Ship strikes with humpback whales in Brazil.

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Abstract

Growing worldwide navigation since the 20th century has led to an increase in collisions and to behavior disturbances on cetaceans. The annual growth rate of the humpback whale population in Brazil was estimated to be 6.74% between 2001 and 2008. Recently, commercial ship traffic has also increased due to new investments in port infrastructure throughout the states of Bahia and Espirito Santo, where the species concentrates for breeding and calving. We report here three well-documented ship strikes with humpback whales in this specific breeding ground from 1999 to 2005. These records do not represent a complete review of collisions with the species in the region but highlight the need of evaluating the significance of ship strike impacts on this whale population during its recovery stage.

Introduction

Cetaceans have to coexist with a series of human activities that have the potential to impact individuals, populations or even entire species. One of these activities is ship traffic.

Vessels can be responsible for two kinds of impacts: behavior changes and ship strikes. Behavior changes are caused mainly by engine noise (BAUER & HERMAN, 1986; NORRIS, 1994; RICHARDSON *et al*., 1995). These behavior changes can be discrete and of difficult detection; ship strikes, on the other hand, may leave physical evidence on the animal.

Vessel collisions are of great concern to some marine mammal populations such as Manatees (*Trichechus manatus*) in Florida and North Atlantic Right whales (*Eubalaena glacialis*). Ship strike is the main cause of mortality to these two populations (ACKERMAN *et al.*, 1995; KRAUS *et al.* 2005; WARD-GEIGER *et al.* 2005).

Collisions between whales and vessels occur generally in coastal waters on feeding or breeding concentrations. Fin (*Balaenoptera physalus*), right (*Eubalaena australis* and *E. glacialis*), humpback (*Megaptera novaeangliae*), sperm (*Physeter macrocephalus*) and gray whales (*Eschrictius robustus*) are the species more frequently affected (LAIST et al. 2001).

LAIST *et. al*. (2001) found records of whale ship strikes since the 19th century, but noted an increase since the second half of the 20th century, probably due to the increasing speed of ships.

The first record of such a ship strike in Brazil was perhaps a narration by Joshua Slocum, the first sailor to make a trip around the world alone. In July of 1888 his 35 feet sailboat "Liberdade" was anchored close to Cabo Frio, in the eastern coast of Brazil, when a whale collided against it. According to Slocum the whale was 50 to 60 feet long and after the collision remained near the Liberdade for some time. The boat lost his anchor and received minimum damages to the keel (SLOCUM, 2005).

In the Abrolhos Bank, the main breeding area of humpback whales in Brazil, anecdotal narrations very similar to Slocum's story are commonly heard from artisanal fishermen. Most of these cases involve small boats 6-7 meters long and there are no evidences to prove the veracity of the collisions.

Any kind of vessel can potentially strike whales but the most serious lesions or deadly cases occur with large ships (80 meters or more) traveling at speeds of 14 knots or higher (LAIST *et al.* 2001).

GERRY (2006) listed at least three risk factors involved in ship strikes with whales: the density of whales and ship traffic in an area; the ability of whales and humans to detect each other; and the ability of whales or ship operators to avoid the collision.

This study reports three cases of ship strikes with whales in Brazil and the risk of increase in this kind of occurrence faced by the recovering humpback whale population along the Brazilian coast.

Records

Three cases were well documented and involved a live humpback whale calf with signs of ship strike in the Abrolhos Bank, a humpback whale carcass with signs of collision in Caravelas and a report by a passenger of a collision between a whale and a catamaran close to Itaparica Island (figure 1).

Case 1.

On August 23rd 1999 a humpback whale calf and his mother were observed by a scientist in the vicinities of Parcel das Paredes (17º 54' S; 039º 02'W), a reef barrier with shallow water (20 meters). The calf had some wounds near the dorsal fin and tail.

On August 26th a research boat from the Humpback Whale Institute found the female and calf in the same area (17º 49' S ; 039º 03' W) approximately 8.8 nautical miles offshore in waters 16 meters deep. The group was observed more closely and the calf was noted to have two deep wounds on both ends of the dorsal fin (figure 2). A third wound with regular borders cut off half of the left lobe of the caudal fluke (figure 3). The calf's wounds appeared to be recent and were consistent with lesions caused by propellers. The female didn't show any lesions.

They were observed for nearly 30 minutes. The female exhibited tail-up behavior (see MORETE *et al*., 2003 for a description of this behavior) and photographs of the caudal fluke were taken for photo identification. The calf breached and tail slapped several times.

Female and calf stayed in the same area for at least two weeks and were observed by many tourist boats during this period. After that they were observed on September 21st close to the Abrolhos Archipelago, approximately 28 nautical miles from the first place. They were monitored by research staff from a land station (17º 57S; 038º 42'W) for two days. In this occasion female and calf were escorted by another whale. The calf performed some breaches and tail slaps. After that they were not seen again.

Case 2

On August 04th 2004 a humpback whale carcass stranded on the Caravelas riverside (17º 45'S; 039º 12'W). It was a male over 13 meters long in advanced state of decomposition. The animal was necropsied by Humpback Whale Institute staff (record number 05C0211/164). The bones were recovered and showed five consecutive ribs

with lesions on the left side. The ribs all presented protuberant bone excrescences in the upper third forming a line. These findings were consistent with a fracture line in healing process. According to LAIST *et. al.* (2001) only a ship strike can break the bones of a whale.

Case 3

On July 31st 2005 a catamaran that does a regular line between Morro de São Paulo and Salvador, north state of Bahia, left Morro de São Paulo at 11:40 a.m. with approximately 50 passengers onboard. According to one passenger report (Tuma *pers. comm.*), the waves were high and strong and the catamaran navigated at 50 Km/h. Fifty minutes into the journey, near Itaparica Island, the boat suffered a strong impact that thrust some of the passengers forward. When they looked back in the wash of the boat they saw a whale breathing with a great bloody spot over a white area (possibly the blubber). The catamaran was slowed down by the collision but didn't stop and resumed the journey while the whale was no longer observed.

After some time the captain had to stop the boat and discovered some damage on the engine and on the right hull, which was causing the boat to capsize. The passengers were instructed to wear life jackets and stay on the left side of the boat. Help was requested by radio and another boat came to transport the passengers to port. The Brazilian Navy investigated the accident. The author of the report informed he suffered a small cut on the leg when the collision occurred.

Since there are no photographic records of this animal it is impossible to affirm the species, however, it's very probable that this animal was a humpback whale. The area where the collision occurred has been monitored for over seven years by researchers of the Humpback Whale Institute and is an important breeding ground for humpback whales (ROSSI-SANTOS *et. al.*; 2008).

Discussion

The three cases reported here are probably underestimations of the problem of ship strikes in Brazilian waters. In fact, at least a fourth event has also occurred in the area. In this case, a calf stranded in Itaparica Island, presenting two deep parallel wounds on the peduncle and partial mutilation of the fluke, possibly caused by watercraft propellers (Santos Neto *et al*. 2007), but the authors suggest that collision probably occurred after the animal´s death.

Recently, commercial ship traffic in Brazil has increased due to new investments in port infrastructure along the whole coast, and there is increasing concern regarding its impacts on the states of Bahia and Espirito Santo, where the humpback whales concentrate for breeding and calving. The annual growth rate of the humpback whale population in Brazil was estimated to be 6.74% between 2001 and 2008 (see WEDEKIN *et. al*. SC/61/SH12 at this meeting). These two factors make the possibility of ship strikes ever more present in this population.

The Abrolhos Bank is considered a biodiversity hotspot in Brazilian waters due to the richness and endemism of the flora and fauna (Ministry of the Environment/Brazil 2002). These special characteristics have led to legal restrictions to anthropogenic impacts in recent years (Engel *et al*. 2004). Since 2002, the navigation of barges for eucalyptus transportation was initiated in the area, observing specific rules to avoid collisions and behavior disturbances. Studies were conducted to determine the areas of lower density of whales in the Bank, supporting the establishment of the navigation route for the barges (Paper SC/56/SH10), in order to warrant avoidance of

the higher concentrations of animals. The presence of whales in the barges' route has been monitored in the last three years to produce a risk analyses and propose regulations.

However, there is still intense traffic on the Southern portion of the bank due to the presence of ports in Barra do Riacho, Vitória and Rio de Janeiro. In the near future, specific rules must be established by the Brazilian Environmental Agency (IBAMA) and the Brazilian Navy, taking in consideration cetacean occurrences in the establishment of commercial navigation routes. The ship strikes reported in this study do not represent a complete review of collisions with the species in the region but highlight the need of evaluating the significance of ship strike impacts on the humpback whale population during its recovery stage.

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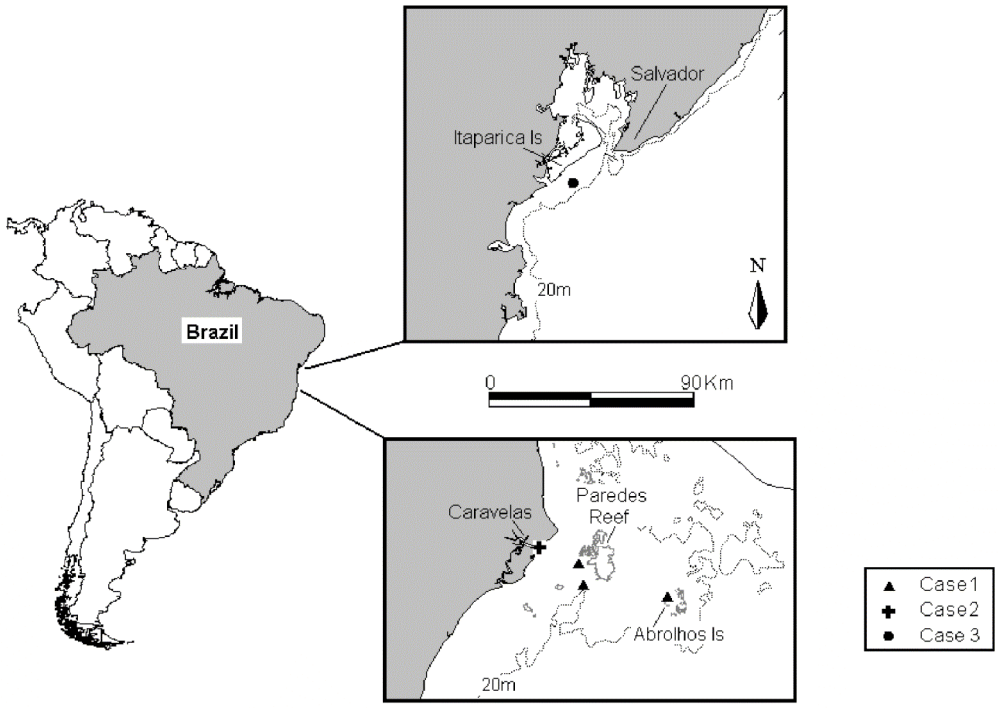

Figure 1. Location of the occurrences.

Figure 2. Humpback whale calf with two wounds near the dorsal fin (Case 1).

Figure 3. Humpback whale calf with partial loss of fluke (Case 1).