

PHOTO-IDENTIFICATION OF ROUGH-TOOTHED DOLPHINS (*STENO BREDANENSIS*) OFF LA GOMERA (CANARY ISLANDS) WITH NEW INSIGHTS INTO SOCIAL ORGANISATION

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INTRODUCTION Photo-identification has been established as a powerful tool in cetacean research. However, no study to date has applied this method to rough-toothed dolphins (*Steno bredanensis*). Off La Gomera, rough-toothed dolphins are present year round, distributed relatively close to shore and suspected to represent a resident population (Ritter, 2002; 2003), thus constituting an excellent target for such a study.

METHODS Photo-ID research and behavioural observations were conducted from 2000-2003 on board of whale watching vessels frequenting the waters south and southwest of the island, using single lens cameras equipped with 70-300mm lenses. Photographs made from 2000-2002 during 29 sightings served as baseline data. From March through June 2003, 71 additional trips were made. The Half Weight Index (HWI) was used to assess non random associations between individuals.

RESULTS 52 sightings were made (9 in 2000, 11 in 2001, 9 in 2002, and 23 in 2003). Total time of observation of rough-toothed dolphins was approximately 32 hours. From 2000-2002, 261 high quality photographs were made, which served as a baseline. In 2003, 26% of 1062 photographs were of high quality enabling identification. Thus, a total of 536 photographs from 52 sightings were analysed in this study. Rough-toothed dolphins showed distinct features suitable for individual identification, such as notch patterns on the fin, global fin shape, pigmentation and distinct scratches (see Figure 1). 12 ID categories were defined (see Table 1). Dolphins showing similar features were assigned to one or more of these categories. 63 individual rough-toothed dolphins could be identified. These were included into the world first electronic ID catalogue of rough-toothed dolphins. Identified individuals were ranked according to quality of photographs and recognisability of markings. Thus, measures of reliability for the re-identification were created. 65% of identified individuals were seen in more than one year, 37% in three or four years. Changes over time of different types of markings occurred, with colour/pigmentation patterns, global fin shape and notch patterns on the dorsal fin being the most stable ones, compared to tip appendices and superficial scratches, which were not found to be reliable on the long term.

The formation of tight and synchronously swimming subgroups (see Figure 3) is an outstanding behavioural peculiarity of rough-toothed dolphins. Subgroup composition was found to be dynamic, with subgroup sizes of 2-8 animals. The Half Weight Index (HWI) was used to assess non random associations between individuals. HWI values ranged from 0 to 0.89 (mean 0.06).

DISCUSSION Photo-identification has been established as a powerful tool in cetacean research (Hammond *et al.*, 1990, Whitehead *et al.*, 2000). With this study, rough-toothed dolphins were found to be a capable target to extend this method to a new species. The identification of 63 individuals, the majority of which were observed in more than one year, strongly suggests residency of rough-toothed dolphins in the Canary Islands. However, we do not know if there is a local population off La Gomera. Off Tenerife, rough-toothed dolphins are observed regularly (Urquiola & de Stephanis, 2000; Martín & Carillo, 2001). As rough-toothed dolphins are regarded as an offshore species (Miyazaki & Perrin 1994), inter-island movements are probable and the existence of an all-over-Canarian resident population is possible, too.

Rough-toothed dolphins show a fluid group composition, between and within observed groups, indicating the existence of a fission-fusion type of organisation of their population, like observed in other cetacean species (Connor *et al.*, 2000; Bruno *et al.* 2004). Association patterns showed that this species not only has strong social bonds between mother and calf/juvenile, but also between individuals of different age classes. These bonds may last for several years. The formation of tight subgroups appears to be a species-specific way how bonds are represented and strengthened.

This first of its kind study on rough-toothed dolphins showed that the use of whale watching vessels as research platforms is an excellent way to collect photo-ID data on a long-term basis. Although a number of restrictions have to be accepted (e.g. time frame and schedule of trips) and results must be dealt with care (see Ritter, 2003), the use of whale watching vessels as a platform of opportunity was proven to shed first light on the social life of a still not well understood species.

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Table 1: Photo ID categories for rough-toothed dolphins off La Gomera

TM	Top missing
TN	.....	Top notches
DN1	.....	1 distinct notch
DN2	.....	2 distinct notches
LN1	.....	1 less distinct notch
LN2	.....	2 less distinct notches
NN	.....	# notches
FS	.....	Fin shape
LE	.....	Leading edge
HP	.....	Hump
CP	.....	Colour pattern
DS	.....	Distinct scratches

Figure 1: Photo-ID features of rough-toothed dolphins off La Gomera. a) TM, DN1 b) DN2, LN, HP c) LN1, FS d) DN1, HP, DS e) CD, DS f) CP. Use Table 1 as a legend

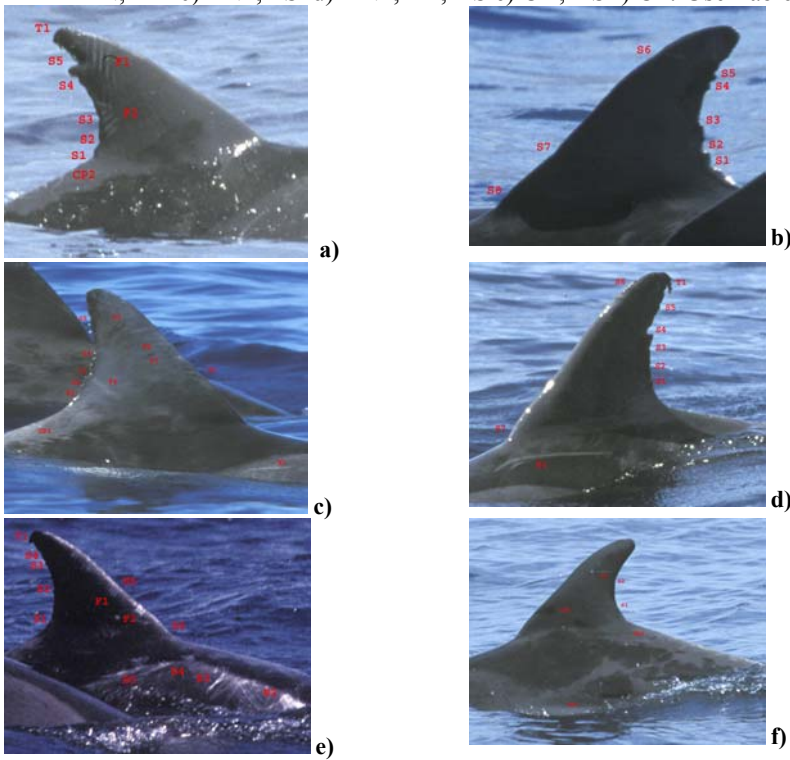


Fig. 3: Tightly swimming subgroup of rough-toothed dolphins off La Gomera

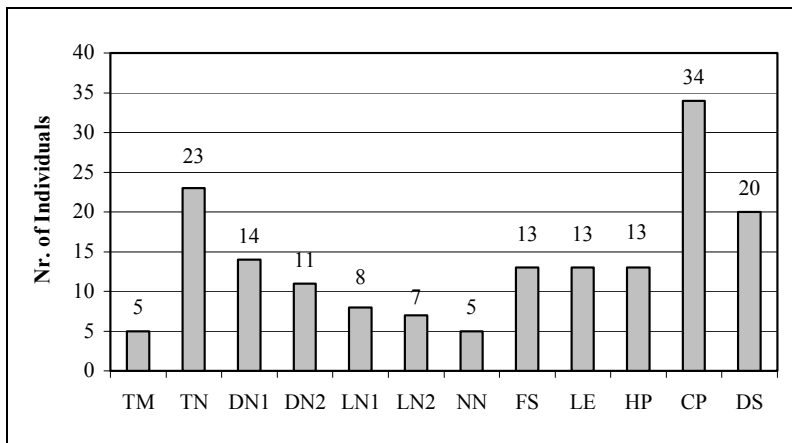


Figure 2: Photo ID categories for rough-toothed dolphins off La Gomera and the number of individuals in each category. Use Tab. 1 as a legend.

Local dive shop operators and fishermen report that rough-toothed dolphins (*Steno bredanensis*) are frequently encountered off the coast of Utila, Honduras, (16°05'46.5"N 86°55'47.8"W). Our observations suggest that at least some of these animals may constitute a resident population, although the extent of the resident group's home range has not been determined. Twenty-eight rough-toothed dolphins were identified using photo-identification techniques, 15 of which were re-sighted on two or more occasions. The 12 animals that were re-sighted four or more times were typically seen together, suggest 1. The rough-toothed dolphin, *Steno bredanensis*. [<http://marinebio.org/oceans/dolphins.asp>, downloaded 18 November 2011]. TRAITS. The rough-toothed dolphin is distinguishable from other dolphins bearing close resemblance to it by its slim nose and tapered small head (Fig. 1). The position of the flippers or pectoral fin is moderately protracted along the body such that it is located further along the body with the dorsal fin exhibiting distinctiveness (Wikipedia 2011). SOCIAL ORGANIZATION. The species are present in groups comprising around 10-20 although a bigger group encompassing approx 50 individuals have been observed in the Canary Island, (Perrin, Wörsig and Thewissen, 2008). Using photo-identification of individual bottlenose dolphins from around all of the main Hawaiian Islands to infer movements, we assessed whether there was evidence for small-scale population structure, and discuss potential implications for management. High levels of site fidelity have been documented for numerous bottlenose dolphin populations (see e.g., Scott et al. Rough-toothed dolphins, *Steno bredanensis* have a broad geographic range which encompasses tropical and subtropical oceans. They have been frequently sighted along various coastal areas such as Kauai, Nihoa, and Oahu of the Hawaiian Islands, the Mediterranean Sea, the Sicily Channel, Tahiti, Moorea, and the Windward Islands. (Gannier and West, 2005; Kuczaj II and Yeater, 2007; Ritter, 2007; Shirihai and Jarrett, 2006; Watkins, et al., 1987).