

Model for a Marine Protected Area designed for sustainable Whale Watching Tourism off the oceanic Island of La Gomera (Canary Islands)



A report by M.E.E.R.e.V.



Model for a Marine Protected Area
designed for sustainable Whale Watching Tourism
off the oceanic Island of La Gomera (Canary Islands)



A report by M.E.E.R.e.V.

Author:

Dipl.-Biol. Fabian Ritter

M.E.E.R. e.V.
Bundesallee 123
D-12161 Berlin
Germany
info@m-e-e-r.de

Copyright:

M.E.E.R. e.V. – 2012
www.m-e-e-r.org

Cover photo: Ursula Tscherter, ORES



This report has been produced on the basis of almost 15 years of cetacean research off the Canary Island of La Gomera (Canary Islands, Spain). A framework for a marine protected area in the waters off this island will be laid out. It will be justified - on the ground of what is known about cetacean biology and ecology off La Gomera - why a comprehensive concept is needed for marine conservation and how it should look like. The layout of the proposed management measures thereby is based upon the experiences of many years of best practice established through the close collaboration between an NGO and local whale watching operators.

The research methods and contents can be seen at the association's website at <http://m-e-e-r.de/index.php?id=221&L=2>

Much of the scientific data has been published and/or presented at conferences, workshops and other fora. M.E.E.R.'s scientific publications can be found at <http://m-e-e-r.de/index.php?id=166&L=2>

We hope this document will contribute to the process of designating effectively managed marine protected areas within the European Union and elsewhere.

Contents

Abstract	6
1 - INTRODUCTION	7
2 - LA GOMERA, A CETACEAN BIODIVERSITY HOTSPOT	9
3 - BASIC PRINCIPLES OF THE PROPOSED MPA	11
Conservation Criteria	12
Location and Size	13
Ecosystem Approach	14
Management	15
a) Management regime & management plan.....	15
b) Conservation objectives.....	16
c) Stakeholder participation.....	17
d) Enforcement.....	17
5 - RECOMMENDED MEASURES WITHIN THE MPA	19
Legal Framework	19
Regulation of User Groups.....	19
a) Local fisheries (extractive use)	19
b) Big game fishery (extractive use)	20
c) Marine traffic including Ferry lines (non-extractive use)	20
d) Leisure craft: recreational use, sailors and whale watchers (non-extractive use) .	20
e) Motorised sea-going fun sports (non-extractive use)	21
f) Tourism planners (alteration)	21
Local Involvement	21
Public Education	22
Whale Watching: Trip Design & Code of Conduct.....	23
Monitoring & Scientific Research	25
Financing	27
5 - CONCLUDING COMMENTS.....	27
References	29
ANNEX: Summary of recommendations made in this report.....	35

ABSTRACT

La Gomera (Canary Islands, Spain) is home to an extraordinarily high cetacean species diversity. However, the protection status of cetaceans in the Canary Islands is limited and mainly determined through the SAC provision of the European Union Habitats Directive, which refers to two species in relation to practical conservation. All other cetaceans are included in the Canary Islands Catalogue of Protected Species, but it remains unclear what that protection entails. At the same time, anthropogenic threats ranging from, habitat degradation, ship strikes and disturbance through whale watching tourism are increasing steadily. In 2008, more than 600,000 tourists went to see cetaceans in the Canaries, while most of this tourism branch is centred on the island of Tenerife where a "Marine Park for Cetaceans" has been established. But again it remains unclear to what extent such a park contributes to marine conservation in the area. Here, a Marine Protected Area is proposed and laid out for La Gomera, Tenerife's neighbouring island, where cetacean tourism is still at a low level. This MPA is especially designed for the long-term development of whale watching tourism and other uses in a sustainable way. Such a new MPA at La Gomera could provide a useful comparative model that might inform management practices in Tenerife and other high volume areas. "Sustainable" thereby means to achieve a long standing equilibrium between the development of whale watching tourism and the maintenance of healthy cetacean populations and their marine environment. The proposed management measures are based upon the experience of many years of best practice established through the close collaboration between an NGO and local whale watching operators. Although specially designed for the waters off La Gomera, this model can serve as a blueprint for other areas as well.

KEYWORDS:

CETACEANS, CANARY ISLANDS, MARINE PROTECTED AREAS, CONSERVATION, MANAGEMENT



1 - INTRODUCTION

Marine protected areas (MPA) are widely acknowledged as a necessary tool for the protection of the marine and coastal environment. MPAs are defined by the IUCN as "any area of intertidal or sub-tidal terrain, together with its overlying water and associated flora, fauna, historical and cultural features, which has been reserved by law or other effective means to protect part or all of the enclosed environment" (Kelleher, 1999). Thus, the concept of marine protected areas is to regulate human activities with the purpose of conserving the area's natural resources (see Salm *et al.*, 2000). During the past decades, whale watching has become a worldwide industry (see Hoyt, 2001; O'Connor *et al.*, 2009), with increasing pressure on cetacean populations observed in a number of areas (IWC, 2006). A reconciliation of economic growth and cetacean conservation appears necessary (IWC, 2010). Within a greater perspective, "the establishment of a global system of marine protected areas is a key means of conserving the marine environment for its intrinsic values and its contribution to sustainable utilisation." (Kelleher & Kenchington, 1992; p.8).

Any MPA is designed for a specific and sometimes a quite limited area and purpose. There neither exists the perfect regulatory concept, nor the perfect procedure to establish an MPA. On the contrary, there may be as many such frameworks as there are MPAs. Although marine protected areas have become more and more popular during the last decades, with most of the worldwide existing MPAs established in the past 10-15 years, the issue of protected areas *for cetaceans* is still under development in the scientific community and on political levels (see Evans & Urquiola Pascual, 1999). Hence, the number of MPAs specifically addressing the conservation of cetaceans – examples are the *Pelagos Cetacean Sanctuary* in the Mediterranean Sea, the *Hawaiian Island Humpback Whale National Marine Sanctuary* or the *Stellwagen Bank NMS* in the USA – is still low, although this realm is growing and has expanded rapidly during the past years (Hoyt, 2011).

The IUCN has established guidelines for the designation of MPAs around the world (Kelleher & Kenchington, 1992; Hoyt 2011). Also, there are numerous international conventions and agreements which have incorporated the concept of MPAs, e.g. chapter 17 of the *Agenda 21*, (UN Conference on Environment and Development UNCED, Rio 1992); the *European Habitats Directive* (1992); the *Oslo and Paris Convention OSPA* (1992); the *World Coast Conference* (1993); the *UN Convention on the Law of the Sea UNCLOS* (1994); the *Convention on Biological Diversity* (CBD) and its *Jakarta Mandate* (1995), and others (see Garrod *et al.*, 2001; overviews given in Urquiola Pascual & Evans, 1999 and Salm *et al.*, 2000; Hoyt, 2011). Chapter 17 of the *Agenda 21* calls coastal states to undertake "measures to maintain biological diversity and productivity of marine species under national jurisdiction, ncluding establishment and management of protected areas".

On a European level, the *Habitats Directive* (Council Directive 92/43/EEC, also known as *Natura 2000 Programme*) is a valuable tool to enhance the establishment of MPAs within EU member countries (but see Proelss *et al.*, 2011 for some difficulties arising through the conflict with the European Common Fisheries Policy). In December 2001, the Macaronesian biogeographical region (encompassing the Azores, Madeira and the Canary Islands) was the first region where the European Union adopted the proposed list of "*Special areas of conservation*" (SAC) for (European Commission, 2002). Under *Natura 2000* (the "common" name of the Programme), Spain is currently obliged to transform proposed SACs to national legislation in order to create an effective protection status. Spain has set aside 47 marine

areas as SAC under this directive (García, 1999). These include several marine zones in the Canaries recognized as core habitats of the bottlenose dolphin (*Tursiops truncatus*) and the loggerhead turtle (*Caretta caretta*), two species listed in the related Species List of the Directive. These areas are found off the southwest coasts of Tenerife, Gran Canaria and La Gomera. On the basis of early findings on bottlenose dolphins, Martin & Carrillo (2001) had already proposed a protected area in the entire South off La Gomera many years ago. Also, in the 1990s a “Canary Island Cetacean Marine Sanctuary” had been proposed (Hoyt, 2010).

Recently, the establishment of a Biosphere Reserve on La Gomera has been proposed, and the process of preparing a proposal is currently ongoing. This proposal also foresees the creation of marine protected areas in the waters around the island (Asociación Insular de Desarrollo Rural de La Gomera, 2011).

Here, a framework for a marine protected area in the waters off La Gomera will be laid out. In this way, the process of establishing a management regime for the SAC Southwest of the island (SAC No. ES7020123: “*Franja marina Santiago-Valle Gran Rey*”, see Map 1) shall be complemented and enhanced by the recommendations made in this paper. This SAC comprises a greater part of the waters in the Southwest of La Gomera and reaches a distance of up to 7.13 km (3.85 nm) from the coastline making up for 12,517 hectares (European Commission, 2002). It will be justified - on the ground of what is known about cetacean biology and ecology off La Gomera - why a more comprehensive concept is needed for marine conservation and how it would look like. The layout of the proposed management measures thereby is based upon the experiences of many years of best practice established through the close collaboration between an NGO and a local whale watching operator.

In doing so, we will look in detail at how tourist activities, above all whale watching activities, are compatible with the proposed management regime. Whale watching has become a tourism attraction worldwide and sometimes is conceived as a consumptive use of cetaceans, because negative impacts on individuals as well as populations have been well documented. Whale watching vessels are known to directly disturb, even injure animals, and increased cetacean watching tourism may interfere with cetacean behaviour as well as their acoustic communication and foraging habits. These short term effects can lead to long term consequences, such as animals leaving (critical) habitats or a decrease in reproduction of distinct populations (see overviews over recent whale watching research given in Scarpaci *et al.*, 2008, 2009a,b; Parsons & Scarpaci, 2010). Relative to this, it always has to be kept in mind that whale watching tourism is but one of a variety of threats in many areas where it is taking place - 108 countries per 2008 (O’Connor *et al.*, 2009). Also, to put criticism of whale watching into perspective, this type of tourism constitutes a comparatively minor threat compared to bycatch, and some of the more common lethal threats.

However, if properly managed, tourism can be compatible with conservation (Salm *et al.*, 2000). We want to show, how such a reconciliation of ecological and economic development can be set up in a defined area. After all, “conservation benefits in the ocean are likely to depend on a greater vision on the part of scientists and policy makers” (Hooker & Gerber, 2004, p.38).

2 - LA GOMERA: A CETACEAN BIODIVERSITY HOTSPOT

The waters off La Gomera (17°15'W-17°21'W and 28°1'N-28°14'N) are known for an extraordinarily high number of cetacean species (Ritter, 2003). 23 cetacean species have been documented (Ritter *et al.*, 2011). Thus, a regularly surveyed area of approximately 100 nm² south and southwest of the island comprises one of the highest species diversities in Europe. These waters are inhabited predominantly by small and medium sized toothed whales such as delphinids, short-finned pilot whales, beaked whales and others. Also, a variety of baleen whale species has been sighted, some regularly (Ritter, 2003; Ritter & Neumann, 2006; Ritter *et al.*, 2011).

Many cetaceans are present year-round. Others appear seasonally or during certain years while they are virtually absent during others. Several populations were found to be resident (Heimlich-Boran, 1993; André, 1998, Ritter, 2003; Mayr, 2004). For many species, these waters appear to be at least part of their critical habitat for rearing young (due to the regular presence of offspring including newborns), for feeding (due to a variety of feeding behaviours observed), or resting (Ritter, 2003; Ritter, 2007). The multispecies character of this area leads to a substantial overlap of distribution patterns and, as a result, frequent aggregations of different species, while at the same there is evidence of habitat partitioning (Smit *et al.*, 2011).

Tourism and tourism related activities are on the rise and affect the cetaceans' habitat. New harbours have been constructed in the two main communities along the south coast of the island. Waste water runoff and plastic debris pollution are "everyday" problems that likely will increase. Long-term observations off La Gomera have shown a significant decrease in bottlenose dolphin and rough-toothed dolphin sighting numbers (Ritter *et al.*, 2011), the only two species frequently seen in coastal waters, where pollution as well as disturbance through human activities presumably are highest.

Another serious threat to cetaceans in the Canary Islands is the extensive, high speed ferry traffic in the archipelago (Ritter, 2010), covering by far the largest part of (mainly tourist, but also domestic) inter-island traffic. Almost 60 cetaceans are known to have been killed from 1991 to 2008 by ships, and some of them were found stranded or floating off La Gomera (Carrillo & Ritter, 2010; IWC, 2010). Finally, the establishment of aquaculture is foreseen (Gobierno de Canarias, 2008) which has had severe effects on bottlenose dolphins off Tenerife (V. Böhlke, *pers. comm.*, see also Lopez & Marino, 2011).

In light of the status of several species classified as vulnerable or endangered according to the *Canary Island Catalogue of Protected Species*, it appears mandatory to apply the precautionary approach. After all, the precautionary approach as a management option is now well defined and enshrined in practice and recognized as a management prescription. An integrated MPA also appears to be a necessary approach to minimise effects of accumulating (and interacting) threats in the future.

But why establish an MPA as a completion to already existing "conventional" measures, e.g. fisheries and navigation regulations? One has to consider the big picture here. While cetaceans can be protected by conventional measures, this would probably lead to a conglomerate of actions, with a variety of responsible agencies and would potentially be very difficult to co-ordinate (see Hooker *et al.*, 2011).

To the contrary, by establishing an MPA in critical cetacean habitat it will be possible to address specific threats with measures that cannot be extended everywhere. If the management of measures lies in the hands of a dedicated body (see below), then the effectiveness of management will increase hugely. Furthermore, the “idealistic” effect on the public is a great advantage of an MPA not to be underestimated. In this way, the MPA can give a public face to the measures, and provide an umbrella approach that helps integrate measures under different management regimes (tourism, fisheries, marine traffic, etc.).

Map 2. Special Areas of Conservation (SAC, blue) in the Canary Islands (after Böhlke, 2007)

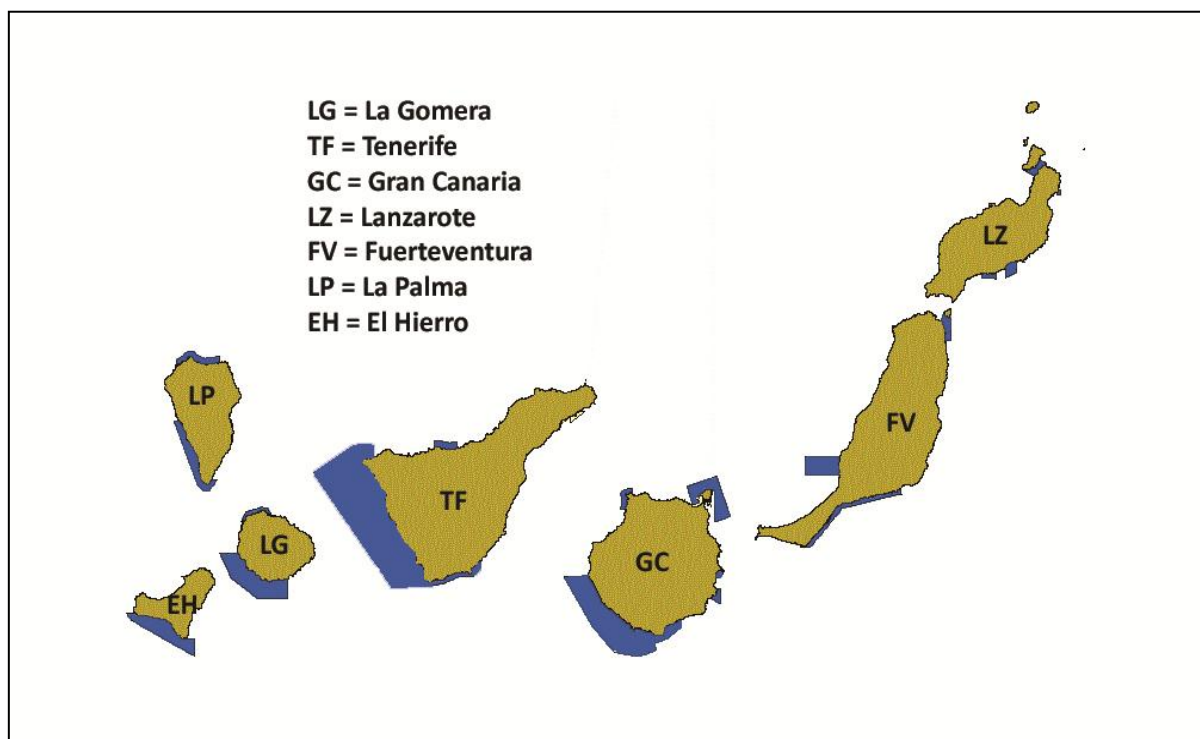


Table 1: Cetacean species' status in the Canary Islands according to the Canary Islands Regional Catalogue (2001 vs. 2010), IUCN Red List and occurrence off La Gomera

SPECIES	CATEGORY 2001 ¹⁾	CATEGORY 2010 ¹⁾	IUCN RED LIST STATUS (2008) ²⁾	OCCURENCE OFF LA GOMERA ³⁾
Blue whale (<i>Balaenoptera musculus</i>)	in danger of extinction	vulnerable / special protection*	endangered	very rare
Sei whale (<i>Balaenoptera borealis</i>)	in danger of extinction	vulnerable / special protection*	endangered	regular
Fin whale (<i>Balaenoptera physalus</i>)	in danger of extinction	vulnerable / special protection*	endangered	rare
(Common) minke whale (<i>Balaenoptera acutorostrata</i>)	vulnerable	vulnerable / special protection*	least concern	very rare
North-Atlantic right whale (<i>Eubalaena glacialis</i>)	in danger of extinction	in danger of extinction / special protection*	endangered	very rare
Humpback whale (<i>Megaptera novaeangliae</i>)	of special interest	of special interest	least concern	very rare
Sperm whale (<i>Physeter macrocephalus</i>)	vulnerable	vulnerable	vulnerable	regular
Short-finned pilot whale (<i>Globicephala macrorhynchus</i>)	vulnerable	vulnerable / special protection	data deficient	resident
Common bottlenose dolphin (<i>Tursiops truncatus</i>)	vulnerable	vulnerable / special protection	least concern	resident
Risso's dolphin (<i>Grampus griseus</i>)	vulnerable	of special interest	least concern	rare to regular
Short-beaked common dolphin (<i>Delphinus delphis</i>)	of special interest	of special interest	least concern	common
Striped dolphin (<i>Stenella coeruleoalba</i>)	of special interest	of special interest	least concern	common
Pygmy sperm whale (<i>Kogia breviceps</i>)	of special interest	of special interest	data deficient	very rare
Long-finned pilot whale (<i>Globicephala melas</i>)	of special interest	of special interest	data deficient	unknown
Orca (<i>Orcinus orca</i>)	of special interest	--	data deficient	very rare

1) Source: Gobierno de Canarias, 2001; 2010.

2) IUCN 2011. IUCN Red List of Threatened Species. Version 2011.2. <www.iucnredlist.org>. Downloaded on 20 January 2012.

3) Estimation on the basis of long-term sighting data (1995-2010) collected by M.E.E.R. e.V.

* The category "special protection" was newly introduced to the 2010 catalogue, which states that it become effective in the case of a downlisting of a species within the National Spanish Species Catalogue (the according national category is given in the first place here)



3 - BASIC PRINCIPLES OF THE PROPOSED MPA

Conservation criteria

Several criteria can be applied for the selection of an MPA. Firstly, the species and habitats to be protected constitute one criterion. Four cetacean species found off La Gomera are red-listed by IUCN as “endangered”, one as vulnerable, nine as “data deficient”, while another nine are considered to be of “least concern” (see Table 1). Moreover, the status of the local cetacean species in the archipelago is highlighted in the Canary Islands Catalogue of Endangered Species (Gobierno de Canarias, 2010). This catalogue of endangered species lists the cetacean species which occur off La Gomera in the following categories: a) in danger of extinction: North-Atlantic right whale, b) vulnerable: sei whale, blue whale, fin whale, common minke whale, short-finned pilot whale, sperm whale, common bottlenose dolphin. Moreover, five cetacean species are considered as being “of special interest”. Several species were delisted since the first establishment of this catalogue in 2001 (Gobierno de Canarias, 2001, 2010; see Table 1), but it remains unclear as to which criteria delisting took place.

Article 12 (1) (d) of the EU Habitat Directive obliges member states to prohibit “...deliberate disturbance, particularly during the life periods where the species are more sensitive to impact or where impacts have a more negative effect on their population, i.e. during breeding, rearing, hibernation and migration” (Proelss *et al.*, 2011). Many of these critical behaviours have been observed in a variety of species off La Gomera.

Criteria potentially relevant for the waters off La Gomera for the designation as an MPA hence include

- its high cetacean abundance and diversity,
- its naturalness and uniqueness,
- its importance to critical life processes (such as calving and nursing, etc., see below),
- its representativeness for a multi-species cetacean habitat,
- its presumed productivity and importance as a feeding ground,
- the regional significance for greater ecological processes and
- its vulnerability.

Besides *ecological* criteria there are several other economic and pragmatic criteria (Salm *et al.*, 2000; Reeves, 2010):

- its importance to local fisheries,
- ii) its economic value for fishing and whale watching,
- iii) its value for recreation,
- v) its value for scientific research and
- iv) the urgency of a protection status.

Based on sightings and ecological data for La Gomera, and the arguments laid out before, it can be said that these criteria also apply to the area dealt with in this report.

Location and size

Many marine megafauna species associate in such a way that large fractions of populations are aggregated (at least temporarily) in relatively small places (Williams *et al.*, 2009). Hence, another approach is to identify biodiversity hotspots that are worthy of protection (Hooker & Gerber, 2004; Hooker *et al.*, 2011). Also, “critical habitats” have become a focus within marine conservation efforts as they are often central to the survival of a given species. A definition for “critical habitat” such as that in Hoyt (2011, pp. 7-10, 34-36) as well as in Reeves (2010, pp. 62-74) is valuable because it includes not only intensively used habitats that are important for feeding, resting and reproduction but areas where cetaceans suffer impacts and where identification and protection could alleviate such pressures. Hence, conserving critical habitat holds the potential to be an effective means to secure important life processes of marine organisms while being spatially distinguishable - as long as it is backed by ecosystem based management considerations either in the framework of the MPA, MPA network within or outside the MPA but part of the management plan. Often, but not always, high species diversity hotspots (created by distributional overlap of many species) are spatially not separated from critical habitats (locations of critical importance for the survival of any particular species). This appears to be the case for cetaceans off La Gomera (and in the Canaries in general)

The leeward sides of the Canary Islands are often described as being especially favourable for cetaceans due to calm waters and oceanographic processes leading to elevated productivity (Hernandez-León, 1986; Aristegui *et al.*, 1997). For many of the species off La Gomera, these waters at least form part of their breeding, feeding and resting areas (Ritter & Brederlau, 1999; Ritter, 2002; Ritter, 2003; Mayr, 2004; Ritter & Neumann, 2006; Smit *et al.*, 2010, Ritter, unpublished data; see also Fernández *et al.*, 2009), and this similarly appears to be true for areas off other Canary Islands also. Nevertheless, only few species (if at all) are restricted to these waters but form part of larger populations. Cetaceans are highly mobile animals and therefore, delineating MPA borders is always a somewhat limited approach for animals that can easily move tens of miles per day. However, concentration on critical habitats is warranted considering that a) determining the total range of a species will need an extraordinary (and often impossible) effort, and b) only limited data is available for the archipelago at large.

As a consequence, the habitat described here must be seen in relation to other similar areas within the Canary Islands archipelago, and their connection has to be highlighted. As an example, there is strong evidence through photo-identification studies that individual bottlenose dolphins use waters of more than one island as part of their habitat indicating that there are considerable inter-island movements taking place (Tobena *et al.*, 2011).

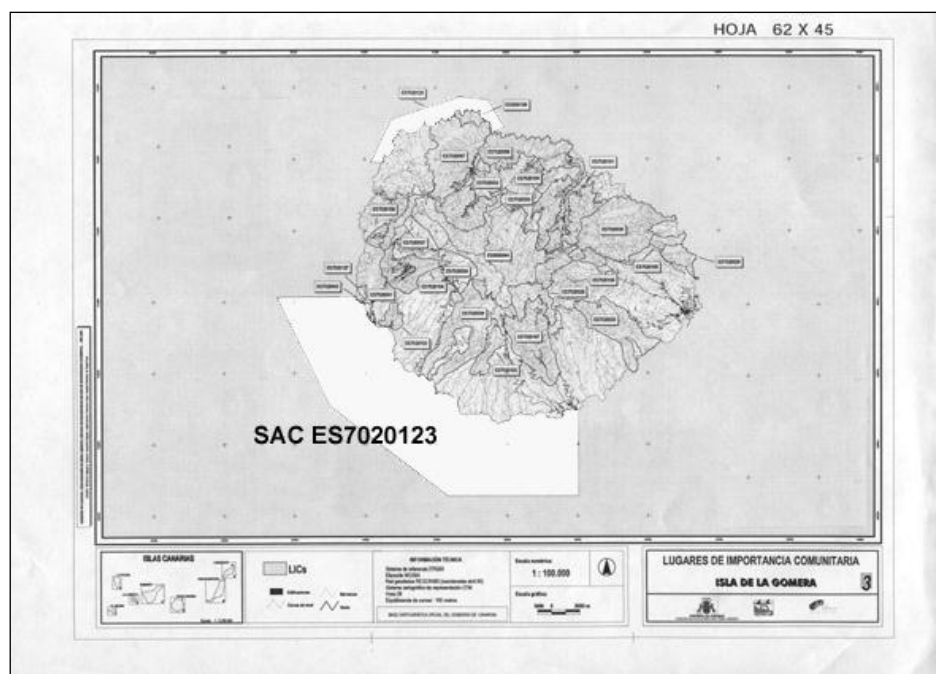
It is suggested that the value of a local MPA off La Gomera will be greatly enhanced when seen as part of a network of similar MPAs within the archipelago. All these shall be established on the lee sides of the islands as foreseen for the SACs under the Habitat Directive (see Map 2, see also below). The significance of networks of MPAs cannot be overestimated. Highly mobile animals such as cetaceans use the Canary Islands as a whole, and therefore have to be able to find protected areas with less or no human presence (and the related threats) throughout the archipelago. Cetacean habitats are literally without borders, hence it is important to ensure spatial and ecological linkages between MPAs within a network (see Reeves, 2010). After all, effectively conserving cetaceans is a must under the given legislative framework of the EU. Ideally, from an ecological standpoint the complete

waters around the Canary Islands would become a sanctuary for cetaceans (as already was proposed, see Hoyt, 2011), but given the current intense use, this appear unrealistic to date.

The dynamic nature of the marine environment is probably the greatest challenge for planners and managers of an MPA (Garrod *et al.*, 2001; Hoyt, 2011; Reeves, 2010). A long-term sighting scheme revealed strong inter-annual variability in cetacean occurrence reflecting changing environmental conditions from year to year (Ritter *et al.*, 2011). Predicting changes in the dynamics of local marine ecosystems is very difficult and managing the fluent temporal and spatial abundance of such highly mobile animals as cetaceans may be impossible. It has been suggested to apply the concept of MPAs in a more dynamic way, just as a reflection of the ever-changing character of marine ecosystems. E.g. Hyrenbach *et al.* (2000) identified different types of dynamic oceanic hotspots which are by far the most difficult to protect. Likewise, oceanic islands and their surrounding waters can be regarded as highly dynamic habitats.

The current SACs encompasses coastal waters off the Southwest of La Gomera up to a distance of 7.13 km (3.85 nm). Because there is good substantiation today about the habitat use of cetaceans within an area up to 9.26 km (5 nm) from the shoreline, (Smit *et al.*, 2010), an expansion of the area delineated by the SAC already in place (see Map 1) to a distance of 5 nautical miles offshore is warranted. In this way, it is insured that a larger part of the critical habitat of a variety of cetaceans will be protected. It has to be stressed that this is a minimum, and some experts would argue for an area an order of magnitude larger (Erich Hoyt, pers. comm.). The number given here is based on the fact that cetacean data are only available for the area within 5 miles from the shore.

Map 1. Special areas of conservation (SAC) of La Gomera (Courtesy Centro de Planificacion Ambiental, CEPLAM, Tenerife)



Ecosystem approach

In the field of marine conservation it has become prevalent to build efforts on an ecosystem based approach. Ecosystem based management (EBM) acknowledges the importance of the structure and function of whole ecosystems, and that all parts of the puzzle and their interrelation play important roles for the functioning of the whole. EBM also takes human social and cultural aspects into account (Dudley, 2008; Hoyt, 2011). In that sense, EBM is based on interdisciplinary (long-term) research that seeks to unravel the connectivity of the different ecosystem elements. Cetaceans thereby can function as umbrella species due to the fact that their position in the natural food web is high (Hooker & Gerber, 2004; Reeves, 2010). Protecting cetaceans and their environment therefore “automatically” contributes to ecosystem based conservation which is considered essential in creating MPAs for cetaceans (see Hoyt, 2011, who stated that “cetaceans provide an ecological monitor for the health of the marine environment” – p.66). It has to be noted that EBM is a more sophisticated way of the ecosystem approach and is being attempted and seen as an ideal situation.

Management

Few existing MPAs are considered effectively managed. Numerous protected areas for cetaceans are relatively small and for many no management plan is available (Hoyt, 2011). With only few MPAs successfully achieving their objectives they repeatedly have been branded as “paper parks” (WWF, 1998; Hooker & Gerber, 2004). Therefore, any efforts to establish an MPA off La Gomera (and elsewhere) should incorporate essential aspects including the setup of a management plan and a related management regime, and define concrete management objectives. Stakeholder engagement will be crucial and corresponding communication and co-ordination is considered an important feature of any management effort (Hoyt, 2011; Reeves, 2010). Finally, monitoring and enforcement measures have to be put in place so as to secure the long-term functioning of the protected area(s). These aspects will be laid out in the following paragraphs.

A) MANAGEMENT REGIME & MANAGEMENT PLAN

A management regime is to bring different uses (and user groups, see below) in line within the same area and to establish a mutual co-existence – and not to exclude each other. In the case of La Gomera the major uses to be managed are fisheries, maritime traffic, recreational use and whale watching tourism. MPAs benefit from a legal basis (WWF, 1998) and it has been recommended that each country should develop a special policy on MPAs together with a national set of criteria (Kelleher & Kenchington, 1992; Salm *et al.*, 2000). Concerning whale watching tourism, New Zealand is a good example of (relatively) effective management (Hoyt, 2001).

In many countries there are now special whale watching regulations and/or guidelines in place (Carlson, 2010; Hoyt, 2001, O'Connor *et al.*, 2009). The number of nations developing their own set of rules is increasing steadily and Spain belongs to those countries that have recently established a national legislative framework. Before that, the Canary Islands whale watching regulations were originally brought into effect in 1996 and were revised in 2000. Hence, the government is already considering the need that such regulations should be adaptive and flexible (see Herzing, 1995; Forestell, 1995; Lien, 2001; Reeves, 2010; Hooker *et al.*, 2011).

To effectively engage stakeholders as well as to impose, follow-through, control, tasks and duties, all protected areas need a management plan (WWF, 1998; Kelleher & Kenchington,

1992). One of the most important roles that managers have to play is to identify uses which have only minimal ecological costs (Hall & Donovan, 2001) and to set limits (carrying capacities) for those activities with significant ecological costs.

The temporal and spatial variation in cetacean abundance makes it a challenge to set up such a framework (Liret *et al.*, 1999) and this is also true for the MPA La Gomera (see Ritter *et al.*, 2011).

On La Gomera there exist ecological links of the marine environment to adjacent terrestrial habitats. Accordingly, under the Habitat Directive a number of adjacent protected areas on La Gomera, both marine and terrestrial, were designated. Moreover, there are also relations to other sectors like fishing, tourism and local development. MPAs ideally should be handled within an Integrated Coastal Management plan (ICM, or Integrated Coastal Zone Management ICZM, see WWF, 1998; Salm *et al.*, 2000; Hoyt, 2011; EU, 2009; Reeves, 2010) to coordinate conservation efforts on adjacent terrestrial areas (and the human activities affecting these as well as the marine environment, respectively). La Gomera in this sense can be viewed as an ideal "learning field" for managers and policy makers.

The existing network of SACs constitutes a very suitable starting point although they are based on species-oriented protection. Therefore it will be important to incorporate the ecosystem based conservation approach into this framework which also takes into account the high cetacean species diversity in the archipelago.

It is helpful to look at a system of categories for protected areas developed by the IUCN (see Table 2), where different management regimes (see Salm *et al.*, 2000) are substantiated. The situation on La Gomera is pinpointed by the enormous potential for whale watching activities and by several, partly contradicting user groups and their interests (see below). Under these circumstances it is recommended to establish an MPA of **Category IV: a habitat/species management area managed mainly for conservation through management intervention**. This category will guide the following validation concerning the "design" of the MPA.

In light of the necessity for adaptive management (see Reeves, 2010), a periodic review of the management plan is warranted.

B) CONSERVATION OBJECTIVES

The main conservation objective for the proposed MPA off La Gomera is to protect the waters south of the island from an excessive growth of whale watching tourism (see also Ritter, 2003), while at the same time also regulating other existing uses in a manner so as to guarantee sustainability and precaution.

The regulation is to be arranged as an integrated approach that acknowledges the different ecological, social and socio-economic characteristics of the area. More concretely, there are a number of threats to cetaceans which have to be addressed. These include collisions with fast moving vessels, overfishing, coastal construction, the plans to install fish farming sites around La Gomera, and others (Ritter, 2003; Carrillo & Ritter, 2011; Martin *et al.*, 2009). Although the scope of this report is not to address these threats directly, they have to be taken into account when dealing with cetacean conservation in the Canary Islands.

At the same time, MPAs should accomplish as many conservation objectives as possible and define sustainable levels for each activity (Salm *et al.*, 2000). However, this is difficult to do for tour boats (Berrow & Holmes, 1999) and the recommendations given below need to be

evaluated through research and monitoring efforts with the goal to establish sustainable use levels. Furthermore, objectives must be clear and achievable and have to be reassessed from time to time (Reeves, 2010; Hooker *et al.*, 2011). Another major challenge in MPA design is to incorporate multispecies interaction in relation to management objectives (Hooker & Gerber, 2004; Hooker *et al.*, 2011).

C) STAKEHOLDER PARTICIPATION

To gain the confidence of those involved in the process of establishing an MPA, it will be necessary to encourage all stakeholders to take part and give them a voice. It is also most important to incorporate local knowledge so that MPA design suits local realities, i.e. ensuring that the MPA functions better because of the “buy in” of their input.

Table 2. IUCN protected area categories (taken from Salm *et al.*, 2000; Hoyt, 2011)

Category	Management Regime
Category Ia	Strict Nature Reserve, protected area managed mainly for research
Category Ib	Wilderness Area, protected area managed mainly for wilderness protection
Category II	National Park, protected area managed mainly for ecosystem protection and recreation
Category III	Natural Monument or Feature – protected area mainly managed for conservation of specific natural features
Category IV	Habitat/Species Management Area: protected area managed mainly for conservation, often through management intervention
Category V	Protected Landscape/Seascape, protected area managed mainly for landscape/seascape conservation and recreation and other values
Category VI	Managed Resource Protected Area, protected area managed mainly for the sustainable use of natural ecosystems

For La Gomera the concerned parties include the Canaries Government, the local government of the island, the relevant municipalities on La Gomera, the local people, fishermen, scientists, whale watching operators, travel operators and tourism/conservation managers, NGOs and those directly employed as MPA staff.

To bring representatives of interest groups together on a regular basis before, during and after the establishment of an MPA, a centralised agency such as an advisory committee or council is strongly recommended (Salm *et al.*, 2000; Reeves, 2010). Regular assemblies and planning workshops where improvements can be proposed and the general development will be communicated are essential to develop a sense of responsibility. This should be realized from an early stage to guarantee for transparency and create opportunities to integrate diverging views of user groups.

As a side note, it is equally important to identify potential opponents to an MPA. In case of opposition there have to be ways and strategies to bring critics on one’s side or to invite them to take part in the process.

D) ENFORCEMENT

Putting regulations into practice is critical (Reeves, 2010), and it is also the most sensitive aspect of law making (Salm *et al.*, 2000). In fact, it constitutes one of the greatest challenges in the whole process (Notarbartolo di Sciara *et al.*, 2008).

Enforcement includes steps that may be perceived as constraints to the freedom of action. The earlier the enforcement measures are communicated and their necessity is made clear to stakeholders, the easier it will be to produce an atmosphere of compliance rather than defence. Principally, incentives should be emphasised (see WWF, 1998; Strasdas, 2002). An incentive for whale watching operators could be the nomination of an "operator of the year", who will be selected through its adherence to the guidelines, the amount and the quality of research and education on board, etc. Similarly, operators can be advised to collect bonus points by performing well in the named aspects, such as that proposed by Egas (2002).

A centralised agency for enforcement is recommended (Salm *et al.*, 2000), ideally an already existing one which can be involved to fulfil MPA related tasks (see Kelleher & Kenchington, 1992). Assigning the management of funds to a single enforcement body will also enable a less bureaucratic handling of infractions. The current agency in charge of cetacean conservation issues is the *Centre for Environmental Planning* (Centro de Planificación Ambiental, CEPLAM), a body acting under the auspices of the Canary Islands Environmental Department. Providing this agency with adequate powers to deal with breaches of the legislative framework can be a promising way forward (but see above). In any case, there is a need to establish a management body, ideally equipped with a director and adequate personnel. This body must be the dedicated representative institution for all measures proposed here, empowered to effectively enforce them and funded with sufficient financial resources to implement the management plan.



4 - RECOMMENDED MEASURES WITHIN THE MPA

Proposed general needs, measures and goals of an MPA specially created for the sustainable use of cetaceans will be summarised and a description is given of how these can be applied locally. This is meant as a guideline and tailored for the waters off La Gomera (and the MPA network they are part of), however, the model described here is also relevant for other coastal areas.

Legal framework

A necessary feature of effectively regulated whale watching activities constitutes the issue of a permit or licensing system (Kelleher & Kenchington, 1992; IFAW *et al.*, 1997; Hoyt, 2011). To date, a licence for the observation of cetaceans on a commercial basis will only be issued if an operator exhibits a guarantee of approx. 6,000 €. This money is set aside to pay for (potential) infractions by that operator. The licenced operator identifies itself by putting a yellow flag with the official logo "barco azul". The licence has to be renewed every year. However, the licence is not related to the quality and contents of the trip, i.e. if there is information presented, research conducted aboard, etc. Also, there is no standard for the amount and the contents of information presented to whale watching tourists. As a result, we see a high number of trips being offered with relatively low informational content, although the current regulations oblige all whale watching vessels to carry specially educated on-board guides (Gobierno de Canarias, 2001). It is strongly recommended to connect the issuing of licences and permits to qualitative features of the whale watching trips, as for example the obligation to collect sighting data on a regular basis or to reserve a place for researchers to facilitate the collection of scientific data. Also, it should be mandatory that all operators should produce regular reports on their educational and research efforts, as well as numbers of passengers. The licence should also include the requirement that a part of the trip prize will be put aside for research and public education. This will be especially helpful, as enforcement and monitoring efforts can consume large amounts of money and a process of self-financing is advisable (see also below).

Regulation of user groups

There is general agreement that greater care has to be given to deciding whether and under what conditions whale watching should be allowed (see Reeves, 2010). Therefore, an integrated view on all uses of a given area is essential. The term *user group* in this respect not only refers to the use of cetaceans, but any part of the natural resources. These will be assigned to one of three use categories: alteration, extractive use, non-extractive use/recreation (see Salm *et al.*, 2000).

A) LOCAL FISHERIES (EXTRACTIVE USE)

The waters off La Gomera constitute an important resource for local fishermen who largely apply traditional and selective fishing methods. Knowing about the economic significance fisheries still have on La Gomera and acknowledging that a great part of the fish species landed comes from the area to be designated as an MPA, ***it is proposed to enhance the rights of locally based fisheries in the sense of exclusive fishing rights for professional, local fishermen.*** If a direct relation is perceived between the protection of cetaceans, their marine environment and the protection of fish stocks, this will strongly contribute to a positive attitude of the public towards a planned or existing protected area as well as creating a sense of ownership on behalf of the fishermen. Moreover, and most importantly, it means

that *local wisdom* on the abundance of fish species and according fishing practices will be kept alive as a cultural heritage which the people from Gomera have to offer. In that sense, implementation of an MPA can also be conservation of culture (see Reeves, 2010).

In the long term, sustainable catch limits should be developed (for both professional and recreational fishing), a matter that has to be left to the responsible fisheries agencies which in this way can be integrated into the conservation efforts.

B) BIG GAME FISHERY (EXTRACTIVE USE)

Big game fishers take sharks, marlins and other top predators from the ecosystem. These animals represent – as is the case with cetaceans – the top level of the food web. In an area with high cetacean abundance, diminishing the number of top predators (of which generally only small numbers exist, see Lalli & Parsons, 1993), may significantly alter the sensitive equilibrium at the top end of the food chain (see Overholtz & Link, 2007; Heithaus *et al.*, 2008; Piroddi *et al.*, 2011). Globally, marine top predator populations have decreased by up to 90% (Myers *et al.*, 2007), and severe consequences in the composition of whole food chains have been observed (Heithaus *et al.*, 2008; Baum & Worm, 2009; Ferretti *et al.*, 2010). Hence, big game fishing as a leisure pursuit with a high ecological impact while serving a very low number of beneficiaries should be *entirely excluded* from the MPA.

C) MARINE TRAFFIC INCLUDING FERRY LINES (NON-EXTRACTIVE USE)

Marine traffic, including the many fast and high speed ferries pose a threat to the well-being of cetaceans and other marine life, and a high and increasing number of collisions have been documented in the archipelago. (Carrillo & Ritter, 2010; Ritter, 2010). Speed limits appear to offer an effective way to mitigate this problem (IWC, 2010). Their fast speed likely will interfere also with those (fishing and other) boats that happen to lie in or close to the ferry transect. It is recommended to introduce a maximum speed limit of 13 knots for the MPA La Gomera for all ferries and other sea-going craft (see also Carrillo & Ritter, 2010). Marine life like marine turtles and other species living close to the surface will benefit from this measure, too. Moreover, as underwater noise from shipping traffic has to be looked at as a pollutant, speed limits can also be helpful to reduce noise emissions (see Reeves, 2010; Hoyt, 2011).

D) LEISURE CRAFT: RECREATIONISTS, SAILORS & WHALE WATCHERS (NON-EXTRACTIVE USE)

Different types of boats may come together where cetaceans are present. The Canaries' regulations allow three vessels within 300 metres of a cetacean (group). Other relevant users are sailors, motor-boaters and divers. These user groups should be bound to the speed limit mentioned above and also will have to comply with the regulations that specifically apply for the observation of cetaceans (see below). This latter obligation is already settled in the revised whale watching regulations (Gobierno de Canarias, 2000). It is sensible to limit the total number of vessels that may frequent the protected area so as to avoid overcrowding by boats. When three or more boats are involved in the observation of the same cetacean group, *highest priority should be given to research vessels as well as licenced whale watching boats carrying researchers on board* (see also below).

Appropriate measures that specifically apply to the observation of cetaceans, i.e. a code of conduct will be set forth below.

E) MOTORISED SEA-GOING RECREATIONAL SPORTS (NON-EXTRACTIVE USE)

Because of the desired high speed, these activities (such as jet skis, para gliders towed by boats, water-skiing and the like) have the potential to come into conflict with cetaceans and other animals frequenting coastal waters (e.g. breeding sea birds). Moreover, they contribute to the noise pollution in and above the water. E.g., bottlenose dolphins are more sensitive to disturbance when they are moving along the coast (Ritter, unpublished data), where such recreational activities likely would be concentrated. Hence, the *exclusion of sea-going fun sports within the MPA La Gomera* is recommended. A total ban will be relatively easy to implement as long there is no such activity already in place.

F) TOURISM PLANNERS (ALTERATION)

The greatest challenge to the establishment of a MPA off La Gomera likely is that it could be perceived as contradicting the development of tourism on the island. This of course is not true. To the contrary, the limitations arising from the motivation to protect the natural resources can contribute to the development of tourism, as long as an emphasis is laid on quality and ecological sustainability – a feature that is already intensely used today to promote La Gomera as an alternative to package holiday tourists. La Gomera's self-understanding has always been that it is "different" and "more natural" than other islands within the archipelago and this has helped to attract tourists searching and acknowledging the unspoiled environment of this island. Creating a powerful brand with an MPA - such as happened with Silver Bank (USA) and a number of other MPAs – has in fact helped to create large whale watching industries.

Local involvement

An MPA is always a representation of the connection between humans and their natural environment. Hence, a special emphasis has to be given to the human-cetacean relationship (Reeves, 2010). A protected area off La Gomera will only be successful if the local population develops a positive attitude towards it. This is best achieved if the public can take part in the development and recognize the MPA as something which adds to the overall development of the island with perceivable benefits such as the development of tourism or increased publicity (see Kelleher & Kenchington, 1992; Hoyt, 2011).

In almost every case, the designation of an MPA will raise public awareness and thus have an immediate and important effect (see Evans & Urquiola, 1999; Berrow, 1999). This effect, although for many MPAs it may remain the only one, is essential. Bringing to the public eye that something is worthy of being protected can trigger a process of collective engagement by developing a sense of pride within a community (Salm *et al.*, 2000; Garrod *et al.*, 2001). This can lead to the initiation of subject related projects or help secure funding, such as experienced with the Irish whale and dolphin sanctuary (Berrow, 1999; Hoyt, 2011).

There are a number of examples for community based whale watching and some of these demonstrate that whole regions can be transformed, also economically, through their commitment to whale watching tourism (IFAW *et al.*, 1997; Hoyt, 2001, 2007; Reeves, 2010). Local NGOs should be supported, or established, if no such organisations already exist (see also Reeves, 2010, for examples of fruitful joint efforts between NGOs and artisanal fisheries).

To attract the attention for the issue, local media, e.g. local radio stations or magazines, should be encouraged to get involved in the promotion of the MPA (see IFAW *et al.*, 1997). Foreign-speaking newspapers and radio stations, which are common in the Canaries for

English or German tourists, simultaneously can inform holidaymakers. Prominent representatives from the community should be engaged to play a key role in promoting the idea of sustainable development of whale watching, (see Salm *et al.*, 2000; Garrod *et al.*, 2001) and interviews with community representatives or scientists will improve the general recognition of the MPA. A specially designed *website* for the MPA will represent a contemporary means to generate an additional platform for the dissemination of information.

As MPAs require sufficient, well-trained personnel (WWF, 1998), it is recommended to charge locals with MPA-related functions (Browning & Williams, 1997; IFAW *et al.*, 1997; Salm *et al.*, 2000; Garrod *et al.*, 2001). This could be employment as guides on tour boats, for organizing events or other issues related to monitoring and enforcement (see also below). Locals can be engaged in visitor centres and thus become representatives of the MPA. Ferry operators should become involved in cetacean sighting schemes so as to create interest and enthusiasm for marine life. As an example, a ferry line operating between Tenerife and La Gomera already has been used to collect scientific data (Aguilar & Brito, 1999), and, since several years, a ferry frequenting the Bay of Biscay has been used as a platform for systematic sighting data (Williams *et al.*, 1999).

To strengthen the identification with the MPA, a *logo* will be helpful. This could be presented on signs which mark the coastline on highly visible locations, i.e. tourist centres, at beaches, harbours, promenades, hiking trails, etc. Stickers and badges are a good means of conveying the conservation image which will be identified with the logo. Finally, *events* like regular festivals are recommended (see IFAW *et al.*, 1997).

Children are a most important target group within the local community. Therefore, special lessons on cetaceans and marine conservation should be incorporated into education plans (see IFAW *et al.*, 1997), combined with specially priced whale watching excursions for pupils (see also below). Through special events like beach clean-ups, children can take an active role and learn to be responsible for the marine environment.

Whale watching operators can play an active role in promoting MPA-related issues. A vivid example already exists on La Gomera with already mentioned close co-operation of an NGO with a local operator. Another example comes from the Robson Bight Ecological Reserve (Williams *et al.*, 2009). Here, the process of protecting critical orca habitat also was driven by local whale watching operators and researchers (Reeves, 2010).

Public education

Public education is a central issue of an MPA (Kelleher & Kenchington, 1992; Strasdas, 2002; Reeves, 2010). Providing locals with information about “their” whales and dolphins is crucial. This can contribute to sharpening awareness and changing human behaviour - which has been termed “interpretive enforcement” (see Reeves, 2010, p.89). The significance of whales and dolphins for the ecosystem and their possible economic importance (and value) to the region should be explained to pupils and the general public, e.g. via information materials (leaflets, brochures, etc.), dedicated websites, workshops, presentations by MPA personnel and researchers, or events like cetacean festivals. Through *special excursions offered to school children*, a message can be conveyed. Internet and multimedia presentations should add to printed matters and face-to-face distribution of educational messages (Salm *et al.*, 2000). Likewise, whale watching operators should be obliged to offer information before and during a trip (see above).

Land-based facilities like the already existing multi-lingual permanent exhibition in Vueltas (Valle Gran Rey) complementing sea-going activities are necessary to involve the visitor and the public so as to generate a realistic image of the MPA and its purposes (Garrod *et al.*, 2001).

Whale watching: trip design & code of conduct

During the past decades, a large number of studies have investigated the effects of whale watching on cetaceans. From this body of work there is a consensus emerging that “the fitness of individual odontocetes repeatedly exposed to whale watching vessel traffic can be compromised and that this can lead to population level effects” (IWC, 2006). Numerous guidelines, regulations and codes of conduct for whale watching have been established to date (Carlson, 2010). A list of typical aspects established in whale watching regulations worldwide is presented in Table 3.

Table 3. Aspects usually included by whale watching guidelines/regulations

1. Maximum number of boats within e.g. 100/300/500 m (usually 3 boats).
2. Minimum distance: Do not approach closer than (usually) 100 metres.
3. Maximum duration of encounters, e.g. 15 or 30 minutes.
4. Do not disturb the natural behaviour of the cetaceans.
5. Approach slowly in an angle from laterally behind the group/animal – no "head on" approach.
6. Reduce speed to "no wake" speed when close to animals.
7. Avoid sudden changes in speed and direction.
8. If animals approach close, put neutral gear and wait.
9. Do not separate mothers from their offspring.
10. Avoid loud sounds of any kind.
11. Do not throw anything over board.
12. When more than one boat is present, activities should be co-ordinated via radio.
13. No swimming, snorkelling, diving.
14. Maintain low speed when leaving the animals.

Lien (2001) proposed that whale watching should be designed with the aim of ensuring that life processes of cetaceans are protected. Friendly behaviour of cetaceans should be welcomed, but not cultivated (IFAW *et al.*, 1997). Habituation of cetaceans to vessel presence is possible (Fleming & Sarvas, 1999; Lien, 2001; Würsig & Evans, 2001; Bejder *et al.*, 2006a) and sensitisation may lead to cetaceans being less attracted to boats after a while (Bejder & Dawson, 1998; Würsig & Evans, 2001). Thus, even apparently positive interactions could have long-term effects on populations (Janik, 1996; Constantine, 2001; Bejder *et al.*, 2006b) such as changes in the balances of foraging, calf rearing, etc. (Evans & Urquiola Pascual, 1999). Besides, habituation could foster risky behaviours on the part of the animals (see Lien, 2001; Lusseau & Bejder, 2007).

Following is a proposal to expand the general sets of rules given in Table 3 (most of which are already integrated into the Canaries' whale watching regulations).

⤴ *Vessel design* should reduce negative impacts as far as possible (IWC, 1994). More research on the relation between the sound characteristics of boats and responsiveness of cetaceans should be conducted. Technical progress should emphasise the development of engines and propellers which minimise noise impact. Another advisable technical means is propeller shrouding so as to avoid injuries which are regularly observed off La Gomera (Ritter, unpublished data).

⤴ The *use of fishing gear* during whale watching activities must be prohibited so as to avoid interactions with such gear. Moreover, a ban of excessive *sale of alcoholic drinks* on board such as that of some nations' regulations (see Carlson, 2010) is advisable. This will help to focus the whole trip around viewing natural behaviour and habitat rather than offering an amusement program.

⤴ The existing regulations limit cetacean encounters to a *maximum duration of 30 minutes*. This might at times be too long, e.g. in the case of resting pilot whales. Likewise, if animals either *avoid* or *strongly interact with boats*, they should be left alone after a shorter period of time (see Ritter, 2003). Cetaceans showing no obvious reaction to the presence of a boat may accept a longer sighting duration. In any case, boats should also leave the group if there are difficulties to stay with the animals, e.g. when animals move quickly, repeatedly change swimming directions, show prolonged dive times, etc. Thus, the duration of the encounter principally has to be put in relation to group size, group formation and the behaviour of the animals.

⤴ Often, it is the case that cetaceans groups are widely dispersed and subgroups might be visible. When encountering large and/or widely dispersed (sub)groups, it might be feasible to distribute boat presence to subgroups of cetaceans, i.e. single boats engage with only a fraction of the whole group.

⤴ Attention always should be directed to the presence of *calves, juveniles and newborns* present in a group. Such (sub)groups should be treated with special care: larger distances and shorter sighting duration are recommended. Newborns should not be approached at all.

⤴ It is widely accepted that *vessel speed* should be kept down when encountering cetaceans (e.g. see IWC, 2010). Within the MPA no vessel should exceed a speed of 13 knots at any time (see above). This will largely avoid collisions between large vessels and cetaceans (Laist *et al.*, 2001; IWC, 2010; Carrillo & Ritter, 2010) and also lower noise levels and according impact.

⤴ A central aspect is the *number of vessels*. As Erbe (2002, p.18) states, large numbers of vessels is where "the real threat comes from". There are countless examples of large numbers of boats pursuing cetaceans (e.g. Scheer, 1999; Hoyt, 2001; Erbe, 2002), the maximum probably being 107 boats with the same group reported by Lien (2001). The limitation of boats operating in the same area, or the number of tourists visiting cetaceans, has only been implemented in very few countries (Hoyt, 2011). On a precautionary basis, it is recommended to allow a *maximum of ten licenced whale watching vessels* operating within the MPA. This number will avoid strong competition between operators, can develop a sense of community amongst the operators, and also facilitate research, monitoring and enforcement as well as the dispersion of boats within the MPA (see below). Likewise, the

number of operators conducting whale watching trips within the MPA will be limited in this way.

Additionally, the *scattering of vessels* can further reduce this pressure

- ✓ Dispersion of boats *by time scale* (time of day, days per week, weeks per month, season, etc.). As an example, it could be sensible to limit the observation of pilot whales during the morning - as pilot whales are known to feed at night and rely on the early hours of the day to restore and rest (Baird *et al.*, 2002; Aguilar Soto *et al.*, 2008; see Ritter, 2003).
- ✓ Dispersion of boats through (a network of) *land-based observation locations*. Smit *et al.*, (2003) and Sollfrank & Ritter (2012) were able to demonstrate the feasibility to direct boats to cetaceans sighted from land. Another study recommended establishing a permanent look-out on the elevated South coast of La Gomera like in the Azores, where this concept has been successfully applied for many years (Sollfrank, 2011; see also Gordon & Matthews, 1999; Hoyt, 2001).

Hoyt (2009b) notes that the Whale and Dolphin Conservation Society has suggested a practical, precautionary plan whereby one-third of every whale and dolphin area and one-third of daylight hours be kept free from any whale watching activity.

Monitoring & Scientific research

Careful monitoring and research on the effects on cetaceans within the MPA will be optimum prerequisites for the regulation of vessel numbers and speed, sighting duration, etc. At the same time, the pressure put upon cetaceans through whale watching activities will be minimised and can stepwise be adjusted according to scientific findings. In this way, adaptive management is regularly informed by current scientific research outputs.

The continuous monitoring of cetacean population and their interactions with humans are essential research tasks so as to detect long-term effects of whale watching activities (Lien, 2001; Berrow & Holmes, 1999; Whitehead *et al.*, 2000, Bejder *et al.*, 2006a,b). Therefore, MPAs as such provide place and reason for long-term research (Hoyt, 2011), also in the sense of developing processes how to effectively achieve compliance with regulatory frameworks. However, it also has been recognized that methods still have to be developed to evaluate MPA effectiveness. Scientific understanding thereby can also come from whale watching operators themselves (see Reeves, 2010). As an example, through the engagement of an NGO, La Gomera has become one of the most intensely investigated Canary Islands (see Ritter 2003, 2010; Smit *et al.*, 2011). This cooperation has resulted in a large body of scientific publications, the development of recommendations and an exceptional long-term data set, which this paper is also based upon.

“The efficacy of protected area management in marine megafaunal conservation will depend on drawing spatially and temporally appropriate boundaries around mobile predators, and monitoring whether management actions achieved the desired effect.” (Hooker & Gerber, 2004). Therefore, scientific research into the following aspects will be crucial:

1. Behaviour of cetaceans around vessels and their interactions with tour boats
2. Compliance of operators/vessels (including private and recreational vessels) with regulations (e.g. vessel speed, minimum distances, etc.)
3. Long-term development of behaviour, status of populations (including abundance and distribution)

To avoid infractions it is necessary to reassure that breaches will likely be detected and pursued - and to communicate appropriate measures. Until 2000, there has been only one boat controlling whale watching activities in the Canaries, operating infrequently only southwest off Tenerife (and some very rare control flights with helicopters which covered other islands, too). As of 2011, there is no direct monitoring or control of the whale watching activities in the Canary Islands, but the Canary Islands Government plans to (re-)install new measures in the future (Manuel Arechavaleta Hernández, personal communication). Hence, there is a need to establish at least a minimum of control action in areas where whale watching is taking place, such as control boats or flights, incognito observers who regularly take part in commercial trips and/or land based observation platforms. Generally, more resources have to be mobilized to build up capacity and strengthen enforcement.

Because “sometimes the best deterrent is simply a presence within the MPA” (see Reeves, 2010, p.90), direct observations/monitoring from elevated cliffs will be important. Smit *et al.* (2003) as well as Sollfrank & Ritter (2012) demonstrated the practicability of land-based monitoring south of La Gomera. This measure is comparably easy to implement, relatively low-cost and represents a way in which the greater part of the waters south of La Gomera can be overseen. Operators knowing that they are being watched “from above” will thus be forced to enhance the adherence to the code of conduct.

Another option will be to establish a “control area” where no whale watching is taking place to obtain a reference to the research on human-cetacean interactions already conducted off La Gomera (see Kelleher & Kenchington, 1992). A feasible area for such comparative studies would be El Hierro, the smallest Canary Island lying near La Gomera. Here, no whale watching activities are taking place to date, although a similar cetacean fauna is assumed to be present in that area (see also Carrillo *et al.*, 2010; Williams *et al.*, 2009).

It is recommended to give emphasis to research projects using whale watching vessels as observation platforms. Research should be multidisciplinary (Ritter & Ladner, 1996), incorporating socio-economic studies as well as social sciences, i.e. research on attitudes of humans (e.g. Amante-Helweg, 1996; Ladner, 1996; Orams, 2000; Weisenberger, 2005; Howard & Parsons, 2006; Kiesewetter, 2007). The involvement of volunteers and students into the research will create opportunities for young people to develop a career in the context of whale watching, as a naturalist, researcher, or conservationist. NGOs can contribute significantly to research efforts and/or the establishment of volunteer programmes, practical courses and the like. As an example, practical courses in behavioural biology have been offered on La Gomera since many years and students from many different universities in Europe have been hosted by the local NGO M.E.E.R.

All monitoring and research efforts could end up in evaluation mechanisms like the preparation of “condition reports” (a practice already in place in the US, see Reeves, 2010) or sustainability report cards (see Hoyt, 2009; 2011), where well performing operators can gain reputation or direct incentives. One whale watching operator based on La Gomera participates in a comprehensive, long-term management project for tourism within the

framework of the European Charta for Sustainable Tourism (*Carta Europea de Turismo Sostenible* - CETS), with the aim to fulfil basic requirements in the fields of nature conservation and environmental protection, social responsibility, support of regional development, as well as a close cooperation with La Gomera's National Park Authority.

Financing

MPAs must be financially sustainable (WWF, 1998; Reeves, 2010), so that they can contribute to the local economy and even become a driving force on the labour market. In this process, tourism can also become a major source of income (Hoyt, 2011). The number of tourists visiting La Gomera for the main reason of observing cetaceans appears to be increasing. In such a situation, MPAs constitute a valuable method for marketing the marine environment (see Hoyt, 2007; Reeves, 2010).

Levies included in the whale watching trip price are an effective means to finance the activities related to an MPA, including enforcement of regulations and monitoring issues (see above). With the very high number of whale watchers in the Canaries, such fees can be kept to an acceptable level for operators and tourists. There are examples where an equal sharing of the costs has been implemented (see Reeves, 2010).

The current legal system does not allow the charging of levies, and the income resulting from environmental offences enters the general public budget of the Canary Islands without necessarily being redirected to environmental agencies. Hence, the establishment of one or more separate funds is recommended (Salm *et al.*, 2000; Kelleher & Kenchington, 1992), firstly to have a control of the magnitude of incoming money, secondly to create a centralised pool to control and distribute resources. A simple calculation highlights the potency of this measure: with only 0.50 € per ticket sold (= less than 3% of a typical trip price) set aside to a conservation fund, based on the latest available number of whale watching tourists in 2008, (Elejabeita & Urquiola, 2009) an amount of more than 300.000 € would be generated in just one year. Obviously, this could greatly add to the financing of research projects, enforcement measures, visitor centres and the like.

Sponsoring by local or international enterprises, e.g. travel operators, ferry lines, etc. is another option. Sponsoring MPA-related tasks demonstrates a strong commitment to nature conservation and thus can be used to transport an environmentally friendly image by companies. (But at the same time, "green washing" of companies should be avoided). One more basis of income can be the *marketing of MPA related products*: badges, stickers, T-shirts, posters, post-cards, books, and other merchandising carrying the logo of the MPA as an easily recognizable symbol. Finally, licence fees for the right to film (i.e. close approach to animals, underwater filming, etc.), as well as taxes and fines can contribute to financing.



5 - CONCLUDING COMMENTS

The situation on La Gomera to date is characterized by several important aspects favourable to set the scene for further steps towards the creation of an integrated, ecosystem based MPA for cetaceans:

- ✓ “Green” image of La Gomera as a tourist destination and related eco-tourist (and probably higher spending) clientele
- ✓ Recognition as a *Special Area of Conservation* (SAC) under the EU Habitat Directive
- ✓ Low level of whale watching tourism (2-3 licenced operators, 5-6 active vessels)
- ✓ Presence of high quality whale watching operations with outstanding reputation
- ✓ Presence of land-based interpretation location and look-out
- ✓ Research efforts integrated into some whale watching operations since many years
- ✓ Good scientific knowledge about the local cetacean fauna
- ✓ NGO involvement fostering best practice approaches

In this sense, a best practice approach in many ways has already been realized which can act as a guidance for future initiatives (see Ritter, 2003; Reeves, 2010).

It is likely that the development of whale watching as a source of income will be recognized as an attractive alternative in an economic sense, especially because currently, the maritime infrastructure is expanding significantly, including the enlargement of two harbours on the South coast of the island. Therefore, it appears crucial to take management steps *before* an unfavourable development such as that witnessed in other places (including Tenerife, see Elejabeita & Urquiola, 2009) does not repeat itself on La Gomera. A precautionary approach in concert with all stakeholders is warranted. The earlier such a process will be initiated, the easier it will be to create a positive momentum for marine conservation.

All MPAs have a social and/or cultural component to a greater or lesser extent. Conserving cultural values could go in line with the establishment of new sources of income for those that have given up fishing due to the scarcity of fish. In this way, an MPA also becomes a matter not only of ethics but economic survival (see Salm *et al.*, 2000) - with tourism being a major source of income (WWF, 1998). While MPAs additionally are helping to maintain recreational qualities, they can be a means of attracting more tourists, thus enhancing the income and so forth (Garrod *et al.*, 2001).

If the proposed MPA off La Gomera (or some of the recommendations made here) will be realised one day, it will send a signal to other areas and contribute to the discussion of how to regulate whale watching tourism so as to create it as a sustainable use of the marine environment. The model of an MPA presented here is tailored for the small island of La Gomera, but this island must not be considered isolated, taking into account the high cetacean presence in the whole archipelago. Research has shown that cetaceans use their habitat around the Canary Islands dynamically, and some (if not most) populations might inhabit several islands at the same time. We can therefore conclude that the Canary Islands as a whole urgently need an effective and well managed network of MPAs for cetaceans (see

Aguilar *et al.*, 2000; Evans & Urquiola, 1999). In the way described here, La Gomera can become a stepping stone, even a mile stone, for such an effort in the archipelago.

Much of what is presented here is an outcome of a fruitful relationship between a whale watching operator and an NGO, i.e. between tourism and conservation. The use of whale watching vessels as platforms of opportunity was an excellent way to create the scientific basis for recommended procedures and management actions. This ongoing partnership has been a learning field for all those involved – while all participants were striving a) for a balance between economic development and ecologic sustainability and b) to mitigate the pressure on the animals.

After all, we have to bear in mind: *managing whales* is not possible. It is human behaviour that has to be managed. When observing cetaceans, we become witnesses of how socially organized, sentient beings with a high level of cognitive skills can adapt to changing environments by behaving in a most flexible way. Hence, there may be something we can learn from the cetaceans. In every case, we will have to learn how to adapt *our* behaviour so as to prevent cetaceans from having to adapt theirs. It is hoped that this paper will play a role in this learning process.



AGRADECIMIENTOS

This report has been produced with the logistic and financial support of M.E.E.R. e.V. Thanks to all members of the MEER-Team, and to our co-operation partners *OCEANO Gomera whale watching* and *Club de Mar*, including the whale watching skippers - their way of conducting cetacean observation off La Gomera was the basis for establishing the research efforts leading to this work. Many thanks to Erich Hoyt, Randall Reeves, Guiseppe Notarbartolo di Sciara, Volker Böhlke, Michael Scheer, and Mark Simmonds for their very helpful comments on an earlier draft. Sylvia Stevens was extremely helpful in finalizing the language. M.E.E.R. is supported by the Society for the Protection of Dolphins (Gesellschaft zur Rettung der Delfine, Munich).

REFERENCES

- Aguilar Soto, N., Johnson, M.P.; Madsen, P.T. & Díaz, F. 2008. Cheetahs of the deep sea: deep foraging sprints in short-finned pilot whales off Tenerife (Canary Islands). *Journal of Animal Ecology* 2008,77, 936–947.
- Aguilar, N. & Brito, A. 1999. The Canary Island cetacean sighting net II. *Proc. 13th Ann. Conf. ECS*, Valencia, Spain. 149-152.
- Aguilar, N., Carrillo, M., Delgado, I., Díaz, F. & Brito, A. 2000. Fast ferries impact on cetaceans in the Canary Islands: collisions and displacement. *Proc. 14th Ann. Conf. ECS*, Monaco. 164.
- Amante-Helweg, V. 1996. Ecotourists' beliefs and knowledge about dolphins and the development of cetacean ecotourism. *Aquatic Mammals* 22 (2): 131-140.
- André, M. 1998. Cachalotes en Canarias. Thésis doctoral de La Universidad de Las Palmas de Gran Canaria.
- Arístegui, J., Tett, P., Hernández-Guerra, A., Basterretxea, G., Montero, M.F., Wild, K., Sangrá, P., Hernández-Leon, S., Cantón, M., García-Braun, J.A., Pacheco, M. & Barton, E.D. 1997. The influence of island-generated eddies on chlorophyll distribution: a study of mesoscale variation around Gran Canaria. *Deep-Sea Research* 44 (1): 71-96.
- Asociación Insular de Desarrollo Rural de La Gomera 2011. Plan Estratégico de la Reserva de la Biosfera de La Gomera. Available online at: http://www.aidergomera.es/images/pdf/Medio_Ambiente/plan-estrategico.pdf
- Baird, R.W., Borsani, J.F., Hanson, M.B. & Tyack, P.L. 2002. Diving and nighttime behavior of long-finned pilot whales in the Ligurian Sea. *Mar. Ecol. Prog. Ser.* 237: 301-305.
- Baum, J.K. & Worm, B. 2009. Cascading top-down effects of changing oceanic predator abundances, *Journal of Animal Ecology*, **78**, 699–714.
- Bejder, L. & Dawson, S.M. 1998. Responses by Hector's dolphins to boats and swimmers in Porpoise Bay, New Zealand. International Whaling Commission. Document number SC/50/WW II.
- Bejder, L., Samuels, A., Whitehead, H., Gales, N., Mann, J., Connor, R., Heithaus, M., Watson-Capps, J., Flaherty, C. & Krützen, M. 2006a. Decline in relative abundance of bottlenose dolphins exposed to long-term disturbance. *Conservation Biology*, 20(6), 1791-1798.
- Bejder, L., Samuels, A., Whitehead, H., Gales, N. 2006b. Interpreting short-term behavioural responses to disturbance with a longitudinal perspective. *Animal behaviour*, 72(5), 1149-1158.
- Berrow, S. 1999. How effective is Ireland's Whale and Dolphin Sanctuary? Proceedings of the workshop: Protected areas for cetaceans. *ECS Newsletter* No. 38 - Special Issue: 44-47.
- Berrow, S.D. & Holmes, B. 1999. Tour boats and dolphins: A note on quantifying the activities of whalewatching boats in the Shannon estuary, Ireland. *Journal of Cetacean Research and Management* 1 (2): 199-204.
- Browning, L.J. & Williams, A.D. 1997. The effective utilization of scientists and non-scientists in an integrated study on free-ranging bottlenose dolphins (*Tursiops truncatus*) at Durlston County Park, Dorset, UK. *Proc. 11th Ann. Conf. ECS*, Stralsund, Germany. 286-289.
- Carlson, C. 2010. A review of whale watching guidelines and regulations around the world. Version 2010. Available online at: http://www.iwcoffice.org/_documents/conservation/WWREGSApril1207.pdf
- Carrillo, M., & Ritter, F. 2010. Increasing numbers of ship strikes in the Canary Islands: Proposals for immediate action to reduce risk of vessel-whale collisions. *Journal of Cetacean Research and Management* 11(2):131-138.
- Carrillo, M., Pérez-Vallazza, C. & Álvarez-Vázquez, R. 2010. Cetacean diversity and distribution off Tenerife (Canary Islands). *Marine Biodiversity Records*, Vol. 3, p.1-9.
- Constantine, R. 2001. Increased avoidance of swimmers by wild bottlenose dolphins (*Tursiops truncatus*) due to long-term exposure to swim-with-dolphin tourism. *Marine Mammal Science* 17 (4): 689-702.
- Egas, W. 2002. Whale watching in Europe. Aspects of sustainability. EUCC. The Castal Union. Leiden, Netherlands. May 2002.
- Elejabeita, C. & Urquiola, E. 2009. Whale Watching in the Canary Islands. International Whaling Commission, Document IWC/61/CC16.

Erbe, C. 2002. Underwater noise of whale watching boats and potential effects on killer whales (*Orcinus orca*), based on an acoustic impact model. *Marine Mammal Science* 18 (2): 394-418.

EU 2002. Official Journal of the European Communities. 9.1.2002.

EU 2009. Protocol on Integrated Coastal Zone Management in the Mediterranean. *Official Journal of the European Union*. OJL 34, 4.2.2009, p. 19-28.

European Commission, 2002. EU focus on coastal zones. Luxembourg: Office for Official Publications of the European Communities. 2001, 29 pp. Available online at:
[http://mainweb.hgo.se/amnen/iczm.nsf/0/0BBD8DDE565D353FC12571F70056F32D/\\$File/2000brochure_en.pdf?OpenElement](http://mainweb.hgo.se/amnen/iczm.nsf/0/0BBD8DDE565D353FC12571F70056F32D/$File/2000brochure_en.pdf?OpenElement)

Evans, P.G.H. & Urquiola Pascual, E. 1999. Introduction to marine protected areas: what are they designed to do and what criteria should be used in their selection? Proceedings of the workshop: Protected areas for cetaceans. *ECS Newsletter* No. 38 - Special Issue: 4-10.

Fernández, R., Santos, M.B., Carrillo, M., Tejedor, M. & Pierce, G.J. 2009. Stomach contents of cetaceans stranded in the Canary Islands 1996–2006. *Journal of the Marine Biological Association of the United Kingdom*, 2009, 89(5), 873–883.

Ferretti, F., Worm, B., Britten, G.L., Heithaus, M.R. & Lotze, H.K. 2010. Patterns and ecosystem consequences of shark declines in the ocean. *Ecology Letters*, 13: 1055–1071.

Fleming, V. & Sarvas, T.H. 1999. Effects of whale watching on sperm whale (*Physeter macrocephalus*) behavior off Andoya, Norway. *Proc. 13th Ann. Conf. ECS*, Valencia, Spain. 103-107.

Forestell, P. 1995. Ensuring scientific proposals for rules are practicable. Working Paper MWW 95/46 of the Workshop on the Scientific Aspects of Whale Watching. Montecastello di Vibio, Italy. 30th March-4th April 1995.

García, E.A. 1999. The role of marine protected areas (MPAs) regarding the protection of marine mammals. Proceedings of the workshop: Protected areas for cetaceans. *ECS Newsletter* No. 38 - Special Issue: 23-27.

Garrod, B., Wilson, J.C. & Bruce, D.M. 2001. Planning for Marine Ecotourism in the EU Atlantic Area: Good Practice Guidance. University of the West of England. Bristol. 76pp.

Gobierno de Canarias 2000. *Boletín Oficial de Canarias* Número 133. Viernes, 6 de Octubre de 2000. Decreto 178/2000.

Gobierno de Canarias 2001. *Boletín Oficial de Canarias* Número 97. Miércoles, 1 de Agosto de 2001. Decreto 151/2001. 11106-11111.

Gobierno de Canarias, 2008. Plan regional de ordenación de la acuicultura de Canarias. Available online at:
<http://www3.gobiernodecanarias.org/agricultura/pesca/proac/default.htm>

Gobierno de Canarias 2010. *Boletín Oficial de Canarias* Número 112. Miércoles, 9 de Junio de 2010. Ley 4/2010 del Catálogo Canario des Especies Protegidas. 15200-15225.

Gordon, J. & Matthews, J.N. 1999. The Azorean whale watching industry and the relevance of recent investigations on sperm whales in the Azores to management. International Whaling Commission, Document SC/51/WW7.

Hall, M.A. & Donovan, G.P. 2001. Environmentalists, fishermen, cetaceans and fish: Is there a balance and can science help to find it? In *Marine Mammals: Biology and Conservation*, edited by Evans, P.G.H. & Raga, J.A. New York: Kluwer Academic / Plenum Publ. 491-521.

Heimlich-Boran, J.R. 1993. Social organisation of the short-finned pilot whale, *Globicephala macrorhynchus*, with special reference to the comparative social ecology of delphinids. Ph.D.Thesis, Univ. of Cambridge. 132pp.

Heithaus, M.R., Frid, A., Wirsing, A.J. & Worm, B. 2008. Predicting ecological consequences of marine top predator declines. *Trends in Ecology and Evolution*, 4, 202–210.

Hernandez Leon, S. 1986. Efecto de masa de Isla en Aguas del Archipelago Canario según estudios de Biomasa y Actividad de Sistema de Transporte de Electrones en el Mesozooplankton. Doctoral thesis, Universidad de La Laguna, La Laguna, Tenerife.

- Herzing, D.L. 1995. Summary of the workshop on small cetacean/human interactions (held at the 11th Biennial Conference on the Biology of Marine Mammals, Orlando, Florida, 14-18 December 1995): Research and Management.
- Hooker, S.K. & Gerber, L.R. 2004. Marine reserves as a tool for ecosystem-based management: the potential importance of megafauna. *BioScience*, Vol. 54, No.1. 27-39.
- Hooker, S.K., Cañadas, A., Hyrenbach, K.D., Corrigan, C., Polovina, J.J. & Reeves, R.R. 2011. Making protected area networks effective for marine top predators. *Endangered Species Research*, Vol. 13: 203–218.
- Howard, C. & Parsons, E.C.M. 2006. Attitudes of Scottish city inhabitants to cetacean Conservation. *Biodiversity and Conservation* 15:4335–4356.
- Hoyt, E. 2001. Whale Watching 2001: Worldwide tourism numbers, expenditures, and expanding socioeconomic benefits. International Fund for Animal Welfare. Yarmouth Port, MA, USA. pp. i-vi, 1-158.
- Hoyt, E. 2007. A Blueprint for Dolphin and Whale Watching Development. Humane Society International. 32 pp.
- Hoyt, E. 2009a. Marine Protected Areas in: Perrin, W.F., Wuersig, B. & Thewissen, J.G.M. (eds): Encyclopaedia of Marine Mammals, 2nd Edition. Academic Press, San Diego, CA, pp688-697.
- Hoyt, E. 2009b. Whale Watching in: Perrin, W.F., Wuersig, B. & Thewissen, J.G.M. (eds): Encyclopaedia of Marine Mammals, 2nd Edition. Academic Press, San Diego, CA, pp 1219-1223.
- Hoyt, E. 2011. Marine protected areas for whales, dolphins and porpoises. A World Handbook for Cetacean Habitat Conservation and Planning. Second Edition. Earthscan/Taylor & Francis, London & New York, 464 pp.
- Hyrenbach, K.D., Forney, K.A. & Dayton, P.K. 2000. Marine protected areas and ocean basin management. *Aquatic Conservation: Marine and Freshwater Ecosystems*, **10**: 437-458.
- IFAW, WWF and WDCS. 1997. The educational values of whale watching. Provincetown, MA, USA. 39 pp.
- IWC 2010a. Report of the Joint IWC-ACCOBAMS Workshop on Reducing Risk of Collisions between Vessels and Cetaceans. 21-24 Sept. 2010, Beaulieu-sur-Mer (France). International Whaling Commission, Document IWC/63/CC8. 42 pp.
- IWC 2010b. Report of the Workshop on Whale Watching, 3-5 Nov, 2010, Puerto Madryn, Argentina. International Whaling Commission, Document IWC/63/CC6.
- IWC 2006. Report of the Scientific Committee. *Journal of Cetacean Research and Management* 8(Suppl.):1–65.
- Janik, V.M. 1996. Changes in surfacing patterns of bottlenose dolphins in response to boat traffic. *Marine Mammal Science* 12 (4): 597-602.
- Kelleher, G. & Kenchington, R. 1992. Guidelines for establishing marine protected areas. A marine conservation and development report. *IUCN. vii+79pp*. Gland, Switzerland.
- Kiesewetter, W. 2007: Die Qualität von Naturerfahrungen am Beispiel von Whale Watching auf La Gomera/ Kanarische Inseln. Diploma thesis, School of Applied Science Eberswalde, Faculty of Nature Conservation & Landscape Protection. 78 pp. + Annexes.
- Ladner, U.A. 1996. Interaktion mit Meeressäugern als Umweltpsychologisches Lernfeld: Einstellungsänderungen durch Begegnungen im natürlichen Lebensraum. Diploma thesis, University of Bremen, Faculty of Psychology.
- Laist, D.W., Knowlton, A.R., Mead, J.G., Collet, A.S. & Podesta, M. 2001. Collisions between ships and whales. *Marine Mammal Science* 17 (1): 35-75.
- Lalli, C.M. & Parsons, T.R. 1993. *Biological Oceanography: An Introduction*. Oxford: Butterworth-Heinemann Ltd.
- Lien, J. 2001. The conservation basis for the regulation of whale watching in Canada by the department of fisheries and oceans: a precautionary approach. Department of Fisheries and Oceans. Ottawa. Canadian Technical Report of Fisheries and Aquatic Sciences 2363. 31 March 2000.
- Liret, C., Le Goaziou, B. & Gourmelon, F. 1999. How a marine national park in the Iroise Sea (Britanny) can contribute to coastal bottlenose dolphin conservation. Proceedings of the workshop: Protected areas for cetaceans. ECS Newsletter No. 38 - Special Issue: 41-43.

- Lopez, B.D. & Marino, F. 2011. A trial of acoustic harassment device efficacy on free-ranging bottlenose dolphins in Sardinia, Italy. *Marine and Freshwater Behaviour and Physiology*, DOI:10.1080/10236244.2011.618216
- Lusseau, D. & Bejder, L. 2007. The long-term consequences of short-term responses to disturbance. Experiences from Whalewatching Impact Assessment. *International Journal of Comparative Psychology*, 2007, 20, 228-236.
- Martín, V. & Carrillo, M. 2001. Proyecto de Apoyo a la Conservación del delfín mular (*Tursiops truncatus*) y la tortuga boba (*Caretta caretta*) en Canarias. EU LIFE Program. Sta. Cruz de Tenerife. LIFE B4-3200/97/247.
- Martín, V., Servidio, A., Tejedor, M., Arbelo, M., Brederlau, B., Neves, S., Pérez, M., Urquiola, E., Pérez, E. & Fernández, A. 2009. Cetaceans and conservation in the Canary Islands. Poster presented to the 18th Biennial Conference on the Biology of Marine Mammals, Quebec, Canada, October 12-16, 2009.
- Mayr, I. 2004. Photo-Identification of Rough-toothed Dolphins (*Steno bredanensis*) off La Gomera (Canary Islands) as a Basis for Long-term Monitoring with new Insights into Social Organisation. Diploma thesis, University of Salzburg, Faculty of Natural Science - Organismic Biology. 100pp.
- Myers, R.A., Baum, J.K., Shepherd, T.D., Powers, S.P., & Peterson, C.H. 2007. Cascading effects of the loss of apex predatory sharks from a coastal ocean. *Science* 315, 1846–1850.
- Notarbartolo di Sciara, G. 2007. Guidelines for the Establishment and Management of Marine Protected Areas for Cetaceans. Contract RAC/SPA, No. 03/2007: 1-29.
- Notarbartolo di Sciara G., Agardy T., Hyrenbach D., Scovazzi T., Van Klaveren P. 2008. The Pelagos Sanctuary for Mediterranean marine mammals. *Aquatic Conservation: Marine and Freshwater Ecosystems* 18:367-391. DOI: 10.1002/aqc.855
- O'Connor, S., Campbell, R., Cortez, H., & Knowles, T. 2009. Whale Watching Worldwide: tourism numbers, expenditures and expanding economic benefits, a special report from the International Fund for Animal Welfare, Yarmouth MA, USA, prepared by Economists at Large.
- Orams, M.B. 2000. Tourists getting close to whales, is it what whale-watching is all about? *Tourism Management* 21: 561-569.
- Overholtz, W. J. and Link, J. S. 2007. Consumption impacts by marine mammals, fish, and seabirds on the Gulf of Maine–Georges Bank Atlantic herring (*Clupea harengus*) complex during the years 1977–2002. *ICES Journal of Marine Science*, 64: 83–96.
- Parsons, E.C.M. & Scarpaci, C. 2010. Recent advantages in whalewatching research: 2009-2010. International Whaling Commission, Document IWC/SC62/WW2.
- Piroddi, C., Bearzi, G., Gonzalvo, J. & Christensen, V. 2011. From common to rare: The case of the Mediterranean common dolphin. *Biological Conservation* xxx (2011) xxx–xxx
- Proelss, A., Krivickaite, M., Gilles, A., Herr, H. & Siebert, U. 2011. Protection of cetaceans in European Waters – A case study on bottom-set gillnet fisheries within Marine Protected Areas. *International Journal of Marine and Coastal Law* 26: 5-45.
- Reeves, R.R. (ed.) 2010. Proceedings of the First International Conference on Marine Mammal Protected Areas, Mar 30– Apr 3, 2009, Maui, Hawaii. Available online at www.icmmpa.org/wp-content/uploads/2010/04/First-ICMMPA-Conference-March-30-April-3-2009.pdf
- Ritter, F. & Brederlau, B. 1999. Abundance, Distribution and Behaviour of Dense Beaked Whales (*Mesoplodon densirostris*) off La Gomera (Canary Islands) and their Interactions with Humans. *Aquatic Mammals*, 25.2, 55-61.
- Ritter, F. 2002. Behavioural observations of rough-toothed dolphins (*Steno bredanensis*) off La Gomera (Canary Islands) with a special reference to their interactions with humans. *Aquatic Mammals*, 28.1, 46-59.
- Ritter, F. 2003. Interactions of Cetaceans with Whale Watching Boats – Implications for the Management of Whale Watching Tourism. M.E.E.R. e.V., Berlin, Germany, 91 pp.
- Ritter, F. 2007. Behavioural responses of rough-toothed dolphins to a dead newborn calf. *Marine Mammal Science*, 23(2): 429-433.

- Ritter, F. 2010. Quantification of ferry traffic in the Canary Islands (Spain) and its implications for collisions with cetaceans. *Journal of Cetacean Research and Management* 11(2):139-146.
- Ritter, F., Ernert, A. & Smit, V. 2011: A long-term cetacean sighting data set from whale watching operations as a reflection of the environmental dynamics in a multi-species cetacean habitat. Poster presented at the Annual Conference of the ECS, Cadiz, Spain, March 2011.
- Ritter, F. & Ladner, U.A. 1996. Whale watch research on La Gomera: A new interdisciplinary approach. European Research on Cetaceans 9. *Proc. 9th Ann. Conf. ECS*, Lisbon 1996, 48ff.
- Ritter, F. & Neumann, K. 2006. The year of the whale: Extraordinary occurrence of Bryde's whales off La Gomera (Canary Islands). Poster presented at the Annual Conference of the ECS, Gdynia, Poland, April 2006.
- Salm, R.V., Clark, J. & Siirila, E. 2000. Marine and Coastal Protected Areas: A guide for planners and managers. Washington DC.: IUCN.
- Scarpaci, C., Lück, M. & Parsons, E.C.M. 2009b. Recent advantages in whalewatching research: 2008-2009. *Tourism in Marine Environments*, 6(1), 39-50.
- Scarpaci, C., Parsons, E.C.M. & Lück, M. 2008. Recent advantages in whalewatching research: 2006-2007. *Tourism in Marine Environments*, 5(1), 55-66.
- Scarpaci, C., Parsons, E.C.M. & Lück, M. 2009a. Recent advantages in whalewatching research: 2007-2008. *Tourism in Marine Environments*, 5(4), 319-336.
- Scheer, M. 1999. Lautäußerungen und Verhalten von Kurzflossen-Grindwalen (*Globicephala macrorhynchus*) vor der Südwestküste Teneriffas. Diploma thesis, University of Bremen, Faculty of Biology, 129pp.
- Smit, V., Ritter, F. & Neumann, K. 2003. Feasibility Study: Land-based Observations of Cetaceans on La Gomera (Canary Islands). Poster presented at the Annual Conference of the ECS, Gran Canaria, Spain, March 2003.
- Sollfrank, T. 2011. Biology, habitat partitioning and boat-related behavioral patterns of small cetaceans off La Gomera, Canary Islands. Diploma thesis, University of Würzburg, Faculty of Animal Ecology. 72 pp.
- Sollfrank, T. & Ritter, F. 2012. Watching Cetaceans from Land in the Canary Islands: Implications for the Management of Whale Watching. Poster presented at the Annual Conference of the ECS, Galway, Ireland, March 2012.
- Strasdas, W. 2002. The ecotourism training manual for protected area managers. German Foundation for International Development, Centre for Food, Rural Development and the Environment. Zschortau, Germany. 103pp.
- Tobena, M., Escanez, A., Rodriguez, Y., Lopez, C. & Aguilar, N. 2011. Inter-island movements of bottlenose dolphins (*Tursiops truncatus*) in the Canary Islands : Implications for Conservation and SAC Design. Poster presented at the Annual Conference of the ECS, Cadiz, Spain, March 2011.
- Urquiola Pascual, E. & Evans, P.G.H. 1999. Legislative instruments relevant to the establishment of marine protected areas for cetaceans. Proceedings of the workshop: Protected areas for cetaceans. *ECS Newsletter* No. 38 - Special Issue: 12-22.
- Weisenberger, F. 2005: Grundlagen eines Meeressäuger-Informationszentrums für ein nachhaltiges Whale Watching vor La Gomera (Kanarische Inseln). Diploma thesis, University of Trier, Faculty of Geosciences. 124pp.
- Whitehead, H., Reeves, R.R. & Tyack, P.L. 2000. Science and the conservation, protection, and management of wild cetaceans. In *Cetacean Societies*, edited by Mann, J., Connor, R.C., Tyack, P.L. & Whitehead, H. Chicago: University of Chicago press. 308-332.
- Williams, R., Lusseau, D., Hammond, P.S 2009. The role of social aggregations and protected areas in killer whale conservation: The mixed blessing of critical habitat. *Biological Conservation* 142: 709-719.
- Williams, R., Williams, A.D. & Brereton, T. 1999. The Biscay dolphin research programme - where science and education work side-by-side. *Proc. 13th Ann. Conf. ECS*, Valencia, Spain. 145.
- Würsig, B. & Evans, P.G.H. 2001. Cetaceans and humans: influences of noise. In *Marine Mammals: Biology and Conservation*, edited by Evans, P.G.H. & Raga, J.A. New York: Kluwer Academic / Plenum Publ. 565-588.
- WWF 1998. Marine protected areas. WWF's role in their future development. WWF. Gland, Switzerland.

ANNEX

Table 4: Summary of recommendations made in this report

- **Location & size:** expansion of area delineated by the SAC already in place to a distance of 5 nautical miles offshore, while at the same time focusing on research of the environmental dynamics leading to changes in critical habitat (p. 4)
- Follow **ecosystem approach** (p. 15)
- Focus management plan on a MPA of **IUCN Category IV** (*a habitat/species management area managed mainly for conservation through management intervention*, p. 16) and **MPA networks** (p. 13)
- Main conservation objective: **to protect the waters south of the island from an excessive growth of whale watching tourism**. Also manage other threats (p. 16)
- **Involve stakeholders** at an early stage (p. 17)

Category	User group / Party responsible	Recommended Action	Notes	See page
Stakeholder participation	Stakeholders	Create centralized agency	A dedicated and adequately empowered management body for the of the MPA is advisable	17
		Conduct regular assemblies	To keep stakeholders updated	17
Enforcement & monitoring	Local government	Create centralized agency with adequate powers	A dedicated and adequately empowered management body for the of the MPA is advisable	17
		Create incentives	E.g. “operator of the year”	18
		Establish land-based observation platforms	Permanent lookouts can easily monitor boat behaviour and compliance	26
		Support long-term biological & interdisciplinary research	Encourage operators to conduct research. Start research in “control” area	15/26
		Support research on compliance of regulations	Land-based <i>and</i> boat-based research	26
		Establish effective monitoring measures	E.g. control boats, control flights, incognito observers, land-based observations, etc.	25f

Legal framework	Local Government / Whale watching operators	Licensing system	Relate licence to quality of trip (educational value, research, etc.)	19
		Include levies into trip price	Either by percentage of trips price or fixed amount	27
		Make operators prepare "condition reports" or to take part in CETS	"Sustainability report cards" are an option (CETS= Carta Europea de Turismo Sostenible)	27
Regulation of user groups	Fisheries	Exclusive rights for local artisanal fisheries		19
		Exclude big game fisheries		20
	Ferry traffic	Impose speed limitation	13 knots are recommended	20
	Leisure craft	Impose speed limitation	13 knots are recommended	20
	Fun sports	Exclude motorized sea going fun sports	E.g. jet skis, water skiing, speed boats, high speed sailing catamarans, etc.	21
	Whale watchers	Give precedence to licenced whale watching vessels over private boats	At sea, precedence rules should be communicated via radio	25
		Give highest precedence to research vessels and licenced whale watching vessels carrying out research	At sea, precedence rules should be communicated via radio	21
Tourism planning	Managers, tour operators	Emphasize nature-based and eco-tourism	Encourage tourists to act conscientiously	21
		Promote conservation efforts as a trigger for developing tourism		21
		Promote uniqueness and unspoiled nature of La Gomera		22f
Local involvement	Local media & (renown) representatives	Promote MPA as a community highlight	E.g. magazines, local Spanish and foreign language radio stations	21f
		Promote sustainable whale watching	Encourage tourists to select operator conscientiously	21f
		Support local NGOs	E.g. research organisations and educative campaigns	21f
	Locals, NGOs & scientists	Set up events	E.g. lectures, festivals, concerts, beach clean-ups, etc.	22f
		Involve volunteers & students		26

	Local government	Create website to promote MPA and sustainable whale watching	To encourage tourists to act conscientiously	23
		Employ locals as MPA staff	MPA staff should be well trained	22
		Create MPA logo and produce (environmentally friendly) merchandised products	Stickers, badges, post cards, T-Shirts, etc.	22
	Local schools	Include lessons on cetaceans, etc.	E.g. lessons by local researchers or NGOs	22
		Organize special trips for pupils	Special trips could be subsidized	23
	Ferry operators	Set up sighting schemes	To report sighting data and collision risk assessment to researchers	22
		Promote MPA and speed limit	Highlight environmentally friendly action to passengers during passages	20
	Whale watching operators	Offer special trips for pupils	Special trips / rates could be subsidized	23
Public education	All stakeholders	Create realistic image / expectations about cetaceans & MPA	E.g. no sighting "guarantee", education should be based on scientific findings	23
	Local government	Create signs / posts	Should be placed along coastal walks and in harbours	23
		Support / create interpretation centre(s)	Should be financed through levies	23/27
	Whale watching operators	Offer sound information for tourists (before, during & after trips)	To create realistic image, education should be based on scientific findings	23
	Scientists	Offer public lectures	E.g. to school, kindergartens, hotels, etc.	23
Whale watching regulations / trip design	Local government	Limit number of operators	To avoid strong competition	25
		Limit number of boats	Max. 10 vessels within MPA	25
		Regulate time spent with animals by dispersion of vessels by time scale	Shorter encounter duration e.g. warranted during resting and feeding behaviours	25
		Issue guidelines on vessel design	To account for sound emissions (noise pollution), propeller shrouding, etc.	24
		Review whale watching regulations regularly	Regular feedback by operators should be solicited	25
		Design species specific regulations	Ensure that personal is trained to easily identify species	24

		Design behaviour specific regulations	Limit encounter duration according to cetacean behaviour & group composition	24
		Prohibit use of fishing gear when around cetaceans		24
		Regulate sale of alcoholic drinks	Whale watching excursions should not become excessive "fun trips"	24
		Ensure that regulations are widely known	Use all communication means including internet and social networks	22
		Ensure that regulations are easy to understand		19f
Whale watching: code of conduct	Whale watch operators, sailors, private watercraft	Comply to all regulations		23f
		Design trips as nature-based excursions	Highlight marine life in general, do not focus solely on cetaceans	24
		Always keep vessel speed down	13 knots are advisable as max. speed during transition	24
		Account for boat dispersal when animals are widely dispersed	Communication via radio is essential	24
		Take note of other vessels and recognized precedence	Communication via radio is essential	24f
Financing	Local Government	Ensure financial sustainability of MPA		27
		Create centralized fund for monitoring & enforcement	Fund should be handled by centralized management body	27
		Include levies into trip price	Ensure direct money flow into centralized fund	27
		Ensure fines enter centralized fund	Ensure direct money flow into centralized fund	27
		Impose fees for professional filming	Ensure direct money flow into centralized fund	27
		Market MPA related products	Maps, stickers, posters & post cards, etc. Products should be environmentally friendly	27