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Traveling at Night: The First Record of Humpback Whales' (*Megaptera novaeangliae*) Wake Riding During the Nighttime

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Little is known about the nocturnal behavior of whales due to the difficulty of observing behavior in the dark without the aid of expensive night-vision technology. However, passive acoustic monitoring and multisensory tagging methods have increased the number of studies focused on the nocturnal behavior of whales (e.g., Izadi et al., 2018; Calambokidis et al., 2019; Caruso et al., 2020). Most of them have been performed to assess the risk of ship strikes (e.g., Calambokidis et al., 2019; Keen et al., 2019; Caruso et al., 2020).

Ship strikes have become a growing concern in many areas around the world (Van Waerebeek et al., 2007; Schoeman et al., 2020; Smith et al., 2020), and the progressive increase in fatal ship strikes on whales has coincided with the worldwide growth in shipping traffic observed since 1950 (Laist et al., 2001). Nowadays, large vessels have implemented some measures to avoid ship strikes such as reducing speed limits on ships passing through whales' habitats and rerouting shipping channels around these areas (Gende et al., 2011; Lagueux et al., 2011; McKenna et al., 2012, 2015). However, no similar technology is available to guarantee the systematic avoidance of nighttime collisions with marine mammals.

Humpback whales (*Megaptera novaeangliae*) migrate long distances between feeding and breeding grounds (Zerbini et al., 2006; De Weerdt et al., 2020). In the western South Atlantic, humpback whales feed near South Georgia and the Sandwich Islands and breed primarily over the Abrolhos Bank and in adjacent areas of Brazil (Zerbini et al., 2006; Andriolo et al., 2010; Baracho-Neto et al., 2012). Migration can be an energetically costly strategy, especially for lactating females and calves that need to allocate their energy to either lactation or growth, respectively, and these energetic costs may be increased as a result of human activities (Braithwaite et al., 2015). Considering that whales may present different strategies to reduce energy costs, the present paper aims to report, for the first time, the behavior of humpback whales while wake riding.

On 17 July 2020, we observed a group of three humpback whales traveling close to the stern of a vessel during the night in the Campos Basin off southeastern Brazil (-21.61511°, -39.81805°) in oceanic waters approximately 1,500 m deep (Figure 1). This group consisted of two adults and one calf (less than 1/3 of the adult's body size). We were aboard a 36-m supply vessel equipped with two 1,200-hp central engines and powerful stern lights, cruising at between 5 and 6 kts, when the whales were sighted following the vessel. The whales were at a distance of 10 m from the vessel. We began systematic monitoring at 0315 h using focal-group sampling (Mann, 1999). The observation continued for 1 h, during which the whales always traveled close to the vessel stern for 10 km. On a number of occasions, a blow was observed at a distance of less than 5 m from the stern (Figure 2). The vessel was heading to the north (0°), the same direction as the migration of the humpback whales during the austral winter. Humpback whales are sighted frequently off southeastern Brazil, which is part of the migratory corridor used by these whales in their transition between feeding and breeding grounds (e.g., Zerbini et al., 2006; Lodi et al., 2020).

As far as we know, this is the first record of whales following a vessel for such a prolonged

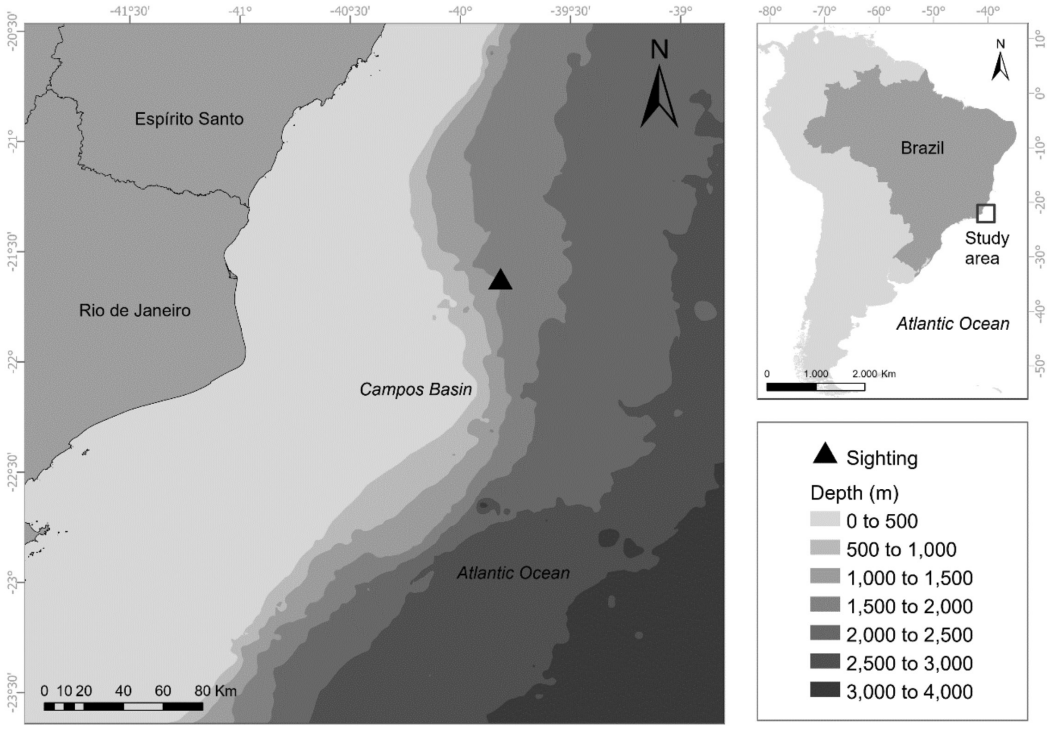

Figure 1. Sighting of the three humpback whales (*Megaptera novaeangliae*) during the nighttime in southeastern Brazil on 17 July 2020

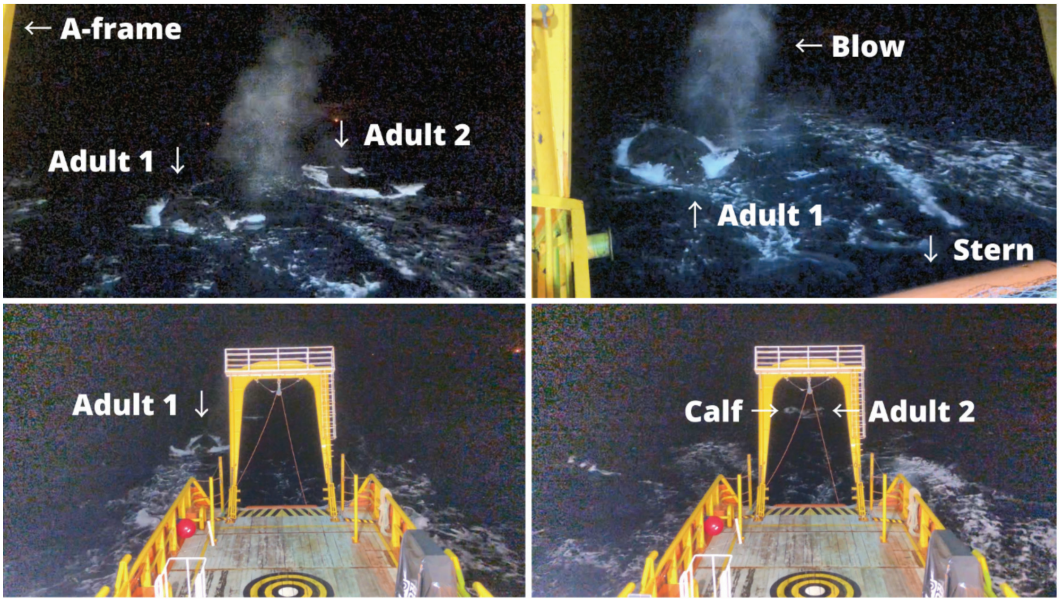

Figure 2. Photo sequence of humpback whales sighted during the nighttime in southeastern Brazil. Photos were taken from a video recorded around 0330 h on 17 July 2020.

time. Because there are no records of this type of behavior in baleen whales, we discuss herein the possible reasons. We hypothesize that these humpback whales exploited the water flow created by the vessel to save energy during the migration to their breeding grounds off eastern Brazil. As calves are likely less mobile than adults, they may "hitchhike" favorable currents and, thus, minimize energy expenditure during the seasonal migration.

Nursing the calf implies that lactating humpback whales require more energy and are, thus, more susceptible to habitat pressures (Jönsson, 1997). Lactating whales need to find alternatives to compensate their own and calves' increased energetic needs to ensure a successful migration. One of the well-known strategies is escorting. The mother–calf pair is escorted by an adult, usually a male, who provides benefits such as defense and protection from predators and other adult males (Chittleborough, 1953; Félix & Botero-Acosta, 2011; Pitman et al., 2015). Although no studies have been done for mysticetes, it has been reported for odontocetes that calves that synchronize their swimming near to their mother's body improve their average swimming speed while also reducing effort and saving energy (Noren et al., 2008; Noren & Edwards, 2011). In Australia, lactating humpback whales have been observed resting often to minimize the energy expenditure (Bejder et al., 2019). However, as whales rest near the surface, this behavior increases the risk of ship strikes (Bejder et al., 2019). In this context, wake riding may not only be an alternative strategy to save energy, but also to spend less time resting.

Our results support the need to better understand the nocturnal behavior of humpback whales to develop effective measures to mitigate the risk of ship strikes, especially during their annual migration, a critical period of the whales' life cycle.

Note: A supplemental video for this paper is available in the "Supplemental Material" section of the Aquatic Mammals website: https://www.aquaticmammalsjournal.org/index.php?option=com_content&view=article&id=10&Itemid=147.

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