

Mass Stranding of Short-beaked common dolphins, *Delphinus delphis*, at Arraial do Cabo, Brazil: Natural or Human Induced?

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Introduction

Mass strandings of short-beaked common dolphins (*Delphinus delphis*) are not very common. About fifty years ago, Van Heel (1962) conducted a worldwide review of all known mass stranding events for small cetaceans; he found only three MSE for the common dolphin and they were all from the British coast. Over the past twenty years, MSEs of this species have been reported from various locations around the world, although MSE for this species are still considered rare events. The best studied cases are the following: (1) in February 2002 about 100 dolphins mass stranded at Pleubian, France in the English Channel (Viricel *et al.* 2008), (2) 11 dolphins mass stranded in Hauraki Gulf, New Zealand (Stockin 2008), and (3) 9 June 2008, about 40-60 dolphins mass stranded in Cornwall, England (Jepson *et al.* 2013).

Here, we report on a mass stranding of short-beaked common dolphins from Arraial do Cabo, eastern Rio de Janeiro state, Brazil in March 2012.

Materials

We examined a video (see <http://www.youtube.com/watch?v=ekmMD8oYtJ0>) of the MSE on YouTube. No dead dolphins were recovered or reported from the region where the MSE occurred.

Results

About 20-30 short-beaked common dolphins mass stranded at about 08:00 on 5 March 2012 on a sandy beach at Arraial do Cabo, (Fig. 1) on the southeastern end of Cabo Frio, Rio de Janeiro State, Brazil (22°57'56" S, 42°01'80" W). In the video, the school of *Delphinus* can be seen swimming straight into the beach. As soon as the dolphins were on the beach, tourists started to return the animals back to the sea. It is assumed that all dolphins were successfully returned to the water as no dead *Delphinus* were found or reported from the area after the MSE, nor were any dead *Delphinus* reported dead in the Cabo Frio region in the weeks following the MSE.

Delphinus strandings are not common in this region. Between 1 December 2000 and 4 March 2012 we have records of only ten single strandings of *Delphinus* sp. in the eastern and northern

coasts of Rio de Janeiro state (GEMM-Lagos database). These 10 *Delphinus* represent only 3% of the total cetacean strandings in the database during the same time period.

Disturbance from marine noise

There were no acoustic recordings at the time of this MSE to determine if any anthropogenic sounds were in the general vicinity of this stranding. At the time of the MSE there were seismic surveys occurring some 40 to 50 km offshore from the stranding site. Around the time of the MSE there were no major earthquakes recorded in or offshore of Brazil (USGS:http://earthquake.usgs.gov/earthquakes/world/historical_country.php#brazil). There was also some port construction in Porto do Forno in Enseada da Prainha, but this location is in the bay next to the one where the MSE occurred (Fig. 2).

Disturbance from other cetaceans

Killer whales are known to cause some species of small cetaceans to mass strand, but no killer whales were observed the day of the MSE. Some killer whales were in the region about a week before this MSE.

Geographical and other factors

The MSE was on a sandy beach with no rocks and assumed to have no large drop off because it is a major tourist beach in the region. The full moon was on the 8 March 2012 three days after the MSE. The tide was low at the time of the stranding.

Discussion

No dead *Delphinus* was found in the days and weeks of the MSE in the Cabo Frio region. Therefore, it appears that this MSE did not result in any known mortality.

Was this MSE natural or human-induced?

At the time of the Arraial MSE there were some seismic surveys occurring some 40 to 50 km offshore from the stranding site. In that seismic surveys are so common now in the world's oceans and the lack of any link to these activities and MSEs of cetaceans, we believe the Arraial MSE was not caused by these surveys. Also it was foggy in the early hours of the day of the MSE and some vessels in the area were using their fog horns, but this aerial sound is not likely to have caused the dolphin to mass strand.

Details on the behavior of small cetacean about to strand or one that mass strand are the case of a near MSE of melon-headed whales (*Peponocephala electra*) in Hawaii in 2004 and a MSE of common dolphin MSE in Cornwall, UK in 2008. The melon-headed whale case a near-MSE that most likely resulted from mid-frequency sonar use during a naval activities. A group of melon-headed whales which are normally pelagic animals, rapidly entered a shallow bay in Hawaii approximately 15 minutes after several naval vessels began to use mid-frequency sonar. Once in

the bay, the MHWs exhibited an unusual pre-stranding behavior called “milling”, and refused to leave, even after the sonar was turned off, until humans finally herded them out of bay the next day (Southall *et al* 2006, Brownell *et al.*, 2009).

The common dolphin MSE case in the UK was also probably due to military activities. About 50 common dolphins were milling around offshore of Cornwall, UK MSE in June 2008 after a large scale international naval exercise which included the use of mid-frequency sonars. Four days after the end of this event, a second event, such as noise from naval helicopters, may have caused a panic response leading to the actual MSE (Jepson *et al.* 2013).

Hubbs (1966) provided a detailed the account of a 1962 MSE of pilot whales that occurred when the US Navy was shelling San Clemente Island off southern California. A man on the island watched the pilot whales swim “in an absolutely straight line to the little cove directly below [him], where approximately twenty piled up on the beach without turning around; they came in from very deep water onto a shore that was not shelving at all”. Therefore, it appears that the practice shelling caused the pilot whales to stampede [panic].

We, therefore, propose that these pelagic dolphins were likely acoustically trapped or restricted by some sound of the mouth of Enseada da Prainha. The actual MSE was most probably induced by some additional acoustic event which caused them to panic/stampede and swim toward the beach and strand.

Recommendations for Future MSEs in Brazil

1. Gather as much data about the stranding ASAP; include any video of the event, including the geography of the area where the MSE occurred.
2. Gather as much data as possible about any human-related acoustic activities around the time of the MSE, including seismic surveys, hydroacoustic surveys [like bottom mapping], vessels moving back and forth for any reason in the area of the MSE and aerial traffic like helicopters

Acknowledgements

S. Siciliano was supported by a FIOCRUZ/CNPq fellowship.

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Figure 1. Tourists on the beach at Arraial do Cabo, Cabo Frio, Brazil on 5 March 2012 returning the stranded short-beaked common dolphins (*Delphinus delphis*) to deeper water.

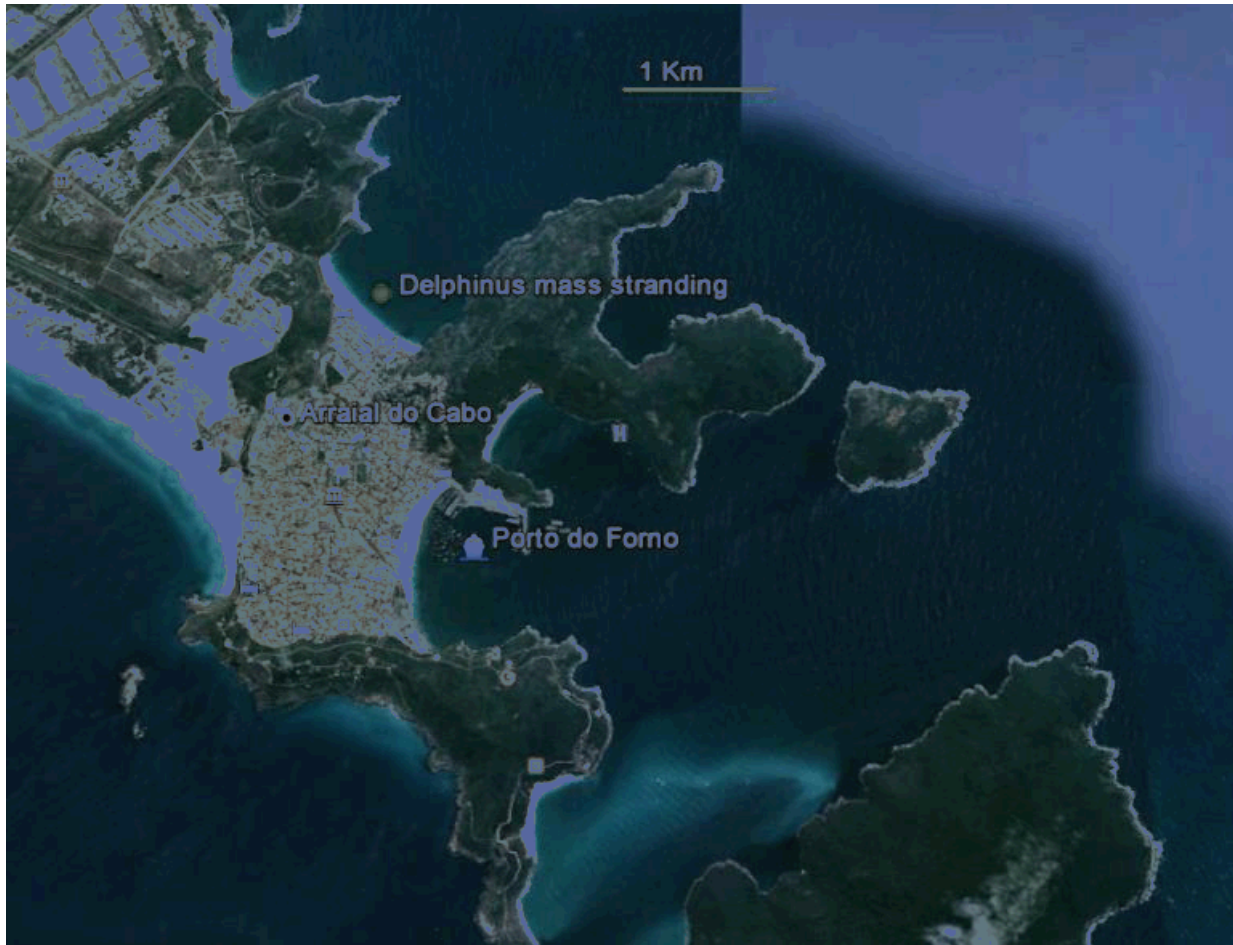


Figure 2. A mass stranding of short-beaked common dolphins (*Delphinus delphis*) occurred at about 08:00 on 5 March 2012 on a sandy beach at Arraial do Cabo, Cabo Frio, Rio de Janeiro State, Brazil (22°57'56" S, 42°01'80" W).