

PROJECT SUMMARY

The spotted dolphin is the most frequently sighted dolphin among the coastal cetaceans in Costa Rican waters, and it has become a target for whale watching and other recreational activities. Whale-watching is defined by the International Whaling Commission as any commercial enterprise which provides for the public to see cetaceans in their natural habitat. The most recent worldwide estimation on whale-watching revenues reports this activity is worth an estimated \$1 billion. Despite the exponential increase of this activity, little is known about its short and long-term effects on cetaceans' behavior. Studies to assess tourist activities effects on cetaceans reflect a considerable research effort throughout the last decade.

Some studies have detected behavioral disturbance in cetaceans that have been exposed to whale-watching. Whale-watching is generally classified as "ecotourism", nevertheless, it brings negative effects when practiced without regulation. This can be noticed in the short term, for instance when a dolphin population show evasive behavior or leave a place that is been controlled by this activity. In addition, there might be long-term effects, such as the species' vulnerability when it has been subjected to stress for certain periods of time or, in a worst-case scenario, with habitat reduction for them. In aquatic mammals, this reduction (e.g. acoustic pollution) might be caused by changes in distribution and use patterns in area that are ecologically important for certain species, especially if these are breeding and feeding areas.

In general, cetaceans' temporal and spatial distribution is under the influence of a series of environmental factors, biotic factors and anthropogenic factors, including fishing boats and vessel traffic, among others. The spotted dolphin is commonly observed in Caño Island and Drake Bay area in the Southern Pacific Costa Rica, but currently there is no information available about their occurrence patterns and behavior (in absence or presence of tourist boats).

Main Results

This thesis consists of two chapters (papers). The purpose of Chapter 1 was to determine the distribution and behavioral patterns of coastal spotted dolphins in the area around Caño Island and Drake Bay during the dry season, taking into account certain environmental variables of the habitat. The purpose of Chapter 2 was to determine the biological and socio-economic data related to the whale-watching industry two areas where this activity is intensively practiced within the country, Drake Bay and Caño Island.

Surveys for each chapter were conducted during dry seasons 2004-2005 and 2005-2006. Band-transects were followed, delineating a triangular area of approximately 260 km². Dolphins' behavior was classified as Feeding, Socializing, Traveling, Resting and Milling.

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The population of coastal spotted dolphins in Caño Island and Drake Bay showed similar behavioral patterns and group sizes to those found in earlier studies conducted elsewhere in the Costa Rican Pacific during the dry season. In addition, dolphins spent more time in feeding activities than in other activities that during the dry season. The highest monthly relative density of sightings was reported in March and April, suggesting that the dominant zooplankton in early summer at Caño Island and surroundings could be a key factor for development of fish species that eventually become spotted dolphins' prey.

Dolphins reacted negatively to those boats that did not follow at least one of the boat handling directions in the national whale-watching regulation (Decree #32495, 2005). In addition, GENMOD analysis showed that feeding and resting behavior in spotted dolphins is less likely to occur in the presence of the tourist boats than in the presence of the research boat (odds ratio values). This might cause this species to evade Drake Bay area if boat mishandling persists. Socio-economic data were collected based on 66 surveys completed by hotel and tour operators' managers, tourist guides and boat drivers from 22 businesses. A total of \$600,000 was estimated in direct whale-watching revenue each year. The density of sightings in presence of tourist boats was greater within 3 km from the island, when compared to the average density in the entire study area. Due to scarce financial resources and personnel in state institutions in Costa Rica, the enforcement of the national whale-watching regulation could be more efficient with partial "bottom-up" control, where community representatives are watching over their own resources.

Workshops:

We (my colleagues from Keto Foundation and I) organized and executed 2 meetings with people from the community, boat captains, tourist guides and tour operator administrators. The first one was an informative meeting (March 26, 2005) about my research at a beginning stage and answered questions from the attendees (boat navigators, tourists' guides, students, families) regarding to my project. There were approximately 20 people in attendance.



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Montero-Cordero, A. 2007. Comportamiento del delfín manchado *Stenella attenuata graffmani* (Cetacea: Delphinidae) en ausencia y en presencia de botes turísticos: Evaluación biológica y socio-económica en Bahía Drake e Isla del Caño. Tesis de Maestría en Biología. Universidad de Costa Rica. 86 p¹.

The second meeting was a successful workshop: *Cetaceans' activities regulation: Dissemination the Decree#32495* (March the 4th, 2006). We explained in simple words the in force Decree # 32495, its biological and legal implications, by making available a place and time to discuss for the about 40 stakeholders (tourism guides, boat drivers, hotel managers, tour operators, tourists, etc., see “AMontero_DecreeWorkshop_KETO”). As a result of this meeting, we elaborated the Dolphins and whales' watching guide (see “AMontero_WW Guide_KETO”), which was distributed to all participants.



Other participation

Montero-Cordero, A. & D. Martínez-Fernández. 2007. Whale-watching revenues and decree regulation awareness in the South Pacific of Costa Rica. 17th Biennial Conference on the Biology of Marine Mammals, Cape Town. Nov. 29th- Dec. 3rd, 2007. (See “AMontero_SMM 17th Biennial_2007”)

Montero-Cordero, A. & J. Lobo. 2008. Efecto De Embarcaciones Turísticas Sobre El Comportamiento Del Delfín Manchado, *Stenella attenuata* En Bahía Drake E Isla Del Caño, Costa Rica. la Reunión de Trabajo de especialistas en Mamíferos Acuáticos (RT), Montevideo, Uruguay. Oct. 13- 17, 2008. Talk. *Accepted*.

Periódico La Nación, Costa Rica (National Newspaper)

<http://www.nacion.com/lne/2008/enero/06/aldea1358540.html>

Boletín CIENCIA Y TECNOLOGIA (National Scientific and Technology Bulletin-CONICIT)

http://www.conicit.go.cr/boletin/boletin72/Andrea_Montero.html

Project details: Keto Foundation website

<http://www.fundacionketo.org/en/proyectos-efecto-potencial-tours-observacion.shtml>

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