

Harassing Behavior by Short-Finned Pilot Whales (*Globicephala macrorhynchus*) Towards a Mother and Calf Sperm Whale (*Physeter macrocephalus*) Pair

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The following paper describes an interaction between two cetacean species: the sperm whale (*Physeter macrocephalus*) and the short-finned pilot whale (*Globicephala macrorhynchus*). The event occurred on 6 June 2021 during a research survey. The crew of Pelagic Life, AC, and the Marine Mammal Laboratory at Universidad Veracruzana was surveying the Continental Slope off the Veracruz coast in the southwestern Gulf of Mexico (GoM) when a mother–calf sperm whale pair was observed. The animals were resting at the surface when a group of at least eight short-finned pilot whales approached and started an unusual behavior against the sperm whales. Herein, we describe what seemed to be an agonistic interaction between these animals.

The GoM is considered a semi-enclosed basin with communication to the Caribbean Sea through the Yucatán Channel (Monreal-Gómez et al., 2004). The southern portion, particularly the littoral of Veracruz state, presents a gentle slope towards the east (Vázquez de la Cerda, 2004; Pérez-Brunius et al., 2013). Its high productivity is due to oceanographic characteristics that host high biodiversity (Elliot, 1982; Etter, 1983; Fernández et al., 1993; Toledo-Ocampo, 2005; Zavala-Hidalgo et al., 2006; Linacre et al., 2015). While sperm whales have been documented in this region (Ortega-Ortiz et al., 1998; Ortega-Ortiz, 2002; Würsig, 2017; García-Aguilar, 2021), studies on this species have occurred primarily in the northern GoM (Fritts et al., 1983; Mullin et al., 1994; Davis et al., 2000); here, the highest abundance of sperm whales has been observed primarily over the continental shelf along Texas (Würsig et al., 2000). Short-finned pilot whales have also been documented in the GoM (Davis & Fargion, 1996; Davis et al., 2002). In the southern GoM, they typically occur in groups

of at least nine individuals (Caldwell, 1955; Padilla et al., 1985; Ramírez-León et al., 2018; García-Aguilar, 2021; García-Aguilar et al., 2021). Still, in the southern GoM, information about sperm whales and short-finned pilot whales is incipient.

Interspecific interactions with sperm whales have been documented elsewhere (Weller et al., 1996; Kasamatsu et al., 2000; Jaquet & Gendron, 2002; Curé et al., 2013); for instance, male sperm whales present anti-predator strategies by interfering with killer whales' (*Orcinus orca*) acoustic signals, remaining silent in their presence (Arnbom et al., 1987; Curé et al., 2013). Observations in the north-central GoM have documented sperm whales exhibiting a defense reaction in the presence of pilot whales, which has been described as agonistic; this was supported by variable movements against the mother–calf pair causing them stress, resulting in the typical “marguerite-rosette formation” (Nishiwaki, 1962; Weller et al., 1996; Pitman et al., 2001). This defensive behavior has also been documented in the presence of false killer whales (*Pseudorca crassidens*) in the Galápagos Islands (Palacios & Mate, 1996), and in the presence of killer whales, during which time sperm whales appeared agitated and abruptly changed their direction (Whitt et al., 2015). Nevertheless, to the best of our knowledge, this is the first documented interaction between these sperm and pilot whales in the southwestern GoM. It is noteworthy that sperm whales are listed as vulnerable (Taylor et al., 2019; International Union for Conservation of Nature [IUCN], 2022), though information in this GoM region is scarce (Galindo et al., 2009). This area is highly susceptible to anthropic disturbances from major vessel transit (at least 27 commercial cargo lines) related to the export/import of products (38 cargo types),

most with weekly arrivals—a total of 2,012 major vessels in 2021 (Administración Portuaria Integral de Veracruz S. A. de C. V. [APIVER], 2022).

The observations presented in this paper occurred during routine surveys of deep-water cetaceans off the coast of Veracruz at the end of the dry season (which lasts from March to June). Weekly boat-based surveys were conducted under good sea conditions (wind speed < 15 km/h) in a 10-m IMEMSA m/v *Bonanza*, powered by two outboard (140 hp) motors. Three observers positioned at the front, left, and right sides of the boat searched for cetaceans with the unaided eye. An unmanned aerial vehicle (UAV; drone) DJI Phantom 4 was often used to record sightings (video and photos) to document group structure and behavior. The research boat maintained a safe distance (~50 to 100 m) to avoid disturbing any animals. Drone photographs were taken *in situ*, and footage was reviewed to assess the behavior of cetacean species from which still frames were selected to exemplify specific behaviors.

On 6 June 2021, at 1600 h, ~55 km off Veracruz and in waters ~900 m deep (19° 24.666 N, 95° 42.125 W), the crew observed a mother–calf sperm whale pair resting on the surface. The drone approached within 100 to 200 m from our boat and ~50 to 100 m of altitude to document the pair (see Supplementary Material Video, which is available in the “Supplemental Material” section of the *Aquatic Mammals* website: https://www.aquaticmammals-journal.org/index.php?option=com_content&view=article&id=10&Itemid=147). Within a few minutes,

a group of ~15 to 20 short-finned pilot whales were sighted, and eight approached the sperm whales (1610 h at the same location). The pilot whales remained close to the mother–calf pair and were visible from the boat. The group dispersed into at least three subgroups around a 1.6 km radius and surrounded the mother–calf pair, appearing calm as evidenced by spy-hopping and slow movements in front of the sperm whale’s head; the calf remained close to the right-side lateral peduncle (at 1615 h; Figure 1; Supplementary Material Video Sequence 1). The pilot whales seemed to escort the sperm whales (while the calf remained close to the mother), with no evidence of sudden behaviors between the two species (Figure 1).

The aggregation shape started to change as the pilot whales got closer (~2 m) to the sperm whales. At 1620 h, one pilot whale crossed below the sperm whales (~5 m under, using the estimated body length of pilot whales as reference), while three other individuals passed in front of the mother, one more to the mother’s right and another two approaching from the same side. The calf stayed on the surface, swimming at the left side near the mother’s head, and the pilot whales remained near each other at the adult sperm whale’s flank (Supplementary Material Video Sequence 2). The mother’s behavior changed to what might have been distress, suggested by her open mouth (which also was observed briefly at the start of the encounter) and spinning movements and posturing, with the calf near her mouth as the pilot whales periodically moved away from the

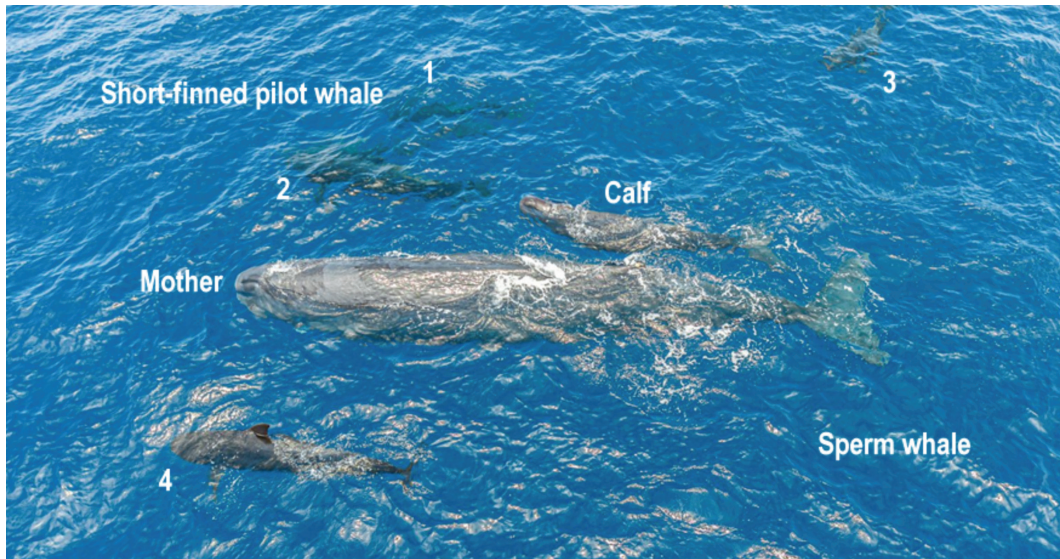


Figure 1. Drone photograph of a group of short-finned pilot whales (*Globicephala macrorhynchus*; ~4 individuals) surrounding a mother–calf pair of sperm whales (*Physeter macrocephalus*) in the southwestern Gulf of Mexico (Drone footage credit: Manuel Fernández)

mother and then regained proximity to one another (Supplementary Material Video Sequence 3). The sperm whales submerged while the pilot whales passed above them, remaining close to each other as they continued to be escorted by the pilot whales. During this event, we witnessed alternating periods of surfacing and diving (~5 m below the surface), with very slow continuous forward movements by both species. The adult sperm whale lifted the head and adopted an inverted underwater posture directly below the calf (6:50 to 7:58 min; Supplementary Material Video Sequence 3). One pilot whale was observed swimming fast below the mother, who splashed with her fluke and apparently tried to bite the pilot whale (10:24 min; Supplementary Material Video Sequence 3). Simultaneously, the other pilot whales were seen within a few hundred meters of our vessel approaching slowly (within 3 m) as the interaction between the short-finned pilot whales and sperm whales kept its course.

After being pursued by pilot whales, the sperm whales increased their speed (~30 km/h), with the pilot whales following at ~4 m, sometimes spreading out and changing positions. The sperm whales' course did not change direction but continued westward where another sperm whale was spotted breaching. Periodically, the mother decreased speed and stopped on her right side, exposing her lower jaw, which was followed by a forceful displacement of water (see Supplementary Material Video Sequence 3). Corresponding with pilot whales' high energetic behavior (moving around the mother–calf pair), the adult sperm whale was witnessed arching and moving her peduncle side-to-side to displace water in response to two pilot whales approaching the calf.

During this last observation (1624 h), eight pilot whales escorted the sperm whales (10:50 min; Supplementary Material Video Sequence 4), six along the right flank and two on her left side (11:28 min; Supplementary Material Video Sequence 4). Suddenly, the interaction became more intense when six additional pilot whales joined the group. All 14 pilot whales used their tails in a violent fashion towards the mother, seemingly to separate her from the calf (14:55 min; Supplementary Material Video Sequence 4).

By the end of the encounter (1628 h), the adult sperm whale stopped being inverted and postured herself vertically while opening her mouth and facing the pilot whales (16:03 to 17:22 min; Supplementary Material Video Sequence 4). This position seemed to be advantageous in reducing harassment as the pilot whales dispersed (to 5 m away); however, shortly afterward, they resumed the same escorting position. Finally, the sperm whales increased their speed, and only two pilot whales kept up with their pace. Our observations

ended at 1633 h. Since the westward course of the whales did not change, we assumed the mother–calf pair joined the other sperm whale that had been breaching to the west.

The observed interaction between sperm whales and pilot whales off the Veracruz coast may have served as an attempt to harass the sperm whale pair in order to isolate the calf, which would then be easier to hunt. Pilot whales have been documented to occasionally feed on small cetaceans (Perryman & Foster, 1980) and behave aggressively towards sperm whales in the north GoM (Weller et al., 1996). Our observations are similar to those in the Strait of Gibraltar where a group of pilot whales presented agonistic behavior against sperm whales as represented by abrupt head movements in and out of the water and the use of the marguerite-rosette formation (Foundation for Information and Research on Marine Mammals [FIRMM], 2021). This documented behavior was hard to explain, though it is possible that the pilot whales displayed threatening behavior against the sperm whales as the former are known to behave aggressively towards other cetaceans (Brown et al., 1966; Perryman & Foster, 1980; Shane et al., 1993; Perrin et al., 2002).

As far as we are aware, observations of pilot whales harassing or hunting sperm whales have not been documented in the area. Even when pilot whales are known for hunting other cetaceans (Ciano & Jørgensen, 2006), our observations are not considered valid proof of hunting behavior on sperm whales. Since no injuries were observed, pilot whales might have been practicing hunting tactics, which could be supported by their agonist behavior towards this mother–calf pair (e.g., Norris, 1977; Shane, 1995a, 1995b; Palacios & Mate, 1996). Our observations highlight the need for research in this region to enhance our understanding of both species for which limited data exist.

Acknowledgments

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