

CIRN/GREC 2014 Campaign report

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Summary

A cetacean survey campaign was performed around São Miguel Island (Azores) by Anacaona Sailing boat (GREC) from May 8th to May 17th and from July 4th to August 1st of 2014. The team conducted a total of 18 days of effort around the island. A total of 9 species were sighted during the survey: common dolphin (*Delphinus delphis*), atlantic spotted dolphin (*Stenella frontalis*), bottlenose dolphin (*Tursiops truncatus*), striped dolphin (*Stenella coeruleoalba*), risso's dolphin (*Grampus griseus*), sperm whale (*Physeter macrocephalus*), fin whale (*Balaenoptera physalus*), false killer whale (*Pseudorca crassidens*) and Blainville beaked whale (*Mesoplodon densirostris*). The common dolphin together with the Atlantic spotted dolphin were the most sighted species. Some differences in the distribution between the species can be appreciated in the corrected effort maps. Acoustic data is currently under study.

INTRODUCTION

The Groupe de Recherche sur les Cétacés (GREC) is a French NGO based in Antibes. It is composed for twenty effective members, having as president Alexandre Gannier. The association seeks to provide scientific documentation for cetacean populations management and conservation. The GREC is a member of the France Nature Environment, official partner of ACCOBAMS and scientific partner of PELAGOS sanctuary.

The Centro de Investigação dos Recursos Naturais (CIRN) is a research center based in the Biology Department of the University of the Azores. It has as main goals multidisciplinary research in Biotechnology, Biodiversity and Biomedical Sciences.

As a result of collaboration between GREC and CIRN a survey campaign was performed during May and July of 2014, around São Miguel Island, Azores. This

campaign was included in the framework of the Phd Thesis of Marc Fernández: “Habitat suitability of oceanic cetaceans: Comparing presence only and presence/absence modelling”.

Aims

- To collect a Presence/Absence dataset of cetacean around São Miguel to be compared with opportunistic data
- To acquire high quality audio recordings
- To collect photos to be included in the MONICET Photo-Id catalogue

METHODS

The 11.9 meters sailing boat Anacaona was used as survey platform. A minimum of 3 and maximum of 5 observers were used for cetacean detection. Speed varied from 3 to 6 knots with a mean of 4 knots. All survey data was introduced into the on-board monitoring system SMAC (Système de Monitoring Acoustique des Cétacés). During sampling GPS was recorded every 5 minutes and environmental conditions (atmosphere and sea) checked and entered every 15-20 minutes. During observations GPS was recorded every 2 minutes.

Due to visibility and navigability issues, effort was restricted to days with Beaufort <4, steady wind. More exactly, wind speed in the lower part of Beaufort 4 range (11-13 knots) were often compatible with the survey, when the upper range of Beaufort 4 did not allow the continuation of survey. For the same reason, survey feasibility was limited to moderate swell: swell height above 1 meter usually imposed limitations to the boat tracks.

The survey spatial strategy was constrained by the availability of ports, and the sea conditions. The survey area around Sao Miguel was divided in survey blocks, both inshore and offshore, and survey blocks were accessed in relation to the weather conditions. The survey aim was to sample equally the 6 southern survey blocks, and to survey at least once the eastern and western island tips, and northern area. A random zig-zag sample was defined in every block, before starting the survey. Pre-defined tracks were strictly followed, or adapted to wind and swell conditions prevailing on the field. In both cases, the survey tracks obeyed to the randomness condition necessary to deliver un-biased presence/absence effort and sighting data.

An acoustic array system was towed continuously during survey transects, feeding the monitoring system. The acoustic array was a dual stereo system (manufactured by Ecologic Ltd, UK), which was employed in a wide band mode: with a 96-kHz sampling rate and a high-pass filtering, the useful band during surveys was 0.2-48 kHz. This acoustic band was effective to detect any odontocetes in the Açores area, including physeterids, delphinids, ziphiids, as well as the

medium-sized balenopterids (i.e. excluding blue and fin whales). Various SMAC software options enabled to increase the acoustic survey efficiency: filtering-denoising, automatic triggering...

Every 15-20 minutes a human listening was done in order to record data on the acoustic environment (presence of cetaceans, noise level and nature) and any acoustic event. A recording was done whenever useful. In relation with the available crew on-board, a continuous listening was eventually performed.

The periodic listening will be used to provide an acoustic mapping of cetacean presence, independent of visual contact. However, the classification of cetacean acoustic signals will be limited to four coarse taxon level: sperm whale, delphinids, ziphiids, other.

During cetacean observations, recordings were performed routinely whenever sea conditions permitted. Recordings were of variable duration, with full species identification in relation to the visual observation in progress. A precise and unambiguous signal classification could not be given for mixed-species observations.

The visually documented recordings will be used to provide new information on species acoustic identification and classification, especially for delphinids.

RESULTS

The present survey is an addition to the present cetacean knowledge of the Azores. Some studies have been conducted previously, however the basic effort was always done around the Pico Island and Faial Island. From the 28 species reported for the Azores we found at least 9 during the 18 days that the survey lasted.

A total of 18 survey days were performed, corresponding to 144.8 hours and 1234 km (Table 1).

Tab1. Detailed effort for the 2014 survey.

	Time (hours)	Distance (km)
Effort	127.21	1102.5
Off-effort	17.59	131.4

As the main port was located in Ponta Delgada (South Coast of São Miguel Island), most of the effort was realized in the South Coast (Fig.1). However it is important to notice that other areas located at the West were also relatively well sampled.

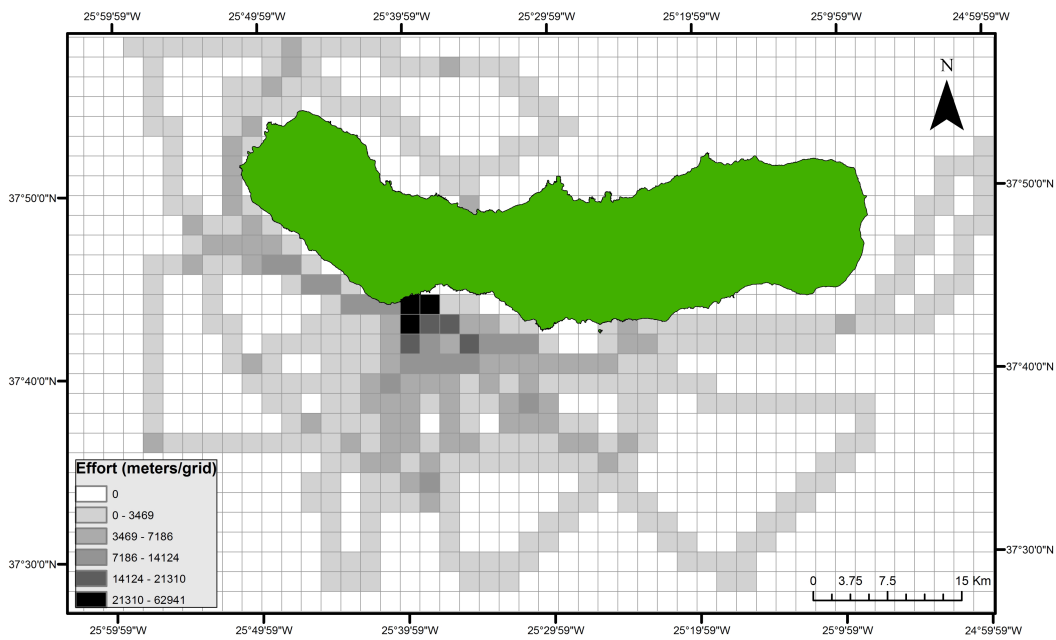


Fig.1: Sampling effort (m) of 2014 survey around São Miguel Island, Azores. Grid size of 2km.

A total of 9 different species were sighted, in a total of 128 sightings. Most common sighted species was the Common dolphin followed by the Atlantic spotted dolphin (Table 2).

Table 2. Species sighted during the survey and mean group size.

Species	Sightings	Mean group size	Min/Max group size
<i>Delphinus delphis</i> (Dd)	68	28.36	2-200
<i>Stenella frontalis</i> (Sf)	26	32.28	7-100
<i>Physeter macrocephalus</i> (Pm)	13	5.50	1-12
<i>Tursiops truncatus</i> (Tt)	10	20.90	2-45
<i>Balaenoptera physalus</i> (Bp)	4	3.5	1-6
<i>Grampus griseus</i> (Gg)	2	3.5	3-4
<i>Pseudorca crassidens</i> (Pc)	2	4.5	4-5
<i>Stenella coeruleoalba</i> (Sc)	2	16.5	3-30
<i>Mesoplodon densirostris</i> (Md)	1	3	3
Unidentified Small delphinids	14	-	-

Sightings were distributed around the entire island, clustering in highest effort area (Fig. 2).

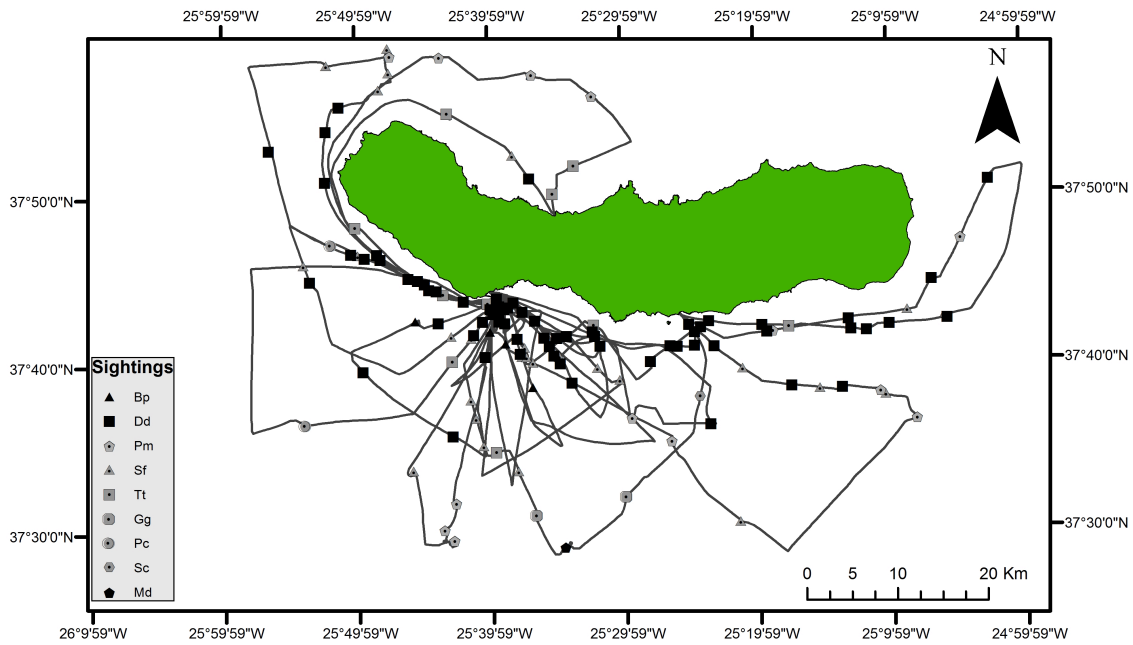


Fig. 2. Tracks and sightings from the 2014 survey

Richness per unit of effort results show how the East and West part of the island together with the North shore have the highest values of cetacean species (fig. 3).

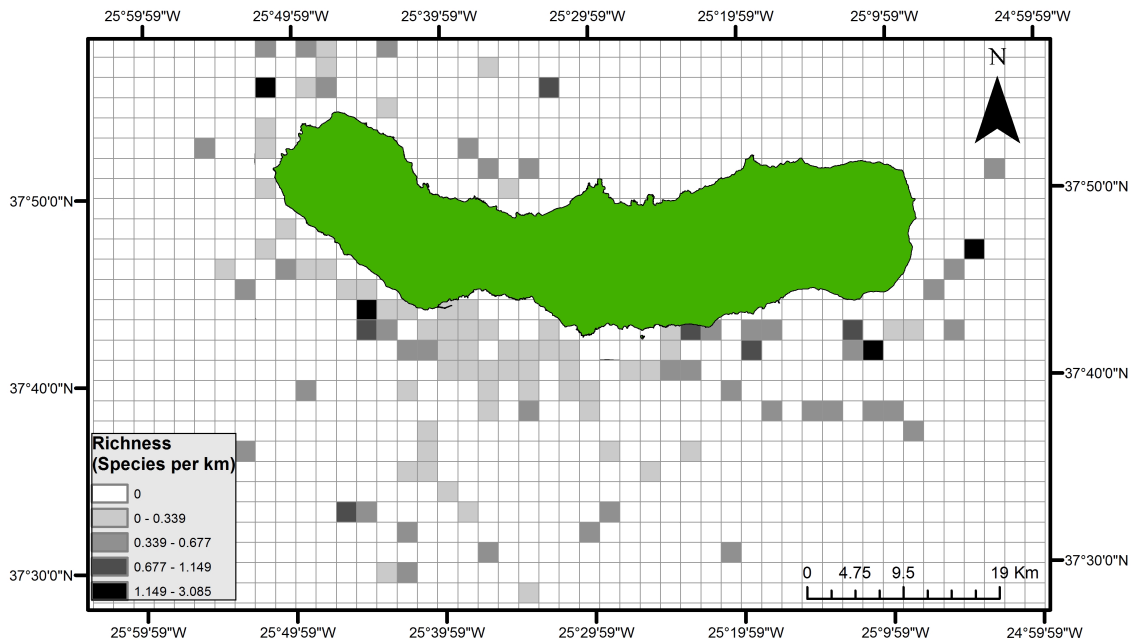


Fig 3. : Richness per unit of effort (km) for 2014 survey.

The Abundance Per Unit of Effort of the species encountered showed some differentiations according to characteristics of each species (Fig. 4)

Acoustic Results

The 2014 scientific survey program around Sao Miguel comprises two phases: (1) spring survey in May, (2) summer survey from 6th July to 1st August. A total of 172 recordings were obtained during 13 days of acoustic survey (Table 3). From 10th May to 17th May, 22 recordings were obtained, mostly of common dolphins (Dd), and five of sperm whales (Pm). Total duration of these recordings is approximately 70 minutes.

From 4th July to 1st August, 150 recordings were obtained, with a total duration of about 11 hours. Among these files, 40 are not of good quality and will probably not be used for analysis.

Table 3: Description of acoustic recordings.

Date	Number	Species
10/05/2014	7	Dd
11/05/2014	3	Dd
12/05/2014	6	Dd
17/05/2014	6	Pm, Dd
04/07/2014	5	Pm
06/07/2014	25	Pm, Sf, Dd
07/07/2014	16	Pm, Dd, Sf, Tt
08/07/2014	23	Md, Gg, Sf, Dd
14/07/2014	8	Pc, Pm, Sf
15/07/2014	21	Pc, Sf, Dd
23/07/2014	28	Pm
28/07/2014	6	Dd, Sf
01/08/2014	18	Pm

During the summer survey, we recorded sounds in the presence of six species (sperm whale, Blainville's beaked whale, false killer whale, Risso's, bottlenose, common and spotted dolphins), although signal level might be very low in some cases (*Mesoplodon* spp).

Some recordings were made to document boat noises, or ambient noise.

A complementary recording set with 80 recordings was obtained while the sailboat was on cruise in the Central group between 3 and 13 August. From these data, a further 20 recordings of sperm whales can be used for analysis.

Sounds are now being listened in order to document the files, a preliminary stage before focused processing. However, presently there are two focused analyses starting: (1) perform contour analysis in order to quantify the discrimination of the two most common dolphins species (common and Atlantic spotted dolphins), (2) describe the sperm whale pulse repertoire beyond the simple foraging clicks. Both analyses are now being conducted on a pooled data set with 2013 and 2014 recordings off Sao Miguel.

DISCUSSION

The campaign realized in summer 2014 covered mostly the South part of São Miguel Island. The west and east point of the island were visited at least two times. Due to the difficulties associated with weather conditions it was only possible to realize one full day of sampling along the north shore of the island.

The high number of cetaceans found at the East and West point could indicate that some oceanographic feature might be related with their distribution. At the north we found several groups of sperm whales, which suggests that the area in question might be an important area for this species.

Putting together the elevated number of sightings and recordings of *Delphinus delphis* and *Stenella frontalis* indicates how these are the most abundant species for the study area during summer months. Compared to 2103 no mixed groups of both species were found, and in general groups were smaller. Only few recordings of active feeding associated with seabirds were found, in general this year feeding events were smaller in size.

Common dolphin

Common dolphins were found all over the area. However a clear pattern towards coastal areas can be observed. This might be due to some depth related issues, or maybe related to the concentration of more productive areas near the shore (mass-island effect).

Atlantic spotted dolphin

Less abundant than common dolphins, this species have more sightings during mid to end of July. Sightings were found more spread in all the area; generally more sightings were made far from shore. The biggest groups were found at the West point of the island.

Bottlenose dolphin

This year no clear pattern was observed for this species. They occurred in many places, however there is a slight pattern in the APUE toward the West part of the island.

Sperm whale

Sperm whales were sighted in 3 main different spots. They were observed at the East, the North and offshore on the centre of the island. Most of the observations were done in the East part of the island, towards the East point. However Sperm whales were also found frequently at 12-14 miles outside of Ponta Delgada.

Regarding to the North shore we encountered several groups. Taking into consideration that this area was sampled only once, this could indicate that it might be an important part of their habitat. Most of the animals encountered were on feeding behaviour, however we also found some interesting social events.

Fin whales

We found Fin Whales during the May campaign. Sightings were mostly located close to the coastline within relatively small groups.

Risso's dolphin

This species was sighted only two times in small groups in an offshore area outside Ponta Delgada.

Stripped dolphin

We had very few sightings of this species, mostly on the East side of the island. No mixed groups observed.

False killer whales

We encountered this species in two occasions and always on the West side of the island. The groups encountered were small, with an animal with a spinal deformation. Chasing behaviour for feeding purposes was observed once.

Beaked Whales

A good encounter with beaked whales allowed us to identify a group of 2 individuals of *Mesoplodon densirostris*. The animals were sighted at 12-14 miles off Ponta Delgada.

