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Review of whalewatching activities in mainland Portugal, the Azores, Madeira and Canary archipelagos and the Strait of Gibraltar.

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ABSTRACT
In areas where whales and dolphins concentrate on a regular basis, whalewatching (ww) activities tend to be implemented gradually, followed by a substantial growth. If improperly managed and regulated, this industry can have severe impacts on the cetacean populations targeted, as well as on their habitat.

This paper intends to be a review of whalewhatching activities in mainland Portugal, the Macaronesian region (the Azores, Madeira and the Canary Islands) and the Gibraltar Strait. Whenever possible, data for each area include: 1) whalewatching history, including year of beginning of the activities, major areas, most abundant species; 2) types of platforms used, mean duration of trips, detection of animals (land based, active search); 3) legislation in place, including date of entry in force, compliance and enforcement; 4) number of companies licensed, number of visitors per year, expected growth and income; 5) information on whether impact assessment was carried (for species and areas) before allowing the activity and methodology used and 6) major problems identified.

KEYWORDS: WHALEWATCHING; ATLANTIC OCEAN; MEDITERRANEAN SEA; PORTUGAL; AZORES; MADEIRA, CANARY ISLANDS, STRAIT OF GIBRALTAR.

LOCATION

MAINLAND PORTUGAL

With a maritime area of 28,000km^2, the Portuguese continental shelf extends between 37º and 42ºN and more than 500km long. Up to ¾ of its surface is turned to the west and, apart from the southern sheltered region of the Algarve, it is subject to the weather conditions of the Atlantic Ocean. Up to Lisbon latitude, the 200m isobathic is located some 50km off the coast and further to the south it come closer inland, keeping an average distance of *ca*. 25km (Fig. 1).

AZORES

The Archipelago of the Azores (Portugal) is located between 37º to 41º N and 25º to 31º W, about 1400km west of Lisbon and about 3000 km of the USA eastern coast. It consists of 9 volcanic islands divided into 3 groups: eastern group (comprising the islands of S. Miguel and Sta. Maria), central group (islands of Graciosa, Terceira, S. Jorge, Pico and Faial) and western group (islands of Flores and Corvo) (Fig. 2). The archipelago extends more than 600km along a northwest–southeast trend and crosses the Mid–Atlantic Ridge. The bottom topography of the region is characterized by numerous shallow-water and emergent features (shoals, seamounts, islets and the

islands) rising steeply from abyssal depths (>3000m), as well as deep-water ridges and submarine canyons (Santos *et al*., 1995). The steep topography of the Azores, its geographic location and proximity to the Mid-Atlantic Ridge make it a privileged site for observing cetaceans (Silva et al., 2003). Twenty-five species have been confirmed in the area, of which 17 are regularly seen (Steiner *et al*., 2007).

MADEIRA

The Madeira archipelago (Portugal) is located about 500km west of the North African coast. It comprises two main islands separated by a few dozens of kilometres, Madeira and Porto Santo; and two sub-archipelagos, Desertas and Selvagens (Fig. 3).

CANARY ISLANDS

The Canary Archipelago is a group of oceanic islands located 100Km off the northeast African coast in the Atlantic Ocean. It is comprised of seven major islands that differ considerably in their climatic conditions and geomorphologic characteristics (Fig. 4). The region is considered a top tourist destination. Daily direct flights to different European cities and a good regional air and ferry transportation network ensure easy accessibility to and between the islands. In its unique natural environment, the archipelago offers ideal conditions to carry out activities related to the observation and study of cetaceans and their habitat. Several facts have contributed to the spectacular development of the whale-watching industry here: rich cetacean biodiversity, all-year-round favourable climatic conditions, numerous well equipped tourist facilities and wide range of services available for the visitor, quick and easy access to the whale-watching spots and high carrying passenger capacity and sighting rate. Additionally, one of the most advanced ww regulations worldwide was implemented in order to minimise the negative impact of the activity. In this scenario, the industry has turned into a mature, competitive market. Here, international tour operators play an important role and a wide variety of ww products and operator companies coexist. Monitoring, research and educational programs have been supported by the public as key issues to ensure the conservation of the marine natural resources and increase public awareness.

STRAIT OF GIBRALTAR

The area of the Strait of Gibraltar and contiguous waters is comprised between longitude 5ºW and 6ºW, and includes both Spanish and Moroccan waters. The Strait of Gibraltar (Fig. 5) is nearly 60km long. Its western border is located between Cape Trafalgar (Europe) and Cape Espartel (Africa) just 44km apart. The Strait then narrows to the East to reach a minimum width of 14km between Tarifa (Europe) and Punta Cires (Europe). Its eastern border is located between Gibraltar and Punta Almina (Africa) 23km apart. The bathymetry of the Strait is characterized by a west to east canyon, with shallower waters (200-300m) found on the Atlantic side and deeper waters (800-1000m) on the Mediterranean side (Figs. 5-6).

THE WHALEWATCHING ACTIVITY

MAINLAND PORTUGAL

Number of companies, boats and seasonality

At present there are 16 companies licensed for ww activities in mainland Portugal: 5 companies operate on the W coast and the main focus is the resident population of bottlenose dolphins in the Sado estuary (some 40km south of Lisbon), and the remaining 11 operate in the Algarve region (south Portuguese coast). Apart from these licensed companies, an unknown number of tour operators located mainly on the south coast of the Algarve also offer ww trips. The competition among all these companies (licensed and illegal) results in several complains been presented by the licensed operators, a situation that calls for a stronger and better enforcement of the ww legislation already in place.

In total, the 17 licensed companies operate 30 vessels, including one schooner, one catamaran and three traditional Sado boats used to transport salt.

Of the total 30 boats licensed for ww activities, 15 are shorter than 9m long and 15 longer than 9m. Engine power varies between 100 to 440HP and passenger carrying capacity between 12 to almost 50 people. The companies operate all year round depending on weather conditions and number of tourists, but the peak of the season is reached during the summer months when the number of trips per day varies between 2 to more than 4

(the companies that operate in the Sado estuary offer 2 trips per day). The main duration of each trip varies betweem 1,30h to 2h but some companies offer programs of ½ day and 1 full day (this program includes visits to the caves, lunch onboard, swimming and dolphinwatch).

Target species

Except for the Sado estuary, where the target species is the bottlenose dolphin (*Tursiops truncatus*), the main species sighted is the common dolphin (*Delphinus delphis*), followed by the bottlenose dolphin and, in smaller numbers, the stripped dolphin. Some operators have reported the sporadic occurrence of killer whales (*Orcinus orca*), harbour porpoises (*Phocoena phocoena*) and minke whales (*Balaenoptera acutorostrata*) on the south coast.

Regulation

Whalewatching regulation in mainland Portugal was published in January 2006 (Decree-Law nr. 9/2006 from 9th of January) in order to regulate and industry that was growing rapidly. The intention behind its publication was to discipline the ww activities with the aim of bringing together the interests of conservation and well-being of cetaceans, on one hand, and the development of environmental touristic activities on the other. The regulation establishes a code of conduct that all boats (either touristic operators, scientific or recreational ww) must follow and covers also several aspects including:

- The obligation of ww companies to develop an educative program and to have an expert (in biological or educational sciences) responsible for the quality of the program offered to the clients;
- The obligation of ww companies to have a guide onboard that give tourists the necessary information on the species sighted and also on the ww legislation in force;
- The possibility for the environmental agency (Ministry of the Environment) do establish special and more restrictive rules for ww in spcific areas and also to define a maximum number of licenses issued for a particular area;
- The prohibiton of swimming with cetaceans.

AZORES

Data collection

Interview survey to the ww enterprises

In 2004 all operators licensed by the Tourism Regional Directorate were contacted in order to obtain information on their historic and recent activity. The companies were required to give information on numbers and characteristics of ww tourists, trips, boats and employees since the beginning of their activity. The companies were contacted again in 2007 and 2009 and were asked to update information previously provided. Fifteen companies answered to the inquiry in 2004, 9 in 2007 and 14 in 2009, corresponding to 100%, 39% and 61% of the licensed companies in those years.

Interview survey to the ww tourists

An interview survey to ww tourists was also conducted to collect information about their trip to the Azores and opinion about the ww experience. 146 inquiries (16% of return) were received in 2004, 222 (25% of return) in 2005 and 347 (10% of return) in 2006.

Sighting information from the enterprises

Cetacean sighting data collected by 15 ww enterprises located in Pico, Faial, S. Miguel and Flores, were analysed between 2000 and 2006. Information collected was recorded on standardized forms and included: name of the enterprise and boat, date and time of the trip, harbour of origin, Beaufort sea state, start and finishing time of each sighting, position (or approximate location), species, group size (minimum and maximum), presence of calves and behaviour. Boats were also requested to provide information on the presence and number of other boats and swimmers during the encounter.

Number of companies, clients and boats

The ww activity started in 1993, with two enterprises, two boats and less than 500 clients. Since then, the activity has been growing continuously and in 2008 there were 23 licensed enterprises, 44 operating boats and around 45,000 clients (Figs 7). The number of clients is certainly underestimated because only 17 out of 23 licensed enterprises answered to the inquiry.

Seasonality

Until 1999, the ww activity was conducted on a seasonal basis, beginning in April-May and extending until October. Beginning in 2000, the enterprises located in S. Miguel started working all year round as a result of the increase in tourists in winter months. In the remaining islands the ww activity is still highly seasonal, with the highest number of clients recorded in July and August.

Characteristics of the boats

Of the 44 boats currently operating in the Azores information was obtained from 42. The majority of the enterprises (over 75%) operated with 7-12m long, rigid hull inflatable boats. However, in Faial and Pico, there were some cabin-boats and in S. Miguel there were a few hard bottom open-deck boats. Of these, 68% had outboard engines, 30% had inboard engines and only one boat had a water-jet engine. In relation to fuel, 67% used gasoline and 34% diesel. The majority of boats used until 2008 had a holding capacity of 12 people. Compared to the other ww sites in the archipelago, there seems to be an increasing tendency towards larger boats with greater holding capacity in S. Miguel (Fig. 8).

Characteristics of the trips

The use of land based lookouts to detect cetaceans and give information to the ww boats is a re-adaptation of the traditional whale hunting technique used in the archipelago. In fact, some of the lookouts that worked in whaling companies were later employed by ww operators. Lookouts scan the sea with binoculars in search for cetaceans and provide information on the species, approximate number of individuals, behaviour and location. Communication between the lookouts and the boat captains is made by radio and the lookouts give regular updates on which cetacean species are present in the area.

As a result of the use of lookouts, percentage of ww trips with zero sightings in the Azores was low, ranging between 1% and 5%. Percentage of trips cancelled because of weather conditions or total absence of cetaceans dropped from 39% in 1993 to 14% in 2004. Most enterprises conducted two trips per day, one in the morning (between 9 am and 1 pm) and one in the afternoon (between 2 and 6 pm). On average, a ww trip lasted three hours but could extend up to five hours.

Price of the ww trip

The cost of a ww trip (maximum and minimum costs) was kept relatively constant from 1991 until 2007. In 2008 the maximum price ranged from 40 to 55€. For one enterprise that offered a 10-day package with ww trips and other activities on the islands the cost of a ww trip varied between 877€ and 1864€ (data from 2004). Direct income (from ticket selling) of all enterprises that gave information in 2004 was 1,381,881€.

Tourist nationalities

From the inquiries to the enterprises, most ww tourists were, in decreasing order, Portuguese, French, German and British. Tourists from EU countries comprised between 74.4% and 96.5% of total clients per year (data from 1993-2004).

Tourist interview surveys

Tourist profiles

British, Portuguese, French and German were the most represented nationalities among the tourists that answered the inquiries after a ww experience. Most interview surveys received were from women (51-58%). The largest percentage of the respondents was between 24 and 44 years old. Around 65% of the respondents had a degree and over 22% completed high school.

Trip to the Azores and ww trip

Most tourists (over 63%) stayed in the Azores between 7 and 14 days and less than 30% travelled in organized groups. Only about 29% of the tourists interviewed stated they came to the Azores with the purpose of experiencing a ww trip. About half of the tourist that came to the Azores searched for a ww enterprise upon arrival and only 21% had the ww trip included in a travel agency package, in the three years of tourists' inquiries. The most frequent information sources about ww trip in the Azores were friends, the Internet and newspapers/magazines.

The majority of tourists interviewed found the price of the trip fair and 22% (value from the 2004 inquiries) was even willing to pay more. Every satisfaction parameter had high percentages of 'Good' and 'Very good' levels (Fig. 9). The parameters 'Quantity of Information', 'Quality of Information', 'Weather Conditions' and 'Boat

Comfort' were more frequently classified as 'Reasonable' and 'Weak'. It should be noted that the 'Cetacean Search Efficiency' and 'Attitude Towards Cetaceans' was considered 'Very Good'.

More than 75% of inquired tourists were informed about the ww regulations (and possibly of its contents) and the majority received the information through the enterprise. Others learned about the rules through the official information on the harbours, tourist guides, travel agencies or the Internet. Over 80% of the tourists believed the ww rules were respected during their trip. The inquired tourists who thought the rules were not respected mentioned the distance limit, the duration of the sightings and the excess of boats near the animals.

Target species

The ww enterprises that provided information reported 7,236 cetacean encounters from 2000 to 2006, involving 19 different species (and 2 families and 1 genus not identified to species level), which represents 76% of the total species recorded in this region (Steiner *at al*., 2007) (Table 1). The sperm whale (*Physeter macrocephalus*) and the common dolphin (*Delphinus delphis*) were the species most frequently sighted by the enterprises, accounting for more than 20% of total sightings. The sperm whale was the most frequent species, which is not supported by data from dedicated and opportunistic sighting surveys (Silva *et al*., 2003, 2005) but instead evidences a preference of the operators. Bottlenose dolphins (*Tursiops truncatus*), Risso´s dolphins (*Grampus griseus*) and Atlantic spotted dolphins (*Stenella frontalis*) were also frequently encountered. This is in agreement with each species' relative abundance in the area (Silva et al., 2003, 2005). The temporal distribution of sightings reported by ww boats agrees with their know pattern of occurrence in the Azores. Sperm whales, common dolphins and bottlenose dolphins were sighted almost year-round, whereas baleen whales, striped dolphins and spotted dolphins were mostly found in spring and summer (Silva *et al.,* 2003, 2005).

It is likely that most of the sightings of pilot whales correspond to short-finned pilot whale (*G. macrorhynchus*) due to its preference for tropical and sub-tropical waters. Yet, some sightings may be of long-finned pilot whales (*G.* melas), a species only recently confirmed in the Azores (Prieto and Fernandes, 2007). Although beaked whales (Ziphiidae) are relatively common in the Azores (Silva *et al*., 2005), they were rarely encountered by ww boats because of its elusive behaviour. Bryde´s whales were reported for the first time in the Azores during the summer of 2004 by Steiner *et al.* (2007), which has also been confirmed in this study.

Among the baleen whales, the fin whale (*Balaenoptera physalus*) was the most common species, followed by the sei whale (*B. borealis*) and the blue whale (*B. musculus)*. The pigmy sperm whale (*Kogia breviceps)*, minke whale (*B. acuturostrata*), short-finned pilot whale (*Globicephala macrorhynchus)* and Bryde´s whale (*B. edeni*) were the least frequently found species.

The highest frequency of encounters was recorded in the islands of Faial and Pico (76.5%), followed by S. Miguel (21.4%) and Flores (1.1%), which reflects the distribution of the activity. In the central group of islands, the majority of the encounters occurred south of Pico that also recorded the largest diversity of species (Fig. 10). The activity tends to concentrate in the south coast of the islands, where there are better sea conditions because the islands offer shelter from the dominant northerly winds. The activity takes place within 15-20 nautical miles from the islands because 1) most boats do not have licenses to go farther than that; and 2) of fuels costs.

The highest number of sighting and diversity of species sighted was recorded in July and August. Baleen whales were more frequently encountered in May but only in the central group of islands and in S. Miguel (Figs 10A and 11) The sperm whale was reported in all three groups of islands and most of the sightings occurred during July (Figs 10B and 12). Whereas encounters with spotted dolphins were concentrated in summer months, common dolphins, bottlenose dolphins and Risso´s dolphins were present in almost all months (Fig. 13). Most of the encounters happened during the morning, when the visibility is better, as has been know since whaling times (Figueiredo, 1996).

Vessels distance to cetaceans, presence of other whale-watching boats and swimmers

During whale-watching tours the presence of more than one boat in the vicinity of cetaceans was frequent (24%). In about 40% of the sightings when distance was recorded, the boats were closer than the legally allowed distance of 50 m. Swimming-with-dolphins was a popular activity being conducted in 229 tours (3%) with a total of 658 clients.

Regulation

Since its beginning in 1993, the whalewatching activity in the Azores has been growing in terms of enterprises, boats and clients. However, the new law order that came into force in 2003 contributed to slowing down this growth, by restricting the number of ww boats in the geographic areas where the activity was concentrated and where the demand for licenses was higher (Oliveira *et al*., 2007). Presently, the number of boats licensed to operate in these areas has reached the maximum value allowed by law. Given that the remaining areas do not offer the best conditions for the activity, we believe the ww activity in the Azores has grown close to its carrying

capacity in terms of number of boats operating. This doesn't mean that economically the activity has also reached its limit since there's no restriction in the number of clients and period of time of operation.

MADEIRA

In Madeira archipelago, the whaling period last from 1940 until 1981, and the knowledge of cetaceans occurrence then, was scarce and mainly concentrated on the sperm whale that was the most hunted species. More recently cetaceans became a touristic resource. In the beginning of this decade, boats dedicated to sightseeing tours along the coast started to look for cetaceans on their trips.

Main areas and type of operation

The activity is growing gradually and the number of tourists involved in ww in Madeira is estimated at 58,000 / year, with an income of 1,5M€ / year (Ferreira, 2007).

The tour boats operate exclusively on the south part of the island. Depending on weather conditions boats can turn east or west when leaving Funchal harbour (Fig. 14).

Whalewatching in Madeira archipelago is mainly done in a non-dedicated way. At the moment there are seven tour operators that offer sightseeing trips along the Madeira Island south coast and do whale-watching in a non-dedicated way and one tour operator exclusively dedicated to whale-watching, including swimming with dolphins. All tour operators are based in Funchal, except one based in Calheta (Southwest Madeira) and another based in Caniçal (Southeast Madeira). Of the seven tour operators only two have two boats, and the one exclusively dedicated to whalewatching has three boats, while the rest of the companies have only one vessel. In total, there are 12 boats operating in Madeira waters: four catamarans with a length between 18,15m and 22,86m, four motor-sailing vessels with length between 13,10m and 22,30m, one fishing boat 12m length adapted to sightseeing trips, and two rigid-inflatable boats with 8,50m length each. The catamarans, sailing boats and the fishing boat are equipped with internal engines (minimum 62HP, maximum 355HP), and the inflatable boats with external engines (150HP), reaching maximum speeds of 12,9km/h (catamaran and sailing boats) and of 100km/h (inflatable boats). Maximum carrying capacity of the whale-watching boats is: the catamarans can take 40 to 100 persons, the sailing vessels between 18 to 100 persons and the rigid-inflatable boats up to 12 persons (Table 2).

The seven tour operators have the same schedule for the sea sighting trips, leaving at 10:30h and at 15:00h. Both trips have the duration of three hours. The company dedicated to whale-watching has a different schedule, leaving in the summer months three times a day at 08:45h, 12:30h and 16:00h, and in the winter months two times a day at 09:00h and 14:00h. All the trips have the duration of 2.30h. This whale-watching company has two land-stations searching actively for cetaceans on the south part of Madeira Island.

Target species

Although, 28 species are described for the area the most sighted species are:

Scientific name	**Common name**	**Season**
Tursiops truncatus	Bottlenose dolphins	Year-round
Delphinus delphis	Common dolphin	Winter-Spring
Stenella frontalis	Spotted dolphin	Summer-Autumn
Steno bredanensis	Rough toothed dolphin	Summer
Globicephala macrorynchus	Short finned pilot whale	Year-round
Physeter macrocephalus	Sperm whale	Year-round
Balaenoptera brydei	Bryde's whale	Summer-Autumn
Balaenoptera physalus	Fin whale	Spring-Autumn

Questionnaires

Between Feb-July 2008 a total of 58 questionnaires were conducted to tourists regarding their experiences with ww trips in Madeira. British and German were the most represented nationalities among the tourists that answered the inquiries after a ww experience. According to the proposed code of conduct the maximum time

allowed within a group of cetaceans is 30 min and the minimum distance to be kept from the animals is set at 50m. Nevertheless a high percentage of tourists (75%) would like to spend more time with the cetaceans, and 33% would like to stay closer to the cetaceans. The majority of tourists interviewed (81%) did not think that ww activities have any impact on cetaceans and 57% was very pleased with the experience.

Regulation

At present no legislation is in place for the whalewatching activity in Madeira archipelago, although a proposal has already been presented and is being discussed by the regional parlement. It is expected to come into force until the end of 2009. Therefore the whalewatching tour operators presently do not need a license to carry out this activity, and only one tour operator presents itself as a company dedicated exclusivity to whalewatching. In 2002 the Madeira Whale Museum (MWM) established a code of conduct that tour operators signed voluntarily (see Appendix I). These guidelines contemplated issues such as maximum distances, speed of approach, disturbance behaviours, etc. From this set of guidelines and from a study made by MWM, monitoring the compliance of the code of conduct, resulted in a document upon which the future legislation is based.

CANARY ISLANDS

Origins and evolution of ww in the Canary Islands

Whalewatching activities (or its demand) were triggered in the Canary Islands by the first known filmed document of Tenerife's short-finned pilot whale community, made public by Jacques Cousteau in the late 80s. Then, local fishermen and private boat owners started to offer ww excursions (in response to the existing demand) as a supplementary source of income.

First official activity records date back to the mid 90s. Nowadays ww is offered in four islands: Tenerife, Gran Canaria, La Gomera and La Palma (sporadically authorized touristic ww services have been offered in Lanzarote as well) (Fig. 4). The industry has evolved differently on each island, with most representative changes occurring in Tenerife. Since its beginnings, the industry has undergone different phases: uncontrolled explosion, qualitative changes in adaptation to market conditions and quantitative consolidation. During 1996, the number of dedicated vessels increased significantly as a continuation of previous years' trend. This represents the explosion phase of an unstable market with broad outlook and coincides with the application of the ww regulation. The changes introduced and the expectations created by the first promulgated decree gave way to a stabilization phase after an all-time-high of 60 authorizations in 1997. This year marked a turning point for the industry that lead to a gradual decrease in the number of dedicated vessels and operator companies. The intense competition and the new legal framework caused the market to self-regulate, affecting some operators and opportunistic private boat owners with irregular activity.

Over the years, the number of licensed vessels and the total passenger capacity have gradually decreased in Tenerife, which still concentrates approximately 75% of the industry activity (Fig. 15). Nevertheless, data show an increase in the average boat capacity of active vessels. Driven by ww operators that strengthened their business-relationship with mass-tourism agents, the industry focused on bigger boats with higher passenger-capacity, which gradually replaced the smaller ones in response to the growing visitor volume. In 2004, the average boat capacity reached an all time high of 107 passengers. Today there are signs of a slight decline, with data showing less active vessels and the return of smaller boats (Fig. 16). On other islands, activity started later and has remained stable, untouched by mass tourism circuits. In the case of Gran Canaria, although it has not completely turned into a huge mass- tourism business, ww has rapidly grown and strengthened its link to international tour-operators during the last few years.

Visitor and direct income numbers have been estimated for several years since 1991, as an indication to assess the impact of the ww industry on local economy (Table 3).

Business has gained in complexity and service quality requirements have become more demanding. Thus, not only ww operator companies but also professionals and additional service providers directly linked to the industry have benefited from its gradual expansion over the years. Further, the natural resources involved have caught the attention of other professionals as well. This has had an evident multiplying effect on local economies, especially in the case of Tenerife. Consequently, social benefits (public awareness, cooperation, cultural growth), which are difficult to quantify, have to be taken into account when considering the evolution of the impact on Canary local communities. In general terms, cooperation of the ww industry with research and educational activities have become more accepted and well considered with time. Despite the historical distant relation of the Canary people to the sea and the mass-tourist industry, the ww industry and the activity itself have both strengthened reasonably their connection to the local population. One of the reasons for this can be found in

the large display of awareness-raising, education, and cultural activities related to cetaceans and their habitat developed by public institutions and private organizations.

Activity areas and target species

Whalewatching activity in the Canaries is carried out in areas that are located off the islands´ southwest coasts. Sheltered from the typical trade winds due to the so–called "island-mass" effect, their waters benefit from the Canary Islands Stream, a branch of the Atlantic Gulf Stream that drives cold water masses towards the archipelago. Since the islands lack of a significant oceanic platform, there is also an upwelling effect occurring here that thrusts nutrient-rich deep waters towards the sea surface. Moreover, these areas benefit from mild weather conditions and stable water temperatures. Thus, they provide an ideal habitat for cetaceans to rest, feed, socialize and breed.

Areas used for ww are part of broader protected extensions that have been declared SCI (Site of Community Importance) for NATURA 2000, the European network of Special Areas of Conservation of natural habitats and species (see Fig. 17):

- In Tenerife, the SCI "Franja marina Teno-Rasca" (LIC ES7020017) extends over 69,500ha, along approximately 75km of coast. There are three departure ports for whalewatching operator companies along this strip, located in three of the most important tourist destinations on the island: Los Gigantes (municipality of Santiago del Teide), Puerto Colón (municipality of Adeje) and Los Cristianos (municipality of Arona).

- In Gran Canaria island, Puerto Rico (municipality of Mogán) is port of call for ww service providers. The activity takes place in the SCI "Franja marina de Mogán" (LIC ES7010017), which covers 29,993ha and borders on the island´s main tourist destination, Maspalomas.

- In La Gomera island, the activity is carried out in the SCI "Franja marina Playa de Santiago - Valle Gran Rey" (LIC ES7020123). Excursions start in Port Vueltas (municipality of Valle Gran Rey) and the port of Playa de Santiago (municipality of Playa de Santiago). The area extends over 13,139ha along approximately 26 km of coast.

- La Palma has a single port of call, Tazacorte. From here, the only ww operator departs to the nearby SCI "Franja marina de Fuencaliente" (LIC ES7020122) to offer his service. The marine protected area (MPA) extends over 7,055.20ha and 29 Km of coastline.

These are MPAs due to the existence of two priority threatened species: the bottlenose dolphin (*Tursiops truncatus*) and the loggerhead turtle (*Caretta caretta*). These areas also host other important protected natural resources such as sea grass prairies (*Cymodosea nodosa*) and include habitats representative of coastal biodiversity. Canary Islands waters, specially its ww areas, are also known for the continuous presence of other species of sea turtles and sea birds. Two other facts are decisive to explain the uniqueness of Canary Islands waters and their importance for ww: the existence of stable communities of cetaceans and the high number of different species that have been registered (up to 26, seven of which were registered as strandings) (Martín *et al.*, 2003). In ww areas, species and seasonality vary from island to island:

- Tenerife is known for its stable communities of short-finned pilot whale (*Globicephala macrorhynchus*) and bottlenose dolphin (*Tursiops truncatus*), which can be seen all year round. Other species like the Bryde´s whale (*Balaenoptera edeni*), the fin whale (*Balaenoptera physalus*), the Atlantic spotted dolphin (*Stenella frontalis*), Blainville´s beaked whale (*Mesoplodon densirostris*) and Cuvier´s beaked whale (*Ziphius cavirostris*) can be seen seasonally. Less frequently sightings have been made: rough-toothed dolphin (*Steno bredanensis*), sperm-whale (*Physeter macrocephalus*), sei whale (*Balaenoptera borealis*), striped dolphin (*Stenella coeruleoalba*), common dolphin (*Delphinus delphis*), including even a few of humpback whale (Megaptera novaeanglicae) and one Northern right whale (*Eubalaena glacialis*).

- Efforts in Gran Canaria aim at the resident groups of bottlenose dolphins and rough-toothed dolphins. Other species can be found seasonally (striped dolphin, common dolphin and Atlantic spotted dolphin) or can be sighted at larger distances off coast (short-finned pilot whale and Bryde´s whale) or just occasionally (sperm whale).

- La Gomera has the highest recorded number of different species sighted, but short-finned pilot whale (off-coast) and bottlenose dolphin remain priority target species. Rough-toothed dolphin, Atlantic spotted

dolphin and Bryde´s whale are also very common in the area. Other sighted species include the fin whale, common dolphin, Blainville´s and Cuvier´s beaked whale and, less frequently, sperm whales and sei whales (*Balaenoptera borealis*). There are references of two anecdotic sightings of blue whale (*Balaenoptera musculus*) and Northern right whale.

- In La Palma, the two most frequent species are the bottlenose dolphin and rough-toothed dolphin. Short-finned pilot whales and spotted dolphins are also frequent, together with common dolphins. Sporadically, beaked whales, sei, Bryde's, fin and sperm whales can be seen, as well as striped dolphins.

Regulation

There are undeniable risks that could affect both cetacean populations and their natural habitats in the Canary Islands. They can be mainly attributed to the unsustainable urbanization plans developed on coastal areas and the heavy traffic of ferries and fast ferries connecting the islands. Other activities actually add to the risk-factor count (abusive ww practices, intense sea-based tourist activity, commercial fisheries and aquaculture, private boat traffic, activities carried out with active sonar, insufficient information available and public outreach) or might do it in the future (mega-port structures, oil prospection, off-shore gas plants and wind-parks). Bearing in mind that ww is an important part of the wide choice of maritime and coastal tourist services offered in the Canary Islands, it is clear that the definition of an adequate regulatory framework has become a fundamental instrument for the regional policy of environmental conservation and for the management of marine natural resources. These efforts are carried out by the regional environmental agency (Viceconsejería de Medioambiente del Gobierno de Canarias) through its Dirección General del Medio Natural, which aims to integrate effective conservation, sustainable use, coordinated planning and public outreach.

Whalewatching began in the Canary Islands as a tourist service lacking a legal regulatory framework. It started being monitored by the public administration during its expansion phase in the early 90s, as the activity stepped up in response to the fast growing pace of the demand. The whalewatching regulation was enacted via regional decree in 1995 and last brought up to date in the year 2000 [1]. It can be considered as one of the most complete worldwide. Conceived as part of a long-term policy for the management and protection of marine natural resources with special public interest, it aims to protect the cetacean populations by minimizing the risk of negative impact caused by human – cetacean interaction (mainly related to ww tourism on the affected areas). It also takes important step towards establishing adequate service quality standards through their managerial, environmental and educational requisites. Further to establishing a compulsory code of conduct (see Appendix II), it covers educational and interpretative aspects of the ww activity. Among other aspects covered, the regulation[2]:

- Distinguishes sea or air based commercial whalewatching activities from those whalewatching activities with scientific, informative or merely recreational purposes.
- Determines the obligation of an authorization to carry out the activity, which is granted by the competent authority.
- Establish technical parameters that are to be respected by whalewatching vessels through a compulsory Environmental Impact Assessment, allowing further parameters to be defined by the authority.
- Determines the requirements that have to be fulfilled by commercial whalewatching operators as well as other whalewatching related activities, in order to obtain the specific authorization: development of an educative program, compulsory presence of officially entitled whalewatching guides on board during whalewatching trips, deposit of a warranty to meet obligations and liabilities in case of regulation abuse.
- Determines the obligations of commercial whalewatching service providers during their activity (follow the code of conduct, show the official distinctive "Blue Flag" on every licensed boat, carry on board a copy of the regulations' content for informative purposes) as well as for other authorized whalewatching platforms.

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[1] Canary Islands, Spain. Decree 320/1995, of November 20th, by which cetacean observation activities in the Canary Islands are regulated. *Boletín Oficial de Canarias*, November 20th 1995, no. 1995/148. Canary Islands, Spain. Decree 178/2000, of September 6th, by which cetacean observation activities in the Canary Islands are regulated. *Boletín Oficial de Canarias*, October 6th 2000, no. 2000/133.

[2] Detailed information concerning some regulatory issues and the code of conduct was included in an informative leaflet published by the regional environmental agency of the Canary Islands Government. See Appendix I.

- Establishes the conduct guidelines that must be complied by authorized vessels or aircrafts during the activity, such as approaching manoeuvres, behaviour in presence of cetaceans, engine manoeuvres and speed, time limits during the sightings, maximum number of vessels allowed in presence of cetaceans, distance and noise restrictions, and special guidelines for scientific trips, among others.
- Determines the creation and functions of a monitoring committee in which specialists of public agencies, private organizations and educational institutions take part.

This regulation established an important precedent for the definition of a national legal framework, which was finally adopted via Royal Decree [3]. The national regulation broadens the regulatory scope by including any type of activity that may affect cetacean individuals or groups. Moreover, it includes an innovative concept: it defines a mobile protection area, which extends 500m around an animal or group of animals independently of their position.

The effort of the regional environmental agency has resulted in further actions throughout these past years, such as offering professional courses and qualification programs for ww guides, carrying out studies to assess short and long term effects of ww tourism on cetaceans behaviour and population and establishing a surveillance system with monthly reports on the observance of the code of conduct. A conservation plan for cetaceans in the Canary Islands is expected to be approved in 2009. This plan will include management and monitoring measures to ensure and promote high-quality whalewatching activities and minimize their negative impact on cetacean populations.

Defining & implementing the WW regulation

The regulation implemented in 1995 helped to overcome the lack of control during the initial explosion phase of the ww industry in Tenerife. Licensed ww operator businesses and vessels became legally registered and were so comparable to any other touristic service provider. Not only did it help to distinguish illegal activity, but also to minimise other abuses and irregularities (trespassing maximum boat capacity allowance, out of date documentation, etc.)

However, one of the main problems arose derived from the insufficient communication between the public and the affected ww agents. These were not taken into consideration when defining the regulation content. The result was lack of confidence and insufficient information, which led ww agents to not fully understand the purpose of the regulation and to misinterpret it. The benefit of a regulation, a license-based management system and activity monitoring was understood, since the need to protect cetaceans was evident. Though, there were discussion points for which even nowadays agreement between the parts still has to be reached. Whalewatching agents mainly argued with issues related to the code of conduct. For one, they did not quite understand why they would pose a threat and in which way they would threat, stress or harm the animals. They also compared their threat to the one caused by other means of transportation such as fast ferries or jet foils active in the area. Other questions arose in relation to the minimum distance that was to be kept during the sightings and the effect of the presence of a vessel on cetaceans. This showed how essential it is to communicate useful information in a timely manner and opening a two way channel before applying a regulation, even before starting to define its content. Getting continuous involvement from the affected parts can be complex but helps to ensure long term effectiveness.

Control and supervision

At first, an inspection service was included as part of the ww regulation. With time, it became clear that a continuous presence of representatives of the authority or the responsible public administration would be needed in ww areas. This was considered as a high priority to ensure compliance with ww regulation, considering the small size of the ww areas and the intense activity occurring there. Also, because it was understood that insufficient or non-existing supervision could make a big difference in law observance, as it happens in most cases, and this would have indeed its impact on the effectiveness of the management measures defined.

Not only supervision has become a way to control operator compliance with the regulation and denounce abusive conducts but it also is a way to inform ww operators and others in the w area (sailors, fishers, divers, and jet sky and water thrills operators) about the regulation and the need to observe a code of conduct, and to assist them, contributing in this way to maintain a high quality ww activity. Also, if continuity is given, supervising personnel gains experience and might advance in their learning curve, adding this way quality to ww with their improved professional and interpersonal skills.

Supervision in the Canary Islands has been carried out in a discontinuous manner (1996-1998, 1999-2000, 2002-2003 and from July 2008 on). Initially, this was a task for the official authorities in charge of surveillance

[3] Spain. Royal Decree 1727/2007, of December 21st, by which protection measures for cetaceans are established. Boletín Oficial de España (BOE), January 12th 2008, no. 11.

activities. Insufficient budget and resources has obliged to implement monitoring activities as an alternative. It is currently carried out by a team that patrols the ww area in Tenerife. The information gathered by this boat has been highly interesting for management purposes, since it has provided data about the position of active boats; the relation between them and their behaviour in presence of cetaceans; to what extent regulation is complied with; the kind of infractions committed; and what difficulties ww boat captains have in order to comply with ww code of conduct. It also has provided valuable scientific information that allowed increase knowledge about the cetacean population (sightings, animal behaviour, and interaction with humans). It is an ideal platform of opportunity for data gathering. Monitoring activities are planned to be extended to Gran Canaria as the next step. This patrol boat also serves as occasional platform of opportunity for ww inspections by authority agents. Obviously, the ideal situation would be to see authority boats themselves patrolling the ww areas again.

Identification of authorized ww boats

Another controversial problem emerged at initial stages from the difficulty for tourists to distinguish licensed vessels when deciding to buy a ww excursion ticket. Since information regarding legal requirements for the ww activity had not been widely spread, they were not concerned with it. After the update decree in 2000, the "blue boat" identification flag was made mandatory for all licensed vessels. In this way, authorised vessels would be easily recognised by tourists, other operators in the area, and supervising personnel. This flag has turned out to be one of the most efficient management measures introduced, not only as a way to ensure legality but also as a means of improving overall quality in the ww industry. The flag is yearly renewable and only conceded after all requisites have been complied with (environmental impact assessment and other administrative and requisites included in the regulation).

Environmental Impact Assessment (EIA)

One of the goals pursued with the implementation of a ww regulation was to ensure that only those vessels fulfilling all technical and administrative requirements would be granted authorization to carry out the activity. A correct environmental behaviour was included as a major consideration here. Thus, a basic EIA study was made mandatory, which included characteristics and aspects relevant to the interaction with cetaceans or that could affect directly or indirectly the animals or their environment. In this way, not only the fulfilment of all requirements included in the regulation would be ensured, but it also made possible to allow the activity according to specific requirements defined for each vessel from both, the technical point of view and according to the type of activity carried out and its characteristics.

The impact study content must include, among others, information regarding general characteristics of the vessel, operator company data, natural resources used or consumed, waste, noise and emissions management, habitats and important natural resources in areas of operation, collaboration activities with researchers, environmental education and the considered level of impact caused [4].

Together with the "blue flag", the EIA has turned out to be one of the most efficient management measures implemented. It has helped to deal with singular cases (specific to a certain vessel or type of vessel) and also to increase awareness in operators regarding their responsibility towards generic and ww activity related environmental conservation measures. It also gave the opportunity to spread information on legal aspects specific to the conservation of marine fauna and protected areas.

Officially entitled whalewatching guide

Having a monitor guide aboard during the ww activity was one of the important prescriptions included in the first decree. It was meant to ensure that whale watchers were provided with enough and good information on cetaceans and its conservation. The latter Decree included the figure of the Whalewatching Tourist Guide in accordance with regional tourist laws. With it, access to this officially recognised title became regulated. Having considered the guide as a fundamental part of the quality-ww activity, knowledge, interpretation and interpersonal skills would be accordingly required.

Also, during the design phase of the regulation, it became clear that the most effective way to ensure boat crew compliance with the code of conduct was to get them involved with a sense of pride in presence of cetaceans, and to strengthen their perception of the ww guide as a valuable conservation agent. This sentiment would take years to develop but giving access to an officially recognised title was thought to serve as encouragement. Introducing the figure of the officially entitled ww guide gave boat crew members and long-time active guides the chance to get involved and to have their ww guide functions officially recognized. Many of them did not fulfill the requirements defined in the first place, so a program of qualification courses was offered to ensure

[4] See Appendix III

eligibility. Nowadays, all applicants must have a university degree, must be academic students of Tourism or have passed these specific courses established by the Environmental Agency.

Present time

The regulation has proven to be complete and useful but some conflicts related to its application continue:

- Budget for supervision activities is not constant and make it difficult to control regulation compliance during the ww activity on a continuous basis.
- There are still ambiguous aspects that are difficult to control like "do not make any noise that can disturb the animals underwater" or "leave the area if you see any sign of alarm, alteration or anxiety".
- Illegal activity seems to have taken on in recent times, probably due to the situation derived from the present economic crisis. Smaller and medium size boat operators that offer charter trips take advantage to offer opportunistic ww without having the required license. Up to 10 of these boats have been detected in Tenerife over the last few months.
- A representative speaker of all ww operator businesses is missing. Thus, companies have less chance to start a dialogue process in which they are able to defend their interests and to communicate their priorities and opinions. Only half of the operator companies have associated and there is no representative of boat crews, guides or other personnel involved whatsoever.
- Other problems are not directly caused by ww activity, neither connected with the ww regulation. Though, they still cause an impact on the animals and the environment that is actually more significant than the impact of the ww activity itself. Because these problems remain unsolved, a negative sentiment has spread among participants of the ww industry: e.g. a growing activity of fast ferries, the continuous and increased presence of jet skies and other water thrills, specially, the high number of fish-farms (aquiculture cages) installed in ww areas or next to them. Over the past few years, a high number of concession operated fish farms have been authorized in ww areas where populations of bottlenose dolphins are resident. This has caused modified behaviour on some individuals, mainly on females and mothers with calves that spend a high amount of time around the aquiculture cages. There is even sporadic human contact since people sometimes take the chance to feed them. Despite control efforts, dolphins are still attracted to these cages, leaving their regular distribution environments, that is, the areas where ww vessels would usually find them. Consequently, ww vessels tend to approach these fish farms too, causing high boat concentration. This situation is new to the industry and the area. Moreover, since the entry to areas occupied by these farms is in any case prohibited, ww activity has experienced a slight drawback. Some jet skies and other water thrills even offer swim-with-dolphin experience near these farms, which is in any case prohibited in the Canary Islands. Thus, control over this conduct is a priority to protect both cetaceans and humans as well as to minimize detriment to the ww industry.
- Another problem to be approached derives from the need to facilitate application processes and to minimize administration efforts and all the burocracy related to ww licenses.

What needs to be done from now on

Certainly, there are management issues that may be common to many ww locations. Others should be adapted to suit the particular features of the specific location to be managed. The experience in the Canary Islands has shown that it is essential to have an effective, continuous control system; an agile management capable to offer quick response from the public administration; to provide adequate training and information for operators and vessel crews; and have information available for the general public, particularly whale watchers. Training for ww guides should be continued with yearly courses, mainly targeted at boat crews, operator company representatives and other guides-interpreters. Also, special emphasis should be made on the educative program developed on each ww trip, in order to enhance its quality and keep its content updated.

Sufficient budget and resources have to be made available to carry out effectively these action lines, which is one of the fundamental problems for the management of ww and affected natural resources. Budget planning must include costs of continuous control program, administrative efforts, informative activities and tools, professional formation and training courses, and research activity needed to improve management.

Besides direct measures, other regulation and management measures must derive from existing legal instruments, such as:

- The declaration of Canary Islands ww areas as Special Areas of Conservation for the European NATURA 2000 network. Having these areas been declared part of the most important European network of protected natural habitats and important areas for priority species, the design of the required

management plans should include aspects relevant for ww and other aspects relevant for cetacean conservation such as pollution, maritime transport, fisheries, aquiculture, invasive species, etc.

- Conservation Plan for cetaceans in the archipelago, which is to be approved and implemented as a next step

From a scientific point of view, there is need to learn more about the biology of the species observed in order to understand human-cetacean interaction issues and provide a preliminary approach on the sustainable carrying capacity of ww areas in the Canary Islands. In order to manage ww activities effectively, it is necessary to define the parameters that determine when and to what extent a cetacean or group of cetaceans are disturbed, altered or harmed. The target of any ww regulation is the development of the activity but only as long as it does not affect negatively a cetacean population. Extra effort is needed when target species are recognized vulnerable, like in the Canaries Islands case. Therefore, it is crucial to elaborate trustworthy population size estimates of at least both main target species (bottlenose dolphin - *Tursiops truncatus* and short–finned pilot whale - *Globicephala macrorhynchus)*. These data provide a solid framework in order to determine population tendencies and to prevent decline and possible negative impacts.

Number of companies, clients, boats and characteristics of trips

In 2008, a total of 37 vessels were licensed for ww operations in the Canary Islands. The island of Tenerife concentrates a major part of the industry, with approximately 70% of the vessels, 65% of the operator businesses and 75% of the passenger carrying capacity (Table 4).

Estimates for 2008 suggest a total of 625,000 ww visitors in the Canary Islands. Ticket price range varies substantially and goes from 6 up to 60€ depending on the trip duration and type. At an average price of 31.8€ (average Tenerife), this makes around 19.8M€ of direct gross income only.

According to interviews carried out in Tenerife (Elejabeitia *et al*, 2002), whale-watchers´ country of origin distribution matches the data shown by regional tourism statistics (United Kingdom, 36%; Spanish mainland, 29%; and Germany 27%). Results also showed that ww service users were not particularly motivated by this activity when choosing this destination for their vacation trip. As a matter of fact, a substantial portion of whale-watching companies' clientele in Tenerife and Gran Canaria is provided by generalist tour-operators. Moreover, ww seasonality follows the general trend of the regional tourist industry, with visitor volume highs during spring (March-April) and summer months (July-August). With these facts in mind, it should not be surprising that the whale-watcher in Tenerife seems not to differ from any generalist tourist who decides to visit the islands.

In mass tourism coastal areas like Los Cristianos and Las Américas (Tenerife) and Puerto Rico (Gran Canaria), ww is part of the wide offer that has been made available for the tourist to thrust visitor spending. Market conditions here (aggressive price competition, high number of operators, and stagnation of tourist entries over the last few years) forced some entrepreneurs to adapt their offer, combine "thematic" trips with whale-watching activity and design other types of products that would suit a mass-tourism market. This motivated other companies to introduce innovations in their product as well. Of course, ww related offer has been updated elsewhere in the Canaries too, though less dramatically. Some operators offer now ww as part of their water-taxi service and others have included in their portfolio products like jet skies and water thrills, charter sailing, accommodation, inland tours or even ww trips in other parts of the world.

Most operator companies have added "value" to their product by offering additional services before, during, and after the excursion in order to match market requirements. Some include a series of services that turns the excursion into a leisure activity with "mere" recreational purpose, eclipsing any educational approach: catering, merchandising, snorkeling and swimming (in absence of animals), photo and video, music and games, hotel transportation and other courtesy services. In other cases, the product keeps its focus on the animal encounter as the major attraction and complementary services are not always a substantial part of the experience. In this scenario, two types of ww trip can be distinguished:

- Excursion offered in bigger, high capacity vessels (55 - 250 passenger.). It´s the ww trip for the big crowds. These maritime excursions of mid-long time duration (3 to 5 hours) are offered according to the requirements of mass tour-operation: rigid schedule and route, a wide range of standardized services and activities (among which whale-watching is included). Service, comfort, exclusivity and even the vessel itself play in many cases a starring role. Only the bigger companies offer 5-hour-trips.

- Excursion planned as a tour to the sighting area (1 to 2.5 hours), for which small to medium passenger capacity boats (8 - 50 passenger) are generally used. This type of trip represents about 2/3 of the daily industry activity, but not so of the passenger volume. It offers a somewhat flexible program and route, with limited additional services (not in all cases provided). The atmosphere so created is more suitable for a ww experience, favouring a closer type of encounter and an individualized customer care,

especially in smaller boats. Though, also some bigger companies offer short trips in big vessels with limited services.

On average, a ww boat offers 2 to 3 daily excursions of 2 – 3 hours duration, which makes a total of 51 to 54 excursions daily only in Tenerife. Trips are scheduled within the period from 9A.M. to 7P.M. daily, with activity peak between noon and 3P.M. [5] During high season, more operators include a third daily trip to enjoy the longer summer evenings. Whalewatching spots are located fairly close to coast, at 10-15 minute sailing distance from the port of call. Depending on the species, groups of animals can be found within the range of 1.5 – 4 miles off coast. There is good communication between boat crews to locate the whales and dolphins. Boats do not tend to concentrate, since several groups of animals can be generally sighted in the same ww area. When more boats are on one same group, turns and time spent with the animals are commonly respected in accordance with the code of conduct. Some operators use a smaller support boat to bring catering, merchandising or hikers onboard. There is occasional illegal activity occurring: mainly ww trips that are marketed without the required license or other opportunistic boats owners that offer charter sailing and deep sea fishing. It is especially obvious in Tenerife but remains quite controlled and limited overall. A new and very important disturbance factor is the growing number of fish farms installed in ww areas (Tenerife), since both cetacean and (consequently) humans tend to concentrate there.

Boat crews are well aware of the necessary procedures in case of an encounter with hurt, entangled or stranded animal, and also of the importance of protecting the marine environment. Whalewatching guides display an acceptable quality level, with good knowledge and notable enthusiasm for their profession. Though, among bigger crowds, their role often bears resemblance to an entertainer, more than an educational guide. This is due to the characteristics of the "mass-ww" product, which demands intense onboard service support, entertainment and communication in up to 4 - 5 different languages. The effectiveness of their educational function, based on a close relation guide-visitor, becomes thus negatively affected.

The type of whale-watching operator company is heterogeneous. There is great variety in organization and number of workers, going from the small family business (mostly locals) to the corporate operator company. Most licensed ww businesses operate with one boat but there are a few bigger companies that operate with 2 or more high capacity vessels, all of them established in Puerto Colón and Los Cristianos (Tenerife).

STRAIT OF GIBRALTAR

Origins and evolution of ww in the Strait of Gibraltar

The whalewatching industry started in 1986, in the Bay of Gibraltar (pink area - Algeciras), with a dolphin watching focused on striped (*Stenella coeruleoalba*) and common dolphins (*Delphinus delphis*) (Fig. 18). In 1998, the industry began to further develop from the harbour of Tarifa, with a fast development until now. This whalewatching is focused mainly in the long-finned pilot whale clan and the bottlenose dolphin community that is resident all year round in the area. Between April and July, the activities are also focused on sperm whales that are semi-resident in the area. Resident common and striped dolphins, as well as the migration of fin whales are also used by the industry. In 2001 the activity registered a considerable increase, with three companies working with 5 boats and offering daily trips. Since 2002, the interactions between killer whales and the blue fin tuna fishery started to be developed as a commercial activity for the whalewatching boats during July and August (blue area – offshore area between Spain and Tanger).

Number of vessels

Up to date, eight boats are working in the Strait of Gibraltar, leaving from the harbour of Tarifa, and five are working in the Bay of Gibraltar. When the weather forecast is not favourable in Tarifa, most of the boats travel to the Bay of Gibraltar and make their activities in this area. The mean number of whalewatching boats present in the area between 2001 and 2006 (de Stephanis 2008) is given in Fig. 19.

Numbers and sizes of boats operating in the area are given in Table 5.

Recreational and fishing vessels

Due to the weather conditions in the Strait of Gibraltar, it is forbidden to use pleasure crafts, jet skis and any kind of recreational vessels in the whalewatching areas. Therefore, the whalewatching activities are quite controlled in number of boats. Apart from the ww boats, the only boats allowed are the sport fishing boats and the commercial fishing boats. The sport fishing boats (Fig. 20) are used during the summer months and are focused on bluefin tuna. The commercial fisheries are focused on the blue fin tuna (Fig. 21) and other fisheries.

[5] Tenerife averages 25 out of 26 licensed boats at sea at this time.

Seasonality

The whalewatching activities occur between April and October, with very low number of trips during the rest of the year mainly due to bad weather conditions and low number of tourists in the area.

Target species

Seven cetacean species are targeted during the ww activity in the Strait of Gibraltar. The activity is based mainly on the long-finned pilot whale, bottlenose dolphin and sperm whale, as well as on killer whales between July and August.

Long finned pilot whale: (Fig. 22 – 25)

The species is present all year round. Around 216 individuals were present in the area between 1999 and 2005 (Verborgh *et al.*, 2009), mainly distributed in the central areas of the Strait (de Stephanis *et al.*, 2008). The animals leave the area, during around three weeks at the end of the spring probably to the Alborán Sea (Mediterranean) for reproduction. Their diet has been analyzed using a stable isotope approach, revealing preferences for squids during the summer months, and a mix of squids and fish during the winter months.

Bottlenose dolphin: (Fig. 26 – 27)

The species is present all year round. Around 250 animals were estimated to be present in the area between 2002 and 2005 (Pérez, 2007). Their spatial distribution is located mainly in the central areas of the Strait of Gibraltar.

Sperm whales: (Fig. 28 – 29)

A total of 25 individuals have been identified in the Strait between 1998 and 2006, between March and August. They probably originate from the Mediterranean Sea, and use the Strait of Gibraltar as a feeding area. Predominant age class observed in the area is composed of sub-adult males that tend to concentrate in the central and deep water of the Strait of Gibraltar.

Killer whales: (Fig. 30 - 31)

Forty two individuals belonging to five pods have been identified in the Strait between 1998 and 2007 (Esteban, 2008). The species is present in the area all year around and is used as a target species by the ww activity during July and August, when the animals interact with the longline blue fin tuna fishery. During the rest of the year they concentrate in the shallow waters of the north-western parts of the Strait.

Common and stripped dolphins: (Fig. 32 – 33)

Both species are present in the area all year round. Although no estimation of abundance for the two species has ever been made, data is being analyzed and it is hoped that spatial modelling could provide estimations of population sizes between 2001 and 2007. The abundances expected for 2006 are of more than 500 common dolphins and more than 2000 striped dolphins. Spatial distribution of both species is plotted in the Figs. 32 and 33.

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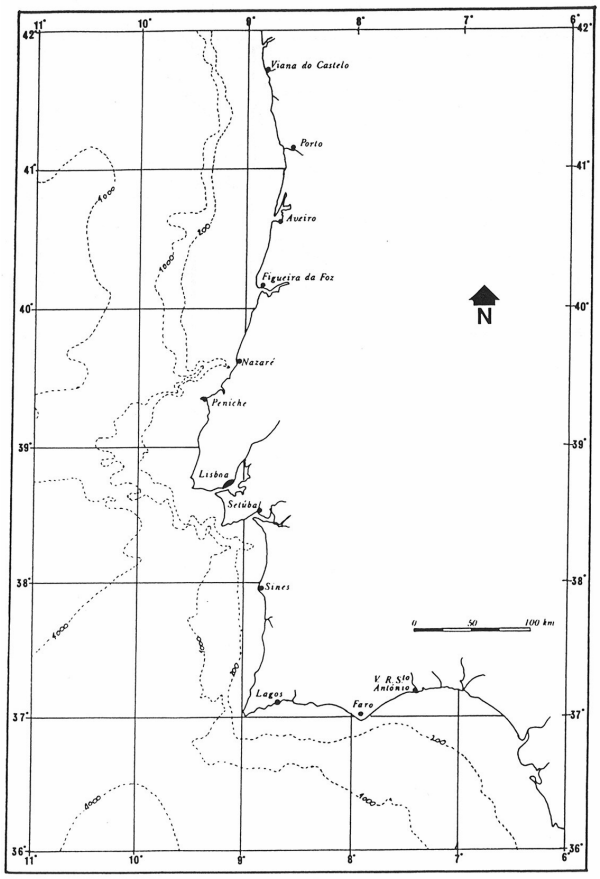


Fig. 1 – Mainland Portuguese coast.

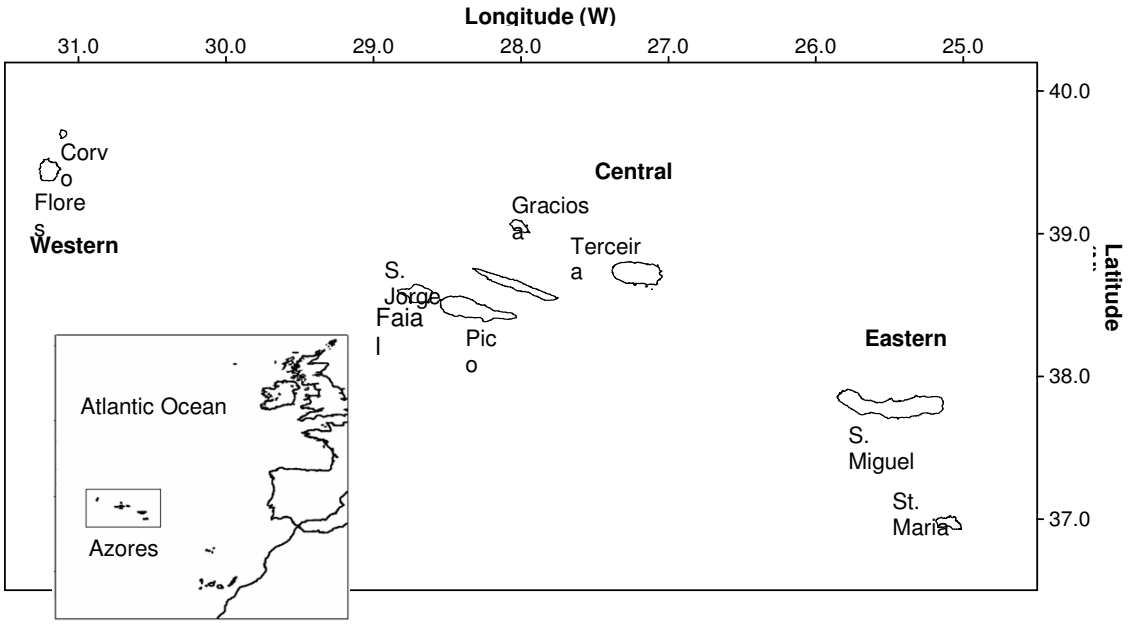


Figure 2 – Location of the Archipelago of the Azores in the North Atlantic.

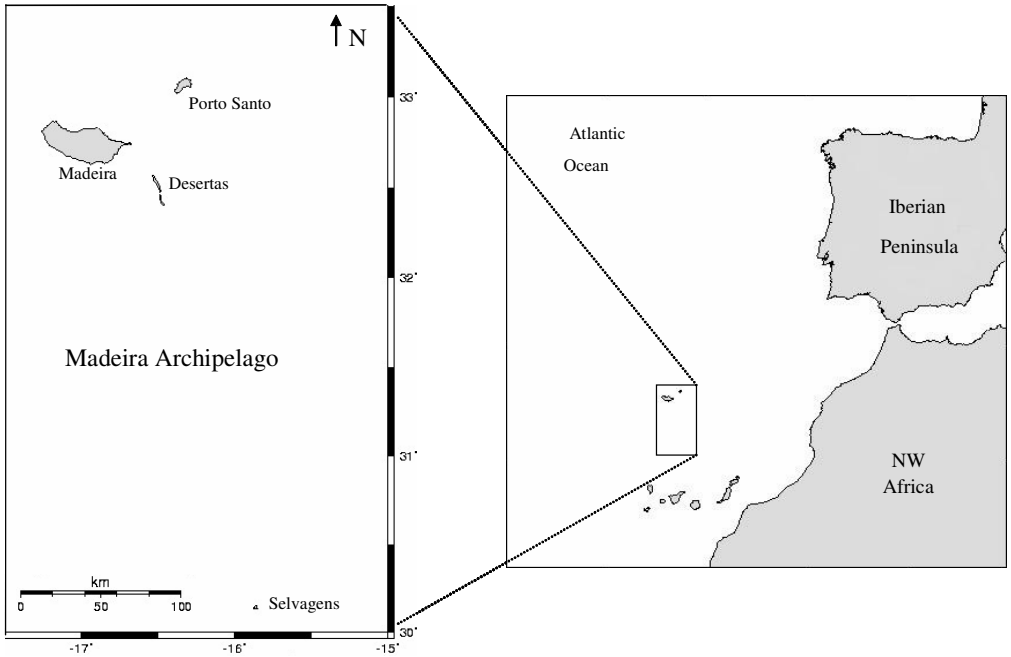


Fig. 3 - Geographic location of the Madeira archipelago in the Atlantic Ocean.

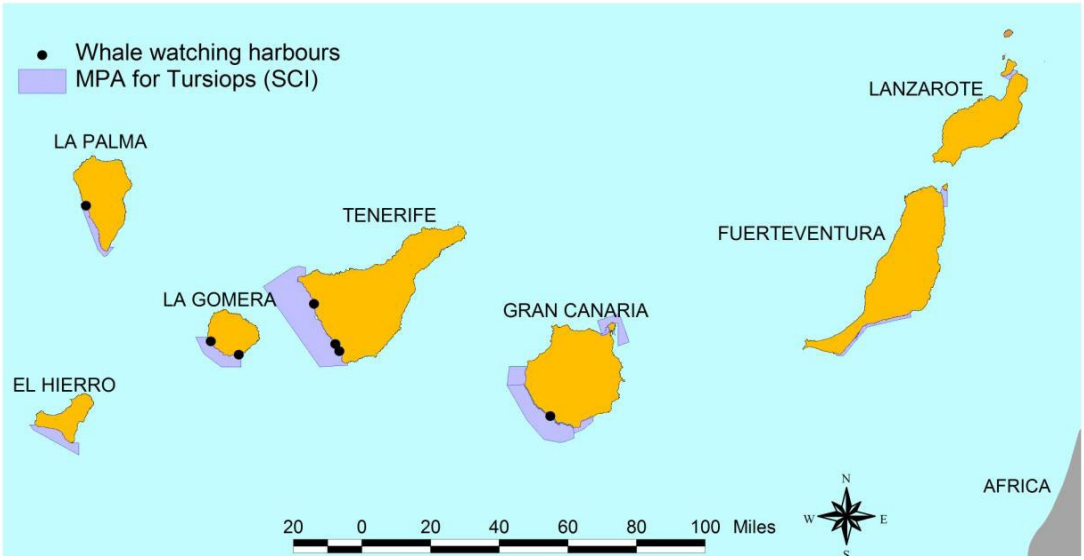


Figure 4 - Canary Islands Archipelago

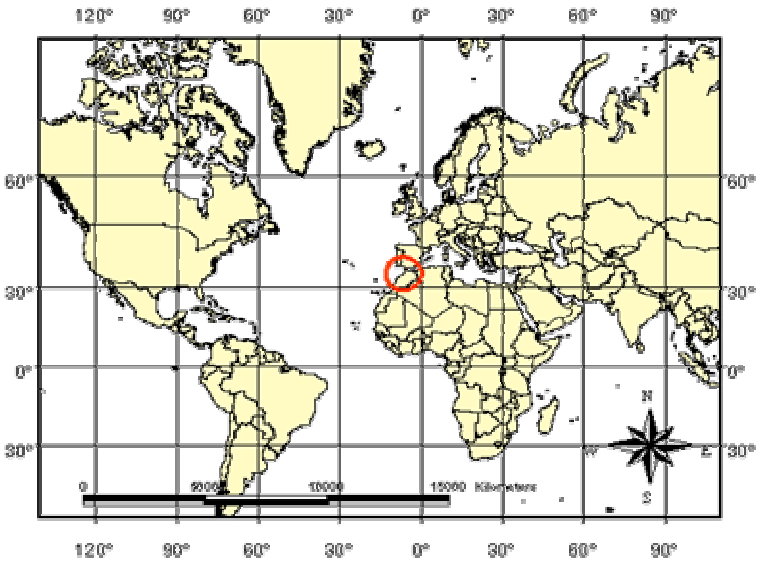


Figure 5 - The Strait of Gibraltar in the World

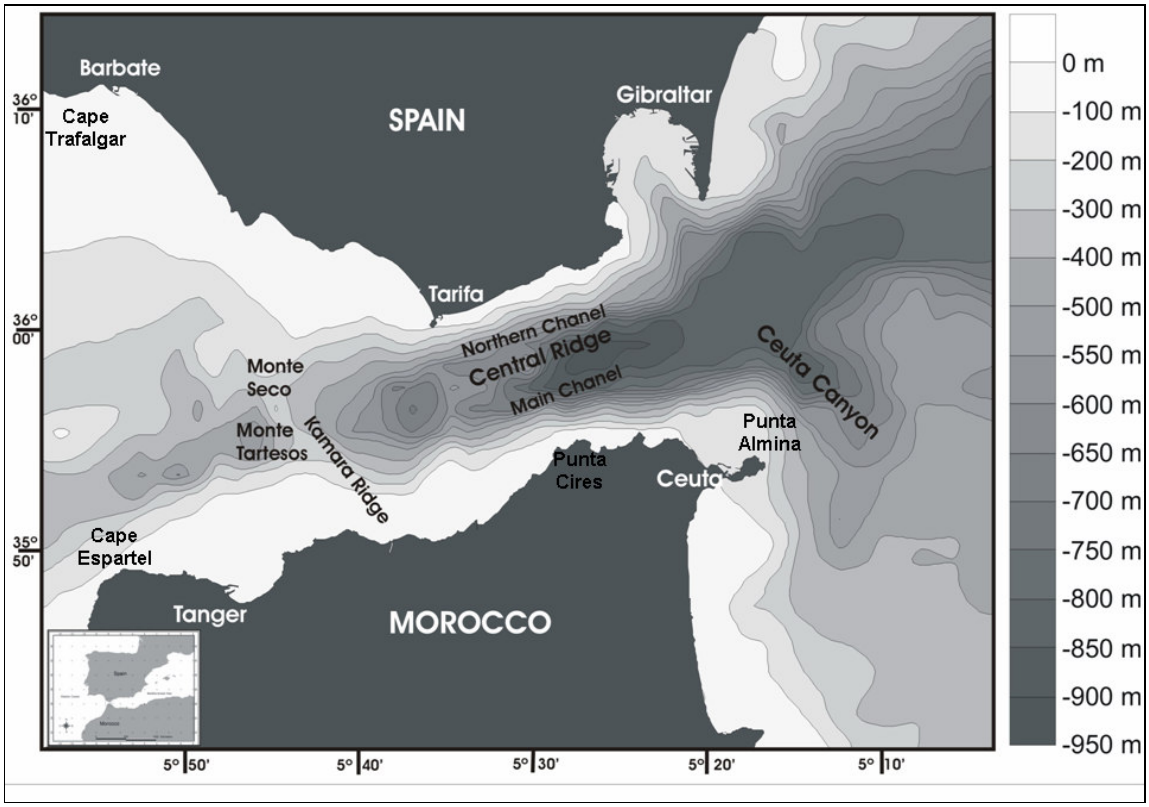


Figure 6 - Bathymetry of the Strait of Gibraltar

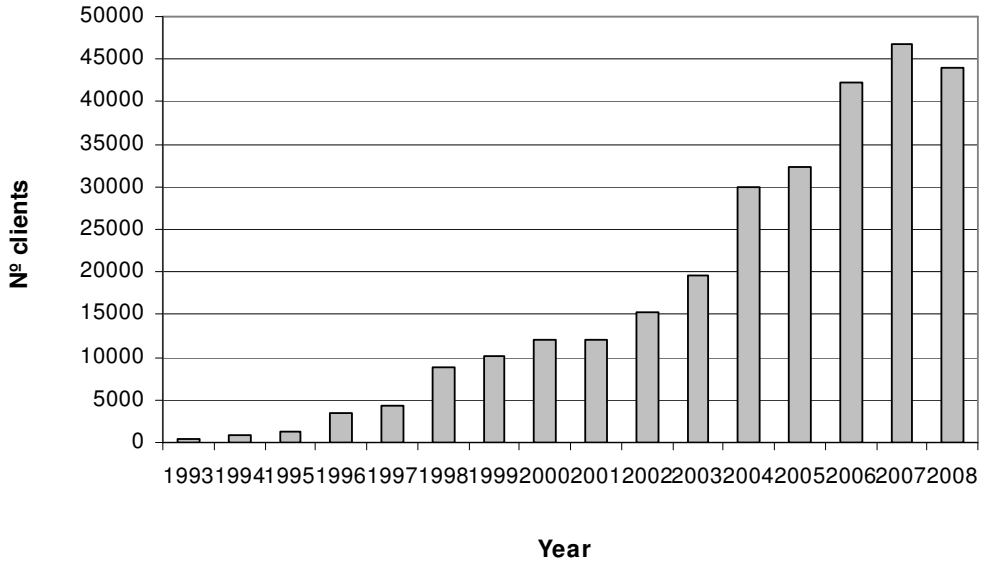


Figure 7 – Number of ww clients in the Azores, from 1993 to 2008, according to information provided by the enterprises licensed by the Tourism Directorate. Data from 2007 and 2008 is incomplete because only 17 out of 23 licensed companies answered to the interview survey.

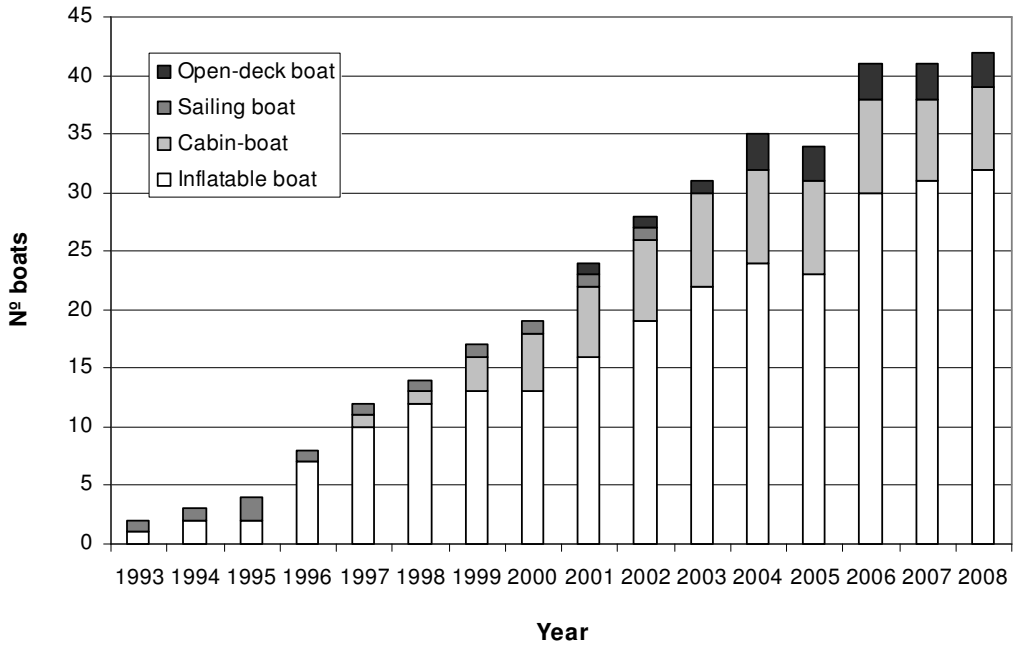


Figure 8 – Number and types of ww boats in the Azores, from 1993 to 2008, according to information provided by the enterprises licensed by the Tourism Directorate. Data from 2008 is incomplete because there was no information available from two boats.

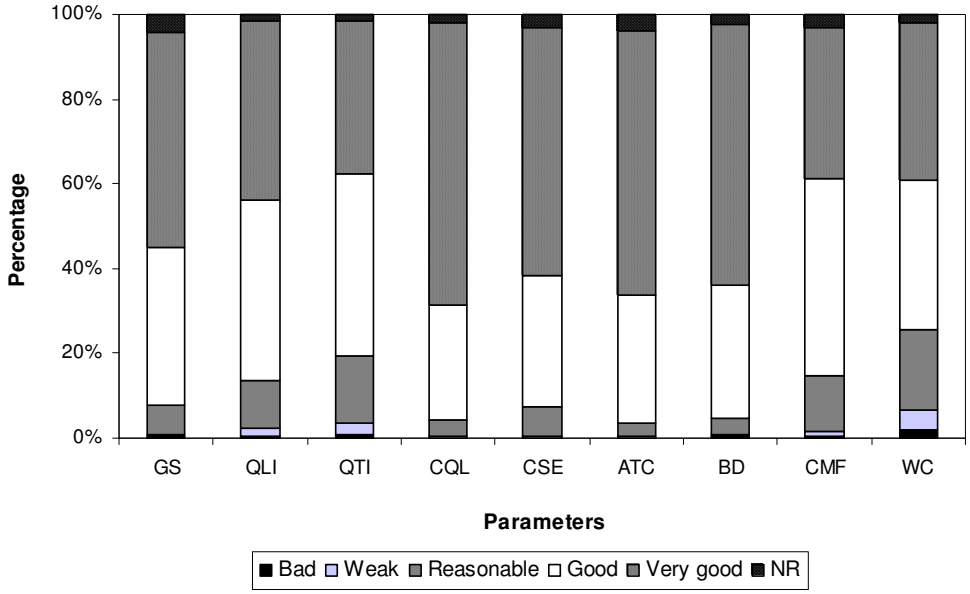
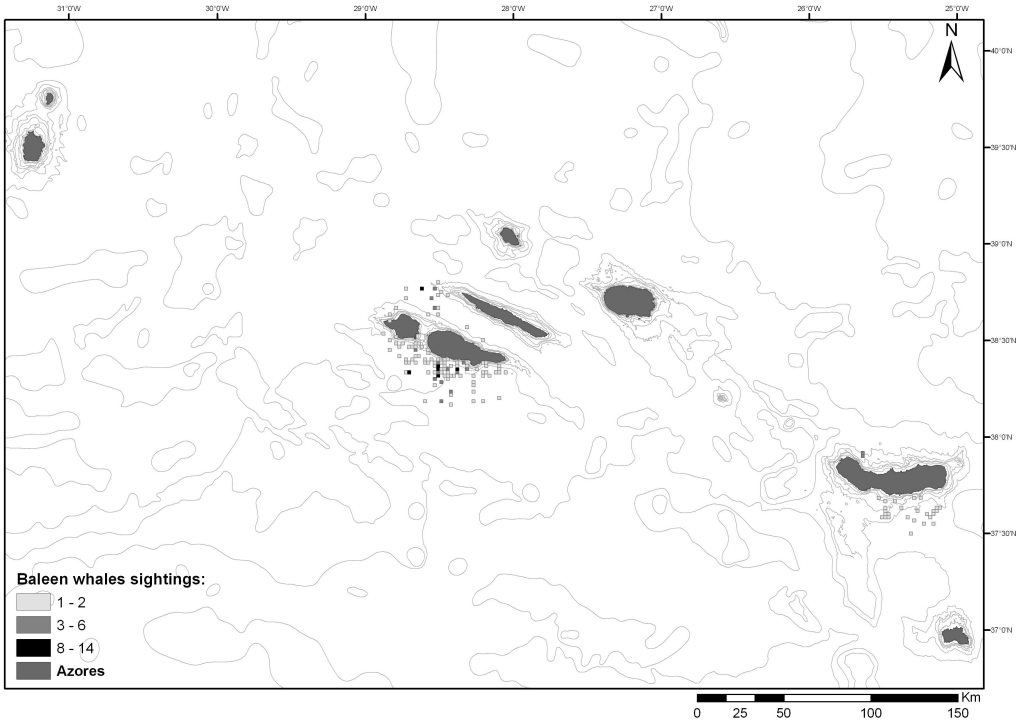
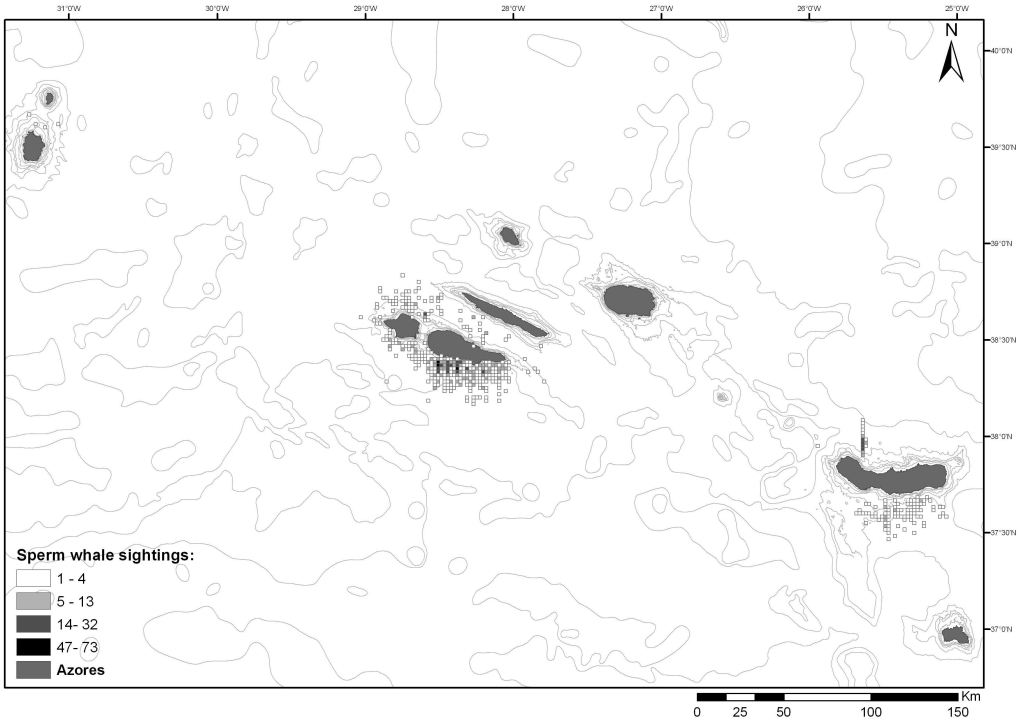


Figure 9 - Percentage of answers from inquired tourists relatively to different parameters that classify the ww trip. "NR" stands for "no response". Parameters: GS=General Satisfaction; QLI=Quality of Information received; QTI=Quantity of Information received; CQL=Crew Quality; CSE=Cetacean's Search Efficiency; ATC=Attitude Towards Cetaceans; BD=Boat Driving; CMF=Boat comfort and WC=Weather Conditions.





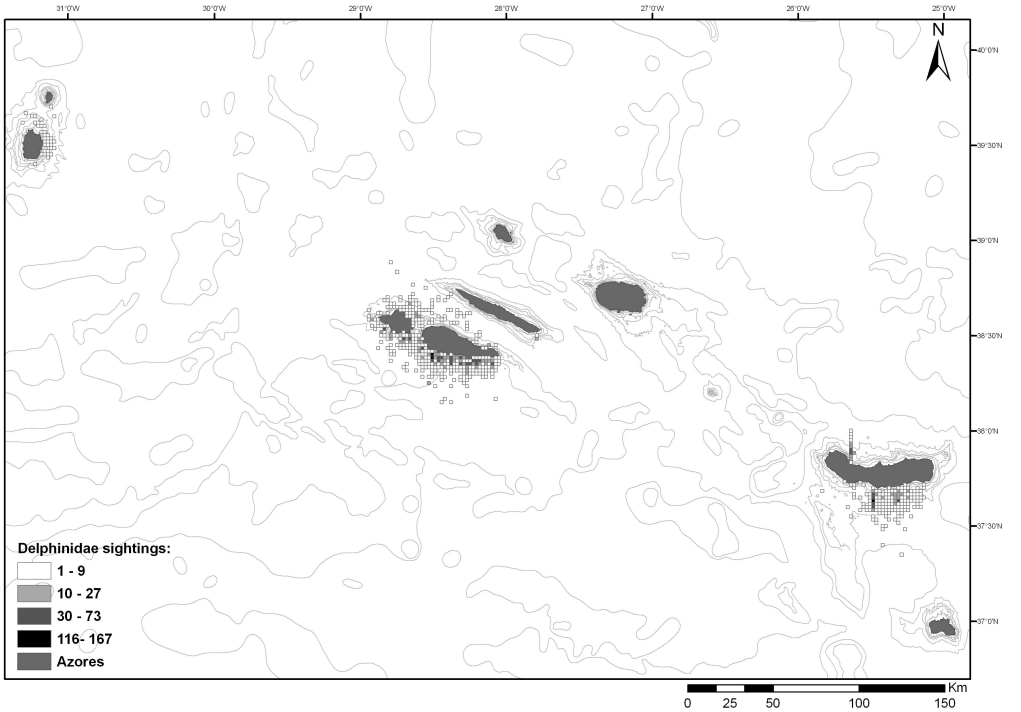


Figure 10 – Location of cetaceans sighted (grouped into A - Baleen whales, B - Sperm whales, C-Delphinidae) in the Archipelago of the Azores by 15 ww enterprises, 2000-2006.

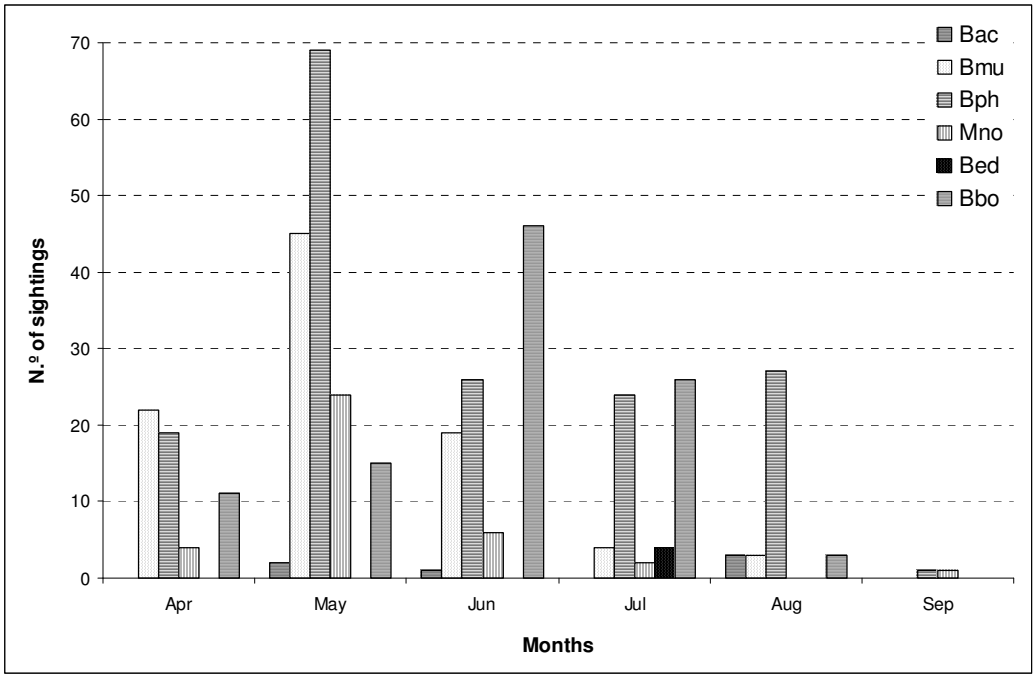


Figure 11 – Monthly sightings of baleen whales in the archipelago of the Azores, recorded by 15 ww enterprises, 2000-2006.

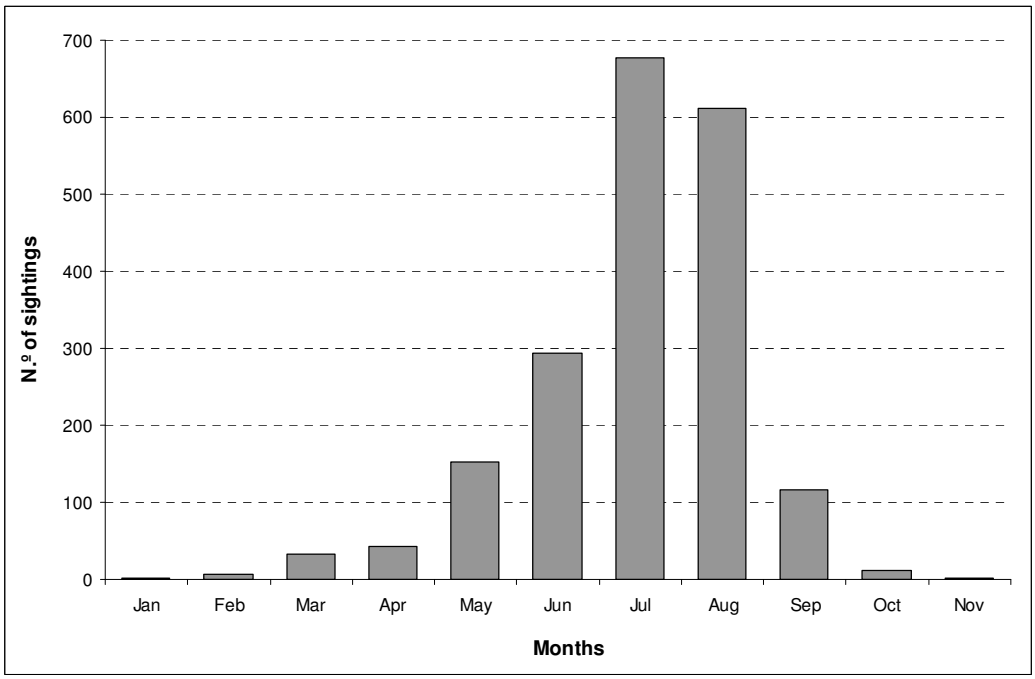


Figure 12 - Monthly sightings of sperm whales in the archipelago of the Azores, recorded by 15 ww enterprises, 2000-2006.

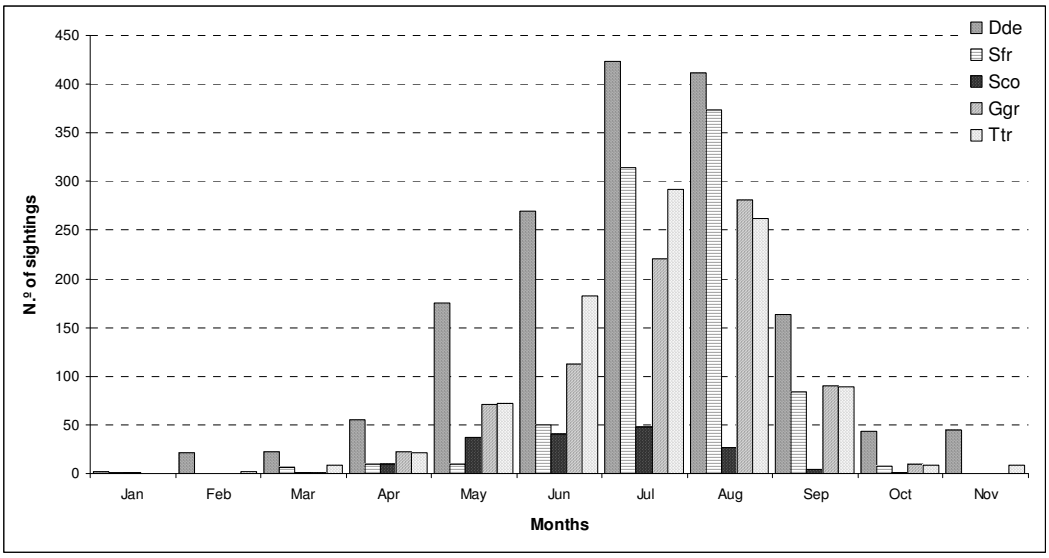


Figure 13 – Monthly sightings of common dolphins, spotted dolphins, striped dolphins, Risso´s dolphins and bottlenose dolphins in the archipelago of the Azores, recorded by 15 ww enterprises, 2000-2006.

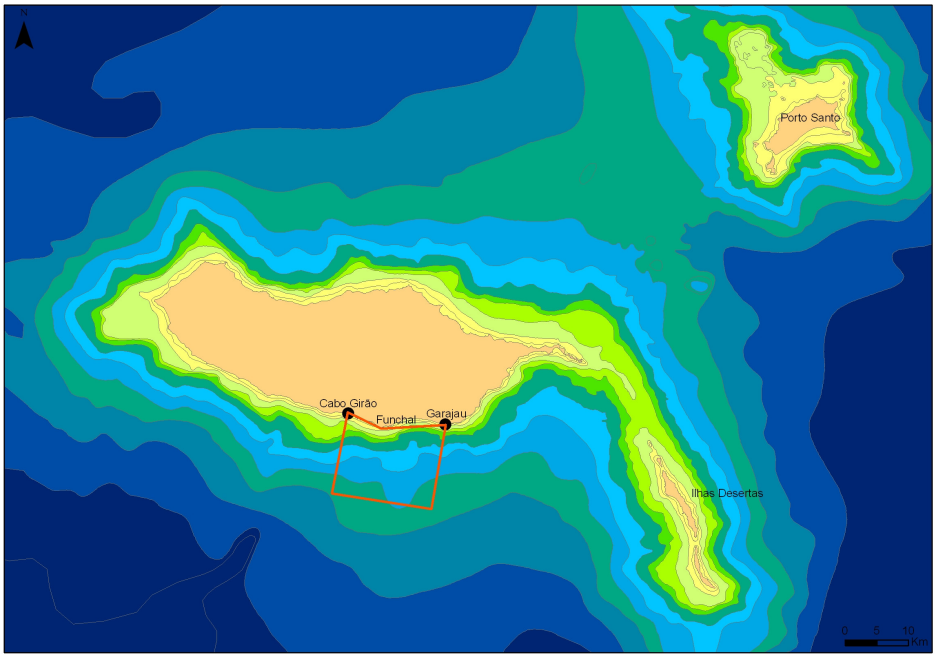


Figure 14 – Location of the main area where tour boats operate in Madeira.

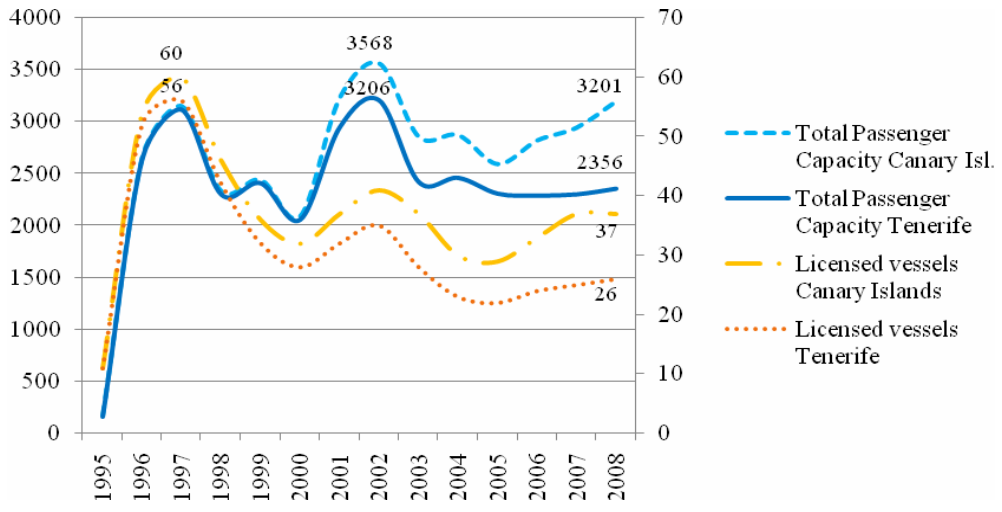


Fig. 15 - Total passenger capacity vs. no. of licensed vessels in Canary Islands and Tenerife (1995-2008)

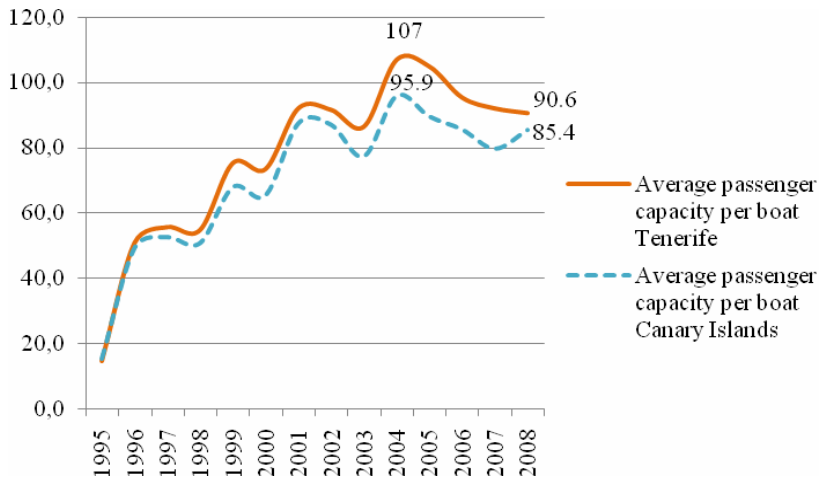


Fig. 16 - Average passenger capacity per boat in Canary Islands and Tenerife (1995-2008).

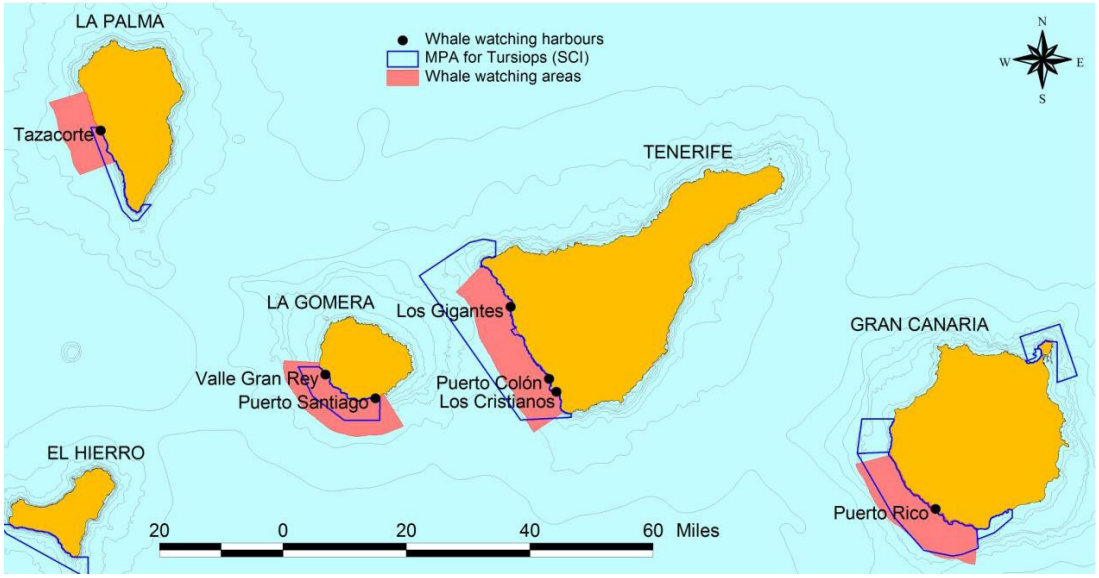


Figure 17 - Whalewatching areas and ports of departure in the Canary Islands.

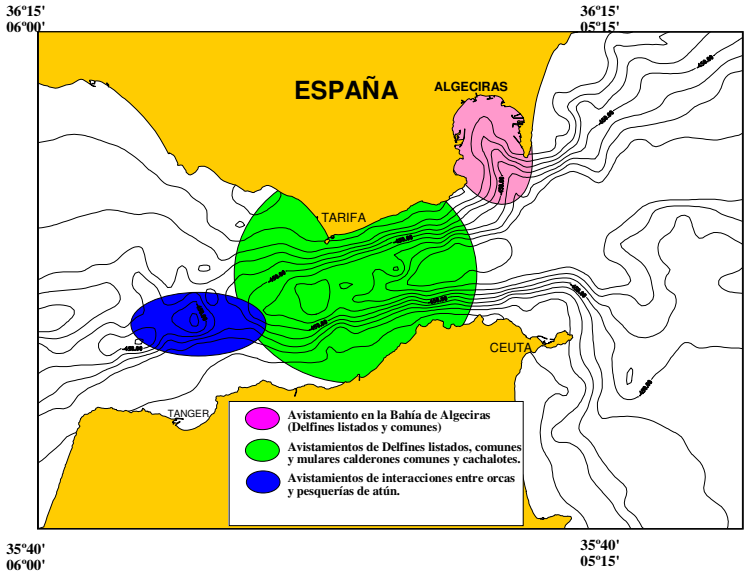


Figure 18 - Different types of whalewatching in the Strait of Gibraltar. The pink area is focusing the activities from the harbours of Gibraltar, and Algeciras, on common and striped dolphins. The green area focuses the whalewatching on long finned pilot whales, bottlenose dolphins and sperm whales. The blue area is the area with whalewatching on killer whales.

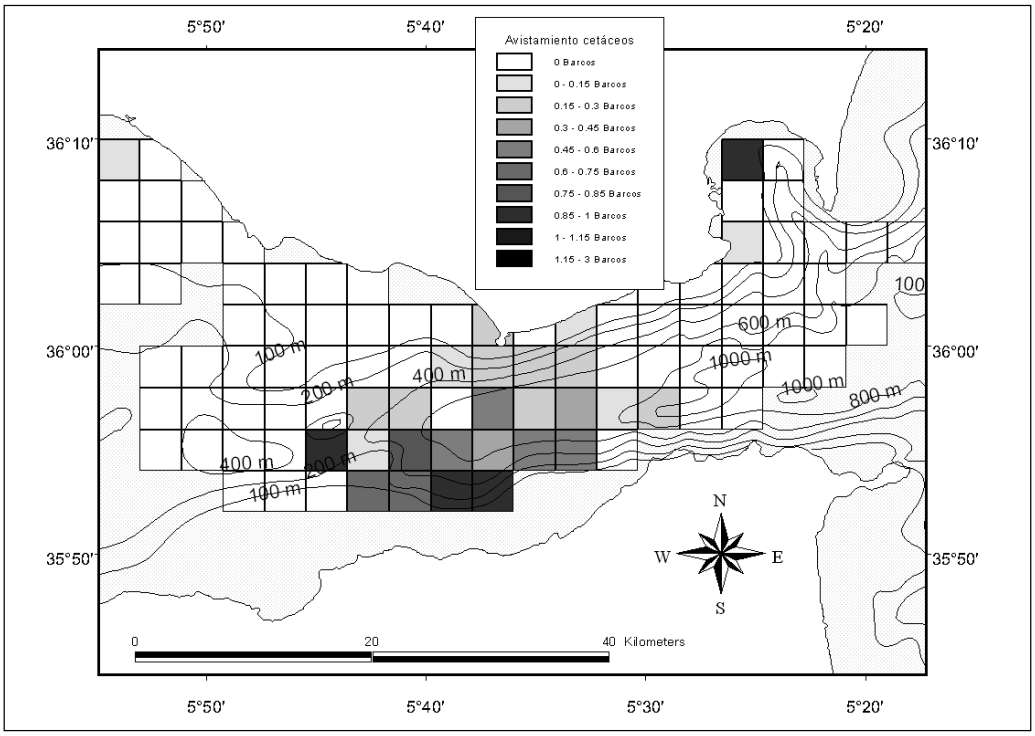


Figure 19 - Mean number of whalewatching boats in the Strait of Gibraltar between 2001 and 2006.

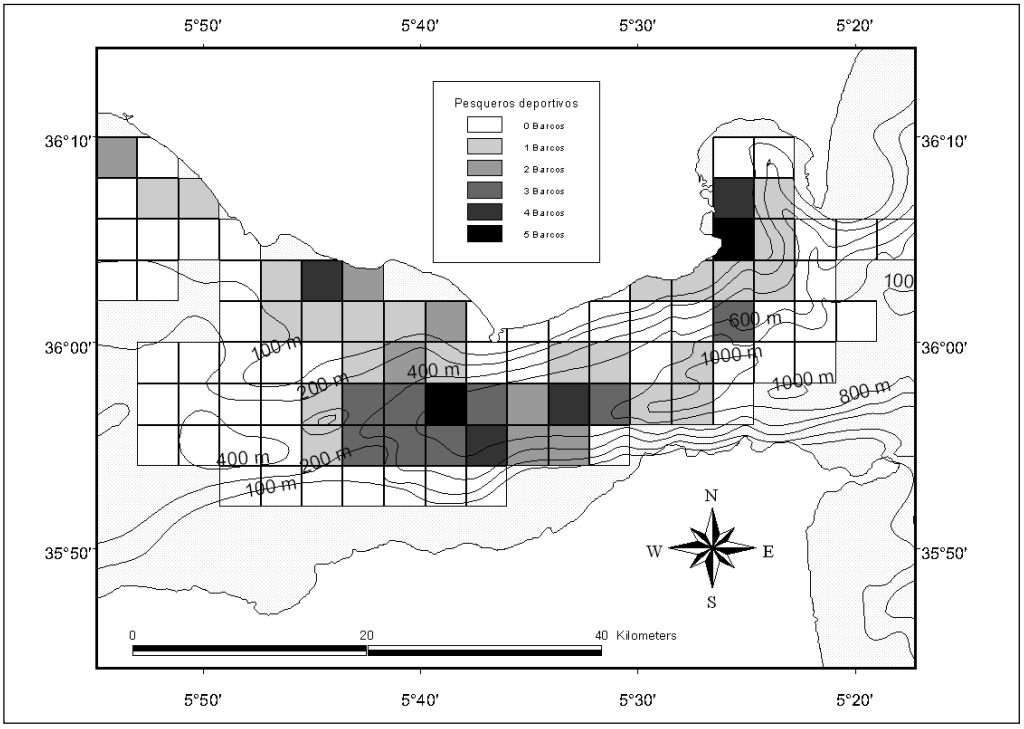


Figure 20 - Mean number of sport fishing boats present in the Strait of Gibraltar between 2001 and 2006.

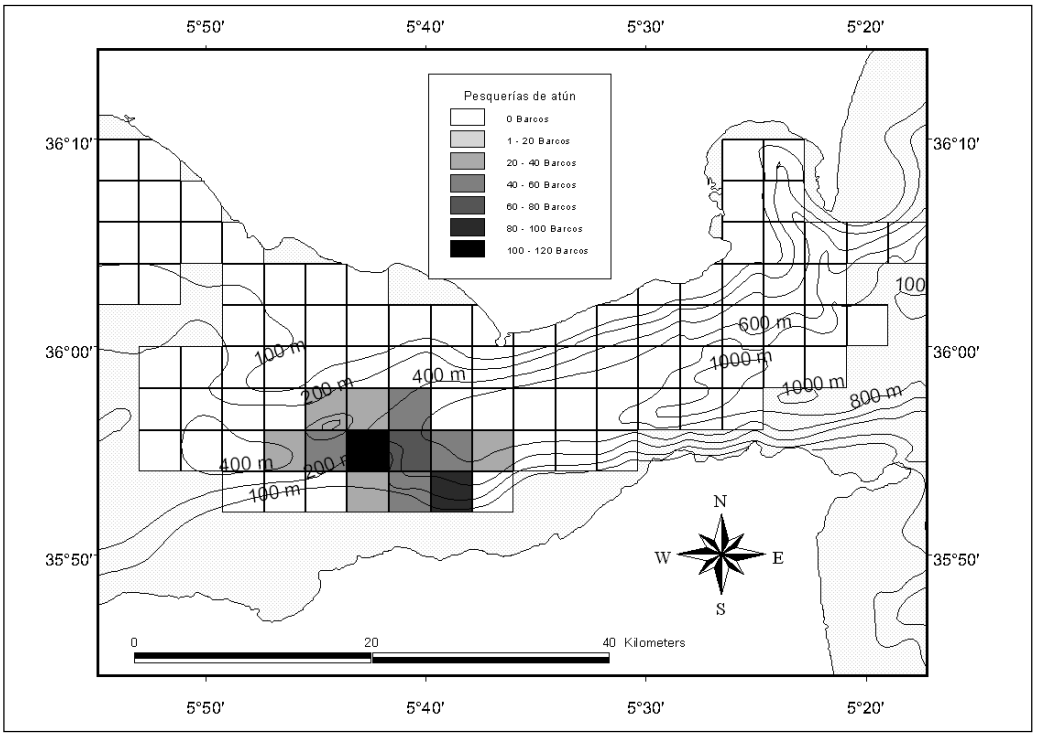


Figure 21 - Mean number of bluefin tuna fishing boats present in the Strait of Gibraltar between 2001 and 2006.

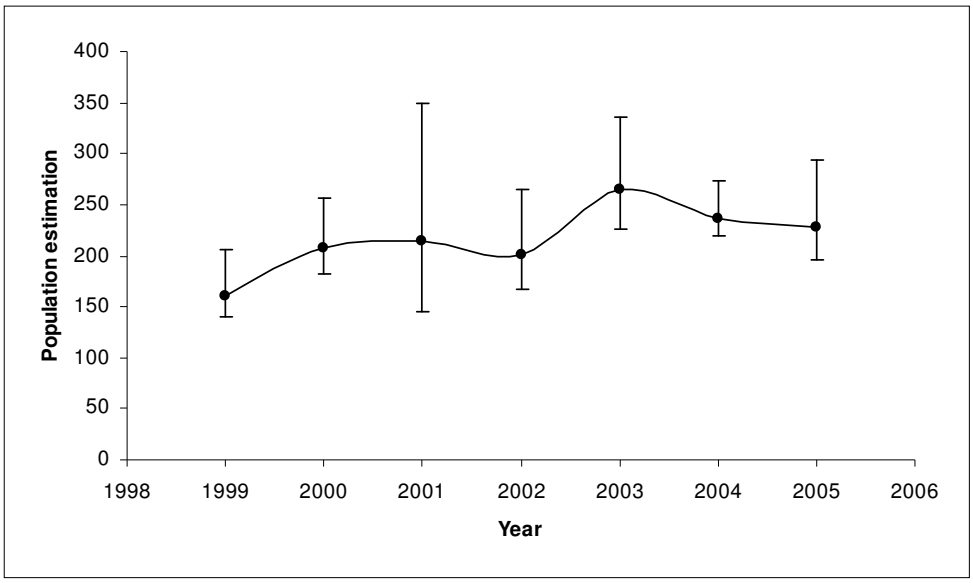


Figure 22 - Population estimation with 95% of confidential interval of long finned pilot whales in the Strait of Gibraltar from robust design mark-recapture models. (de Stephanis 2008, Verborgh *et al*, 2009). The estimations of 1999 and 2000 were obtained from whalewatching platforms. The models indicated a growth rate of 5.5%, with very low levels of immigrations, and a survival rate of around 0.982 (Verborgh *et al.*, 2009).

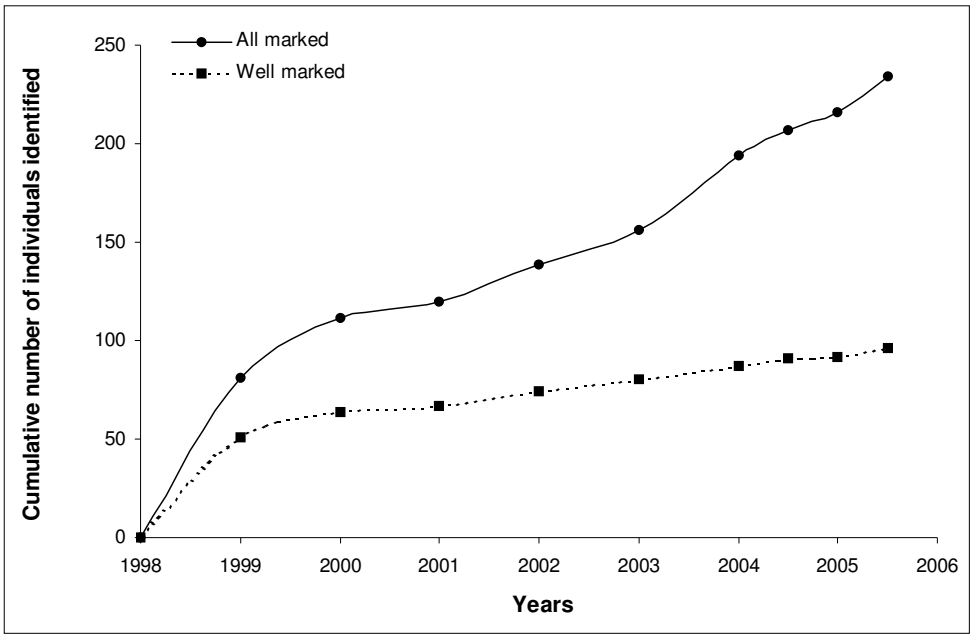


Figure 23 - Cumulative number of individuals of long finned pilot whales identified in the Strait of Gibraltar between 1998 and 2006. Note that since 2004, evaluations are also made during the winter month.

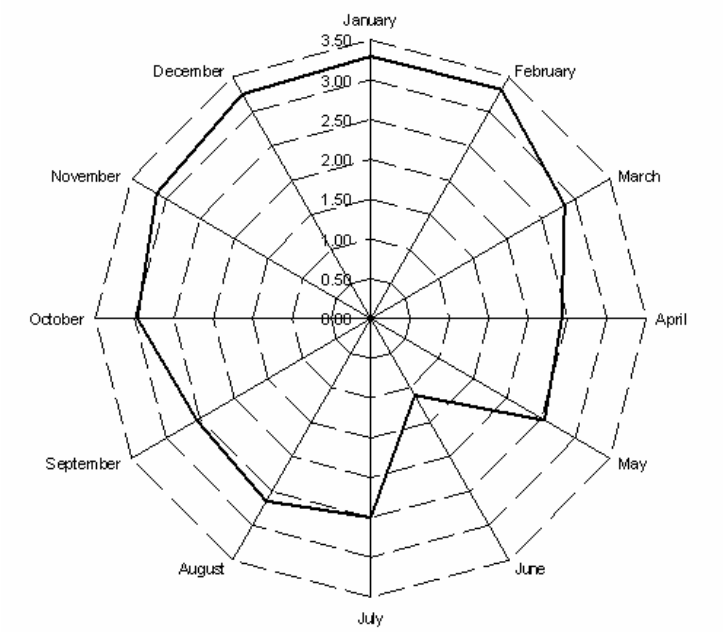


Figure 24 - Temporal distribution of Encounter rates (number of pods observed per 100km sailed) of long finned pilot whales in the Strait of Gibraltar between 1998 and 2006.

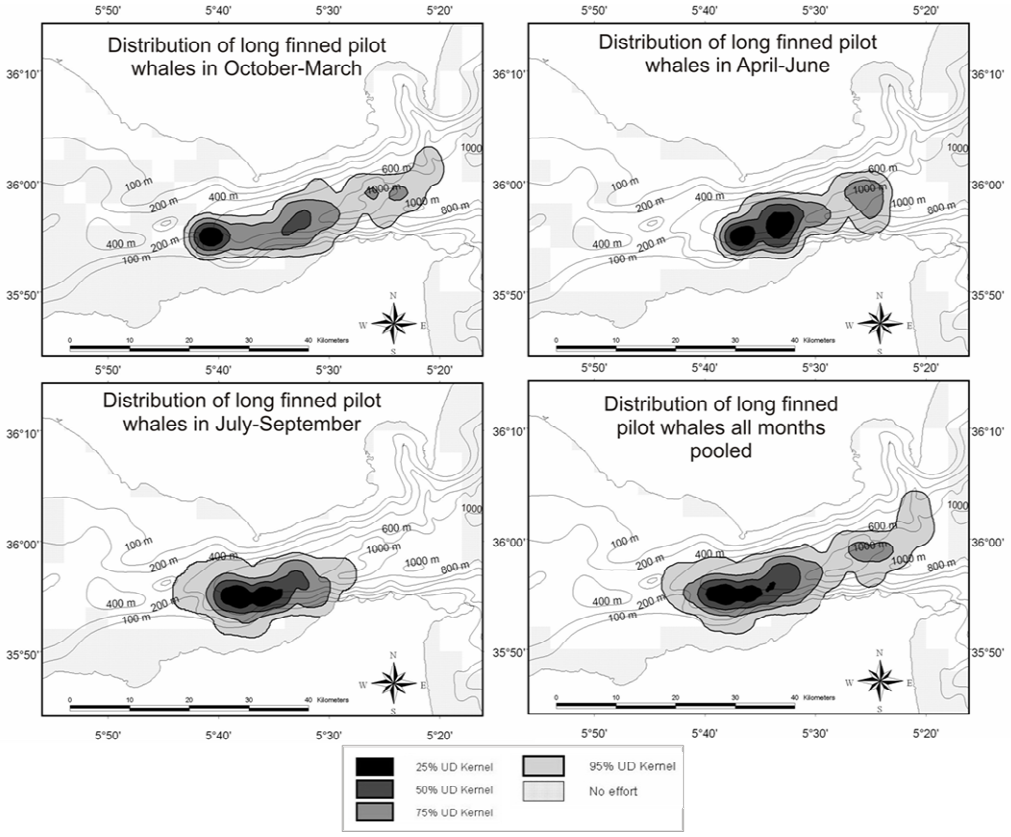


Figure 25 - Spatial distribution of the Long-finned pilot whales of the Strait of Gibraltar between 2001 and 2006.

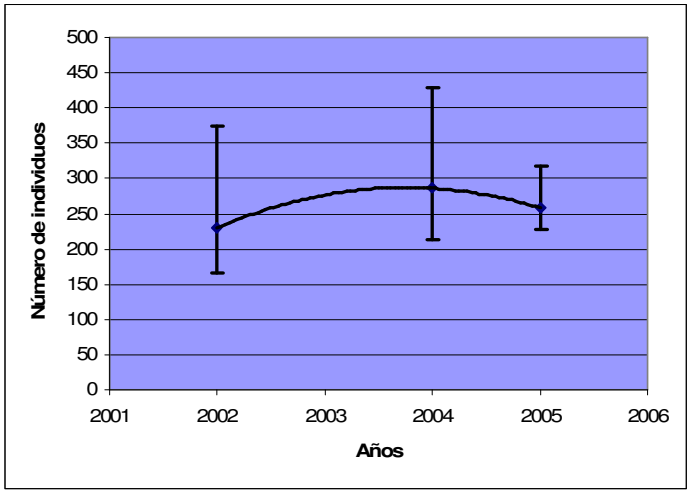


Figure 26 - Population estimation with 95% of confidential interval of bottlenose dolphins in the Strait of Gibraltar from classic mark-recapture models (Pérez, 2007)..

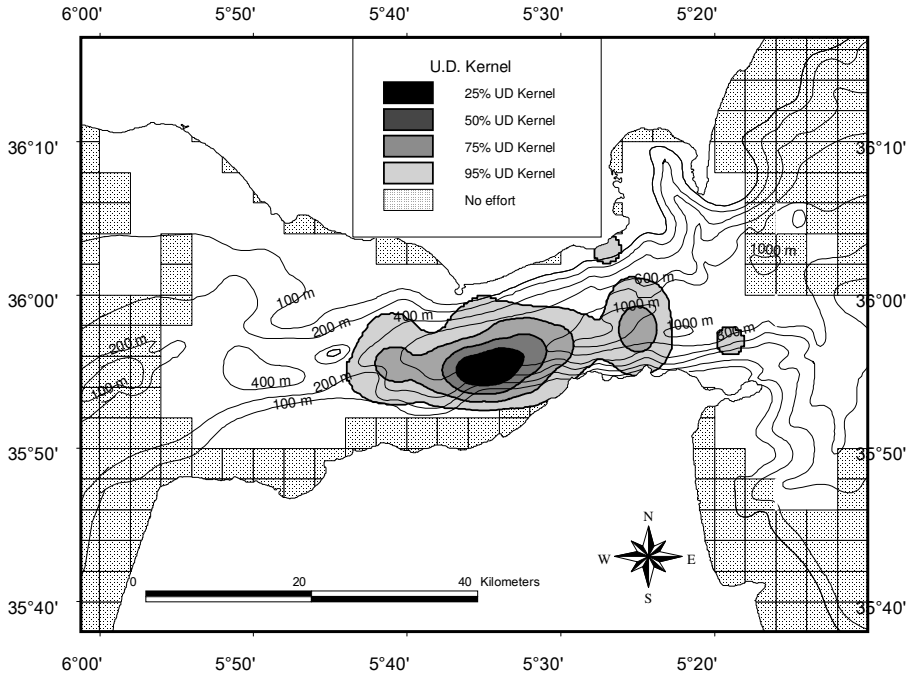


Figure 27 - Spatial distribution of bottlenose dolphins in the Strait of Gibraltar between 2001 and 2006.

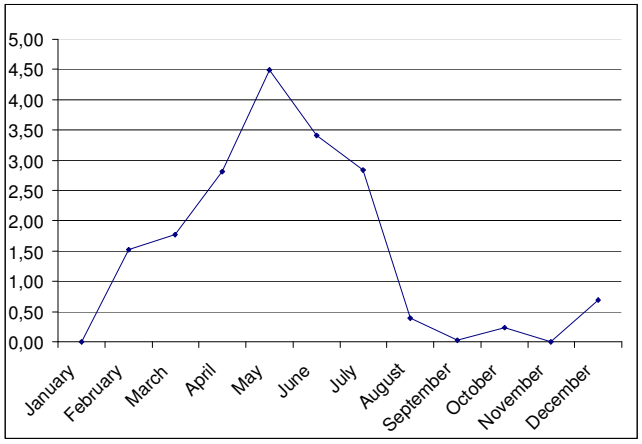


Figure 28 - Temporal distribution of encounter rates (number of individual observed / 100km sailed) of sperm whales in the Strait of Gibraltar between 1998 and 2006.

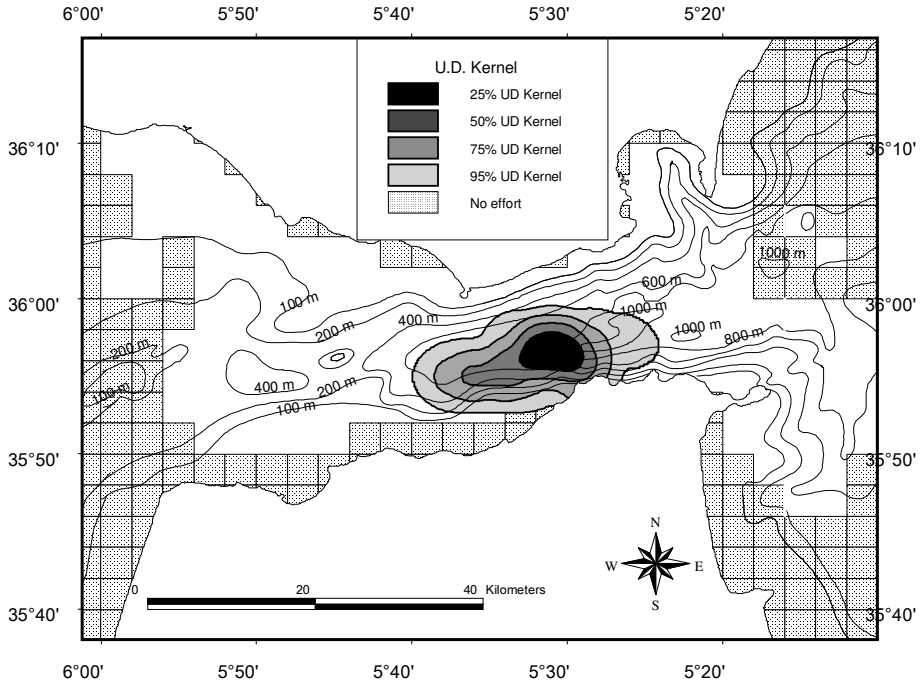


Figure 29 - Spatial distribution of sperm whales in the Strait of Gibraltar between 2001 and 2006.

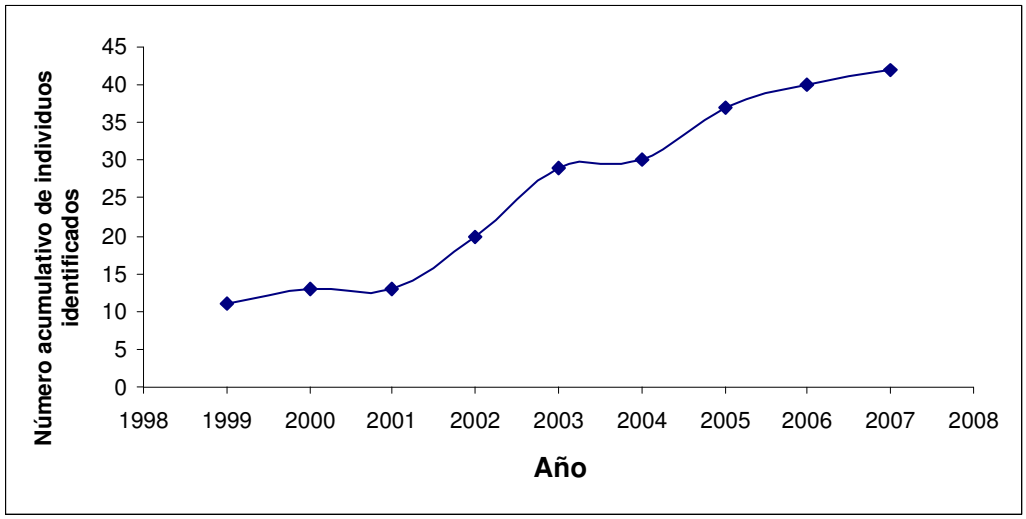


Figure 30 - Cumulative number of individuals of killer whales identified in the Strait of Gibraltar between 1998 and 2007 (Esteban, 2008)..

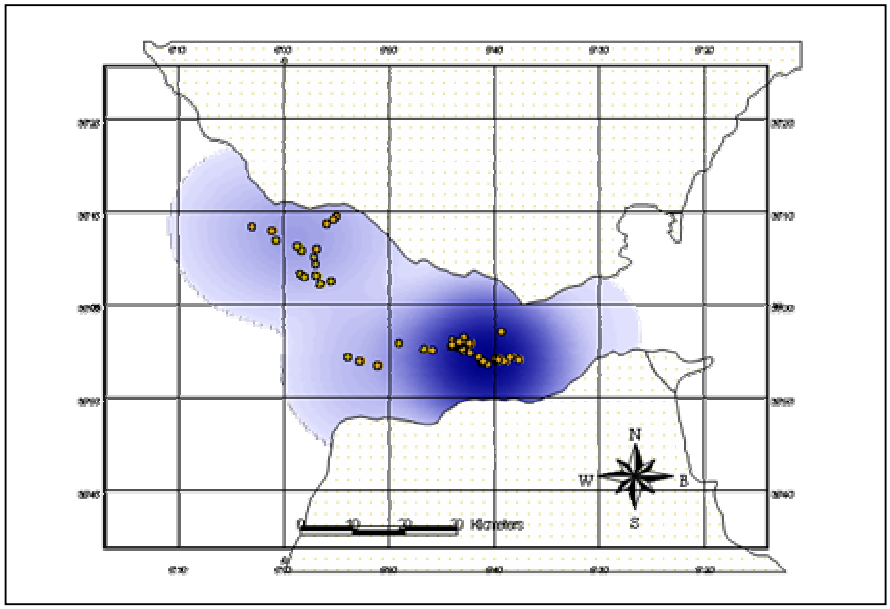


Figure 31 - Spatial distribution of killer whales in the Strait of Gibraltar between 2001 and 2006.

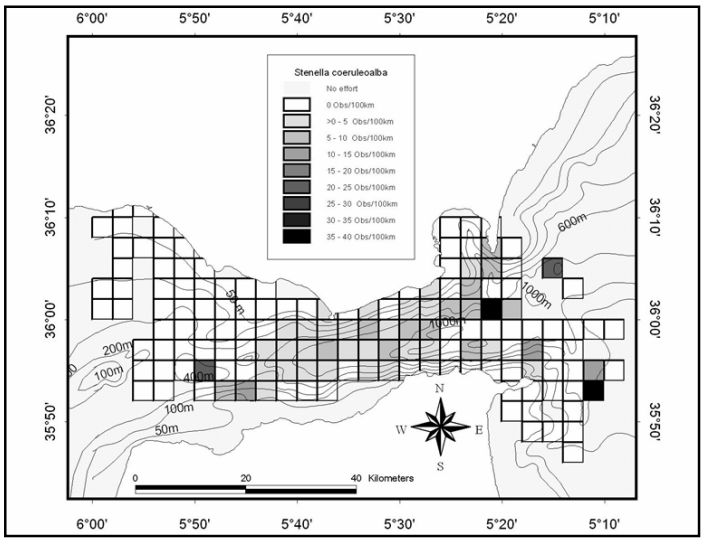


Figure 32 - Spatial distribution of striped dolphins in the Strait of Gibraltar between 2001 and 2004.

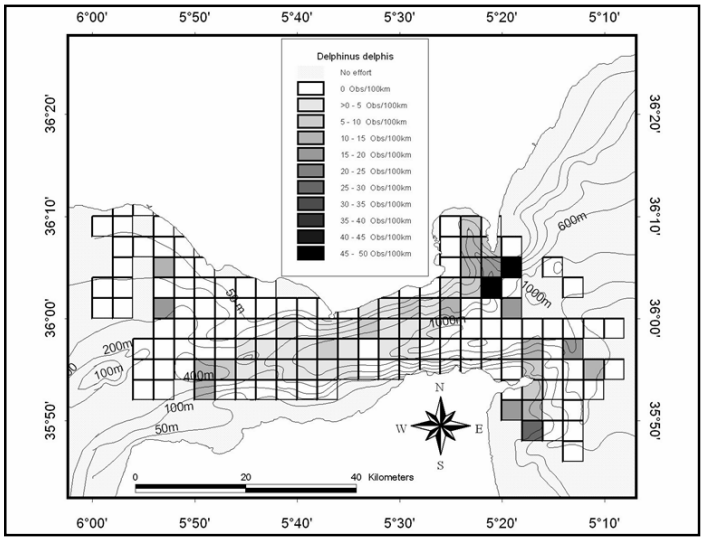


Figure 33 - Spatial distribution of common dolphins in the Strait of Gibraltar between 2001 and 2004.

Table 1 - Number and percentage of sightings, and group size (mean, standard deviation (SD) and range) of cetaceans sighted in the Archipelago of the Azores by 15 ww enterprises, 2000-2006.

Species	N.º sightings	% sightings	Group size		
			Mean	SD	Range
Balenoptera acuturostrata	6	0.08	1.30	0.45	1-2
Balaenoptera borealis	101	1.39	2.27	1.24	1-8
Balaenoptera edeni	4	0.06	2.00		2
Balaenoptera musculus	93	1.28	1.74	1.13	93
Balaenoptera physalus	166	2.29	2.51	1.95	1-13
Megaptera novaeangliae	37	0.51	1.12	0.30	1-2
Kogia breviceps	9	0.12	2.50	2.29	1-7
Physeter macrocephalus	1948	26.89	3.92	3.59	1-40
Delphinidae	25	0.35	33.53	19.92	1-100
Delphinus delphis	1631	22.54	54.84	74.49	1-1800
Globicephala spp.	182	2.51	19.81	24.00	1-300
Globicephala macrorhynchus	5	0.07	32.70	38.76	10-150
Grampus griseus	809	11.17	13.42	10.01	1-200
Orcinus orca	11	0.15	7.20	3.09	5-12
Pseudorca crassidens	62	0.86	16.12	11.90	2-50
Stenella coeruleoalba	169	2.33	50.81	48.26	2-300
Stenella frontalis	856	11.82	54.23	76.30	1-1300
Tursiops truncatus	947	13.07	27.64	36.62	1-600
Hyperoodon ampullatus	69	0.95	6.44	4.80	1-26
Mesoplodon bidens	45	0.62	5.14	4.76	1-30
Ziphiidae	36	0.50	5.67	4.86	1-15
Ziphius cavirostris	24	0.33	7.33	4.20	2-20
Total	7236				

Table 2 – Characteristics of ww vessels in Madeira archipelago.

Name	SeaBorn	SeaPleasure	ZonaCat	Nau Sta. Maria	Ventura	Gavião	Bonita da Madeira	Ribeira Brava	Cetáceos I and II
Type	Catamaran	Catamaran	Catamaran	Sailboat	Sailboat	Sailboat	Sailboat	Fishing boat	Inflatable boats
Lenght (m)	22,86	19,50	18,15	22,30	14,70	13,10	20,70	12,00	8,50
Wide (m)	10,50	10,00	9,07	7,00	4,20	3,66	6,20	4,00	2,95
Capacity (nr. people)	100	70	40	100	18	20	46	20	12
Nr. Engines	2	2	2	1	1	1	1	1	2
Engines' characteristics	170HP inboards	62HP inboards	62HP inboards	455HP inboard	83HP inboard	140HP inboard	355HP inboard	211HP inboard	150HP outboards
Date of construction	2004	2004	n.d.	1998	1965	1997	1996	1964	2007
Beginning of activity	2004	2004	2004	2001	2003	2003	2003	2004	2007

Table 3 - Whalewatching visitor and direct revenue evolution in the Canary Islands (1991-2008).

Year	**No. of whale watchers**	**Revenues per ticket selling only**	**Reference**
1991	40,000	$ 1,144,000 (3)	Hoyt, 1995
1994	250,000-600,000	$ 7,150,000 (4)	Hoyt, 1995
1995	500,000	9,015,082 €	Urquiola, 1996
1996	700,000	12,020,242 €	Montero and Arechavaleta, 1997
1997	1,000,000	12,022,626 €	Urquiola *et al.* 2000
1998	-------	16,227,326 € (5)	Brito *et al.* 2000
2001	437,6846 (6)	12,755,379 €	Elejabeitia *et al.*, 2002
2002	394,3885 (6)	11,958,305 €	Elejabeitia *et al.*, 2002
2003	475,5855 (6)	16,578,036 €	Elejabeitia *et al.*, 2004
2008	625,000	19,800,000 €	Present report

(3) 925,725 € at an 1991 USD-ECU average exchange rate of 0.809
(4) 6,041,750 € at an 1994 USD-ECU average exchange rate of 0.845
(5) 2,700,000,000 Pts
(6) Value for Tenerife only

Table 4 - Number of licensed boats and businesses, with passenger capacity in the Canary Islands (2008)

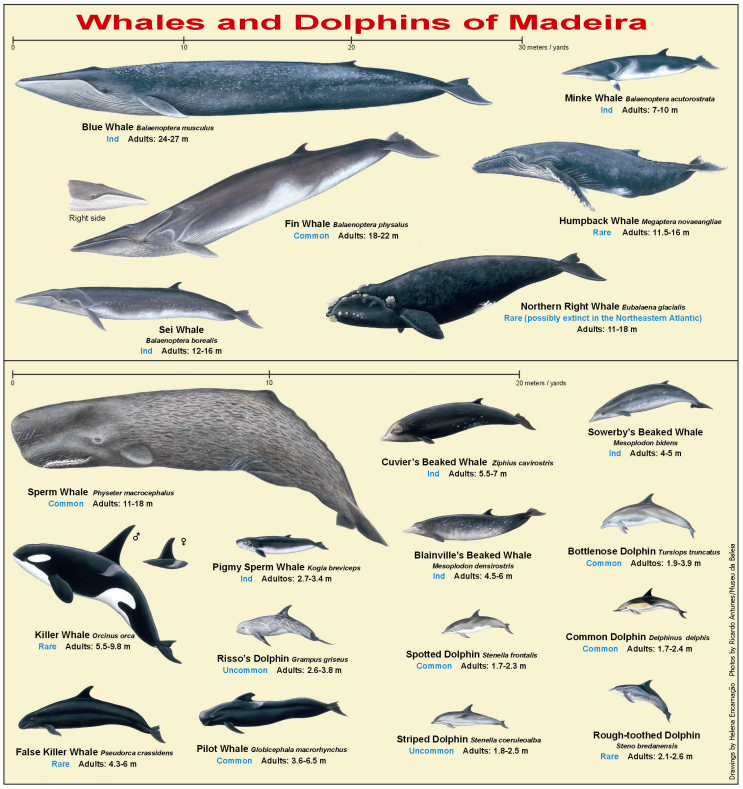
	Licensed vessels	**Licensed operator**	**Passenger capacity**
Tenerife	26	18	2,356
Puerto Colon	11	7	1,270
Los Cristianos	6	6	740
Los Gigantes	9	5	346
Gran Canaria	7	6	668
La Gomera	3	3	124
La Palma	1	1	53
Total Canary Islands	**37**	**28**	**3,201**

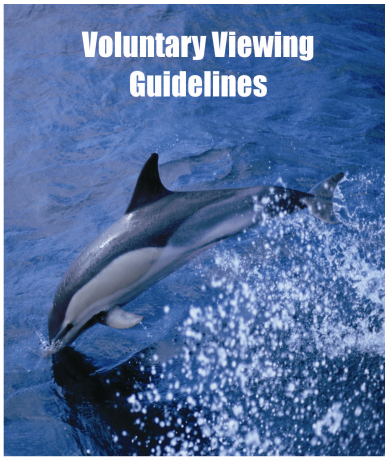
Table 5 – Number and size of ww boats in the Strait of Gibraltar area.

	Tarifa	Gibraltar
<10m	5	3
<20m	3	2

APPENDIX I

WHALEWATCHING CODE OF CONDUCT PROPOSED BY THE WHALE MUSEUM (MADEIRA)





Your Guide to Watching Whales and Dolphins

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WHY DO WE NEED GUIDELINES

Seeing whales and dolphins in their natural environment can be a thrilling experience both for adults and children. In our excitement, we sometimes forget that our presence has an effect on the animals. Despite their apparent playful and friendly behaviour, whales and dolphins can be sometimes under stress. When we get too close, approach too fast, or make too much noise we may cause the animals unnecessary disturbance, which can interrupt their ability to perform critical functions such as feeding, breeding, nursing, resting and socialising.

Disturbing whales and dolphins can result in temporary effects with little importance, such as the momentaneous change in their behaviour or in more negative long term impacts such as the temporary or permanent abandon of an area or the increasing on the population mortality.

The impact of the whale and dolphin watching can be minimised by adopting the guidelines presented here, resulting in benefits both to animals, boat companies and tourists.

VIEWING GUIDELINES

- When approaching a group, avoid noises and abrupt movements of the boat that can startle and stress the animals
- Avoid making any abrupt changes in speed or course
- Always approach and depart animals from the side, sightly behind them, moving in a direction parallel to the direction of the animals. Never approach from the front
- Never separate a group or isolate a calf
- Never follow a group that avoids the boat
- Be aware of the presence of other animals besides the ones initially observed

APPROACHING LIMITS

500 m / yards

- Reduce speed to less than 10 knots

400 m / yards

- Reduce speed to less than 4 knots

100 m / yards

- No-go zone when in the presence of groups with calves or groups socialising, resting or feeding
- No-go zone for sailing boats (without engine running)

50 m / yards

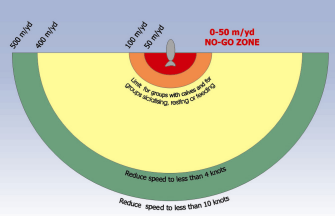
NO-GO ZONE

If whales or dolphins approach your vessel at less than 50m/yd, put your engine in neutral and allow animals to pass.

Special case for bow riding dolphins: maintain your course and speed until they leave the boat.

Limit your time engaged in viewing to a maximum of 30 minutes

Be sensitive to the presence of other vessels. If two or more boats are present this time must be shared by them



HOW TO RECOGNISE DISTURBANCE

Whales and Dolphins in general

- Rapid changes in swimming direction or speed
- Escape tactics such as prolonged diving, underwater course changes or rapid swimming away from your location at the surface
- Forceful slapping of the tail against the surface of the water
- Female attempting to shield a calf with her body or by her movements
- Sudden stop in feeding or resting activities after your arrival

Sperm whales in social/resting behaviour*

- Sudden dive of all group, with fluke-up

Sperm whales in feeding behaviour**

- Short dives, without fluke-up

Cautiously move away from behind the animals if you observe any of these behaviours

NOTE:
* When socialising, sperm whales form close clusters of 4-40 whales and stay at or near the surface for periods of 20min-12hr. Behavior is varied, ranging from all whales lying still and very close to one another at the surface, to active socialising characterised by rolling, touching, spy-hopping and breaching

** When feeding, sperm whales dive for about 35-55min and stay at the surface for a period of about 10min. During the surface period the whale generally moves steadily, does not turn or suddenly accelerate, blows regularly and continually breaks the surface. The surface period ends with a deliberate fluke-up to dive into deep water

This leaflet was produced by the "Project for the Conservation of Cetaceans in Madeira".

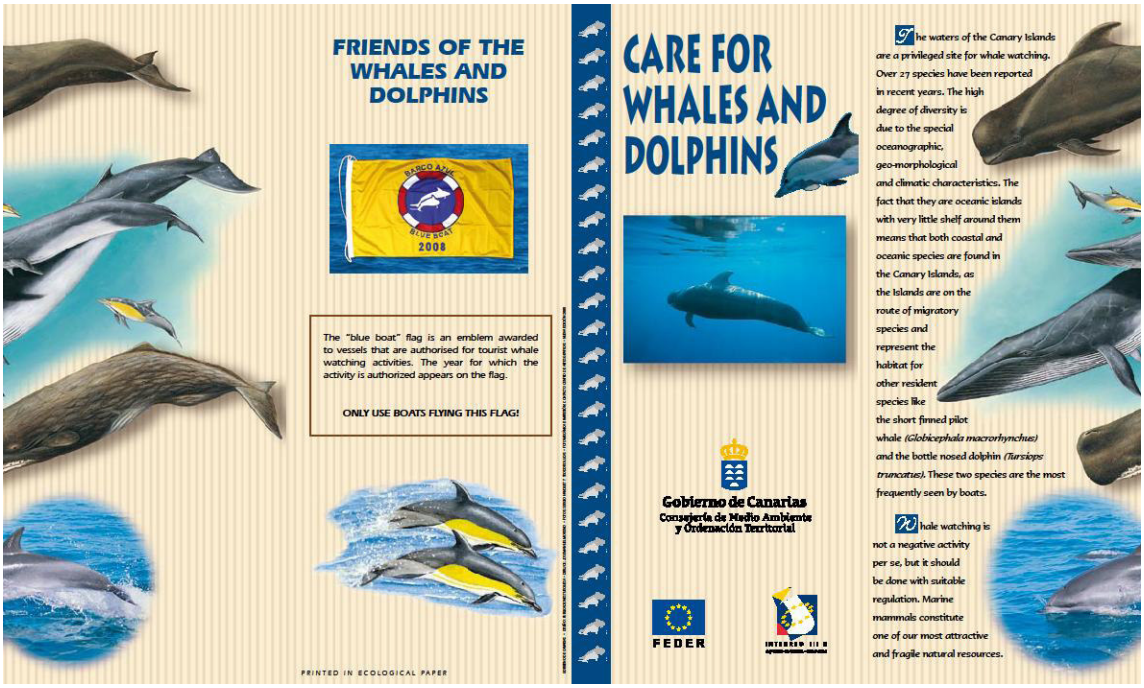
The implementation of this volunteer whale and dolphin viewing guidelines depends on the interest of boat companies in developing a sustainable activity, which protects wildlife.

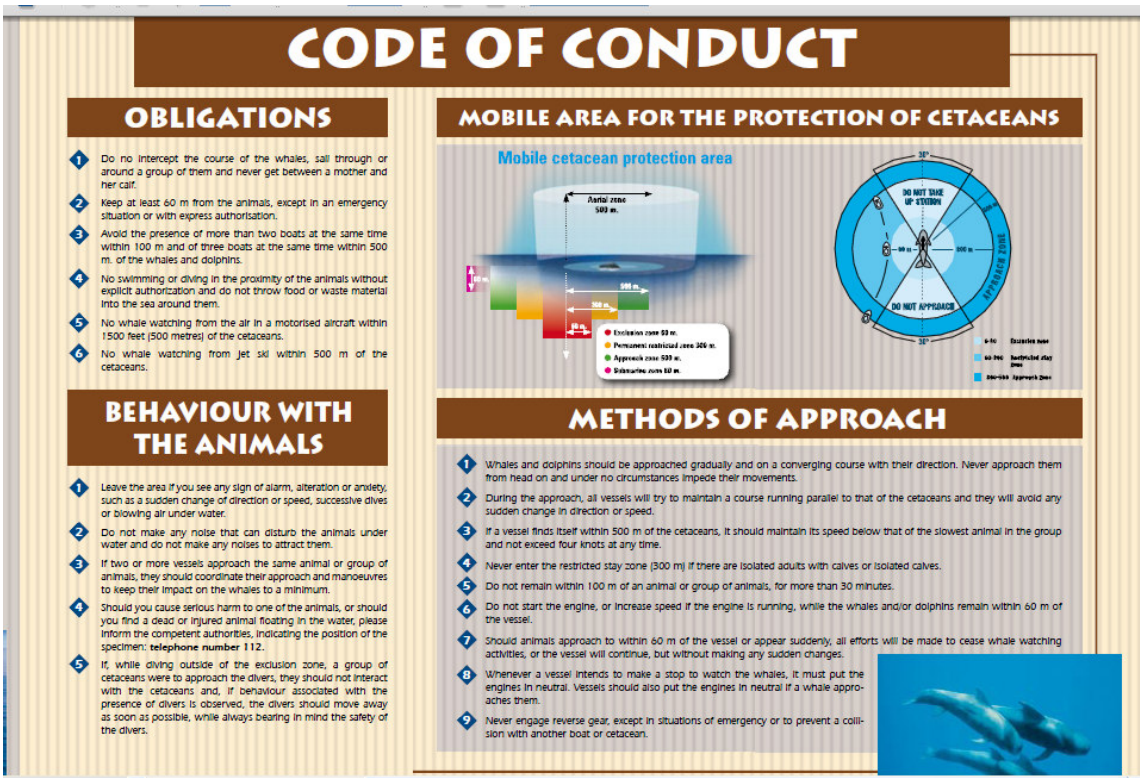
Boats operating with this logo respect the guidelines presented here.

EU RESPEITO AS BALEIAS E GOLFINHOS

APPENDIX III

WHALEWATCHING CODE OF CONDUCT IN FORCE IN THE CANARY ISLANDS





APPENDIX III

CONTENT OF THE IMPACT STUDY REQUIRED BY REGIONAL WHALEWATCHING REGULATION IN THE CANARY ISLANDS

Vessel characteristics: length, width, year of construction, materials, engines, registration, etc.

Natural resources used or consumed: affected species, maritime routes carried out (with cartographic appendix), description of the different routes, frequency and duration of the excursions, characteristics of the excursions, timetables, seasons, etc.

Release of substances, energy or noise to the environment (including prevention measures):

- Waste generated (bilge water and/or waste waters): average volume of waste generated, provision of storage system of bilge water and /or waste waters, solid waste and collection system.
- Noise emission:
- Acoustic analysis of motor noise emissions in air and in water (noise study for engines running at tick-over and at 1,000 rpm (preferably) at 10 m. and at 60 m. to port, starboard, bow and stern). Existence and description of sound insulation system used. Mechanisms used to minimise unnecessary noise (banging of metallic objects, screeching, etc)?
- Engine technical data (cylinder capacity, revolutions, fuel type used, etc.)
- Use of propellers screws to minimise cavitations?
- Emission of toxic substances: Type of anti-fouling used, emission of exhaust gases to the air.

Habitats and specific natural elements

- Protected species of flora and fauna**.** Protected species of flora and fauna in the area covered during the activity (name of the species, category of protection, type of interaction)
- Effect on Protected Natural Spaces and Sensitive Ecological Areas.

Other considerations of interest

Is there equipment available to avoid possible collisions with cetaceans and to facilitate compliance with current legislation (telemeter, binoculars)?

Is there equipment available to carry out eventual collaboration tasks for the research of cetaceans and other species (GPS, video camera, photographic camera, and marker buoys for injured or dead animals)?

Collaboration activities with research and environmental education

Ecological Impact Assessment

The overall impact is considered as: Not significant; Only Slightly Significant; Significant; Very Significant.