

## WHALE MORTALITY FROM SHIP COLLISIONS UNDERREPORTED, CASE STUDIES FROM ECUADOR AND WEST AFRICA

FERNANDO FÉLIX\* AND KOEN VAN WAEREBEEK #<sup>1</sup>

\* Fundación Ecuatoriana para el Estudio de Mamíferos Marinos (FEMM), PO Box 09-01-11905. Guayaquil, Ecuador

[fernandofelix@femm.org](mailto:fernandofelix@femm.org); [www.femm.org](http://www.femm.org)

# Peruvian Centre for Cetacean Research (CEPEC), MUSEO DE DELFINES, Pucusana, Lima-20, Peru  
[cepec.dir@terra.com.pe](mailto:cepec.dir@terra.com.pe)

### ABSTRACT

We document two cases of whales struck by container cargo vessels, one each in the Southeast Pacific and the Eastern Tropical Atlantic. The 207m-length *P&O Nedlloyd Pantanal* collided with an adult Bryde's whale *Balaenoptera edeni* in the southern Gulf of Guayaquil, Ecuador, on 10 December 2004. The whale, pinned on the bow, showed massive hypodermal hematoma indicating that it was alive when struck. In a similar case off West Africa, the container ship *OSNA Bruck* arrived at Dakar port, Senegal, on 19 March 1998 with the fresh carcass of a juvenile sei whale *B. borealis* wrapped on the bow bulb. Collision occurred between Las Palmas, Canary Islands, and Dakar, Senegal. A review of previous cases show that ship strikes are rarely reported in these regions, partly due to the lack of regulations including obligation to report collisions. In both instances the crew was aware of the event only upon arrival at port, suggesting that whales which are hit and killed or wounded, but do not become wedged on the bow go entirely unnoticed. These are the first fatal whale collisions documented in Ecuador and West Africa south of the Canary Islands, and the first of a Bryde's whale in the Southeast Pacific. National authorities are encouraged to improve data collection and introduce regulations including obligatory reporting.

KEYWORDS: SHIP STRIKES; BRYDE'S WHALE; HUMPBACK WHALE; SEI WHALE; ECUADOR; SENEGAL; WEST AFRICA.

### INTRODUCTION

The increase of both maritime traffic and vessel speed is cause of concern because of the high number of cetaceans involved in collisions around the world (IWC, 2002; Reeves, *et al.*, 2003). In their global compilation Jensen and Silber (2004) informed about 292 cases of ship strikes with whales between 1975 and 2002, most of them in waters of the United States. However, as cautioned by the authors, these cases would represent a small part of the total cases occurred since most collisions are unperceived or underreported by crews. Collisions with whales occur with all types of vessels including cargo, tankers, cruise and fishing vessels, although they are more frequent with bigger and faster vessels (Laist *et al.*, 2001; Jensen and Silber, 2004).

In general, collisions occur in coastal areas where whales concentrate for feeding or breeding (Laist *et al.*, 2001). The most frequently involved mysticete species include fin (*Balaenoptera physalus*), right (*Eubalaena glacialis* and *E. australis*), humpback (*Megaptera novaeangliae*), gray (*Eschrichtius robustus*), ordinary minke (*B. acutorostrata*) and blue whales (*B. musculus*). The sperm whale (*Physeter macrocephalus*) is the most common odontocete involved (Lainst *et al.*, 2001; Jensen and Silber, 2004). The impact on whale populations is unknown, but in the case of the North Atlantic right whales (*E. glacialis*), collisions with vessels were responsible for 35.5% of total recorded mortality in the period 1970-1999 (Knowlton and Kraus, 2001). NOAA Fisheries is currently developing a strategy to reduce whale mortality by ship strikes which includes, among others, operational measures for vessels larger than 65ft (19.8m), such as the modification of navigation routes to avoid areas of whale concentration, speed restrictions, and a dynamic management of the area (Silber *et al.*, 2004).

Here we document two recent cases off Ecuador and off West Africa, in which two species infrequently reported in ship strikes, the Bryde's whale (*Balaenoptera edeni*) and the sei whale (*Balaenoptera borealis*), were involved. With the purpose to evaluate their frequency, we reviewed the known cases of collisions with whales in the Southeast Pacific and the Eastern Tropical Atlantic.

---

<sup>1</sup> *KVW attends the IWC Scientific Committee meeting for Belgium's Federal Public Service: Public Health, Food Chain Security and Environment, Brussels.*

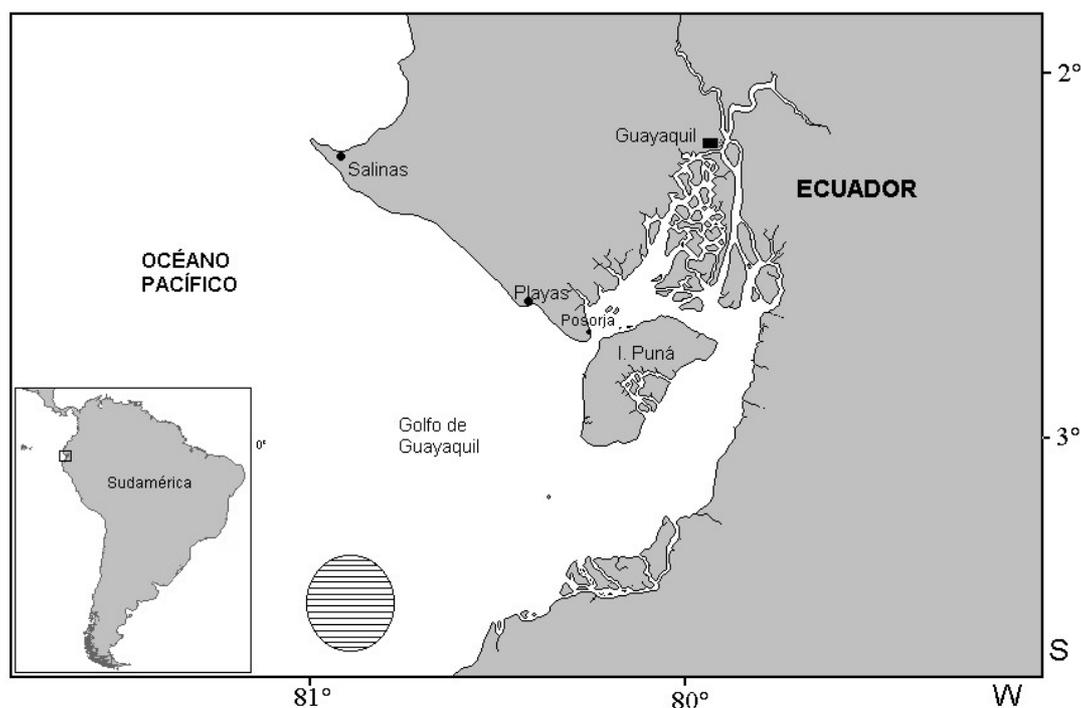
## SHIP STRIKES IN THE SOUTHEAST PACIFIC

The occurrence of ship strikes with whales in the Southeast Pacific is poorly known, although it is a cause of concern due to important maritime routes across the area, especially in the southern part (Flórez *et al.*, in press). Most documented collisions in the Southeast Pacific involve the humpback whale. According to Capella *et al.* (2001), at least three cases of humpback whales found dead between 1986 and 2000 in Colombia were caused by ship strikes. Photos of humpback whales in Ecuador also show wounds on the back, or tails with an entire fluke missing, likely caused by propellers (FEMM catalogue<sup>2</sup>, unpublished data). Haase and Félix (1994) informed of a 12.6m sperm whale with fractured maxillaries beached in 1991 at Punta Carnero, Ecuador, probably caused by a ship strike. In FEMM's database there are also three other anecdotal cases of ship strikes published in Ecuadorian newspapers: (1) in August 1989 the small purse-seiner *Paquin* sunk after collision with a whale, presumably a humpback whale; (2) in October 1996 the sailboat *Joel* struck a whale, possibly a sperm whale, 120nm offshore during a sailing championship between the Ecuador mainland and the Galapagos Islands; and (3) in August 2001 an open fishing boat was destroyed when it ran into a humpback whale near La Plata Island. In Peru, the NOAA's R/V *Surveyor* struck an undetermined whale 19km off Callao (Laist *et al.*, 2001; Jensen and Silber, 2004). A blue whale *B. musculus* that ran aground, bleeding, on the rocks of isla Don Martín, central Peru, in January 1997 may have collided with a ship (Van Waerebeek *et al.*, 1997). Goya *et al.* (2004) and Luis Santillán (CEPEC, unpublished data) suggested that a ship strike could be the cause of a sperm whale stranded at Paramonga, Peru.

### Ecuador

At daybreak on 10 December 2004, the 207m-length cargo ship *P&O Nedlloyd Pantanal*, en route from Callao, Peru, arrived at the quarantine area of the port of Guayaquil, Ecuador, with a freshly dead Bryde's whale pinned on the bow. The species was identified by the diagnostic presence of three head ridges, colouration pattern and the form and size of the dorsal fin.

From information provided by the captain, on the night of 9 December, between 20:00h and 21:00h, the ship's speed dropped from 18.5 to 16.8kn without obvious reason. Engine power had to be increased to reach the entrance of the inner estuary of the Gulf of Guayaquil on schedule. At the moment when speed decreased, and presumably the collision occurred, the ship was in the southern part of the Gulf (03°34'S, 80°58'W - 03.20°S, 80°48'W), at the border between Ecuador and Peru (Figure 1). The impact was not perceived by the crew who realized the event only when the ship entered port.



<sup>2</sup> Currently the FEMM catalogue contains photographic evidence of individual identification for around 500 different individuals.

Fig. 1. Area (hatched circle) at the entrance of the Gulf of Guayaquil where the collision with a Bryde's whale occurred, according information received from the captain of the cargo ship *P&O Nedlloyd Pantanal*.

The whale was positioned on the bow bulb on its belly, midbody out of the water (Figure 2). The area of impact, however, was not visible because the sharp edge of the bow was incrustated in the left flank, so the full extent of trauma could not be evaluated. The specimen was freshly dead with most of the skin intact and retaining pigmentation: dark gray dorsally, light gray on the flanks and a white throat. On its right side, over an area of ca. 4m between the flipper and the dorsal fin, the epidermis/dermis was abraded. The exposed blubber showed massive dermal hematoma (bruising), from behind the ventral grooves rearward, beyond the dorsal fin. A smaller bruised area with damaged skin extended from the ear region forward through the right side of the head. Flippers and the dorsal fin were complete, although most of the skin on the flippers was ripped off.

The extensive hematoma evident on the dermis indicates that the whale was alive when struck. The left-side impact, it is thought, may have broken ribs and ruptured vital inner organs, causing massive hemorrhage and the death of the whale. Before being wedged on the bow, the whale may have been rolled around its axis, which would explain skin abrasion also on its right side. The specimen was an adult-sized female. No standard length could be taken, but FF measured 16.2m along the body's bended contour. The carcass was dropped off the vessel in open waters two days later.

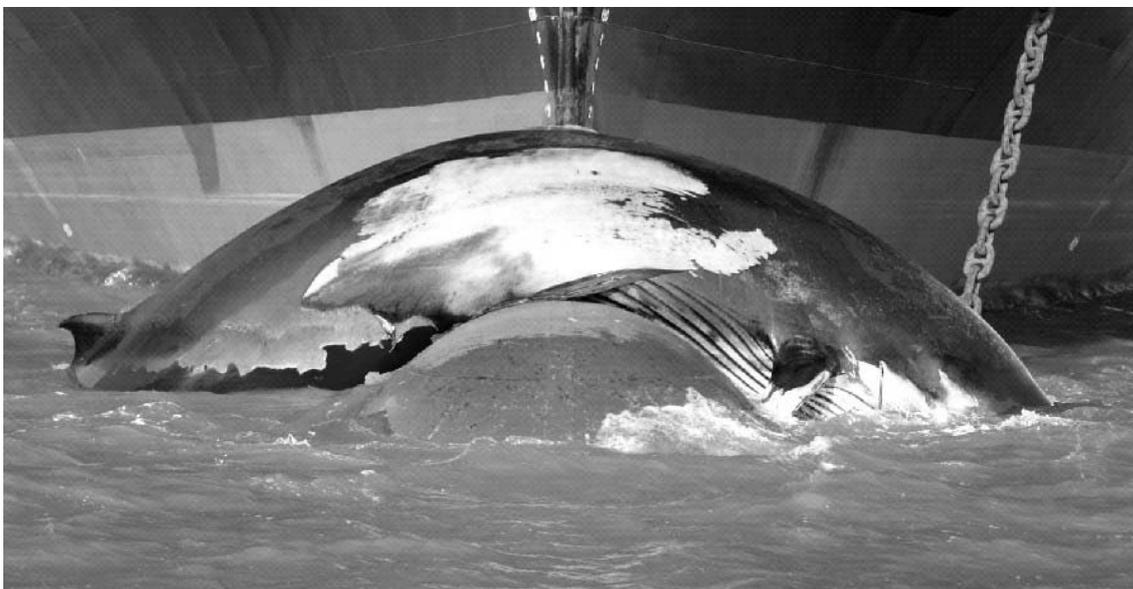


Fig. 2. Bryde's whale wrapped on the bow bulb of container vessel *P&O Nedlloyd Pantanal*, in Guayaquil port, Ecuador. Note extensive dermal hematoma on the lower mid-body, indicating antemortem trauma.

### SHIP STRIKES IN THE EASTERN TROPICAL ATLANTIC

The only area off West Africa for which data are available is the Canary Islands. Treganza *et al.* (2002) compiled 21 probable instances of lethal collisions in six species of cetaceans between 1985 and February 2002. Since the introduction of fast ferries in 1999, a significant increase of fatal collisions occurred, especially with sperm whales.

On 19 March 1998, a dead juvenile sei whale was brought into quay no.2 of the port of Dakar, Senegal, wrapped on the bow bulb of the German container ship *OSNA Bruck* (Group Somico-Smith and Kraft).<sup>3</sup> Considering that the impact was not registered, it was not possible to state with absolute certainty whether the whale had been hit and died on impact, or whether the animal was scooped up dead. However, the very fresh state of the carcass strongly suggests the former. The absence of bloating, all baleen plates attached to the palate and largely intact skin suggested that the whale had not been dead for more than two days. Its body length was about 12m, and its body weight 9,960kg, as weighed at Dakar port facilities (Fig. 2).

<sup>3</sup> information was collected by Dr. Papa Ndiaye, Laboratoire Biologie Marine, Institut Fondamental d'Afrique Noire, Dakar, as part of the UNEP/CMS sponsored WAF CET-1 Project (Van Waerebeek *et al.*, 2000).

On Monday 23 March 1998, the Dakar daily *Le Soleil* published a photo of the whale wrapped around the ship's bow and reported that it was struck close to Gorée Island, a few nautical miles off Dakar. However, according to the captain of the *OSNA Bruck*, the ship had departed Las Palmas, Canary Islands, some two days earlier and the crew became aware of the dead whale only after passing Gorée Island, off Dakar. The captain indicated that the collision may have occurred earlier, en route from Las Palmas.

Dr. Papa Ndiaye photographed and collected the specimen, however no necropsy was performed. The carcass was trucked to Sangalkam and buried, destined for future retrieval of the skeleton<sup>4</sup>. No samples were taken except for two apical baleen plates (deposited at IFAN), which were all-black with very fine, white bristles (examined by KVV). The arched rostrum with downturned tip, a single central but no auxiliary rostral ridges, overall dark grey colouration, a high falcate dorsal fin and the baleen were diagnostic for *B. borealis*. One flipper measured 156cm.

Port Captain Mr. Edouard Sarr claimed that this was the third whale found in Dakar waters 'over a short period'. One had stranded at poste 17, and a second whale had found its end north of the port'. No dates were available for these cases. Ndiaye thought these were also sei whales, but without voucher samples their specific identity cannot be confirmed.

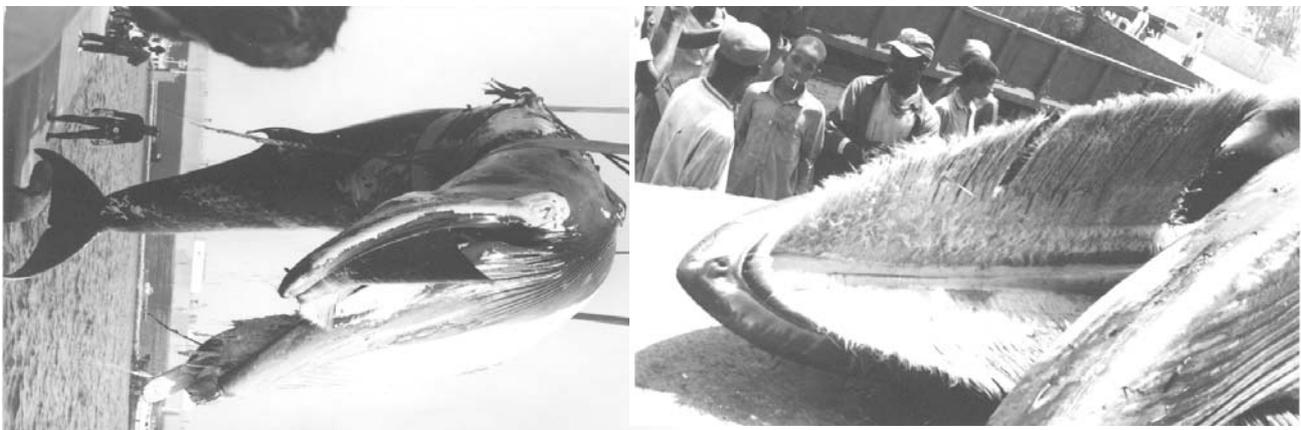


Fig. 2. Young sei whale brought into Dakar port, Senegal, on 23 March 1998, on the bow of the German container ship *OSNA Bruck*. A full set of baleen still in the palate, mostly intact skin and the lack of bloating suggested that the whale had died within the past two days, presumably from impact with the vessel. Photos by Dr P. Ndiaye, IFAN (CMS/UNEP WAF CET-1 Project).

## DISCUSSION

The collision of the container ship *P&O Nedlloyd Pantanal* with a Bryde's whale is the first formally recorded case of this type of incidental mortality in Ecuador and the first time this species is recorded killed by a ship strike in the Southeast Pacific. However, similar cases probably have occurred in open waters, were not noticed or reported, so the magnitude of ship collisions with cetaceans is unassessed in this region. Crews of large cargo vessels generally are unaware of collisions (Jensen and Silber, 2004; this paper) and typically notice the kill only when the whale becomes stuck on the bow. Another reason for limited number of records would be the lack of regulations (or enforcement) regarding ship strikes with whales, including no reporting obligation in countries bordering the Southeast Pacific. In Peru, proposals<sup>5</sup> for the construction of a mega port (Hub Port) at Isla San Lorenzo-Callao to accommodate ULCS (Ultra Large Container Ships), SPPS (Super Post Pamamax Ship) and SCS (Super Cruiser Ships) greater than 300,000 MT, and additional projects for major port expansion at Bayovar, Eten, San Juan and Ilo, are an increasing cause of concern for both resident and migrating whales off Peru's coast.

The situation is very similar in the Eastern Tropical Atlantic (except for the Canary Islands). The ship strike with a sei whale, so far we know, is the first documented case off West Africa. However, high potential for shipping-caused mortality exists in the northern Gulf of Guinea, and specifically in the Bight of Benin. Expanding merchant shipping to and from Cotonou, Benin, and shipping lanes which cross the breeding area of a northern Gulf of Guinea humpback whale stock (Van Waerebeek *et al.*, 2001, 2002) pose increasing risks and endangers slow-moving mother/calf pairs in particular. A second container port is planned along Benin's coast and heavy shipping

<sup>4</sup> The skeleton was abandoned since its burial site was developed for urbanization (P. Ndiaye, pers. comm. to KVV)

<sup>5</sup> See 'Proyecto Ciclópez', CARETAS Edición 1860, 10 February 2005. [www.caretas.com.pe](http://www.caretas.com.pe) (Peruvian weekly).

traffic is linked to Nigerian (Lagos, Port Harcourt) and Cameroon ports. Under current circumstances ship collisions with cetaceans off West Africa may often remain formally unreported, and mortality unaccounted for. National authorities are encouraged to improve data collection and introduce regulations including obligatory reporting.

Ship strikes with both Bryde's and sei whales are considered uncommon. The NOAA database contains only three cases for each of these species world-wide (Jensen and Silber, 2004). Perhaps part of the explanation is that these species are among the fastest moving baleen whales (Slijper, 1979). Their smaller size, compared to other more frequently affected species, such as fin and right whales, also reduces the probability to be struck.

Vessel speed seem the most relevant factor driving ship strikes: 90% of cases in which the speed was known, vessels moved at 10kn or higher, with the highest rate of incidence between 13 and 18kn (Jensen and Silber, 2004). The cruise speed of the *P&O Nedlloyd Pantanal* is even higher.

A large proportion of ship strike records in the NOAA database are from carcasses of beached animals, which show signals of cuts by propellers, as well as fractures of skull and ribs (Jensen and Silber, 2004). According to Laist *et al.* (2001), 58 of 407 beached whales (14%) recorded in the USA East coast between 1975 and 1996 could have been caused by ship strikes. Hence, the careful analysis of whale carcasses could provide the main evidence to estimate strike frequencies and the species involved. It would be desirable that environmental authorities in Southeast Pacific and West African nations, as well as in other developing countries, issue regulations to deal with beached whales and to systematically conduct necropsies in order to determine mortality rates from shipping.

On geographic grounds, sei whales off West Africa tentatively form part of the Eastern North Atlantic stock (*sensu* Jonsgård and Darling, 1977; Donovan, 1991). Allen (1916) claimed that sei whales are rarely seen south of the Straits of Gibraltar, contradicted by Anonymus (1914, *in* Jonsgård and Darling, 1977) who indicated that sei whales were observed, sometimes in large numbers, in the area that stretches southward from the Madeira Islands, past the Canary toward the Cape Verde Islands. Ingebrigtsen (1929) argued that sei whales stay in the southern part of the North Atlantic during the winter and their northward migrations seem to take place offshore. Kirpichnikov (1950) documented three sightings in May 1948 off West Africa, the southernmost record being at 06°30'N, 18°20'W. Maigret (1981) reported on a stranding of an 11m *B. borealis* in February 1981 in the Baie du Lévrier, Mauritania. In Senegal a series of nine baleen plates from a sei whale were recovered from a tiger shark stomach landed at Joal in July 1949 (Cadenat, 1955). The present specimen is the first documented record in Senegal for half a century. No evidence of sei whales has been found in The Gambia and Guinea-Bissau (Van Waerebeek *et al.*, 2000).

## ACKNOWLEDGEMENTS

FF thanks the Ecuador Environment and Port Authorities for the facilities provided to examine the Bryde's whale in Guayaquil; the captain of the *P&O Nedlloyd Pantanal*, Mr. Rudolph Gruhnwald, who kindly provided information. Dr. Papa Ndiaye and Mr. Abdoulaye Djiba of IFAN (Dakar) are thanked for logistics support during survey work by KVV. The WAF CET-1 Project, directed by KVV, was sponsored by the Convention on the Conservation of Migratory Species of Wild Animals (CMS/UNEP), Bonn. KVV is supported by the Federal Public Service (Public Health, Food Chain Security and Environment) of Belgium while attending the IWC 57<sup>th</sup> SC Meeting. Travel between Lima and Brussels is supported by the International Whaling Commission.

## REFERENCES

- Allen, G.M. 1916. The whalebone whales of New England. *Mem. Boston Soc. nat. Hist.* 8: 106-322.
- Anonymus. 1914. Seihvalen. *Norsk Hvalfangsttid.* 43(4): 57-58.
- Cadenat, J. 1955. A propos d'un échouage de baleine à Dakar. *Notes Africaines* 67: 91-94.
- Capella, J., Flórez-González, L. and Falk, P. 2001. Mortality and anthropogenic harassment of humpback whales along the Pacific coast of Colombia. *Memoirs of the Queensland Museum* 47(2): 547-553.
- Donovan, G.P. 1991. A review of IWC stock boundaries. Pp. 39-68. *In:* (A.R. Hoelzel ed.) *Genetic ecology of whales and dolphins.* 311pp.
- Flórez, L., J. Capella, P. Falk, F. Félix, J. Gibbons, J., Haase, B., Santillán, L., Peña, V., Ávila, I., Herrera, J., Tobón, I. and Van Waerebeek, K. (In press). *Estrategia para la Conservación de la Ballena Jorobada del Pacífico Sudeste.* Universidad de Magallanes, Chile.
- Goya, E., Márquez, J.C. and García-Godos, A. 2004. Informe nacional del Perú sobre el estado actual de los mamíferos marinos y las medidas de protección adoptadas. Informe presentado a la III Reunión de Expertos para Revisar las Actividades del Plan de Acción para la Conservación de los Mamíferos Marinos del Pacífico Sudeste. Lima, Perú, 23-25 de marzo de 2004. 55 p. (Unpublished).
- Haase, B. and Félix, F. 1994. A note on the incidental mortality of sperm whales (*Physeter macrocephalus*) in Ecuador. *Report of the International Whaling Commission (Special Issue)* 15:481-483.

- IWC, 2002. Report of the Scientific Committee. Annex M. Estimation of bycatch and other human-induced mortality. Pp 19-24. IWC/54/4.
- Ingebrigtsen, A. 1929. Whales caught in the North Atlantic and other seas. *Rapp. P.-v. Reun. Cons. Perm. Int. Explor. Mer.* 56(1): 1-123.
- Jensen, A. S. and Silber, G.K. 2004. Large whale ship strike database. *NOAA Technical Memorandum NMFS-OPR*. January 2004. 37 p.
- Jonsgård, A. and Darling, K. 1977. On the biology of the eastern North Atlantic sei whale, *Balaenoptera borealis* Lesson. *Rep. Int. Whal. Commn.* (special issue 1): 124-129.
- Kirpichnikov, A.A. 1950. Nablyudeniya nad raspredeleniyem kito-obraznakh v Atlanticheskom okeane. *Priroda* (Leningrad), 10: 63-64.
- Knowlton A. R. and Kraus, S.D. 2001. Mortality and serious injury of northern right whales (*Eubalaena glacialis*) in the Western North Atlantic Ocean. *Journal of Cetacean Research and Management* (Especial Issue) 2:193-208.
- Laist, D. W., Knowlton, A.R., Mead, J.G., Collet, A.S. and Podesta, M. 2001. Collision between ships and whales. *Marine Mammal Science*, 17(1):35-75.
- Maigret, J. 1981a. Les mammifères des côtes de Mauritanie.2 . Rapport annuel des observations signalées en 1981. *Bulletin du Centre National de Recherches Océanographiques et des Pêches*, Nouadhibou 10(1): 81-85.
- Reeves, R. R., Smith, B.D., Crespo, E. and Notarbartolo di Sciara, G. (compilers). (2003). *Dolphins, Whales and Porpoises: 2002–2010 Conservation Action Plan for the World's Cetaceans*. IUCN/SSC Cetacean Specialist Group. IUCN, Gland, Switzerland and Cambridge, UK. 139pp.
- Silber, G., Gerrior, P. and Zoodsma, B. 2004. NOAA's Fisheries proposed strategy to reduce ship strikes of North Atlantic right whales – Shipping Industry dialog. Available at <http://www.nero.noaa.gov/shipstrike>.
- Slijper, E.J. 1979. *Whales*. Hutchinson of London (Second English edition). 511pp.
- Tregenza, N., Aguilar, N., Carrillo, M., Delgado, I., and Díaz, F. 2002. Collisions between fast ferries and whales in the Canary Islands: observational data and theoretical limits. Document SC/54/BC4 presented to IWC SC Meeting. 7pp. (unpublished).
- Van Waerebeek, K., Pastene, L.A., Alfaro-Shigueto, J., Brito, J.L. and Mora-Pinto, D. 1997. The status of the blue whale *Balaenoptera musculus* off the west coast of South America. Paper SC/49/SH9 presented to IWC Scientific Committee Meeting, Bournemouth, UK. 12pp.
- Van Waerebeek, K., Ndiaye, E., Djiba, A., Diallo, M., Murphy, P., Jallow, A., Camara, A., Ndiaye, P. and Tous, P. 2000. A survey of the conservation status of cetaceans in Senegal, The Gambia and Guinea-Bissau. UNEP/CMS Secretariat, Bonn, Germany. 80pp.
- Van Waerebeek, K., Nobimé, G., Sohou, Z., Tchoboza, S., Dossou-Bodjrenou, J.S., Dossou, C., and Dossou-Hountoudou, A. 2002. Introducing whale and dolphin watching to Benin, 2002 exploratory survey. Report to the Netherlands Committee for IUCN, Amsterdam. 9pp. (unpublished).
- Van Waerebeek, K., Tchiboza, S., Montcho, J., Nobime, G., Sohou, Z., Sohohoue, P. and Dossou, C. 2001. The Bight of Benin, a North Atlantic breeding ground of a Southern Hemisphere humpback whale population, likely related to Gabon and Angola substocks. Paper SC/53/IA21 presented to the IWC Scientific Committee Meeting, London, July 2001. 8pp.