



## 2018 Report

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## Introduction

MONICET is a collaborative platform to collect, organize and disseminate cetacean distribution data and photo-identification images collected by whale watching companies in the Azores. We believe this information has great value for the companies but also for researchers and decision makers.

With initial funding from an Azores Government grant, the platform has been running continuously since its launch, in 2009. From the initial 3 companies, the number of partners has been increasing over the years. In 2018 seven companies contributed sighting information to the database (Fig. 1). This was also accompanied by a geographic expansion: MONICET today has partners in all the islands with whale watching activity. The database also contains information from partners in Algarve (Dream Wave Algarve, 2015/16) and in Tenerife (Whale Watch Tenerife, 2018).

ISLAND	PARTNER	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
São Miguel	Picos de Aventura - São Miguel	[Shaded]									
	Terra Azul	[Shaded]									
	Futurismo		[Shaded]	[Shaded]							
	Sea Colors							[Shaded]	[Shaded]	[Shaded]	[Shaded]
	Terra do Pico										[Shaded]
Faial	Horta Cetáceos			[Shaded]	[Shaded]	[Shaded]	[Shaded]	[Shaded]	[Shaded]	[Shaded]	[Shaded]
Terceira	Ocean Emotion							[Shaded]	[Shaded]	[Shaded]	[Shaded]
	Picos de Aventura - Terceira									[Shaded]	[Shaded]
Pico	AquaAçores									[Shaded]	[Shaded]

Fig. 1. Timeline of partner's participation

MONICET works on a voluntary basis, whale watching companies contributing staff time to record data and enter it in the online database, and researchers, students and trainees validating the data and building the photo-identification catalogue. MONICET is supported by the Center for Ecology, Evolution and Environmental Changes (CE3C, through the Azores Biodiversity Group, a research group from the University of the Azores) and by the Azorean Association for the Study of Cetaceans (PHYSETER, a non-profit association).

## Trips and sightings

A total of over 1,600 records were introduced in 2018, continuing the expansion trend started 5 years ago (Fig. 2). Today, the database contains nearly 7,400 records.

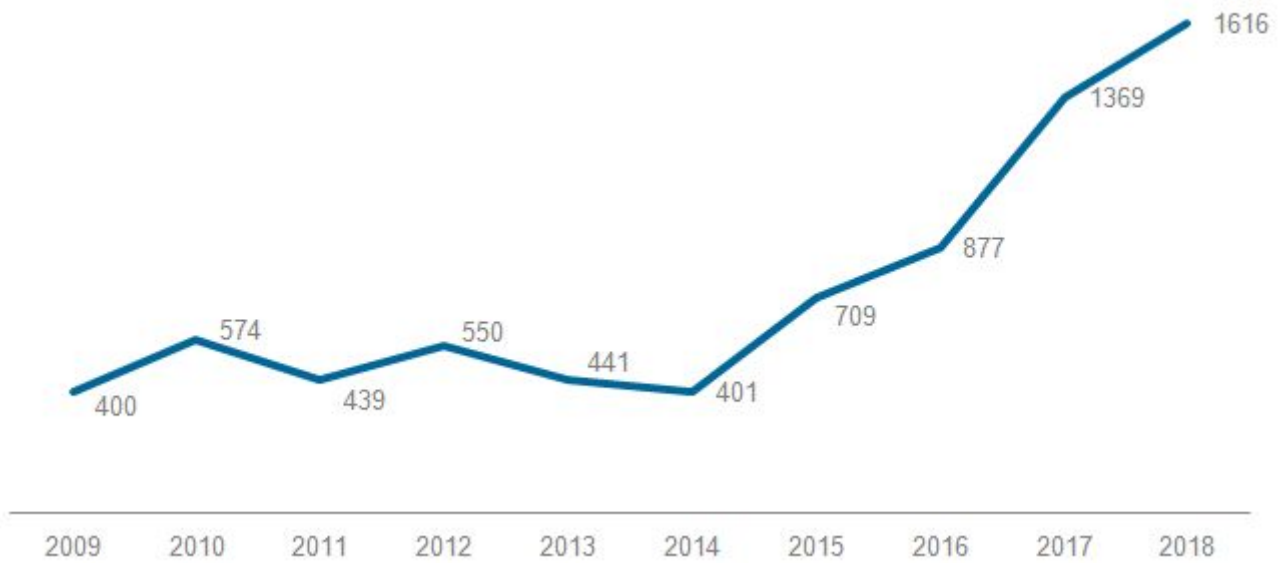


Fig. 2. Number of registered trips per year

The difference between 2017 and 2018 was mainly due to the larger number of trips registered in the peak season of 2018, from May to August (Fig. 3)



Fig. 3. Number of registered trips per month.

The most commonly recorded species include dolphins (common, bottlenose and spotted), the sperm whale and the baleen whales (Fig. 4). The frequency in which each species is recorded varies from one year to the next. In 2018 there were relatively more records of sperm whales and bottlenose dolphins and less records of spotted and common dolphins.



Fig. 4. Number of sightings of the most common species.

The Azores are known for the exceptional diversity of cetaceans in their waters. This gives each trip a particular challenge, because there is always the possibility of sighting a less common species for the archipelago. These include humpback whales and even the rare beaked whales. Last year the highlight were Bride's whales, a species of baleen whale commonly found in warmer waters. 2018, on the other hand, was a particularly good year for pilot whales (Fig. 5).



Fig. 5. Sightings of less common species.

One of the interesting things in MONICET is how it conveys the rhythms of cetacean migrations. Spring is the time when baleen whales are seen in the Azores in larger numbers (Fig. 6), because this is when they move from their resting grounds in tropical waters to feed in the colder, more productive, northern regions. This year the peak months for fin and blue whales were from March to May, with sei whales sighted more towards the summer.

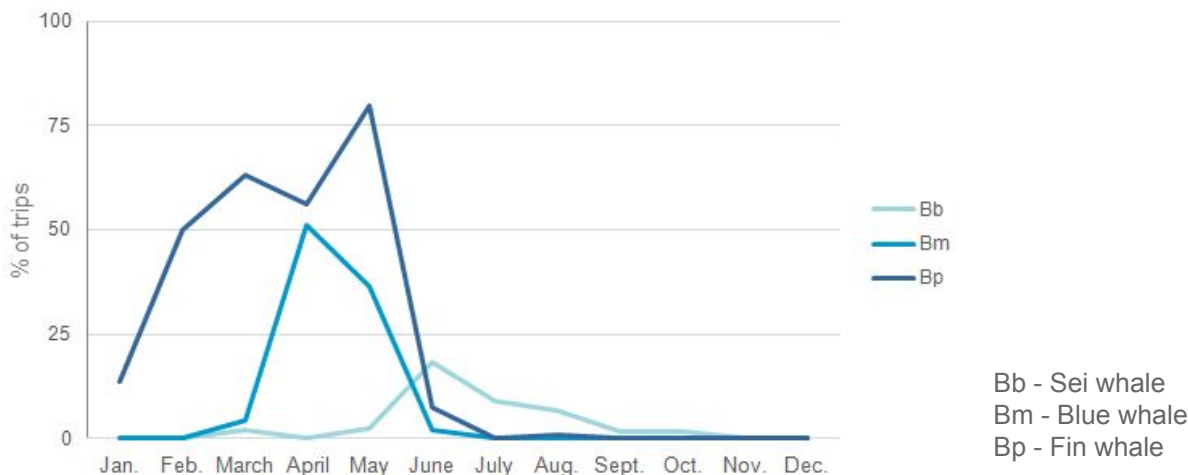


Fig. 6. Sightings of baleen whales in 2018

Generally the commonly sighted species of toothed cetaceans are residents, in the sense that they can be seen year round, although with seasonal variations (Fig. 7). Some, however, are clearly migratory. The most obvious case are the spotted dolphins: this year they started to be seen in June (when sea water temperatures rose from 18 to around 22°C) and were almost gone by October (when the seawater temperatures dropped rather quickly from 24 to 21°C).

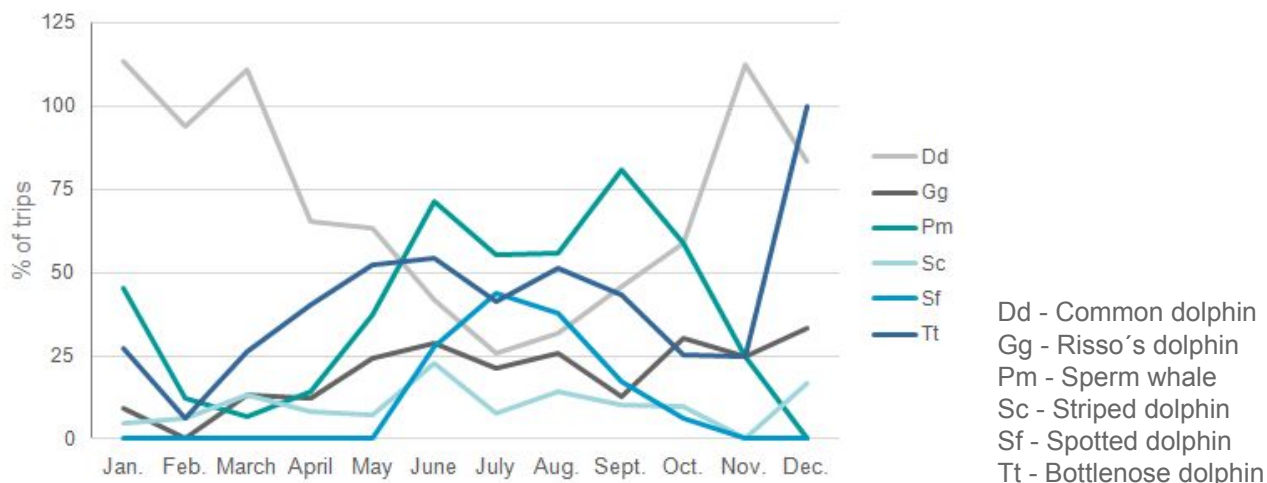


Fig. 7. Sightings of sperm whales and dolphins in 2018.

MONICET also records the positions where the animals are sighted. When these are plotted as a function of the number of sightings per unit area (a so-called heatmap) we can have a perception of the areas of highest concentration of observations.

Fin and blue whales have very similar distribution of sightings, although fin whales were more concentrated in São Miguel and blue whales on the south of Pico (Fig. 8).

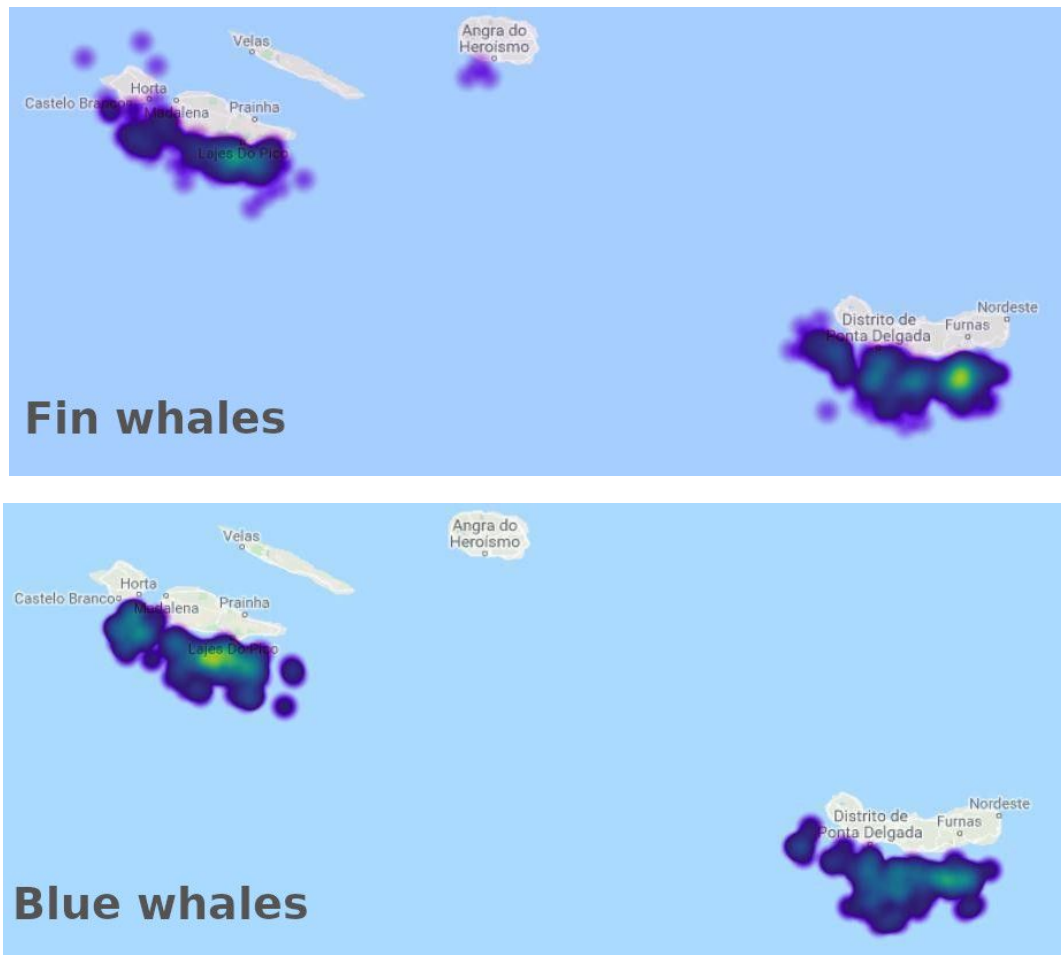


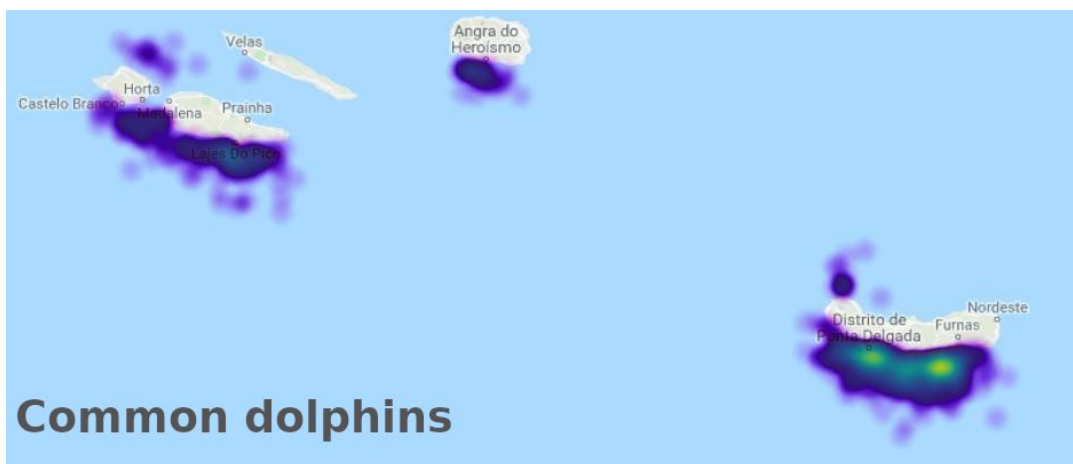
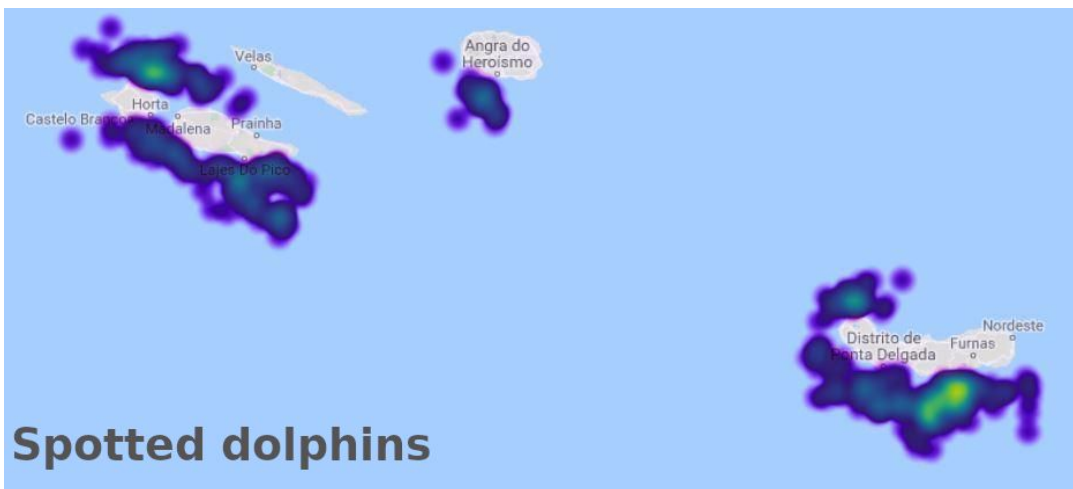
Fig. 8. Heatmap of fin and blue whale sightings in 2018. Lighter shades of green means higher density.

Sperm whales feed mainly on deep-water squid, so they tend to be concentrated in areas with depths around 1,000m. Data collected by MONICET partners shows this very clearly (Fig. 9): the distribution is farther from the coast around Ponta Delgada, with its platform of only about 200m, and spreads on a NW-SE direction along the Terceira canyon. Fig. 9 also supports the long-held belief that sperm whales are more abundant on the north coast of São Miguel- and MONICET partners are realizing this.



Fig. 9. Heatmap of sperm whale sightings in 2018. Same conventions as above.

The common dolphin is the most sighted dolphin of the Azores. The recorded distribution was similar to that of two other species, the spotted and the bottlenose dolphins (Fig. 10). Nevertheless, the spotted dolphin were relatively more sighted around Fail and Pico than the other two species.



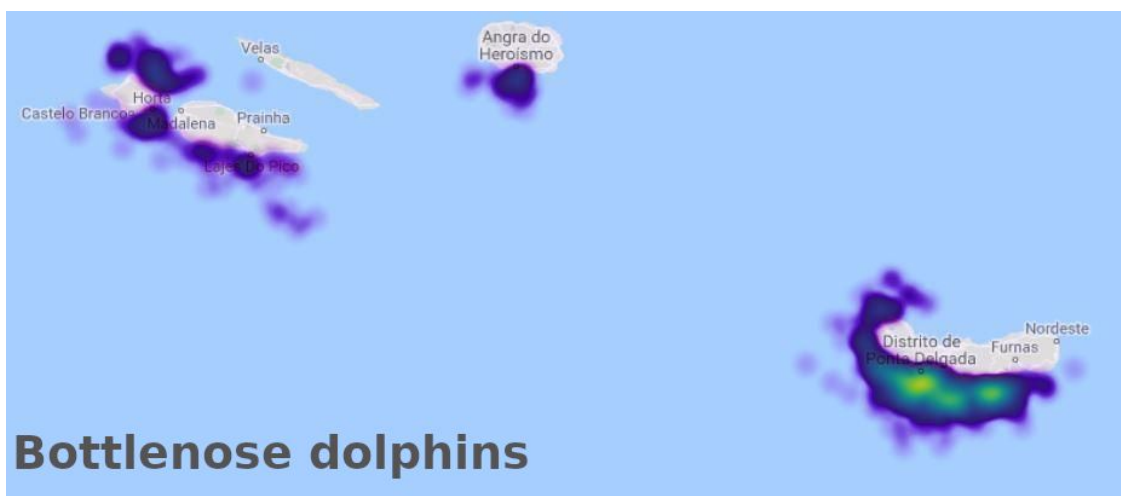


Fig. 10. Heatmap of small dolphins sightings in 2018. Same conventions as above.

The known Risso's dolphin preference for a coastal area south of Pico is visible on the MONICET data, which also suggest that there may be at least two additional hotspots for this species: the south of Terceira and the Ponta Garça area in São Miguel (Fig. 11). This distribution is thought to be related to the distribution of prey of this squid-eating dolphin.

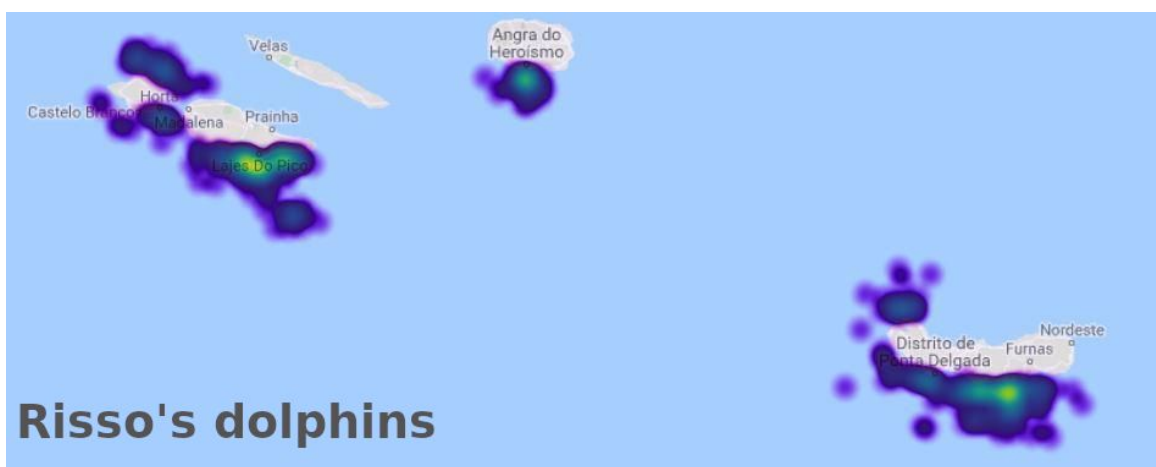


Fig. 11. Heatmap of Risso's dolphins sightings in 2018. Same conventions as above.

### Photo-identification catalogue

The MONICET photo-identification catalogues contain more than 6,000 images from 12 species (Table 1), dating back to 2003. The biggest catalogues are those from bottlenose dolphins and sperm whales, with respectively nearly 800 and nearly 1000 individually identified animals. The frequency of recapture is also interesting, with some animals being recaptured more than 50 times over ten years, often on the same island (Fig. 12).



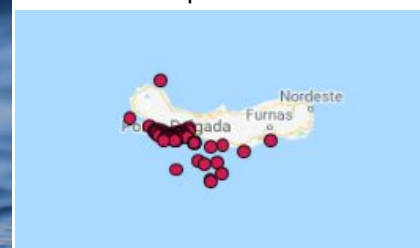
Table 1. Selected statistics from the MONICET photo-identification catalogue

Species	Nº Photos	Nº Individuals	Nº Recaptures	Most recaptured individual	Nº Recaptures Most recapt. ind.
Bottlenose Dolphin	2615	786	345	DBUAC-TT-06004	84
Sperm Whale	2275	953	263	DBUAC-PM-08016	57
Risso's Dolphin	439	282	68	DBUAC-GG-10091	10
Short-finned Pilot Whale	367	267	71	DBUAC-GMA-03003	3
				DBUAC-GMA-10028	
				DBUAC-GMA-11028	
Fin Whale	147	115	19	DBUAC-BP-10003	3
				DBUAC-BP-14001	
				DBUAC-BP-14009	
False Killer Whale	67	51	11	DBUAC-PC-13003	3
Sei Whale	62	59	3	DBUAC-BB-09001	1
				DBUAC-BB-15005	
				DBUAC-BB-16004	
Blue Whale	59	53	0	/	/
Killer Whale	31	29	0	/	/
Humpback Whale	12	12	0	/	/
Blainville's Beaked Whale	6	5	1	DBUAC-MD-15002	1
Sowerby's Beaked Whale	6	6	0	/	/



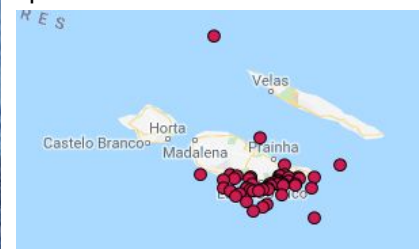
©SeaColors/MNCT

Bottlenose dolphin 06004





Sperm whale 08016



Risso's dolphin 10091



Fig. 12. Some of the most recaptured individuals on the MONICET photo-identification catalogue.

### Impact and outreach

This was a particularly good year for the dissemination and use of MONICET data. These are open access, shared under a Creative Commons Attribution Non-Commercial Share-Alike licence. As such, they have been used for scientific and research purposes, and its interest for management and conservation has also been acknowledged.

The main use of MONICET data for academic purposes on 2018 was on the PhD thesis of Marc Fernandez, co-founder of the MONICET platform. The thesis, presented in August, concluded that opportunistic data can be used to model the habitat of cetaceans, having the advantage over dedicated surveys that they have a much higher time replication. Like in previous years, MONICET data have been used by the students of the Marine Mammals module at the University of the Azores. This year students have looked at the directionality of movements of baleen whales to see if they could be related to the known migration patterns. They found, for instance, that the sei whales travel on a general direction SE-NW, matching their movement across the Atlantic, from the African coast to the Labrador Sea. There were two other request for data for academic purposes, one from a master's student of the University of California, Santa Barbara, USA, and another from a lecturer in the University of Exeter, UK. In the first case the data ended up not being used, but the University of Exeter students did interesting work. One of the poster presented concluded that sperm whales tend to feed in deeper waters in summer than in

winter, speculating that this may be due to a change in diet from mainly fish in winter to mainly squid in summer.

On the scientific side, two papers were published using MONICET data:

- Fernandez, M., Yesson, C., Gannier, A., Miller, P. I., & Azevedo, J. M. N. (2018). A matter of timing: how temporal scale selection influences cetacean ecological niche modelling. *Marine Ecology Progress Series*, 595, 217-231.
- Alves, F; Alessandrini, A; Servidio, A; Mendonça, A. S; Hartman, K. L; Prieto, R; Berrow, S; Magalhães, S; Steiner, L; Santos, R; Ferreira, R; Pérez, J. M; Ritter, F; Dinis, A; Martín, V; Silva, M. and de Soto, N. A. (2018). Complex biogeographical patterns support an ecological connectivity network of a large marine predator in the north-east Atlantic. *Diversity and Distributions*. <https://doi.org/10.1111/ddi.12848>

A second edition of the Atlas dos Mamíferos de Portugal is being prepared and MONICET data has been requested to update the maps produced in the first edition.

The potential of MONICET data to generate distribution estimates useful for species management, including the institutional reports required under Natura 2000, was acknowledged by the Azores Government by including the platform in its application for funding from the LIFE program. That application was successful, so from mid-2019 MONICET will have a person working full time on the platform.

In 2018 two additional funding applications were submitted: one to the INTERREG-MAC program, to integrate the MARCET consortium, and another to PO 2020 under a call launched by DRCT, the Directorate for Science and Technology of the Azores Government. The latter project, designated “MEEMO - Maintain, expand and explore the MONICET cetacean watching platform. An opportunity for science, public policy and enterprise”, has been selected for approval and will likely be launched early 2019. Its scientific aims are to use the 10-year data set to analyze temporal trends of cetacean occurrence in the Azores in relation to oceanographic, atmospheric and anthropogenic variables. But the project will also allow for rebuilding MONICET’s technological infrastructure (including a streamlined and collaborative photo-identification module) and to finish the development of the long awaited data-collection app.

## **Acknowledgements**

The first words of appreciation must go to all the people involved in recording data in the field and entering it (manually!) on the database. We estimate this should take about half-hour per trip, so the work involved in 2018 was in the order of 100 person-day. Thank you also to the partner companies for believing in this project and internalizing these costs.

Thank you to all the people who contributed photos for the catalogue, in particular to the Espaço Talassa team for maintaining their sperm whale pictures accessible online.