PROJECTO CETACEOSMADEIRA II

IDENTIFICAÇÃO DE ÁREAS MARINHAS CRITICAS PARA O GOLFINHO-ROAZ E VIGILÂNCIA DOS ESTATUDOS DE CONSERVAÇÃO DOS CETÁCEOS NO ARQUIPÉLAGO DA MADEIRA

Projecto Nº LIFE07 NAT/P/000646

Deliverable A.8 – I

REPORT ON THE SURVEILLANCE OF THE CONSERVATION STATUSES OF CETACEANS SPECIES IN MADEIRA OFFSHORE WATERS

VERSION 1.0

September 2014

Produced by:
Madeira Whale Museum

Executed by

Funded by

AUTHORS NOTE

The present document is a product of the CETACEOSMADEIRA II project, and the information presented here is the result of the collective work of:

Cátia Nicolau

Filipe Alves

Rita Ferreira

Filipe Henriques

Adalberto Carvalho

Inês Cunha

Luís Freitas

Document prepared by:

Cátia Nicolau

Filipe Alves

Luís Freitas

This document should be cited as follows:

Nicolau C, Alves F, Ferreira R, Henriques F, Carvalho A, Cunha I, Freitas L (2014). *Surveillance of the conservation status of cetaceans species in Madeira offshore waters (Deliverable A.8_I).* Technical report of Project CETACEOSMADEIRA II (LIFE07 NAT/P/000646), Madeira Whale Museum, 60p.

Acknowledgements:

The following vessels of the regional tuna fleet, vessel owners, masters and crews contributed decisively to the work presented in this report., namely: "Amanhecer", "Autonomia", "Azimute", "Baía do Funchal", "Cabo do Mar", " Cabo da Praia", "Condor", "Falcão do Mar", "Flor do Pico", "Gavina", "Mal-Amanhado", "Mestre Sacadura", "Mestre Soares", "Pesca Atum", "Progresso Futuro", "Pérola de Santa Cruz", "Pepe Combrera", "Ponta do Espartel" e "Rei dos Açores". We would like to thank them for their support, enthusiasm and availability to collaborate.

We also thank Rui Prieto and Miguel Machete for their technical support, availability and sharing of experience at the objective 3 protocol definition stage.

DOCUMENT HISTORY

Version	Data	Updated chapters	Comments
1.0	30-09-2014		First version

INDEX

1. INTRODUCTION

Cetaceans' scientific studies and the monitoring of their conservation status have been conducted only in the coastal waters of the Madeira archipelago (<12 nautical miles [nmi] of Madeira, Desertas and Porto Santo Islands). There is a lack of information regarding the cetaceans' species and possible threats in the offshore waters of the Madeira Exclusive Economic Zone (EEZ). Life Nature projects support the implementation of the surveillance of the conservation status of natural habitats and species covered by the Habitats Directives, in the sense of its 11º article "*all Member States shall undertake surveillance of the conservation status of the natural habitats and species referred to in Article 2 with particular regard to priority natural habitat types and priority species.*". Therefore, to fill the gap in scientific knowledge, a study was carried out in the offshore waters of Madeira as part of the project CETACEOSMADEIRA II (CMII) and its results are reported here.

As described for other offshore waters worldwide, such as in the neighbouring Azores archipelago (Morato et al. 2008), the Madeira offshore waters are likely to constitute an important habitat for several cetaceans' species. It is thus important to collect information on the cetaceans' biological/ecological parameters in those waters, to identify possible threats and to evaluate their conservation status. The present study provides a step forward to the assessment of the cetacean species occurrence, to the identification of human activities developed in the offshore waters and to determine their potential impacts on the cetaceans and on the marine environment. It is also an opportunity to develop and implement the surveillance of the conservation status of the cetaceans' species in the offshore waters, through the definition and testing of the methodology that could be the basis for the surveillance.

The awareness of such impacts on the cetaceans' species is fundamental for the implementation of measures to minimize those impacts and contribute for the maintenance of the cetaceans' conservation status in the Madeira Archipelago overall.

1.1. Human activities

Marine traffic and fisheries are two of the main human activities taking place in the Madeira EEZ. One of the indirect results of those anthropogenic activities is litter. Persistent litter at sea can take decades, or even centuries, to disappear, polluting the marine environment, with negative impacts to the marine life. There is a lack of dedicated studies on the impact of those human activities on the cetaceans' species in Madeira offshore waters, but the Madeira Whale Museum (MWM) has over the years recorded several stranded cetaceans that have died from entanglements in fishing gear, from ship strikes, and from ingesting plastic debris.

In the Madeira archipelago, the tuna fishermen have reported the cetaceans' interference in the fishing activities by approaching the tuna fishing vessels and sinking the tuna shoals, making it disappear and ending

the fishing events. The short-finned pilot whale (*Globicephala macrorhynchus*) is one of the main cetaceans' species blamed by the fishermen.

The fishermen reports were taken into account in this study, and as a result, collaboration with the tuna fishing boat owners and skippers was established and several meetings took place. Moreover, their vessels were tested as platforms of opportunity for the surveillance of the conservation status of the cetaceans' species in the offshore waters, since their main area of operation is the offshore waters beyond the 12 nmi from the coast, and because of the cost-effective characteristics of their, allowing us to avoid the high costs of dedicated survey platforms (ships or plans) and, at the same time, helping to decrease the project's carbon footprint.

The fishing technique used in the Madeira tuna fishery is called Pole and Line. It is a very selective fishing technique, which uses a hooked line attached to a rigid pole to catch the tuna. In the past decade the tuna fishing methods have changed, incorporating a new approach. The traditional method, that we may call 'occasional', involves searching for a tuna shoal that fishermen will fish until all the shoal is caught or disappears, with the fishing event lasting from minutes to few hours. The second method, called 'mancha', involves the fishermen searching for a large school of the tuna that they fish only for short periods of the day, with the boat manoeuvring at slow speeds to remain near the tuna shoal, and behaving like a floating object which aggregates the fish around, below or not far from the vessel; the tuna shoal associated with the vessel is fed everyday with live bait and when the vessel has filled the wells or 5 days have passed, a second vessel takes its place; this fishing operation can last the whole tuna fishing season (i.e. several months) exploiting a single shoal. Another fishing activity that is associated with the tuna fishery is the small pelagics fishery, directed to catching sardines (*Sardinella* sp.), european pilchard (*Sardina pilchardus*), chub mackerel (*Scomber joponicus*), blue jack mackerel (*Trachurus picturatus*) and other type of small pelagic fish, which are used as live bait in the tuna fishery. This type of fishery is done mainly in the coastal areas of the Madeira archipelago, but occasionally, there are events in the offshore waters.

The reported cetaceans' interference on tuna fisheries, with potential impact on the fishermen economic income, may trigger aggressive behaviour towards these animals. Apart from the by-catch problem, which according to Silva et al (2011) is not a major problem with this fishing technique, the aggressive behaviour towards the animals may result in mortality.

In order to cover other types of fisheries and to increase the Madeira EEZ coverage, the "Direção Regional das Pescas" (DRP) (Madeira Fisheries Department) was contacted. According to the Commission Regulation No.665/2008 of 14 July 2008, all Members States should collect data regarding biological and economic data on the fisheries, and activities related to it. The DRP based on the Commission Regulation No. 1639/2001 established programs for fisheries related data collection, following detailed rules based on the Council Regulation No. 1543/2000. Therefore, each year the DRP has observers on-board the Madeira fishing fleet

(or at least on part of the fleet). The observers collect biological data on different fisheries target species. Taking advantage of this opportunity, the MWM established collaboration with the DRP to record biological data and interactions between cetaceans and other fisheries, such as, the black scabbard fishery and the small pelagic fishery (catches small pelagic fish for human consumption and to be used as live bait for tuna fisheries). This collaboration would benefit both institutions, by widening the coverage of the Madeira fishing fleet, and the collection of data relevant for the projects of both institutions.

1.2. Conservation Status

With the data collected by the MWM, within the CETACEOSMADEIRA (LIFE99 NAT/P/006432), the conservation status of the cetaceans' species in 2004 was assessed (Freitas, 2004), and published in the Portuguese Vertebrate Red Book (Cabral et al. 2005). However, those conservation statuses were evaluated based only on data collected on coastal waters.

To assess the conservation status of a species, data need to be collected and biological parameters evaluated. In the case of cetaceans it can be a challenge due to these animals elusive and highly mobile nature, especially in oceanic populations. The International Union for the Conservation of Nature (IUCN) guidelines, criteria and categories are generally used to assess species conservations status, and its criteria are based in characteristics such as number and distribution of individuals, fluctuation and declines in the abundance and distribution, and risk of extinction. Therefore, an effort was made to collect as much valid data as possible, within the constraints imposed by the use of platforms of opportunity, in order to be able to apply the IUCN criteria to assess the conservation status for, at least, some cetacean species using the Madeira offshore waters.

2. OBJECTIVES

1) To collect data and attempt to assess the conservation status of cetaceans' species in the offshore waters of the Madeira Archipelago, evaluating the human activities impact on cetaceans, cetaceans' occurrence, their encounter rate and their relative abundance.

   To define and test the methodology for the surveillance of the conservation status of cetaceans' species in the offshore waters of the Madeira Archipelago. The surveillance scheme aims to collect data to determine biological parameters of cetacean species, to gather data on human activities and detect their impacts on cetaceans, prompting when necessary adequate management measures. It also aims at monitor the effect of such management measures on the improvement of the conservation status of cetacean species in the Madeira offshore waters.

3. METHODOLOGY

Between 2010 and 2012 data was collected by four observers from the MWM on-board tuna fishing vessels. The methodology was defined in the Technical Plan CMII Project Objective 3 (Nicolau & Alves (2011) - Deliverable A.3 – "Protocolo para a Vigilância do estatuto de conservação dos cetáceos em águas offshore do Arquipélago da Madeira"). Data was recorded using Global Positioning System (GPS) device and on printed data forms. Of the four observers, two were from the research team of the MWM, and the remaining two were external observers that received proper training to detect and identify cetaceans and to record all the required data.

The offshore waters were defined in the technical plan as the Madeira EEZ waters beyond the 12 nmi from the coast, defined by the limits of standard survey sectors established around Madeira, Porto Santo and Desertas Islands, for previous cetacean surveys in Madeira coastal waters (Freitas & Alves, 2004).

All the scientific research carried out in Madeira by the MWM before the present study, including the field work for Objectives 1 and 2 of CMII, was carried out in coastal waters within the 12 nmi limit. Therefore, the study area comprises the sea between the outer limits of the survey sectors (roughly 12 nmi from the coasts of Madeira, Desertas and Porto Santo) to the border of the (200 nmi) of the Madeira EEZ (Figure 1: Study area - Madeira EEZ, divided in inshore (coastal waters [12 nmi] around the Madeira, Desertas and Porto Santo Islands) and offshore waters), with a total area of 441 699 km^2.

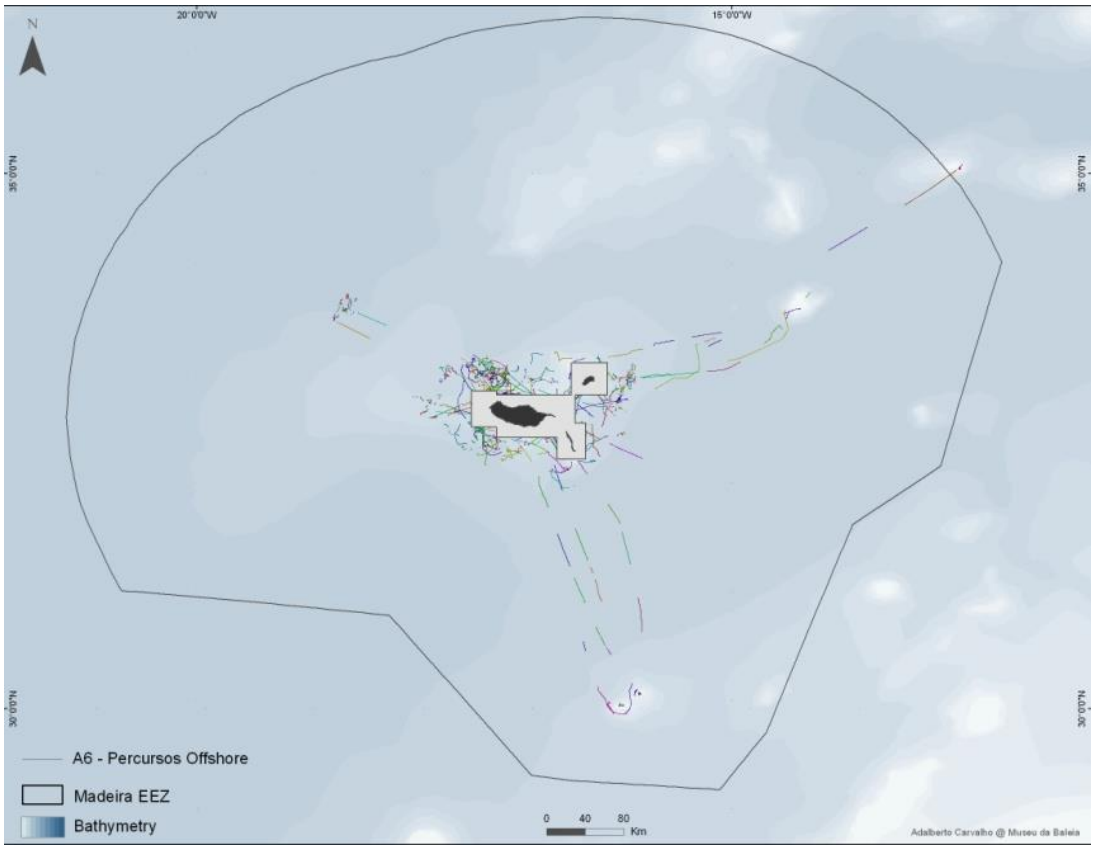


Figure 1: Study area - Madeira EEZ, divided in inshore (coastal waters [12 nmi] around the Madeira, Desertas and Porto Santo Islands) and offshore waters.

3.1. Effort

Effort was dependent on the tuna fishing vessels as survey platforms of opportunity. The effort was restricted to the tuna fishing season, usually starting in March and ending in September.

When it was initially considered the use of tuna fishing boats as survey platforms of opportunity (in the project CMII application - 2007) and defined the amount of effort (years surveyed) needed to gather the necessary data, most of the tuna fisheries was using the 'ocasional' method, that meant vessels spent an important part of the fishing season searching for tuna within Madeira offshore EEZ waters. The use of such method resulted, expectedly, in a better coverage of the study area. Unfortunately, tuna fisheries shifted in the meantime to the use, mostly, of the 'mancha' method, where the random or, at least, wide search of tuna shoals is importantly reduced and most of the effort in concentrated around a tuna fish shoal(s) during the fishing season. This change resulted in a much lower coverage of the study area and far less quantitative data that might allow a robust statistical analysis, to estimate some biological/ecological parameters (e.g. abundance estimates and distribution of cetacean species) in Madeira offshore waters. Never-the-less, relevant quantitative and qualitative data was gathered with importance to help address the questions posed by the project on what regards cetaceans' conservation statuses in Madeira waters.

Effort was registered in printed data forms. The tuna fishing vessels tracks were recorded using GPS. The track lines were downloaded to the software Mapsource®, converted into Excel files and introduced in the ArcView 9.3.1, used for processing georeferenciated data for analysis. Effort was divided into two categories based on the type of navigation: (1) Survey mode, when the vessel was travelling, and included two possible sub-types of navigation (1 - navigation towards specific coordinates; 2 - active search of tuna); (2) Point count mode, when the vessel was not travelling, and included three possible sub-types of navigation (3 - resting; 4 – fishing; 5 - resting from fishing). In point count mode, the vessels did not travel but drifted, since the vessels were in deep waters.

3.2. Cetaceans

All cetaceans' sightings were recorded on-effort mode, and occasionally off-effort, when the observer was resting but randomly looking at sea, both in inshore and offshore waters. Sightings positions were defined using GPS and recorded on printed data forms together with data regarding group size and composition and natural behaviour. The data was introduced in excel files and georeferenciated data processed in the ArcView 9.3.1. The cetaceans groups encounter rate (number of encounters per 100 km), and their relative abundance (number of individuals per 100 km) in the offshore waters, was calculated using only on-effort and in 'survey mode' sightings. Non-georeferenciated cetaceans' sightings and/or not confirmed by the MWM observers were not considered in the analysis.

3.3. Potential Threats

All known main human activities taking place in the Madeira EEZ offshore waters with potential impacts on cetaceans were registered, described and analysed. These were marine traffic, interaction between fisheries and cetaceans, and litter.

3.3.1. Marine traffic

Two datasets were used to investigate marine traffic in Madeira EEZ. One included visual data on marine traffic collected on-board the tuna fishing vessels and the other Automatic Identification System (AIS) data provided by the *Administração dos Portos da Região Autónoma da Madeira* (APRAM) (Madeira marine traffic and ports Authority). The AIS data on the fishing fleets operating in Madeira EEZ was also requested to DRP but, unfortunately, it was not provided for this report.

Visual data

The fours observers on-board the tuna fishing vessels collected visual information on the number and type of vessels per day, always on-effort mode. The data was introduced in the ArcMap 10.1, used for mapping the data collected visually.

AIS data

In the technical plan of the CMII Project Objective 3, it was considered the use of AIS receptors on-board the tuna fishing vessels connected 24 h per day, from harbour to harbour. However it was not possible to gather these data due to technical problems. To overcome this issue, AIS data was requested to APRAM. These data provided a different type of information (better coverage of all the traffic in the waters of the Madeira EEZ, identification of the type of vessels and their routes, and the time they spent in the area), otherwise impossible to obtain through direct visual data collection (field work). The AIS data was collected through a land station positioned in the Funchal harbour, which records all the Madeira EEZ AIS traffic.

Unfortunately, the AIS dataset delivered by APRAM did not cover the whole period requested initially (all months from 2010 to 2012). Only some months were represented, namely, March 2010 and 2011, April 2010 and 2011, May 2010, June 2010 and 2011, July and August 2010. For the analysis a sample of 7 consecutive days was used as being representative of that specific month. The number and type of vessels were also considered in the analysis. Vector maps were created using the ArcMap 10.1.

In a later stage a more comprehensive dataset was delivered by APRAM. Due to the complexity of the analysis and extend of the datasets involved, a deeper and more comprehensive study and analysis was promoted by Inês Cunha (2013), within a partnership between Porto University (Master program in Ecology, Environment and Territory) and the Madeira Whale Museum (see annex A.8 – I of Project CetaceosMadeira II final report). This work extended the study period (2001 – 2012), including all data collected by the MWM

on marine traffic in Madeira inshore waters, as well as, a deeper analysis of the AIS data from 2008 to 2011 in Madeira EEZ waters.

3.3.2. Interaction between fisheries and cetaceans

On-board the tuna fishing vessels, all fishing events were recorded, and information regarding the number of fishing events, type of fisheries, presence of cetaceans in the fisheries (video, and photos were taken when the cetaceans where present in the fisheries), by-catch of cetaceans, fisherman behaviour towards the presence of cetaceans in the fisheries, cetaceans behaviour towards the fisheries, and the fish behaviour towards cetaceans presence in the fisheries were registered.

In the technical plan of CMII Project objective 3, it was initially proposed that the cetaceans were considered 'present' in the fishery if they were less than 10 m from the vessel. However, during fieldwork that distance was readjusted to 50 m in order to accommodate the reality in the field. The dynamic nature of tuna fish shoals (and cetaceans as well), meant that their aggregation under and around the fishing boats extended beyond the immediate proximity of the vessels. It was necessary to consider the 'presence' of cetaceans in the fisheries further away the initially anticipated. Tuna fish shoals are very active during the fishing events and during its diel movements (moving closer and away of the vessel at different periods of the day - tuna tend to aggregates/approaches at sunrise and sunset).

All cetaceans' sightings, collected during off- or on-effort mode, in the study area were included in the analysis of the interaction between the fisheries and the cetaceans. Fishing events non-georeferenciated and/or not confirmed by the MWM observers were not considered in the analysis.

3.3.3. Litter

Information about the type of litter, dimension and aggregation was recorded only during on-effort mode. The data was processed in the ArcView 9.3.1.

3.4. Conservation Status

In order to have a robust assessment of the conservation status of a species, biological/ecological parameters need to be estimated, such as, abundance and distribution estimates, abundance and distribution fluctuations, among others. The relevant quantitative data expected to be collected on board tuna fishing vessels was limited by constraints previously explained (see section 3.1). However, the data effectively collected it is very important to establish a first overview of how cetaceans use the Madeira offshore waters, and to compare it with the better knowledge about cetaceans in the inshore waters of Madeira. On the other hand, the data on human activities and impacts on cetaceans in offshore waters, although cannot be directly integrated in the assessment of conservation statuses, it helps interpret and understand the results on a qualitative perspective.

In spite of the data constraints explained before, an assessment of the conservation statuses of some cetaceans species was made based on data collected in inshore surveys carried out within project CMII (project objectives 1 and 2) and in previous projects. The abundance estimates used in the assessment exercise were obtained by spatial modelling (systematic surveys) or mark-recapture (photo-id data), whichever had the lower CV (for further information see Freitas el al (2014a) and Freitas et al (2014b)).

The first step in the assessment was to determine which taxa and regional populations to assess. The assessment followed the IUCN criteria (software program RAMAS®) to determine the conservation statuses of the selected cetaceans' species. The IUCN criteria are based in parameters such as number and distribution of individuals, fluctuation and declines in the abundance and distribution of the population, and risk of extinction. The software program RAMAS® Red list 2.0 assists in the implementation of those criteria and allows the incorporation of uncertainty in the data introduced (e.g. number of mature individuals can be specified as a number, or an interval, or a number of intervals with a better estimate). The qualitative and some quantitative knowledge obtained from the offshore waters surveys can be partially considered in the assessment through the different levels of uncertainty in the data and also though different levels of data reliability (e.g. educated guess).

The final result is a technical sheet, containing information about the species, and the classification of the species by category (step two). The categories (conservation status) are defined in different threats levels: Extinct (EX), Extinct in the Wild (EW), Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT), Least Concern (LC), Data Deficient (DD), and Not Evaluated (NE).

The IUCN Red List Categories and Criteria were designed for global taxon assessment, however it is our interest to apply it regionally. Therefore the guidelines for the application of the IUCN red list criteria at regional and national levels, prepared by IUCN/SSC Regional Applications Working Group and the National Red List Working Group of the IUCN SSC Red List Committee (e.g. Gärdenfors et al. 2001, IUCN 2003, 2012), were followed. This system (for regional and national levels) adds two categories, to the conservation status classification, namely, Regionally Extinct (RE) and Not applicable (NA)

The following scheme represents the procedures for adjusting the preliminary IUCN Red List Category to the final regional Red List Category (step 3).

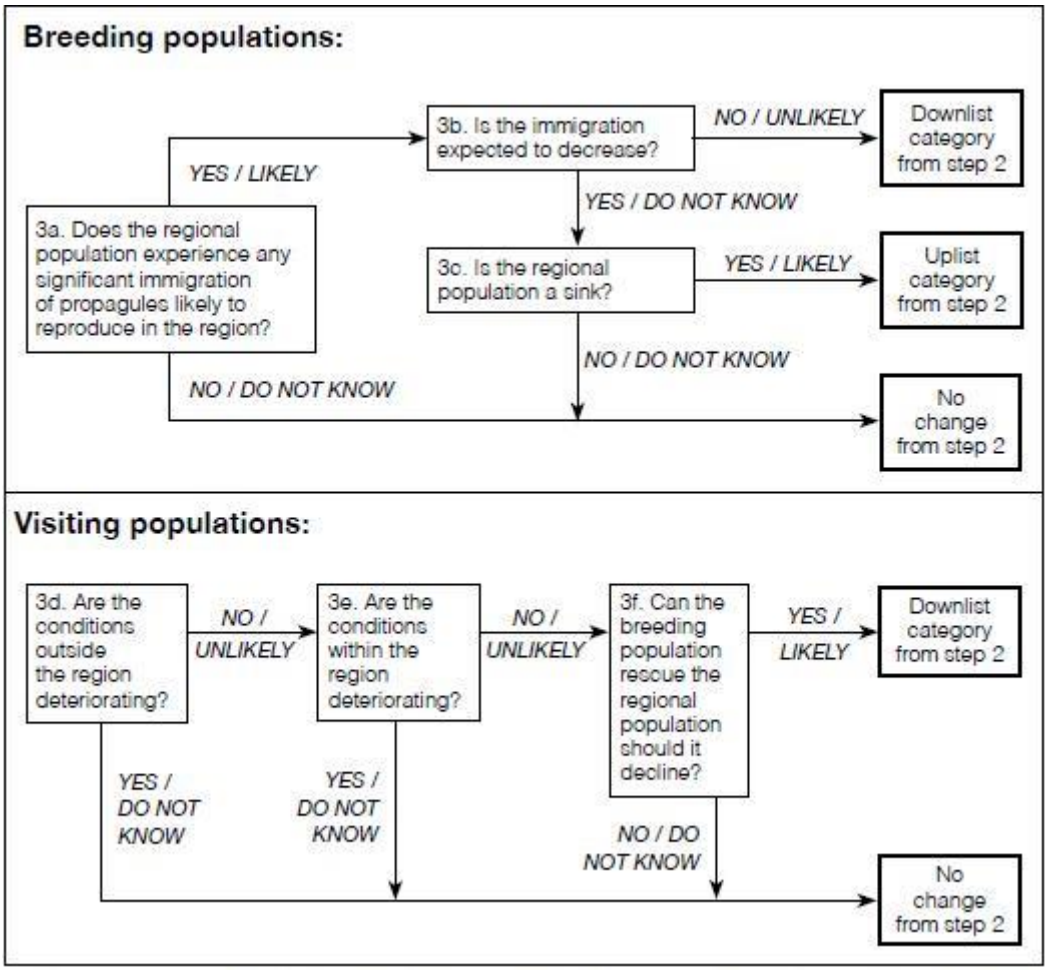
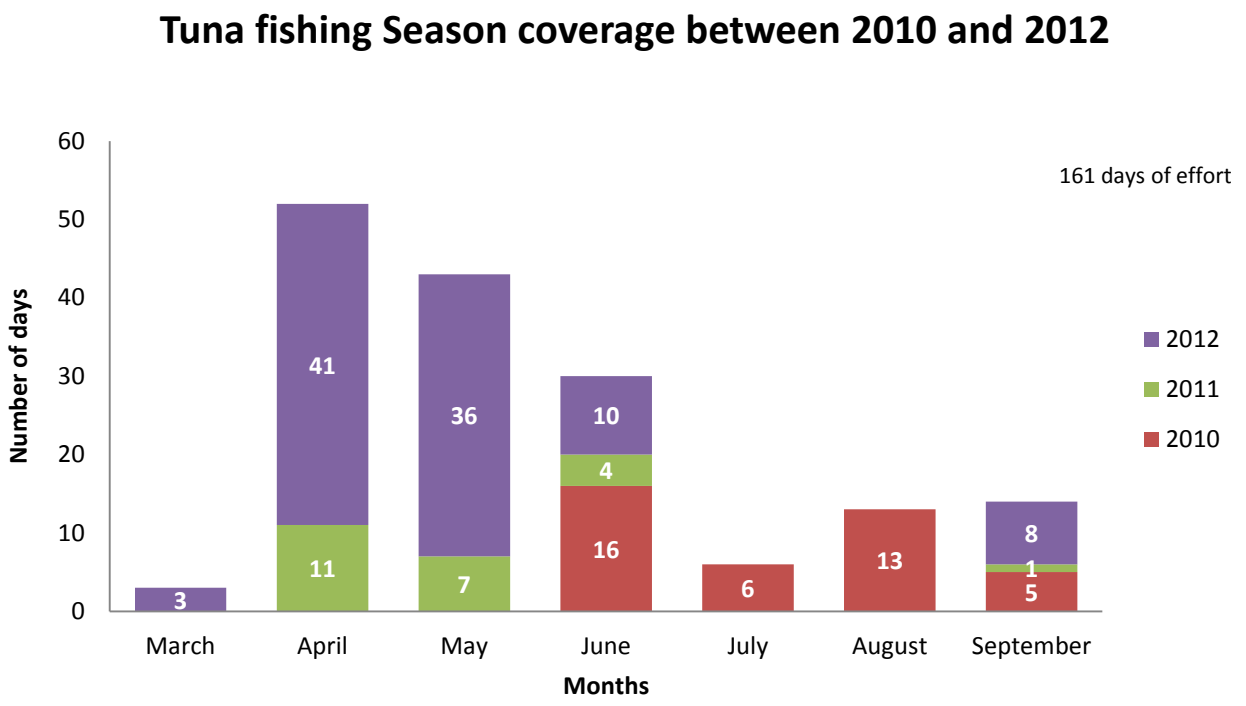


Figure 2: Conceptual scheme of the procedure for adjusting the preliminary IUCN Red List Category to the final regional Red List Category following IUCN (2012).

4. RESULTS

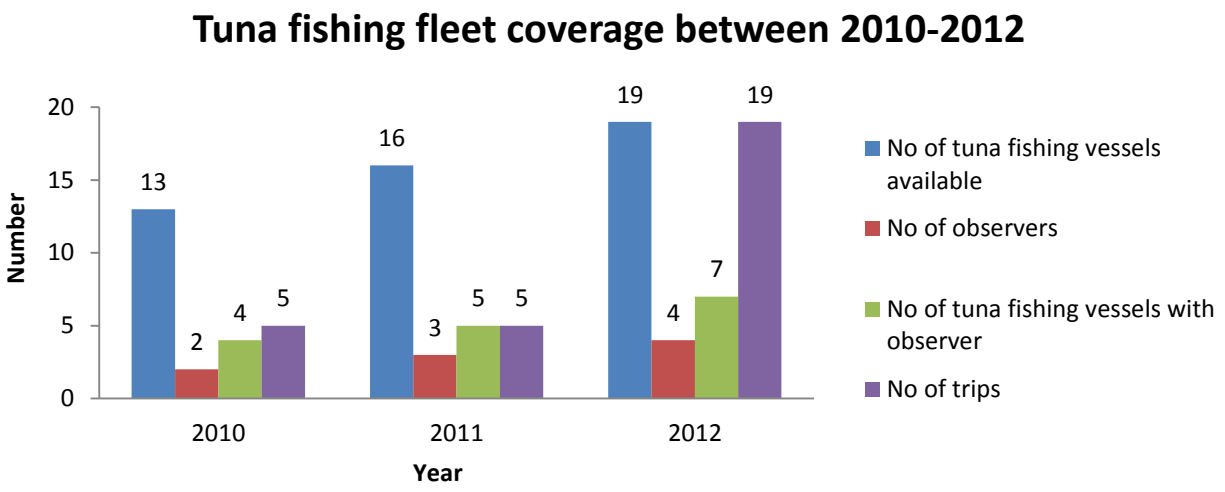
4.1. Effort

Between June 2010 and September 2012, the observers of the MWM made 161 days of effort on-board the tuna fishing vessels. The data collection was distributed by the 3 years of the project, and the whole tuna fishing season was covered (March to September). April, May and June were the months with higher sampling effort (62, 43 and 30 days, respectively). The year 2012 had, the higher sampling effort (98 days, which is more than half of the 160 days of effort initially considered) (Graphic 1).



Graphic 1: Coverage of the tuna fishing season in the Madeira archipelago between 2010 and 2012.

In the beginning of the project (2010) 13 tuna fishing vessels collaborated, allowing the MWM observers to go on-board de vessels, and by the end of the project (in 2012) the number of tuna fishing vessels collaborating had increased to 19 (Graphic 2). Of those 19 vessels, 10 were covered by the four observers of the MWM, corresponding to 53 % of the tuna fishing fleet. The number of observers increased annually, from two in 2010, when the data collection began, to four in 2012, translating in an increase in the number of tuna fishing vessels monitored (4 in 2010 to 7 in 2012). The number of trips was the same during the first two years (5 trips each year), and only in 2012 there was a significant increased (19 trips), making a total of 29 trips on-board the tuna fishing vessels (Graphic 2).



Graphic 2: Tuna fishing fleet covered throughout the 3 years of data collection.

A total of 7 068 km of track lines were made on-board the tuna fishing vessels in the Madeira EEZ area. Of those, 5 220 km were on offshore waters (Figure 3) and 1 848 km in the coastal waters (Figure 4).

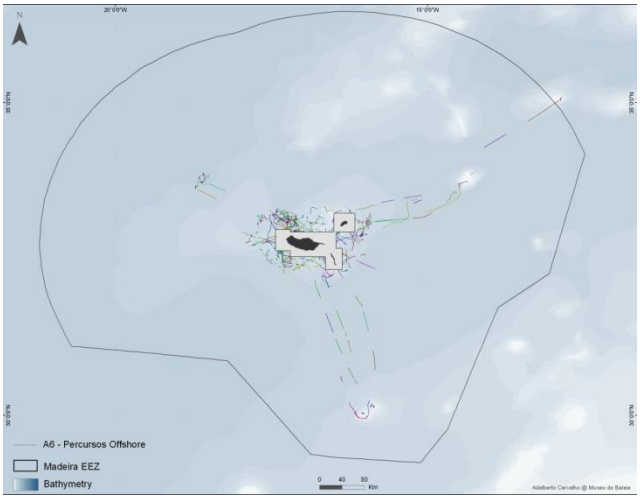


Figure 3: Map of the Madeira EEZ with the trips made on-board the tuna fishing vessels in the offshore waters.

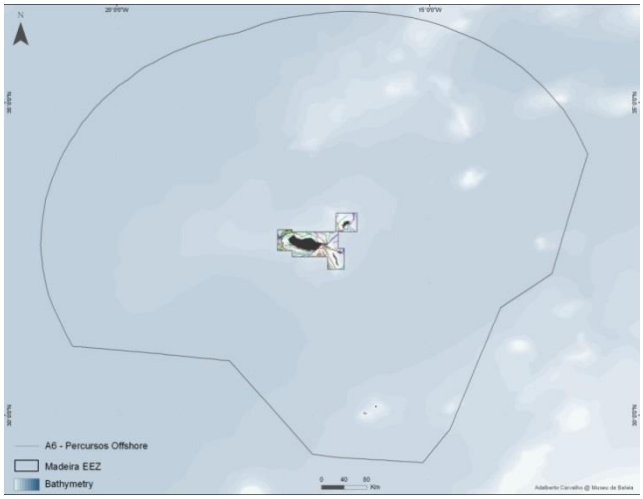


Figure 4: Map of the Madeira EEZ with the trips made on-board the tuna fishing vessels in the inshore waters.

The effort was divided into survey mode and into point count mode in the offshore waters of the Madeira EEZ. We recorded 3 833 km on survey mode and 1 387 km in point count mode (Figure 5).

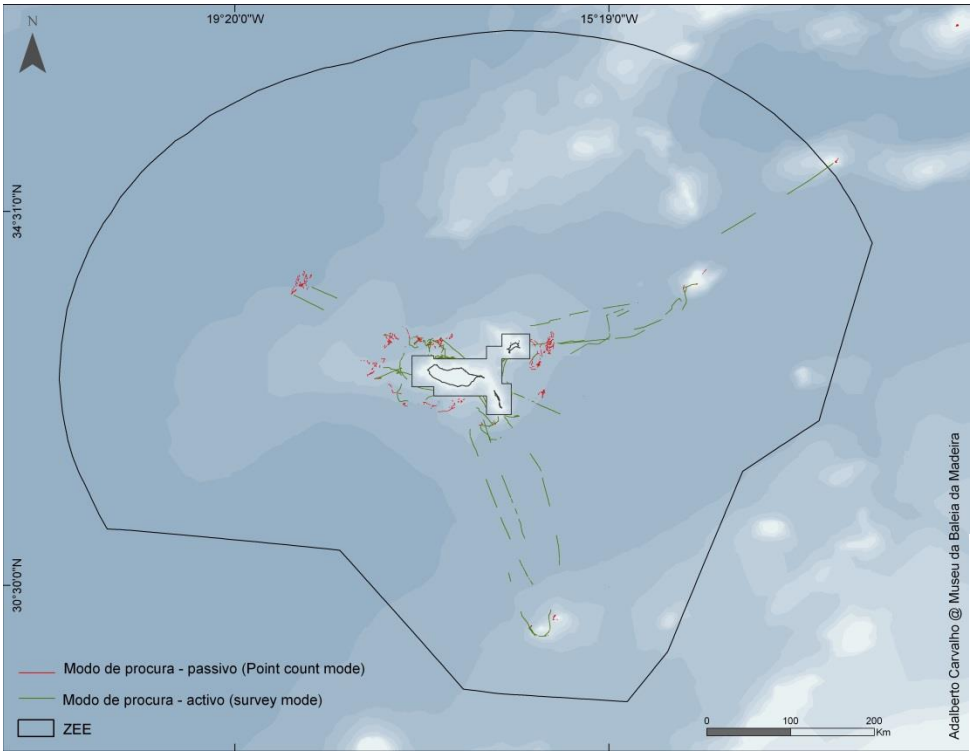


Figure 5: Map of the trips made on-board the tuna fishing vessels in the offshore waters. The survey mode and the point count mode are illustrated by the colour green and red, respectively.

4.2. Cetaceans

A total of 320 cetaceans' sightings were recorded by the observers on-board the tuna fishing vessels, including sightings in the coastal and offshore waters of the Madeira Archipelago and during off and on-effort mode. Of those, 277 cetaceans' sightings were recorded in on-effort mode, being 203 in the offshore waters and 74 in the inshore waters (Figure 6).

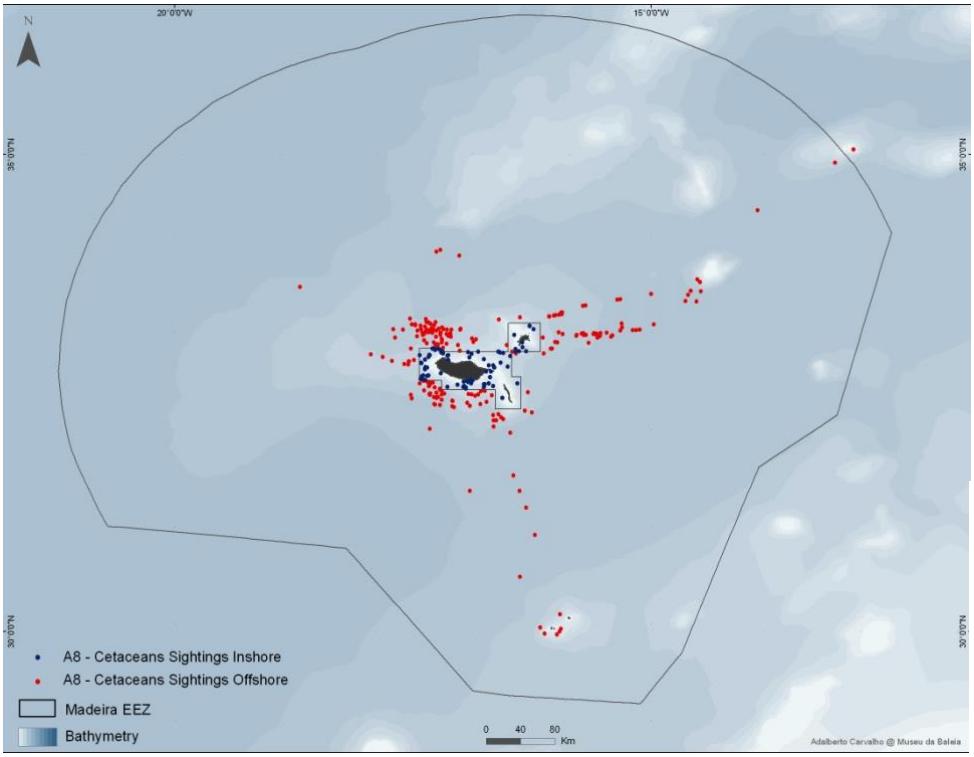
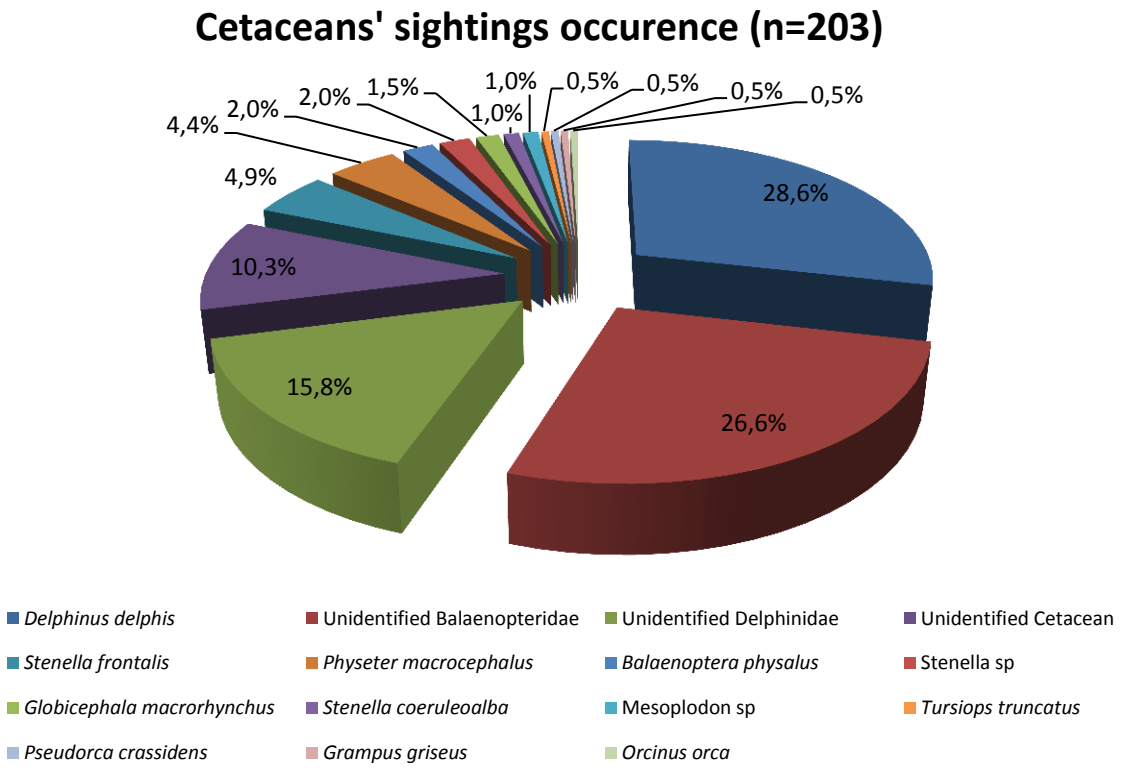


Figure 6: Map of the cetaceans' sightings made on-effort mode in the Madeira EEZ. The red dots correspond to the 203 cetaceans' sightings in the offshore waters, and the blue dots to the 74 cetaceans' sightings in the inshore waters.

Offshore waters

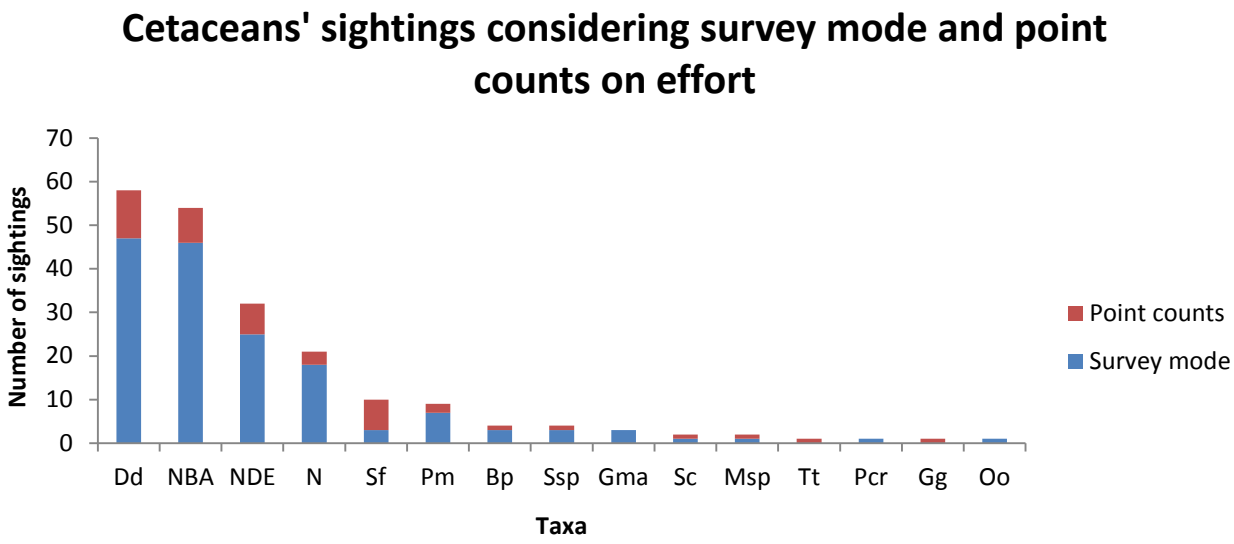
Considering only the 203 cetaceans' sightings recorded in the offshore waters on-effort mode, 10 species were identified: *Delphinus delphis, Stenella frontalis, Physeter macrocephalus, Balaenoptera physalus, Globicephala macrorhynchus, Stenella coeruleoalba*, *Tursiops truncatus, Pseudorca crassidens, Grampus griseus,* and *Orcinus orca.* In most cetaceans' sightings (56%) it was only possible to identify the animals to the Sub-Order, Family or Genera levels: Unidentified Balaenopteridae, Unidentified Delphinidae, Unidentified Cetacea (big cetaceans, Mysticeti or Odontoceti), *Stenella* sp., or *Mesoplodon* sp. (Graphic 3).

In Graphic 3 is possible to observe that the short-beaked common dolphin (abbreviated to common dolphin from now on) was the *taxum* with the highest percentage of sightings (Dd – 29%), followed by unidentified Balaenopteridae (NBA – 27%) and unidentified Delphinidae (NDE – 16%), representing 72% of all sightings. The cetaceans' sightings recorded as unidentified Cetacea (N – 10%) were all large whales, either Mysticeti or Odontoceti.



Graphic 3: Cetaceans' sightings recorded on-board the tuna fishing vessels in the offshore waters of the Madeira EEZ on-effort mode.

From the 203 cetaceans' sightings recorded in the offshore waters of the Madeira EEZ, 159 sightings were made in survey mode, and 44 in point counts mode (Graphic 4). In the following graphics and maps, species will be identified by the first letter of the first and second name of the scientific designation (e.g. ***O****rcinus* ***o****rca* - Oo). NDE, NBA, N and Ssp stands for non-identified delphinidae, non-identified balaenopteridae, non-identified cetacean and genera *Stenella*, respectively.



Graphic 4: Cetaceans' sightings in the offshore waters divided by survey mode and point counts mode.

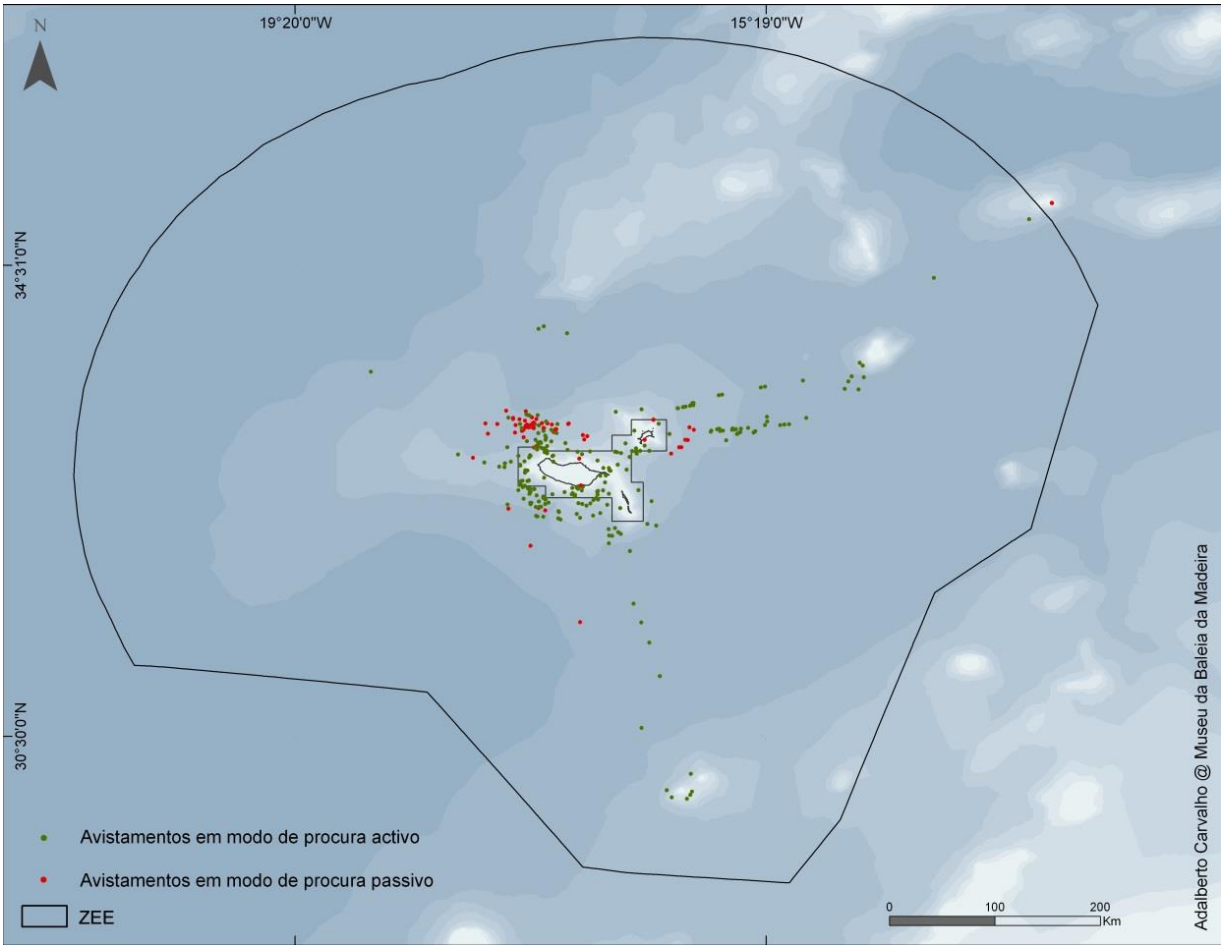


Figure 7: Map with the distribution of sightings made in 'survey mode' (green dots) and 'point count mode'.

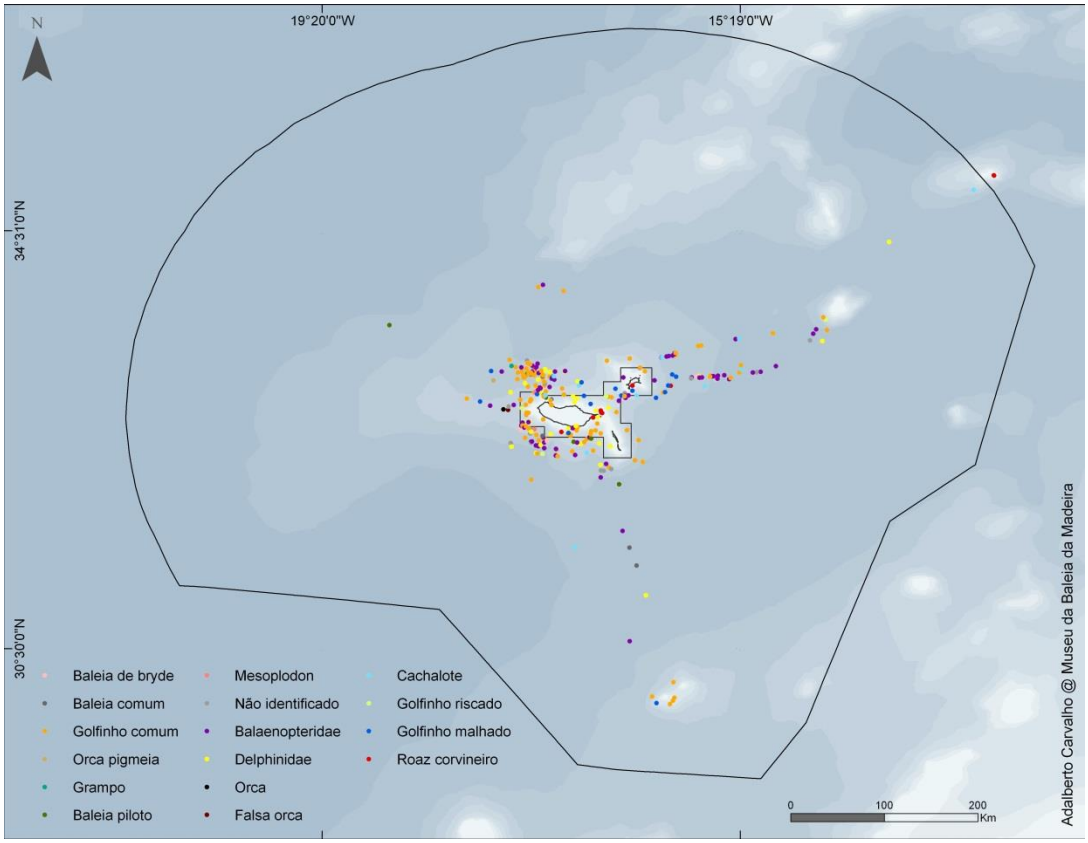


Figure 8: Sightings distribution by species/family in inshore and offshore waters made from tuna fishing vessels. It can be seen the preponderance of common dolphins, spotted dolphins and balaenopteridae sightings in offshore waters.

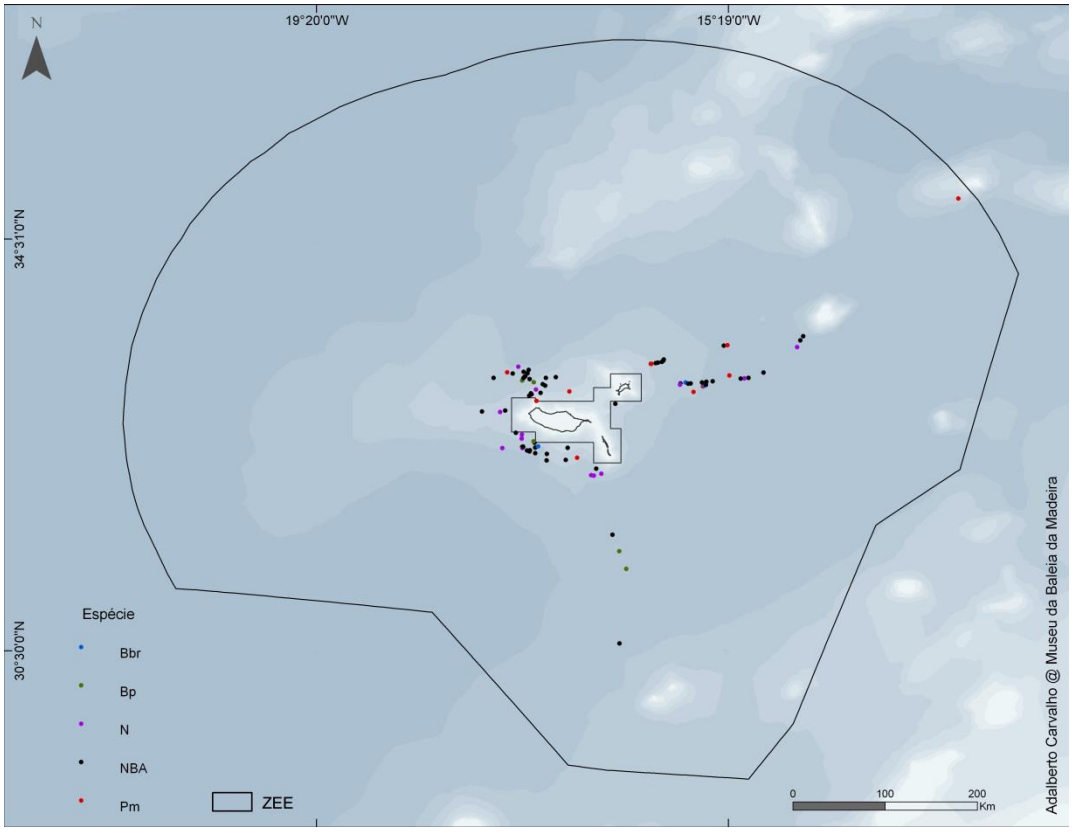


Figure 9: Sightings distribution of the great whales, including baleen and sperm whales, in offshore waters made from tuna fishing vessels. Bbr – Bryde's Whale; Bp – Fin whale; Pm – Sperm whale; NBA – Unidentified baleen whale; N – Unidentified cetacean.

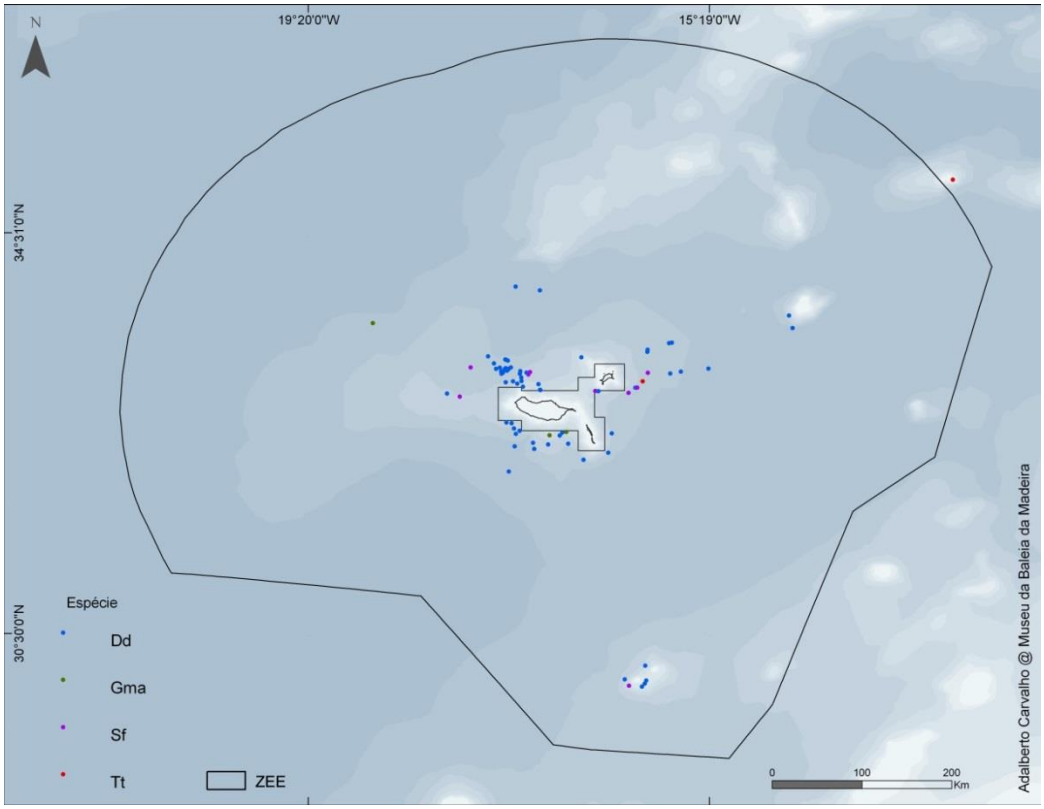


Figure 10: Sightings distribution in offshore waters of the main dephinidae species present in Madeira waters, namely common dolphin (dd), short-finned pilot whale (Gma), spotted dolphin (Sf) and bottlenose dolphin(Tt). The coastal preference of the bottlenose dolphin is reflected in this map the almost absence of the species in offshore waters in contrast with common and spotted dolphins open/waters preferences.

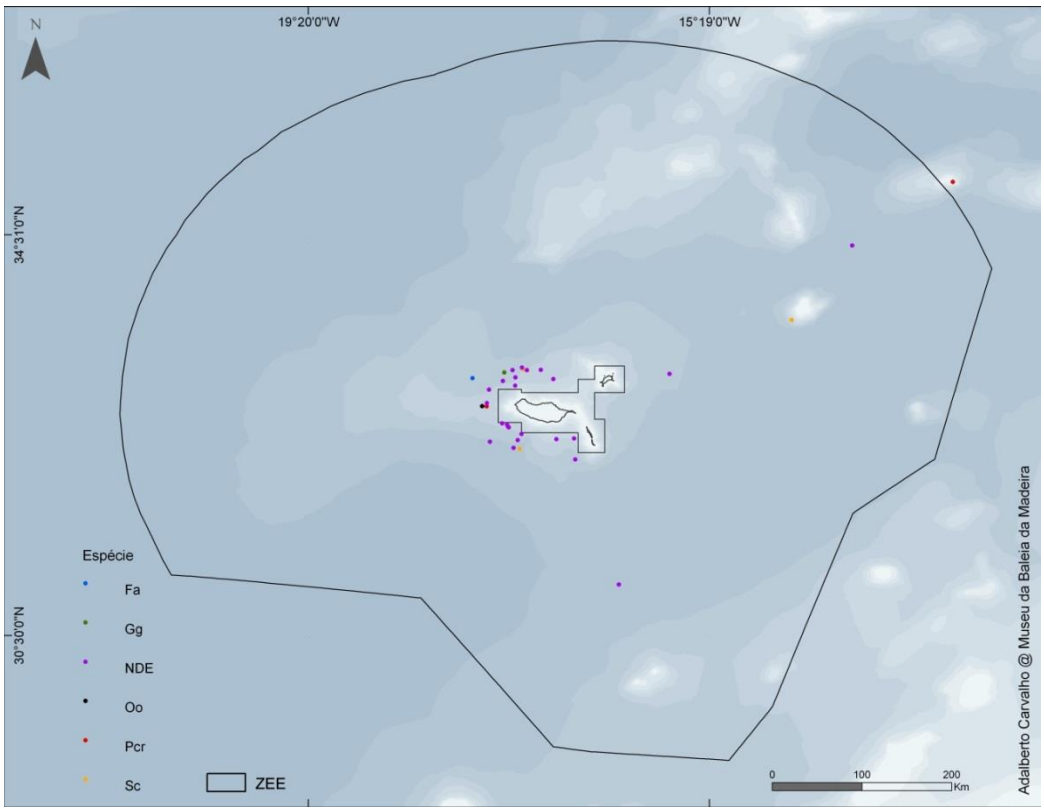
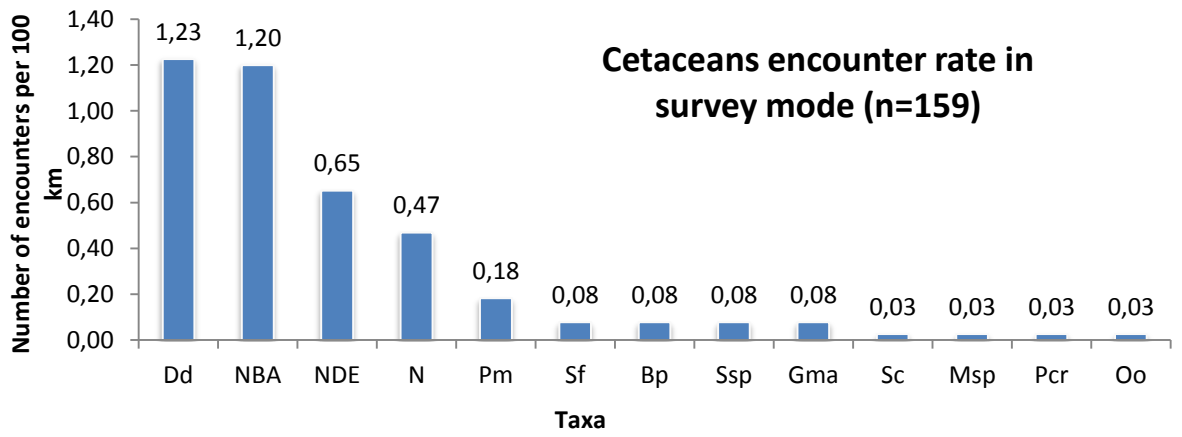


Figure 11: Sightings distribution in offshore waters of the dephinidae species with less presence in in Madeira waters, namely Risso's dolphin (Gg), killer whale (Oo), false killer whale (Pcr), stripped dolphin (Sc) and non-identified delphinidae (NDE).

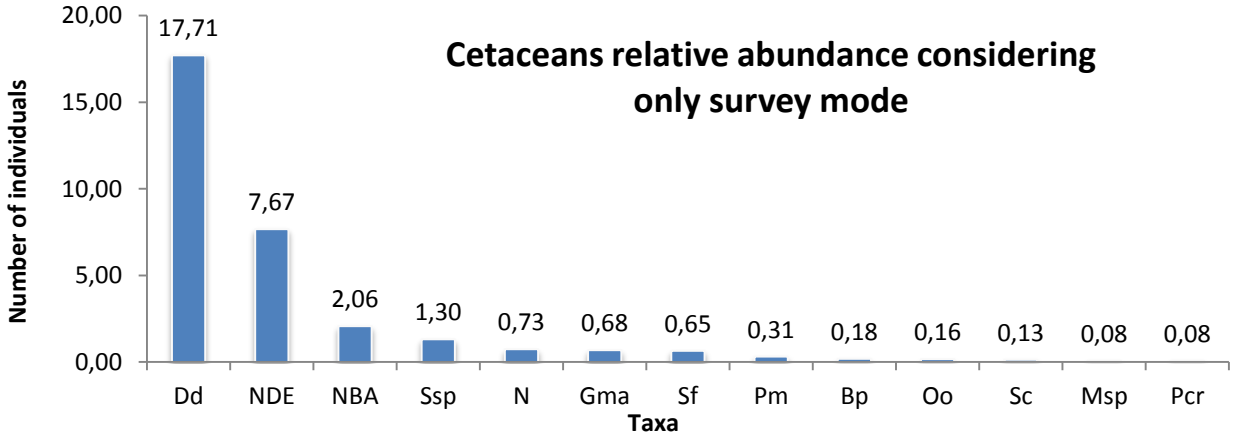
When calculating the encounter rate and the relative abundance of the cetaceans' sightings, only the sightings recorded during survey mode were used (n=159). The number of species was then reduced to eight, where *Tursiops truncatus* and *Grampus griseus* became excluded of the species list.

The encounter rate was of 4.15 cetaceans'groups /100 km. The common dolphin had the highest encounter rate followed by unidentified Balaenopteridae and unidentified Delphinidae (1.23, 1.20 and 0.65 encounters per 100 km respectively; Graphic 5).



Graphic 5: Encounter rate of cetacean groups (number of encounters per 100 km) in the offshore waters of the Madeira EEZ.

A total relative abundance of 31.75 individuals per 100km was recorded in the Madeira EEZ offshore waters. The common dolphin presented the highest values followed by unidentified Delphinidae and unidentified Balaenopteridae (17.71, 7.67 and 2.06 individuals per 100 km, respectively) (Graphic 6).



Graphic 6: Relative abundance of cetaceans (number of individuals per 100 km) in the offshore waters of the Madeira EEZ.

An evaluation of the cetacean groups with calves was made, but considering only the cetaceans groups where it was possible to determine the presence, or not, of calves (n=138). Calves were present in 15.94% of those cetacean groups. In table 1 is the detailed information of the frequency of cetaceans' taxa with calves in the offshore waters.

Table 1: Frequency of cetaceans groups sighted with calves in the offshore waters on the Madeira EEZ.

Taxa	No. of groups where it was possible to determine the presence/absence of calves	No. of groups with calves	Frequency of groups with calves (%)
Pseudorca crassidens	1	1	100,00
Orcinus orca	1	1	100,00
Stenella frontalis	6	2	33,33
Stenella sp	3	1	33,33
Globicephala macrorhynchus	3	1	33,33
Delphinus delphis	43	10	23,26
Unidentified Delphinidae	6	1	16,67
Unidentified Balaenopteridae	45	5	11,11
Unidentified Cetacea	15	0	0
Physeter macrocephalus	8	0	0
Balaenoptera physalus	3	0	0
Grampus griséus	1	0	0
Mesoplodon sp	1	0	0
Stenella coeruleoalba	1	0	0
Tursiops truncatus	1	0	0
Total	138	21	15,22

Inshore waters

A short analysis of the cetaceans' sighting data collected in the inshore waters was made in order to compare with the results from the offshore waters using the same methodology (i.e. platforms, observers and period). Considering only on-effort mode sightings collected during survey mode, there was 4.40 cetaceans encounters per 100km and a relative abundance of 51.52 individuals per 100km. The following table has a list of all the cetaceans' sightings in these waters, with the respective encounter rate and relative abundance. The common dolphin presented the highest encounter rate followed by unidentified Delphinidae and by unidentified Balaenopteridae (2.07, 0.97 and 0.58 encounters per 100 km, respectively).

Table 2: Encounter rate and relative abundance of the cetaceans in the inshore waters of the Madeira archipelago.

Taxa	Encounter rate	Relative abundance
Delphinus delphis	2,07	33,14
Unidentified Delphinidae	0,97	11,20
Unidentified Balaenopteridae	0,58	0,71
Stenella frontalis	0,19	3,24
Tursiops truncatus	0,19	1,75
Unidentified Cetaceans	0,13	0,26
Stenella coeruleoalba	0,13	1,04
Physeter macrocephalus	0,06	0,13
Mesoplodon sp	0,06	0,06

An evaluation of the cetacean groups with calves was also made. As in the analysis of the offshore waters, here the percentage of the number of calves in the groups was also made considering only the cetaceans groups where it was possible to determine the presence, or not, of calves (n=52). Calves were present in 26.92% of those cetacean groups. In the following table is the detailed information of the frequency of cetaceans' taxa with calves in the coastal waters.

Tabela 3: Frequency of cetaceans groups sighted with calves in the coastal waters of the Madeira EEZ.

Taxa	No. groups were it was possible to determine the existence of calves	No groups with calves	Frequency of Groups with calves (%)
Stenella frontalis	3	1	33,33
Delphinus delphis	27	11	40,74
Unidentified Delphinidae	4	0	0,00
Unidentified Balaenopteridae	7	0	0,00
Unidentified Cetacean	2	0	0,00
Physeter macrocephalus	1	0	0,00
Mesoplodon sp	1	0	0,00
Stenella coeruleoalba	2	2	100,00
Tursiops truncatus	5	0	0,00
Total	52	14	26,92

4.3. Potential Threats

3.3.4. Marine traffic

Visual data

The observers on-board the tuna fishing vessels recorded a total of 388 vessels' sightings in the offshore waters of the Madeira archipelago on-effort mode (Figure 12). Eight types of vessels were identified; the tuna fishing vessels (Figure 13) were the most sighted (60.57%), followed by cargo ships (24.23%) (Figure 14), other type of fishing vessels (4.12%), sailing boats (3.61%), cruise ships (3.61%), other type of vessels (1.29%), scabbard fishing vessels (1.29%), and yachts (1.29%). We obtained a mean of 2.66 (SD=3.00) vessels per day in the offshore waters of Madeira EEZ.

The encounter rate of the marine traffic was not evaluated because most vessels' sightings were registered in point count mode, when the tuna fishing vessel was not navigating/travelling (they were drifting). In these maps it is possible to observe a higher number of vessels' sightings in the NW part of the archipelago.

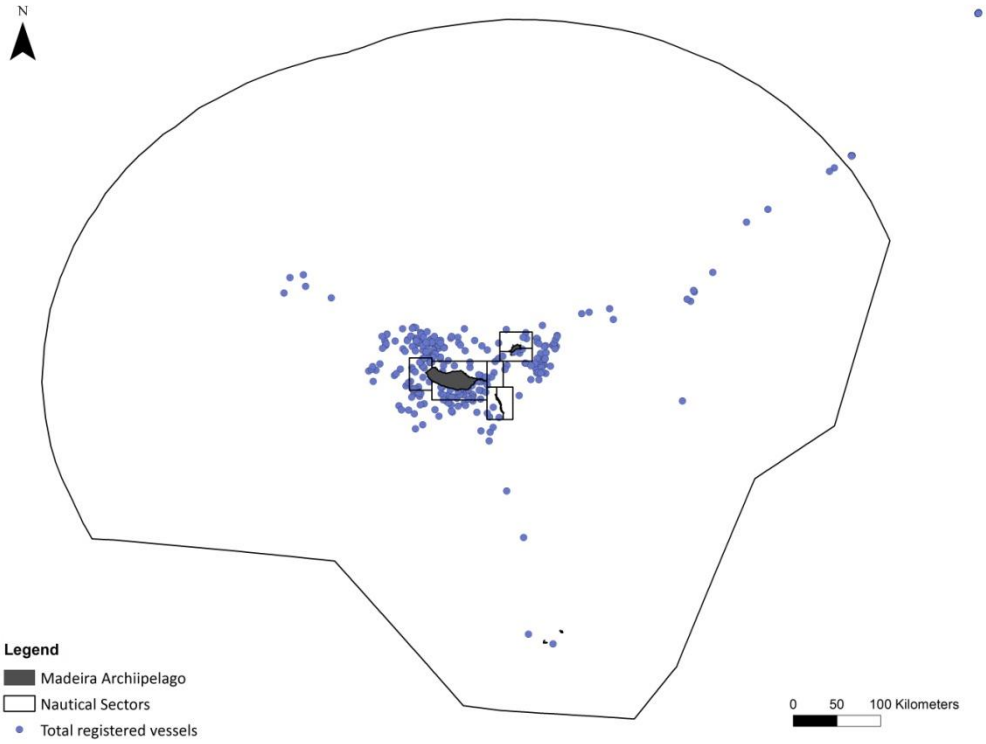


Figure 12: Map of all the visual data of the marine traffic (all type of vessels) in the Madeira EEZ, collected on-board the tuna fishing vessels.

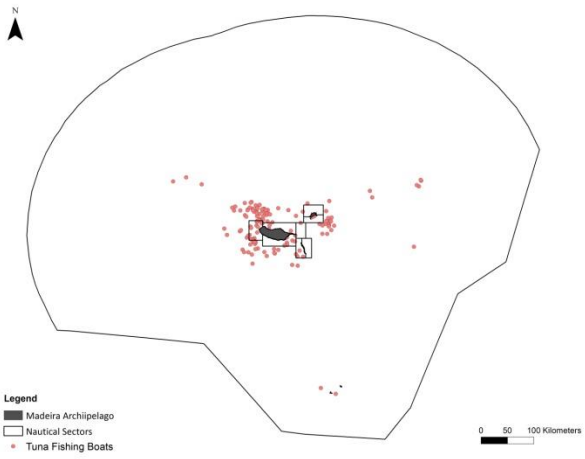


Figure 13: Map of the tuna fishing vessels register in the Madeira EEZ based on visual data.

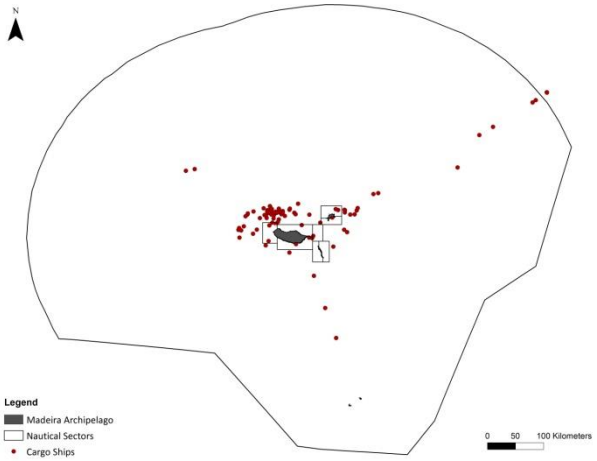


Figure 14: Map of the cargo ships register in the Madeira EEZ based on visual data.

AIS data

The analysis of the AIS data showed that 1 755 vessels were recorded in the sampled months and years, of which 1 231 vessels were recorded in the 6 months of 2010 and 524 vessels in the 3 months of 2011. In both years the number of vessels recorded by the AIS system was higher than the visual data records of the three years (2010-2012) collected on-board the tuna fishing vessels.

In the maps shown in Figure 15 to Figure 23 is possible to observe the marine traffic mapped between March and August in 2010 and 2011. It shows that the marine traffic was recorded all around the Madeira EEZ; where each track line represents the trip of single vessel. The cargo ships, represented in red in the maps bellow, represented highest percentage of traffic (89.46%), followed by other types of vessels (5.19%), by cruise ships (4.96%) and by leisure vessels (0.4%). We calculated that a mean of 27.86 vessels used the area of the Madeira EEZ per day.

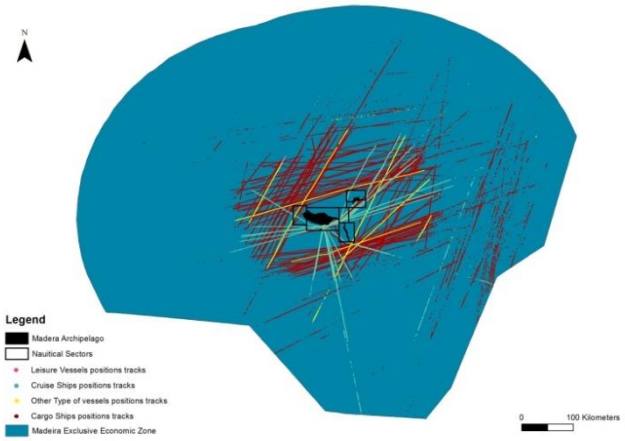


Figure 15: Map of the AIS data from March 2010 (7 days) in the Madeira EEZ.

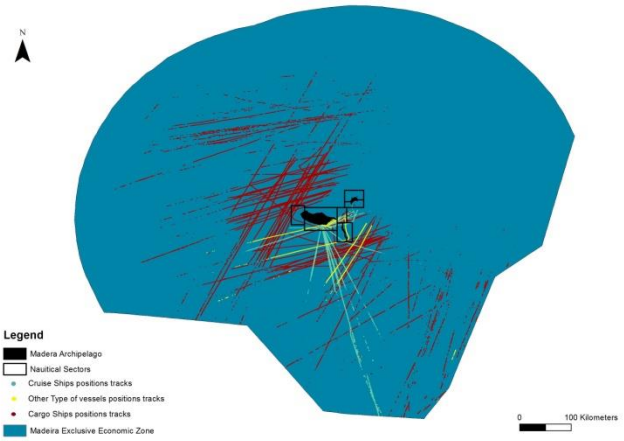


Figure 16: Map of the AIS data from March 2011 (7 days) in the Madeira EEZ.

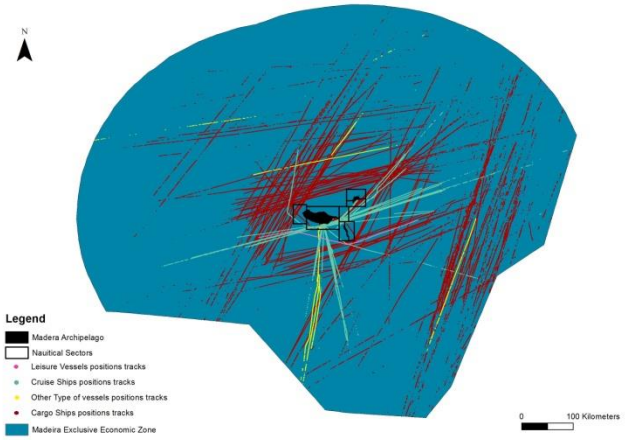


Figure 17: Map of the AIS data from April 2010 (7 days) in the Madeira EEZ.

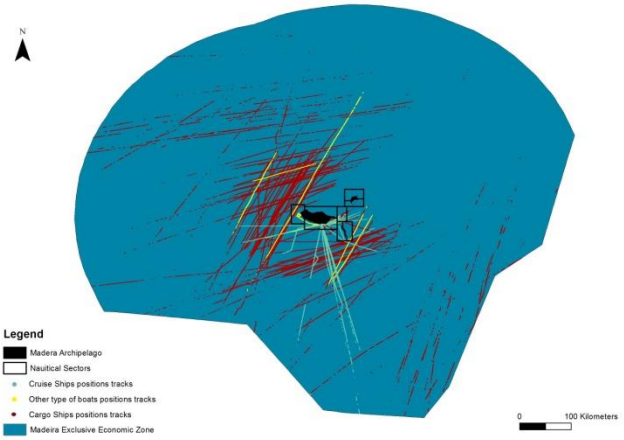


Figure 18: Map of the AIS data from April 2011(7 days) in the Madeira EEZ.

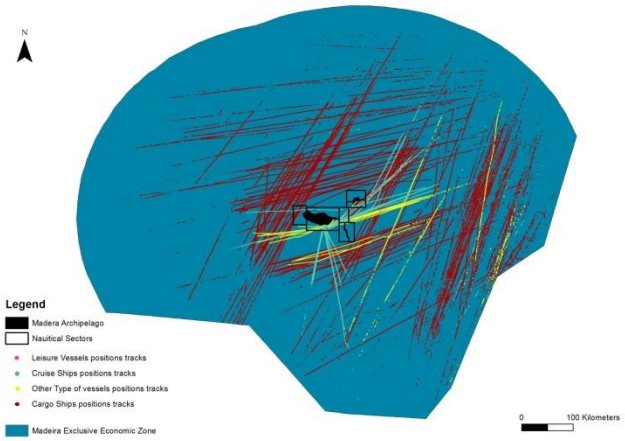


Figure 19: Map of the AIS data from May 2010 (7 days) in the Madeira EEZ.

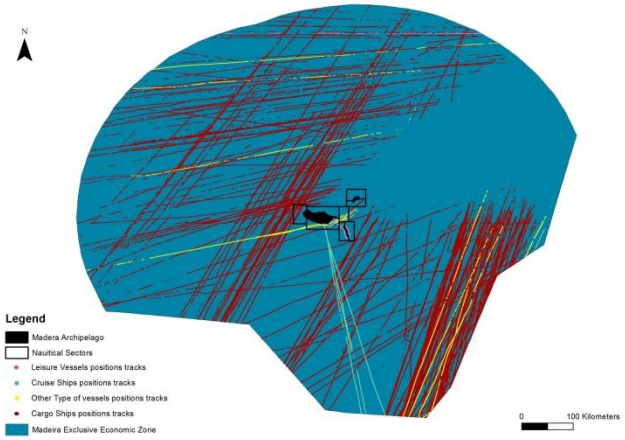


Figure 20: Map of the AIS data from June 2010 (7 days) in the Madeira EEZ.

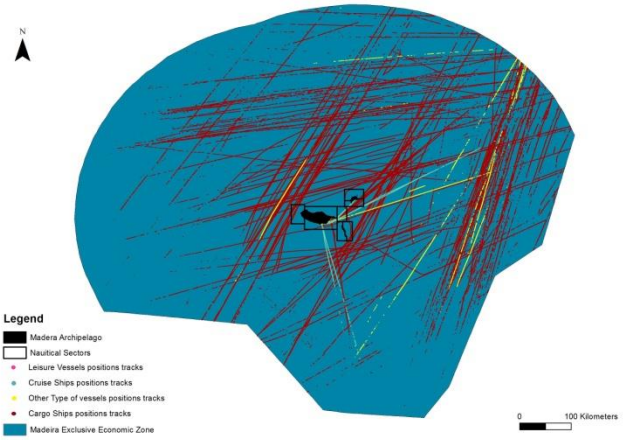


Figure 21: Map of the AIS data from June 2011 (7 days) in the Madeira EEZ.

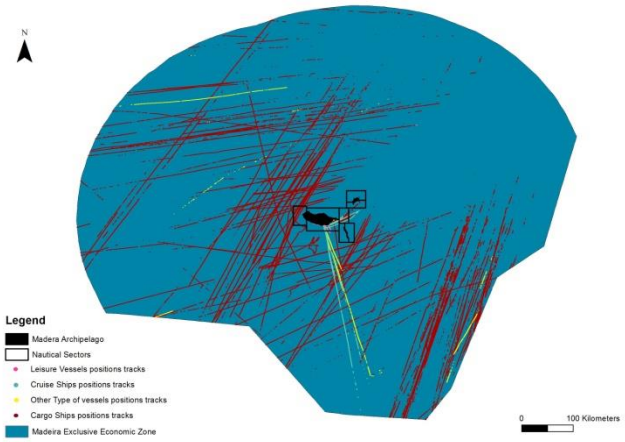


Figure 22: Map of the AIS data from July 2010 (7 days) in the Madeira EEZ.

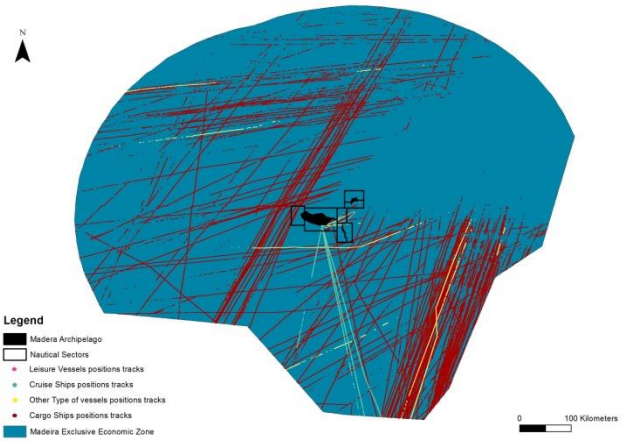


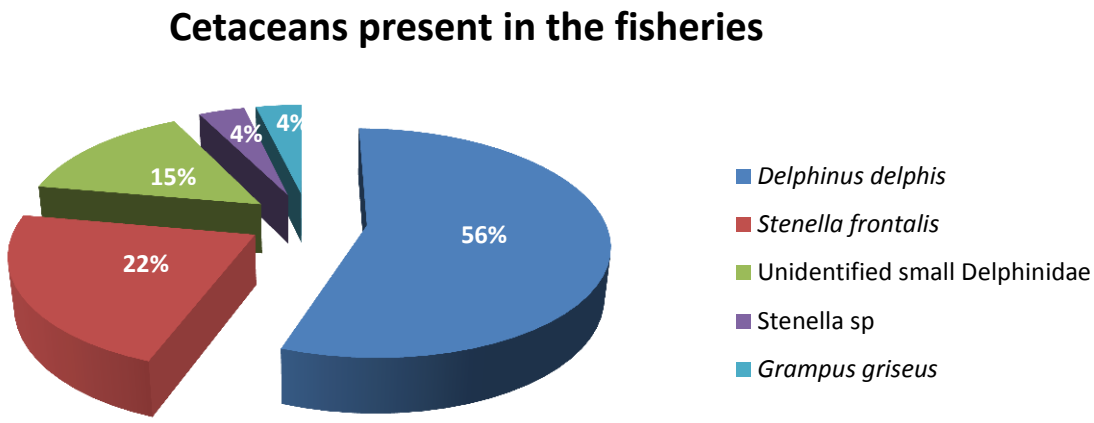
Figure 23: Map of the AIS data from August 2010 (7 days) in the Madeira EEZ.

3.3.5. Interaction between fisheries and cetaceans

For this analysis we used the data collected during off and on-effort mode in the offshore waters of the Madeira EEZ (n=232, 203 sightings on-effort mode, 29 sightings off-effort mode). Of those 232 sightings, only 27 cetaceans groups were present in the fisheries (13% of all sightings) and all recorded during the tuna fishery (and none during the small pelagics fishery). A total of 277 fishery events (272 tuna fishery events and 5 small pelagics fishery events) were recorded on-board the tuna fishing vessels in the offshore water of the Madeira EEZ.

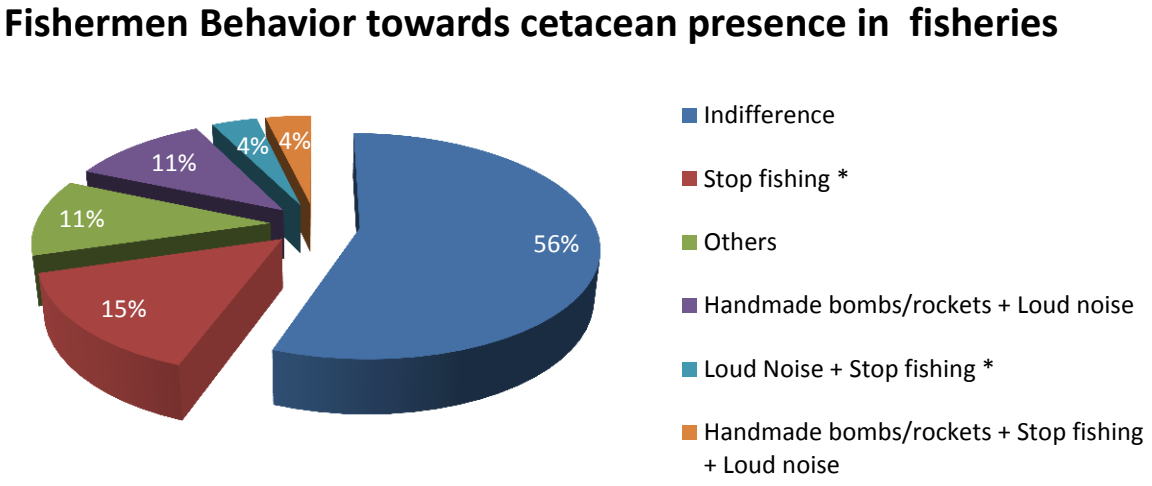
The 27 cetacean sightings during the 277 fishery events corresponded to a presence of 10% of cetaceans during fisheries**. In 3% of those events the cetaceans disturbed the fisheries, and no by-catch of cetaceans was recorded.**

Of the 27 cetacean sightings present in the fisheries, the common dolphin was the species with the highest presence (56%), followed by the *Stenella frontalis* (22%), unidentified small Delphinidae (15%), *Stenella* sp (4%) and *Grampus griseus* (4%) (Graphic 7).



Graphic 7: Graphic representation of the species of the 27 cetacean sightings present in the fisheries in the offshore waters of the Madeira EEZ.

The behaviour of the fishermen was recorded in the 27 cetacean sightings that occurred during the fishing events. Four types of behaviour were identified: (1) indifference, (2) stop fishing, (3) use of handmade bombs/rockets to drive the cetaceans' away from the boat and from the group of tuna fish and (4) loud noise (screams from the fishermen). In Graphic it is represented the percentages of those behaviours towards the cetaceans.

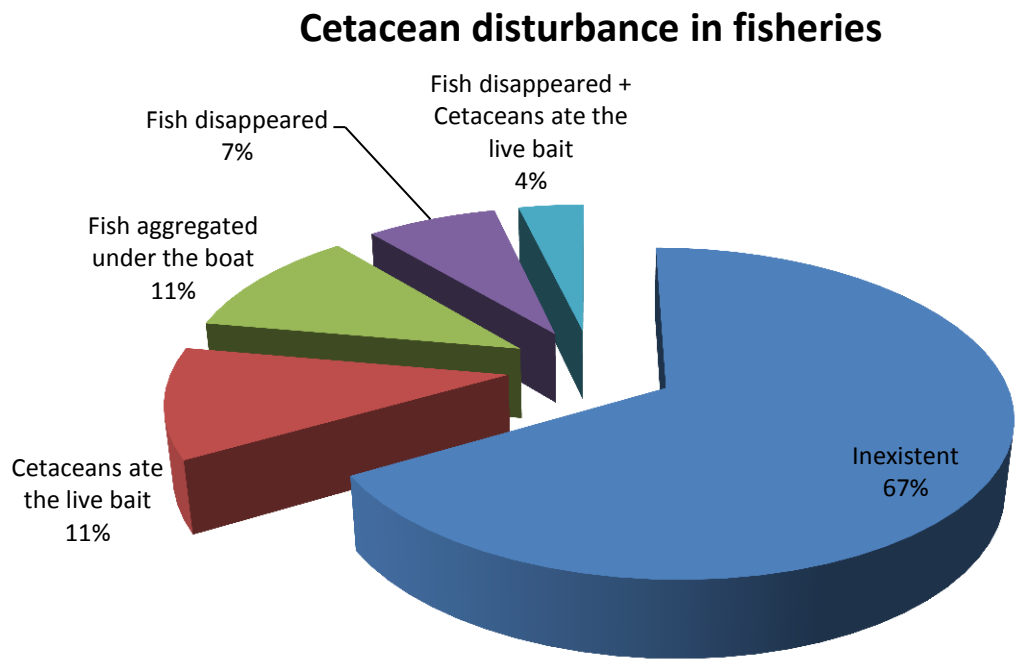


Graphic 8: Graphic representation of the fishermen behaviour towards cetaceans' presence in the fisheries in the offshore waters of the Madeira EEZ.

In 56% of the times cetaceans were present in a fishing event the fishermen were indifferent to their presence, in 19 % they stop fishing and made loud noises to drive the animals away, while in 15% of the times fishermen used handmade bombs/rockets to drive the animals away from the tuna fish shoal. In these events, it was recorded only one time reaction to handmade bombs/rockets, when cetaceans swam away from the tuna fishing vessel. It was not possible to confirm injuries or damage to the animals since they disappeared. The common dolphin (1 time), the Atlantic spotted dolphin (2) and an unidentified small Delphinidae (1), were species targeted by this behaviour.

Another type of threat identified outside fishery events (when the vessel was travelling) was the poring of diesel oil in the seawater to drive the orcas away from the tuna fishing vessel, and away from the school of tuna fish, that the vessel had just left previously to their encounter.

The cetaceans' behaviour towards the fisheries was also recorded. Four types of behaviour were identified: (1) inexistent (the cetaceans did not react to the presence of the tuna school) (67% of the events), (2) ate the live bait (used to catch the tuna fish) (11%), (3) made the fish aggregate under the tuna fishing vessel (11%), and (4) made the tuna fish disappear (the tuna school sunk, ending the fisheries) (7%) (Graphic 9).



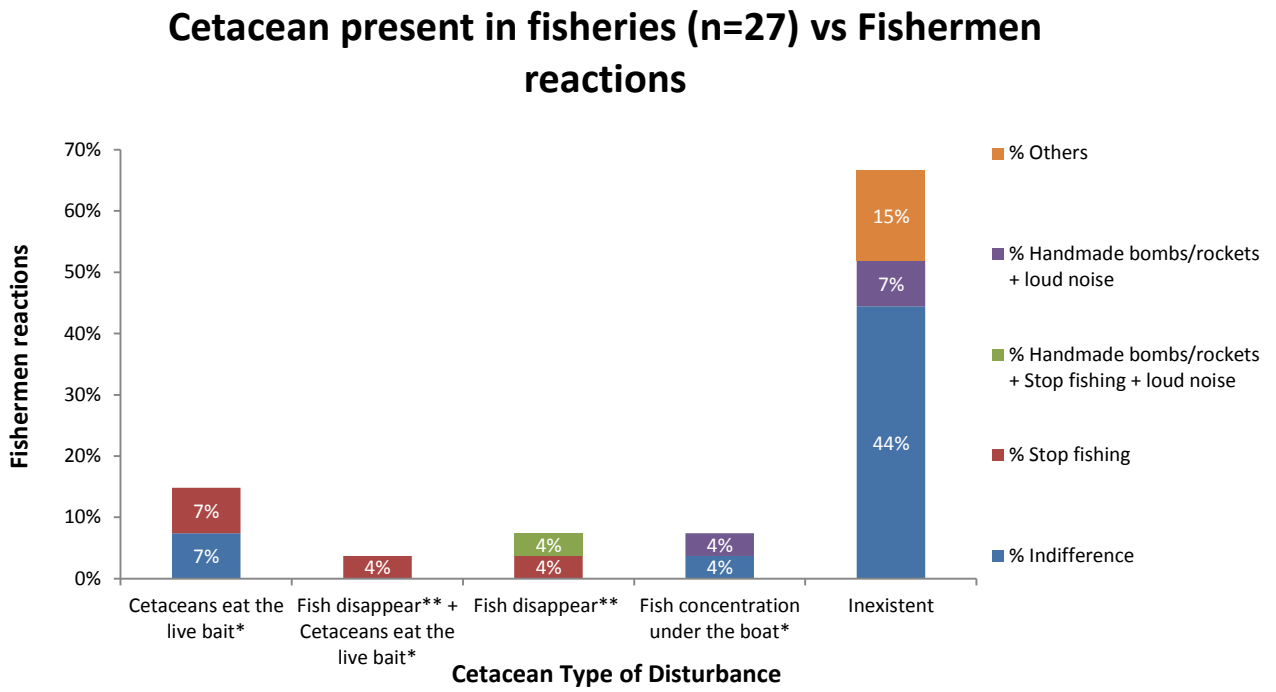
Graphic 9: Graphic representation of the cetaceans' behaviour towards the fisheries in the offshore waters of the Madeira EEZ.

The cetaceans' species that caused some type of disturbance in the fisheries were the common dolphin (67%), followed by unidentified small Delphinidae (22%) and the Atlantic-spotted dolphin (11%). In the following table are shown the details of the number of times that there was a type of disturbance made by the different small cetaceans'.

Table 4: Identification of the types of disturbance from the cetaceans' species and their respective number of occurrence.

Species	Cetaceans ate the live bait	Fish disappeared	Fish disappeared and Cetaceans ate the live bait	Fish aggregated under the boat
Delphinus delphis	3	2	1	
Unidentified small Delphinidae	1			1
Stenella frontalis				1

The Graphic 10 crosses the data of the cetaceans present in the fisheries versus the fishermen reactions. When the cetaceans ate the live bait, the fishermen stop fishing the tuna (7% of the times) or did not react to their presence (7%). When the cetaceans ate the live bait and the tuna fish disappeared, the fishermen stop fishing the tuna (4%). When the cetaceans made the tuna fish disappear, the fishermen stop fishing the tuna (4%) or threw handmade bombs/rockets (4%). When the cetaceans were present and the tuna fish aggregated under the boat, fishermen did not react to their presence (4%) or threw handmade bombs/rockets to the cetaceans (4%). Finally, when the presence of cetaceans in the fisheries did not cause disturbance, the fishermen were indifferent to their presence (44%), or had other types of behaviour (drove the boat away from the animals, and did not even saw the animals) (15%), or threw handmade bombs/rockets to the cetaceans (7%).



Graphic 10: Graphic representation of the fishermen behaviour towards the behaviour of the cetaceans present in the fisheries. The values presented in this graphic are cumulative, total of 100%.

3.3.6. Litter

The litter encountered during the on-effort mode was also classified and recorded. From the 5 220 km track lines made on-board the tuna fishing vessels in the offshore waters of the Madeira EEZ, a total of 31 aggregations of litter was recorded (Figure 23). Four types/categories were used to classify the litter, namely, plastics (bags, packages and Styrofoam), cables and/or fish nets, buoy/floating devices, and others (e.g. aluminium, wood). In Graphic 11 it is possible to observe the different types of litter encountered in the offshore waters. The encounter rate was 0.59 litter aggregations by 100km track line.

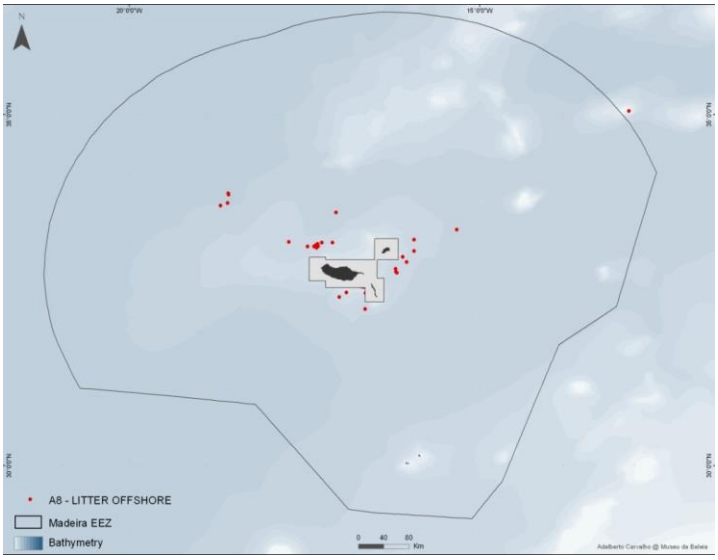
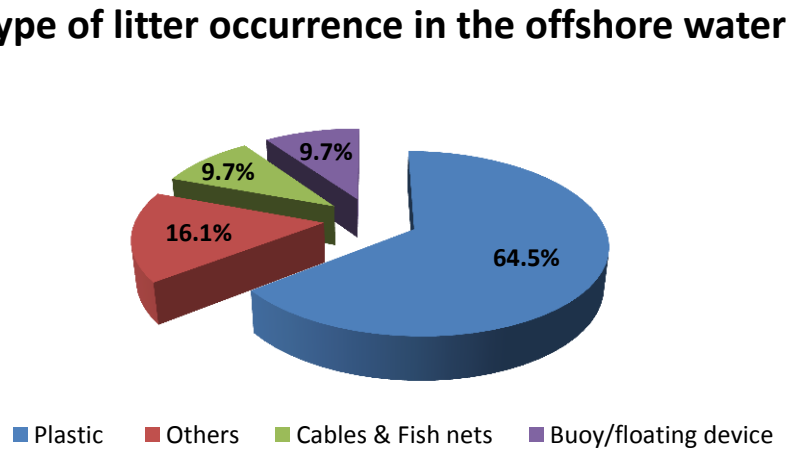


Figure 24: Map of the litter encountered in the offshore waters of the Madeira EEZ.

Plastic was the most sighted type of litter in the offshore waters with 64.5% of all the records, followed by other type of litter (16.1%), cables and fish nets (9.7%), and buoy/floating devices (9.7%) (Graphic 11). The encounter rate of the litter encountered was not evaluated because most litter sightings were register in point count mode, when the vessel was not navigating (drifting).



Graphic 11: Type of litter occurrence in the offshore waters of the Madeira EEZ between 2010-2012.

4.4. Conservation Status

Using data collected in the Objective 1 and 2 of the project CMII and in previous projects carried out by the MWM, It was only possible to re-evaluate the conservation statuses of the following species: *Tursiops truncatus*, *Globicephala macrorhynchus, Stenella frontalis* and *Delphinus delphis*. That is because those were the species with enough biological/ecological data to apply the set of IUCN criteria on which the assessment was based. For further information on the results of the assessment please see annex I.

Tursiops truncatus

Abundances were estimated based on 69 groups sighted between 2007 and 2012. The results gave an estimated abundance of 482 individuals in the study area (CI95: 365-607, CV=14%). It must be mentioned that this abundance estimates were no corrected for the availability bias and thus may be underestimated. The population estimates for the period 2004 - 2012 were of 438 animals (CI95: 394 – 486), of which 183 animals (CI95: 155 – 218) were residents (Freitas et al, 2014a). This estimate regards the Madeira south coast and may not be representative of all Madeira coastal waters. Dinis (2014) shows that there is a higher probability of animals staying in the north coast of Madeira island when compared with the other coastal waters of Madeira, including the south coast.

The relevant estimated biological/ecological parameters were introduced in the software program RAMAS® Red list 2.0 and adjusted to the regional level, using the scheme represented in the methodology. In 2004

the conservation status evaluation for this species was **Least Concern** (Freitas, 2004; Cabral et al, 2005). The re-evaluation - incorporating new knowledge on the population abundances, structure and genetic context – did not change the previous conservation status of the species in Madeira archipelago waters.

Globicephala macrorhynchus

Abundances were estimated based on 27 groups sighted between 2007 and 2012. The results gave an estimated abundance of 151 individuals in the study area (CI95: 993-201, CV=23%) (Freitas et al, 2014b). It must be mentioned that this abundance estimates were no corrected for the availability bias and thus may be underestimated.

Population abundances were estimated based on photo-identification methodology using data collected between 2005 and 2012 in the south and east part of the Madeira Island. A sample of a period of three months from 2010, from mid-summer (end of July) to mid-autumn (end of October) 2010, was chosen as the less biased and best representative period. A total of 48 groups of short-finned pilot whales were sighted in that period and were used in the analysis. It was estimated an abundance of 334 individuals (95% CI: 260-437, CV=0.16], including whales of all residency status (resident, transient and temporary emigrants). These estimates are corrected for the percentage of unmarked individuals. These estimates regard the Madeira south area, but the preferential distribution of the species in the south coast of Madeira (Freitas et al, 2014b) indicates it may be representative of all Madeira coastal waters.

As for the bottlenose dolphin, the re-evaluation did not change the previous conservation status of the species in Madeira archipelago waters. In 2004 the conservation status evaluation for this species was **Least Concern** (Freitas, 2004; Cabral et al, 2005).

Stenella frontalis

Abundances were estimated based on 46 groups sighted between 2007 and 2012. The results gave an estimated abundance of 1067 individuals in the study area (95% CI: 717-1378, CV=22%). The result from the conservation status re-evaluation exercise for the species is **Least Concern**, remaining the same as for the evaluation carried out in 2004 (Freitas, 2004; Cabral et al, 2005).

Delphinus delphis

Abundances were estimated based on 67 groups sighted between 2007 and 2012. The results gave an estimated abundance of 741 individuals in the study area (95% CI: 496-1032, CV=27%). It must be mentioned that this abundance estimates were no corrected for the availability bias and thus may be underestimated. The result from the conservation status re-evaluation exercise for the species is **Least Concern**, remaining the same as for the evaluation carried out in 2004 (Freitas, 2004; Cabral et al, 2005).

5. DISCUSSION

Effort

Although the effort was distributed by the whole tuna fishing season in the Madeira Archipelago, it was not distributed evenly as originally planned. April, May and June were the months with a higher number of days of data collection, as well as the year of 2012. This high number was due to the increased number of observers and boats available in those periods. The number of trips was higher in the early months of the tuna fishing season in the Madeira Archipelago (April, May and June) to guarantee the initially planned effort, i.e. to prevent that we run out of vessels in case they departed earlier to the Azores like in the previous years.

By using only the tuna fishing vessels as platforms of opportunity for the data collection, we could only cover the period between March and September and not all year-round. To manage and solve this problem the DRP was contacted but unfortunately they were not able to proceed with their program and thus data on-board other fishing vessels were not collected. This constitutes a problem since it does not allow an annual coverage of the offshore waters of the Madeira EEZ and the complete survey of all its area. In order to proceed with the surveillance of the conservation status of the cetaceans' species, an annual coverage is necessary, as well as representative coverage of the study area, and therefore a platform that is able of collecting all year data needs to be considered. This may include a specific/dedicated vessel, which implicates other costs.

Cetaceans

Ten cetaceans' species were identified in the offshore waters of Madeira EEZ. The common dolphin was the taxa with the highest percentage of sightings, followed by three groups of unidentified cetaceans. There was a high percentage of unidentified cetaceans in this study (approximately 56% of all the sightings), and one of the reasons is related with the platform used to collect the data. The main goal of the platform (tuna fishing vessels) was to look for and capture tuna fish, so when a cetacean group was sighted by the observers the platform did not travel in direction of the group in order to identify it. One other reason was the difficulty in identifying big whales and other small cetaceans to the species level at great distances, even with experienced observers on-board. All the cetaceans' taxa sighted are described in the update check list of cetaceans in the Madeira archipelago (Freitas et al, 2012).

This study presents encounter rates for cetaceans in the offshore waters for the first time. The rate of 4.15 encounters of cetacean per 100 km found in the offshore waters is only slightly lower than the rate of 4.40 found in the coastal waters of the Madeira Archipelago (using the same platforms, observers, and period). The underwater topography of the Madeira Archipelago is characterised by the lack of a continental shelf (a

rapid increase in depth as the distance from the coast increases), allowing oceanic marine species that inhabit deep waters to come closer to the coast, where they may be more easily sighted (oceanic island effects, with the forming of eddies and upwelling increasing the primary productivity (Santos et al.. 1995, Caldeira et al. 2001)).

Baleen whales have a higher encounter rate in the offshore than in the inshore waters. Baleen whales are migratory species (Bannister 2009), and during the majority of the sightings they were recorded as being travelling (passing by on their migratory route). Only one sighting of bottlenose dolphin was recorded in the offshore waters of the Madeira EEZ (during on-effort mode and in point count mode). The sighting was very near the limit of the inshore waters (12 nmi). Bottlenose dolphins are known to be primarily coastal, but can be also found in pelagic waters, near oceanic islands, and over the continental shelf, especially along the shelf break (Wells & Scott 2009). Recent studies made in this project and in the previous one indicate that there is a resident population of bottlenose dolphins in the Madeira Archipelago, but also that transient individuals pass in the area (Freitas et al, 2014a).

Despite the similarity in the encounter rate of groups of cetaceans between the offshore and the inshore waters of Madeira, the analysis of the relative abundance showed a great discrepancy. We found a relative abundance of 31.75 individuals per 100km for the offshore waters and of 51.52 individuals per 100 km for the inshore waters.

Although there were sightings of cetacean groups with calves in the offshore waters, the results reinforce the importance of the inshore waters for this activity. Overall, 15 % of the groups sighed had calves in the offshore waters while in the inshore waters it was 27%. If we compare only species with multiple sightings in the inshore and offshore waters, we can see that spotted dolphins have the same percentage of groups with calves (33%) in the inshore and offshore waters, while common dolphins have almost twice the number of groups with calves in the inshore waters. While it is difficult to infer of the importance of the inshore waters for calving for the first species because of the small number of samples (sightings with calves), the results are more clear for the common dolphin.

It is important to take into consideration the uneven month coverage of effort which might reflect in these results, as different species have different calving seasons and abundance fluctuations throughout the year.

Threats - Marine traffic

The analysis of the visual data collected on-board the tuna fishing vessels in the offshore waters indicated that there was approximately 2.66 ± 3.00 vessels per day, which is a low number (when compared to higher marine traffic areas such as the Strait of Gibraltar)(Cunha 2013), and their impact on the cetaceans and the marine environment is likely to be low. On the other hand, the analysis of the AIS data provided by the

APRAM indicated that approximately 28 vessels per day (mean) travelled inside the offshore waters of the Madeira EEZ, which is likely to be closer to true than the one based on visual data. Taking in consideration the size of the Madeira ZEE (454 139 km^2), and even considering the highest value we consider that there is still low potential for impact on the cetaceans.

The AIS data received from the APRAM was important, because it allow the analysis of the marine traffic of the total area of the offshore waters and provided information that otherwise would be impossible to obtain through direct observational data. Yet, there are limitations to the data obtained by AIS, such as: several smaller fishing and recreational vessels are not equipped with AIS devices; the transmission range could also be limited and unpredictable according to the height of the transmitting and receiving aerials, incapacitating the detection and identification of small or further away vessels; the AIS signal propagation and capitation by the shore stations is weather dependent. Nevertheless, future studies aiming the surveillance of the inshore and offshore waters of the Madeira EEZ should use AIS data.

Finally, it is important to highlight that the while it should be easier to assess some aspects of the impact of the fisheries on the cetaceans (e.g. bycatch), it is much more difficult and less obvious to assess the impact of the marine traffic and litter. While it is important to understand the magnitude of both threats (intensity and spread) in Madeira EEZ, it is necessary to continue investigating how both traffic and litter impact cetaceans, either by direct killing (e.g. ship strikes or plastic ingestion) or indirectly (e.g. acoustic impact or microplastic particles intake). Even the direct killing is hard to determine because an unknown, but possibly substantial, part of the animals affected sink before they are detected or strand.

Threats - Interaction between fisheries and cetaceans

Cetaceans were only present in 10% of the fishing events, and only in 3% the cetaceans caused some type of disturbance in the fisheries, and no by-catch of cetaceans was recorded. The data analysis showed no records of interaction between the short-finned pilot whales and the tuna fishery, which is the main species that the fishermen complained about disturbing the fishery. Yet, we recorded interaction between three cetacean taxa (common dolphin, unidentified small Delphinidae, and Atlantic spotted dolphin) and the fisheries. The common dolphin was the species with the highest percentage of disturbance in the fisheries, either eating the live bait or sinking the tuna school (i.e. the fish disappears). A similar scenario was also recorded in the Azores in 2012 (Machete & Santos 2013).

When the cetaceans were present in the fishing events the fishermen reacted in different ways. An unexpected behaviour were shown by the fishermen towards the cetaceans present, namely, throwing handmade small bombs/rockets towards the animals. The first behaviour happened in 15% of the events driving the animals away from the fishing boat and tuna shoals. Apparently the acoustic impact of the

explosion in the water did not harm the animals. However it should be better understood the amount of energy put into the water to check if it is enough to cause damage to the dolphins earing apparatus. A second behaviour was recorded outside the fishing events, which was pouring diesel into to the seawater to drive the orcas away from the tuna fishing vessel. In both cases the cetaceans left the area of the tuna fishing vessel. Although not a priority the true impact on cetaceans of these behaviours should the researched and taken measures to prevent them if needed.

The impact of tuna fisheries on cetaceans is considered to be very low with no by-catch registered in 277 fishing events, half of the times cetaceans were present the fishermen did not react and in the remaining 45% they had benign behaviours or behaviours with apparent short term impacts on cetaceans. The same conclusions have also been described in the last report monitoring the tuna fishing activity in the Azores (Machete & Santos 2013), which is based on the same fleet. Although in these last years they increased the recordings of the number of common dolphins hooked, these were all immediately released without killings (Machete & Santos 2013).

Threats - Litter

The lower number of aggregations of litter (31) recorded during the 5220 km of track lines surveyed could suggest a low impact to the marine life. However, these were mainly plastics, which may constitute a significant danger for the marine life, such as turtles, marine mammals and other marine life, since take long time to deteriorate and may be confused with food and the animals can ingest it and die. The analysis of several necropsies in cetaceans and turtles has corroborated it. On the other hand, an aggregation considers only a minimum of five objects (of litter) found close to each other. Therefore, the true objects of litter in the Madeira EEZ are likely to be greater than the one presented here.

Conservation Status of the cetaceans' species

The IUCN criteria were established to assess species conservation statuses at a global level. To adapt the conservation assessment at a regional level a set of guidelines were prepared by the IUCN/SSC Regional Applications Working Group and the National Red List Working Group of the IUCN SSC Red List Committee (e.g. Gärdenfors et al.. 2001; IUCN 2003, 2012). When applied at a regional level it must be recognized that a global category may not be the same as the regional category for a particular taxon. For example, taxa classified as Least Concern globally might be Critically Endangered within a particular region where numbers are very small or declining, perhaps only because they are at the margins of their global range. Conversely, taxa classified as Vulnerable on the basis of their global declines in numbers or range might be Least Concern within a particular region where their populations are stable.

Although there were considerable knowledge improvements since the last conservation statuses assessment, namely on what regards population abundance estimates and population structure for the four species here reassess, the knowledge is still scarce in some parameters to help us make a more sound evaluation. The lack of data regarding population structure and abundance in the wider Atlantic makes it difficult to contextualise the Madeira "sub-populations" of these species in the wider Atlantic picture. All the assessed species are highly mobile animals, two of them with resident groups with year around presence in Madeira waters and the other two seasonal, all part of wider ranging populations of unknown limits and numbers.

It is important to better understand the significance of the open ocean (offshore areas) for these different species. Is it mainly used for travelling between hotspots or are the high seas important habitats used regularly by the animals for their critical activities, such as feeding, resting, calving, socialising or reproducing? For example, while for the bottlenose dolphins the high seas don't seem to be very important, based on the scarcity of sightings, for common-dolphin it may be the contrary. It is important to further study the relevance of dynamic oceanographic systems in the Atlantic open oceans (e.g. fronts) to cetaceans as areas of higher productivity and feeding opportunities.

On the other hand the knowledge about the different cetaceans' abundances and distribution towards the South of the North Atlantic decreases dramatically. This information is important to contextualize the cetaceans using Madeira waters and better understand if Madeira is located in the middle, south or north boundaries of the populations' distribution area.

The conservation statuses of the four species remain the same as in 2004 when it was evaluated for the first time for the Madeira archipelago.

Methodology for the surveillance of the conservation status of cetaceans' species

The second objective of this study was to define and test methodology for the surveillance of the conservation status of cetaceans' species in the offshore waters of the Madeira Archipelago. So it was important to use a methodology that allows the gathering of data to determine biological parameters of the cetaceans' species on a cost-effective way. The methodology used in this study, using platforms of opportunity such as fishing vessels, is described in detail in a technical plan (Nicolau et al., 2011).

The platforms of opportunity used in this study - the tuna fishing vessels – were a cost-effective means of gathering data on offshore waters regarding occurrence, relative abundance and at some degree the temporal and spatial distribution of the different cetacean species. It is also a viable way of establishing long-term data sets. However, there are some methodological limitations, one of them being the uneven and unpredictable coverage of the study area. In the 3 years of sampling the fishing activities tended to concentrated in specific areas (Figure 3), leaving most of the Madeira EEZ uncovered. This search pattern is

the result of a change of fishing techniques a few years ago (shift to "mancha" fishing method), lowering dramatically the search effort to find tuna in the offshore waters. The second problem aroused from a high percentage of unidentified cetaceans and gathering of other sightings' associated data (group size and composition, behaviour, etc.) that could be partially solved with the use of more powerful binoculars. Although with this methodology and protocol it is not possible to gather data to determine absolute abundances and associated uncertainty, the inclusion in the protocol of the collection of distance and angle to the sightings data may allow, with certain constrains, to obtain absolute abundance estimates through spatial modelling. Nevertheless, even with the disadvantages pointed out above, valuable data was collected for the first time regarding the presence and use of offshore waters by cetaceans, such as relative abundances, group composition (presence of calves in offshore waters), seasonal presence and level of interactions with human activities and related impacts.

The use of platforms of opportunity to collect information on biological data in offshore waters has been discussed in the scientific community in the last few years. For example, in the study of Bravington et al. (1999) data collected on platforms of opportunity were used to investigate trends in relative abundance of harbour porpoises over space and time in the North Sea. In their study statistical tools were developed with the aim of determining whether or not trends in cetacean distribution could be discerned in time or space. They even stated that if it can be assumed that protocols or sight ability have not changed substantially over the period they were collected, platforms of opportunity data offer the possibility of detecting trends or even sudden changes in abundance within restricted areas.

Although we had problems in using the AIS receiver on-board the fishing vessels, it is a powerful tool and should be considered for collected extra data on the marine traffic apart from the visual data. Yet, and probably even better for the evaluation/monitoring of the marine traffic, is to use AIS data collected from a land station (like APRAM, as used in this study) if possible. That can provide information on marine traffic from all the EEZ without any survey, thus constituting an excellent cost-effective technique. A protocol with such land station could be established in order to access that AIS data.

Besides the use of platforms of opportunity, other methods could be applied to continue the surveillance of the distance waters of the Madeira Archipelago in the future. Next we suggest one approach to obtain absolute abundance estimates and another to better understand the distribution, range and movements of animais in offshore waters.

Line transect sampling (DISTANCE)

Visual surveys are usually made using vessels and/or aircrafts as dedicated platforms for data collection. The data collected will allow estimating relative and absolute abundances, and can be used to calculate

abundance trends, as long as estimates are precise enough. It also allows gathering comparable long term data sets and information on spatial distribution, as long as sampling is done periodically. However, these surveys are usually very expensive, especially in offshore waters because of the need to resort to bigger platforms better suited to withstand weather and with long range capabilities. SCANS and CODA surveys are examples of this approach (Berggren et al. 2006; CODA 2009).

Telemetry

Tagging animals with satellite devices can provide information about the movement, range and migration of individual animals. That helps to identify important and preferable habitats, also provides information about the animals without human presence (after the device is placed on the animal), and their behaviour. The conservation of the cetaceans' population is enhanced with this information. The downside of using this technique is that the devices are expensive, from the tagging process there are potential animal welfare issues, and a high number of individuals need to be tagged in order to make general conclusions. The tag can be deployed in the coastal areas.

6. CONCLUSION

The cetaceans' species that occur in the Madeira EEZ offshore waters are the same as the ones found in the inshore waters. Also as in the inshore data, the *Delphinus delphis* was the most sighted species and showed the highest relative abundance and the highest encounter rate.

There was a very low visible impact of the monitored human activities in the offshore waters on cetaceans' species. There was no other evidence of human activities impacts in the study area, making it reasonable to assume that there are not major conservation issues regarding cetaceans in Madeira offshore waters. However, there are several other human activities that were not monitored, such as, the black scabbard fisheries and the fishing fleet from other EU countries operating beyond the 100 nautical miles from shore. The human activities carried out in those distant waters should continue to be monitored, including other relevant activities/fleets that were not observed so far.

For a most robust data collection and a better spatial and temporal coverage of the study area, a different methodology should be considered, with a robust design, incorporating all the requirements necessary to establish cetaceans' population trends in order to evaluate and surveillance the conservation status of the cetaceans' species in the Madeira Archipelago.

REFERENCES

Bannister JL (2009). Baleen Whales (Mysticetes). *In*: Perrin WF, Würsig B, Thewissen JGM (eds) *Encyclopedia of marine Mammals*. Academic Press, San Diego, p 80-88.

Berggren P, Teilmann J, Borchers DL, Burt LM, Gillespie D, Gordon J, MacLeod K, Leaper R, Scheidat M, Swift R, Tasker ML, Winship AJ, Hammond PS (2006). Appendix D2.1: *Review of methods previously used in monitoring temporal and spatial trends in distribution and abundance of cetaceans*, SCANS II report.

Cabral MJ (coord), Almeida J, Almeida PR, Dellinger T, Ferrand de almeida N, Oliveira ME, Palemrin JM, Queiroz AL, Rogado L, Santos-Reis M (eds.) (2005). *Livro Vermelho dos Vertebrados de Portugal.* Instituto da Conservação da Natureza, Lisboa.

Caldeira RMA, Russell P, Amorim A (2001). Evidence of an unproductive coastal front in Baia D'Abra, an embayment on the South East of Madeira Island, Portugal. *Bull Mar Sci* **69**:1057-1072.

CODA (2009). *Cetacean Offshore Distribution and Abundance in the European Atlantic (CODA).*

Cunha I (2013). *Marine traffic and potential impacts towards cetaceans within the Madeira EEZ: a pioneer study*. Tese de Mestrado em Ecologia, Ambiente e Território, Universidade do Porto.

Dinis A (2014). *Ecology and Conservation of Bottlenose Dolphins in Madeira Archipelago, Portugal.* PhD Thesis, Universidade da Madeira.

Freitas L (2004). *Estatutos de conservação dos cetáceos no arquipélago da Madeira (documento F)*. Relatório técnico do Projecto CETACEOSMADEIRA (LIFE99 NAT/P/06432), Museu da Baleia da Madeira, 36p.

Freitas L, Alves F (2004). *Protocolo dos Censos náuticos (Documento B)*. Documento preparado no âmbito do Projecto CetaceosMadeira (LIFE99 NAT/P/06432), Museu da baleia da Madeira, 28p.

Freitas L, Dinis A, Alves F, Nóbrega F (2004). *Cetáceos no Arquipélago da Madeira*. Museu da Baleia, Machico.

Freitas L, Dinis A, Nicolau C, Ribeiro C, Alves F (2012). New records of cetaceans species for Madeira Archipelago with an updated checklist. *Bol. Mus. Mun. Funchal,* **62** (334): 25-43.

Freitas, L; Dinis, A.; Ribeiro, C.; Nicolau, C.; Alves, F.; Carvalho, A. (2014a). *Estudo técnico-científico de suporte à criação de um Sítio de importância Comunitária (SIC) para o golfinho-roaz (Tursiops truncatus) no Arquipélago da Madeira (Deliverable A.7_IA)*. Relatório técnico do Projecto CETÁCEOSMADEIRA II (LIFE07 NAT/P/000646), Museu da Baleia da Madeira.

Freitas L, Alves F, Ribeiro C, Dinis A, Nicolau C, Carvalho A (2014b). *Relatório da proposta de criação de áreas de operação para a actividade de Whale-watching e respetiva capacidade de carga (Deliverable A.7 II)*.

Relatório técnico do Projecto CETÁCEOSMADEIRA II (LIFE07 NAT/P/000646), Museu da Baleia da Madeira.

Gärdenfors U, Hilton-Taylor C, Mace G, Rodríguez JP (2001). The application of IUCN Red List Criteria at regional levels. *Conserv Biol* **15**:1206-1212.

IUCN (2003). *Guidelines for Application of IUCN Red List Criteria at Regional Levels: Version 3.0*. IUCN Species Survival Commission. IUCN, Gland, Switzerland and Cambridge, UK.

IUCN (2012). *Guidelines for Application of IUCN Red List Criteria at Regional and National Levels: Version 4.0*. Gland, Switzerland and Cambridge, UK.

Machete M, Santos RS (2013). *Relatório de Atividades do POPA - Programa De Observação Para As Pescas Dos Açores*. Departamento de Oceanografia e Pescas, Centro do IMAR da Universidade dos Açores. 14ª Reunião Ordinária do Conselho de Supervisão do POPA, Horta.

Morato T, Varkey DA, Damaso C, Machete M, Santos M, Prieto R, Santos RS, Pitcher TJ (2008). Evidence of a seamount effect on aggregating visitors. *Mar Ecol Prog Ser* **357**: 23-32.

Nicolau C, Alves F, Freitas L (2011). Plano Técnico do objectivo 3 - *Protocolo para a Vigilância do estatuto de conservação dos cetáceos em águas offshore do Arquipélago da Madeira*. Projecto CETACEOSMADEIRA II (LIFE07 NAT/P/000646), 76pp.

Perrin WF (2009). Common Dolphins, *Delphinus delphis* and *D. capensis.* In: Perrin WF, Würsig B, Thewissen JGM (eds) *Encyclopedia of marine Mammals*. Academic Press, San Diego, p 255-259.

Santos RS, Hawkins S, Monteiro LR, Alves M, Isidro EJ (1995). Marine research, resources and conservation in the Azores. *Aquat Conserv: Mar Fresh Ecosys* **5**: 311-354.

Silva MA, Machete M, Reis D, Santos M, Prieto R, Dâmaso C, Pereira JG, Santos RS (2011) A review of interactions between cetaceans and fisheries in the Azores. *Aquat Conserv: Mar Fresh Ecosys* **21**: 17-27.

Wells RS, Scott MD (2009) Common Bottlenose dolphin. *In*: Perrin WF, Würsig B, Thewissen JGM (eds) *Encyclopedia of marine Mammals*. Academic Press, San Diego, p 249-253.

ANNEXES

ANNEX I

Next are presented the forms resulting from the assessment, according with IUCN criteria, of the conservation statuses of 4 cetacean species (bottlenose dolphin – *Tursiops truncatus*; Short-finned pilot whale – *Globicephala macrorhynchus*; Common dolphin – *Delphinus delphis*; Atlantic spotted dolphin – *Stenella frontalis*) for Madeira waters, taking in consideration new data and information gathered in the last 10 years.

Tursiops truncatus Montagu, 1821

Evaluation with RAMAS Red List version 2.0.0.7

Taxon name: Tursiops truncatus Montagu, 1821
Taxon type: Species
Assessment: regional
Assessor(s): Luís Freitas (Museu da Baleia, Madeira)
Date of assessment: 20-08-2014
Evaluators:
Date of evaluation: 20-08-2013
RAMAS Red List filename: C:\Users\AuditorioMBM\Desktop\ORGANIZAR INVESTIGAÇÃO\RAMAS - AVALIAÇÕES ESTATUTOS CONSERVAÇÃO\CMII_RAMAS_REVISÃO_ESTATUTOS CONSERVAÇÃO_2013\REAVALIAÇÃO LUIS FREITAS_23-10-2014\MAD-Roaz 23-10-2014.red

INFORMATION

Taxonomic information: Mammalia
Cetacea
Delphinidae
Roaz Corvineiro
Life history: Autóctone. Espécie preferencialmente costeira, pode ser observada associada a habitats pelágicos e Ilhas Ocêanicas. Alimenta-se de peixes de cefalópodes e aparenta ser oportunista na escolha de presas. Ocorrem em grupos de 2 a 15 animais, embora tenham já sido avistados agrupamentos muito maiores. É possível observar esta espécie durante todo o ano nas águas do arquipélago da Madeira, com grupos residentes, migrantes e transeuntes.
Distribution: Distribuição cosmopolita, evitando apenas latitudes elevadas.
Habitat: São reconhecidas duas formas nesta espécie, associadas ao tipo de Habitat. A forma costeira, mais pequena, vive em águas pouco profundas e explora, baías, estuários, podendo entrar também em portos e rios. Esta forma aparenta utilizar regularmente uma área restrita. A forma oceânica, parece ter áreas de distribuição e movimentos bastante menos limitados, estando presentes em muitas áreas de produtividade, particularmente nos tropicos.
Threats: capturas acidentais em aparelhos de anzol (pontuais) (4.1.1.1); ingestão ou imprisionamento em de residuos sólidos (pontual) (6.3.9); turismo (whalewatching) (10.1)
Conservation: Medidas realizadas: elaboração e implementação legislação de protecção (Dec-Legislativo Regional nº 6/86/M de Maio1986) (1.2.1.3) (1.2.2.3); campanhas de educação e sensibilização ambiental (2.2); criação do Museu da Baleia (2.3); Decreto Legislativo Regional n.º 15/2013/M que aprova o Regulamento da Atividade de Observação de Vertebrados Marinhos na Região Autónoma da Madeira; Portaria 46/2014/M de 22 Abril, que estabelece as áreas de operação e respectiva capacidade de carga para a actividade de whalewatching, avaliação e distribuição dos efectivos populacionais (3.2); estudos de biologia e ecologia (3.3); avaliação das principais ameaças (3.5); proposta de medidas de conservação (3.8); monitorização (3.9).Medidas em curso: campanhas de educação e sensibilização ambiental (2.2);
Está proposta a criação de um Sítio de Importância Comunitária (SICp) para o golfinho-roaz e restantes espécies de cetáceos nas águas costeiras do arquipélago da Madeira (Freitas et al, 2014)
Comments: MADEIRA

RESULTS

Status: LC (LC)
Listed under: None
Contribution:
Minus A: LC (LC)
Minus B: LC (LC)

Minus C: LC (LC)
Minus D: LC (LC)
Minus E: LC (LC)
Only A: LC (LC)
Only B: LC (LC)
Only C: LC (LC)
Only D: LC (LC)
Only E: DD (DD)

Warning: Some values were left blank; they are assumed to be "unknown" and assigned to the widest possible range
Warning: Continuing decline is ignored because its qualifier is too weak
Warning: Population size is ignored because its qualifier is too weak
Warning: Continuing decline is ignored because its qualifier is too weak
Warning: Continuing decline is ignored because its qualifier is too weak
Warning: Population size is ignored because its qualifier is too weak
Warning: Continuing decline is ignored because its qualifier is too weak
Warning: Population size is ignored because its qualifier is too weak
Warning: Continuing decline is ignored because its qualifier is too weak
Warning: Size of the largest subpopulation is ignored for Criterion C2a(i) because its qualifier is too weak
Warning: Continuing decline is ignored because its qualifier is too weak
Warning: Population size is ignored because its qualifier is too weak
Warning: Population size is ignored because its qualifier is too weak

OPTIONS

Dispute tolerance: 50
Risk tolerance: 50
Burden of proof: 50
Justification for attitude options:

DATA

Generation length: [11;35] years (Qualifier: Inferred; Uncertainty:)

A idade da maturação sexual das fêmeas é de 12 in Perrin e Reilly (1984). Os dados de longividade obtidos para o roaz corvineiro são de 50 anos, não se sabendo qual a idade média de sinescência reprodutiva (Boyd *et al.*). Assim considerou-se o exemplo do golfinho riscado apontam para uma idade máxima de 57,5 anos (próxima da do roaz), apesar de se considerar que a capacidade reproductora começa a declinar a partir dos 30 anos de idade (Perrin et al., 1994).

Population size: [438;10001] mature individuals (Qualifier: Inferred; Uncertainty: Min/max)

As estimativas populacionais para as águas costeiras do arquipélago da Madeira são de 438 animais (IC95% = 394 - 486) (Freitas et al 2014), com uma estimativa de animais residentes ou associados às ilhas de 183 (IC95%=155-218), para a costa sul da Madeira.

Com certeza que para a restante área da ZEE o valor total de animais é superior apesar de não sabermos em que medida. Muito dificilmente atingirá os 10 000 animais, uma vez que se trata de uma espécies com habitos bastante costeiros e porque os dados evidenciam muito menores densidades no mar alto. Se aplicarmos os mesmos valores de densidades estimados para as águas costeiras da Madeira, Porto Santo e Desertas (0,11 animais/m2) (Freitas el al 2014b) o valor total da ZEEMadeira seria de 48 510 animais (0,11 animais/km2 * 441 000 km2 (Área ZEEMadeira)). Após 3 833 km de esforço de observação nas águas offshore da Madeira (dados obtidos por observadores a bordo de atuneiros) não foram efectuados avistamentos de golfinho-roaz (com a excepção de um avistamento em mode de busca passivo(point count mode) - embarcação parada)(Nicolau et al 2014), que contrasta totalmente com os valores de 13,6 e 9,66 animais/100km obtidos para as águas costeiras da Madeira entre 2007 e 2012 (Freitas et al 2014) em censos náuticos sistemáticos. Apesar dos valores de abundância relativa terem sido obtidos com metodologias diferentes são uma boa indicação da diferença de escala de grandeza da presença de animais nas águas inshore e offshore da Madeira. No entanto, existem claras evidências de que estes animais utilizam as águas offshore para deslocação para outras áreas (Freitas et al 2014)

Past population size: *unknown*

A inexistência de quaisquer dados científicos ou registos que permitam fundamentar ou permitir inferências relativamente ao tamanho da população no passado

Future population size: *unknown*

Face à protecção legal que a espécie goza nas águas do arquipélago da Madeira, às ameaças que actualmente este taxon está sujeito e às medidas de mitigação em curso, esperamos que o estatuto da espécie na Madeira mantenha-se. Esta suspeição é válida apenas se esta população utilizar exclusivamente as águas do arquipélago da Madeira ou se este estatuto for estensivo a toda a sua área de distribuição. (situação não confirmada).

Extreme fluctuations: no (Qualifier: Suspected; Uncertainty: Subjective judgement)

O facto desta espécie não ter sido alvo de exploração comercial ou captura intencional (não é tradicional o consumo de carne de golfinho ou o seu uso para isco), os níveis de captura acidentais em artes de pesca serem muito baixos, não haver degradação substancial do habitat ou sobre exploração de recursos pesqueiros e não vislumbrarmos outro tipo de impactos que possam causar flutuações extremas leva-nos a considerar que não deverão existir flutuações extremas no efectivo populacional da ZEE Madeira. Esta inferência é válida se a população se mantiver na área da ZEE Madeira ou as condições acima referidas se mantiverem em toda a área de distribuição destes animais.

Population Notes:

Estimativas de abundância obtidas para esta espécie para as águas da Madeira (2007 - 2012), a partir de censos náuticos sistemáticos (distance sampling e modelação espacial), apontam para 482 animais (IC95% =365 - 607; CV= 0,14) utilizando estas águas em média a qualquer momento. Esta estimativa está provavelmente subestimada porque não foi corrigida para o "availability bias" e o "perception bias".

Foi estimado em 438 animais (IC95% = 394 - 486) o tamanho da população de golfinho-roaz utilizando a costa sul da Madeira no periodo entre 2004-2012, dos quais 183 animais (IC95%=155-218) eram residentes ou associados às ilhas(Freitas et al 2014). Esta estimativa populacional, refere-se apenas à costa sul da Madeira e não é possivelmente representativa de todas as águas costeiras do arquipélago da Madeira. Na realidade Dinis (2014) mostra que existe maior probabilidade dos animais utilizarem costa norte da Madeira, quando comparado com as restantes áreas costeiras, incluindo a costa sul.

Contudo, para o presente exercicio foi utilizada a estimativa populacional existente para a costa sul (438 animais). O facto de estarmos a lidar com uma população aberta com grande percentagem de animais migrantes ou transeuntes (Dinis 2014), de origem desconhecida (parte da população pelágica Atlântica bastante dispersa) torna difícil a definição de o limite superior populacional (nº de individuos maturos) para este exercício. Neste caso, e tendo em consideração estimativas de abundância obtidas em águas inshore e offshore portuguesas (Marpro) e águas pelágicas atlanticas (CODA)(obtidas em campanhas sistemáticas conduzidas em áreas de ocorrência da população pelagica atlantica do golfinho-roaz), consideramos o limite superior em > 10 000 animais (10001).

Current trends: Stable

Past reduction: [0;29] percent (Qualifier: Suspected; Uncertainty: Subjective judgement)

Apesar de não existirem dados concretos relativamente ao número de roazes corvineiros no passado e presente na Madeira, a ausência de grandes ameaças conhecidas no passado e actualmente nas águas da ZEE da Madeira, levam-nos a considerar que o número de animais que frequentam estas águas tem-se mantido estável. Esta situação é válida considerando que esta população utiliza apenas a ZEE da Madeira (situação não confirmada).

Past reduction basis: c,d

Future reduction: [0;29] percent (Qualifier: Suspected; Uncertainty: Subjective judgement)

Não se perspectiva o aparecimento de ameaças de peso para esta espécie na ZEE da Madeira, pelo que consideramos que a população se irá manter estável para um futuro próximo. As ameaças pontuais actualmente identificadas são as capturas acidentais em linhas de pesca do atum e mortes pontuais provocadas por lixo sólido ingerido. Estas duas ameaças não parecem ter tendência para aumentar no futuro, especialmente porque os pescadores estão mais sensibilizados e porque existe actualmente um grande esforço no sentido de reduzir o lixo que vai parar ao mar, desigandamente através de campanhas de sensibilização e politícas de redução, reciclagem e reutilização de resíduos sólidos. A outra ameaça potencial é a actividade de observação de baleias e golfinhos, para actual está a ser implementado um regulamento de adesão voluntária que pretende disciplinar a actividade, ainda em fase embrionária.

Future reduction basis: c,d

Moving window reduction: [0;29] percent (Qualifier: Suspected; Uncertainty: Subjective judgement)

Moving window reduction basis: c,d

Are the causes of reduction reversible? Yes

Are the causes of reduction understood? Yes

Have the causes of reduction ceased? Yes

Continuing decline: [0;0,1] (Qualifier: Suspected; Uncertainty: Subjective judgement)

Apesar de não existirem dados concretos quanto ao número actual de animais desta espécie na Madeira, a ausência de grandes ameaças conhecidas actualmente nas águas da ZEE da Madeira, levam-nos a considerar que o número de animais que frequentam estas águas tem-se mantido estável. Esta situação é válida considerando que esta população utiliza apenas a ZEE da Madeira (situação não confirmada).

Não se perspectiva o aparecimento de ameaças de peso para esta espécie na ZEE da Madeira, pelo que consideramos que a população se irá manter estável para um futuro próximo. As ameaças pontuais actualmente identificadas são as capturas acidentais em linhas de pesca do atum e mortes pontuais provocadas por lixo sólido ingerido. Estas duas ameaças não parecem ter tendência para aumentar no futuro, especialmente porque os pescadores estão mais sensibilizados e porque existe actualmente um grande esforço no sentido de reduzir o lixo que vai parar ao mar, desigandamente através de campanhas de sensibilização e politícas de redução, reciclagem e reutilização de resíduos

sólidos. A outra ameaça potencial é a actividade de observação de baleias e golfinhos, para actual está a ser implementado um regulamento de adesão voluntária que pretende disciplinar a actividade, ainda em fase embrionária.

Continuing decline in 11 to 35 years: *unknown*
Continuing decline in 22 to 70 years: *unknown*
Continuing decline in 33 to 105 years: *unknown*
Reduction Notes:

Extent of occurrence: 20001 km² (Qualifier: Observed; Uncertainty: Opportunistic observation)
Consideramos que estes animais podem utilizar toda a área da ZEE Madeira, especialmente junto às Ilhas e bancos submarinos.
Continuing decline: no (Qualifier: Suspected; Uncertainty: Subjective judgement)
Não existem indícios que sustentem uma alteração na extensão de ocorrência
Extreme fluctuations: no (Qualifier: Suspected; Uncertainty: Subjective judgement)
Area of occupancy: 4500 km² (Qualifier: Suspected; Uncertainty: Subjective judgement)
Esta espécie com hábitos costeiros é observada especialmente junto às Ilhas. No entanto é possível que efectue movimentos entre estes polos, o que torna dificil inferir a área de ocupação.
Continuing decline: no (Qualifier: Suspected; Uncertainty: Subjective judgement)
Extreme fluctuations: no (Qualifier: Suspected; Uncertainty: Subjective judgement)
Continuing decline in habitat: no (Qualifier: Suspected; Uncertainty: Subjective judgement)
Very restricted: no (Qualifier: Suspected; Uncertainty: Subjective judgement)
Extent and Area Notes:
Os golfinhos-roazes têm uma distribuição cosmopolita, no entanto, têm uma preferência por águas costeiras de menor profunidade. Ocorrem na ZEE Madeira (441 699km2), com evidências de muito maiores densidades nas águas costeiras em relação ao alto mar.

Number of subpopulations: 1 (Qualifier: Inferred; Uncertainty: Subjective judgement)
Estudos genéticos efectuados nos ultimos anos apontam para uma ausência de estrutura genética na população pelágica Atlântica (louis et al 2014; Quérouil et al 2007) da qual fazem parte os golfinhos-roazes que utilizam as águas da Madeira (Quérouil et al 2007). Estudos de estrutura populacional efectuados na Madeira indicam que os golfinhos-roazes que utilizam as águas costeiras são uma combinação entre animais locais (residentes ou associados às ilhas), animais migrantes e animais transeuntes que constituem uma população aberta (Freitas et al 2014a).
Number of locations: 11 (Qualifier: Suspected; Uncertainty: Subjective judgement)
Subpopulations (name and size):
Continuing decline in the number of subpopulations or locations: no (Qualifier: Suspected; Uncertainty: Subjective judgement)
Extreme fluctuations in the number of subpopulations or locations: no (Qualifier: Suspected; Uncertainty: Subjective judgement)
Size of the largest subpopulation: [1000;10001] mature individuals (Qualifier: Inferred; Uncertainty: Hypothetical)
All individuals in one subpopulation: yes (Qualifier: Inferred; Uncertainty:)
A inexistência aparente de barreiras físicas leva-nos a considerar todos os animais como fazendo parte de uma subpopulação. Para reforçar esta idea está o facto de serem capazes de efectuar grandes deslocações.
Severely fragmented: no (Qualifier: Observed; Uncertainty:)
Fragmentation Notes:
A existência de grupos residentes ou associados às Ilhas nas águas costeiras da Madeira, com uma estimativa de 183 animais (IC95%=155-218), torna estes grupos vulneráveis a pressões locais, no entanto, o facto de interagirem e se reproduzirem num contexto populacional mais amplo (não estão geneticamente isolados) reduz essa vulnerabilidade.

Extinction probability in 33 to 100 years: *ignored*
Extinction probability in 55 to 100 years: *ignored*
Extinction probability in 100 years: *ignored*
PVA model filename-Pessimistic:
PVA model filename-Best Estimate:
PVA model filename-Optimistic:
Risk Notes:

REFERENCES

[Reference #1]
Leatherwood, S. e Reeves, R. (1983). T*he Sierra Club Handbook of Whales and Dolphins*. Sierra Club Books, San Francisco, 302p.
[Reference #2]
Perrin, W.F. e Reilly, S.B. (1984). *Reproductive* Parameters of Dolphins and Small Whales of the Family

Delphinidae: *9797-133.* In *Reproduction in Whales, Dolphins and Porpoises (Perrin, W.F., Brownell Jr.,Eds.), International Whaling Commission, Special Issue 6, Cambridge*

[Reference #3]
Boyd, I, L., Lockyer, C., Marsh, H.D. (1999). *Reproduction in Marine Mammals:* 218-286 *In* Biology of Marine Mammals (R. E. Reynolds III e S. A. Rommel, Eds.), Smithsonian Institution Press, Whashington e Londres.

[Reference #4]
Freitas, L., Antunes, R., Freitas, C. e Pires, R. (2002). *Mamíferos Marinhos do Mar do arquipélago da Madeira*.. Colecção Biodiversidade Madeirense: avaliação e conservação, nº2, Direcção Regional do Ambiente. 71p.

[Reference #5]
Wells, R.S. e Scott, M.D. (1999). *Bottlenose Dolphin* Tursiops truncatus *(Montagu, 1821)* . *In* Handbook of Marine Mammals: The second book of Dolphins and Porpoises (S.M. Ridgway e R. Harrison, Eds.), Vol 6, Academic Press.

[Reference #6]
Freitas L, Ribeiro C, Dinis A, Alves F, Nicolau C, Carvalho A (2014). Proposta de Criação de um Sítio de Importância Comunitária para o golfinho-roaz (Tursiops truncatus) no Arquipélago da Madeira. Relatório técnico do Projecto CETACEOSMADEIRA II (LIFE07 NAT/P/000646), Museu da Baleia da Madeira

[Reference #7]
Freitas L, Ribeiro C, Dinis A, Nicolau C, Alves F, Carvalho A (2014a). Estudo técnico-científico de suporte à criação de um Sítio de Importância comunitária para o golfinho-roaz (Tursiops truncatus) no Arquipélago da Madeira. Relatório técnico do Projecto CETACEOSMADEIRA II (LIFE07 NAT/P/000646), Museu da Baleia da Madeira

[Reference #8]
Freitas L, Alves F, Ribeiro C, Dinis A, Nicolau C, Carvalho A (2014b). Estudo técnico-científico de suporte à proposta de criação de áreas de operação para a actividade de whalewatching e respectiva capacidade de carga. Relatório técnico do Projecto CETACEOSMADEIRA II - LIFE07 NAT/P/000646 (Deliverable A.7-IIA), Museu da Baleia da Madeira

[Reference #9]
Quérouil S, Silva M, Freitas L, Prieto R, Magalhães S, Dinis, A, Alves F, Matos JA, Mendonça D, Hammond P, Santos R (2007). High gene flow in oceanic bottlenose dolphins (Tursiops truncatus) of the North Atlantic. *Conserv Genet*, 8: 1405-1419.

[Reference #10]
Louis M, Viricel A, Lucas T, Peltier H, Alfonsi E, Berrow S, Brownlow A, Covelo P, Dabin W, Deaville R, de Stephanis R, Gally F, Gauffier P, Penrose R, Silva MA, Guinet C, Simon-Bouhet B (2014). Habitat-driven population structure of bottlenose dolphins, Tursiops truncatus, in the North-East Atlantic. *Molecular Ecology*, 23: 857-874.

[Reference #11]
Dinis A (2014). Ecology and Conservation of Bottlenose Dolphins in Madeira Archipelago, Portugal. PhD Thesis, Universidade da Madeira.

[Reference #12]
CODA (2009). Cetacean Offshore Distribution and Abundance in the European Atlantic (CODA).

[Reference #13]
Marpro (2014). Primeira Proposta técnica de novos Sítios de Interesse Comunitário para a conservação de cetáceos em Portugal Continental para inclusão na Lista Nacional de Sítios. Relatório técnico do Projecto Marpro (LIFE MarPro NAT/PT/00038).

Globicephala macrorhynchus, Gray,1846

Evaluation with RAMAS Red List version 2.0.0.7

Taxon name: Globicephala macrorhynchus, Gray,1846
Taxon type: Species
Assessment: regional
Assessor(s): Luís Freitas (Museu da Baleia, Madeira)
Date of assessment: 20-08-2013
Evaluators:
Date of evaluation: 20-08-2013
RAMAS Red List filename: C:\Users\AuditorioMBM\Desktop\ORGANIZAR INVESTIGAÇÃO\RAMAS - AVALIAÇÕES ESTATUTOS CONSERVAÇÃO\CMII_RAMAS_REVISÃO_ESTATUTOS CONSERVAÇÃO_2013\REAVALIAÇÃO LUIS FREITAS_23-10-2014\MAD-boca de panela 23-10-2014.red

INFORMATION

Taxonomic information: Mammalia
Cetacea
Delphinidae
Boca de panela ou baleia-piloto-tropical
Life history: Autóctone. Alimentam-se principalmente de cefalópodes pelágicos (Teutófago), apesar de ocasionalmente consumirem peixe. Formam grupos que podem ter 10 até mais de 100 individuos. É uma espécie observada com frequência nas águas da Madeira e com grupos de animais residentes, migrantes e transeuntes.
Distribution: Habita águas tropicais, sub-tropicais e temperadas quentes. Normalmente associada a águas profundas. Na Madeira apresenta uma distribuição restrita, com uma área de concentração a Sudeste da Madeira.
Habitat: Mar aberto (9.1)
Threats: Explosivos caseiros na pesca do atum (pontual); ingestão ou imprisionamento em de residuos sólidos (pontual) (6.3.9); turismo (Whale-watching) (10.1).
Conservation: Medidas realizadas: elaboração e implementação legislação de protecção (Dec-Legislativo Regional nº 6/86/M de Maio1986) (1.2.1.3) (1.2.2.3); campanhas de educação e sensibilização ambiental (2.2); criação do Museu da Baleia (2.3); Decreto Legislativo Regional n.º 15/2013/M que aprova o Regulamento da Atividade de Observação de Vertebrados Marinhos na Região Autónoma da Madeira; Portaria 46/2014/M de 22 Abril, que estabelece as áreas de operação e respectiva capacidade de carga para a actividade de whalewatching, avaliação e distribuição dos efectivos populacionais (3.2); estudos de biologia e ecologia (3.3); avaliação das principais ameaças (3.5); proposta de medidas de conservação (3.8); monitorização (3.9). Medidas em curso: campanhas de educação e sensibilização ambiental (2.2).
Comments: MADEIRA

RESULTS

Status: LC (LC)
Listed under: None
Contribution:

- **Minus A:** LC (LC)
- **Minus B:** LC (LC)
- **Minus C:** LC (LC)
- **Minus D:** LC (LC)
- **Minus E:** LC (LC)
- **Only A:** LC (LC)
- **Only B:** LC (LC)
- **Only C:** LC (LC)
- **Only D:** LC (LC)
- **Only E:** DD (DD)

Warning: Some values were left blank; they are assumed to be "unknown" and assigned to the widest possible range
Warning: The largest population is larger than the total number of individuals
Warning: Continuing decline is ignored because its qualifier is too weak
Warning: Population size is ignored because its qualifier is too weak
Warning: Continuing decline is ignored because its qualifier is too weak
Warning: Continuing decline is ignored because its qualifier is too weak
Warning: Population size is ignored because its qualifier is too weak
Warning: Continuing decline is ignored because its qualifier is too weak
Warning: Population size is ignored because its qualifier is too weak
Warning: Continuing decline is ignored because its qualifier is too weak
Warning: Size of the largest subpopulation is ignored for Criterion C2a(i) because its qualifier is too weak
Warning: Continuing decline is ignored because its qualifier is too weak
Warning: Population size is ignored because its qualifier is too weak
Warning: Population size is ignored because its qualifier is too weak

OPTIONS

Dispute tolerance: 50
Risk tolerance: 50
Burden of proof: 50
Justification for attitude options:

DATA

Generation length: [7;40] years (Qualifier: Observed; Uncertainty:)
O tempo geracional foi obtido de Kasuya (1984)

Population size: [438;10000] mature individuals (Qualifier: Inferred; Uncertainty: Min/max)

As estimativas populacionais para as águas costeiras do arquipélago da Madeira são de 334 animais (IC95% = 260 - 437) (Alves et al 2014), com uma estimativa de animais residentes ou associados às ilhas de 140 (IC95%=131-151). Com certeza que com a restante área da ZEE o valor total de animais é superior apesar de não sabermos em que medida. Dificilmente atingirá os 10 000 animais, uma vez que os dados evidenciam menores densidades no mar alto. Se aplicarmos o mesmo valor de densidade estimado para as águas costeiras da Madeira, Porto Santo e Desertas (0,03 animais/m2) (Freitas el al 2014) o valor total da ZEEMadeira seria de 13 230 animais (0,03 animais/km2 * 441 000 km2 (Área ZEEMadeira)). Foram obtidos, para as águas offshore (dados obtidos por observadores a bordo de atuneiros) valores de abundância relativa de 0,68 animais/100km (Nicolau et al 2014), muito a abaixo do valores de 3,3 e 6,14 animais/100km obtidos para as águas costeiras da Madeira entre 2007 e 2012 (Freitas et al 2014) em censos náuticos sistemáticos. Apesar dos valores de abundância relativa terem sido obtidos com metodologias diferentes dão uma boa indicação da diferença de escala de grandeza da presença de animais nas águas inshore e offshore da Madeira.

Past population size: *unknown*

A inexistência de quaisquer dados científicos ou registos que permitam fundamentar ou permitir inferências relativamente ao tamanho da população no passado

Future population size: *unknown*

Extreme fluctuations: no (Qualifier: Suspected; Uncertainty: Subjective judgement)

O facto desta espécie não ter sido alvo de exploração comercial ou captura intencional (não é tradicional o consumo de carne de golfinho ou o seu uso para isco), os níveis de captura acidentais em artes de pesca serem muito baixos, não haver degradação substancial do habitat ou sobre exploração de recursos pesqueiros e não vislumbrarmos outro tipo de impactos que possam causar flutuações extremas leva-nos a considerar que não deverão existir flutuações extremas no efectivo populacional da ZEE Madeira. Esta inferência é válida se a população se mantiver na área da ZEE Madeira ou as condições acima referidas se mantiverem em toda a área de distribuição destes animais.

Population Notes:

Estimativas de abundância obtidas para esta espécie para as águas da Madeira (2007 - 2012), a partir de censos náuticos sistemáticos (distance sampling e modelação espacial), apontam para 151 animais (IC95% =99 - 201; CV= 0,23) utilizando estas águas em média a qualquer momento. Esta estimativa está provavelmente subestimada porque não foi corrigida para o "availability bias" e o "perception bias".

Foi estimado em 334 animais (IC95% = 260 - 437) o tamanho da população de baleias-piloto-tropical utilizando a costa sul da Madeira no periodo entre 2004-2012, dos quais 140 animais (IC95%=131-151) eram residentes ou associados às ilhas Alves et al 2014). Esta estimativa populacional, refere-se à costa sul da Madeira, no entanto, dada a distribuição da espécie sobretudo na costa sul da Madeira (Freitas el al 2014b) é possivelmente representativa das águas costeiras da Madeira..

Assim o presente exercicio foi utilizada a estimativa populacional existente para a costa sul (438 animais). O facto de estarmos a lidar com uma população aberta com grande percentagem de animais migrantes ou transeuntes (Alves et al 2013), de origem desconhecida (parte de uma população pelágica Atlântica, provavelmente com uma vasta área de distribuição ainda não totalmente conhecida) torna difícil a definição de o limite superior populacional (nº de individuos maturos) para este exercício. Neste caso, e tendo em consideração que é uma espécie eminentemente ocêanica, com uma ampla distribuição que incluirá possivelmente os Açores, Madeira, Canárias costa Atlantica da Península e o alto mar, é de esperar um numero considerável de efectivos, mesmo que em baixa densidade, para além das áreas onde são conhecidas grupos locais, como é o caso de Tenerife nas Ilhas Canárias. Assim consideramos razoável que esta população tenha mais de 10000 animais (10001).

Current trends: Stable

Past reduction: [0;29] percent (Qualifier: Inferred; Uncertainty: Subjective judgement)

Apesar de não existirem dados concretos relativamente ao número de baleias-piloto-tropical no passado e presente na Madeira, a ausência de grandes ameaças conhecidas no passado e actualmente nas águas da ZEE da Madeira, levam-nos a considerar que o número de animais que frequentam estas águas tem-se mantido estável. Esta situação é válida considerando que esta população utiliza apenas a ZEE da Madeira (situação não confirmada).

Past reduction basis: c,d

Future reduction: [0;29] percent (Qualifier: Suspected; Uncertainty: Subjective judgement)

Não se perspectiva o aparecimento de ameaças de peso para esta espécie na ZEE da Madeira, pelo que consideramos que a população se irá manter estável para um futuro próximo.

Future reduction basis: c,d

Moving window reduction: [0;29] percent (Qualifier: Suspected; Uncertainty: Subjective judgement)

Moving window reduction basis: c,d

Are the causes of reduction reversible? Yes

Are the causes of reduction understood? Yes
Have the causes of reduction ceased? Yes
Continuing decline: [0;0,1] (Qualifier: Suspected; Uncertainty: Subjective judgement)
Apesar de não existirem dados concretos quanto ao número actual de animais desta espécie na Madeira, a ausência de grandes ameaças conhecidas actualmente nas águas da ZEE da Madeira, levam-nos a considerar que o número de animais que frequentam estas águas tem-se mantido estável. Esta situação é válida considerando que esta população utiliza apenas a ZEE da Madeira (situação não confirmada).
Não se perspectiva o aparecimento de ameaças de peso para esta espécie na ZEE da Madeira, pelo que consideramos que a população se irá manter estável para um futuro próximo. O conflito entre estes animais e os pescadores de atum tem conduzido a agressões e possíveis mortes pontuais destes animais, uma vez que afugentam a pesca. Outro possível impacto é a actividade de Whale-watching. A primeira ameaça não parece ter tendência para aumentar no futuro, especialmente porque os pescadores estão mais sensibilizados. Quanto à segunda, está a ser implementado um regulamento de adesão voluntária que se pretende venha disciplinar a actividade, ainda em fase embrionária, e num futuro próximo sirva de base a legislação regional.
Continuing decline in 7 to 40 years: *unknown*
Continuing decline in 14 to 80 years: *unknown*
Continuing decline in 21 to 120 years: *unknown*
Reduction Notes:

Extent of occurrence: 20001 km² (Qualifier: Observed; Uncertainty: Opportunistic observation)
Existem evidências que estes animais podem utilizar toda a área da ZEE Madeira, especialmente junto às Ilhas e bancos submarinos.
Continuing decline: no (Qualifier: Suspected; Uncertainty: Subjective judgement)
Não existem indícios que sustentem uma alteração na extensão de ocorrência
Extreme fluctuations: no (Qualifier: Suspected; Uncertainty: Subjective judgement)
Area of occupancy: 2001 km² (Qualifier: Observed; Uncertainty: Point estimate)
Esta espécie é observada em águas profundas e também junto a costa nas Ilhas o que nos leva a considerar que poderá ter uma área de ocupação superior a 2001km2.
Continuing decline: no (Qualifier: Suspected; Uncertainty: Subjective judgement)
Não existem indícios que nos levem a considerar uma diminuição na área de ocupação.
Extreme fluctuations: no (Qualifier: Suspected; Uncertainty: Subjective judgement)
Continuing decline in habitat: no (Qualifier: Suspected; Uncertainty: Subjective judgement)
Very restricted: no (Qualifier: Suspected; Uncertainty: Subjective judgement)
Extent and Area Notes:
As baleias-piloto tropical ocorrem nas águas temperadas e tropicais de todo o mundo, normalmente em áreas offshore (Taylor et al 2014, online). Ocorrem em toda a ZEE da Madeira - 441 699 km2, com evidências de maiores densidades nas águas inshore em relação às águas offshore.

Number of subpopulations: 1 (Qualifier: Inferred; Uncertainty: Subjective judgement)
Desconhece-se a estrutura populacional para o Atlântico. Não existem evidências que sustentem a possibilidade de existência de subpopulações, especialmente porque não existem barreiras físicas que isolem grupos de animais ou dificultem o seu contacto com outros grupos. Estes animais são capazes de efectuar deslocações de grande amplitude no oceano, existindo provas de movimentos entre a Madeira e as Canárias num curto espaço de tempo - 20 dias (Servidio et al, 2007) . Contudo, a Madeira é visitada por baleias-piloto migrantes e transeuntes, que interagem com grupos locais associados às Ilhas, com provavel cruzamento genético entre os animais residentes e visitantes (Alves et al, 2013).
Number of locations: 11 (Qualifier: Suspected; Uncertainty: Subjective judgement)
Subpopulations (name and size):
Continuing decline in the number of subpopulations or locations: no (Qualifier: Suspected; Uncertainty: Subjective judgement)
Extreme fluctuations in the number of subpopulations or locations: no (Qualifier: Suspected; Uncertainty: Subjective judgement)
Size of the largest subpopulation: [1000;10001] mature individuals (Qualifier: Inferred; Uncertainty: Hypothetical)
Ver notas relativamente à população
All individuals in one subpopulation: no (Qualifier: Inferred; Uncertainty:)
A inexistência aparente de barreiras físicas leva-nos a considerar todos os animais como fazendo parte de uma população. Para reforçar esta idea está o facto de serem capazes de efectuar grandes deslocações.
Severely fragmented: no (Qualifier: Observed; Uncertainty:)
Não existem evidência que indiquem fragmentação das populações pela inexistência de barreiras físicas, pelas grandes deslocações documentadas efectuadas por animais da espécie (Servidio et al 2007) e pela interacção com grupos residentes de animais (Alves et al, 2013).

Fragmentation Notes:
A existência de grupos residentes ou associados às Ilhas nas águas costeiras da Madeira, com uma estimativa de 140 animais (IC95%=131-151), torna estes grupos vulneráveis a pressões locais, no entanto, o facto de interagirem e se reproduzirem num contexto populacional mais amplo (não estão geneticamente isolados) reduz essa vulnerabilidade.

Extinction probability in 21 to 100 years: *ignored*
Extinction probability in 35 to 100 years: *ignored*
Extinction probability in 100 years: *ignored*
PVA model filename-Pessimistic:
PVA model filename-Best Estimate:
PVA model filename-Optimistic:
Risk Notes:

REFERENCES

[Reference #1]
eatherwood, S. e Reeves, R. (1983). T*he Sierra Club Handbook of Whales and Dolphins*. Sierra Club Books, San Francisco, 302p.
[Reference #3]
Kasuya, T. e Marsh, H. (1984). *Life History and Reproductive Biology of the Short- finned Pilot Whale,* Globicephala macrorhynchus, *of the Pacific coast of Japan:* 259-310. *In* Reproduction in Whales, Dolphins and Porpoises, (W.F. Perrin, R. L. Brownell Jr., D. P. De Master, Eds.), Reports International Whaling Commission (special issue 6), Cambridge.
[Reference #3]
Maul, G. E. e Sergeant, D.E. (1977). New Cetacean Records from Madeira. *Bocagiana*, **43**: 1-8
[Reference #4]
Bernard, H.J. e Reilly, S.B. (1999). *Pilot Whales* Globicephala Lesson 1828. *In* Handbook of Marine Mammals (S.M. Ridgway e R. Harrison, Eds.),Vol 6, Academic Press, San Diego.
[Reference #5]
Freitas, L., Antunes, R., Freitas, C. e Pires, R. (2002). *Mamíferos Marinhos do Mar do arquipélago da Madeira*.. Colecção Biodiversidade Madeirense: avaliação e conservação, nº2, Direcção Regional do Ambiente. 71p.
[Reference #6]
Alves F, Quérouil S, Dinis A, Nicolau C, Ribeiro C, Freitas L, Kaufmann M, Fortuna C (2013a) Population structure of short-finned pilot whales in the oceanic archipelago of Madeira based on photo-identification and genetic analyses: implications for conservation. *Aquat Conserv* 23:758-776
[Reference #7]
Alves F, Dinis A, Nicolau C, Ribeiro C, Kaufmann M, Fortuna C, Freitas L (2014) Survival and abundance of short-finned pilot whales in the archipelago of Madeira, NE Atlantic, *Mar Mammal Sci*, DOI: 10.1111/mms.12137
[Reference #8]
Taylor, B.L., Baird, R., Barlow, J., Dawson, S.M., Ford, J., Mead, J.G., Notarbartolo di Sciara, G., Wade, P. & Pitman, R.L. 2011. Globicephala macrorhynchus. The IUCN Red List of Threatened Species. Version 2014.2. <www.iucnredlist.org>. Downloaded on 24 October 2014.
[Reference #9]
Freitas L, Alves F, Ribeiro C, Dinis A, Nicolau C, Carvalho A (2014b). Estudo técnico-científico de suporte à proposta de criação de áreas de operação para a actividade de whalewatching e respectiva capacidade de carga. Relatório técnico do Projecto CETACEOSMADEIRA II - LIFE07 NAT/P/000646 (Deliverable A.7-IIA), Museu da Baleia da Madeira.
[Reference #10]
Nicolau C, Alves F, Freitas L (2014). Surveillance of the conservation status of cetaceans species in Madeira offshore waters. Relatório técnico do Projecto CETÁCEOSMADEIRA II - LIFE07 NAT/P/000646 (Deliverable A.8-I). Museu da Baleia da Madeira.
[Reference #11]
Servidio, A. et al., 2007. First record of movement of short-finned pilot whales between two Atlantic oceanic archipelagos. In 17th Biennial Conference on the Biology of Marine Mammals: Cape Town, South.

Stenella frontalis Cuvier, 1829

Evaluation with RAMAS Red List version 2.0.0.7

Taxon name: Stenella frontalis Cuvier, 1829
Taxon type: Species
Assessment: regional
Assessor(s): Luís Freitas (Museu da Baleia, Madeira)
Date of assessment: 23-08-2014
Evaluators:
Date of evaluation: 20-08-2013
RAMAS Red List filename: C:\Users\AuditorioMBM\Desktop\ORGANIZAR INVESTIGAÇÃO\RAMAS - AVALIAÇÕES ESTATUTOS CONSERVAÇÃO\CMII_RAMAS_REVISÃO_ESTATUTOS CONSERVAÇÃO_2013\REAVALIAÇÃO LUIS FREITAS_23-10-2014\MAD-Golfinho malhado 20-10-2014.red

INFORMATION

Taxonomic information: Mammalia
Cetacea
Delphinidae
Golfinho pintado ou golfinho malhado
Life history: Ocorre quer em zonas costeiras, quer em zonas pelágicas. Alimentam-se de peixes, cefalópodes e ainda de invertebrados no caso das formas costeiras. Vivem em grupos de 1 a 15 indivíduos, podendo formar associações temporárias com mais de 100 animais. Presente regularmente nos mares do arquipélago da Madeira no final da Primavera, Verão e Outono.
Distribution: Águas tropicais e temperadas quentes do Oceano Atlântico
Habitat: Mar aberto (9.1)
Threats: Explosivos caseiros na pesca do atum (pontual), capturas acidentais em aparelhos de anzol (pontuais) (4.1.1.1); iingestão ou imprisionamento em de residuos sólidos (pontual) (6.3.9); turismo (whalewatching) (10.1)
Conservation: Medidas realizadas: elaboração e implementação legislação de protecção (Dec-Legislativo Regional nº 6/86/M de Maio1986) (1.2.1.3) (1.2.2.3); campanhas de educação e sensibilização ambiental (2.2); criação do Museu da Baleia (2.3); Decreto Legislativo Regional n.º 15/2013/M que aprova o Regulamento da Atividade de Observação de Vertebrados Marinhos na Região Autónoma da Madeira; Portaria 46/2014/M de 22 Abril, que estabelece as áreas de operação e respectiva capacidade de carga para a actividade de whalewatching; avaliação e distribuição dos efectivos populacionais (3.2); estudos de biologia e ecologia (3.3); avaliação das principais ameaças (3.5); proposta de medidas de conservação (3.8); monitorização (3.9)
Medidas em curso: campanhas de educação e sensibilização ambiental (2.2).
Comments: MADEIRA

RESULTS

Status: LC (LC)
Listed under: None
Contribution:

- **Minus A:** LC (LC)
- **Minus B:** LC (LC)
- **Minus C:** LC (LC)
- **Minus D:** LC (LC)
- **Minus E:** LC (LC)
- **Only A:** LC (LC)
- **Only B:** LC (LC)
- **Only C:** LC (LC)
- **Only D:** LC (LC)
- **Only E:** DD (DD)

Warning: Some values were left blank; they are assumed to be "unknown" and assigned to the widest possible range
Warning: Continuing decline is ignored because its qualifier is too weak
Warning: Population size is ignored because its qualifier is too weak
Warning: Continuing decline is ignored because its qualifier is too weak
Warning: Continuing decline is ignored because its qualifier is too weak
Warning: Population size is ignored because its qualifier is too weak
Warning: Continuing decline is ignored because its qualifier is too weak
Warning: Population size is ignored because its qualifier is too weak
Warning: Continuing decline is ignored because its qualifier is too weak
Warning: Continuing decline is ignored because its qualifier is too weak
Warning: Population size is ignored because its qualifier is too weak

OPTIONS

Dispute tolerance: 50
Risk tolerance: 50
Burden of proof: 50
Justification for attitude options:

DATA

Generation length: [8;30] years (Qualifier: Inferred; Uncertainty: Subjective judgement)

De acordo com Leatherwood e Reeves (1983) as fêmeas desta espécie atingem a maturidade sexual no intervalo entre os 4,5 e os 8,5 anos, não indicando a que populações dizem respeito. Por outro lado, Perrin et al (1994) apresenta valores para jovens adultos para a costa dos Estados Unidos (florida) entre os 9 e os 15 anos.

Considerando a disparidade nos intervalos de maturidade para esta espécie de acordo com os autores e que a taxa de sobrevivência da descendência de fêmeas jovens outras espécies é baixa (e.g. roaz corvineiro) optou-se por assumir um valor médio de maturação sexual 8 anos para esta espécie.

Uma vez que não foram encontradas referências para a longevidade desta espécie, optou-se por extrapolar a partir de outra da mesma família com características semelhantes. Assim, os dados obtidos para o golfinho-riscado apontam para uma idade máxima de 57,5 anos, apesar de se considerar que a capacidade reproductora começa a declinar a partir dos 30 anos de idade (Perrin et al., 1994).

Population size: [1067;10001] mature individuals (Qualifier: Inferred; Uncertainty: Min/max)

Não existem estimativas da população de golfinho-malhado que utiliza as águas da Madeira. A estimativa existente diz respeito ao número de animais que em média a área de estudo a qualquer momento, entre 2007 e 2012. Apesar das limitações associadas a esta estimativa (teriamos que assumir que são os mesmos animais a utilizarem a área de estudo todos os anos e que permanencem durante a época toda ou quase toda por forma a serem todos amostrados), foi utilizado este valor como referência para o limite inferior do nº de individuos maturos na população. Foram obtidos, para as águas offshore (dados obtidos por observadores a bordo de atuneiros) valores de abundância relativa de 0,65 animais/100km (Nicolau et al 2014), muito a abaixo do valores de 20,83 e 6,14 animais/100km obtidos para as águas costeiras da Madeira entre 2007 e 2012 (Freitas et al 2014) em censos náuticos sistemáticos. Apesar dos valores de abundância relativa terem sido obtidos com metodologias diferentes dão alguma indicação da diferença de escala de grandeza da presença de animais nas águas inshore e offshore da Madeira. Apesar de uma presença mais costeira, a ampla distribuição da espécie (Inclui Açores, Madeira e muito provavelmente Canárias) aponta para uma população superior a 10 000 animais (Ver explicações da estrutura populacional na secção Fragmentation).

Past population size: *unknown*

A inexistência de quaisquer dados científicos ou registos que permitam fundamentar ou permitir inferências relativamente ao tamanho da população no passado

Future population size: *unknown*

Face à protecção legal que a espécie goza nas águas do arquipélago da Madeira, às ameaças que actualmente este taxon está sujeito e às medidas de mitigação em curso, esperamos que o estatuto da espécie na Madeira mantenha-se. Esta suspeição é válida apenas se esta população utilizar exclusivamente as águas do arquipélago da Madeira ou se este estatuto for estensivo a toda a sua área de distribuição. (situação não confirmada).

Extreme fluctuations: no (Qualifier: Suspected; Uncertainty: Subjective judgement)

O facto desta espécie não ter sido alvo de exploração comercial ou captura intencional (não é tradicional o consumo de carne de golfinho ou o seu uso para isco), os níveis de captura acidentais em artes de pesca serem muito baixos, não haver degradação substancial do habitat ou sobre exploração de recursos pesqueiros e não vislumbrarmos outro tipo de impactos que possam causar flutuações extremas leva-nos a considerar que não deverão existir flutuações extremas no efectivo populacional da ZEE Madeira. Esta inferência é válida se a população se mantiver na área da ZEE Madeira ou as condições acima referidas se mantiverem em toda a área de distribuição destes animais.

Population Notes:

Estimativas de abundância obtidas para esta espécie para as águas da Madeira (2007 - 2012), a partir de censos náuticos sistemáticos (distance sampling e modelação espacial), apontam para 1067 animais (IC95% =717 - 1378; CV= 0,22) utilizando estas águas em média a qualquer momento. Esta estimativa está provavelmente subestimada porque não foi corrigida para o "availability bias" e o "perception bias".

Current trends: Stable

Past reduction: [0;29] percent (Qualifier: Suspected; Uncertainty: Subjective judgement)

Apesar de não existirem dados concretos relativamente ao número de golfinhos malhados no passado e presente na Madeira, a ausência de grandes ameaças conhecidas no passado e actualmente nas águas da ZEE da Madeira, levam-nos a considerar que o número de animais que frequentam estas águas tem-se mantido estável. Esta situação é válida considerando que esta população utiliza apenas a ZEE da Madeira (situação não confirmada) ou que o seu estatuto de conservação na área de distribuição é identico ao da Madeira.

Past reduction basis: c,d

Future reduction: [0;29] percent (Qualifier: Suspected; Uncertainty: Subjective judgement)

Não se perspectiva o aparecimento de ameaças de peso para esta espécie na ZEE da Madeira, pelo que consideramos que a população se irá manter estável para um futuro próximo. As ameaças pontuais actualmente identificadas são as capturas acidentais em linhas de pesca do atum e mortes pontuais provocadas por lixo sólido ingerido. Estas duas ameaças não parecem ter tendência para aumentar no futuro, especialmente porque os pescadores estão mais sensibilizados e porque existe actualmente um grande esforço no sentido de reduzir o lixo que vai parar ao mar, desigandamente através de campanhas de sensibilização e politícas de redução, reciclagem e reutilização de resíduos sólidos. A outra ameaça potencial é a actividade de observação de baleias e golfinhos, para actual está a ser implementado um regulamento de adesão voluntária que pretende disciplinar a actividade, ainda em fase embrionária.

Future reduction basis: c,d
Moving window reduction: [0;29] percent (Qualifier: Suspected; Uncertainty: Subjective judgement)
Moving window reduction basis: c,d
Are the causes of reduction reversible? Yes
Are the causes of reduction understood? Yes
Have the causes of reduction ceased? Yes
Continuing decline: [0;0,1] (Qualifier: Suspected; Uncertainty: Subjective judgement)

Apesar de não existirem dados concretos quanto ao número actual de animais desta espécie na Madeira, a ausência de grandes ameaças conhecidas actualmente nas águas da ZEE da Madeira, levam-nos a considerar que o número de animais que frequentam estas águas tem-se mantido estável. Esta situação é válida considerando que esta população utiliza apenas a ZEE da Madeira (situação não confirmada).

Não se perspectiva o aparecimento de ameaças de peso para esta espécie na ZEE da Madeira, pelo que consideramos que a população se irá manter estável para um futuro próximo. As ameaças pontuais actualmente identificadas são as capturas acidentais em linhas de pesca do atum e mortes pontuais provocadas por lixo sólido ingerido. Estas duas ameaças não parecem ter tendência para aumentar no futuro, especialmente porque os pescadores estão mais sensibilizados e porque existe actualmente um grande esforço no sentido de reduzir o lixo que vai parar ao mar, desigandamente através de campanhas de sensibilização e politícas de redução, reciclagem e reutilização de resíduos sólidos. A outra ameaça potencial é a actividade de observação de baleias e golfinhos, para actual está a ser implementado um regulamento de adesão voluntária que pretende disciplinar a actividade, ainda em fase embrionária.

Continuing decline in 8 to 30 years: *unknown*
Continuing decline in 16 to 60 years: *unknown*
Continuing decline in 24 to 90 years: *unknown*
Reduction Notes:

Extent of occurrence: 20001 km² (Qualifier: Observed; Uncertainty: Opportunistic observation)

Consideramos que estes animais podem utilizar toda a área da ZEE Madeira, especialmente junto às Ilhas e bancos submarinos.

Continuing decline: no (Qualifier: Suspected; Uncertainty: Subjective judgement)

Não existem indícios que sustentem uma alteração na extensão de ocorrência

Extreme fluctuations: no (Qualifier: Suspected; Uncertainty: Subjective judgement)
Area of occupancy: 4637 km² (Qualifier: Suspected; Uncertainty: Subjective judgement)

Esta espécie com hábitos costeiros é observada especialmente junto às Ilhas e bancos submarinos. No entanto é possível que efectue movimentos entre estes polos, o que torna dificil inferir a área de ocupação, apesar de suspeitarmos ser superior a 2001 km2

Continuing decline: no (Qualifier: Suspected; Uncertainty: Subjective judgement)

Não existem indícios que nos levem a considerar uma diminuição na área de ocupação.

Extreme fluctuations: no (Qualifier: Observed; Uncertainty: Subjective judgement)
Continuing decline in habitat: no (Qualifier: Suspected; Uncertainty: Subjective judgement)
Very restricted: no (Qualifier: Suspected; Uncertainty: Subjective judgement)
Extent and Area Notes:

Number of subpopulations: 1 (Qualifier: Inferred; Uncertainty: Hypothetical)

Não existem evidências que sustentem a possibilidade de existência de subpopulações, especialmente porque não existem barreiras físicas que isolem grupos de animais ou dificultem o seu contacto com outros grupos. Estes animais têm uma presença sazonal nas águas da Madeira (final da Primavera, Verão e principio do Outono), vindo muito provavelmente de águas mais a sul. Este padrão de migração/sazonalidade também é visível nos Açores tornando provavel que os animais pertençam à mesma população (Quérouil, 2010). Por outro lado, um estudo genético de Quérouil et al (2010) aponta para uma falta de estrutura genética entre os animais de ambos arquipélagos, reforçando a idea de que se trata de uma grande população que efectua migrações sazonais para a Madeira e Açores.

Number of locations: 11 (Qualifier: Suspected; Uncertainty: Subjective judgement)
Subpopulations (name and size):
Continuing decline in the number of subpopulations or locations: no (Qualifier: Suspected; Uncertainty: Subjective judgement)

Extreme fluctuations in the number of subpopulations or locations: no (Qualifier: Suspected; Uncertainty: Subjective judgement)
Size of the largest subpopulation: [1067;10001] mature individuals (Qualifier: Suspected; Uncertainty: Subjective judgement)
All individuals in one subpopulation: yes (Qualifier: Inferred; Uncertainty:)

A inexistência aparente de barreiras físicas leva-nos a considerar todos os animais como fazendo parte de uma subpopulação. Para reforçar esta idea está o facto de serem capazes de efectuar grandes deslocações.

Severely fragmented: no (Qualifier: Observed; Uncertainty:)
Fragmentation Notes:
Não existem evidências que sustentem a possibilidade de existência de subpopulações, especialmente porque não existem barreiras físicas que isolem grupos de animais ou dificultem o seu contacto com outros grupos. Estes animais têm uma presença sazonal nas águas da Madeira (final da Primavera, Verão e principio do Outono), vindo muito provavelmente de águas mais a sul. Este padrão de migração/sazonalidade também é visível nos Açores tornando provavel que os animais pertençam à mesma população (Quérouil, 2010). Por outro lado, um estudo genético de Quérouil et al (2010) aponta para uma falta de estrutura genética entre os animais de ambos arquipélagos, reforçando a idea de que se trata de uma grande população que efectua migrações sazonais para a Madeira e Açores.

Extinction probability in 24 to 90 years: *ignored*
Extinction probability in 40 to 100 years: *ignored*
Extinction probability in 100 years: *ignored*
PVA model filename-Pessimistic:
PVA model filename-Best Estimate:
PVA model filename-Optimistic:
Risk Notes:

REFERENCES

[Reference #1]
Leatherwood, S. e Reeves, R. (1983). T*he Sierra Club Handbook of Whales and Dolphins*. Sierra Club Books, San Francisco, 302p.

[Reference #2]
Perrin, F. W., Caldwell, D. K., Caldwell, M. C., (1994). *Atlantic Spotted Dolphin Stenella frontalis* (G. Cuvier, 1829): Pp173-190. *In* Handbook of Marine Mammals, vol. 5: The first Book of Dolphins (R. H. Ridgway e R. Harrison, Eds.). ,Academic Press, San Diego.

[Reference #3]
Perrin, W.F., Wilson, C.E., Archer, F.I. (1994). *Striped dolphin Stenella coeruleoalba* (Meyen, 1833): 129-159. *In* Handbook of Marine Mammals, vol.5: The first book of dolphins (S.H. Ridgway e R. Harrison Eds.). Academic Press, San Diego.

[Reference #4]
Freitas, C. Dellinger, T. Reiner, F. (1998). First record of Atlantic spotted Dolphin , Stenella frontalis, G. Cuvier, 1829 (Cetacea: Delphinidae) from archipelago of Madeira. *Bocagiana*, **190**: 1-5.

[Reference #5]
Freitas, L., Antunes, R., Freitas, C. e Pires, R. (2002). *Mamíferos Marinhos do Mar do arquipélago da Madeira*.. Colecção Biodiversidade Madeirense: avaliação e conservação, nº2, Direcção Regional do Ambiente. 71p.

[Reference #6]
Freitas L, Alves F, Ribeiro C, Dinis A, Nicolau C, Carvalho A (2014b). Estudo técnico-científico de suporte à proposta de criação de áreas de operação para a actividade de whalewatching e respectiva capacidade de carga. Relatório técnico do Projecto CETACEOSMADEIRA II - LIFE07 NAT/P/000646 (Deliverable A.7-IIA), Museu da Baleia da Madeira.

[Reference #7]
Quérouil, S., Freitas, L., Cascão, I., Alves, F., Dinis, A., Almeida, J.R., Prieto, R., Borràs, S., Matos, J.A., Mendonça, M. Santos R.S., (2010). Molecular insight into the population structure of common and spotted dolphins inhabiting the pelagic waters of the Northeast Atlantic. Marine Biology, 157:2567-2580. DOI 10.1007/s00227-010-1519-0.

Delphinus delphis Linnaeus, 1758

Evaluation with RAMAS Red List version 2.0.0.7

Taxon name: Delphinus delphis Linnaeus, 1758

Taxon type: Species
Assessment: regional
Assessor(s): Luís Freitas (Museu da Baleia, Madeira)
Date of assessment: 23-08-2014
Evaluators:
Date of evaluation: not evaluated
RAMAS Red List filename: C:\Users\AuditorioMBM\Desktop\ORGANIZAR INVESTIGAÇÃO\RAMAS - AVALIAÇÕES ESTATUTOS CONSERVAÇÃO\CMII_RAMAS_REVISÃO_ESTATUTOS CONSERVAÇÃO_2013\REAVALIAÇÃO LUIS FREITAS_23-10-2014\MAD-golfinho comum 23-10-2014.red

INFORMATION

Taxonomic information: Mammalia
Cetacea
Delphinidae
Golfinho-comum
Life history: A sua dieta é baseada em peixes podendo consumir também cefalópodes. Habita ao longo das costas na plataforma continental e pode ser observado também associado a elevações topográficas submarinas, tais como, bancos submarinos , Crista Médio-Atlântica e ilhas oceânicas. São observados em grupos de 20 a 500 ou mais animais. É uma espécie bastante frequente nas águas do arquipélago da Madeira, sobretudo, durante o Inverno e Primavera.
Distribution: Ocorre globalmente nos mares temperados, subtropicais e tropicais, é a espécie mais abundante nas águas temperadas-quentes do oceano Atlântico. É observado em geral entre os paralelos 40º-60º N e 50ºS de latitude.
Habitat: Mar aberto (9.1)
Threats: Explosivos caseiros na pesca do atum (pontual), capturas acidentais em aparelhos de pesca de anzol (pontual) (4.1.1.1); ingestão ou imprisionamento em de residuos sólidos (pontual) (6.3.9); turismo (Whalewatching) (10.1)
Conservation: Medidas realizadas: elaboração e implementação legislação de protecção (Dec-Legislativo Regional nº 6/86/M de Maio1986) (1.2.1.3) (1.2.2.3); campanhas de educação e sensibilização ambiental (2.2); criação do Museu da Baleia (2.3); Decreto Legislativo Regional n.º 15/2013/M que aprova o Regulamento da Atividade de Observação de Vertebrados Marinhos na Região Autónoma da Madeira; Portaria 46/2014/M de 22 Abril, que estabelece as áreas de operação e respectiva capacidade de carga para a actividade de whalewatching; avaliação e distribuição dos efectivos populacionais (3.2); estudos de biologia e ecologia (3.3); avaliação das principais ameaças (3.5); proposta de medidas de conservação (3.8); monitorização (3.9).
Medidas em curso: campanhas de educação e sensibilização ambiental (2.2);
Comments: MADEIRA

RESULTS

Status: LC (LC)
Listed under: None
Contribution:

- **Minus A:** LC (LC)
- **Minus B:** LC (LC)
- **Minus C:** LC (LC)
- **Minus D:** LC (LC)
- **Minus E:** LC (LC)
- **Only A:** LC (LC)
- **Only B:** LC (LC)
- **Only C:** LC (LC)
- **Only D:** LC (LC)
- **Only E:** DD (DD)

Warning: Continuing decline is ignored because its qualifier is too weak
Warning: Population size is ignored because its qualifier is too weak
Warning: Continuing decline is ignored because its qualifier is too weak
Warning: Continuing decline is ignored because its qualifier is too weak
Warning: Population size is ignored because its qualifier is too weak
Warning: Continuing decline is ignored because its qualifier is too weak
Warning: Population size is ignored because its qualifier is too weak
Warning: Continuing decline is ignored because its qualifier is too weak
Warning: Size of the largest subpopulation is ignored for Criterion C2a(i) because its qualifier is too weak
Warning: Continuing decline is ignored because its qualifier is too weak
Warning: Population size is ignored because its qualifier is too weak
Warning: Population size is ignored because its qualifier is too weak

OPTIONS

Dispute tolerance: 50
Risk tolerance: 50
Burden of proof: 50
Justification for attitude options:

DATA

Generation length: [6;30] years (Qualifier: Inferred; Uncertainty: Subjective judgement)

A idade da maturação sexual das fêmeas no Atlântico Norte foi estimada em 6 anos (Collet, 1981). Uma vez que não foram encontradas referências para a longevidade desta espécie, optou-se por extrapolar a partir de outra da mesma família com características semelhantes. Assim, os dados obtidos para o golfinho-riscado apontam para uma idade máxima de 57,5 anos, apesar de se considerar que a capacidade reproductora começa a declinar a partir dos 30 anos de idade (Perrin et al., 1994).

Population size: [741;10001] mature individuals (Qualifier: Inferred; Uncertainty: Min/max)

Past population size: *unknown*

A inexistência de quaisquer dados científicos ou registos que permitam fundamentar ou permitir inferências relativamente ao tamanho da população no passado

Future population size: *unknown*

Extreme fluctuations: no (Qualifier: Suspected; Uncertainty: Subjective judgement)

O facto desta espécie não ter sido alvo de exploração comercial ou captura intencional (não é tradicional o consumo de carne de golfinho ou o seu uso para isco), os níveis de captura acidentais em artes de pesca serem muito baixos, não haver degradação substancial do habitat ou sobre exploração de recursos pesqueiros e não vislumbrarmos outro tipo de impactos que possam causar flutuações extremas leva-nos a considerar que não deverão existir flutuações extremas no efectivo populacional da ZEE Madeira. Esta inferência é válida se a população se mantiver na área da ZEE Madeira ou as condições acima referidas se mantiverem em toda a área de distribuição destes animais.

Population Notes:

Estimativas de abundância obtidas para esta espécie para as águas da Madeira (2007 - 2012), a partir de censos náuticos sistemáticos (distance sampling e modelação espacial), apontam para 741 animais (IC95% =496 - 1032; CV= 0,27) utilizando estas águas em média a qualquer momento. Esta estimativa está provavelmente subestimada porque não foi corrigida para o "availability bias" e o "perception bias".

Não existem estimativas da população de golfinho-comum que utiliza as águas da Madeira. A estimativa existente diz respeito ao número de animais que em média a área de estudo a qualquer momento, entre 2007 e 2012. Apesar das limitações associadas a esta estimativa (teriamos que assumir que são os mesmos animais a utilizarem a área de estudo todos os anos e que permanencem durante a época toda ou quase toda por forma a serem todos amostrados), foi utilizado este valor como referência para o limite inferior do nº de individuos maturos na população. Foram obtidos, para as águas offshore (dados obtidos por observadores a bordo de atuneiros) valores de abundância relativa de 17,71 animais/100km (Nicolau et al 2014), acima dos valores de 5,88 e 11,53 animais/100km obtidos para as águas costeiras da Madeira entre 2007 e 2012 (Freitas et al 2014), em censos náuticos sistemáticos. Apesar dos valores de abundância relativa terem sido obtidos com metodologias diferentes dão uma boa indicação da diferença de escala de grandeza da presença de animais nas águas inshore e offshore da Madeira. Contrariamente a outras espécies o golfinho-comum parece ter uma ampla distribuição em toda a ZEEMadeira. Para além disso a distribuição da espécie inclui Açores e Canárias, apontando assim para uma população superior a 10 000 animais (Ver explicações da estrutura populacional na secção Fragmentation).

Current trends: Stable

Past reduction: [0;29] percent (Qualifier: Suspected; Uncertainty: Subjective judgement)

Apesar de não existirem dados concretos relativamente ao número de golfinhos comuns no passado na Madeira, a ausência de grandes ameaças conhecidas no passado e actualmente nas águas da ZEE da Madeira, levam-nos a considerar que o número de animais que frequentam estas águas tem-se mantido estável. Esta situação é válida considerando que esta população utiliza apenas a ZEE da Madeira (situação não confirmada)

Past reduction basis: c,d

Future reduction: [0;29] percent (Qualifier: Suspected; Uncertainty: Subjective judgement)

Não se perspectiva o aparecimento de ameaças de peso para esta espécie na ZEE da Madeira, pelo que consideramos que a população se irá manter estável para um futuro próximo. As ameaças pontuais actualmente identificadas são as capturas acidentais em linhas de pesca do atum , explosivos caseiros atirados para o meio do grupo de golfinhos e mortes pontuais provocadas por lixo sólido ingerido. Estas três ameaças não parecem ter tendência para aumentar no futuro, especialmente porque os pescadores estão mais sensibilizados e porque existe actualmente um grande esforço no sentido de reduzir o lixo que vai parar ao mar, designadamente através de campanhas de sensibilização e políticas de redução, reciclagem e reutilização de resíduos sólidos. A outra ameaça potencial é a actividade de observação de baleias e golfinhos, agora regulamentada pelo Decreto Legislativo Regional n.º 15/2013/M.

Future reduction basis: c,d
Moving window reduction: [0;29] percent (Qualifier: Suspected; Uncertainty: Subjective judgement)
Moving window reduction basis: c,d
Are the causes of reduction reversible? Yes
Are the causes of reduction understood? Yes
Have the causes of reduction ceased? Yes
Continuing decline: [0;0,1] (Qualifier: Suspected; Uncertainty: Subjective judgement)

Apesar de não existirem dados concretos quanto ao número passado de animais desta espécie na Madeira, a ausência de grandes ameaças conhecidas actualmente nas águas da ZEE da Madeira, levam-nos a considerar que o número de animais que frequentam estas águas tem-se mantido estável. Esta situação é válida considerando que esta população utiliza apenas a ZEE da Madeira (situação não confirmada). Não se perspectiva o aparecimento de ameaças de peso para esta espécie na ZEE da Madeira, pelo que consideramos que a população se irá manter estável para um futuro próximo. As ameaças pontuais actualmente identificadas são as capturas acidentais em linhas de pesca do atum, explosivos caseiros atirados para meio do grupo de golfinhos e mortes pontuais provocadas por lixo sólido ingerido. Estas três ameaças não parecem ter tendência para aumentar no futuro, especialmente porque os pescadores estão mais sensibilizados e porque existe actualmente um grande esforço no sentido de reduzir o lixo que vai parar ao mar, designadamente através de campanhas de sensibilização e políticas de redução, reciclagem e reutilização de resíduos sólidos. A outra ameaça potencial é a actividade de observação de baleias e golfinhos, regulamentada actualmente pelo Decreto Legislativo Regional n.º 15/2013/M.

Continuing decline in 6 to 30 years: *unknown*
Continuing decline in 12 to 60 years: *unknown*
Continuing decline in 18 to 90 years: *unknown*
Reduction Notes:

Extent of occurrence: 20001 km² (Qualifier: Suspected; Uncertainty: Subjective judgement)

Consideramos que estes animais podem utilizar toda a área da ZEE Madeira, especialmente junto às Ilhas e bancos submarinos.

Continuing decline: no (Qualifier: Suspected; Uncertainty: Subjective judgement)

Não existem indícios que sustentem uma alteração na extensão de ocorrência

Extreme fluctuations: no (Qualifier: Suspected; Uncertainty: Subjective judgement)
Area of occupancy: 4637 km² (Qualifier: Observed; Uncertainty: Point estimate)

Esta espécie com hábitos costeiros é observada especialmente junto às Ilhas e bancos submarinos. No entanto é possível que efectue movimentos entre estes polos, o que torna dificil inferir a área de ocupação.

Continuing decline: no (Qualifier: Suspected; Uncertainty: Subjective judgement)

Não existem indícios que nos levem a considerar uma diminuição na área de ocupação.

Extreme fluctuations: no (Qualifier: Suspected; Uncertainty: Subjective judgement)
Continuing decline in habitat: no (Qualifier: Suspected; Uncertainty: Subjective judgement)
Very restricted: no (Qualifier: Suspected; Uncertainty: Subjective judgement)
Extent and Area Notes:

Number of subpopulations: 1 (Qualifier: Estimated; Uncertainty: Point estimate)

A inexistência de barreiras físicas e a capacidade destes animais em efectuarem grandes deslocações levam-nos a considerar os animais observados na ZEE Madeira constituem uma única população.

Number of locations: [11] (Qualifier: Suspected; Uncertainty: Subjective judgement)
Subpopulations (name and size):
Continuing decline in the number of subpopulations or locations: no (Qualifier: Suspected; Uncertainty: Subjective judgement)
Extreme fluctuations in the number of subpopulations or locations: no (Qualifier: Suspected; Uncertainty: Subjective judgement)
Size of the largest subpopulation: [741;10001] mature individuals (Qualifier: Inferred; Uncertainty: Subjective judgement)
All individuals in one subpopulation: yes (Qualifier: Estimated; Uncertainty: Point estimate)

A inexistência aparente de barreiras físicas leva-nos a considerar todos os animais como fazendo parte de uma subpopulação. Para reforçar esta idea está o facto de serem capazes de efectuar grandes deslocações.

Severely fragmented: no (Qualifier: Suspected; Uncertainty: Subjective judgement)
Fragmentation Notes:

Não existem evidências que sustentem a possibilidade de existência de subpopulações, especialmente porque não existem barreiras físicas que isolem grupos de animais ou dificultem o seu contacto com outros grupos. Estes animais efectuam são capazes de efectuar deslocações de grande amplitude. O estudo genético de Quérouil et al (2010) aponta para uma falta de estrutura genética entre os animais de ambos arquipélagos, indiciando assim que estamos perante animais em ambos os arquipélagos que pertecem à mesma população. Outros estudos (Natoli et al 2006) apontam para um grande

fluxo genético nesta espécie à escala da bacia Atlântica. Esta animais têm uma presença sazonal nas águas da Madeira (Inverno e Primavera).l. Existe também uma flutuablidade sazonal na abundância da espécie nos azores, apesar de ser observada todo o ano (Quérouil, 2010).

Extinction probability in 18 to 90 years: *ignored*
Extinction probability in 30 to 100 years: *ignored*
Extinction probability in 100 years: *ignored*
PVA model filename-Pessimistic:
PVA model filename-Best Estimate:
PVA model filename-Optimistic:
Risk Notes:

REFERENCES

[Reference #1]
Collet, A. (1981). *Biologie du dauphin commum Delphinus delphis L. en Atlantique Nord-Est*. Thèse presentée à l'Université de Poitiers pour obtenir le titre de Docteur de 3ème cycle en Biologie Animal. La Rochelle, 156pp.

[Reference #2]
Perrin, W.F.; Wilson, C.E. e Archer, F.I. (1994). *Striped dolphin Stenella coeruleoalba* (Meyen, 1833). Pp 129-159. *In* Handbook of Marine Mammals, vol.5: The first book of dolphins. (S. H. Ridgway e R. Harrison, Eds.). Academic Press, San Diego.

[Reference #3]
Leatherwood, S. e Reeves, R. (1983). *The Sierra Club Handbook of Whales and Dolphins*. Sierra Club Books, San Francisco, 302p.

[Reference #4]
Freitas, L., Antunes, R., Freitas, C. e Pires, R. (2002). *Mamíferos Marinhos do Mar do arquipélago da Madeira*.. Colecção Biodiversidade Madeirense: avaliação e conservação, nº2, Direcção Regional do Ambiente. 71p.

[Reference #5]
Freitas, L., Dinis, A., Alves, F. e Nóbrega, F. (2004). *Cetáceos no Arquipélago da Madeira*. .Museu da Baleia, Machico

[Reference #6]
Freitas, L., Dinis, A., Nicolau, C., Ribeiro, C., Carvalho, A. and Alves, F., (2009). An evaluation of common dolphin (Delphinus delphis) distribution, occurrence and conservation status in Madeira (Portugal), 2001 to 2008. Document presented in IWC 2009 Sub-Committee Small Cetaceans, SC/61/SM29.

[Reference #7]
Quérouil, S., Freitas, L., Cascão, I., Alves, F., Dinis, A., Almeida, J.R., Prieto, R., Borràs, S., Matos, J.A., Mendonça, M. Santos R.S., (2010). Molecular insight into the population structure of common and spotted dolphins inhabiting the pelagic waters of the Northeast Atlantic. Marine Biology, 157:2567-2580. DOI 10.1007/s00227-010-1519-0.

[Reference #8]
Quérouil ,S., Freitas, L., Dinis, A., Alves, F., Cascão, I., Prieto, R., Silva, M.A., Magalhães, S., Matos, J.A., and Santos, R.S., (2010). Sex bias in biopsy samples collected from free-ranging dolphins. European Journal Wild live Research, 56:151-158. DOI 10.1007/s10344-009-0299-7.

[Reference #9]
Amaral, A.R., Beheregaray, L.B., Bilgmann ,K., Boutov, D., Freitas, L., Robertson, K.M., Sequeira, M., Stockin, K.A., Coelho, M.M. and Moller, L.M., (2012). Influences of past climatic changes on historical population structure and demography of a cosmopolitan marine predator, the common dolphin (genus Delphinus). Molecular Ecology. DOI: 10.1111/j.1365-294X.2012.05728.x

[Reference #10]
Amaral, A.R., Beheregaray, L.B., Bilgmann ,K., Boutov, D., Freitas, L., Robertson, K.M., Sequeira, M., Stockin, K.A., Coelho, M.M. and Moller, L.M., (2012) Seascape Genetics of a Globally Distributed, Highly Mobile Marine Mammal: The Short-Beaked Common Dolphin (Genus Delphinus). PLoS ONE 7(2): e31482. DOI:10.1371/journal.pone.0031482

[Reference #11]
Quérouil, S., Kiszka, J., Cordeiro, A.R., Cascão, I., Freitas, L., Dinis, A., Alves, F., Santos, R.S., Bandarra, N.M., (2013). Investigating stock structure and trophic relationships among island-associated dolphins in the oceanic waters of the North Atlantic using fatty acid and stable isotope analyses. Marine Biology, 160:1325-1337. DOI 10.1007/s00227-013-2184-x.

[Reference #12]
Natoli A, Peddemors VM, Aguilar A, Vaquero C, Fernàndez-Piqueras P, Hoelzel AR (2006). Phylogeography and alpha taxonomy of the common dolphin (Delphinus sp.). *J Evol Biol* 19:943-954