

## First Reported Encounter of Bryde's Whale and Interaction with Humpback Whales in the Gulf of Tribugá, Chocó, Northern Colombian Pacific

Ann Carole Vallejo,<sup>1</sup> Dalia C. Barragán-Barrera,<sup>1</sup> Nohelia Farías-Curtidor,<sup>2</sup>  
Ashley Moss,<sup>1</sup> Sara Castano,<sup>1</sup> Jenny Bachmann,<sup>1</sup> Edwin Gonzáles Murillo,<sup>1,3</sup>  
Luis Antonio Lloreda,<sup>1,3</sup> and Yerson Gonzáles Murillo<sup>1,3</sup>

<sup>1</sup>R&E Ocean Community Conservation, 2580 Valleyridge Drive, Oakville, ON L6M 5H5, Canada

E-mail: carole.vallejo@oceancommunityconservation.org

<sup>2</sup>Independent researcher, Bogotá, Colombia

<sup>3</sup>Local fisherman, Jurubirá, Colombia

Various species of cetaceans annually visit the Pacific coast of Colombia. Some only visit seasonally, while others are present throughout the year (Avila et al., 2013). Humpback whales (*Megaptera novaeangliae*) belonging to breeding stock G (BSG), recognized by the International Whaling Commission (Félix et al., 2021), are commonly seen in the Gulf of Tribugá (northern Colombian Pacific; Figure 1) on an annual basis — as early as May and as late as December (Avila et al., 2020). Other commonly sighted cetaceans in this area include various species of dolphins,

such as bottlenose dolphins (*Tursiops truncatus*), spinner dolphins (*Stenella longirostris*), and pantropical spotted dolphins (*Stenella attenuata*) (Avila et al., 2013; Caicedo-Herrera et al., 2018), which are seen throughout the year (E. Gonzáles, pers. comm., 18 May 2022), though appear more frequently in certain months than others. Research is still ongoing to determine these dolphins' populations, abundance, distribution, and habitat use within the region.

Within the Gulf of Tribugá, there have been various encounters with less-frequent cetacean travelers, including killer whales (*Orcinus orca*), false killer whales (*Pseudorca crassidens*), and sperm whales (*Physeter macrocephalus*) (Avila et al., 2013). The infrequent mysticetes seen in or around the gulf include minke whales (*Balaenoptera acutorostrata*), fin whales (*Balaenoptera physalus*), sei whales (*Balaenoptera borealis*), and, rarely, blue whales (*Balaenoptera musculus*) (Avila et al., 2013; Caicedo-Herrera et al., 2018). Sightings of these species are important to record to add to the collective scientific community's knowledge as well as because this area appears to be a target for a multipurpose port that could imply a future high impact on marine fauna, including cetaceans (Rey-Baquero et al., 2021).

Due to the presence of numerous different sympatric cetaceans in the area, it is possible that interspecies interactions occur (Deakos et al., 2010). The reason for these associations remains unknown, but some explanations may be feeding opportunities (Kasamatsu et al., 2000; Clua & Grosvallet, 2001; Quéroil et al., 2008), play (Deakos, 2002), sexual harassment or antagonistic behaviors (Acevedo-Gutiérrez et al., 2005; May-Collado, 2010), predation (Bowers et al., 2018), and others (Deakos et al., 2010; MacKay



**Figure 1.** Location of encounter between humpback whales (*Megaptera novaeangliae*) and a Bryde's whale (*Balaenoptera edeni*) within the Gulf of Tribugá (northern Colombian Pacific)

& Bacon, 2019). Some authors define harassment or antagonistic behavior as an aggressive action by one species towards another that elicits a hostile response indicative of agitation, annoyance, or distress, including, but not limited to, a change in direction, chuffing, or percussive activity (Silber, 1986; Smultea et al., 2014; MacKay, 2015; MacKay & Bacon, 2019).

For the past two years, a community science program has been ongoing through which locals (fishermen) are trained to carry out monthly cetacean monitoring transects in a 9-m motorboat throughout the Gulf of Tribugá. The goal was to strengthen knowledge about cetacean presence, occurrence, and distribution along the Colombian Pacific. During one routine monitoring assessment, on the morning of 28 July 2021, the blows of two humpback whales (a mother–calf pair) were spotted as they were moving south (Table 1). The research vessel left the transect line and followed the pair. Mother and calf displayed dives, resurfacing, (respiration) blows, and tail slaps (Table 1). A third individual of a different species (Figure 2a & b) was encountered entering the area after 20 min of observation of the humpback pair. This species was identified through photos and video as a Bryde’s whale (*Balaenoptera edeni*).

This whale’s identification was based on the erect sickle-shaped dorsal fin that had a deeply concave trailing edge and its three distinctive parallel rostrum ridges (Shirihai, 2006; Figure 3).

The interaction’s initial sighting position (03° 46' 39.4" N, 77° 21' 40.599" W) was located where the humpback pair deviated from their path, and the research vessel followed all three individuals swimming around one another (Table 1). After 13 min, another much larger adult humpback whale (Figure 4) joined the mother–calf pair. The complete interaction is described in Table 1 and shown in Figures 3 and 4; it concluded when the third humpback and Bryde’s whale also separated and swam slowly away (Table 1). The final sighting position (05° 46' 8.2" N, 77° 21' 41.098" W) was ~9.2 km west from the shore of Tribugá (Figure 1; Table 1).

Although Bryde’s whales have been reported previously within the Colombian Pacific, this is the first reported encounter of a Bryde’s whale in the Gulf of Tribugá and the first interspecies interaction documented with humpback whales. Local fishermen have previously seen other whale species in the gulf during April and May, which perhaps overlaps with the presence of migrating sardine schools (N. Botero, pers. comm., 12 April 2022). Bryde’s whales are cosmopolitan species

**Table 1.** Description of an encounter between humpback whales (*Megaptera novaeangliae*) and a Bryde’s whale (*Balaenoptera edeni*) in the Gulf of Tribugá (northern Colombian Pacific)

| Time  | Behavior description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 08:05 | Two blows from humpback whales were spotted, followed by a mother–calf pair heading south. Observers departed from monitoring trackline and began following the whales, marking the geographic location upon arrival at the observation location (~50 m from the whales).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 08:09 | Humpback pair fluked for a deep dive.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 08:11 | Humpback pair resurfaced with a series of blows.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 08:13 | Humpback pair began tail slapping at the surface.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 08:23 | A large unidentified cetacean (identified as a Bryde’s whale) came within 50 m of the humpback mother–calf pair. The humpbacks deviated from their original path south, and all three whales began swimming around one another within 30 m.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 08:36 | A third adult humpback whale joined the mother–calf pair. This third humpback exhibited aggressive behaviors (e.g., pectoral fins slapping and tail slapping against the water). These behaviors are typically observed between a group of males in fierce competition for a female. Cetaceans were breathing frequently and changing directions causing surface water disturbance, but all stayed within the same area. Shortly after the third humpback arrived, the mother–calf pair began to distance themselves and moved away from the area. The third humpback and the Bryde’s whale were in very close proximity to one another (~10 m), and images show the humpback swimming directly behind the unidentified whale. There was also a moment when both whales were side-by-side. Many blows from the humpback whales were observed, but no blows from the Bryde’s whale were observed. |
| 08:46 | End of sighting: Geographic location was recorded before heading back to the trackline to resume regular monitoring activities.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |



**Figure 2.** Bryde's whale in the Gulf of Tribugá (northern Colombian Pacific): identifying details of the (a) dorsal rostrum and (b) dorsal fin were documented. (Photo credit: ©Ashley Moss)

(Acevedo et al., 2007) that inhabit tropical and subtropical waters of more than 16°C; they are considered both pelagic and offshore whales (Kato & Perrin, 2018; NOAA Fisheries, 2021). In Colombia, Bryde's whales have been reported in both the Caribbean and Pacific Ocean (Vidal, 1990; Trujillo & Avila, 2013), likely represented by the large form *B. edeni brydei*, which is widely distributed, including in South American waters (Pastene et al., 2015). However, because this species is so elusive (Shirihai, 2006), little is known about its habits or behaviors, particularly in areas like Colombia where no long-term monitoring programs exist. Thus, this paper provides relevant data to help overcome the prevailing information gaps about this species.

This is also the first reported interaction between humpback whales and a Bryde's whale during the humpback whale breeding season in the Colombian Pacific. This observation describes an apparently uncommon interspecies encounter between two large cetaceans. There are reports of humpback whales interacting with other cetacean species in different locations such as Brazil, Hawaii, Norway, and Puerto Rico, and in other coastal areas of the United States with odontocetes such as bottlenose dolphins, clymene dolphins (*Stenella clymene*), killer whales, melon-headed whales (*Peponocephala electra*), pantropical spotted dolphins, pilot whales (*Globicephala* sp.), and rough-toothed dolphins (*Steno bredanensis*)



**Figure 3.** Humpback whale behavior during interaction with a Bryde's whale in the Gulf of Tribugá (northern Colombia): behaviors included (a) flipper slapping, (b) tail slapping, and (c) tail slashing at surface. (Photo credit: ©Ashley Moss)

(Jefferson et al., 1991; Ciano & Jørgensen, 2000; Rossi-Santos et al., 2009; MacKay & Bacon, 2019). Thus, it is possible that more interactions between baleen whale species occur in the Gulf of Tribugá, but the lack of research or published data reflects a non-interaction scenario.

For instance, off Gorgona Island, a Colombian Pacific area with a greater marine mammal research tradition, an observation in September 1991 reported an attack by killer whales to what was identified as a humpback whale mother, escort, and calf (Flórez-González et al., 1994). This prey/predator interaction caused erratic movements, forceful exhalations, and snorting from the humpbacks (Flórez-González et al., 1994). Similar antagonistic behavior, such as slashing tail flukes at the predator, rolling, and moving their pectoral flippers and head shaking, have been observed by baleen whales when killer whales attack (Ford & Reeves, 2008). In an interaction of 50 pilot



**Figure 4.** Side-by-side swimming interaction between a large humpback whale and a Bryde's whale within the Gulf of Tribugá (Photo credit: ©Ashley Moss)

whales and a humpback, the pilot whales made a tight formation around the humpback whale; the humpback was observed side-fluking, seemingly in an attempt to disengage from the pilot whales (Ciano & Jørgensen, 2000). Rossi-Santos et al. (2009) observed another interaction between humpbacks and a northern minke whale in a breeding area off Brazil, where both were spotted side-by-side, surfacing together though not exposing their flukes while swimming. Conversely, during the encounter reported here, different behaviors were observed: the mother-calf pair changed direction rapidly and slapped their flukes. Such behavior (e.g., fluke slaps, peduncle slaps, head slaps, head lunges) has been described as antagonistic when in the presence of whale-watching boats or during swimming activities with baleen whales (Scheidat et al., 2004; Sprogis et al., 2017). Therefore, and because no boats were present, we concluded they seemed distressed by the Bryde's whale's presence, and the presence of the third humpback seemed to be a defensive and/or protective behavior or a distraction for the mother and calf to leave.

The behavior observed during this sighting showed that humpbacks have a wide variety of behaviors that they display at the surface, which makes it easier to spot them—for example, pectoral fin and tail slapping, large blows above the surface, and tails that often break the surface before diving deep. These actions may also include erratic changes of direction, forceful exhalations, and snorting—actions that have been tied to antagonistic behavior (Flórez-González et al.,

1994; Ford & Reeves, 2008; Sprogis et al., 2017). Conversely, during this observation, the Bryde's whale did not exhibit many behaviors at the surface other than breathing, which occasionally exposed the dorsal fin above the surface. Bryde's whales do not exhibit many superficial activities (Shirihai, 2006), thus they are typically much more difficult to spot. Also, they are often alone, though they may occasionally be sighted in pairs (NOAA Fisheries, 2021).

In conclusion, despite cetacean interspecific interactions being similar between some dolphin species and humpback whales along the Colombian Pacific coast and in the Gulf of Tribugá (E. Gonzáles, pers. comm., 7 July 2021; N. Botero, unpub. research, April 2010–ongoing), this is the first report of an interspecies interaction between humpback whales and a Bryde's whale in the Gulf of Tribugá, and, of particular note, the first report of a Bryde's whale in the area. Our observations highlight the need to gather more information to strengthen and understand Bryde's whale distribution, behavior, ecology, and habitat use, especially within the Gulf of Tribugá and along the Pacific Colombian coast. The community science program conducted in the area showed the relevance of including local communities to effectively monitor cetacean occurrence, particularly in developing areas where no established cetacean monitoring programs exist. This encounter and the interaction are key to strengthening the community science program in the region as a tool to broaden knowledge about cetaceans' occurrences and interspecies interactions.

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## Literature Cited

- Acevedo, J., Rasmussen, K., Félix, F., Castro, C., Llano, M., Secchi, E., Saborío, M. T., Aguayo-Lobo, A., Haase, B., Scheidat, M., Dalla Rosa, L., Olavarria, C., Forestell, P., Acuña, P., Kaufman, G., & Pastene, L. A. (2007). Migratory destinations of humpback whales from the Magellan Strait feeding ground, southeast Pacific. *Marine Mammal Science*, 23(2), 453-463. <https://doi.org/10.1111/j.1748-7692.2007.00116.x>
- Acevedo-Gutiérrez, A., DiBerardinis, A., Larkin, S., Larkin, K., & Forestell, P. (2005). Social interactions between tucuxis and bottlenose dolphins in Gandoca-Manzanillo, Costa Rica. *Latin American Journal of Aquatic Mammals*, 4, 49-54. <https://doi.org/10.5597/lajam00069>
- Avila, I. C., García, C., Palacios, D. M., & Caballero, S. (2013). Mamíferos acuáticos de la región del Pacífico colombiano [Aquatic mammals of the Colombian Pacific region]. In F. Trujillo, A. Gärtner, D. Caicedo, & M. C. Diazgranados (Eds.), *Diagnóstico del estado de conocimiento y conservación de los mamíferos acuáticos en Colombia* [Diagnosis of the state of knowledge and conservation of aquatic mammals in Colombia] (pp. 129-168). Ministerio de Ambiente and Desarrollo Sostenible, Fundación Omacha, Conservación Internacional, and WWF. 312 pp.
- Avila, I. C., Dormann, C. F., García, C., Payán, L. F., & Zorrilla, M. J. (2020). Humpback whales extend their stay in a breeding ground in the Tropical Eastern Pacific. *ICES Journal of Marine Science*, 77(1), 109-118. <https://doi.org/10.1093/icesjms/fsz251>
- Bowers, M. T., Friedlaender, A. S., Janik, V. M., Nowacek, D. P., Quick, N. J., Southall, B. L., & Read, A. J. (2018). Selective reactions to different killer whale call categories in two delphinid species. *Journal of Experimental Biology*, 221(11), jeb162479. <https://doi.org/10.1242/jeb.162479>
- Caicedo-Herrera, D., Becerra, C., Duque, L., Trujillo, F., Ortiz, E., Rosso-Londoño, M., & Mignucci, A. (2018). *Cetáceos, sirenios y tortugas: Guía de identificación para el Caribe y Pacífico Colombiano* [Cetaceans, manatees and sea turtles: Identification guide for the Caribbean and Pacific coasts of Colombia]. Fundación Omacha.
- Ciano, J. N., & Jørgensen, R. (2000). Observations on an interaction between a humpback whale (*Megaptera novaeangliae*) and pilot whales (*Globicephala melas*). *Marine Mammal Science*, 16(1), 245-248. <https://doi.org/10.1111/j.1748-7692.2000.tb00916.x>
- Clua, É., & Grosvalet, F. (2001). Mixed-species feeding aggregation of dolphins, large tunas and seabirds in the Azores. *Aquatic Living Resources*, 14(1), 11-18. [https://doi.org/10.1016/S0990-7440\(00\)01097-4](https://doi.org/10.1016/S0990-7440(00)01097-4)
- Deakos, M. H. (2002). *Humpback whale (Megaptera novaeangliae) communication: The context and potential functions of pec-slapping behavior on the Hawaiian wintering grounds* (Doctoral dissertation). University of Hawaii at Manoa.
- Deakos, M. H., Branstetter, B. K., Mazzuca, L., Fertl, D., & Mobley, J. R., Jr. (2010). Two unusual interactions between a bottlenose dolphin (*Tursiops truncatus*) and a humpback whale (*Megaptera novaeangliae*) in Hawaiian waters. *Aquatic Mammals*, 36(2), 121-128. <https://doi.org/10.1578/AM.36.2.2010.121>
- Félix, F., Acevedo, J., Aguayo-Lobo, A., Ávila, I., Botero-Acosta, N., Calderón, A., Cáceres, B., Capella, J., Carnero, R., Castro, C., Cheeseman, T., Rosa, L. D., Dellabianca, N., Denkinger, J., Friedlaender, A., Guzmán, H., Haase, B., Haro, D., Huckle-Gaete, R., Llano, M., . . . Vásquez, E. (2021). *Humpback whale breeding stock G: Updated population estimate based on photo-ID matches between breeding and feeding areas* (SC/68C/ASI/02). IWC. 17 pp.
- Flórez-González, L., Capella, J. J., & Rosenbaum, H. C. (1994). Attack of killer whales (*Orcinus orca*) on humpback whales (*Megaptera novaeangliae*) on a South American Pacific breeding ground. *Marine Mammal Science*, 10(2), 218-222. <https://doi.org/10.1111/j.1748-7692.1994.tb00264.x>
- Ford, J. K. B., & Reeves, R. R. (2008). Fight or flight: Antipredator strategies of baleen whales. *Mammal Review*, 30(1), 50-86. <https://doi.org/10.1111/j.1365-2907.2008.00118.x>
- 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(4), 151-180. <https://doi.org/10.1111/j.1365-2907.1991.tb00291.x>
- Kasamatsu, F., Matsuoka, K., & Hakamada, T. (2000). Interspecific relationships in density among the whale community in the Antarctic. *Polar Biology*, 23(7), 466-473. <https://doi.org/10.1007/s003009900107>
- Kato, H., & Perrin, W. F. (2018). Bryde's whale *Balaenoptera edeni*. In B. Würsig, J. G. M. Thewissen, & K. M. Kovacs (Eds.), *Encyclopedia of marine mammals* (3rd ed., pp. 143-145). Academic Press. <https://doi.org/10.1016/B978-0-12-804327-1.00079-0>

- MacKay, M. (2015). *Occurrence patterns and social behaviors of humpback whales (Megaptera novaeangliae) wintering off Puerto Rico, USA* (Doctoral dissertation). Texas A & M University, College Station.
- MacKay, M. M., & Bacon, C. E. (2019). Rare and antagonistic interactions between short-finned pilot whales (*Globicephala macrorhynchus*) and fasting humpback whales (*Megaptera novaeangliae*) off western Puerto Rico. *Latin American Journal of Aquatic Mammals*, 14(1), 34-40. <https://doi.org/10.5597/00252>
- May-Collado, L. J. (2010). Changes in whistle structure of two dolphin species during interspecific associations. *Ethology*, 116, 1065-1074. <https://doi.org/10.1111/j.1439-0310.2010.01828.x>
- NOAA Fisheries. (2021, July 21). *NOAA lists Gulf of Mexico Bryde's whales as endangered*. National Oceanic and Atmospheric Administration. <https://www.fisheries.noaa.gov/feature-story/noaa-lists-gulf-mexico-brydes-whales-endangered>
- Pastene, L. A., Acevedo, J., Siciliano, S., Sholl, T. G. C., de Moura, J. F., Ott, P. H., & Aguayo-Lobo, A. (2015). Population genetic structure of the South American Bryde's whale. *Revista de Biología Marina y Oceanografía*, 50(3), 453-464. <https://doi.org/10.4067/S0718-19572015000400005>
- Quérrouil, S., Silva, M. A., Cascaõ, I., Magalhães, S., Seabra, M. I., Machete, M. A., & Santos, R. S. (2008). Why do dolphins form interspecific-species associations in the Azores? *Ethology*, 114, 1183-1194. <https://doi.org/10.1111/j.1439-0310.2008.01570.x>
- Rey-Baquero, M. P., Huertas-Amaya, L. V., Seger, K. D., Botero-Acosta, N., Luna-Acosta, A., Perazio, C. E., Boyle, J. K., Rosenthal, S., & Vallejo, A. C. (2021). Understanding effects of whale-watching vessel noise on humpback whale song in the North Pacific coast of Colombia with propagation models of masking and acoustic data observations. *Frontiers in Marine Science*, 182, 623724. <https://doi.org/10.3389/fmars.2021.623724>
- Rossi-Santos, M., Santos-Neto, E., & Baracho, C. (2009). Interspecific cetacean interactions during the breeding season of humpback whale (*Megaptera novaeangliae*) on the north coast of Bahia State, Brazil. *Journal of the Marine Biological Association of the United Kingdom*, 89(5), 961-966. <https://doi.org/10.1017/S0025315409000897>
- Scheidat, M., Castro, C., Gonzalez, J., & Williams, R. (2004). Behavioural responses of humpback whales (*Megaptera novaeangliae*) to whalewatching boats near Isla de la Plata, Machalilla National Park, Ecuador. *Journal of Cetacean Research and Management*, 6(1), 63-68.
- Shirihai, H. (2006). *Whales, dolphins and seals: A field guide to the marine mammals of the world*. A. & C. Black Publishers Ltd.
- Silber, G. K. (1986). The relationship of social vocalizations to surface behavior and aggression in the Hawaiian humpback whale (*Megaptera novaeangliae*). *Canadian Journal of Zoology*, 64(10), 2075-2080. <https://doi.org/10.1139/z86-316>
- Smultea, M. A., Bacon, C. E., Lomac-MacNair, K., Visser, F., & Bredvik, J. (2014). Rare mixed-species associations between sperm whales and Risso's and northern right whale dolphins off the Southern California Bight: Kleptoparasitism and social parasitism? *Northwestern Naturalist*, 95(1), 43-49. <https://doi.org/10.1898/NWN13-11.1>
- Sprogis, K. R., Bejder, L., & Christiansen, F. (2017). *Swim-with-whale tourism trial in the Ningaloo Marine Park, Western Australia: Report to the Department of Parks and Wildlife, Western Australia*. Murdoch University.
- Trujillo, F., & Avila, I. C. (2013). Uso no letal de cetáceos: El turismo de observación de delfines y ballenas como estrategia de conservación en Colombia [Non-lethal use of cetaceans: Dolphin and whale watching tourism as a conservation strategy in Colombia]. In F. Trujillo, A. Gärtner, D. Caicedo, & M. C. Diazgranados (Eds.), *Diagnóstico del estado de conocimiento y conservación de los mamíferos acuáticos en Colombia* [Diagnosis of the state of knowledge and conservation of aquatic mammals in Colombia] (pp. 232-251). Ministerio de Ambiente and Desarrollo Sostenible, Fundación Omacha, Conservación Internacional, and WWF.
- Vidal, O. (1990). Lista de los mamíferos acuáticos de Colombia [List of aquatic mammals of Colombia]. *Informe Museo del Mar*, 37, 1-18.