Collisions between ships and cetaceans in Spain.

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Collisions between ships and marine mammals have been reported all over the world, and can be one of the major treats for several species. In Spain, two places have been located where collisions are taking place, the Strait of Gibraltar and the Canary Islands. In the Strait of Gibraltar, due to the high maritime traffic, with more than 90.000 ships crossing the Strait in the line north-South, or East-West, collisions have been reported with sperm whales and fin whales. At the end of 2007, a new commercial harbour will start to work in the north of Morocco, just in the middle of the Strait. The ferries, and fast ferries route will change and will cross the main feeding grounds for sperm whales in the Strait. Due to this new harbour the presence of sperm whales could be affected. In the Canary Islands, this problem started in the 1995, with the apparition of jet foils linking the islands. In the 1999, big fast ferries started to operate, replacing the jet foils in some Islands. Collisions with sperm whales, pigmy killer whale, and common beaked whale, have been reported since then. The data of collisions of the two areas, and their relation with the maritime traffic routes will be shown. Mitigation measures raised will be also presented.

Introduction

Collisions between ships and marine mammals have been reported all over the world, and can be one of the major treats for several species. In Spain, two places (Figure 1) have been located where collisions are taking place, the Strait of Gibraltar and the Canary Islands. In this document we will present the problematic existing in Spain, firstly we will describe the situation in the Strait of Gibraltar, secondly, the situation in the Canary Islands.

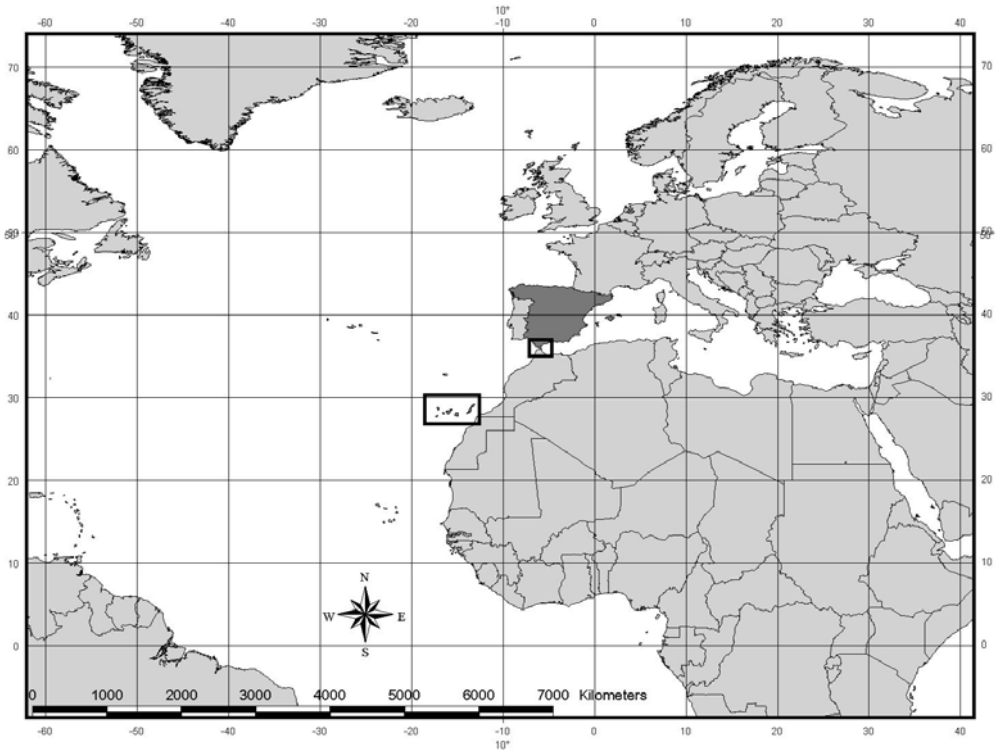

Figure 1. Study area, the Canary Islands and the Strait of Gibraltar

The case of the Strait of Gibraltar

The maritime traffic

The Strait of Gibraltar is a place transited by a large number of ferries and fast ferries on the North-South axe, and cargos on the East-West axe with a traffic estimated at 91 009 vessels, 29825 being ferries or fast ferries, and crossing the Strait in the axe North-South, and 61184, being cargos, tankers or supertankers, and crossing the Strait in the axe East-West, in 2004 according to the data of the Maritime Rescue Records of Tarifa (Spain). These data makes the Strait of Gibraltar the second natural navigation channel most transited in the world after the English Channel. The evolution between 2000 and 2005 has been important with new passenger lines opening between Tangier and Algeciras and Tangier and Tarifa. The number of companies almost doubled, passing from 5 to 9 and the total number of passenger boat has also increased from 9 to 20 boats.

The fact that the Strait of Gibraltar is a place highly transited by passenger and commercial boats, as shown before, on the North-South and East-West axes, is an important factor to take into consideration for the conservation of the cetacean communities of the Strait of Gibraltar. A new harbour under construction on the North of Morocco is predicted to absorb all of the passenger traffic that currently exists between the North of Africa and South of the Iberian Peninsula, which is presently from Algeciras and Tarifa. It is also highly probable that it will absorb part of the traffic that currently exist between Ceuta and Algeciras, which will produce a high increase in terms of ferries and fast ferries in the centre of the Strait of Gibraltar. Therefore the new harbour is expected to have an important increase of number of commercial boats that currently arrived in Tanger (Figure 2 and 3).

Cetaceans and maritime traffic

The species described as resident all the year in the Strait of Gibraltar are the common dolphin (*Delphinus delphis*), the striped dolphins (*Stenella coeruleoalba*), the bottlenose dolphin (*tursiops truncatus*), with an abundance of 263 CV:0.08 (95% CI:231-319), the long finned pilot whale (*Globicephala melas*) with and abundance of 258 CV: 0.09 (95% CI: 227-317), Killer whales (*Orcinus orca*), with 32 indiviuals identified, and sperm whales (*Physeter macrocephalus*), with 22 individuals identified, have been described as partially resident in the Strait, during the Spring and summer (Cañadas et al 2005, de Stephanis 2004, de Stephanis et al 2005). Fin whales (*Balaenoptera physalus*) have been seen migrating throughout the Strait during the months of May-June to the Atlantic, and during December-January to the Mediterranean. (De Stephanis et al 2001).

In the figure 2, the distribution of the sperm whales, probably the more susceptible species to have interactions with the maritime traffic has been plotted together with the maritime routes.

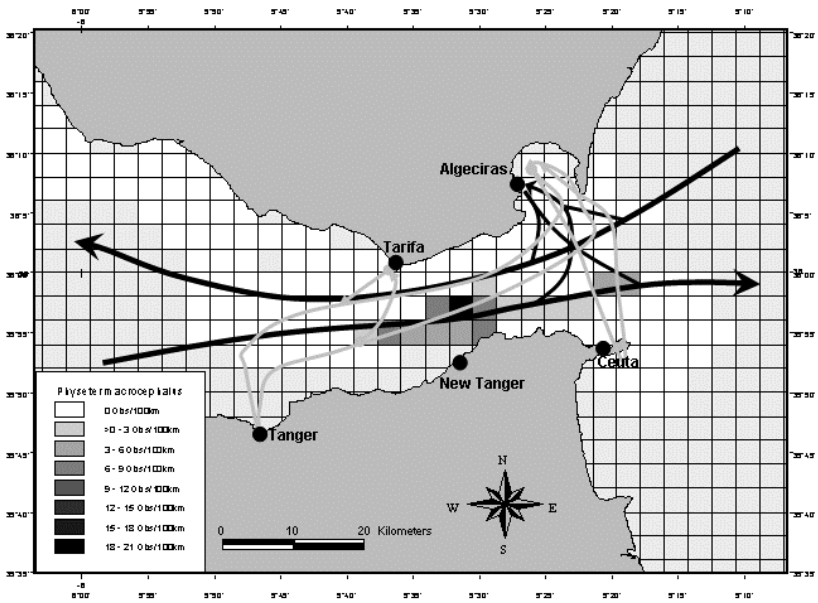

Figure 2. Distribution of sperm whales between 2001 and 2004 (number of sightings per 100 km of effort in each quadrate), in the Strait of Gibraltar and actual maritime lines. In Black, the cargo and tanker traffic, in grey the ferries and fast ferries traffic.

Collisions in the Strait of Gibraltar

A total of 5 collisions have been recorded in the Strait of Gibraltar. En the table 1, those collisions are recorded. Two species seems to be related to those collisions, the Sperm whales and the Fin whales.

Year	Species	Area
2001	*Physeter macrocephalus*	Strait of Gibraltar
2002	*Physeter macrocephalus*	Strait of Gibraltar
2002	*Balaenoptera physalus*	Strait of Gibraltar
2004	*Globicephala melas*	Strait of Gibraltar
2004	*Balaenoptera physalus*	Gulf of Cadiz (Probably coming from Gibraltar)

Table 1. Collisions recorded in the Strait of Gibraltar between 2001 and 2005

A new harbour in the Strait of Gibraltar

At the end of 2007, a new commercial harbour will start to work in the north of Morocco (Figure 3). The new harbour will close the harbour of Tanger. The new ferries and fast ferries lines will then cross directly the feeding grounds for Sperm whales.

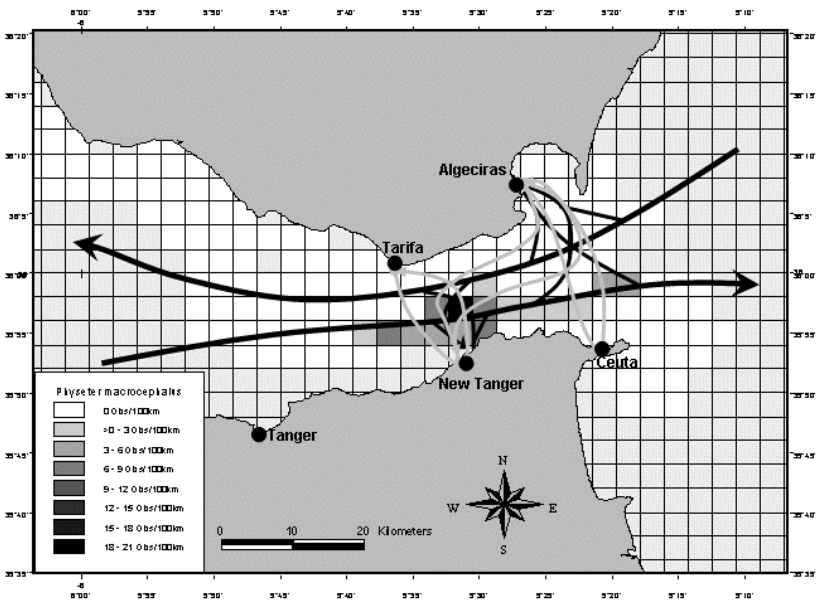

Figure 3. Distribution of sperm whales between 2001 and 2004 (number of sightings per 100 km of effort in each quadrate), in the Strait of Gibraltar and maritime lines after the construction of the new harbour. In Black, the cargo and tanker traffic, in grey the ferries and fast ferries traffic.

The case of the Canary Islands

Cetaceans and maritime traffic

The cetaceans are a natural resource in the Canary Islands, as it is highlighted by the presence of more than 35 whale watching boats in the Islands, and about 500.000 whale watching tourists every year in the Canaries (Spanish Cetacean Society SEC 2005), but since 1998, the natural resource could be endangered due to the collisions existing in the Archipelago. During the summer of 1999, the fast ferries started to operate between the

Islands, and collisions started to be more common. In the canaries, 27 species have been described. The collisions seems to affect mostly the Sperm whales, (with 15 standings with signs of collisions), Pigmy sperm whales (6 strandings with marks of collisions), and finally Cuvier beaked whale, with 4 strandings

Collisions in the Canaries Islands:

A total of 37 strandings with signal compatible with collisions lesions have been recorded in the Canaries. In the table 2 and figure 4, those collisions are recorded. In the first part of the table, 7 collisions were recorded before the presence of fast ferries, and in the second part of the table, 30 collisions are recorded, after the fast ferries started to operate between the islands.

Year	Species	Area (Island)
	Before Fast ferries	
1985	*Physeter macrocephalus*	Gran Canaria
1991	*Physeter macrocephalus*	Tenerife
1992	*Globicephala macrorhynchus*	Tenerife
	Ziphius cavirostris	Tenerife
1995	*Physeter macrocephalus*	Tenerife
1996	*Physeter macrocephalus*	Gran Canaria
	Physeter macrocephalus	Gran Canaria
	After Fast ferries	
1999	*Physeter macrocephalus*	Tenerife
	Physeter macrocephalus	Tenerife
	Physeter macrocephalus	Tenerife
2000	*Physeter macrocephalus*	Gomera
	Ziphius cavirostris	Tenerife
	Physeter macrocephalus	Tenerife
2001	*Physeter macrocephalus*	Tenerife
	Physeter macrocephalus	Tenerife
	Physeter macrocephalus	Tenerife
2002	*Kogia breviceps*	Tenerife
	Physeter macrocephalus	Gran Canaria
	Globicephala macrorhynchus	Tenerife
	Ziphius cavirostris	Tenerife
2003	*Kogia breviceps*	Tenerife
	Kogia breviceps	Tenerife
	Kogia breviceps	La Palma
	Physeter macrocephalus	Tenerife
	Physeter macrocephalus	Hierro
	Mesoplodon europaeus	Tenerife
2004	*Ziphius cavirostris*	Tenerife
	Kogia breviceps	Tenerife
	Physeter macrocephalus	Gomera
	Physeter macrocephalus	Tenerife
	Ziphius cavirostris	Tenerife
2005	*Balaenoptera physalus*	Fuerteventura
	Physeter macrocephalus	Tenerife
	Physeter macrocephalus	Fuerteventura
	Balaenopteridae	Gomera
	Globicephala macrorhynchus	Tenerife
	Kogia breviceps	Gran Canaria

Table 2. Collisions recorded in the Canary Islands between 1985 and 2005

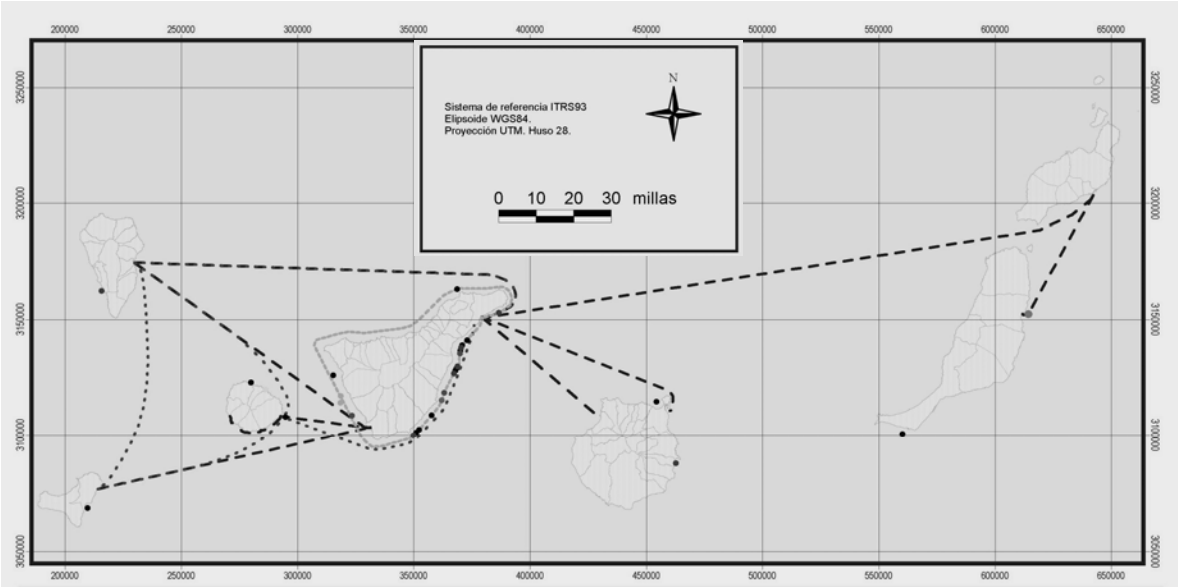

Figure 4. Distribution of collisions and ferries and fast ferries lines in the Canary Islands between 1999-2005.

Mitigation measures in the Canaries Islands:

After a collision between a jet foil and a sperm whale in 1999, a passenger died. After that event, the company installed a "Whale detector apparatus", developed by Kawasaki Inc, and some observers onboard. Research on the distribution of Sperm whales in the area and all the sightings of cetaceans has been reported to the "Consejería de Medio Ambiente de las Islas Canarias", until the jet foil stopped working in 2005. After the use of the "Whale Detector Apparatus", no collision was recorded between the jet foils and cetaceans.

Nevertheless, after the fast ferries started to connect the islands, stranding of animals with marks of collisions started to go up. Those fast ferries don't use the Whale Detector Apparatus, used by the Jet foils, and their manoeuvrability is lower.

Three mitigation measures have been discussed with the companies:

- Reduce the speed
- Modification of the routes
- Develop a new "Whale Detector Apparatus" that could be installed in the fat ferries.

The first measure is not applicable, as the speed should only be reduced in a few knots, and this couldn't give a solution to the collisions. The communication between the islands is an issue in the archipelago. Modify the routes would be accepted, but in a low area. In fact, one of the new routes between two islands has been modified, and now doesn't cross the main area for short finned pilot whales at the west of Tenerife, but it is impossible to do it in the rest of the islands, as the distribution of cetaceans is extended all around the archipelago. The third option is probably the best option, but after the test of different options none is definitive.

Conclusions

Strait of Gibraltar:

Between 2001 and 2005 new fast ferry lines opened between Algeciras and Tangier and Tarifa and Tangier and it was demonstrated that collisions are reality. Therefore, it could be concluded that the opening of new lines and the congestion of the central part of the Strait will be faced with, will be dramatic for the sperm whale population and could put it in danger of extinction. When the high speed vessels will start transiting in this new area and due to the low manoeuvrability that exist in the area, it could increase the risk of collisions which would be harmful for the animal and for the ships transiting in the area leaving the animal drifting below the surface and therefore creating a danger for navigation. Furthermore, this area is a feeding area for most of the different species inhabiting the Strait and intensely transited also by whale watching boats, especially during summer. The presence of boats could also increase the level of stress to which the different cetacean population of the Strait are already exposed.

Canary Islands:

The Canary Islands are a hot spot for cetaceans. It is an archipelago that lives from its natural resources, like the tourism, and the archipelago needs to arrange development with conservation. The maritime traffic is essential in the Islands, and the cetaceans are protected. Between the option to implement mitigation measures, the development of a technology that detect cetaceans in front of the boats is probably the more suitable, but this option need the international cooperation and there is also a need to promote research in this aspect. Another option is to reduce the speed, and to change the courses, but this option is not realistic in the canaries. Observers on board are accepted, but it is a secondary option.

In any case, the cetaceans population doesn't seems to change their distribution range because of the fast ferries, neither the whale watching activities in the area. What is really important is to monitor periodically the area to detect possible trends in the abundance and distribution of the cetacean populations, and then detect possible impacts of those activities.

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