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Towards ship strike mitigation in the Canary Islands

Fabian Ritter, Natacha Aguilar de Soto and Vidal Martín

INTERNATIONAL WHALING COMMISSION

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Fabian Ritter[1], Natacha Aguilar de Soto[2], Vidal Martín[3]

[1] M.E.E.R., Bundesallee 123, D-12161 Berlin, Germany
[2] BIOECOMAC, University of La Laguna, Tenerife, Canary Islands, Spain
[3] SECAC, Apartado de Correos 49, 35500 Arrecife de Lanzarote, Canary Islands, Spain

Introduction

The Canary Island archipelago lies off West Africa and belongs to Spain. Besides attracting millions of tourists every year, they also are home for an extraordinary species diversity: 30 cetacean species have been documented here, i.e. more than a third of all existing species. Many of these are residents, others appear frequently, seasonally or more sporadically in the deep water around the islands.
At the same time, the Canary Islands have been identified as a hot spot for vessel-whale collisions (Aguilar de Soto et al, 2002; De Stephanis & Urquiola; 2006; Carrillo & Ritter, 2010; Cates *et al.,* 2017). The reason is the strong overlap between cetacean habitats and an intense marine traffic (international, inter-island large vessels and small-medium sized vessels). Today, fast and high-speed ferries are connecting the islands with each other almost exclusively, posing a significant threat to cetaceans in the area. A recent accumulation in strandings of cetacean with lesions typical for ship strikes has led to an increase in public interest as well as efforts from the Spanish and Canary Islands officials to tackle the issue. Only recently, and as a consequence of the latest ship strike cases which received a lot of public attention, demonstrations, authorities from the Canary Island and the national Spanish Government joined efforts to revive the interchange of knowledge and scientific data as well as to invite opinion on recommended actions. This process is ongoing and this paper is meant to support these current efforts.

The Problem

Very dense ferry traffic

In 1999, fast ferries (travel speed 20- 25 knots or 40-45 km/h) and high-speed ferries (travel speed around 35 knots/70 km/h) were introduced and successively replaced almost all regular inter-island ferries. The first strike that gained public attention was an accident of a small fast hydrofoil that collided with a sperm whale and this caused lethal and sublethal injuries to passengers. Other reported strikes of sperm whales before 1999 involved traditional ferries, but the number of strandings with large cuts increased in 1999 coinciding with the start of functioning of fast ferries (Aguilar de Soto *et al*., 2002; Carrillo & Ritter, 2010)
The steady increase of fast and high-speed ferries did not cease until today. There are different types of ferries in the Canary Islands, including small passenger high-speed ferries (mostly catamarans travelling around 20-35 knots, large mono-hull fast ferries for up to 1200 persons and 300 cars, with a maximum speed of 25 knots and large multihull high-speed ferries (maximum speed 40 knots). The latter include various catamaran ferries as well as the largest trimaran ferry in the world (length: 142 m, capacity ca. 1,800 persons and 300 cars). The catamarans are so called wave piercer, because they cut through the waves, as opposed to displacing vessels.
Figure 1 represents all ferry transects within the Canaries in 2007. That study (Ritter, 2010) showed that about 29,000 ferry transects were travelled between the Canary Islands in that

year, and these covered a total of almost 1.5 Million kilometers. Almost all of these transects were operated by either fast or high-speed ferries. The number of animals dying due to a collision with ferries is high. Officially, 54 whales and dolphins had been killed by ships until 2008. One study found that 11% of a total of 556 stranded animals in the Canary Islands showed injuries caused by ship strikes – resulting in a total 59 cases (Carrillo & Ritter, 2010). More recent studies have shown that the relative number of cetaceans struck by vessels has increased during the past years (Arbelo *et al*., 2013, Díaz-Delgado *et al*., 2018). There is a common trend in these numbers: a strong increase has been observed after fast moving ferries started operating in the Canaries in 1999 (Aguilar de Soto *et al*., 2002). All numbers are solely based on animals found washed ashore, as there is currently no obligation to report strikes, and consequently there have been no direct reports by the two existing ferry operators to date.

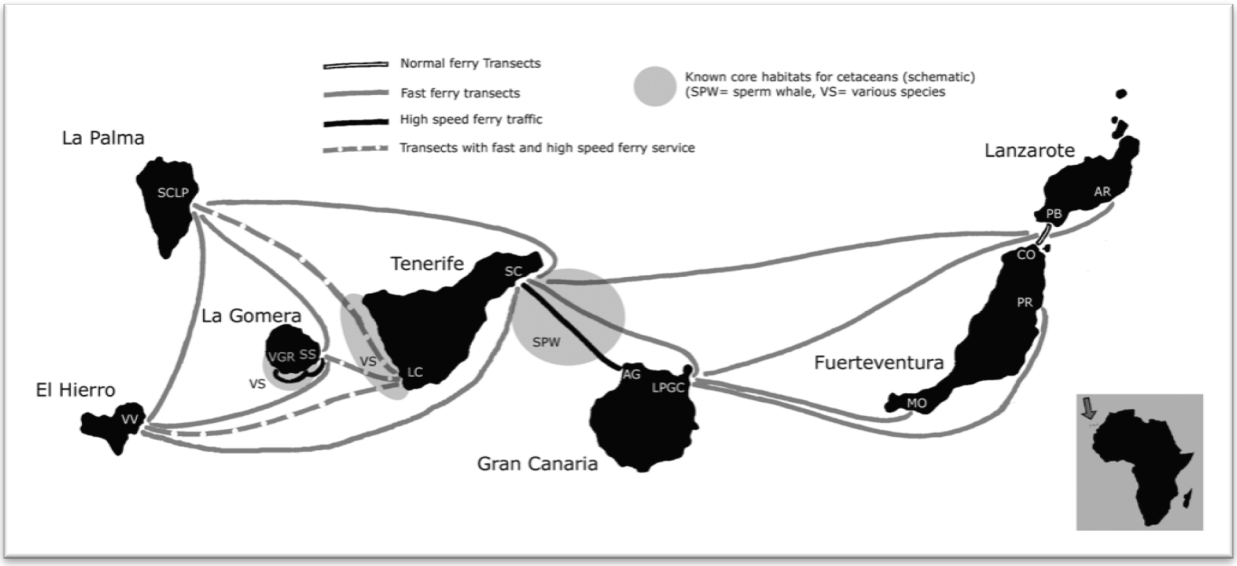

Figure 1: Ferry transects of inter-island traffic in the Canary Islands (as of 2007); taken from Ritter, 2010.

Species affected

The species mostly affected is the sperm whale, a resident species in the archipelago (see Figure 2). The majority of cetaceans killed by ships were sperm whales, most of them being females, juveniles or calves (Arbelo *et al*., 2013; Carrillo & Ritter, 2010; Díaz-Delgado *et al*., 2018). Pygmy sperm whales where hit regularly, too, and also a number of other species including baleen whales, beaked whales, pilot whales and others. There were numerous cases with sperm whales missing large body parts, including incidents where only sperm whale heads were found. Investigations by the veterinary faculty of the University of Las Palmas (Gran Canaria) with newly developed methods proved that most specimen investigated were hit when still alive. Evidence for a significant effect on the sperm whales occupying the archipelago came along with a study by the University of La Laguna (Fais *et al*., 2016) reporting a best estimate of population abundance of sperm whales of 224 individuals (95% log-normal CI 120–418) within the waters surrounding the Canary Islands. These authors proposed that given this estimate and the published recruitment rate of the species, a number of two sperm whales killed by vessels each year might have population-level effects, or, in case of high connectivity, that the Canary Islands might be functioning as a sink habitat for sperm whales within the Macaronesian region.

Unknown dark number

Until today it remains unclear how many cetaceans are killed each year as a result of ship strikes in the Canaries archipelago. According to what is known, a (very) high number is expected. As an example, it is hard to imagine that it will be recognized a small cetacean was hit by a huge ferry during darkness. Whale carcasses often will drift away miles or simply sink to the bottom without being detected. Moreover, until now scientist having to prove that the death of a cetacean was caused by a ship strike.

Recent development

In early 2019, an extraordinary high number of strandings of cetaceans carrying typical lesions indicating vessel strikes occurred in the Canaries. On 13 March, a sperm whale was found in Gran Canaria; and on 12 April, a sperm whale washed ashore in South Tenerife. Both animals were necropsied and it was shown that the cause of death had been a ship strike. Both cases reached significant attention in the public. Interestingly, only shortly before these strandings, two new high-speed ferry transects were introduced joining the island of Gran Canaria with the islands of Fuerteventura and Lanzarote.

More recently, another three whales (one Bryde's whale and two sperm whales) were found at the coastlines of Fuerteventura; Gran Canaria and Tenerife. The determination of the cause of death is still pending, but at least one of these whales carried large gashes, a typical lesion inflicted by large wave-piercing vessels. In addition, a pilot whale was found within the Nature 2000 Special Area of Conservation Teno-Rasca (SW Tenerife) with a severed caudal peduncle, the cuts were consistent with the propeller of a small-medium sized boat. This whale had to be euthanized (Figure 3). It is relevant that tag-data have shown that pilot whales have negative buoyancy once they collapse their lungs, meaning that large cuts cutting the lungs would cause these whales to sink and thus these collisions would pass unnoticed (Aguilar de Soto, 2006).

Figure 2: Carcass of a stranded sperm whale in the Canary Islands showing a typical lesion inflicted by a sharp bow like the ones of high-speed ferries operating in the Canaries.
Photo © *Manuel Carrillo, Canarias Conservación*

Figure 3: Short-finned pilot whale with a severed caudal peduncle due to cuts inflicted by the propeller of a small-medium sized boat. The whale was found on 24th March 2019 within the Special Area of Conservation Teno-Rasca (SW Tenerife). Photo © Francis Perez.

Stakeholder activities so far

The University of La Laguna founded a Ship Strike Prevention Working Group in 2014-2017 holding meetings with the ferry companies, the Canary Islands and Spanish Governments and the academia. This group concluded that ship strikes were an important threat to sperm whales and other cetaceans and reviewed worldwide mitigation actions to assess their applicability within the Canary Islands to reduce strike risk in the archipelago. The group clearly identified several mitigation measures to be implemented, ranging from education of mariners to testing technological means to improve whale detection, plus others that required further knowledge on cetacean distribution (e.g. re-routing and speed restrictions in discrete areas of cetacean concentration). Since then, ULL imparts classes at the ULL Nautical Engineering School on the issue of ship strikes annually, and collects cetacean distribution data through on-board observers (volunteers) within the Canary Islands Cetacean and Seabird Sighting Network (CETAVIST https://cetavist.blogspot.com). Testing of thermal detection devices of the high quality required to be efficient requires funding, which has been challenging to obtain.

On an international level, the IWC in 2010 convened its first international expert workshop on ship strikes which had a special regional focus on the Mediterranean Sea and the Canary Islands. A second expert workshop in Panama in 2014 also dealt in depth with the situation in the Canaries.

The University of La Laguna and local research NGOs, such as *Canarias Conservación*, the *Sociedad para el Estudio de los Cetáceos en el Archipiélago Canario* (SECAC) and *M.E.E.R.* have worked since 1998 to educate the public on the issue at large, to collect data on ship struck animals, to work on the multi-stakeholder level (government and naval industry) and to collaborate with the IWC. Veterinary specialists from the Universidad de Las Palmas de Gran Canaria (ULPGC, Gran Canaria) are responsible for the pathological investigation of stranded animals, to determine causes of death through the Canary Islands Cetacean Stranding Network, funded by the Spanish and Canary Islands Governments.

Mitigation measures taken so far

Although the Government of the Canary Islands is aware of the issue since many years (see Gobierno de Canarias, 2009), and while there is scientific evidence that ship strikes are prevalent in the Canaries probably more than in any other area of the world, until to date there does not exist a mandatory reporting scheme nor have effective mitigation measures been implemented to counter-act this situation.

Recommendations

All cetacean species are listed in Annex IV of the EU Habitats Directive and thus are protected. One of the resident species of the Canaries, the bottlenose dolphin, is listed in Annex I of the Directive, hence dedicated measures have to be taken to conserve them as especially protected species. Some areas have already been declared as Special Areas of Conservation (SACs) for bottlenose dolphins as part of the EU wide network of protected areas Natura 2000. It is obvious that existing designated protected areas need special attention. In that sense, it is important that the measure highlighted below will also be integrated as permanent measure laid out in the management plans for the existing SACs within the Natura 2000 network.

Some of the areas where cetacean abundance and ferry traffic overlap significantly have been identified in Carrillo & Ritter (2010). These are valid until today. At the same time, and although the recent cases of strandings of cetaceans with typical lesions for vessel-whale strikes indicate a worsening in the area between Gran Canaria and Fuerteventura, it has to be stressed that the whole archipelago constitutes an important habitat for a great variety of different cetacean species, small and large, on an international level. Accordingly, it is necessary to consider introducing measures for the complete waters surrounding the islands. Vessels can hit cetaceans literally everywhere and anywhere in the Canaries, and that is even more true for fast moving ships.

We recommend that all measures are taken forward immediately, and on the basis of the precautionary principle. The knowledge of the overall critical situation is large enough to justify immediate action. The paucity of discrete scientific results and evidence should in no way be used to postpone the implementation of measures.

Recommendations for operational measures:

The IWC has, as a result of year-long discussions of experts and on the basis of several studies, identified the following two measures as the only ones that reliably can reduce the number of ship strikes in a given area (Cates *et al*., 2017; compare Conn & Silber, 2013; Laist *et al*., 2014)

(1) Separation of vessels and whales
(2) Speed reduction

- With respect to (1), it is of utmost importance to keep ferry transects as far as possible away from cetacean concentrations. This is true for known critical habitats of cetaceans, especially the sperm whale (see Ritter, 2010; Fais *et al*., 2016), but also for existing marine protected areas.

Note: It is important to avoid an increase of the small-scale ship strike risk while such measures are being taken. As an example, re-routing fast ferries away from the SACs south of La Gomera (implemented to protect bottlenose dolphins), i.e. away from the coast to deep offshore waters will significantly increase the risk for pilot whales and other species consistently found around the 1,000 m depth contour. A multi-species approach based hence will be necessary. Furthermore, re-routing of international shipping lanes crossing the archipelago or proposing speed reductions on an international level may be implemented through the IMO, as has been done in Spain before (see Tejedor *et al*., 2007).

- Where (1) appears not to be feasible, a mandatory speed reduction to 10 knots must be implemented for all watercraft, small and large within designated SACs (with the exception of government vessels during service, e.g. safety at sea). Fast ferry companies report that fast and high-speed ferries are not efficient at such slow speeds. However, these vessels leave the harbor at slow speeds and SACs extend few miles

offshore, thus it is expected that this measure is feasible to be implemented by all ferry types.

- Speed restrictions should be implemented also in other known cetacean concentration areas.

- Dedicated trained observers looking out for whales should be on the bridge of all fast and high-speed ferries during all transects. This measure will increase the alertness of the ship crews and increase the reaction time in case cetaceans are spotted in front of a vessel.

- Implementation of mandatory reporting of all witnessed cases of ship strikes in the Canary Islands through a standardized protocol. This necessitates the identification of a body responsible for receiving such reports. This should be in first case the Canary Islands and Spanish Governments, and these should inform the IWC through its global ship strike data base (see www.iwc.int/ship-strikes). This also would help standardizing reports and to guarantee an independent review of all reports.

Recommendations for research:

- Complete documentation and analysis of the development and prevalence of ferry traffic in the Canary Islands by making use of AIS, S-AIS and VMS data (see Carrillo & Ritter, 2010; Robards *et al*., 2016)

- Identification of small-scale critical areas within the archipelago using modelling based on cetacean habitat use studies, correlated with shipping and ferry traffic routes and density (compare Canadas *et al*., 2005; Redfern *et al*., 2013). Such studies shall be used to "fine-tune" measures.

- Detailed pathological investigation of all cetaceans stranded in the archipelago with a special consideration of injuries/symptoms caused by ship strikes.

- Testing thermal detection systems will provide data to assess speed limits at which this technology can be applied to effectively detect whales at ranges enough to enable reactions in maneuvering of fast-moving vessels to avoid a strike. These data should also inform speed limits for inter-island ferries throughout the archipelago.

Recommendations for other measures (educational, technological, etc.):

- Vessel crews, manager and other stakeholders in the shipping sector should be educated about the collision risk and how to avoid it.

- The general public, including both locals and tourists should be educated about the issue.

- The IWC also has concluded that there are currently no technical measures available that reliably can reduce the number of ship strikes. Nevertheless, it is advisable that such option may be developed and tested, especially with regard to fast and high-speed vessels. Some of the measures potentially to be tested can be found in Cates *et al*. (2017)

- It is also recommended that the competent authorities (Spanish and Canary Islands Governments in the areas of Environment, Maritime Traffic and other nautical activities) (re-) convene a permanent Ship Strike Prevention Working Group, i.e. a

round table where all stakeholders take part to maintain a continuing multilateral dialogue.

- A wider co-operation is also recommended, e.g. with international experts, and especially with the IWC or the IUCN Marine Mammal Protected Area Task Force (IUCN MMPA TF).
- Finally, it is most important that sufficient funds will be available to support the work on this issue of the responsible authorities and the round table. As soon as concrete measures are in place, all necessary funding to monitor compliance and to support enforcement should be provided. Such financial means should not only be afforded by the Government(s), but also by the ferry operators (costs-by-cause principle)

Conclusion

It has to be stated that the correction of the omissions in the past will be a difficult path, politically, technically and financially. Nevertheless, this situation also holds a great potential for the Canary Islands as a top tourist destination on a global level, to initiate changes that will help to create an image of environmentally friendliness that most likely would also have effects on an international level. In that sense, we envision a transition of the Canary Islands from a worrisome hot spot for vessel-whale collisions to a locale initiating a new, politically conscientious development where cutting-edge measure are being implemented to achieve a peaceful mutualism between humans and cetaceans. We recommend to take this opportunity *now*.

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