

Short-finned pilot whales (*Globicephala macrorhynchus*) interact with melon-headed whales (*Peponocephala electra*) in Hawaii

Katherine A. Migura^{1,2} and Dwayne W. Meadows¹

¹*Pacific Whale Foundation, 300 Ma'alaea Road, Ma'alaea, HI 96793, USA*

²*Department of Biology, American University, Washington, DC, 20016, USA*

Abstract

A group of 15 short-finned pilot whales (*Globicephala macrorhynchus*) was seen interacting with a group of 30 melon-headed whales (*Peponocephala electra*) in Hawaiian waters. The interaction involved behaviours that suggest the encounter was unrelated to feeding symbioses, but may have involved an inquisitive and/or protective response by the pilot whales.

Key words: pilot whale, *Globicephala macrorhynchus*, melon-headed whale, *Peponocephala electra*, Hawaii, interaction, spy-hopping.

Introduction

Documentation of the occurrence and function of interspecific interactions and associations in large delphinids is rare. However, pilot whales have been sighted with other marine mammals, including large whales, dolphins and sea lions (Reilly & Shane, 1986; Weller *et al.*, 1996; Roden & Mullin, 2000). Documenting the occurrence and function of such interactions is important for understanding the potential ecological and behavioural roles played by such associations, particularly in the context of conservation and management of these protected species. During a transect survey around the four-island region of Hawaii (Maui, Molokai, Lanai, and Kahoolawe) on 18 August 2001, we encountered short-finned pilot whales (*Globicephala macrorhynchus*) interacting with a large group of melon-headed whales (*Peponocephala electra*). Associations of these two species apparently have not been previously reported.

Materials and Methods

The observations were made during the course of a strip transect study of cetaceans in the vicinity of the islands of Maui, Molokai, Lanai, and Kahoolawe that we conducted from June through

September 2001. Transects were run between the hours of 7 am and 3 pm in Beaufort sea state condition of 3 or less. Seven observers were positioned around the periphery and in the 4 m high raised wheelhouse of a 17 m powered catamaran travelling at 12 to 14 kts. Wheelhouse observers scanned the peripheral 360-degree area out to the limits of visibility while the observers on the lower deck scanned in closer to the boat. Observations were made with the naked eye. The interaction of pilot whales and melon-headed whales was observed approximately 8 nm off of Palaoa Point on the southwest shore of Lanai, in waters approximately 700 m deep.

Results

At 0905h and location 20°37.571'N, 157°01.746'W, a group of approximately 15 to 30 short-finned pilot whales was encountered. This was one of 18 encounters with short-finned pilot whales during the course of 41 transects covering 2735 nm and 177.3 h on effort during the course of the field season. The group traveled slowly northwest while our vessel followed at idle or zero speed for 63 min. The whales exhibited mixed logging (floating motionless in a group on the surface) and milling (animals active but no directional displacement, i.e. travel) activities with some individuals 'surfing' the swells. One calf was breaching and splashing, with bouts of possible nursing as evidenced by the positions assumed by mom and calf (mom rolled onto her side and lied motionless at the surface while calf's head was near mom's genitals). This was accompanied by the discharge of a milky-white substance into the water around the calf's head. After shutting down the engines, a hydrophone was deployed and infrequent 'whistles' were heard (but not recorded) at a rate of approximately 2/min with each vocalization lasting 2–3 s as the group approached our vessel. The vocalizations that we heard were similar in nature to those documented by Weller *et al.* (1996) and Reilly & Shane (1986).

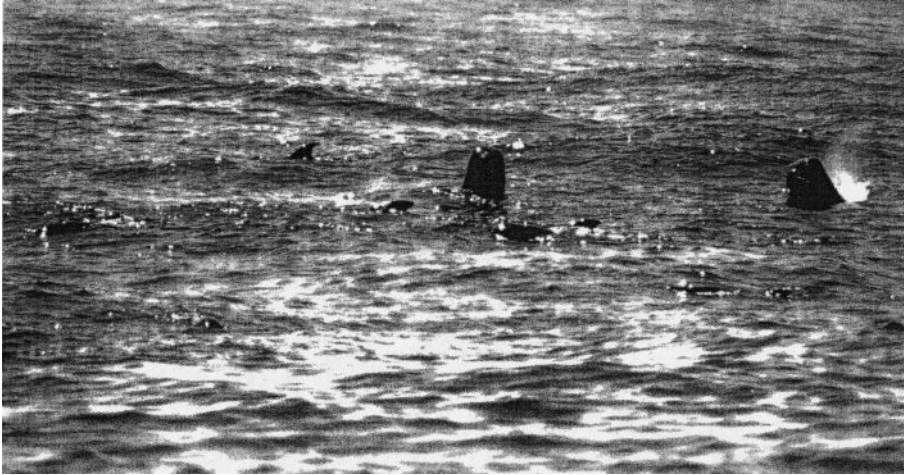


Figure 1. Spy-hopping pilot whales surrounded by melon-headed whales near Lanai, Hawaii on 18 August 2001.

Five minutes after departing the pilot whales and continuing the transect (i.e., 1013h), a group of 300 to 500 melon-headed whales was encountered at 20°38.169'N, W 157°03.728'W. This was only about 800 to 1000 m from where the pilot whale group had been when we departed. Upon first encounter, some individuals rode the boat's bow wave, but all ignored the boat once we ceased moving. Some calves were noted. The subsequent behaviours of the melon-headed whales varied from subgroup to subgroup. Members of at least one group were slowly moving around, but in no particular direction (i.e., milling); in other subgroups the activity levels were higher and included active splashing and porpoising (i.e., socializing); while individuals in other subgroups floated motionless at the surface, suggesting resting behaviour. This was the only encounter with melon-headed whales during the study.

At 1102h and location 20°39.045'N, 157°03.214'W, approximately 15 pilot whales joined a subgroup of roughly 30 melon-headed whales at the outer edge of the large melon-headed whale group. These pilot whales were most likely from the group encountered earlier in the day because of the group size and short distance travelled between sightings. The interaction between the two species consisted of at least two or three pilot whales spy-hopping at all times while the melon-headed whales swam asynchronously in several directions while encircling the pilot whale group (Fig. 1). Both species surfaced frequently and did not appear otherwise agitated. Our vessel was nearest to several melon-headed whale subgroups from the main group who were socializing or milling when we again deployed the hydrophone. The mixed-species

group was about 200 m away. Distinctive clicks with brief whistles were heard, resembling the descriptions of vocalizations of melon-headed whales recorded in the Caribbean (Watkins *et al.*, 1997). In addition, we were able to distinguish the vocalizations of the pilot whales from those of the melon-headed whales. In the previous encounter with short-finned pilot whales we noted that their whistles were sporadic. During the interaction with the melon-headed whales their vocalizations were at least twice as frequent. It was also noted that approximately 100 unidentified seabirds were circling at least 30 m above the interaction. The interaction was observed to continue with the same behaviours for 29 min before the transects were resumed, and presumably continued after our departure.

Discussion

Pilot whales often are sighted with other marine mammals, including large whales, dolphins and sea lions (Reilly & Shane, 1986; Weller *et al.*, 1996; Roden & Mullin, 2000). The formation of mixed species groups usually results in a benefit for at least one species (Baraff & Asmutis-Silvia, 1998; Wilson, 2000). These benefits may include increased feeding or decreased predation rates, the same benefits generally found in single-species groups (Connor, 2000).

Opportunities for multispecies associations increase where both prey and other habitat needs of each species overlap (Norris & Døhl, 1980). Pilot whale distribution is linked closely with their primary prey of squid (Reilly & Shane, 1986; Sinclair, 1992; Shane, 1995; Baraff & Asmutis-Silvia, 1998).

Melon-headed whales frequently eat small schooling fish, but also feed on squid (Sekiguchi *et al.*, 1992; Jefferson & Barros, 1997). Pilot whales are extremely efficient at detecting food, and other marine mammals often take advantage of this skill (Reilly & Shane, 1986). An association based on increased foraging success may thus account for this interaction and the numerous circling birds observed above the mixed-species group. Such associations of seabirds with feeding odontocetes has regularly been observed by us in this area. However, three factors suggest that this encounter was not based on enhanced foraging success: (1) short-finned pilot whales are nocturnal feeders (Shane, 1995; Gannier, 2000), (2) none of the behaviours exhibited by either species were characteristic of feeding i.e., there were no deep dives and most individuals spent the majority of time visible at the surface, and (3) if the melon-headed whales were using the unique foraging abilities of the pilot whales to find food, the pilot whales would not have approached the melon-headed whales as we observed.

Humans, some sharks, and possibly killer whales are predators of pilot and melon-headed whales (Reilly & Shane, 1986; Weller *et al.* 1996; Baraff & Asmutis-Silvia, 1998), so protection from predators is also a possible function for this interaction. During several previous encounters with short-finned pilot whales we observed oceanic white-tipped sharks (*Carcharhinus longimanus*) trailing the whales. Six killer whales (*Orcinus orca*) also were observed in the area two weeks after this interaction between pilot and melon-headed whales. Great white (*Carcharodon carcharias*) and tiger (*Galeocerdo cuvier*) sharks are other potential shark predators known from the area. Protecting the calves that were present also may have been significant in this interaction. Moreover, melon-headed and pilot whales are reported to herd and attack small dolphins and sperm whales aggressively (Perryman & Foster, 1980; Perryman, *et al.*, 1994; Weller *et al.*, 1996) so we cannot completely rule-out predation as the basis for the interaction, but there was no overt evidence of predatory intent.

Spy-hopping is thought to be a curious and inquisitive behaviour that allows individuals to gain a better view of their surroundings (Roden & Mullin, 2000; Tyack, 2000). The presence of this behaviour suggests the encounter may simply be a matter of two species that rarely come in contact investigating each other. This may be true, since melon-headed whales were only seen once in over 40 transects in the four-island area in 2001, and are only slightly more common in waters near the big island of Hawaii (Kaufman & Forestell, 1986; Mobley *et al.*, 2000).

While the purpose of this interaction is difficult to determine with only this one observation, the most feasible explanations are protection from predators or a chance, rare encounter in shared habitat. We hope this record of short-finned pilot whales associating with melon-headed whales stimulates further study of this and other interspecific associations in marine mammals.

Acknowledgments

We thank the crew aboard *Ocean Explorer* (Chris Howard and Christa Corsaro) and the research assistants (Anne Cornell, Lauren DeMaio, Emily DeWit, Trish Lambdin, Lindsay Rumohr, Brooke Smith and Christina Toms) who assisted with the sightings and data collection during this and other odontocete surveys. Also, we thank Chris Howard, Alison Roberts, Jeanette Thomas, and two anonymous reviewers for helpful reviews of drafts of this manuscript. This is publication number 2002-02 of the Pacific Whale Foundation.

Literature Cited

- Baraff, L. S. & Asmutis-Silvia, R. A. (1998) Long-term association of an individual long-finned pilot whale and Atlantic white-sided dolphins. *Marine Mammal Science* **14**, 155–161.
- Connor, R. C. (2000) Group living in whales and dolphins. In: J. Mann, R. C. Connor, P. L. Tyack & H. Whitehead (eds.). *Cetacean Societies: field studies of dolphins and whales*. pp. 197–208. University of Chicago Press, Chicago, Illinois.
- Gannier, A. (2000) Distribution of cetaceans off the Society Island (French Polynesia) as obtained from dedicated surveys. *Aquatic Mammals* **26**, 111–126.
- Jefferson, T. A. & Barros, N. B. (1997) *Peponocephala electra*. *Mammalian Species* **553**, 1–6.
- Kaufman, G. D. & Forestell, P. H. (1986) *Hawaii's Humpback Whales: a complete whalewatchers' guide*. 2nd ed. Island Heritage, Aiea, Hawaii. 145 pp.
- Mobley, J. R., Spitz, S. S., Forney, K. A., Grotefendt, R. & Forestell, P. H. (2000) Distribution and abundance of odontocete species in Hawaiian waters: preliminary results of 1993–98 aerial surveys. Administrative Report LJ-00–14C. NMFS Southwest Fisheries Science Center, La Jolla, California.
- Norris, K. S. & Døhl, T. P. (1980) The structure and function of cetacean schools. In: L. Herman (ed.). *Cetacean Behavior: mechanisms and functions*. pp. 211–261. John Wiley & Sons, New York.
- Perryman, W. L. & Foster, T. C. (1980) Preliminary report on predation by small whales, mainly the false killer whale (*Pseudorca crassidens*), on dolphins (*Stenella spp.* and *Delphinus delphis*) in the eastern tropical Pacific. Administrative Report LJ-80–05. NMFS Southwest Fisheries Center, La Jolla, California.
- Perryman, W. L., Au, D. W. K., Leatherwood, S. & Jefferson, T.A. (1994) Melon-headed whale, *Peponocephala electra* Gray, 1846. In: S. H. Ridgway &

- R. Harrison (eds.). *Handbook of Marine Mammals*. vol. 5. pp. 363–386. Academic Press, London, England.
- Reilly, S. B. & Shane, S. H. (1986). Pilot Whale. In: D. Haley (ed.). *Marine Mammals of Eastern North Pacific and Arctic Waters*. pp 133–139. Pacific Search Press, Washington. 295 pp.
- Roden, C. L. & Mullin, K. D. (2000) Sightings of cetaceans in the northern Caribbean Sea and adjacent waters, winter 1995. *Caribbean Journal of Science* **36**, 280–288.
- Sekiguchi, K., Klages, N. T. W. & Best, P. T. (1992) Comparative analysis of the diets of smaller odontocete cetaceans along the coast of southern Africa. *South African Journal of Marine Science* **12**, 843–861.
- Shane, S. H. (1995). Behavior patterns of pilot whales and Risso's dolphins off Santa Catalina Islands, California. *Aquatic Mammals* **21**, 195–197.
- Sinclair, E. H. (1992). Stomach contents of four short-finned pilot whales (*Globicephala macrorhynchus*) from the southern California Bight. *Marine Mammal Science* **8**, 76–81.
- Tyack, P. L. (2000) Functional aspects of cetacean communication. In: J. Mann, R. C. Connor, P. L. Tyack, and H. Whitehead (eds.). *Cetacean Societies: field studies of dolphins and whales*. pp. 270–307. University of Chicago Press, Chicago, Illinois.
- Watkins, W. A., Daher, M. A., Samuels, A. & D. P. Gannon. (1997) Observations of *Peponocephala electra*, the melon-headed whale, in the southeastern Caribbean. *Caribbean Journal of Science* **33**, 34–40.
- Weller, D. W., Würsig, B., Whitehead, H., Norris, J. C., Lynn, S. K., Davis, R. W., Clauss, N. & Brown, P. (1996) Observations of an interaction between sperm whales and short-finned pilot whales in the Gulf of Mexico. *Marine Mammal Science* **12**, 588–594.
- Wilson, E. O. (2000) *Sociobiology: the new synthesis*. 25th anniversary edition. Harvard University Press, Cambridge, Massachusetts. 697 pp.