

Results

In total, 14 instances of interspecific interactions directed by common bottlenose dolphins towards six common dolphin calves and one striped dolphin calf were observed (Table 1; Fig. 1). Five of these calves were considered neonates (71.4%). In 13 of these sightings, the heterospecific calf was swimming in echelon position alongside an adult bottlenose dolphin (Fig. 2). Additionally, antagonistic behavior was observed in three sightings, including one sighting in which the separation of a common dolphin neonate from its presumed mother by bottlenose dolphins was observed. Across all encounters in which interspecific interaction occurred, 94 adult bottlenose dolphins were identified through photo-identification, with 39 (41.5%) of these adults recurring in at least two, and up to five separate sightings. All 14 sightings included re-sighted individuals. Additionally, three sightings over 29 days in 2024 included a consistent pairing (more than one day) between one adult bottlenose dolphin and a common dolphin neonate, with no other adult bottlenose dolphin accompanying a heterospecific calf more than once. Moreover, the adult of this consistent pairing was observed swimming with a different heterospecific calf in 2025. In nine sightings (64.3%) bottlenose dolphin calves and/or neonates were recorded.

Table 1
Overview of all recorded bottlenose dolphin sightings including interspecific calf association events between 2016 and 2025

Sighting nr.	Date	Interspecific calf species	Interspecific calf ID and age class	Nr. of photo-identified bottlenose dolphins	Nr. of re-sighted bottlenose dolphins	Bottlenose dolphin calves present	Echelon-swimming of heterospecific calf	Aggression towards heterospecific calf	Consistent interspecific pairing
1	17/09/2016	*Delphinus delphis*	01_calf	13	1	NA	Yes	No	No
2	25/07/2020	*Delphinus delphis*	02_neonate	2	2	NA	No	Yes	No
3	29/07/2020	*Delphinus delphis*	02_neonate	7	4	NA	Yes	No	No
4	30/07/2023	*Delphinus delphis*	03_neonate	10	8	No	Yes	Yes	No
5	04/08/2023	*Delphinus delphis*	03_neonate	11	6	Yes	Yes	No	No
6	18/07/2024	*Delphinus delphis*	05_neonate	8	7	Yes	Yes	No	Yes
7	18/07/2024	*Stenella coeruleoalba*	04_calf	10	8	No	Yes	No	No
8	19/07/2024	*Delphinus delphis*	05_neonate	15	12	Yes	Yes	No	Yes
9	15/08/2024	*Delphinus delphis*	05_neonate	17	10	Yes	Yes	Yes	No
10	15/08/2024	*Delphinus delphis*	05_neonate	10	8	Yes	Yes	No	Yes
11	16/08/2024	*Delphinus delphis*	05_neonate	18	8	Yes	Yes	No	No
12	09/07/2025	*Delphinus delphis*	06_neonate	28	10	Yes	Yes	No	No
13	09/07/2025	*Delphinus delphis*	06_neonate	12	8	Yes	Yes	No	No
14	31/07/2025	*Delphinus delphis*	07_neonate	11	5	No	Yes	No	No

The first observation of a heterospecific mother-calf pair occurred on September 17, 2016 while aboard a platform of opportunity. Here, a common dolphin calf was seen swimming in echelon position beside an adult bottlenose dolphin in a group of 13 identified bottlenose dolphins. This heterospecific pair was not resighted in future interspecific encounters, although one adult present in this group was resighted in two subsequent events (July 25, 2020 and July 29, 2020).

The next mixed-species sightings occurred in 2020 during two different dolphin-watching tours. On July 25, 2020, a common dolphin neonate was separated from its presumed mother and group by a group of six to eight bottlenose dolphins, including two photo-identified individuals. Here, the bottlenose dolphins porpoised rapidly towards the common dolphins. After a few minutes, both groups diverged in opposite directions, but the bottlenose dolphins continued to chase a lone common dolphin neonate. While the presumed mother of the neonate initially remained close to it during the pursuit, she eventually left the area, leaving the common dolphin neonate with the bottlenose dolphins. Then, one bottlenose dolphin flanked the neonate, while two or three others aggressively pursued and rammed the neonate. The neonate did not accompany any adult bottlenose dolphin during this sighting. Four days later, on July 29, 2020, two of the bottlenose dolphins involved on July 25, 2020 were again sighted with the common dolphin neonate. In this group of seven identified bottlenose dolphins, the neonate was now swimming in echelon position together with an adult that was not previously observed and no antagonistic behavior occurred. Although the neonate appeared calm, it seemingly attempted to escape from the adult on two occasions. Two adults in this group, including the adult in the heterospecific pair, were later seen during the first mixed-species sighting in 2023, though none were seen accompanying a heterospecific calf in this subsequent event. This common dolphin neonate was not seen again.

On July 30, 2023, a group of 15 to 20 bottlenose dolphins, including 10 individuals identified through photo-identification, was observed aggressively interacting with a common dolphin neonate during a dedicated survey (Fig. 3). This behavior involved pushing and tossing the neonate out of the water on multiple occasions, and was mainly instigated by one adult bottlenose dolphin not seen in other mixed-species events. Additionally, the heterospecific neonate was observed in echelon position next to this one adult bottlenose dolphin on occasion. Five days later, on August 4, 2023, a group of 11 bottlenose dolphins including four adults that were present in the previous sighting were found while aboard a platform of opportunity. Here, the same common dolphin neonate was observed traveling in echelon position beside a bottlenose dolphin adult not seen in other mixed-species sightings. No antagonistic behavior was observed during this sighting, however this sighting notes the last time this heterospecific neonate was seen.

The next series of sightings with interspecific associations occurred in 2024. On July 18, 2024, during a dedicated survey, a group of seven photo-identified adult bottlenose dolphins with conspecific calves was seen swimming with a common dolphin neonate. This neonate frequently swam in echelon position with one adult. No antagonistic behavior was seen during this sighting, yet the neonate was occasionally left alone at the surface during foraging dives by the bottlenose dolphins. One adult in this sighting was seen during both mixed-species sightings in 2023, while the adult of the heterospecific pair was not observed previously.

On the same day during a dolphin-watching tour, we encountered a different group of 11 to 15 bottlenose dolphins, with ten photo-identified individuals. Here, a striped dolphin calf was seen swimming in echelon position next to a bottlenose dolphin adult, with no signs of aggression during the sighting. One adult in this group was seen in both mixed-species events of 2023. The adult of the heterospecific pair was not seen in previous mixed-species events.

The next day, on July 19, 2024, our team encountered a group of 15 photo-identified bottlenose dolphins aboard a platform of opportunity. Ten of these individuals were seen in past mixed-species events, of which seven (including one calf) were seen during the previous day and three in 2023. The common dolphin neonate accompanied the same adult as the previous day in echelon position, indicating the possibility of a long-term association by this heterospecific pair (Fig. 4a). Again, the neonate was seen left alone at the surface during longer dives by the bottlenose dolphins, but no antagonistic behavior was observed.

On August 15, 2024 (27 days later), a group of about 25 to 30 bottlenose dolphins with 14 adults and three conspecific calves confirmed through photo-identification were observed during a dedicated survey. Six of the adults and two of the calves were seen in past calf-snatching events, including five adults and both conspecific calves present during the previous sighting on July 19, 2024. However, the adult accompanying the heterospecific neonate in the other 2024 sightings was not seen, instead the neonate accompanied another adult with a conspecific calf that was present in previous sightings with this neonate. During this sighting, our team observed antagonistic behaviors including ramming and tossing of the neonate, combined with the bottlenose dolphins swimming erratically and tail slapping. Ten minutes after this sighting ended, our team found the same group of dolphins during an opportunistic survey where aggressive behavior ceased and part of the group seemed to have dispersed from the main group. Here, the neonate was again seen with the bottlenose adult it was accompanying on July 18 and 19 2024, confirming the long-term association of this heterospecific pair (Fig. 4b).

Figure 4 The long-term association of a common dolphin neonate and a bottlenose dolphin adult in 2024: (**a**) The heterospecific pair on July 18, 2024. (**b**) The heterospecific pair on August 15, 2024

The last sighting with an interspecific association of 2024 took place on August 16, 2024, where 18 photo-identified bottlenose dolphins (12 adults and six conspecific calves) were seen with the same common dolphin neonate as in the previous sightings of 2024. Here, the neonate was accompanying another adult with a conspecific calf, with the adult of the long-term pair missing from the group. In total, seven adult bottlenose dolphins and three conspecific calves encountered in past mixed-species events in 2023 and 2024, including the other adult accompanying this heterospecific neonate on August 15, 2024 were identified. No antagonistic behaviors were displayed towards the neonate during this sighting, however this sighting marks the last observation of a heterospecific calf-snatching event in 2024.

In 2025, there were three sightings with a heterospecific calf. The first two sightings occurred on July 9, 2025, where during a dedicated survey a group of 24 identified adults with three conspecific calves and one conspecific neonate was observed with a common dolphin neonate. This neonate was swimming in echelon position next to an adult bottlenose dolphin previously sighted in the group with the striped dolphin calf in 2024. Additionally, three other bottlenose dolphins (two adults and one calf) that were observed in 2024, including the adult previously paired with the striped dolphin calf were present in this sighting but not observed swimming with this neonate. Four hours later, aboard a platform of opportunity the team found part of this group, now only consisting of ten adults and two conspecific calves that were also present in the earlier sighting. Here, the common dolphin neonate was still observed associating with the same adult as earlier in the day, but was also seen accompanying another adult or sometimes swimming alone. No aggression was observed during both sightings.

On July 31, 2025, our team had the last sighting with an interspecific association of 2025 involving 11 identified adults and a new common dolphin neonate. Five of these adults were present in a total of five past events in 2023 and 2024, including the adult involved in the long-term association in 2024. This adult also swam in echelon position with this heterospecific neonate, however the neonate was also accompanying a different adult and occasionally swam alone. Again, no aggression was observed during this sighting, however through personal communication our team received footage of aggression by bottlenose dolphins towards this neonate from the day before this sighting, including tossing the neonate in the air.

Discussion

Considering these and previously reported cases of interspecific associations are sporadic observations, it remains unclear what drives these interactions. It has been reported that inexperienced bottlenose dolphin females lead unrelated conspecific calves away from their biological mother by taking advantage of the following-response in young calves, making the infant more prone to following unrelated individuals (Mann and Smuts 1998). In a previously reported case of calf-directed interspecific associations by Ramos et al. (2024), bottlenose dolphins initiated interactions with heterospecific calves and violently separated the calf from its biological mother by harassing the pair and swimming in between them, similar to what we observed on June 25, 2020. However, it is unsure whether all heterospecific calves were actively acquired in a similar way or if the involved bottlenose dolphins opportunistically encountered unaccompanied calves which were accidentally separated from their conspecific group.

Despite the mostly unknown origin of these interspecific associations, in the majority of our sightings the calves were observed swimming in echelon position. When an infant is in echelon position, it needs to make less tail fluke movements compared to a solitary swimming infant, as the draft alongside the adult creates a hydrodynamic advantage (Weihs 2004; Noren et al. 2008). The swimming speed of the adult in these cases decreases, implying that the maternal swim performance worsens in echelon position and the swimming effort increases (Noren 2008). Considering this energetic investment of the adults in the heterospecific pairs, the reported cases that include echelon swimming by the heterospecific calf could be considered as a form of interspecific alloparental care.

While nursing has not been observed in any of our sightings, the long-term association over a four-week period of the heterospecific pair in 2024 holds the possibility that this was an adoption event of the common dolphin neonate by the bottlenose dolphin. Research on the dynamics of common dolphin mother-calf pairs shows this species has a suckling rate of 0.33 suckling attempts per minute (Castro et al. 2024). This rate indicates the low chances of survival for this particular common dolphin neonate without nourishment for an extended period of time. Additionally, the apparent body condition of this neonate did not worsen during the four-week period (Fig. 4). While it is unsure if the adult of the heterospecific pair was lactating and therefore actually adopted the neonate, the observed presence of conspecific mother-calf pairs in the group and the observed echelon swimming of the heterospecific neonate with two of these mothers presents the possibility that the neonate had access to nutrition.

Interspecific alloparental caring behaviors have multiple proposed explanations. One suggestion is that this behavior is a form of displaced epimeletic behavior, during which care-giving behavior is displayed towards other adults or infants (Caldwell and Caldwell 1966; Baird 1998). The display of allomaternal care towards a heterospecific calf could positively influence the future reproductive success of adults in the heterospecific pair as the individual can practice their maternal skills (Baird 1998; Roulin 2002). Two of the adults that formed a heterospecific pair were females, as evidenced by the presence of their own calves. Thus, they may have practiced their maternal skills, or were already more prone to swim alongside the heterospecific calf due to their increased maternal instinct (Carzon et al. 2019; Conry et al. 2022). However, we are unaware of the age, sex, or reproductive past of the other adults in the heterospecific pairs to further test whether developing maternal care or heightened maternal instincts may be plausible hypotheses for this behavior.

Bottlenose dolphins display cultural transmission of behavioral traits (Krützen et al. 2005), thus it is also possible that interspecific alloparental care is a socially transmitted behavior. Our observations support this suggestion considering that all our mixed-species sightings involved adults that were reoccurring in the documented heterospecific groups. Moreover, alloparental caring behavior can be driven by some species or even individuals being more prone to display affiliative behavior towards calves (Carzon et al. 2019; Conry et al. 2022), which could lead to the eventual caring behavior towards an encountered or acquired calf among bottlenose dolphins. The presence of the adult bottlenose dolphin in a long-term heterospecific association in 2024 and the resighting of this adult associating with a different heterospecific calf in 2025 could be explained by this suggestion. However, the exact drivers behind these interspecific alloparental care events can only be speculated on.

In three of our sightings, antagonistic behaviors towards the calves were displayed by some bottlenose dolphins in the groups, including pushing, tossing, and ramming the calf. While interspecific aggression directed by bottlenose dolphins is not rare and also reported towards common and striped dolphins (Barnett et al. 2009; Crespo-Picazo et al. 2021; Methion and Lopez 2021; Ascheri et al. 2024), it offers an interesting contrast to the seeming alloparental care we observed in other or even the same sighting. A possible explanation for these antagonistic behaviors towards the heterospecific calf could be practicing or developing skills that can be used for future infanticidal behavior towards conspecifics (Baird 1998; Patterson et al. 1998). Another possibility is that the antagonistic behavior originates from redirected sexual frustration when access to females in the group is limited or triggered by stress or expressions of dominance (Methion and Lopez 2021; Bearzi et al. 2022). However, as we do not know the sex of the aggressors, we cannot confirm this as an explanation.

Conclusion

In this paper, 14 cases of calf-directed interspecific interactions by common bottlenose dolphins towards common dolphin calves and a striped dolphin calf in southern Portugal are reported. These associations, including seemingly care-giving and antagonistic behavior, are elements seen in other reports of cross-genus adoptions and interspecific calf-directed aggression. The exact direction (care vs. aggression) of these mixed-species events remains unclear, except for the case in which the active harassment and separation of a calf from its biological mother was observed. The drivers for the cases of apparent alloparental care, including one prolonged association to a heterospecific adult and the display of antagonistic behaviors can be speculated on but cannot be confirmed. However, the observations in our study provide a unique insight into the social dynamics between different cetacean species. As cases of interspecific alloparental care are still rarely reported on, we want to contribute towards a better understanding of the behavioral complexity of these types of interspecific interactions by documenting the first instance of prolonged interspecific alloparental care among cetaceans along the coast of mainland Portugal.

Declarations

Animal Ethics This study was based on observations during opportunistic or dedicated field surveys. No animals were captured, handled, or experimentally manipulated. Therefore, no ethical approval was required.

Competing Interests

The authors declare no competing interests.

Funding

This study was financially supported by AIMM. MPM thanks funding by national funds through FCT – Fundação para a Ciência e a Tecnologia, I.P., through the PhD grant 2025.04354.BD, and under CEAUL Research Unit, UID/00006/2025, DOI: https://doi.org/10.54499/UID/00006/2025 and by the European Union – NextGenerationEU through the project UID/PRR/00006/2025, DOI: https://doi.org/10.54499/UID/PRR/00006/2025.

Author Contribution

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Acknowledgement

The authors would like to thank all AIMM volunteers and interns who helped with the data collection. We thank our partner dolphin-watching companies AlgarExperience, Algarve Charters, Blue Dolphin, Cape Cruiser, Capitão Nemo, Discover Tours, Ocean Quest, Oceaneye, Sabino Boat Tours, Sea Xplorer Sagres, and XRide for providing data collection platforms.

Data Availability

Data used for this study can be provided upon request.

References

1. Acevedo-Gutiérrez A, DiBerardinis A, Larkin S, Larkin K, Forestell P (2005) Social interactions between tucuxis and bottlenose dolphins in Gandoca-Manzanillo, Costa Rica. Lat Am J Aquat Mamm 4(1):49–54. http://dx.doi.org/10.5597/lajam00069
2. Ascheri D, Fontanesi E, Marsili L, Berio E, Garibaldi F, Goria M, Serracca L, Dondo A, di Francesco CE, Varello K, Casalone C, Giorda F, Grattarola C (2024) Post-mortem examination on a striped dolphin (*Stenella coeruleoalba*) reveals a potential fatal interaction with bottlenose dolphins (*Tursiops truncatus*) in Italian waters. J Mar Biol Assoc UK 104:e4. https://doi.org/10.1017/S0025315423000942
3. Baird RW (1998) An interaction between Pacific white-sided dolphins and a neonatal harbor porpoise. Mammalia 62(1):129–133
4. Baraff LS, Asmutis-Silvia RA (1998) Long-term association of an individual long-finned pilot whale and Atlantic white-sided dolphins. Mar Mammal Sci 14(1):155–161. https://doi.org/10.1111/j.1748-7692.1998.tb00700.x
5. Barnett J, Davison N, Deaville R, Monies R, Loveridge J, Tregenza N, Jepson PD (2009) Postmortem evidence of interactions of bottlenose dolphins (*Tursiops truncatus*) with other dolphin species in south-west England. Vet Rec 165(15):441–444. https://doi.org/10.1136/vr.165.15.441
6. Baumgartner CD, Selbmann A, Middel H, Schulze J, Bellon G, Samarra FI (2025) Interactions Between Killer Whales (*Orcinus orca*) and Neonate Long-Finned Pilot Whales (*Globicephala melas*) off South Iceland. Ecol Evol 15(4):e71193. https://doi.org/10.1002/ece3.71193
7. Bearzi G, Eddy L, Piwetz S, Reggente MA, Cozzi B (2022) Cetacean behavior toward the dead and dying. In: Vonk J, Shackelford TK (eds) Encyclopedia of animal cognition and behavior, 1st edn. Springer, Cham, pp 1205–1213. https://doi.org/10.1007/978-3-319-55065-7_2023
8. Caldwell MC, Caldwell DK (1966) Epimeletic (caregiving) behavior in Cetacea. In: Norris KS (ed) Whales, dolphins, and porpoises, 1st edn. University of California Press, Berkeley and Los Angeles, pp 755–789
9. Carzon P, Delfour F, Dudzinski K, Oremus M, Clua É (2019) Cross-genus adoptions in delphinids: One example with taxonomic discussion. Ethology 125(9):669–676. https://doi.org/10.1111/eth.12916
10. Castro J (2010) Characterization of Cetaceans in the South Coast of Portugal Between Lagos and Cape São Vicente. MSc Dissertation, University of Lisbon
11. Castro J, Couto A, Borges FO, Cid A, Laborde MI, Pearson HC, Rosa R (2020) Oceanographic determinants of the abundance of common dolphins (*Delphinus delphis*) in the south of Portugal. Oceans 1(3):165–173. https://doi.org/10.3390/oceans1030012
12. Castro J, Cid A, Quirin A, Matos FL, Rosa R, Pearson HC (2024) Assessing the dynamics of common dolphin (*Delphinus delphis*) mother-calf pairs along the south coast of Portugal using unmanned aerial vehicles. Mar Mammal Sci 40(3):e13115. https://doi.org/10.1111/mms.13115
13. Conry DS, De Bruyn PJ, Pistorius P, Cockcroft VG, Penry GS (2022) Alloparental care of a bottlenose and common dolphin calf by a female Indian Ocean humpback dolphin along the Garden Route, South Africa. Aquat Mamm 48(3):197–202. https://doi.org10.1578/AM.48.3.2022.197
14. Cotter MP, Maldini D, Jefferson TA (2012) Porpicide in California: Killing of harbor porpoises (*Phocoena phocoena*) by coastal bottlenose dolphins (*Tursiops truncatus*). Mar Mammal Sci 28(1):E1–E15. https://doi.org/10.1111/j.1748-7692.2011.00474.x
15. Crespo-Picazo JL, Rubio-Guerri C, Jiménez MA, Aznar FJ, Marco-Cabedo V, Melero M, Sánchez-Vizcaíno JM, Gozalbes P, García-Párraga D (2021) Bottlenose dolphins (*Tursiops truncatus*) aggressive behavior towards other cetacean species in the western Mediterranean. Sci Rep 11(1):21582.

https://doi.org/10.1038/s41598-021-00867-6

16. Frantzis A, Herzing DL (2002) Mixed-species associations of striped dolphins (*Stenella coeruleoalba*), short-beaked common dolphins (*Delphinus delphis*), and Risso's dolphins (*Grampus griseus*) in the Gulf of Corinth (Greece, Mediterranean Sea). Aquat Mamm 28(2):188–197
17. Gilles A, Authier M, Ramirez-Martinez NC, Araújo H, Blanchard A, Carlström J, Eira C, Dorémus G, FernándezMaldonado C, Geelhoed SCV, Kyhn L, Laran S, Nachtsheim D, Panigada S, Pigeault R, Sequeira M, Sveegaard S, Taylor NL, Owen K, Saavedra C, Vázquez-Bonales JA, Unger B, Hammond PS (2023) Estimates of cetacean abundance in European Atlantic waters in summer 2022 from the SCANS-IV aerial and shipboard surveys. https://tinyurl.com/3ynt6swa. Accessed 31 August 2026
18. Herzing DL, Johnson CM (1997) Interspecific interactions between Atlantic spotted dolphins (*Stenella frontalis*) and bottlenose dolphins (*Tursiops truncatus*) in the Bahamas, 1985–1995. Aquat Mamm 23:85–99
19. Jefferson TA, Stacey PJ, Baird RW (1991) A review of killer whale interactions with other marine mammals: Predation to co-existence. Mammal Rev 21(4):151–180. https://doi.org/10.1111/j.1365-2907.1991.tb00291.x
20. Kamaruzzan AS, Jaaman SA (2013) Interactions between Indo-Pacific humpback and Irrawaddy dolphins in Cowie Bay, Sabah, Malaysia. Malay Nat J 64(4):185–191
21. Karczmarski L, Thornton M, Cockcroft VG (1997) Description of selected behaviours of humpback dolphins. Aquat Mamm 23(3):127–133
22. Krützen M, Mann J, Heithaus MR, Connor RC, Bejder L, Sherwin WB (2005) Cultural transmission of tool use in bottlenose dolphins. Proc Natl Acad Sci 102(25):8939–8943. https://doi.org/10.1073/pnas.0500232102
23. Mann J, Smujts BB (1998) Natal attraction: allomaternal care and mother–infant separations in wild bottlenose dolphins. Anim Behav 55(5):1097–1113. https://doi.org/10.1006/anbe.1997.0637
24. Melillo KE, Dudzinski KM, Cornick LA (2009) Interactions between Atlantic spotted (*Stenella frontalis*) and bottlenose (*Tursiops truncatus*) dolphins off Bimini, The Bahamas, 2003–2007. Aquat Mamm 35(2):281–291. https://doi.org/10.1578/AM.35.2.2009.281
25. Methion S, Díaz López B (2021) Spatial segregation and interspecific killing of common dolphins (*Delphinus delphis*) by bottlenose dolphins (*Tursiops truncatus*). Acta Ethol 24(2):95–106. https://doi.org/10.1007/s10211-021-00363-0
26. Morais P, Afonso L, Dias E (2021) Harnessing the power of social media to obtain biodiversity data about cetaceans in a poorly monitored area. Front Mar Sci 8:765228. https://doi.org/10.3389/fmars.2021.765228
27. Mrusczok MT, Zwamborn E, von Schmalensee M, Ramallo SR, Stefansson RA (2023) First account of apparent alloparental care of a long-finned pilot whale calf (*Globicephala melas*) by a female killer whale (*Orcinus orca*). Can J Zool 101(4):288–293. https://doi.org/10.1139/cjz-2022-0161
28. Neumann DR, Orams MB (2005) Behaviour and ecology of common dolphins (*Delphinus delphis*) and the impact of tourism in mercury bay, North Island, New Zealand. Science & Technical Publishing. https://www.doc.govt.nz/documents/science-and-technical/SFC254.pdf. Accessed 31 August 2026
29. Noren SR (2008) Infant carrying behaviour in dolphins: costly parental care in an aquatic environment. Funct Ecol 22(2):284–288. https://doi.org/10.1111/j.1365-2435.2007.01354.x
30. Noren SR, Biedenbach G, Redfern JV, Edwards EF (2008) Hitching a ride: the formation locomotion strategy of dolphin calves. Funct Ecol 22(2):278–283. https://doi.org/10.1111/j.1365-2435.2007.01353.x
31. Patterson IAP, Reid RJ, Wilson B, Grellier K, Ross HM, Thompson PM (1998) Evidence for infanticide in bottlenose dolphins: an explanation for violent interactions with harbour porpoises? Proc Roy Soc Lond Ser B Biol Sci 265(1402):1167–1170. https://doi.org/10.1098/rspb.1998.0414
32. Ramos EA, Galves J, Searle L, Walker Z, Walker P, Castelblanco-Martínez N, Knowles B, Self-Sullivan C, Kiszka JJ (2024) Agonistic interactions initiated by adult bottlenose dolphins on Antillean manatee calves in the Caribbean Sea. PLoS ONE 19(1):e0295739. https://doi.org/10.1371/journal.pone.0295739
33. Riedman ML (1982) The evolution of alloparental care and adoption in mammals and birds. Quar Rev Biol 57(4):405–435. https://doi.org/10.1086/412936
34. Ross HM, Wilson B (1996) Violent interactions between bottlenose dolphins and harbour porpoises. Proc Roy Soc Lond Ser B Biol Sci 263(1368):283–286. https://doi.org/10.1098/rspb.1996.0043
35. Roulin A (2002) Why do lactating females nurse alien offspring? A review of hypotheses and empirical evidence. Anim Behav 63(2):201–208. https://doi.org/10.1006/anbe.2001.1895
36. Silva AA, Castro J, Cid A, Jesus SM, Matos FL (2024) Influence of dolphin-watching tourism vessels on the whistle emission pattern of common dolphins and bottlenose dolphins. Oceans 5:770–784. https://doi.org/10.3390/oceans5040044
37. Stensland EVA, Angerbjörn A, Berggren PER (2003) Mixed species groups in mammals. Mamm Rev 33(3–4):205–223. https://doi.org/10.1046/j.1365-2907.2003.00022.x
38. Visona-Kelly BC, Barrett-Lennard LG (2025) The foe you know: Observations of interspecific interactions between small cetaceans and northern resident killer whales (*Orcinus orca*) in the Northeast Pacific. Ecol Evol 15(6):e71444. https://doi.org/10.1002/ece3.71444
39. Vizeu-Pinheiro M, Rogan E, Cid A, Castro J, Borges FO (2025) Environmental influence on bottlenose dolphin (*Tursiops truncatus*) abundance in southern Portugal. Reg Stud Mar Sci 104569. https://doi.org/10.1016/j.rsma.2025.104569
40. Wang X, Wu F, Mou J, Zhu Q (2013) Indo-Pacific humpback dolphins (*Sousa chinensis*) assist a finless porpoise (*Neophocaena phocaenoides sunameri*) calf: evidence from Xiamen waters in China. J Mammal 94(5):1123–1130. https://doi.org/10.1644/13-MAMM-A-064.1
41. Weihs D (2004) The hydrodynamics of dolphin drafting. J Biol 3:1–16

42. Woodroffe R, Vincent A (1994) Mother's little helpers: Patterns of male care in mammals. Trends Ecol Evol 9(8):294–297. https://doi.org/10.1016/0169-5347(94)90033-7

Figures

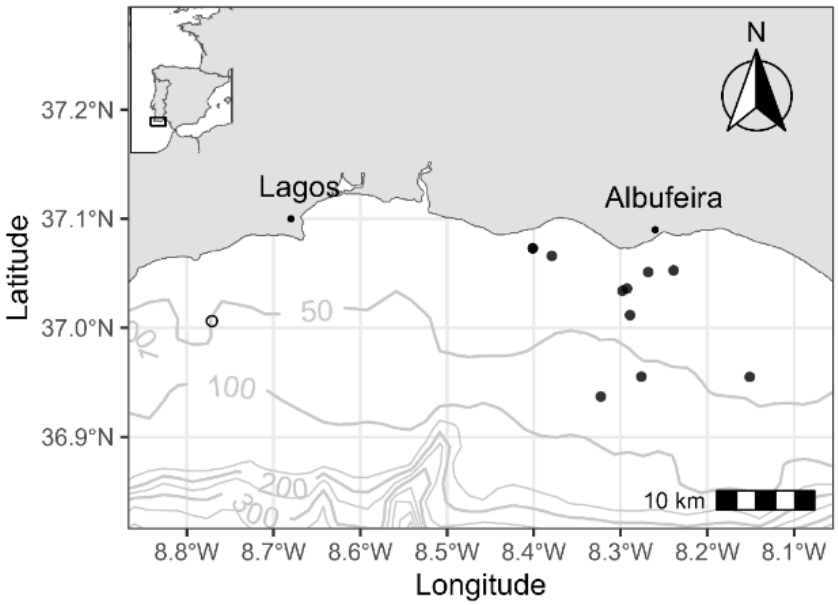


Figure 1

Study area with heterospecific sightings (n = 11), *T. truncatus* + *D. delphis* in black (n = 10) and *T. truncatus* + *S. coeruleoalba*in white (n = 1). Three observations of *T. truncatus* + *D. delphis*are missing on the map, as exact geographic location was not recorded

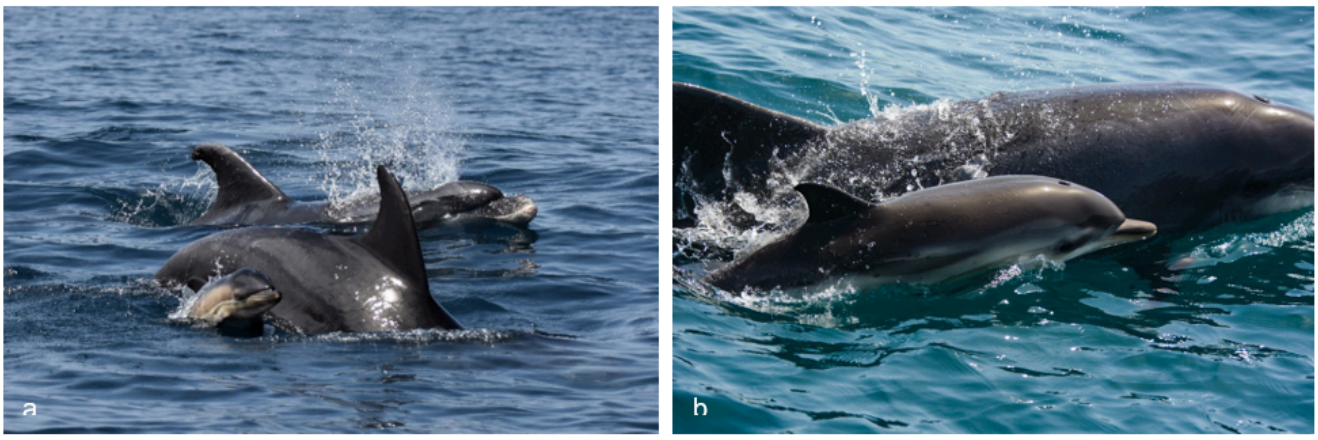


Figure 2

Echelon swimming of a heterospecific calf next to a bottlenose dolphin adult: (**a**) A common dolphin neonate on July 18, 2024. (**b**) A striped dolphin calf on July 18, 2024



Figure 3

Aggressive behavior, including calf tossing and ramming, directed by a bottlenose dolphin adult towards a common dolphin neonate on July 30, 2023. (**a**) Calf-tossing, and (**b**) calf-ramming



Figure 4

The long-term association of a common dolphin neonate and a bottlenose dolphin adult in 2024: (**a**) The heterospecific pair on July 18, 2024. (**b**) The heterospecific pair on August 15, 2024