



Convention on the Conservation of Migratory Species of Wild Animals

Secretariat provided by the United Nations Environment Programme



14th MEETING OF THE CMS SCIENTIFIC COUNCIL

Bonn, Germany, 14-17 March 2007

CMS/ScC14/Doc.7
Agenda item 6(a)

CONSERVATION STATUS OF THE NORTHWEST AFRICAN POPULATION OF THE HARBOUR PORPOISE

(Prepared by Dr. Koen Van Waerebeek and submitted by Dr. William Perrin)

Background

1. The harbour porpoise is a mammal perhaps not readily associated with Africa, but continental shelf waters off its northwestern coast are habitat for the southernmost occurring population of the species. This marginal distribution has left the NW African stock largely at the fringe of scientific and conservation focus, despite the harbour porpoise being one of the best studied odontocetes at a global level, often profiled as a flagship species for marine conservation efforts. Indications are that the NW population is small. With the NW African shelf waters amongst the most heavily fished areas in the world (e.g. see Zeeberg *et al.*, 2006), concern is that if the population would be significantly depleted, chances that it would be detected in time to install drastic conservation measures are minimal.

Distribution, population identity, status

2. Harbour porpoises typically occupy neritic habitat and rarely venture far beyond the continental shelf, although some individuals have been found in deep water (Read *et al.*, 1996). The NW Africa population ranges from Agadir, Morocco, south to Joal-Fadiouth (14°09'N, 16°49'W), Senegal (Robineau and Vely, 1998; Van Waerebeek *et al.*, 2000, 2003). Support for population discreteness consists of an apparent distribution gap of some 895km from Cabo de Espichel, southern Portugal over the Strait of Gibraltar south to Agadir. Smeenk *et al.* (1992) showed that harbour porpoises from West African, on average, may have a larger body size than those from Denmark. A sample of 5 porpoises from Mauritania did not share any mt-DNA haplotypes with other *P. phocoena* stocks in the NE Atlantic (Tolley and Rosel, 2006). The main caveat with these studies is that all sample sizes are small.

3. The new southernmost range is significant in that it demonstrates that the species' range bypasses the Cap Vert Peninsula, often considered the southern limit for the influence of the cool Canary Current, by some 100km. South from Joal-Fadiouth, the marine environment becomes increasingly warm and unfit for harbour porpoises. The species has not been confirmed from The Gambia.

*For reasons of economy, documents are printed in a limited number, and will not be distributed at the meeting.
Delegates are kindly requested to bring their copy to the meeting and not to request additional copies.*

4. No abundance estimates are available for the NW African population. Reports of both sightings and specimens are infrequent, suggesting that the species is not abundant, especially off Morocco. Indications, both from sightings and available specimens, are that within this range harbour porpoises are most common off northern Mauritania (Robineau and Vely, 1998), where off Cap Blanc it moves back and forth across national borders, probably on a diurnal basis.

Threats

5. The International Whaling Commission (1996) noted a severe bycatch problem for the species as a whole. In areas where adequate data on abundance and by-catch levels exist, incidental mortality exceeds sustainable levels. Naturally, the principal threat to the NW African population is thought to be interactions with fisheries, and specifically net entanglements, considering the very intensive fishing effort in the shelf waters (e.g. Pauly *et al.* 1998; Mahmoud Cherif, 2001; Zeeberg *et al.*, 2006). Although annual bycatch mortality cannot be estimated with the current poor documentation record, harbour porpoises have been incidentally captured in Senegal and Mauritania with some regularity for many decades (e.g. Cadenat, 1949; Fraser, 1958; Maigret, 1994; Van Waerebeek *et al.*, 2000). Much less is known about bycatches in Morocco and Western Sahara. The norm in the region is that cetacean bycatches are clandestinely processed where fishers fear fines or other sanctions (Van Waerebeek *et al.*, 2000). In terms of habitat degradation, over-fishing off NW Africa is thought to be highly disruptive of the shelf ecosystem. Depleted fish stocks and intense maritime traffic have the potential to reduce foraging efficiency of the porpoises.

Conclusion

6. A high degree of reproductive isolation for NW African harbour porpoises, a largely ‘forgotten’ population, is practically certain. The lack of abundance estimates and the poor insight on spatial and temporal distribution allow only a most superficial assessment, and no potential to evaluate trends. Coupled to well-established anthropogenic threats, the case for a strong precautionary conservation approach cannot be more evident. One such measure is reinforcing legal protection, the reason why it is proposed below to place this population on CMS Appendix II. Doing so would stimulate a second urgent measure: implementation of dedicated research, including regular visual and acoustic surveys and population studies with adequate samples in order to establish a firm baseline from which to evaluate future trends.

References

- Cadenat, J. 1949. Notes sur les Cétacés observés sur les côtes du Sénégal de 1941 à 1948. *Bulletin de l'IFAN* 11: 1-15. [In French].
- International Whaling Commission (1996). Report of the subcommittee on small cetaceans. *Rep. Int. Whal. Commn* 46: 160-179.
- Mahmoud Cherif, A. 2001. Fishing Zones. Balancing priorities. *Samudra* August 2001.
- Maigret, J. 1994. Marine mammals and fisheries along the West African coast. *Rep. Int. Whal. Commn.* (Special Issue 15): 307-306.
- Christensen, V., Dalsgaard, J., Froese, R., Torres Jr., F. 1998. Fishing down Marine food Webs. *Science* 279 (5352): 860 – 863.

- Read, A.J., Nicolas, J.R. and Craddock, J.E. 1996. Winter capture of a harbor porpoise in a pelagic drift net off North Carolina. *Fish. Bull.* 94(2) : 381-383.
- Robineau, D. and Vely, M. 1998. Les cétacés des côtes de Mauritanie (Afrique du Nord-Est). Particularités et variations spatio-temporelles de répartition: rôle des facteurs océanographiques. *Rev. Ecol. (Terre Vie)* 53: 123-152. [In French].
- Smeenk, C., Leopold, M.F. and Addink, M.J. 1992. Note on the harbour porpoise *Phocoena phocoena* in Mauritania, West Africa. *Lutra* 35: 98-104.
- Tolley, K. and Rosel, P. E. 2006. Population structure and historical demography of eastern North Atlantic harbour porpoises inferred through mtDNA sequences. *Mar. Ecol. Prog. Ser.* 327: 297–308.
- Van Waerebeek, K., Barnett, L., Camara, A., Cham, A., Diallo, M., Djiba, A., Jallow, A.O., Ndiaye, E., Samba Ould Bilal, A.O. & Bamy, I. L. 2003. Conservation of Cetaceans in The Gambia and Senegal 1999-2001, and Status of the Atlantic humpback dolphin. WAF CET-2 Report. UNEP/CMS, Bonn, Germany. 55 pp.
- 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. WAF CET-1 Report. UNEP/CMS Secretariat, Bonn, Germany. 80pp.
- Zeeberg, J., Corten, A. and De Graaf, E. 2006. Bycatch and release of pelagic megafauna in industrial trawler fisheries off Northwest Africa. *Fish. Res.* 78(2-3): 186-195.

DRAFT PROPOSAL FOR INCLUSION OF SPECIES ON THE APPENDICES OF THE CONVENTION ON THE CONSERVATION OF MIGRATORY SPECIES OF WILD ANIMALS

A. PROPOSAL: Include the NorthWest African population of the harbour porpoise *Phocoena phocoena* on Appendix II.

B. PROPONENT: [Preferably a range state of the population].

C. SUPPORTING STATEMENT

1. Taxon

1.1	Classis	Mammalia
1.2	Ordo	Cetacea
1.3	Familia	Phocoenidae
1.4	Genus, species	<i>Phocoena phocoena</i> (Linnaeus, 1758)
1.5	Common names	E: Harbour porpoise F: Marsouin commun ES: Marsopa común DE: Schweinswal

2. Biological data

2.1 Distribution (current and historical)

Harbour porpoises are widely distributed in temperate to subpolar shallow waters in the Northern Hemisphere. This proposal relates to the NW African population, which is considered discrete (see below) from the geographically closest Iberia population and Black Sea subspecies *P. phocoena relicta* Abel, 1905. Distributional support for discreteness consists of an apparent distribution gap from Cabo de Espichel (38°25'N, 09°12'W), southern Portugal (Culik, 2004) over the Strait of Gibraltar south to Agadir, central coast of Morocco, some 895km. No evidence exists of normal occurrence in the western Mediterranean and Strait of Gibraltar now or in the past. A single confirmed record from the western Mediterranean, near Malaga, Spain (Frantzis *et al.*, 2001) was probably a vagrant. This absence is all the more striking considering the fact that harbour porpoises are relatively common and are present year-round along the Atlantic coast of the Iberian Peninsula (Sequeira, 1996).

The NW Africa population ranges from Agadir (30°25'N, 09°36'W) (Bayed and Beaubrun, 1987; Robineau and Vely, 1998) south to Joal-Fadiouth (14°09'N, 16°49'W) (Van Waerebeek *et al.*, 2000, 2003). This new southernmost range south to Senegal's Petite Côte is significant in that it demonstrates that the species' range bypasses the Cap Vert Peninsula (Dakar) by some 100km. The peninsula is often considered the southern limit for the influence of the cool Canary Current. Cadenat (1956) reported that several porpoises were taken off Hann, near Dakar, and Bathurst (the former name for Banjul, The Gambia) at 13°27'S. While only about 70km farther SE of Joal-Fadiouth, records at the boundary of a known range, more than any others, require substantiation. The fact remains that despite field work no *P. phocoena* have been documented from The Gambia (Van Waerebeek *et al.*, 2000, 2003; Jallow *et al.*, 2005). South from Joal-Fadiouth, waters are

increasingly dominated by the warm Guinea Current and the habitat becomes unfit for harbour porpoises. A vague reference to a case in Guinea, in March (Cadenat, 1957) is not credible. It must be noted that probably accurate distinctions between small cetacean species (and in particular porpoises) by knowledgeable locals such as fishermen can be lost in translation when reported in French or English.

2.2 Population (estimates and trends)

Population identity

While Fraser (1958) found no significant cranial differences between harbour porpoises from Senegal and those from Britain, his sample was small and included immature specimens. Mostly distributional arguments led several authors to consider NW African harbour porpoises as a discrete population (Gaskin, 1984; Donovan and Bjørge, 1995). Smeenk *et al.* (1992) suggested that porpoises from West Africa, on average, have a larger body size than those from Denmark. Although their analysis was rather weak, results were consistent with the apparent Strait of Gibraltar/northern Morocco distribution gap. A recent study added further evidence in showing that five porpoises from Mauritania did not share any mt-DNA haplotypes with any other *P. phocoena* stock in the NE Atlantic and contiguous seas (Tolley and Rosel, 2006). A high degree of reproductive isolation now appears practically certain.

Abundance

No abundance estimates are available for the NW African population (see Read, 1999; Culik, 2004). Reports of both sightings and specimens are infrequent, suggesting that the species is not abundant, especially off Morocco where porpoises are considered rare (Aloncle, 1967; Duguy, 1976). No porpoises were encountered off the Rio de Oro/Western Sahara coast during a 750km survey in the Bay of Dakhla and the Bay of Cintra, nor in-between (Notarbartolo di Sciara *et al.*, 1998). Additional effort is desirable, however, considering that visual surveys of *P. phocoena* are very sensitive to sea conditions, with harbour porpoises easily missed in anything more than Beaufort 2-3 seas.

Indications, both from sightings and the number of available specimens, are that within this range harbour porpoises are most common off northern Mauritania (Smeenk *et al.*, 1992; Robineau and Vély, 1998) and especially around the Cap Blanc Peninsula, i.e. east in the Baie du Lévrier (Smeenk *et al.*, 1992) and west and south off Cap Blanc (Van Waerebeek and Jiddou, 2006). In a 3-day survey of waters in and adjacent to the Parc National du Banc d'Arguin (PNBA) in November 2006, five sightings were made. All involved loose aggregations composed of 2-14 (mode, 3) apparently feeding porpoises, either west or southwest off Cap Blanc. The overall encounter rate for the 3-day survey (226nm, 27h59min on effort) was 0.022 groups/nmile surveyed or 0.217 porpoises/nmile (Van Waerebeek and Jiddou, 2006). No porpoises were seen in the shallow waters of the Banc d'Arguin (PNBA), although sighting effort was much higher there, supporting earlier findings that porpoises avoid the Banc d'Arguin proper (Smeenk *et al.*, 1992; Robineau and Vély, 1998).

Recent inspection of two main collections in Mauritania, in an effort to set up a national database, revealed three and five cranial specimens, curated respectively at IMROP and PNBA (Van Waerebeek and Jiddou, 2006). At Dakar's IFAN institute, ten skulls are deposited, seven from Senegal and three from Mauritania (Van Waerebeek *et al.*, 2000). Skulls at other collections still require verification. With less than 10 specimen records and no documented sightings from Senegal, the species is considered uncommon. None were encountered during cetacean coastal

work in Senegal in 1995-97 (Van Waerebeek *et al.*, 1997). Surveys, preferably combined visual and acoustic, are needed in all range states.

2.3 Habitat (short description and trends)

Harbour porpoises typically occupy neritic habitat and rarely venture far beyond the continental shelf (Read, 1999; Culik, 2004), although some individuals have been found in deep water (Read *et al.*, 1996). Off NW Africa, the harbour porpoise, adapted to temperate waters, appears closely associated with the cool Canary Current flowing south along the NW African coasts down to about the Cap Vert Peninsula, coinciding with the approximate southern range of the species (Smeenk *et al.*, 1992; Robineau and Vely, 1998; Van Waerebeek *et al.*, 2000; 2003). Off Cap Blanc, Mauritania, porpoises seem to be linked to strong local upwelling, rip curls and eddies, the result of unusually strong currents off the peninsula's headland. Independently moving individuals, with non-directional high-speed swimming bursts and encountered in a very loose association (Van Waerebeek and Jiddou, 2006) seem consistent with individual feeding behaviour of harbour porpoises (Read, 1999). This species is known to prey on small, schooling clupeoid and gadid fishes. In some, but not all, areas their prey is found near the sea floor (Read, 1999).

2.4 Migrations (kinds of movement, distance, proportion of the population migrating)

There is no evidence that supports or rejects possible long-range movements of *P. phocoena* off NW Africa. Read and Westgate (1997) found harbour porpoises in Canada to be extremely mobile and capable of covering large distances in relatively short periods. From satellite tagging data, mean daily distances in the Bay of Fundy ranged between 14-58 km, and home ranges may encompass tens of thousands of km² (Read and Westgate, 1997). The porpoise community present off Cap Blanc (20°44'N, 17°03'W) moves freely between Mauritania and Rio de Oro waters; in fact, as the international border bisects the Cap Blanc Peninsula, daily cross-border movements are a virtual certainty (Van Waerebeek and Jiddou, 2006).

3 Threat data

3.1 Direct threat to the population (factors, intensity)

Bycatches

Although few cases have been documented in any detail, the principal threat to the West African population is thought to be accidental net entanglements, considering the very intensive coastal fishing effort in range states (e.g. Maigret, 1994; Zeeberg *et al.*, 2006). The International Whaling Commission (1996) noted the problem for the species as a whole, and in areas where adequate data on abundance and by-catch levels exist, incidental mortality exceeds sustainable levels.

Harbour porpoises have been captured in Senegal with some regularity for many decades (e.g. Fraser, 1958). A first bycatch was reported in 1949 off Hann when two harbour porpoises were taken in nets, but then such catches were considered rare (Cadenat, 1949). Cadenat (1957) reported that several harbour porpoises had been taken off Hann, near Dakar, and Banjul, The Gambia. However, there is concern about correct identification where reports were second-hand. In the 1990s, harbour porpoises were taken by the artisanal lobster fishery in the northern border areas of Mauritania. Several of the collection specimens from Mauritania are thought to originate from fisheries' victims. Maigret (1994) estimated bycatch 'at less than 20 per year', but he added 'the population is thought to be small along the northwestern African coasts'. A total of 51 stranded specimens were reported for Mauritania (Robineau and Vely, 1998) however the fraction due to bycatches was not estimated.

In 1999-2001, three captures of harbour porpoise were recorded on Senegal's Petite Côte (Van Waerebeek *et al.*, 2003), all were apparently landed at Joal-Fadiouth, but one was butchered in nearby Tidine. Overall, cetacean bycatches are rarely reported in Senegal because fishermen fear fines or other sanctions.

Directed catches

Duguy (1976) indicated that from verbal information gathered in 1968 harpooning of porpoises ('marsouins') was relatively frequent in that period, on board fishing boats working these waters [i.e. Senegal, Mauritania, Rio de Oro]. However, as pointed out before, the term 'marsouins' as used by locals may have referred to delphinids. Harbour porpoises avoid boats and are very hard to approach. It is doubted that they could be harpooned on a regular basis, unless netted or shot first (Van Waerebeek *et al.*, 2000).

While there are no substantiated incidents, porpoises that survive entanglement are unlikely to be released.

3.2 Habitat destruction (quality of changes, quantity of loss)

Over-fishing is probably the most important damage inflicted on the marine habitat off Northwest Africa, as it is in many regions (e.g. Mahmoud Cherif, 2001; Brashares *et al.*, 2004; Pauly *et al.* 1998). Depleted fish stocks are thought to reduce foraging efficiency of the porpoises, forcing them to spend more time and energy to meet metabolism demands. Intensified traffic from fishing and cargo vessels may add significant disturbance, more so than for delphinids, considering the systematic avoidance behaviour seen in harbour porpoises in the face of an approaching vessel (Van Waerebeek and Jiddou, 2006).

3.3 Indirect threat (e.g. reduction of breeding success by pesticide contamination)

Wildlife in coastal areas of Mauritania is threatened by pollution from industrial developments at Nouadhibou (Shine *et al.*, 2001). Heavy metal contamination may constitute a problem for the porpoise population feeding in and adjacent to the Cap Blanc PNBA Satellite Reserve. Huge quantities of high-grade iron ore are processed on the Cap Blanc Peninsula and shipped out via the port of Nouadhibou. On windy days, clouds of iron ore dust, no doubt laden with a variety of trace elements including heavy metals, are blown over adjacent waters (Van Waerebeek, personal observations) and may find their way into the marine food web. Porpoises as an upper trophic level predator will inevitably accumulate contaminants. The risks of these anthropogenic chemicals in harbour porpoises are still little understood (e.g. Read, 1999)

3.4 Threat connected especially with migrations

There are no known threats because migrations remain unstudied.

3.5 National and international utilization

4 Protection status and needs

4.1 National protection status

Small cetaceans are formally protected by national legislation in at least Senegal and Mauritania, but there are no specific measures to protect harbour porpoises. In practice, takes of small cetaceans in foreign and domestic fisheries off West Africa, even if systematic and predictable, are not sanctioned.

In 2006, to better protect the PNBA, the World Heritage Committee of UNESCO encouraged Mauritania to implement the Marine Environment Code (MEC) in order to implement MARPOL (International Convention for the Prevention of Pollution from Ships) provisions as soon as possible.

The coastal sector called Aguerguer or Côte des Phoques of the proposed 15,000- 20,000 km² Parc National de Dakhla could also protect potentially important habitat of *P. phocoena*.

4.2 International protection status

The *P. phocoena* populations of the North and Baltic Seas are listed in Appendix II of CMS. The harbour porpoise is listed as ‘Vulnerable’ by IUCN (Black and Baltic Seas stocks are listed separately also as Vulnerable) and it is listed under Appendix II of CITES.

4.3 Additional protection needs

Much better and updated information is necessary to allow a sound protection strategy to be drafted. Cetaceans could be added to the data sheets of species to be reported on by fisheries observers and some basic training should be provided. Although most fishermen will hide cetacean bycatches to avoid sanctions (Van Waerebeek *et al.*, 2000), some are landed or transported openly and could be documented. Even isolated cases may provide useful information. The harbour porpoise community off Cap Blanc may require specific protection as it inhabits some of the most heavily fished areas in all of Mauritania.

5. Range States of West African population of harbour porpoise

Confirmed range states: Morocco, Mauritania, and Senegal. (Western Sahara).

Possible range state: The Gambia.

6. Comments from Range States

7. Additional remarks

Indications are that the Cap Blanc community of harbour porpoises may be present year-round (re observations in Robineau and Vely, 1998 and Van Waerebeek and Jiddou, 2006). Foraging porpoises stay around for hours and can easily be sighted with regular binoculars from the cliffs of the Cap Blanc PNBA Satellite Parc. Considering zero-impact on porpoises with excellent possibilities to observe the Mediterranean monk seal, the cape deserves to be added to the list of recommended sites for low-impact marine mammal ecotourism.

8. References

- Aloncle, H. 1967. Deuxième note sur les petits cétacés de la baie Ibéro-Marocaine. *Bulletin de l'Institut des Pêches Maritimes du Maroc* 12: 21-42.
Brashares, J.S., Arcese, P., Sam, M.K., Coppolillo, P.B., Sinclair, A.R.E. and Balmford, A. 2004. Bushmeat hunting, wildlife declines, and fish supply in West Africa. *Science* 306, 12 November 2004: 1180-1183.

- Bayed, A. and Beaubrun, P.C. 1987. Les mammifères marins du Maroc: inventaire préliminaire. *Mammalia* 54: 162-164. [In French].
- Cadenat, J. 1949. Notes sur les Cétacés observés sur les côtes du Sénégal de 1941 à 1948. *Bulletin de l'IFAN* 11: 1-15. [In French].
- Cadenat, J. 1957. Observations de Cétacés, Siréniens, Chéloniens et Sauriens en 1955-1956. *Bull. de l'IFAN* 19A : 1358-1375. [In French].
- Culik, B. 2004. Review on small cetaceans: distribution, behaviour, migration and threats. Compiled for CMS/UNEP. (available from CMS website).
- Donovan, G. P. and Bjørge, A. 1995. Harbour porpoises in the North Atlantic. In: (eds. A. Bjørge and G. P. Donovan) *Biology of the Phocoenids. Rep. int. Whal. Commn (special issue 16)*: 3-25.
- Duguy, R. 1976. Contribution à l'étude des mammifères marins de la côte nord-ouest Afrique. *Revue des Travaux de l'Institut des Pêches maritimes* 39(3): 321-332. [In French].
- Frantzis, A., Gordon, J., Hassidis, G., and Komnenoy, A. 2001. The enigma of harbor porpoise presence in the Mediterranean Sea. *Marine Mammal Science* 17(4): 937-944.
- Fraser, F.C. 1958. Common or harbour porpoises from French West Africa. *Bull. de l'IFAN* 20A (1): 276-285.
- Gaskin, D. 1984. The harbour porpoise *Phocoena phocoena*: regional populations, status, and information on direct and indirect catches. *Rep. int. Whal. Commn* 34: 569-586.
- International Whaling Commission (1996). Report of the subcommittee on small cetaceans. *Rep. Int. Whal. Commn* 46: 160-179.
- Jallow, A., Cham, A.M., Barnett, L. and Van Waerebeek, K. 2005. Conservation of cetaceans in The Gambia: whale and dolphin field research. pp. 37-54. In: Proceedings from the First Biodiversity Research Symposium The Gambia. Ed. L. Barnett, Makasufu Wildlife Trust, Darwin Initiative Project, The Gambia.
- Maigret, J. 1981. Rapports entre les cétacés et la pêche thonière dans l'Atlantique tropical oriental. *Notes Africaines* 171: 77-84. [In French].
- Mahmoud Cherif, A. 2001. Fishing Zones. Balancing priorities. *Samudra* August 2001.
- Maigret, J. 1982. Recherches scientifiques dans les Parcs Nationaux du Sénégal. XVIII. Les mammifères marins du Sénégal. Etat des observations dans les Parcs Nationaux. *Mém. IFAN* 92: 221-231. [In French].
- Maigret, J. 1994. Marine mammals and fisheries along the West African coast. *Rep. Int. Whal. Commn. (Special Issue 15)*: 307-306.
- Notarbartolo-di-Sciara, G., Politi, E., Bayed, A., Beaubrun, P-C. and Knowlton, A. 1998. a winter survey off southern Morocco, with a special emphasis on right whales. *Rep. Int. Whal. Commn.* 48: 547-50.
- Pauly, D., Christensen, V., Dalsgaard, J., Froese, R., Torres Jr., F. 1998. Fishing down Marine food Webs. *Science* 279 (5352): 860 – 863.
- Read, A.J. 1999. Harbour porpoise *Phocoena phocoena* (Linnaeus, 1758). In: *Handbook of marine mammals*. Academic Press. Vol.6: 323-355.
- Read, A.J. and Westgate, A.J. 1997. Monitoring the movements of harbour porpoises (*Phocoena phocoena*) with satellite telemetry. *Marine Biology* 130(2): 315-322.
- Read, A.J., Nicolas, J.R. and Craddock, J.E. 1996. Winter capture of a harbor porpoise in a pelagic drift net off North Carolina. *Fish. Bull.* 94(2) : 381-383.
- Robineau, D. and Vely, M. 1998. Les cétacés des côtes de Mauritanie (Afrique du Nord-Est). Particularités et variations spatio-temporelles de répartition: rôle des facteurs océanographiques. *Rev. Ecol. (Terre Vie)* 53: 123-152. [In French].
- Sequeira, M. 1996. Harbour porpoises, *Phocoena phocoena*, in Portuguese waters. *Rep. Int. Whal. Commn.* 46: 583-586.

- Shine, T., Robertson, P. and Lamarche, B. 2001. Mauritania. In: (eds.) Fishpool, L. and Evans, M. The Important Bird Areas of Africa. BirdLife International, Cambridge, UK.
- Smeenk, C., Leopold, M.F. and Addink, M.J. 1992. Note on the harbour porpoise *Phocoena phocoena* in Mauritania, West Africa. *Lutra* 35: 98-104.
- Tolley, K. and Rosel, P. E. 2006. Population structure and historical demography of eastern North Atlantic harbour porpoises inferred through mtDNA sequences. *Mar. Ecol. Prog. Ser.* 327: 297–308.
- Van Waerebeek, K., Barnett, L., Camara, A., Cham, A., Diallo, M., Djiba, A., Jallow, A.O., Ndiaye, E., Samba Ould Bilal, A.O. & Bamy, I. L. 2003. Conservation of Cetaceans in The Gambia and Senegal 1999-2001, and Status of the Atlantic humpback dolphin. WAF CET-2 Report. UNEP/CMS, Bonn, Germany. 55 pp.
- Van Waerebeek, K., Diallo, M., Djiba, A., Ndiaye, P. and Ndiaye, E. 1997. Cetacean research in Senegal 1995-97, an overview. Paper SC/49/SM10, Annual Meeting of the International Whaling Commission, Bournemouth, UK. [obtainable from the IWC Secretariat].
- 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. WAF CET-1 Report. UNEP/CMS Secretariat, Bonn, Germany. 80pp.
- Van Waerebeek, K. and Jiddou, A. 2006. Deuxième formation sur l'identification des mammifères aquatiques de l'Afrique de l'Ouest et campagne de prospection des cétacés dans les eaux du Cap Blanc et du PNBA. Rapport à la Fondation Internationale du Banc d'Arguin. 13pp. (unpublished). [in French].
- Zeeberg, J., Corten, A. and De Graaf, E. 2006. Bycatch and release of pelagic megafauna in industrial trawler fisheries off Northwest Africa. *Fish. Res.* 78(2-3): 186-195.