

Rough-Toothed Dolphins (*Steno bredanensis*) Catch Diskfishes while Interacting with Humpback Whales (*Megaptera novaeangliae*) off Abrolhos Bank Breeding Ground, Southwest Atlantic

Leonardo L. Wedekin,¹ Ana Freitas,² Márcia H. Engel,¹ and Ivan Sazima³

¹Projeto Baleia Jubarte – Instituto Baleia Jubarte/IBAMA, Praia do Kitongo s/nº, Caravelas BA 45900-000, Brazil

²Coronado Yacht Charter, Clóvis Ramos 220, Caravelas BA 45900-000, Brazil

³Departamento de Zoologia & Museu de História Natural, Universidade Estadual de Campinas, Caixa Postal 6109, Campinas SP 13083-970, Brazil

Abstract

We provide a summary of interactions between humpback whales (*Megaptera novaeangliae*) and rough-toothed dolphins (*Steno bredanensis*) observed during a long-term study conducted at the Abrolhos Bank off Brazil, with additional notes on the behaviour of both cetacean species. One dolphin caught and likely preyed on a diskfish (Echeneidae) while interacting with the whales, these latter displaying avoidance behaviour. This encounter may be regarded as a negative interaction with short-term and nonlethal impacts on the whales. In addition, we present evidence that the sharksucker (*Echeneis naucrates*) is preyed on by the rough-toothed dolphin while interacting with the whales.

Key Words: humpback whale, *Megaptera novaeangliae*, rough-toothed dolphin, *Steno bredanensis*, remora, *Echeneis naucrates*, interspecific interaction, feeding behaviour, sharksucker

Introduction

Cetaceans are one of the mammalian groups in which the most diverse interactions between closely related species are recorded. The nature of these interactions spans from predation to cooperative feeding (e.g., Baird, 1998; Ciano & Jorgensen, 2000; Jefferson et al., 1991; Patterson et al., 1998; Scott & Chivers, 1990; Shane, 1995; Weller et al., 1996).

At the Abrolhos Bank, off northeast Brazil, Southwest Atlantic, we observed humpback whales (*Megaptera novaeangliae*) interacting with three cetacean species: the southern right whale (*Eubalaena australis*), the bottlenose dolphin (*Tursiops truncatus*), and the rough-toothed

dolphin (*Steno bredanensis*). We provide here a brief summary of the unexpected interactions between humpback whales and rough-toothed dolphins observed during a long-term study conducted at the Abrolhos Bank, with additional notes on the behaviour of both cetacean species.

Material and Methods

The Abrolhos Bank (between 17° 30' and 19° 30' S) is located on the continental shelf of Brazil, with mean water depths of about 30 m. It is the most important breeding ground for the humpback whales in the Southwest Atlantic (Martins et al., 2001; Siciliano, 1997). Since 1988, systematic research cruises have been conducted in this area during the whales' breeding season (for a description of the study area and methodology see Martins et al., 2001).

Most of the behavioural descriptions presented here were based on *ad libitum* field notes taken by experienced researchers. One exception is an interaction videotaped from a boat for which we provide a brief description (September 2001) based on a 10-min video footage as well as detailed interviews with two experienced whale watchers aboard. At the time the observations were made, the sea state was equivalent to Beaufort 1 and the distance of the boat from the interaction varied 10-30 m.

Results

Eight instances of interactions between humpback whales and rough-toothed dolphins have been recorded at the Abrolhos Bank since 1997. On four occasions, the whales displayed avoidance behaviour such as bubble trails, trumpeting (forceful exhalation with noise), caudal slash or

slap, and side-fluking. On two other occasions, we recorded rough-toothed dolphins interacting with competitive groups of humpback whales, which are groups characterized by “much surface activity and a sometimes high level of aggression between participants” (p. 183), related to intrasexual competition (Clapham et al., 1992). Below we describe briefly two of these interactions.

Interaction 1 (17 September 1999)

The research vessel was approaching a mother-calf pair and an escort group, which were swimming slowly and blowing regularly. After a while, a group of rough-toothed dolphins approached and began interacting with the whale group. Immediately, the mother started to trumpet and side-fluke. This interaction lasted 10 min, after which the dolphins left the whale group, and the whales resumed their normal behaviour.

Interaction 2 (28 September 2001)

The boat approached a mother-calf humpback whale pair escorted by about 10 adult rough-toothed dolphins. Both cetacean species showed no apparent avoidance to the vessel nearby. The whales moved little during the interaction, remaining most of the time near the surface in the same area. The dolphins were swimming around the whales with variable speed and direction, at times heading fast and directly towards the whales. Some of the dolphins approached to about 1 to 2 m of the whales. The mother was constantly side-fluking and trumpeting, while the calf tail-slapped several times. After a few seconds, one dolphin was observed shaking its head with a diskfish (or remora) about 50 cm long in its mouth and then throwing it to the side. Two additional diskfishes were recorded attached to the calf’s back near the dorsal fin while it was surfacing.

Discussion

The behaviours performed by the humpback whales while interacting with rough-toothed dolphins are similar to the aggressive interactions reported between humpback and killer whales (*Orcinus orca*) (Flórez-González et al., 1994; Whitehead & Glass, 1985), and humpback and pilot whales (*Globicephalus* spp.) (Ciano & Jorgensen, 2000). Our observations of rough-toothed dolphins, interacting with competitive groups cast some doubts on the assumption that rough-toothed dolphins were riding the waves created by the movement of the whales (bow riding), which is probably the case for most interactions between large whales and other small cetaceans such as the bottlenose dolphin. A competitive group is generally a very dynamic and highly energetic type of association

(Clapham et al., 1992), and the whales constantly change their swimming direction while traveling in these groups.

The close approach and fast swimming towards the whales displaying avoidance behaviour, and a diskfish being caught by a dolphin that displayed feeding behaviour afterwards indicate that the interaction we recorded was an instance of rough-toothed dolphins preying on diskfishes. We do not know, however, whether the diskfish was attached to the whale’s body or was swimming freely close to the whale as these fish are able to do (IS, pers. obs.).

Two diskfish species are recorded from humpback whales: the whalesucker (*Remora australis*) and the sharksucker (*Echeneis naucrates*) (Fertl & Landry, 1999). The whalesucker is specific to cetaceans and found mostly at open sea. It is rarely recorded near shore or in shallow waters (Fertl et al., 2002; Rice & Caldwell, 1961; Sazima et al., 2003). The sharksucker is a host-generalist. It is habitually found in shallow reef sites such as those found in the Abrolhos Bank (Randall, 1983). Additionally, the sharksucker is a common sight in the Abrolhos Archipelago area, and one of us (IS) identified this species attached to humpback whales in the shallow waters of the Abrolhos Bank, based both on photographic records and videotaped sequences. Thus, most probably, the diskfish we recorded being taken by the rough-toothed dolphins was *Echeneis naucrates*.

The unusual position of the diskfishes on the host’s back and above the water could be this fish’s behavioural response to the immediate risk of predation. Taking the diskfish off the whale’s body surface by the dolphins may cause a little discomfort to the host, and this may be one reason for the whales showing avoidance behaviour during such interactions. Removal of a diskfish should not cause harm, pain or discomfort to a whale (Fertl & Landry, 2002), however, and, thus, another possibility is that the whales simply were disturbed by the direct, swift, and close passes by the dolphins. The interaction here recorded between rough-toothed dolphins and humpback whales may be regarded as a negative interaction with short-term, nonlethal impacts on the whales (see Alling, 1985, for comments on the association between whales and diskfishes).

The behaviour of shaking the head while holding a diskfish in the mouth is a feeding technique already reported for the rough-toothed dolphin while feeding on mullets on the Brazilian coast (Lodi & Hetzel, 1999). The diet of the rough-toothed dolphin is composed of cephalopods and fishes, including large pelagic species (Jefferson et al., 1993; Leatherwood et al., 1982) and near-shore fishes (Klinowska, 1991; Lodi & Hetzel,

1999). Here, we provide evidence that the shark-sucker is taken by the rough-toothed dolphin, a new prey even if occasional.

Acknowledgments

We thank Carlo D'Ângelo for kindly providing his video recording of the interaction; Cristiane A. Martins, Maria Emília Morete, Paulo C. Simões-Lopes, Renata S. Souza Lima, Nélio Barros, Jeanette Thomas, and an anonymous reviewer for greatly improving the manuscript with comments and suggestions; José Martins Silva-Jr. for providing bibliographic information; José Lima de Figueiredo and Rodrigo Leão de Moura for information about fish biology on an early version of the manuscript; and the PETROBRAS (Brazilian Oil Company), Pantanal Linhas Aéreas, CNPq, and FAPESP for essential financial support.

Literature Cited

- Alling, A. (1985). Remora and blue whales: A commensal or mutual interaction? *Whalewatcher (Journal of the American Cetacean Society)*, 19, 16-19.
- Baird, R. W. (1998). An interaction between Pacific white-sided dolphins and a neonatal harbour porpoise. *Mammalia*, 62, 129-134.
- Ciano, J. N., & Jorgensen, R. (2000). Observation on an interaction between a humpback whale (*Megaptera novaeangliae*) and pilot whales (*Globicephala melas*). *Marine Mammal Science*, 16, 245-248.
- Clapham, P. J., Palsbøll, P. J., Matilla, D. K., & Vasquez, O. (1992). Composition and dynamics of humpback whale groups in the West Indies. *Behaviour*, 122, 182-194.
- Fertl, D., & Landry, Jr., A. M. (1999). Sharksucker (*Echeneis naucrates*) on a bottlenose dolphin (*Tursiops truncatus*) and a review of other cetacean-remora associations. *Marine Mammal Science*, 15, 859-863.
- Fertl, D., & Landry, Jr., A. M. (2002). Remoras. In W. F. Perrin, B. Würsig, & J. G. M. Thewissen (Eds.), *Encyclopedia of marine mammals* (pp. 1013-1015). San Diego: Academic Press.
- Fertl, D., Landry, Jr., A. M., & Barros, N. B. (2002). Sharksucker (*Echeneis naucrates*) on a bottlenose dolphin (*Tursiops truncatus*) from Sarasota Bay, Florida, with comments on remora-cetacean association in the Gulf of Mexico. *Gulf of Mexico Science*, 2002, 151-152.
- Flórez-González, L., Capella, J. J., & Rosenbaum, H. (1994). Attack of killer whales (*Orcinus orca*) on humpback whales (*Megaptera novaeangliae*) on a South American Pacific breeding ground. *Marine Mammal Science*, 10, 218-222.
- Jefferson, T. A., Leatherwood, S., & Webber, M. A. (1993). *FAO species identification guide: Marine mammals of the world*. Rome: FAO. 320 pp.
- Jefferson, T. A., Stacey, P. J., & Baird, R. W. (1991). A review of killer whale interactions with other marine mammals: Predation to co-existence. *Mammal Review*, 21, 151-180.
- Klinowska, M. (1991). *Dolphins, porpoises and whales of the world: The IUCN red data book*. Gland, Switzerland and Cambridge, UK: IUCN – The World Conservation Union. 429 pp.
- Leatherwood, S., Reeves, R. R., Perrin, W. F., & Evans, W. E. (1982). Whales, dolphins, and porpoises of the eastern north Pacific and adjacent Arctic waters: A guide to their identification. *NOAA Technical Report (NMFS Circular 444)*. 245 pp.
- Lodi, L., & Hetzel, B. (1999). Rough-toothed dolphin, *Steno bredanensis*, feeding behaviours in Ilha Grande Bay, Brazil. *Biociências*, 7, 29-42.
- Martins, C. C. A., Morete, M. E., Engel, M. H., Freitas, A. C., Secchi, E. R., & Kinas, P. G. (2001). Aspects of habitat use patterns of humpback whales in the Abrolhos Bank, Brazil, breeding ground. *Memoirs of the Queensland Museum*, 47, 563-570.
- Patterson, I. A. P., Reid, R. J., Wilson, B., Grellier, K., Ross, H. M., & Thompson, P. M. (1998). Evidence for infanticide in bottlenose dolphins: An explanation for violent interactions with harbour porpoises? *Proceedings of the Royal Society of London, Series B, Biological Sciences*, 165, 1-4.
- Randall, J. E. (1983). *Caribbean reef fishes* (2nd ed). Neptune City, NJ: TFH Publications. 350 pp.
- Rice, D. W., & Caldwell, D. K. (1961). Observations on the habits of the whalesuckers (*Remilegia australis*). *Norsk Hvalfangst-tidende*, 5, 181-189.
- Sazima, I., Sazima, C., & Silva-Jr., J. M. (2003). The cetacean offal connection: Feces and vomits of spinner dolphins as a food source for reef fishes. *Bulletin of Marine Science*, 72, 151-160.
- Scott, M. D., & Chivers, S. J. (1990). Distribution and herd structure of bottlenose dolphins in the Eastern Tropical Pacific Ocean. In S. Leatherwood & R. R. Reeves (Eds.), *The bottlenose dolphin* (pp. 387-402). San Diego: Academic Press.
- Shane, S. H. (1995). Relationship between pilot whales and Risso's dolphins at Santa Catalina Island, California, USA. *Marine Ecology Progress Series*, 123, 5-11.
- Siciliano, S. (1997). *Características da população de baleias jubarte (Megaptera novaeangliae) na costa brasileira, com especial referência aos Bancos de Abrolhos*. M.S. thesis, Universidade Federal Rural do Rio de Janeiro.
- Whitehead, H., & Glass, C. (1985). Orcas (killer whales) attack humpback whales. *Journal of Mammalogy*, 66, 183-185.

Gray whale (*Eschrichtius robustus*). Humpback whale (*Megaptera novaeangliae*). Minke whale (*Balaenoptera acutorostrata*). North Atlantic right whale (*Eubalaena glacialis*). Risso's dolphin (*Grampus griseus*). Rough-toothed dolphin (*Steno bredanensis*). Short-beaked common dolphin (*Delphinus delphis*). Short-finned pilot whale (*Globicephala macrorhynchus*). Pelagic false killer whale interactions with longline fisheries in the central North Pacific. *Fisheries Research* 230(October 2020), 105665. doi: 10.1016/j.fishres.2020.105665. Abstract. Humpback Whales, *Megaptera novaeangliae*. Species Database | Resources Taxonomy BioOne PLOS Scholar Red List Conservation Evidence Map Of Life NOAA MBARI iNaturalist. Taxonomy: Animalia Chordata Mammalia Cetartiodactyla Balaenopteridae *Megaptera novaeangliae*. Description & Behavior. Whale Evolution All members of the Order Cetacea (includes all whales, toothed and those using baleen) are believed to have evolved from terrestrial hoofed mammals like cows, camels, and sheep some 45 million years ago – that's about 40 million years before humans! This fact, together with the fact that the normal breeding-cycle of a humpback whale is two years, helps to explain why recovery of humpback whale populations progresses so slowly. World Range & Habitat. Using opportunistic platforms to study humpback whales (*Megaptera novaeangliae*) during their breeding season, from July to November, we analyzed the distribution of dolphin sightings in a poorly studied area, the north coast of Bahia State, Brazil. Between 2001 and 2006, more than 500 days of surveys were performed (2360 h of effort), in which 93 groups of dolphins were sighted from Itacarai (14° 53'S, 38° 15'W) to Subaema (12° 30'S; 37° 63'W): 58 (62.4%) bottlenose dolphin, *Tursiops truncatus*; 21 (22.6%) estuarine.