Marine mammals around the Comoros archipelago (Mozambique Channel): recent records and review of available information

Jeremy KISZKA [1, 3, 4], Olivier BREYSSE [1], Michel VELY [1] & Kamardine BOINALI [2]

[1] *Megaptera Océan Indien, BP 609, F-97600 Mamoudzou, Mayotte (France).*

[2] *Parc Marin de Mohéli, Nioumachoua, island of Mohéli, Union of the Comoros.*

[3] Present address *: Observatoire des Mammifères Marins, Office National de la Chasse et de la Faune Sauvage & Direction de l'Agriculture et de la Forêt, BP 103, F-97600 Mamoudzou, Mayotte, France.*

[4] *Contact : Jeremy KISZKA (jeremy.kiszka@wanadoo.fr)*

ABSTRACT

The Comoros archipelago is situated in the northern Mozambique Channel. The islands of *Mohéli*, *Anjouan* and *Grande Comore* (Union of the Comoros) constitute volcanic islands, and are a proposed migration destination for humpback whales. Cetaceans have never been studied in the area and preliminary small boat-based surveys were conducted during the austral summer of 2002 and 2003. These surveys were primary dedicated to the assessment of the occurrence of humpback whales (*Megaptera novaeangliae*), but other cetacean species were also recorded. The collation of opportunistic sighting records was also used to provide information on the diversity of marine mammals inhabiting this area. A total of fourteen marine mammal species were recorded around the Union of the Comoros, including the dugong (*Dugong dugon*), humpback and sperm whale (*Physeter macrocephalus*), spinner dolphin (*Stenella longirostris*), pantropical spotted dolphin (*Stenella attenuata*), Fraser's dolphin (*Lagenodelphis hosei*), bottlenose dolphin (*Tursiops* sp.), Risso's dolphin (*Grampus griseus*), melon-headed whale (*Peponocephala electra*), short-finned pilot whale (*Globicephala macrorhynchus*), pygmy killer whale (*Feresa attenuata*) but also Blainville's beaked whale (*Mesoplodon densirostris*) and Longman's beaked whale (*Mesoplodon pacificus*). During the dedicated surveys, humpback whale was the most encountered species (71.5%) followed by the spinner dolphin (15.3%). Humpback whale group composition was heterogeneous, but mother-calf pairs were the most commonly sighted. This study underlines the waters around the Union of the Comoros is an important site for wintering humpback whales in the western Indian Ocean and for a wide variety of cetacean species.

***Keywords*:** Indian Ocean, breeding grounds.

Introduction

The Indian Ocean has been designated as a whale sanctuary since 1979, at the initiative of the Seychelles government. This comprises the waters of the Northern Hemisphere from the coast of Africa to 100°E, including the Red and Arabian Seas and the Gulf of Oman; and the waters of the Southern Hemisphere in the sector from 20°E to 130°E, with the southern boundary set at 55°S (Leatherwood & Donovan, 1991). However, few studies on cetacean populations have been conducted round the islands of the western part of the Indian Ocean Sanctuary (see for example Balance *et al.*, 2001 for the Maldives area; Keller *et al.*, 1982 for the Seychelles; Avolio *et al.*, 2002 for the island of Mayotte, south-eastern Comoros; Rosenbaum *et al.*, 1997 for Madagascar; Corbett, 1994 for Mauritius; and Amir *et al.*, 2002 for Zanzibar).
In the eastern African region, there are at least 25 cetacean species recorded, including six baleen whales, 10 toothed whales and nine delphinids (de Lestang, 1993; La Hausse de la Louviere, 1991; reviewed by De Boer *et al.*, 2002). The most common dolphin species observed are the Indo-Pacific humpback dolphin, the bottlenose dolphin, the spinner dolphin, the spotted dolphin and the striped dolphin.

No previous studies on the diversity, status and distribution of cetaceans have been conducted in the Comoros archipelago. The Comoros are situated in the northern Mozambique Channel, in the western tropical Indian Ocean (Figure 1). The archipelago consists of four main islands[1], and many surrounding small islets. The islands of *Mohéli*, *Anjouan,* and *Grande Comore* (Union of the Comoros) constitute volcanic islands. The *Anjouan* and *Grande Comore*, feature deep oceanic waters in close proximity to the coastline. In contrast, the southern coastal waters of *Mohéli* (where effort was concentrated) are shallow waters, including coral reef complexes and smaller islands extending to the 100m isobath (around 404 km²).
Dedicated small boat surveys were conducted in 2002 and 2003 in order to assess cetacean diversity, distribution, and occurrence, with a special attention to wintering humpback whales (*Megaptera novaeangliae*). In addition, opportunistic sighting data collected both by the *Parc Marin de Mohéli* and the NGO *Megaptera Océan Indien* provided additional information on the occurrence of marine mammals in this area. A qualitative description of the data is presented in this report, especially regarding the diversity of species encountered and details of the wintering humpback whale population. A review of available information of marine mammals around the Union of the Comoros is also provided.

MATERIALS AND METHODS

Dedicated surveys

Two data sources were used in this study. Sighting data collected during the months of August and September 2002, round the three main islands of the Comoros (*Anjouan, Mohéli, Grande Comore*), during dedicated closing mode surveys. Observation effort focussed north and south of the island of *Anjouan*, off the southern coast of *Mohéli*, and off the western and southern coasts of *Grande Comore*. Two to four permanent observers have recorded cetacean sightings (species, position, group size, behaviour) onboard small motorized boats (5-7 meters long, 25 to 40 PH engine).
A closing mode methodology was employed in which the survey vessel would leave a previously determined search track in order to close on the group of whales or dolphins (Ersts *et al.*, in prep). The survey vessel would return to the search track once the group of whales or dolphins had been completely sampled. Maximum time limits were imposed so as not to stress the individual animals in the group or affect their behaviour. Search tracks were not rigidly defined or followed. Consequently, data collected during closing mode surveys were not used in analyses of distribution or density.
When a group of marine mammals was encountered, the initial position of the group was recorded in addition to descriptive attributes and photographs of diagnostic features. Because humpback whales were the primary focus of these surveys, behavioural information was not collected for other cetacean species and photographic data of other species were only collected for species confirmation. Groups of humpback whales were classified into one of seven classes (mother-calf pairs, mother-calf-escort, pairs, competitive groups, non-competitive, singers, and singletons), based on observed attributes or behavioural characteristics previously described for this species (Tyack & Whitehead, 1983; Baker & Herman, 1984; Clapham *et al*., 1992). Individual humpback whales were also identified using photographs of the ventral side of their tail flukes (Katona & Whitehead, 1981), dorsal fins (Blakmer *et al.*, 2000), and other natural markings (Mayo, 1982).

Opportunistic records

We collated incidental sightings data from 2000 to 2003 throughout the year collected by fishermen, local field naturalists and other various observers (habituated to cetacean identification in the western tropical Indian ocean). All the data collected were vessel-based. The data were also recorded by experienced observers during trips dedicated to other activities (on boarded observers during a trip dedicated to film the whales in 2003) than marine mammal census which are centralised in the databases of the *Parc Marin de Mohéli* and the NGO "*Megaptera Océan Indien*".

RESULTS AND DISCUSSION

Effort during dedicated surveys

From July to October of 2002, a total of 42 trips were performed during daylight hours.
A total of 117 hours were spend at sea around the three islands (Figure 1), during the austral winter (July-October), to undertake cetacean closing mode surveys.

[1] Mayotte is the fourth island of the Comoros, but under French administration. This island is not investigated in the present work. Please refer to Kiszka *et al*. (SC/58/O13).

Diversity of species

A total of fourteen marine mammal species (one sirenian and thirteen cetaceans) were recorded in the Comoros (n=152 sightings), *i.e.* dugong (*Dugong dugon,* n=1), humpback whale (n=98), sperm whale (*Physeter macrocephalus*, n=1), spinner (*Stenella longirostris*, n=21), pantropical spotted (*Stenella attenuata*, n=7), bottlenose (*Tursiops* sp., n=6), Fraser's (*Lagenodelphis hosei*, n=1), Risso's dolphin (*Grampus griseus*, n=1) melon-headed (*Peponocephala electra*, n=2), pygmy killer (*Feresa attenuata*, n=8), short-finned pilot whales (*Globicephala macrorhynchus*, n=3), but also Blainville's (*Mesoplodon densirostris*, n=2), and Longman's beaked whale (*Indopacetus pacificus*, n=1). The bulk of the data were collected during the dedicated cetacean surveys (78%). This diversity of marine mammal species is relatively high around the Union of the Comoros, with the presence of both coastal and oceanic species. A provisory list of marine mammal species from the Comoros archipelago (including Mayotte) has been established by Tilot (1997) and Paris (1999) and has been reviewed by Louette *et al.* (2004). Previous records of dugongs include, two observed/found at/by *Grande Comore* in 1987 (Tilot, 1997), several catches and sightings reported in southern *Mohéli* from 1982 to 2003 (Tilot, 1994; Beudard, personal communication[2]), and several sightings reported from *Anjouan* between September and October in 1993, and finally two sightings in January 1994 in Domoni (see Figure 1). In Mayotte, many sightings and dugong catches regularly occur and were reported in Kiszka *et al.* (2004).
Another cetacean species (species not recorded in our database), the Cuvier's beaked whale (*Ziphius cavirostris*), was noted by Robineau (1975), who recorded in *Grande Comore* based on the finding of a stranded individual.

Humpback whale distribution and group composition

The humpback whale was by far the most encountered species during the surveys (71.5% of encounters), followed by the spinner dolphin (15.3%). A total of 13 groups were encountered in *Anjouan*, 27 off *Grande Comore*, and 23 off *Mohéli* (with 25, 57, and 23 individuals observed, respectively). The species was encountered throughout the study area, with an average occurrence of 0.42 groups/hour of effort off *Anjouan*, vs. 0.56 off *Mohéli*, and 0.60 off *Grande Comore*.
Humpback whale group composition was heterogeneous, with the presence of both mother-calf pairs (48.6%), competitive groups (14.3%), mother-calf pairs with an escort (20%), and singletons/singers (17.1%). A photo-identification catalogue has been set-up during the surveys. A total of 153 different individual whales were identified. Between-days site fidelity was observed in three individuals in *Mohéli* during a week in September 2003.

CONCLUSION

Many species of marine mammals can be found in the Comoros waters, both coastal and oceanic species. Only one baleen whale species has been recorded around the Union of the Comoros, the humpback whale. This whale was the most frequently sighted cetacean species during the austral winter (July to October), where they reproduce in these low-latitudes. Further research on the spatial/temporal distribution, abundance and movements of humpback whales are needed in Comoros waters, as well as more comprehensive studies on the other cetaceans found in the area. The conservation status of marine mammal population is unknown and needs to be determined. Threats facing to marine mammals need to be investigated in this area. The increasing human population and the development of tourism may impact negatively marine mammal populations in the area.

REFERENCES CITED

Amir, O.A., Berggren, P. & Jiddawi, N.S. 2002. The incidental catch of dolphins in gillnets fisheries in Zanzibar, Tanzania. *Western Indian Ocean Journal of Marine Science*, 1: 155-162.

Avolio, M., Ersts, P.J., Pomilla, C., Vély, M., Bastid, J.-J., Wendling, B., Seitre, R., Seitre, J., Dammangeat, P., Collin-Mones, V., Razafindrakoto, Y., Findlay, K. & Rosenbaum, H.C., 2002. Humpback whale distribution and marine mammal diversity in the waters of Mayotte (Comoros archipelago), in the Mozambique Channel. Paper SC/54/H18 presented to the IWC Scientific Committee.

Baker, C. S. & Herman, L. M. (1984). Aggressive behavior between humpback whales (*Megaptera novaeangliae*) wintering in Hawaiian waters. *Canadian Journal of Zoology*, 64: 1922-1937.

Ballance, L.T., Anderson, R.C., Pitman, R.L., Stafford, K., Shaan, A., Waheed, Z. & Brownell Jr. R.L. 2001. Cetacean sightings around the Republic of the Maldives, April 1998. *Journal of Cetacean Research and Management*, 3: 213-218.

[2] François Beudard, personal communication, August 2004.

Blackmer, A. L., Anderson, S. K. & Weinrich, M.T. 2000. Temporal variability in features used to photo-identify humpback whales (*Megaptera novaeangliae*). *Marine Mammal Science*, 16: 338–354.

Corbett, H.D. 1994. The occurrence of cetaceans of Mauritius and adjacent waters. *Report of the International Whaling Commission*, 44: 393-397.

Clapham, P. J., Palsbøll, P. J., Mattila, D. K. & Vasquez, O. 1992. Composition and dynamics of humpback whale competitive groups in the West Indies. *Behaviour*, 122: 182-194.

De Boer, M.N., Baldwin, R., Burton, C.L.K., Eyre, E.L., Jenner, K.C.S., Jenner, M.N.M., Keith, S.G., McCabe, K.A., Parsons, E.C.M., Peddemors, V.M., Rosenbaum, H.C., Rudolph, P. and Simmonds, M. 2002. Cetaceans in the Indian Ocean Sanctuary: A review. Paper SC/54/O5 presented to the IWC Scientific Committee.

Katona, S.K. & Whitehead, H.P. 1981. Identifying humpback whales using their natural markings. *Polar Record*, 20: 439–444.

Keller, R.W., Leatherwood, S. & Holt, S.J. 1982. Indian Ocean cetacean survey, Seychelles islands, April through June 1980. *Report of the International Whaling Commission*, 32: 503-513.

Kiszka, J., 2004. *Les mammifères marins dans les eaux de Mayotte (Océan Indien): statut écologique et de conservation dans le cadre de l'inventaire du patrimoine naturel selon la méthodologie nationale ZNIEFF*. Report de l'Observatoire des Mammifères Marins de Mayotte (Office National de la Chasse et de la Faune Sauvage & Direction de l'Agriculture et de la Forêt). 24 p.

Kiszka, J., Vely, M., Bertrand, N., Breysse, O., Wickel, J. & Maleck-Bertrand, N., 2004. Mayotte and Reunion. Pp. 55-55. *In*: C. Muir, A. Ngusaru & L. Mwakanema (eds.). *The Status of Dugongs in the Western Indian Ocean & Priority Conservation Actions.* The Eastern African Marine Ecoregion.

Leatherwood, S. & Donovan, G.P. 1991. Cetaceans and cetacean research in the Indian Ocean Sanctuary. *In*: S. Leatherwood & G.P. Donovan (eds). *Cetaceans and cetacean research in the Indian Ocean Sanctuary.* Marine Mammal Technical Report N°3, UNEP, Nairobi, Kenya.

Louette, M., Meirte, D. & Jocqué, R. (eds.) 2004. *La faune terrestre de l'archipel des Comores*. Studies in Afrotropical Zoology, 293. Tervuren : MRAC.

Mayo, C. 1982. Observations of cetaceans: Cape Cod Bay and Stellwagen Bank, Massachusetts, 1975-1979. (Final report to the Marine Mammal Commission). NTIS PB82-186263 (unpublished).

Paris, B. 1999. *Espèces de faune et de flore connues en RFI des Comores. Projet de conservation de la biodiversité et développement durable*. (PNUD/FEM) Moroni, Comores.

Pitman, R.L., Palacios, D.M., Brennan, P.L.R., Brennan, B.J., Balcomb, K.C.III, & Miyashita, T. 1999. Sightings and possible identity of a bottlenose whale in the tropical Indo-Pacific: *Indopacetus pacificus*? *Marine Mammal Science*, 15: 531-549.

Robineau, D. 1975. Echouage d'un *Ziphius cavirostris*, Cuvier 1823, dans l'archipel des Comores (Océan Indien). *Mammalia*, 39: 513-515.

Rosenbaum, H.C., Walsh, P.D., Razafindrakoto, Y., Vely, M. & DeSalle, R. 1997. First description of a humpback whale breeding ground in Baie d'Antongil, Madagascar. *Conservation Biology*, 11: 312-314.

Ross, G.J.B., Heinsohn, G.E. & Cockroft, V.G.C. 1994. Humpack dolphins *Sousa chinensis* (Osbeck, 1765), *Sousa plumbea* (Cuvier, 1829) and *Sousa teuszii* (Kukenthal, 1892). Pp. 23-42. *In* S.H. Ridway & Sir R. Harrison. *Handbook of Marine Mammals*. Volume 5: The first book of dolphins.

Tillot, V. 1994. *Etude de l'environnement marin et côtiers et des aspects socio-économiques de la pêche autour de l'île de Mohéli*. Rapport de projet PNUD/UNESCO/UICN – COI/91/006 « Appui à la programmation nationale en matière d'environnement ». 80 p.

Tilot, V. 1997. Caractéristiques écologiques et recommandations pour la conservation de la biodiversité des ressources naturelles des milieux marins, côtiers et terrestres de la Grande Comore (République Fédérale Islamique des Comores, SW Océan Indien). *Mésogée*, 55: 65-106.

Tyack, P. and Whitehead, H. 1983. Male competition in large groups of wintering humpback whales. *Behaviour*, 83: 132-154.
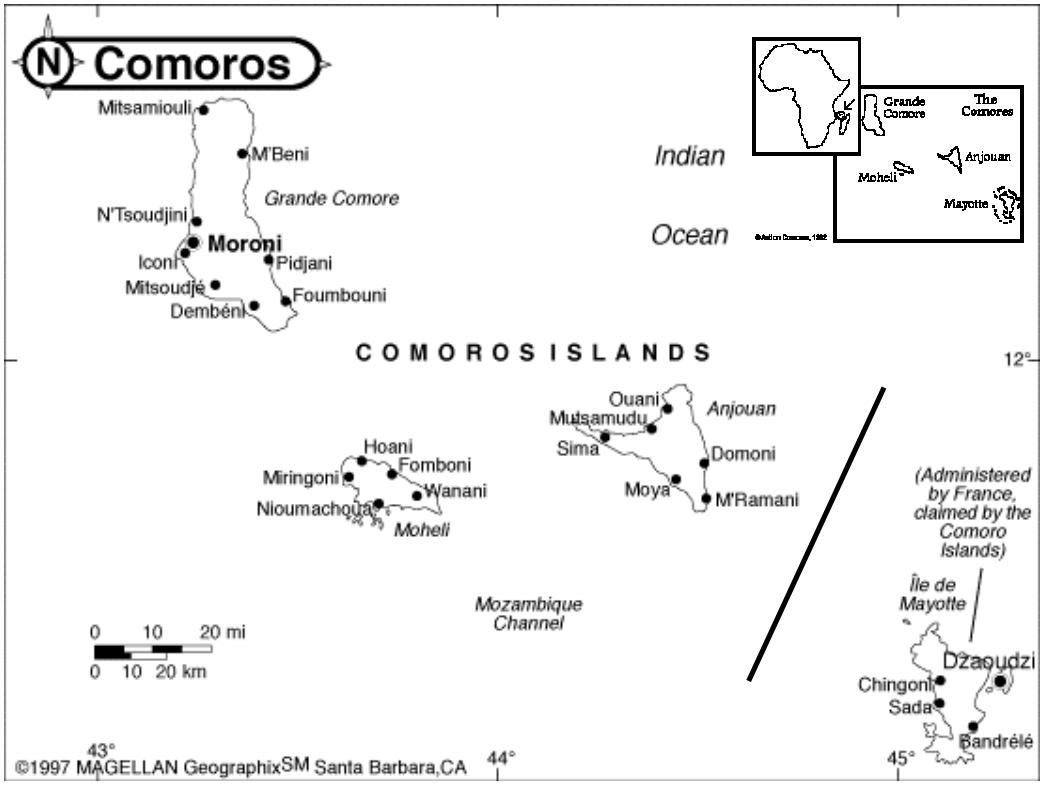
Fig. 1: Presentation of the area of study.