

CIRN/GREC 2013 Campaign report

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Summary

A cetacean survey campaign was performed around São Miguel Island (Azores) by Anacaona Sailing boat (GREC) from July 13th to August 24th of 2014. The team conducted a total of 22 days of effort around the island. A total of 8 species was 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*), sei whale (*Balaenoptera borealis*) and beaked whales (*Mesoplodon sp.*). 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 summer 2013, 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 8 during the 22 days that the survey lasted.

A total of 22 survey days were performed, corresponding to 175.1 hours and 1300 km (Table 1).

Tab1. Detailed effort for the 2013 summer survey.

	Time (hours)	Distance (km)
Effort	152.91	1094.3
Off-effort	22.19	205.7

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 East and West were also relatively well sampled.

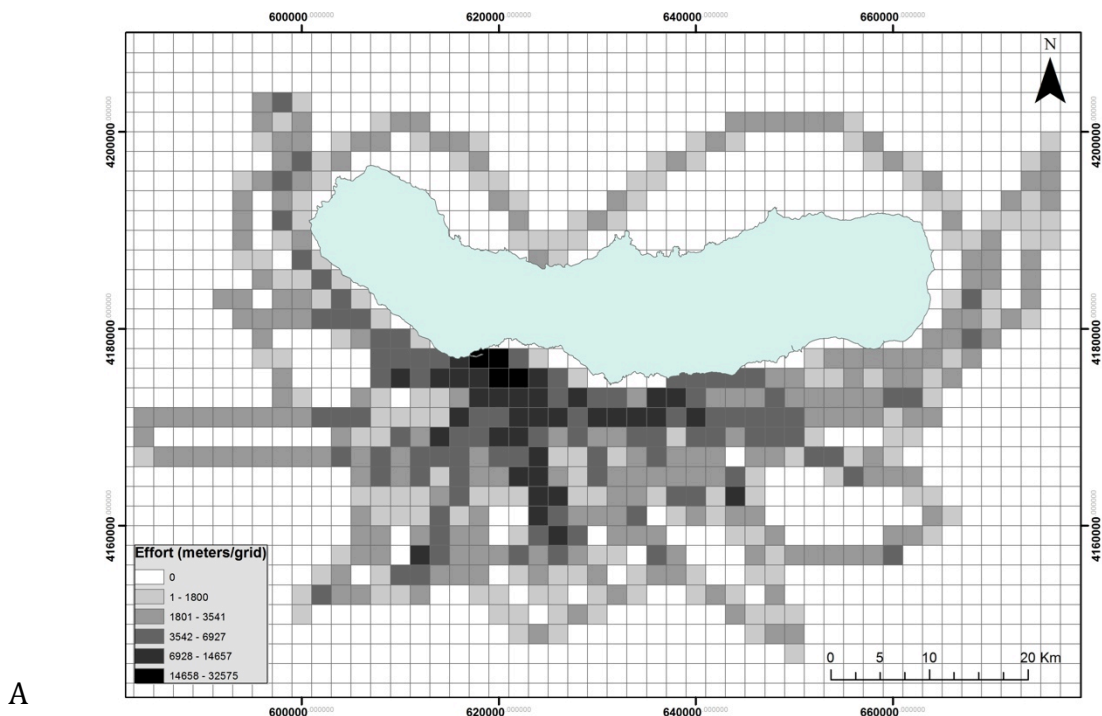


Fig.1: Sampling effort (m) of 2013 summer survey around São Miguel Island, Azores. Grid size of 2km.

total of 8 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)	47	33.31	1-2000
<i>Stenella frontalis</i> (Sf)	34	38.6	3-700
<i>Tursiops truncatus</i> (Tt)	10	15.26	1-100
<i>Physeter macrocephalus</i> (Pm)	8	4.34	1-15
<i>Grampus griseus</i> (Gg)	6	11.37	3-30
<i>Stenella coeruleoalba</i> (Sc)	5	7.40	2-30
<i>Mesoplodon sp.</i> (Zp)	3	4.16	2-10
<i>Balaenoptera borealis</i> (Bb)	1	1	-
Unidentified Small delphinids	14	-	-

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

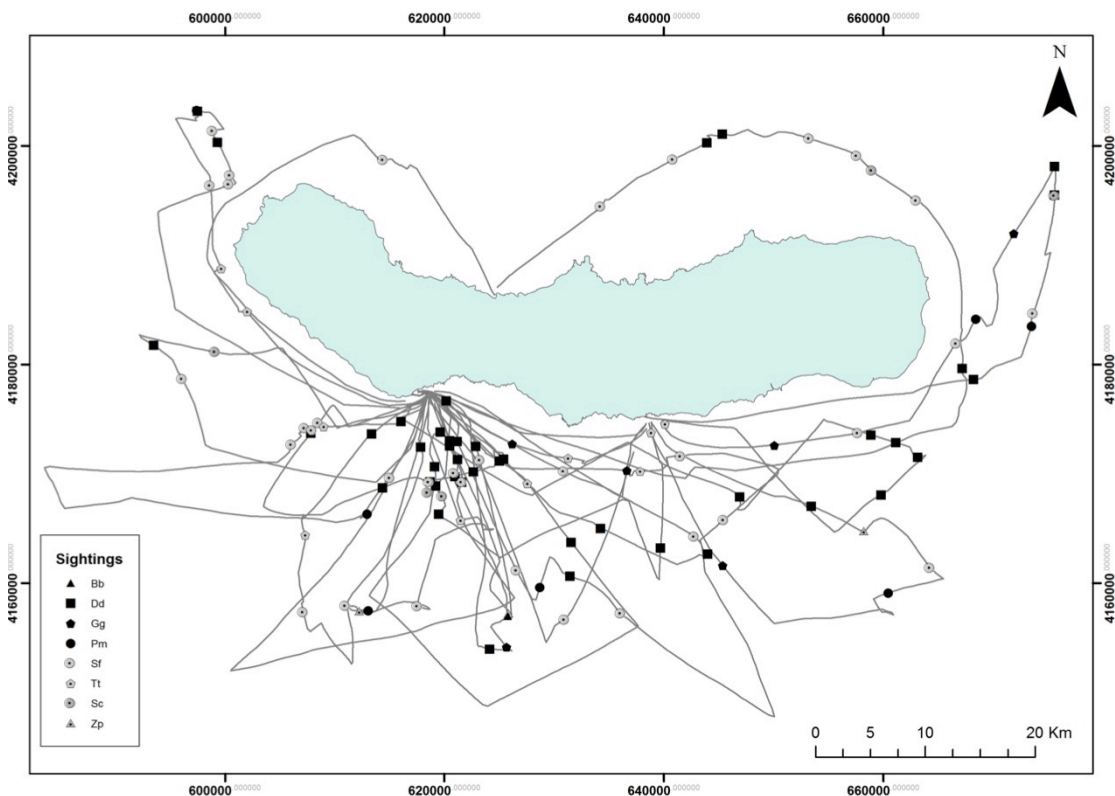


Fig. 2. Tracks and sightings from the 2013 summer survey

The Sighting Per Unit of Effort (SPUE) showed some differences in the distribution patterns for the most sighted species (Fig. 3,4).

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. 5).

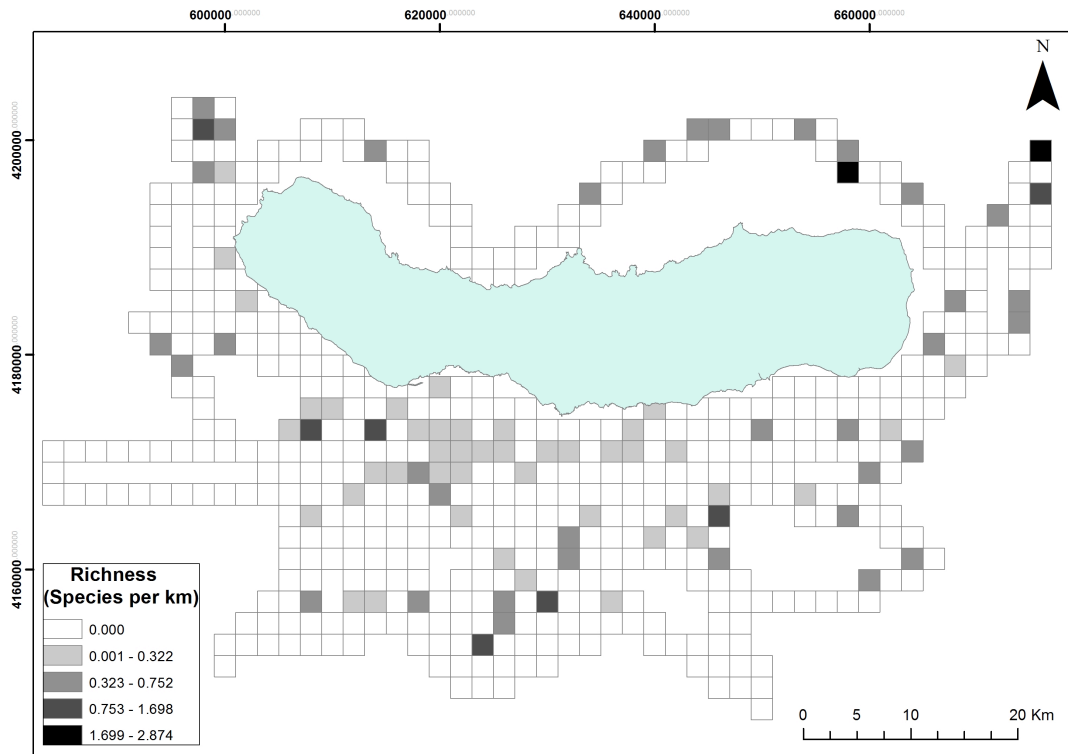


Fig 5. : Richness per unit of effort (km) for 2013 summer survey.

Acoustic Results

A total of 267 recordings were obtained during 18 days of survey (Table 3), as well as Atlantic spotted dolphins (13/18 days). Next in recording frequency were sperm whales (11/18 days). Risso's and bottlenose dolphins were less common in our recordings (respectively 4 and 3/18 days).

Table 3: Description of acoustic recordings.

Date	Number	Species
13/07/2013	15	Dd, Pm, Gg
14/07/2013	14	Dd, Pm, Sc
15/07/2013	9	Dd
20/07/2013	15	Dd, Pm
21/07/2013	17	Dd, Pm, Gg, Sf
24/07/2013	16	Dd, Sf, Sc
25/07/2013	23	Pm, Dd, Sf
28/07/2013	17	Pm, Sf
03/08/2013	23	Dd, Pm, Gg, Sf
06/08/2013	7	Sf, Dd
07/08/2013	9	Dd, Sf, Tt, Gg
08/08/2013	12	Dd, Sf
12/08/2013	16	Pm, Sf, Dd
17/08/2013	4	Sf
18/08/2013	24	Dd, Sf, Pm
20/08/2013	23	Pm, Tt
21/08/2013	19	Pm, Sf, Tt, Dd
22/08/2013	4	Sf

On several number of occasions, the presence of whale-watching boats precluded recordings, as it was necessary to recover the hydrophone to avoid its destruction due to their propellers. The whale-watching traffic was the main source of noise during our recordings.

The recordings are now being processed and will be analysed during the later part of 2014 and in 2015 (along with recordings obtained in 2014).

DISCUSSION

The campaign realized in summer 2013 covered mostly the South part of São Miguel Island. However 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 two days 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. The high values of richness found on the North shore could be related with the higher Chlorophyll values found typically on that area during summer time.

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. Mixed groups of both species were found in some cases, gathering together with *Stenella coeruleoalba*. The existence of these groups together with the main behaviour of the species (feeding) could suggest the importance of the Azores as feeding grounds for these small delphinids.

Common dolphin

Common dolphins were found all over the area. However a clear pattern towards coastal areas can be observed. Larger groups of this species were found during at the beginning of the campaign (mid-July), and usually in coastal areas. 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 August. Sightings were found more spread in all the area; generally more sightings were made far from shore.

Bottlenose dolphin

The sightings from this species was concentrated a western area of the South Coast of São Miguel. However when looking at other data sources (opportunistic data from MONICET) it is possible to see that several sightings had occurred also in the Southeast region of the study area.

Sperm whale

Sperm whales were sighted mostly in the East and West coast of the island, some sightings were also made in an area located in front of the main harbour. Opportunistic data also shows another important area located at the Southeast coast. However taking in consideration the low effort done in the East and West coast and the high number of individuals encountered suggest the existence of high suitable areas.

When looking at the relatively high number of recordings for the Sperm whale (11 days) in comparison to the relatively low number days sighted (5 days) evidences the importance of acoustic surveys in the study of this species. Being a species that spends long time diving, visual detection can be strongly biased.

Risso's dolphin

This species was predominantly sighted in the Southeast and East part of the area surveyed. In this case these results agrees with other data sources, which indicates that there is some kind of preference for that area. Studies are being conducted to analyse this pattern and link it with environmental factors.

Stripped dolphin

This small delphinid was found usually close (or mixed) to other species, as Common dolphins or Atlantic spotted dolphins. However a couple of sightings were made without any other species close.

Beaked Whales

For the beaked whales, due to the difficulties on identification, only genus identification was possible (*Mesoplodon* sp.). It is important to notice that all the sightings made were located in areas far from shore. This result suggest that the genus can be more related with depth and sea bottom relieve rather than with distance to the shore.