

CETACEAN OCCURRENCE IN THE SANTA MARTA REGION, COLOMBIAN CARIBBEAN, FEBRUARY-MAY 2007¹

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Until recently, cetacean presence in the Santa Marta region of the Colombian Caribbean was poorly documented and limited to incidental reports (Cuervo *et al.*, 1986; Prieto-Rodríguez, 1988; Vidal, 1990; Flórez-González and Torres, 1994⁵; Flórez-González and Capella-Alzueta, 1995; Flórez-González *et al.*, 2004). Continued presence and interest by researchers in the area since the early 2000's has resulted in significant new information, including a better understanding of species occurrence, environmental influences, and human impacts on the local populations (Pardo and Palacios, 2006; Jiménez-Pinedo and Domínguez-García, 2007; Lozano, 2007). With the aim of providing continuity to the study of cetaceans in the region, this study reports on the cetacean community around Santa Marta during the first months of 2007. We evaluate our methods and results in the context of these recent studies and provide recommendations for future research in the region.

Santa Marta's coastal zone is highly variable over the course of the year in water temperature, salinity, and fisheries yields (Manjarrés *et al.*, 1993⁶). Input from deep, nutrient-rich waters (150-200m) to the surface takes place during December to April (the dry season) as a result of wind-driven coastal upwelling, which also increases salinity up to 36.5‰ and lowers water temperatures to 22-25°C. For the rest of the year (the rainy season) a surface countercurrent enters the region from the south, decreasing salinity values and increasing water temperatures (Fajardo, 1978; Bula-Meyer, 1990; Díaz-Merlano, 1990⁷; Ramírez, 1990⁸; Andrade-Amaya, 2001; Franco-Herrera, 2005⁹). The abrupt geomorphology of the region is determined by the

presence of the Sierra Nevada de Santa Marta, whose foothills extend to the coast, resulting in an absence of a continental shelf and leading to water depths up to 100m at distances between 0.5 and 6km from the coast, and resulting in an intricate system of bays, coves and rocky shores (Andrade, 1988; Díaz-Merlano, 1990⁷; Díaz-Merlano and Gómez, 2000¹⁰). The presence of deep waters close to shore confers the coastal environment an oceanic character (Bula-Meyer, 1990; Franco-Herrera, 2005⁹).

The study was conducted between Gaira Bay (11°12'N, 74°15'W) and Arrecifes (11°20'N, 73°57'W), in the Tayrona National Natural Park (TNNP), during February and May 2007 (Figure 1). Observations from land-based stations (42.2hr in 17 days) were conducted on key outposts located at a height of about 15m above sea level using Minolta® 8x40 binoculars with a vision range of 8.2° and 143m. Additionally, 16 boat-based surveys (83.0hr) were carried out systematically over a 36.7km transect running parallel to the coastline at a distance of 1km from shore. The boat, with 9m length, had an effective visual range of about 2km and operated at a survey speed of about 9.6km/hr, slowing down whenever a group of animals was encountered. Two trained observers were constantly looking out, in sea-state conditions of Beaufort <4. Shape and color pattern of the animals and appropriate photographic material was collected, as well as data concerning time and location of the sighting, number of individuals, heading of the animals, surface behavior, sea state and visibility. In addition to the shore-based and boat surveys, incidental sightings collected by third parties with training on marine

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⁵ Flórez-González, L. and Torres, D. (1994) Presencia de la ballena tropical *Balaenoptera edeni* y ballena yubarta *Megaptera novaeangliae* en la región de Santa Marta, Caribe colombiano. Page 83 in Abstracts, IX Seminario Nacional de Ciencias y Tecnologías del Mar y Congreso Latinoamericano de ciencias del mar, 21-25 November, Medellín, Colombia.

⁶ Manjarrés, L., Infante, J., Rueda, A. and Escorica, F. (1993) Evaluación de captura y esfuerzo pesquero en el área marítima de Santa Marta. Instituto Nacional de Pesca y Agricultura-INPA, Centro Internacional de Investigación para el Desarrollo-CIID, *Proyecto integral de investigaciones y desarrollo de la pesca artesanal marítima en el área de Santa Marta*: Pages 21-43. [Available from Universidad del Magdalena, Santa Marta, Colombia].

⁷ Díaz-Merlano, J.M. (Ed.) (1990) Estudio ecológico integrado de la zona costera de Santa Marta y Parque Nacional Natural Tayrona. Project final report: 439pp. [Available from INVEMAR, Santa Marta, Colombia].

⁸ Ramírez, G. (1990) Distribución de los nutrientes inorgánicos en las aguas costeras de la región de Santa Marta. Caribe colombiano. Pages 244-254 in Proceedings, VII Seminario Nacional de Ciencias y Tecnologías del Mar. Comisión Colombiana de Oceanografía, 30 October - 2 November, Cali, Colombia.

⁹ Franco-Herrera, A. (2005) Oceanografía de la Ensenada de Gaira-El Rodadero, más que un centro turístico en el Caribe colombiano: 56 pp. [Available from Universidad Jorge Tadeo Lozano, Santa Marta, Colombia].

¹⁰ Díaz-Merlano, J.M. and Gómez, D.I. (2000) Programa Nacional de Investigación en Biodiversidad Marina y Costera-PNIMB. Fondo Financiero de Proyectos de Desarrollo-FONADE, Ministerio de Medio Ambiente. [Available from Instituto de Investigaciones Marinas-INVEMAR, Santa Marta, Colombia].

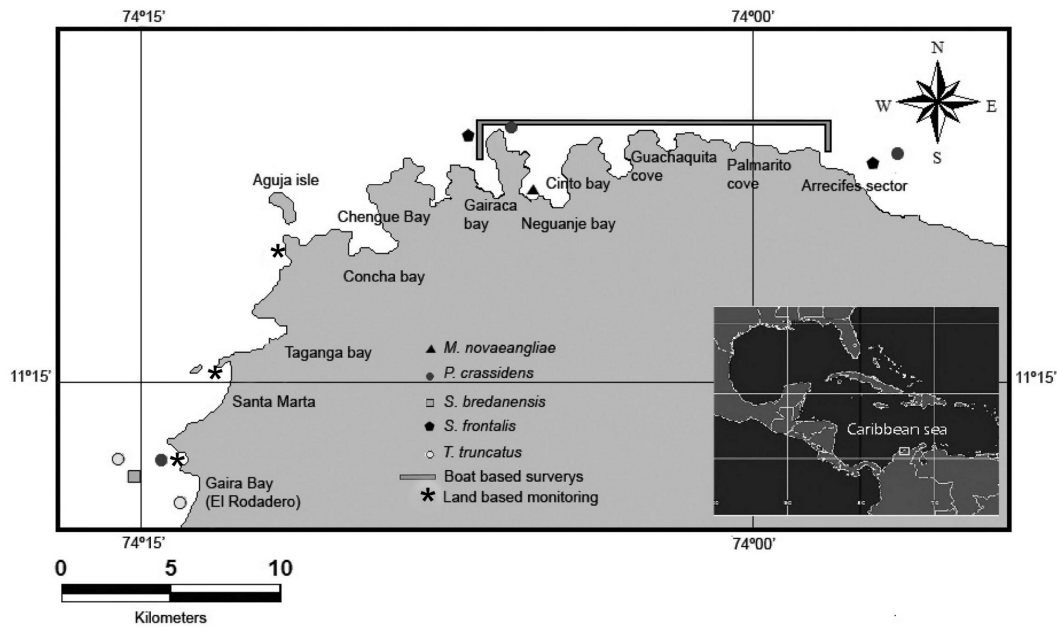


Figure 1. Study area showing land-based monitoring areas (open triangles), the typical track of the boat-based surveys (thick line), and the location of the cetacean observations (filled symbols).

mammal identification and supported with adequate photographic and filmic material are considered here as supplemental information.

To obtain an environmental context for the presence of the various cetacean species recorded during the study, oceanographic data was obtained from the Oceanographic and Hydrographic Investigation Center (CIOH) and from the Jorge Tadeo Lozano University's SURDEMAG Program, which focuses on the study of upwelling dynamics in Magdalena, the political department to which the Santa Marta region belongs. Bathymetric and ocean floor charts were obtained from the Instituto de Investigaciones Marinas y Costeras (INVEMAR). Finally, ichthyic material was sampled from the landings by the local artisanal fisheries.

Humpback whale (*Megaptera novaeangliae*) – On 21 April 2007, the carcass of an animal measuring 6.15m was found ashore in Neguanje Bay (Table 1, Figure 1), in a high level of decomposition. Unidentified ectoparasites and a deep,

circular perforation (10cm diameter) in the caudal peduncle were observed (Figure 3c-d). Due to the decomposition level it was not possible to ascertain the cause of death; however samples of skin, blubber and vertebrae were collected and deposited at the Jorge Tadeo Lozano University for future study.

According to the mean length at birth of this species (4.5m) (Clapham and Mead, 1999) the animal was a calf. The humpback whale has only been occasionally reported in the Colombian Caribbean (Vidal, 1990; Flórez-González and Capella-Alzueta, 1995). Individuals from the North Atlantic population gather in the southeastern Caribbean during mid-February and mid-March, where nursing, mating and calving occurs (Swartz, *et al.*, 2003). Therefore, it is quite possible that the stranded calf belonged to this population. Studies documenting the presence of the humpback whale in the Colombian Caribbean are needed, focusing on determining the relationship between animals found in the southwestern Caribbean to those elsewhere.

Table 1. Summary of cetacean observations collected in the Santa Marta region during the survey.

DATE DD/MM/YY	SPECIES	LOCATION	GROUP COMPOSITION	TYPE OF EVENT	SURFACE EVENTS
07/01/07	<i>Pseudorca crassidens</i>	Gairaca bay	Und.	Ind.	Trav.
13/01/07	<i>Tursiops truncatus</i>	Gairaca bay	Und.	Ind.	Und.
14/02/07	<i>Stenella frontalis</i>	Gairaca bay	3 (A/J)	Dir.	Rest.
17/02/07	<i>Pseudorca crassidens</i>	Arrecifes sector	22 (Und.)	Dir.	Trav.
18/02/07	<i>Tursiops truncatus</i>	Gairaca bay	Und.	Ind.	Und.
24/02/07	<i>Stenella frontalis</i>	Arrecifes sector	23 (A/J/C)	Dir.	Trav.
04/03/07	<i>Pseudorca crassidens</i>	Neguanje bay	30 (A/J)	Dir.	Feed.
15/03/07	<i>Steno bredanensis</i>	Gairaca bay	30 (A/J)	Dir.	Feed.
21/04/07	<i>Megaptera novaeangliae</i>	Neguanje bay	1 (C)	Stran.	N/A

Und. = undetermined; A = adults; J = juveniles; C = calf; Ind. = indirect sighting; Dir. = direct sighting; Stran. = stranding; Rest. = resting; Trav. = traveling; Feed. = feeding; N/A = not applicable.



Figure 2. False killer whales sighted off the Santa Marta region.

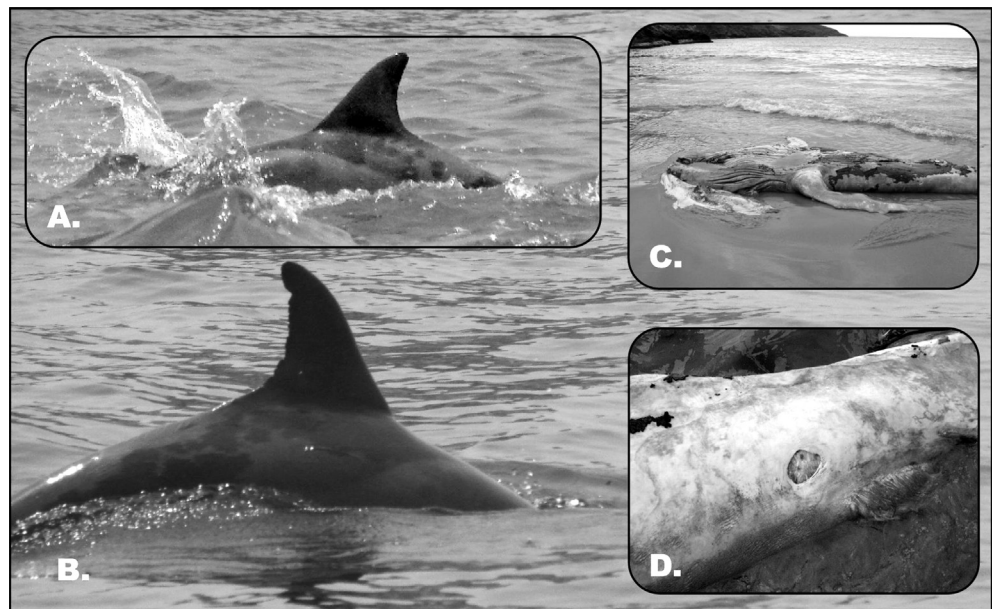


Figure 3. Skin lesions in rough-toothed dolphins (a-b) and a stranded humpback whale showing a perforation wound in the caudal peduncle (c-d).

Atlantic spotted dolphin (*Stenella frontalis*) – The two sightings made in this study were located around the 50m isobath (Table 1, Figure 1); in both occasions the animals appeared to be in transit through the zone. The group structure of the sighted animals contained adults and juveniles. This species is common in the Santa Marta region, having been previously reported by Vidal (1990), Flórez-González and Capella-Alzueta (1995), Pardo and Palacios (2006) and Jiménez-Pinedo and Domínguez-García (2007). According to Pardo and Palacios (2006) and Bolaños-Jiménez *et al.* (2007¹¹), who worked previously in the Santa Marta region and in adjacent Venezuelan waters,

respectively, the Atlantic spotted dolphin tends to use waters around the 200m isobath, coming into shallower coastal zones sporadically. At least part of the population found in Venezuela displays a high site fidelity, with re-sightings separated by few days or even months (Bolaños-Jiménez *et al.*, 2007¹¹). It is important to continue the studies on this species to determine the relationship of the animals seen off Santa Marta and those found in the Venezuelan waters as well as the stock structure in the southwestern Caribbean. Common bottlenose dolphin (*Tursiops truncatus*) – Two incidental sightings were reported near the coast, in waters 10-20m deep (Table 1), which is common

¹¹ Bolaños-Jiménez, J., Villaroel-Marin, A., Parsons, E.C.M. and Rose, N. (2007) Origin and development of whale watching in the state of Aragua, Venezuela: Laying the groundwork for sustainability. In Abstracts, *Proceedings of the 5th International Coastal and Marine Tourism Congress*, 11-15 September, Auckland, New Zealand.

for the species (Würsig and Würsig (1978). As the spatial distribution of cetaceans is highly correlated with areas of bathymetric relief (Mignucci-Giannoni, 1998; Oviedo *et al.*, 2005; Bilgmann *et al.*, 2007), we suggest that these animals may travel through the area and enter the bays, using them as resting or foraging places. This species, as the Atlantic spotted dolphin, has been reported several times in the region by Prieto-Rodríguez (1988), Vidal (1990), Flórez-González and Capella-Alzueta (1995), Pardo and Palacios (2006), Lozano (2007) and Jiménez-Pinedo and Domínguez-García (2007).

Rough-toothed dolphin (*Steno bredanensis*) - One sighting of the species with a high cohesion between the individuals that made up the group was observed (Table 1). The animals showed slow movements at the surface, which according with Würsig and Würsig (1978) suggest foraging behaviors. Despite the species' pelagic habits, the animals can have seasonal inshore movements related to prey concentrations (Longhurst and Pauly, 1987; Mignucci-Giannoni, 1998; Addink and Smeenk, 2001). Apparent skin lesions were observed (Figure 3a, b), which could have been caused by chemical or organic pollutants in the water (Van Bresse *et al.*, 1999; 2003; 2007). More studies are required to determine the cause of these lesions and its pervasiveness in the population.

False killer whale (*Pseudorca crassidens*) - During the three sightings of the species (Table 1) the animals were traveling, except for one group observed in Neguanje Bay, which appeared to be feeding on surface fishes and showing behaviors indicative of subsurface foraging activities like strong movement of the caudal fin towards the water (Acevedo-Gutiérrez *et al.*, 2007). Upwelling in the Santa Marta region offers enriched waters during the dry season and, according to fishery catch, prey availability is increased (Manjarrés *et al.*, 1993⁶; CPMO, 2007¹²). The ichthyic material collected by artisanal fisheries during the surveys was mostly albacores (*Thunnus alalunga*), frigate tunas (*Auxis hazard*), little tunnies (*Euthynnus alletteratus*), and sardines (*Sardinella* sp.), upon which the false killer whale and the rough-toothed dolphin may feed (Longhurst and Pauly, 1987; Addink and Smeenk, 2001).

In the Wider Caribbean, the false killer whale has been reported for Cuba, Saint John's in the Virgin Islands, Saint Vincent, Tobago, and Venezuela (Mignucci-Giannoni, 1998; Romero *et al.*, 2001¹³). In Colombian waters, one sighting had been previously reported near the oceanic archipelago of San Andrés and Providencia (Palacios *et al.*, 1995¹⁴; 1996¹⁵; Pardo *et al.*, 2009b). In addition, a stranded specimen was reported in the Santuario de Fauna y Flora Los Flamencos (11°24'N, 73°07'W), to the northeast of Santa Marta, by Pardo *et al.* (2009a). The sightings presented here constitute the first live record of the species in the Santa Marta region and in the continental Caribbean coast of Colombia, adding it to the confirmed range of the species in the southwestern Caribbean.

The two sampling strategies used during the study, land-based monitoring and boat-based surveys, were previously employed by Pardo and Palacios (2006) and Jiménez-Pinedo and Domínguez-García (2007), having yielded useful results. However, given the limited financial resources for research in the region, it is suggested that future studies focus their efforts on coastal boat-based surveys to include a larger sampling area in deeper zones not accessible from the land stations. Incidental reporting by trained personnel and the use of platforms of opportunity has been shown to augment the data collected by directed studies.

The information presented here, together with the earlier results from Pardo and Palacios (2006), Jiménez-Pinedo and Domínguez-García (2007) and Lozano (2007), indicate the persistent presence of several species such as the common bottlenose dolphin, the Atlantic spotted dolphin and the rough-toothed dolphin. From these studies, no clear pattern of species occurrence in the zone emerges. However, species with both coastal and oceanic habits are present in the region, and appear to use it as a foraging ground or perhaps for transiting to other areas, according to the local availability of food. It is important to continue monitoring efforts in the region with long-term studies that may further contribute to the knowledge of the cetacean community of the southwestern Caribbean.

¹² Central de Pronósticos Meteorológicos y Oceanográficos-CPMO. (2007) Boletín meteomarinero mensual del Caribe colombiano. Centro de Investigaciones Oceanográficas e Hidrográficas (CIOH). [PDF available from <http://www.cioh.org.co/dev/proserv/boletinmet.html>].

¹³ Romero, A., Agudo, A.I., Green, S., Notarbartolo di Sciarra, G. (2001) Cetaceans of Venezuela: Their distribution and conservation status. U.S. Department of Commerce, *A technical report of the Fishery Bulletin* 151: 61 pp. [Available from NMFS, Seattle, Washington, USA].

¹⁴ Palacios, D., Gerrodette, T., Beltrán, S., Rodríguez, P. and Brennan, B. (1995) *Cetacean sighting cruises off the Colombian Caribbean Sea and Pacific Ocean*. Page 88 in Abstracts, Eleventh Biennial Conference on the Biology of Marine Mammals, 14-16 December 1995, Orlando, Florida, USA.

¹⁵ Palacios, D., Rodríguez, P., Brennan, B.J., Beltrán, S., and Trujillo, F. (1996) *Cetacean sightings during cruises in the southwestern Caribbean Sea*. Page 76 in *Programas y Resúmenes*, 7ma. Reunión de Trabajo de Especialistas en Mamíferos Acuáticos de América del Sur, 22-25 October 1996, Viña del Mar, Chile.

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