*Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and contiguous Atlantic area, concluded under the auspices of the Convention on the Conservation of Migratory Species of Wild Animals (CMS)*

*Accord sur la Conservation des Cétacés de la Mer Noire, de la Méditerranée et de la zone Atlantique adjacente, conclu sous l'égide de la Convention sur la Conservation des Espèces Migratrices appartenant à la Faune Sauvage (CMS)*

## Seventh Meeting of the Parties to ACCOBAMS

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# PROGRESS REPORT REGARDING SPECIES CONSERVATION MANAGEMENT PLANS (CMP) IN ACCOBAMS

# PROGRESS REPORT REGARDING SPECIES CONSERVATION MANAGEMENT PLANS (CMP) IN ACCOBAMS

**Note of the Secretariat**:

The concept of Conservation and Management Plans (CMP), developed under the framework of the International Whaling Commission, was adopted by Parties during MOP6. Initial drafts of Conservation Management Plans for four species were prepared and presented by experts of the ACCOBAMS Scientific Committee during its 12th Meeting in 2018. The overall goal of those CMPs is to manage human activities that affect fin whales, Risso's dolphins, bottlenose dolphins and common dolphins in the Mediterranean Sea, in order to maintain a favorable conservation status throughout their historical range, based on the best available scientific knowledge.

The present document compiles progress reports on CMP, presented during the 12th Meeting of the ACCOBAMS Scientific Committee in November 2018. It aimed at providing the Parties with the progress reports regarding CMP of those four species, keeping in mind that those versions still need to be completed with contributions from key players in the ACCOBAMS area. In this respects, expert workshops will be organized by the end 2019 to finalize fin whales and Risso's Dolphins CMP.

**I - STATUS REPORT ON DRAFT CONSERVATION MANAGEMENT PLAN ON FIN WHALE**

# Draft Outline

# ACCOBAMS/IWC CMP for Mediterranean fin whales (*Balaenoptera physalus*)

Simone Panigada, Margherita Zanardelli, Greg Donovan

**DISCLAIMER: This document is a *draft outline* intended to facilitate discussion during the meeting of the ACCOBAMS Scientific Committee in November 2018. It does NOT represent a final draft version of the CMP, particularly as contributions from key players in the ACCOBAMS area are still missing and could not be integrated during this preliminary draft.**

**It is expected that a drafting workshop should be organized in spring 2019, where scientists involved in fin whale research in the Mediterranean will be invited and will be able to collaborate towards a draft final CMP that will also be considered by the IWC Scientific Committee in May 2019 before submission to the ACCOBAMS Meeting of Parties and the IWC for consideration.**

# CONTENTS

## EXECUTIVE SUMMARY (JUST AN EXAMPLE TO BE FINALISED WHEN THE PLAN IS READY)

***The overall goal of the Mediterranean Fin Whale CMP is to manage human activities that affect fin whales in the Mediterranean Sea in order to maintain a favourable conservation status throughout their historical range, based on the best available scientific knowledge.***

*The CMP includes eight sections, of which the first three provide background information including biology and status of the Mediterranean fin whale population. Section 4 reviews* ***actual and potential anthropogenic threats*** *and ranks these as low, moderate or high priority. Section 5 describes* ***mitigation measures*** *for those threats that have been accorded moderate or high priority. These include:*

- ***vessel strikes***
- ***noise (acute and chronic)***
- ***habitat degradation including chemical pollution and micro- and nano-plastics***

*Section 6, dealing with* ***public awareness and education****, will address …..*

*Section 7 outlines the actions called for and includes sub-sections on monitoring, on implementation and coordination of the CMP, and on involvement of stakeholders. In order to be effective, the CMP must have a recognised,* ***full-time Co-ordinator*** *who is responsible for* inter alia *actively involving stakeholders, especially those whose livelihoods may be affected. The Co-ordinator should report to* ***a Steering Committee*** *closely linked to appropriate authorities. The CMP will be useless without sufficient implementation funding. At the very least, sufficient funds must be made available to support the appointment and functioning of a Co-ordinator and Steering Group.*

*Section 8 describes in detail the high priority actions identified at this stage (see table below). They fall under the following five headings:* ***Co-ordination****,* ***Capacity building and public awareness****,* ***Research essential for providing adequate management advice****,* ***Monitoring****, and* ***Mitigation measures****. Descriptions of the high priority actions follow a common format, which consists of* ***description of action*** *(specific objective, rationale, target, timeline),* ***actors*** *(responsible for co-ordination of the action, stakeholders),* ***action evaluation*** *and* ***priority*** *(importance, feasibility).*

*The most critical and urgent action is the implementation of the Mediterranean Fin Whale CMP (CORD-01). Funding must be found for this action at the earliest opportunity to appoint a Co-ordinator and set up the Steering Group to ensure that the CMP moves ahead in a timely fashion.*

# INTRODUCTION

## 1.1 WHY A CONSERVATION MANAGEMENT PLAN IS NEEDED

For at least some parts of the year, the Mediterranean Sea contains two populations of fin whales (*Balaenoptera physalus*). One population is resident (hereafter the 'Mediterranean' population) and another (hereafter 'NENA', the northeastern North Atlantic population *sensu* Castellote *et al.,* 2012) is found in the very west of the region (Gauffier et al., 2018) with some overlap in distribution (see Fig. 1). Although no 'historic' estimates of abundance exist for either population, the Mediterranean population was not subject to direct exploitation whilst the NENA was subject to intense whaling near the Straits of Gibraltar, primarily in the early 1920s, after which catches declined then ceased (Sanpera and Aguilar, 1992).

The only historic large scale-abundance estimate comes from a survey in 1991 that provided an estimate of around 3,500 animals (Forcada *et al.*, 1996). The distribution of the sightings suggests that most, if not all, of these animals were from the Mediterranean population. The results of the large-scale summer 2018 survey (ACCOBAMS Survey Initiative) ……

A comparison of summer abundance in the 'Pelagos' area (add boundaries to map) from 1992 and 2009, showed an appreciable decline that may represent a true decline in abundance although potentially could have reflected a change in distribution (Panigada *et al.*, 2011). This information is sufficient to warrant considerable conservation concern over this population. The most recent IUCN Red List classifies the Mediterranean fin whales as Vulnerable (Panigada and Notarbartolo di Sciara, 2012). The potential threats (primarily ship strikes, pollution and noise) to the conservation status of fin whales in the Mediterranean and mitigation approaches are detailed in this document.

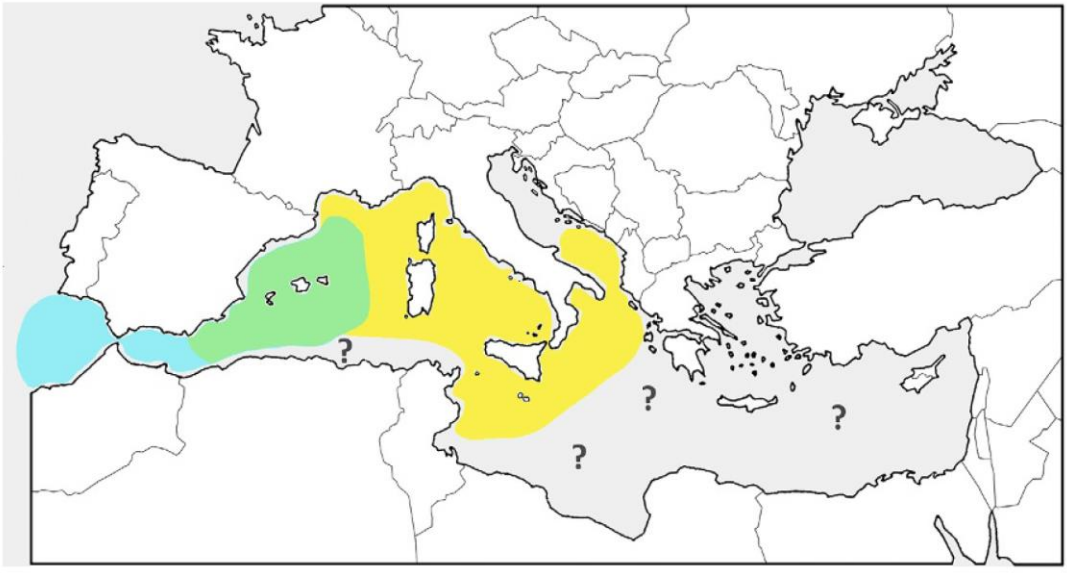


**Fig.1. Presumed distribution of fin whale (*Balaenoptera physalus*) populations in the Mediterranean Sea. Blue: north-east North Atlantic population (NENA whales). Yellow: Mediterranean population (MED whales). In green the presumed overlap between the two populations. NENA whales' distribution in the wider Atlantic Ocean is not shown. *Taken from Di Sciara* et. al., 2016 NEED TO ADD BOUNDARIES OF PELAGOS SANCTUARY**

The distribution of fin whales in both national and international waters requires international collaboration on the conservation and management actions developed in this plan. This has been recognised and supported by both ACCOBAMS and the IWC and will require co-operation by many

stakeholders, ranging from local and national governments, through intergovernmental bodies to industry and NGOs.

This CMP (following the general structure and philosophy given in Donovan *et al.* (2008)) and the accepted IWC template also adopted by ACCOBAMS (Res 6.21) is a framework to stimulate and guide the conservation of fin whales found in the Mediterranean and as such it should be re-evaluated and updated regularly (see Item 8.3).

NEED TO INSERT A TABLE OF RANGE STATES AND INCLUDE WHETHER MEMBERS OF ACCOBAMS AND/OR IWC

### 1.1.1 What is a mediterranean fin whale?

For the purposes of this plan, 'Mediterranean fin whales' are considered to be fin whales that spend all their lives in the waters of the Mediterranean Sea. The plan also considers, to the extent possible, fin whales from the presumed 'Northeastern North Atlantic (NENA)' population that spend some of their lives in the most western areas Mediterranean Sea, migrating through the Straits of Gibraltar. The full range of this population remains unknown (see Item 3.1) and clarification of this as soon as possible is important given the conservation implications.

## 1.2 OVERALL GOAL OF THE CMP

It is not possible to 'manage' fin whales in the Mediterranean themselves, but it is possible to manage human activities that adversely affect the whales and/or their habitat. Thus, by their nature, the management actions associated with this CMP require a degree of control and limitation on human activities.

> *The overall goal of this CMP is to manage human activities that affect fin whales in the Mediterranean Sea in order to maintain a favourable conservation status throughout their historical range, based on the best available scientific knowledge.*
>
> *In pursuing this goal, the needs and interests of stakeholders will be taken into account to the extent possible, whilst recognising that favourable conservation status is the highest priority. Moreover, scientific uncertainty must be taken into account while setting priorities and determining appropriate actions.*

Ideally, all management actions are based on adequate scientific data. However, there are occasions when the potential conservation consequences of waiting for confirmatory scientific evidence are sufficiently serious that it is justified to take action immediately whilst continuing to study the problem. This means following the 'precautionary principle'.

# 2 LEGAL FRAMEWORK

A summary of information on relevant conventions, agreements and national regulations is given in Annex 1.

# 3 BIOLOGY AND STATUS OF MEDITERRANEAN FIN WHALES (NEEDS TO BE BRIEF NOT A SCIENTIFIC THESIS!)

## 3.1 POPULATION STRUCTURE

A distinct 'Mediterranean' population of fin whales was confirmed by the genetic work of Berube et al., 1998 and Palsbøll *et al*., 2004. The samples examined all came from the Ligurian Sea and samples were significantly different from those elsewhere in the North Atlantic.

Subsequently, animals from an additional population found seasonally in the very west of the region was presented by Castellote *et al*. (2012) from acoustic data and Gauffier *et al*. (2108) with sightings data from the Strait of Gibraltar. There is a possibility of overlapping distribution. These animals are thought to be part of a much larger northeastern North Atlantic population (NENA). However, the possibility that they are remnants of a smaller population, severely depleted by commercial whaling in the 1920s by whaling from Spain and Portugal (at least 4,800 fin whales were caught between 1921 and 1927 with a peak of over 1100 whales in 1924) remains open.

It is extremely important to determine which of these hypotheses is true since the conservation implications are very different. If the latter, then this remnant population would be in danger of extinction.

Understanding population structure and movements is essential to interpreting abundance and trend information (see Item 3.3 below). The information available at present suggests that the summer abundance surveys (e.g. Forcada *et al*., 1995) are almost all of the Mediterranean population (all sightings east of 5˚E although surveys began at the Strait of Gibraltar).

Sightings of fin whales have been reported in waters from Spain to the Ionian Sea, much less frequently elsewhere. In summer, they appear to congregate in feeding grounds in the northwestern portion of the basin, namely the Corso-Ligurian-Provençal Basin and the Gulf of Lions (e.g. Forcada *et al*., 1995; 1996; Notarbartolo di Sciara, 2003; Panigada *et al.*, 2011, 2017).

### 3.1.1 Satellite Tagging

Between 2012 and 2015, thirteen fin whales were equipped with satellite transmitters; 8 tags were deployed in September 2012 in the Pelagos Sanctuary, while 5 tags were deployed in the Strait of Sicily, in March 2013 and March 2015, respectively (Panigada et al., 2017). Tagging occurred late in the summer in the Pelagos Sanctuary to gather information from outside the known summer feeding areas and to observe movements towards 'winter destinations'. In the Strait of Sicily, transmitters were deployed in March, when small numbers of whales are known to concentrate for feeding purposes (Canese *et al*., 2006). The animals equipped with satellite transmitters in the Pelagos Sanctuary revealed consistent movements within the Corso-Liguro-Provençal Basin and the Gulf of Lions and the Balearic Islands. Animals tagged in the Strait of Sicily remained around the Island of Lampedusa for a significant portion of the time they were tracked (March), with observed movements towards the southern coast of Sicily and northern Tunisia. Most of the whales sighted off Lampedusa in 2013–2015 were observed actively feeding at the surface on large swarms of krill,

most likely of the species *Nyctiphanes couchii*. Two fin whales moved north towards the Southern Tyrrhenian Sea and the east coast of Sardinia Island with an individual reaching the area of the Pelagos Sanctuary.

The longitudinal movements of fin whales tagged in the Ligurian Sea in the late summer and the latitudinal migration recorded in early spring, support the hypothesis that the whales summering in the northwestern Mediterranean Sea travel southwards towards winter feeding grounds in the Strait of Sicily, and possibly towards non-identified breeding areas in the Southern Mediterranean Sea (Notarbartolo di Sciara *et al*., 2003; Castellote *et al*., 2012). One additional hypothesis is that whales would later move northbound towards the Pelagos Sanctuary and adjacent waters during the early-mid-spring, following the marked feeding habitat concentration in the area (Notarbartolo di Sciara *et al*., 2016).

**Information gaps:** long-term information (ideally over a year, which would require implantable rather than LIMPET tags) on the movements of animals from the Strait of Gibraltar/Sea of Cadiz area will be extremely important. More detailed shorter-term data (e.g. from limpet tags) can assist in verifying spatial modelling approaches such as that of Druon *et al*. (2012).

### 3.1.2 Photographic effort

Long-term photo-identification was used to estimate survival rate, population size, rate of change, sex ratio of fin whales in the Pelagos Sanctuary. Abundance estimates for fin whales summering in the Pelagos Sanctuary feeding grounds were obtained through mark-recapture methods, which have never previously been applied for this species in the Mediterranean Sea. Merging existing photo-identification catalogues from different Institutes operating in adjacent study areas in the northwestern Mediterranean Sea provided a large dataset (505 fin whales identified between 1990 and 2007). The number of resightings was highest for the years 1991-1995, and this time interval provided the most robust abundance estimates obtained through the mark-recapture analysis. Population values ranged between 930 individuals in 1991-92 and 1,133 in 1994-95, with CVs of around 34% (Zanardelli *et al*., in preparation).

**Information gaps:** comparison of all photo-ID data from the various parts of the region is lacking that may provide valuable information on population structure and movements

### 3.1.3 Genetic Analyses

The first large-scale population genetic assessment of North Atlantic fin whales, based on ~400 mitochondrial (mt) control region DNA sequences of 288 nucleotide length and genotypes at six nuclear microsatellite loci, found an elevated degree of genetic divergence between North Atlantic and Mediterranean Sea fin whales (Berube et al. 1998). The elevated degree of genetic divergence was indicative of limited gene flow, suggesting that Mediterranean Sea fin whales are distinct from con-specifics in the North Atlantic. A later study (Palsbøll *et al.* 2004) applied the Isolation-with-Migration framework, originally developed by Nielsen and Wakeley (2001), to determine if the elevated degree of genetic divergence between the North Atlantic and Mediterranean Sea was due

to either low recurrent gene flow or a recent divergence of previously connected populations. The study was based on mtDNA control region sequences and estimated that a model of recurrent gene flow, at two females per generation, was more plausible than a model of recent divergence and subsequent zero gene flow. The inferred migration rate, low from an ecological/conservation perspective, is consistent with the current paucity of fin whale sightings in the Strait of Gibraltar.

***Information gaps*: See 3.1.5**

### 3.1.4 Integration

Integrating the data from *inter alia* telemetry, genetics, photo-identification and sightings/distribution, acoustic surveys is essential to obtain a better understanding of population structure and determine plausible hypotheses. This may also identify priority areas to undertake studies to resolve population structure, especially with respect to animals from the Strait of Gibraltar and Gulf of Cadiz. This may be best achieved through an expert workshop once all available data have been identified and collated.

### 3.1.5 Information Gaps/needs

(a) Understanding of the population structure of fin whales in the region, in particular to allow understanding of:

- whether animals from the Strait of Gibraltar/Sea of Cadiz are from a wider abundant population in the eastern North Atlantic or comprise a small relict population severely reduced by intensive whaling, especially in the 1920s; and
- the overlap in time and space of whales from the two populations within the region.

(b) To achieve this, needs include (NB these studies may provide important information on topics other than population structure):

- collation of available data/samples from a variety of techniques (genetics, photo-ID, telemetry, sightings and distribution, etc.) within and between seasons relevant to population structure;
- creation and maintenance of a single photo-identification catalogue – ideally in conjunction with a genetic-ID catalogue;
- increased targeted satellite tagging effort to address:
    - long-term movements and origins of Strait of Gibraltar/Sea of Cadiz whales;
    - where and when fin whales mate and conceive;
    - winter distribution.

## 3.2 BASIC BIOLOGY

### 3.2.1 Feeding

Fin whales favour upwelling and frontal zones with high concentrations of zooplankton (e.g. Bauer *et al*., 2015). The euphausiid *Meganyctiphanes norvegica* or northern krill is considered to be the main prey. Fin whales concentrate for feeding during the summer in the high productivity region in the Corso-Ligurian-Provençal Basin and the Gulf of Lions (Astraldi *et al*., 1994; 1995; Notarbartolo di Sciara *et al*., 2003).

However, as summarised in Notarbartolo di Sciara *et al*. (2003), fin whales have been observed engaging in inferred or directly observed feeding in other areas and times of the year e.g. in summer off eastern Sicily and off the island of Ischia, in spring off eastern Sicily and in winter off northeastern

Sardinia and off the island of Lampedusa. Using remote sensing data and fin whale observations, Druon *et al*. (2012) developed a modelling framework to predict in near real-time the presence of potential feeding habitats for fin whales in the northwestern Mediterranean Sea.

***Information gaps:*** better knowledge of feeding areas outside the summer e.g. by testing the Druon *et al*., spatial model with observations in other areas.

### 3.2.2 **Life history**

Population parameters specific to fin whales in the region are poorly understood. A study (Arrigoni *et al.,* 2011) based upon standings data from 1986-2007 necessarily involved considerable assumptions but the results were consistent with other cetacean and mammalian studies with respect to high calf mortality rates declining to low mortality rates for adults. No significant difference from an equal sex ratio was detected. The inevitable uncertainties made it impossible to determine whether the population was increasing or decreasing.

There is evidence that breeding is not strictly seasonal unlike other areas of the world where fin whales generally undertake regular migrations, e.g. see Notarbartolo di Sciara *et al*. (2003).

***Information gaps:*** better understanding of population parameters, breeding behaviour and distribution to aid (a) population modelling efforts to integrate several threats, and (b) development of targeted mitigation measures e.g. to improve survival of mature females.

## **3.3** ABUNDANCE AND TRENDS

Comprehensive basin-wide estimates of density and abundance are largely lacking for fin whales across the whole Mediterranean Region. The most comprehensive single survey prior to 2018 was undertaken in 1995; it covered the region from the Strait of Gibraltar as far as the coast of Italy. Almost all fin whales were seen in the Liguro-Provençal basin. Total estimated abundance was around 3,500 animals – the sightings distribution suggests these were all or almost all from the Mediterranean populations. Panigada *et al*. (2011, 2017) and Bauer *et al*. (2015) provided a synthesis of the available information on the species abundance, density and encounter rates in the Western portion of the Basin and present the most recent seasonal abundance and density estimates for the Pelagos Sanctuary and adjacent waters. Bauer *et al*. (2015) and Laran *et al.* (2017) also provided estimates of density - corrected for the availability bias - for the same species in the Gulf of Lions.

Most recently, in 2018 a basin wide survey was undertaken that …….

As discussed in Panigada *et al.* (2011), the appreciable decline in abundance estimates for an area broadly encompassing the Pelagos Sanctuary between surveys carried out in 1992 and 2009, is a cause for concern.

**Information gaps/needs:** there is a need to re-examine the available survey data, including use of spatial modelling approaches. Data on population trends are lacking and a thorough examination of the available data to determine an effective future monitoring approach (incorporating a realistic power analysis of the ability to detect trends should they occur) to ensure that adequate mitigation measures are working is needed. Data on winter distribution and abundance will enhance the ability to develop targeted mitigation approaches throughout the year.

## **3.4** **‘**ATTRIBUTES’ OF THE POPULATION(S) TO BE MONITORED

Potential attributes (power analyses needed to examine ability to detect trends if they occur):

(1) abundance and trends by population (high);

(2) distribution and changes over time (medium);

(3) body and health condition (e.g. from photographic studies including drones and photogrammetry, stress hormones etc.,) – feasibility to be assessed

# 4 SUMMARY OF ACTUAL AND POTENTIAL ANTHROPOGENIC THREATS

## 4.1 ACTUAL AND POTENTIAL ANTHROPOGENIC THREATS

Mediterranean fin whales face a number of both direct and indirect threats throughout their range (Table 1). Direct threats (i.e. those that may cause instantaneous or near instantaneous death of the animal) include vessel strikes, and, rarely but potentially, severe blasts of extremely loud noise. Indirect threats that may affect survival or reproduction but at a longer timescale, include:

- anthropogenic noise from different sources (e.g. industrial, extractive, prospective or military activities, or even from approaching vessels, such as during whale watching or research); and
- chemical pollution including micro- and nano- plastic ingestion (both fin whales and/or their prey); physical disturbance (e.g. intrusive whale watching and research).

Climate change may influence/exacerbate several of these, especially abundance and distribution of prey (and hence whales).

Table 1

Initial draft summary of information on actual and potential threats

| Actual/potential threat | Human activity | Strength of evidence | Possible impact | Priority for action | Relevant actions |
|---|---|---|---|---|---|
| **Major threats (lethal or sub-lethal)** | | | | | **Add later** |
| Vessel strikes | Ship traffic, particularly at speeds higher than 10 knots,<br>Presence or development of ports in areas of high use by whales | Strong | Mortality, serious injury | High | |
| Anthropogenic noise | Production of loud noise by industrial activities including those related to oil and gas extraction, military activities, general ship traffic incl. whale watching and research activities | Strong or moderate | Temporary or even permanent threshold shift, sound masking, temporary or permanent displacement from breeding or feeding areas, risk of ship strikes | High | |
| Micro- and nano-plastic ingestion | Release of plastic debris into the marine environment (tends towards breaking down into smaller and smaller particles) | Strong | Bioaccumulation of contaminants, with negative physiological effects | High | |
| **Other threats** | | | | | |
| Chemical contamination of cetaceans and their prey | Chemical pollution from industrial and development activities on land spreading into the sea or release of chemicals directly into the sea, including oil spills | Strong or moderate | Leading to compromised health that may affect reproduction (e.g. affecting hormonal balance or production) and survival (e.g. through reduced immune response) | Moderate to High | |
| Physical disturbance | Intrusive marine activities including oil and gas developments, coastal developments, fishing, whale watching and research | Moderate | Avoidance, displacement, interruption of life cycle activities, detrimental effects at the population level | Moderate to High | |
| Climate change | Production of green house gases | Low or Moderate | May influence distribution and abundance of prey | Low | |

### 4.1.1 Vessel strikes

The Mediterranean Sea is subject to some of the most heavy vessel traffic in the world, with about 30% of the world's total merchant shipping concentrated within only 0.8% of the global ocean surface. Unusually high rates of ship collisions have been reported for fin whales in the region, where the minimum mean annual fatal collision rate increased from 1 to 1.7 whales/year from the 1970s to the 1990s [Update with 2006 paper data and with ship strike project data]. By far the majority of reported fatal strikes (over 82.2%) were reported in or adjacent to the Pelagos Sanctuary, characterised by high levels of traffic and seasonal whale concentrations.

**Information gaps:** understanding the relationship between true numbers of animals killed or severely wounded by ship strikes and reported numbers, improve understanding on the mechanism of ship strikes (vessel type, speed, noise signatures, whale behaviour etc.) to determine the most effective mitigation measures.

### 4.1.2 Anthropogenic noise

Noise can adversely affect whales in a number of different ways. In the most severe cases (e.g. extremely high levels of acute noise e.g. from seismic vessels) this can result in permanent threshold shift or even death). Chronic noise at various time scales can affect whales e.g. by inducing temporary threshold shift and changing at least short-term and possibly long-term behaviour, excluding them from preferred habitat for shorter to longer time periods with the potential to impede successful feeding and reproduction. In addition to vessel traffic of all types (cargo, transport, fishing, tourism, noisy activities can arise from oil and gas exploration, military activities (sonar and explosions), dredging and building, whale watching and research. Potentially, the noise signatures of vessels may affect the ability of whales to avoid collisions.

**Information gaps**: understanding of the hearing abilities (audiogram) of fin whales and the physical and behavioural effects of both acute and chronic noise of different frequencies and intensities, sound mapping at the appropriate temporal and physical scales, better understanding of the noise signatures of vessels and other noisy activities.

### 4.1.3 Micro and nano plastic ingestion

The interaction between free-ranging fin whales and microplastics in the Mediterranean Sea and elsewhere has only recently started to be investigated. Fossi *et al.* (2016) found considerable quantities of microplastics and plastic additives in surface samples in the waters of and adjacent to the Pelagos Sanctuary. There was considerable overlap between high-density microplastic areas and whale feeding areas; exposure by whales was confirmed by a temporal increase in toxicological stress in whales. The authors concluded that exposure to microplastics (direct ingestion and consumption of contaminated prey) poses a major threat to the health of fin whales in the Mediterranean Sea.

**Information gaps**: better understanding of effects of micro- and nano-plastics on whale reproduction and survival at the individual and population level.

### 4.1.4 Contamination of cetaceans and their prey

Systematic studies of the contamination by xenobiotic compounds of free-ranging Mediterranean fin whales first started in 1990 and revealed high levels of organochlorine compounds, heavy metals, polycyclic aromatic hydrocarbons, hexachlorobenzene (HCB) and trace elements. The poor detoxifying potential possessed by marine mammals must be taken into account when dealing with these pollutants. This needs updating and references. What comprises "high" needs clarifying e.g. wrt other baleen whales in particular but also with odontocetes.

Prey contamination: to be added

Emerging contaminants: to be added

***Information gaps:*** to be inserted when section is updated. Will include how to incorporate information into modelling of effects of contaminants on reproduction and survival (e.g. see IWC POLLUTION 2020 initiative).

### 4.1.5 Physical disturbance

It is often difficult to separate physical disturbance (i.e. related directly to presence or physical damage to the habitat e.g. coastal developments) from factors associated with presence (e.g. high levels of noise during or because of coastal developments or other effects via the food chain).

Either way, directly or indirectly human development activities (both coastal and pelagic) in preferred habitat can have a serious adverse impact.

Invasive approaches of boats (e.g. from whale watching activities or even non-careful research activities) can also disturb whales through direct physical presence and/or via noise and interrupt important behaviour including feeding and reproduction (Jahoda et al.,2003) . Long-term presence can exclude animals from preferred habitat.

Unregulated whale watching activities, which may grow very fast is specific areas, may have detrimental effects at the population levels, which needs to be mitigated and prevented.

***Information gaps:*** better understanding of the direct and indirect of physical disturbance on fin whales and their prey.

### 4.1.6 Climate change

The potential effects of global climate change or ocean acidification on fin whales in the Mediterranean, largely dependent for feeding on euphausiids (Notarbartolo di Sciara et al., 2003) that are possibly susceptible to adverse reactions to an increase in temperatures due to climate change, are unknown, but cannot be neglected and need further investigation.

## 4.2 MONITORING

Any active species conservation effort requires that human activities, as well as the animals, are monitored over time in order to determine whether threats are worsening or lessening and to interpret results on the effectiveness of mitigation. Examples for this CMP include monitoring the number and trends in ships/journeys in areas where ship strikes are known or expected to occur, how vessel traffic is changing (e.g. number and size of vessels, speeds, routing) and levels and characteristics of underwater noise in feeding (and other) areas. In all cases, the first step is to establish a baseline.

XXX specific actions are identified here to address threat monitoring. In addition to these actions, any baseline study of other threat factors should be encouraged.

# 5 MITIGATION MEASURES

This section deals only with threats that are considered at this stage to be of moderate or high priority and where mitigation measures can be identified. This includes vessel strikes, noise in feeding areas and pollution. [refer to Pelagos Sanctuary actions where they exist]

## 5.1 VESSEL STRIKES

To be added based *inter alia* on IWC, ACCOBAMS and IMO work on ship strike mitigation.

## 5.2 ANTHROPOGENIC NOISE

To be added based *inter alia* on IWC, ACCOBAMS, CMS, IUCN and IMO work on chronic and acute noise mitigation

## 5.3 MICRO AND NANO PLASTIC INGESTION

To be added based *inter alia* on talking to Fossi *et al.*, but in practical terms, mitigation is clear if dependent on outside political will and public pressure: stop chucking this into the ocean and instigate clean ups for nano plastics.

## 5.4 CONTAMINATION OF CETACEANS AND THEIR PREY

In practical terms, mitigation is clear if dependent on outside political will and public pressure: stop chucking this stuff into the ocean

Physical disturbance

To be added in light of IWC and ACCOBAMS guidelines, national EI assessments and coastal planning rules, and specific cases where these are known.

# 6 PUBLIC AWARENESS, EDUCATION AND CAPACITY BUILDING

The great difficulty of locating Mediterranean fin whales in the ACCOBAMS waters outside of their known summer feeding grounds in the Western Ligurian Sea both complicates the challenge of improving public awareness and understanding at the basin level but also provides an opportunity to engage 'citizen science' in improving our understanding. Thus, these difficulties reinforce the importance of trying to engage the public's interest and involvement in Mediterranean fin whale science and conservation.

Providing range state parties and the public with easy access to up-to-date, accurate information on Mediterranean fin whales is essential. Outreach should include the use of mass media such as internet, newspaper, radio and television; public lectures and symposiums; education programmes for teachers and students of all ages; and dissemination of information in written and spoken form to whale-watch boats and other tourism operations.

Coastal communities where fishing or tourism is significant to the economy should be targeted as a priority. In addition, awareness and education programmes should emphasise the need to reach audiences in the eastern range states where, in spite of considerable awareness of whales and marine life generally, there is relatively little knowledge of fin whales.

Capacity building differs from outreach in that the objective is to assure that individuals and organisations in responsible positions within each of the range states have the motivation, skills and

resources needed to function effectively in implementing this plan. The transfer of necessary skills is but the initial step in this process, however. Ultimately, it is hoped that training efforts will translate into both legislative and regulatory actions and the commitment of necessary resources to support the conservation of Mediterranean fin whales throughout their range.

# 7 EXECUTIVE SUMMARY OF ACTIONS

Before moving to the specific actions, here we present some general considerations that require elucidation regarding the nature and usefulness of CMPs (and see Donovan, Cañadas and Hammond 2008).

## 7.1 DEALING WITH INADEQUATE DATA

While ideally, all CMPs and associated management actions are based on adequate scientific data, there are occasions when the potential conservation consequences of waiting for confirmatory scientific evidence mean that it is better to take action immediately whilst collecting the necessary information. This has become known as following the "precautionary principle" or taking a "precautionary approach." However, application of this principle must be carefully considered and well justified.

## 7.2 MONITORING

Establishing baseline information as a scientific reference for conservation actions is an important step towards effective conservation. Once this is achieved, monitoring (of the species or population, human activities, implementation and effectiveness of mitigation measures) **must** be an integral and essential part of management, not an optional extra.

## 7.3 LIFE OF THE CMP

Any CMP needs to be reviewed periodically so that the actions called for can be adjusted as appropriate in response to new information or changed circumstances. Once a Coordinator has been appointed and a steering committee is functioning, it is expected that a regular review and revision process will be implemented. It is suggested that this CMP would be reviewed every two years and that an in-depth review would be conducted every four years.

## 7.4 IMPLEMENTATION OF THE CMP; CO-ORDINATION, INVOLVEMENT OF STAKEHOLDERS

Experience has shown that in order to be effective, CMPs must have a recognized Coordinator who is either hired at least half-time under contract for the role or is situated professionally such that his or her investment of time and other resources (e.g. travel costs) is paid for as part of a salaried position. This is particularly true where effective conservation requires action (including legislative or regulatory action) by multiple stakeholders including, for example, intergovernmental and national authorities, scientists from several disciplines, representatives from industry, local communities, and NGOs. We do not believe that it is sufficient for such a Plan to be run part-time. Ideally, the

Coordinator should have a scientific and management background and be capable of communicating effectively with the various stakeholders. The importance of actively involving stakeholders, especially those whose livelihoods are likely to be affected by management measures, cannot be overemphasized. The Coordinator should report to a small Steering Committee appointed after consultation with appropriate authorities.

Amongst other things, the Coordinator and Steering Committee would be expected to:

- promote and coordinate implementation of the CMP (including investigating and pursuing funding opportunities and options), giving particular attention to stakeholders;
- make efforts to ensure that implementation of all high- and medium-priority actions has been initiated;
- determine and track the state of implementation of actions the results obtained, the objectives reached, and the difficulties encountered;
- communicate this information through regular reporting in an open, accessible format;
- appoint a group of experts to evaluate effectiveness and update the CMP every four years. The conclusions of this group should be made public in some way.

Finally, we stress that a CMP will not be effective without sufficient funding. At the very least, funds must be available to allow the Coordinator and the Steering Group to function.

## 7.5 TABLE OF ACTIONS [**includes a few DRAFT examples at this stage – they will be based on information gaps and needs identified above and then developed into full actions following the template**]

**Coordination actions**

| Nr. | Action | Impor-tance | Feasibi-lity | Crossref. |
|---|---|---|---|---|
| CORD-01 | Implementation of the CMP:<br>Coordinator and Steering Committee | ESSENTIAL | HIGH | |
| CORD-02 | Development of a Web-based exchange of scientific information | MEDIUM-HIGH | HIGH | PACB-01 |

**Capacity building and public awareness actions**

| Nr. | Action | Impor-tance | Feasibi-lity | Crossref. |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| PACB-01 | Development of a strategy to increase public awareness and build capacity in range states with a focus on:<br>(1) Occurrence, especially outside known summer range;<br>(2) Threats and mitigation | HIGH | HIGH | CORD-02 |

**Research actions essential for providing adequate management advice**

| Nr. | Action | Impor-tance | Feasibi-lity | Crossref. |
|---|---|---|---|---|
| RES-01 | Collation and analysis of available data/samples from a variety of techniques (genetics, photo-ID, telemetry, sightings and distribution, etc.) within and between seasons relevant to population structure. Hold expert workshop to elaborate stock structure hypotheses for the fin whales in the Mediterranean Sea and adjacent waters and finalise targeted studies to narrow these (see below). | HIGH | HIGH | RES-02<br>RES-03<br>RES-04<br>PACB-01<br>CORD-02 |
| RES-02 | Assess whether animals from the Strait of Gibraltar/Sea of Cadiz are from a wider abundant population in the eastern North Atlantic or comprise a small relict population severely reduced by intensive whaling, especially in the 1920s. Involves additional telemetry studies, genetic samples (present and if possible past from museums) etc. | HIGH | MEDIUM | RES-01 |
| RES-03 | Targeted telemetry studies to determine movements, migration routes, winter distribution and feeding and breeding areas of Mediterranean fin whales with a focus on:<br>(1) Evaluation of the overlap in time and space of whales from the two populations (NENA and true Med) within the region by season.<br>(2) Identifying areas by season with a high risk of being exposed to ship strikes (also see results from IMMA-IWC workshop) | HIGH | MEDIUM-HIGH | RES-01<br>CORD-02<br>PACB-01 |
| RES-04 | Creation and maintenance of a single photo-identification catalogue – ideally in conjunction with a genetic-ID catalogue to improve information on: population structure and movements, abundance and trends, population parameters, scarring and threats | HIGH | MEDIUM-HIGH | RES-01<br>CORD-02 |

**Monitoring actions**

| Nr. | Action | Impor-tance | Feasibi-lity | Crossref. |
|---|---|---|---|---|
| MON-01 | Develop effective (i.e. with sufficient power) long-term monitoring programme to estimate abundance and trends including consideration of most appropriate techniques e.g. individual identification (photo-identification and biopsy sampling) and/or sightings surveys | HIGH | HIGH | RES-04 |
| MON-02 | Ensure effective (i.e. with sufficient power) long-term monitoring of distribution, abundance and trends in the main summer distribution area (e.g., Liguro-Corso-Provencal Basin) | MEDIUM | MEDIUM | |

**Mitigation measure actions**

| Nr. | Action | Impor-tance | Feasibi-lity | Crossref. |
|---|---|---|---|---|
| MIT-01 | Prevention of ship strikes in selected areas based upon present information and that obtained from other CMP actions based upon mitigation measures agreed by IWC and ASCOBANS, primarily avoidance of areas of concentrations of whales and reduced speed in presence of whales | HIGH | MEDIUM-HIGH | PACB-01<br>RES-03 |
| MIT-02 | Evaluate any proposed existing or new technical mitigation measures including REPCET | HIGH | MEDIUM-HIGH | |
| MIT-02 | Adoption of a 'whale safe' certificate by shipping companies | HIGH | HIGH | PACB-01 |
| MIT-03 | Wider adoption and implementation of standardized codes of conduct (IWC/ACCOBAMS/CMS) to mitigate adverse impact of whale watching activities and intrusive research | HIGH | HIGH | |

## 8 ACTIONS [JUST A FEW POSSIBLE EXAMPLES ARE PROVIDED BELOW THAT WILL NEED REVIEWING AND FINALISING TO ILLUSTRATE THE FORMAT OF A FULLY SPECIFIED ACTION]

The Actions are described below, with each action beginning on a new page. One of the first tasks for the Coordinator and Steering Committee will be to develop detailed specifications for each action and where appropriate, assign costings and likely sources of funding.

## ACTION CORD-01: IMPLEMENTATION OF THE CMP: COORDINATOR AND STEERING COMMITTEE

*Coordination Action* Priority*:* **HIGH**

### DESCRIPTION OF ACTION

- **Specific objectives:** to ensure timely progress is made on implementation of the CMP and the specific actions prescribed in it, and to provide progress reports to appropriate bodies including: ACCOBAMS, CMS, IWC, range states and regional stakeholders, thereby maximising the chances of survival and maintaining a favourable conservation status throughout the historical range of Mediterranean fin whales.
- **Rationale:** this CMP is complex and considerable coordination is essential for it to be effective. Implementation will depend on stakeholders in several countries and a broad range of expertise. A dedicated, well-supported coordinator and a similarly committed Steering Committee are essential.
- **Target:** appointment of a suitably qualified Coordinator and Steering Committee, with the required logistical and financial support.

  Ideally, the Coordinator will be based in (but operationally independent of) an office capable of providing some level of support. While logistical and other support from a host institution should be paid for at an appropriate rate, it would not be appropriate for overheads to be charged on all actions funded.

  It will be necessary for a broader stakeholder steering committee to be established as soon as possible, with specific terms of reference and *modus operandi*. One of the first tasks of the Steering Committee will be to assess the need for national Sub-coordinators in each of the range states.

- **Timeline:**

| | WHAT | WHO | WHEN |
|---|---|---|---|
| (1) | Identification of host institution and agreement on hosting conditions | Interim Steering Committee (ISC) | First quarter 2020 |
| (2) | Development of detailed job description and conditions of work based on the tasks outlined below | ISC | First quarter 2020 |
| (3) | Identification of initial funds | ISC | Last quarter 2019 – first quarter 2020 |
| (4) | Recruitment of co-ordinator | ISC | First quarter 2020 |
| (5) | Co-ordinator begins work (initial 3-year contract) | Co-ordinator | Second quarter 2020 |
| (6) | Development of proposed terms of reference and *modus operandi* for stakeholder Steering Committee | ACCOBAMS, IWC, ISC, funders | Second quarter 2020 |
| (7) | Appointment of Steering Committee | ACCOBAMS, IWC, ISC, funders | Second or third quarter 2020 |

- **Tasks of Coordinator in conjunction with Steering Committee:**
  - To assess the need for national Sub-coordinators in each range state.
  - To promote and explain the CMP and progress with its implementation to relevant stakeholders, including:
    - International and regional bodies.
    - Range state officials.
    - Industry representatives including, shipping, hydrocarbon exploration and development, etc.
    - Local authorities and communities in selected areas.

    - NGOs.
  - To raise funds for and manage the Mediterranean fin whales CMP Fund including, where necessary, assigning contracts to ensure that the Actions of the CMP are undertaken and completed.
  - To liaise with relevant authorities to facilitate any permitting required to undertake Actions of the CMP.
  - To facilitate (and if necessary adapt or modify existing) data-sharing agreements to ensure that data are made available in timely fashion to maximise their value for conservation.
  - To develop a database or databases and coordinate the collation, in an appropriate electronic format, of relevant data and information on human activities, the environment and whales, as far as possible in a GIS context.
  - To maintain and update the existing list of international and national regulations and guidelines relevant to the conservation of Mediterranean fin whales (see Annex 1).
  - To produce concise annual progress reports on the implementation of the CMP.
  - To arrange for periodic expert review of the CMP and the development of new or modified actions as appropriate
  - To develop a Mediterranean fin whale CMP website as a resource for researchers, stakeholders and the general public.

## INITIAL BUDGET ITEMS TO BE CONSIDERED BY ISC

- Recruitment process (*e.g.* advertising, travel and subsistence for ISC and shortlisted candidates).
- Host institution annual costs (needs to be negotiated by ISC).
- Salary of Coordinator (level, tax and benefits issues).
- Initial working budget for Coordinator (travel and subsistence including visits to range states and meetings with stakeholders).

## ACTORS

- **Responsible for coordination of the action:** the ISC to identify the host institution, obtain initial funding and appoint the Coordinator; ACCOBAMS and IWC to appoint the broader stakeholder Steering Committee for the CMP.
- **Stakeholders**: as listed above under 'Tasks'.

## ACTION EVALUATION

- ACCOBAMS, IWC.
- Regular (*e.g.* biennial or triennial) meetings open to stakeholders.

## PRIORITY

- **Importance**: Essential
- **Feasibility**: high if political will is there

## ACTION CORD-02: DEVELOPMENT OF A WEB-BASED EXCHANGE OF SCIENTIFIC INFORMATION

*Co-ordination Action* Priority: **HIGH**

### DESCRIPTION OF ACTION

- **Specific objective**: develop a web-based forum by which scientific information (*e.g.* photo-ID catalogues, tissue sample database, sighting record registry) can be maintained in a centralized location and freely exchanged among interested parties (also see CORD-01).
- **Specific threats to be mitigated**: while not a mitigation action *per se*, this action will provide a valuable framework for the exchange of information necessary to develop and/or monitor the effectiveness of mitigation measures.
- **Rationale**: integration of information on Mediterranean fin whales from all areas where they are observed is of substantial value in understanding patterns of habitat use and the links between geographic areas as well as in determining migration routes and wintering area location(s). Having a centralized data repository where all interested parties (including the public) would be able to share and exchange information on Mediterranean fin whales in accordance with an agreed data availability protocol (see CORD-01) would benefit conservation measures at a broader (*i.e.* rangewide) geo-spatial scale.
- **Target:** creation of a centralized data exchange forum allowing for information sharing and integration amongst interested parties should be developed as soon as possible, realistically beginning January 2020 upon engagement of the CMP coordinator.
- **Method**: the CMP coordinator will arrange for the design and implementation of a web-based forum (see CORD-01) to facilitate the archiving and exchange of information relevant to Mediterranean fin whale conservation that would incorporate: 1) photo-identification data/catalogue, 2) information on genetic samples and analyses, 3) sighting records, 4) stranding and necropsy data, 5) current and future human activities, and 6) environmental information. Where appropriate, data will be available in standard GIS format. Data safeguards and sharing agreements will be developed and taken into account.
- **Implementation-timeline**: begin design of web-based site immediately with establishment of a live URL launched as soon as possible.

### ACTORS

- **Responsible for coordination of action:** CMP coordinator.
- **Stakeholders**: Range State Governments, ACCOBAMS, IWC, industry, local authorities, NGOs.

### ACTION EVALUATION

- IWC
- ACCOBAMS

### PRIORITY

- **Importance:** high
- **Feasibility:** high

## ACTION PACB-01: DEVELOP A STRATEGY TO INCREASE PUBLIC AWARENESS AND BUILD CAPACITY IN RANGE STATES PUBLIC AWARENESS AND CAPACITY BUILDING

*Public Awareness and Capacity Building Action* Priority*:* **HIGH**

### DESCRIPTION OF ACTION

- **Specific objective**: to develop a strategy specific to each range State for the timely production of a series of resources to inform citizens of range states of the status of Mediterranean fin whales and what they should do if they see animals either at sea or stranded.
- **Rationale:** it is extremely difficult to obtain information on Mediterranean fin whales away from the known concentrations on the feeding grounds, given the small total number of animals and the lack of information on migration routes and on the location of breeding grounds (see Action RES-01). Without further information, traditional research methods such as sightings surveys will be ineffective (as well as prohibitively expensive). However, in much of their suspected range, Mediterranean fin whales would have to be in waters with considerable marine traffic (*e.g.* fisheries, cargo, public transport, military, marine industry, research, pleasure). They may occur on (if stranded) or near heavily populated coastlines. The value of opportunistic observations should be maximised using the variety of communication techniques available, including the internet, newspapers, radio and television. The information obtained will be of direct value to conservation efforts in a number of ways.
- **Target:** to develop a strategy and Actions to produce a variety of targeted, accurate, public awareness resources that will inform people on the status of Mediterranean fin whales and on how citizens can assist in conservation efforts including what they should do if they encounter living or dead Mediterranean fin whales. 'Targeted' refers to a variety of categories of persons (there will be overlap), to be determined but certainly including, for each range state: mariners (and their trade associations where applicable), fishermen (and their trade associations where applicable), whale watching operations, NGOs, research institutes, schools. Such efforts will need oversight by the coordinator and Steering Committee such that local differences are accounted for but ensuring overall consistency and accuracy. The CMP website and central database(s) will play an important role (see Actions CORD-01 and CORD-02).
- **Timeline:**

| | WHAT | WHO | WHEN |
|---|---|---|---|
| (1) | Preparation for a small expert workshop to develop a strategy for the public awareness effort | Interim Steering Committee (ISC) – see Action CORD-01 | December 2020 |
| (2) | Hold workshop | Identified participants (see methods below) | March 2021 |
| (3) | Implement strategy and actions agreed by workshop following a timeline established by the workshop (probably a staged process) | Workshop, coordinator of CMP | To be determined |

- **Methods:** the ISC begin preparations for a small expert workshop to determine the strategy for public awareness materials, including:
    - Identification of target groups, by range state where appropriate.
    - Identification of existing/development of new text, audio and visual material to provide general background to the situation of Mediterranean fin whales; consideration should be given to how this material may need to be varied for any of the target groups.
    - Identification of existing/development of new text, audio and visual material to provide information on what to do if one encounters a living or dead animal; consideration should be given to how this material may need to be varied for any of the target groups, taking into account Actions MIT-01 and MIT-02.
    - Identify/ensure that mechanisms are in place to receive, review and incorporate information (data, photos, tissues etc.) for maximum conservation benefit, taking into account Actions CORD-01 and CORD-02.

- Determine a mechanism to ensure that the general objective/target is met in as timely a fashion as possible, including specific actions, a budget and a timeline.

- Attendees should include:
  - Coordinator of the CMP and representatives of the stakeholder Steering Committee.
  - Scientists familiar with the Mediterranean fin whale situation.
  - Scientists familiar with incorporating data from the general public – *e.g.* IWC ship strikes project (http://www.iwcoffice.org/sci_com/shipstrikes.htm).
  - Public awareness experts from each country.

### INITIAL BUDGET ITEMS TO BE CONSIDERED BY ISC

Costs associated with preparatory materials and holding of a workshop in December 2020.

### ACTORS

- **Responsible for co-ordination of the action:** the ISC to prepare for the holding of the workshop, subsequently the coordinator and broader stakeholder Steering Committee for the CMP.
- **Responsible for carrying out the action:** to be determined at workshop.
- **Stakeholders**: all

### ACTION EVALUATION

- ACCOBAMS, IWC.
- Feedback system built in to materials.

### PRIORITY

- **Importance**: high
- **Feasibility**: high

## 9 REFERENCES

To be added on completion of draft

# 10 ANNEX 1 THIS IS A PRELIMINARY ROUGH DRAFT AND WILL REQUIRE ASSISTANCE FROM THE LEGALLY MINDED

Annex 1 includes a summary of information on relevant international conventions and agreements, and on relevant national legislation. A more detailed treatment of this will be available from the Mediterranean Fin Whale CMP webpage, once this has been established.

# 11 INTERNATIONAL CONVENTIONS AND AGREEMENTS

## 11.1 INTERNATIONAL CONVENTION FOR THE REGULATION OF WHALING

The **International Convention for the Regulation of Whaling** (ICRW) was adopted on 2 December 1946. It established the International Whaling Commission (IWC) to ensure the proper and effective conservation and development of whale stocks by regulating whaling activities. List which range states are members as of 2018. Since the 1985/1986 season, commercial takes of all large whales have been suspended and catch limits set for only aboriginal subsistence whaling. Convention on the Conservation of Migratory Species of Wild Animals

## 11.2 CONVENTION ON THE CONSERVATION OF MIGRATORY SPECIES

The **Convention on the Conservation of Migratory Species of Wild Animals** (CMS), also known as the **Bonn Convention**, is an intergovernmental treaty under the auspices of the United Nations Environment Programme. It aims to "conserve terrestrial, marine and avian migratory species throughout their range". List which range states are members as of 2018. Appendix I of the Convention is a list of endangered migratory species that are threatened with extinction while Appendix II is a list of migratory species that need or would significantly benefit from international co-operation. The species is listed on both Appendix I or Appendix II.

## 11.3 AGREEMENT ON THE CONSERVATION OF CETACEANS IN BLACK SEA, MEDITERRANEAN SEA AND CONTIGUOUS ATLANTIC AREA

xxxx

## 11.4 CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES OF WILD FAUNA AND FLORA

The **Convention on International Trade in Endangered Species of Wild Fauna and Flora** (CITES) was agreed at a meeting of representatives of 80 countries in Washington DC., United States of America, on 3 March 1973, and on 1 July 1975 CITES entered into force. The purpose of the convention is to protect endangered animals and plants from over-exploitation by regulating international trade. All range states of Mediterranean fin whales except the Democratic People's Republic of Korea are members of CITES. Endangered species threatened with extinction are listed in Appendix I of the Convention. International trade of these species is prohibited except for non-commercial uses where it can be shown that limited and well-documented trade represents no risk to the species (*e.g.* scientific research). The fin whale is listed in Appendix I.

## 11.5 INTERNATIONAL MARITIME ORGANISATION

The **International Maritime Organisation** (IMO) was established on 6 March 1948 with the mandate to "…develop and maintain a comprehensive regulatory framework for shipping…" as well as to prevent and control marine pollution from ships. All Mediterranean fin whale range states are members. The IMO has spawned a number of international conventions intended to regulate or prevent impacts of shipping activities on the marine and coastal environment as well as insure people's safety:

The **Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter**, generally known as the **London Convention**, was adopted on 29 December 1972. It was replaced on 17 November 1996 by the **Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter**, also known as the **London Protocol**. This protocol aims to protect the marine environment from human activities and defines the global rules and regulations on dumping. With the exception of the Democratic People's Republic of Korea, all other range states are members. Among them, only the People's Republic of China (1998), Japan (2007) and the Republic of Korea (2009) have signed the London Protocol. The London Protocol promotes waste management by regulating and preventing dumping activities.

The **International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL 73/78)** came into force on 2 October 1983. Among the range states, only the People's Republic of China, Japan, and the Republic of Korea have signed all MARPOL Annexes. The Democratic People's Republic of Korea and the Russian Federation agreed to all except MARPOL Annex VI on the prevention of air pollution from ships. This Convention acts to prevent accidental and operational pollution of the marine environment resulting from shipping activities. It incorporates most of the articles of the ***International Convention for the Prevention of Pollution of the Sea by Oil***, also known as OILPOL, adopted in 1954. MARPOL 73/78 explicitly provides regulations for oil, chemicals, harmful substances in packaged form, sewage and garbage pollution. Under this agreement, ships are required to have double hulls, ballast tanks and other appropriate equipment to prevent or limit pollution and discharges at sea. The Convention also designates special areas where dumping and pollution are strictly prohibited.

The **International Convention on Oil Pollution Preparedness, Response and Co-operation**, known as the **OPRC Convention**, was adopted on 30 November 1990. It promotes international co-operation and mutual assistance for preparation and response to oil pollution incidents. It also encourages members to develop and maintain an adequate capability to deal with oil pollution emergencies. Among the range states, only Japan, the Republic of Korea and the People's Republic of China have signed this convention.

## 11.6 REGIONAL FISHERIES BODIES

To be added

## 11.7 OTHER BODIES THAT MANAGE HUMAN ACTIVITIES IN THE MARINE ENVIRONMENT

The **United Nations Convention on the Law of the Sea (UNCLOS)** is a legal instrument defining the legal status of the different seas and straits as well as countries' limits, rights and duties within territorial seas. The convention defines the rights and responsibilities of nations in their use of the world's oceans, establishing guidelines for businesses, the environment, and the management of marine natural resources. List Range States

The **Convention on the Transboundary Movement of Hazardous Wastes**, known as the **Basel Convention**, controls the movement and disposal of hazardous wastes across nations.

Etc, Etc……..

## 12 NATIONAL LEGISLATION

The information on relevant national range state legislation needs to be developed ?by the Secretariat? – a useful resource is EcoLex (http://www.ecolex.org)

**II - STATUS REPORT ON DRAFT CONSERVATION MANAGEMENT PLAN ON MEDITERRANEAN RISSO'S DOLPHIN**

# Draft Outline

# ACCOBAMS CMP for Mediterranean Risso's dolphin *(Grampus griseus)*

Coordinated by Léa DAVID

Attention please :

This document is a draft which should facilitate the discussion during the meeting of the ACCOBAMS Scientific Committee in November 2018. Contributions from key players in the ACCOBAMS area are missing and could not be integrated during this preliminary draft, but it is expected that a workshop should be organized in spring 2019, where all the scientists involved in Risso's dolphin research in the Mediterranean Sea will be invited. They will be able to collaborate to the drafting of the final CMP before submission to the Meeting of Parties (2019) for formal approval.

Some sections are missing in this draft, their content is described by sentences written in orange, and the information will be added for the final version.

## CONTENTS

## EXECUTIVE SUMMARY

(To be finalised when the plan is ready)

***The overall goal of the Mediterranean Risso's dolphin CMP is to manage human activities that affect this species in the Mediterranean Sea in order to maintain a favourable conservation status throughout their historical range, based on the best available scientific knowledge.***

*The CMP includes eight sections, of which the first three provide background information including biology and status of the Mediterranean Risso's dolphin population. Section 4 reviews* ***actual and potential anthropogenic threats*** *and ranks these as low, moderate or high priority. Section 5 describes* ***mitigation measures*** *for those threats that have been accorded moderate or high priority. These include:*

- *incidental mortality and injury in fisheries (bycatch)*
- *anthropogenic noise*
- *habitat degradation including prey depletion*
- *marine litter, macro-, micro- and nano-plastics*
- *contamination of cetaceans and their prey*
- *physical disturbance / harassment*

*Section 6, dealing with* ***public awareness and education****, concludes that …..*

*Section 7 outlines the actions called for and includes sub-sections on monitoring, on implementation and coordination of the CMP, and on involvement of stakeholders. In order to be effective, the CMP must have a recognised,* ***Co-ordinator*** *who is responsible for* inter alia *actively involving stakeholders, especially those whose livelihoods may be affected. The Co-ordinator should report to* ***a Steering Committee*** *closely linked to appropriate authorities. The CMP will be useless without sufficient implementation funding.*

*Section 8 describes in detail the high priority actions identified at this stage (see table below). They fall under the following five headings:* ***Co-ordination****,* ***Capacity building and public awareness****,* ***Research essential for providing adequate management advice****,* ***Monitoring****, and* ***Mitigation measures****. Descriptions of the high priority actions follow a common format, which consists of* ***description of action*** *(specific objective, rationale, target, timeline),* ***actors*** *(responsible for co-ordination of the action, stakeholders),* ***action evaluation*** *and* ***priority*** *(importance, feasibility).*

*The most critical and urgent action is the implementation of the Mediterranean Risso's dolphin CMP coordinator (CORD-01). Funding must be found for this action at the earliest opportunity to appoint a Co-ordinator and set up the Steering Group to ensure that the CMP moves ahead in a timely fashion.*

*Remarks : as ACCOBAMS develops Conservation and Management Plan for four cetacean's species, one coordinator could take in charge one, two or several of these CMP as the work might be some time species-specific and sometimes very similar to conduct.*

# 1 INTRODUCTION

## 1.1 WHY A CONSERVATION MANAGEMENT PLAN IS NEEDED

(To be finalised when the plan is ready)

This CMP is based on the template found in the Resolution 6.21 adopted by the Parties of ACCOBAMS concerning S**pecies conservation management plans.** This CMP is a framework to stimulate and guide the conservation of Risso's dolphin found in the Mediterranean and as such it should be re-evaluated and updated regularly (see section 7.3).

## 1.2 OVERALL GOAL OF THE CMP

If the term "conservation" is for the species, Risso's dolphin, the term "management" is not for the animal as it is not possible to 'manage' Risso's dolphin in the Mediterranean themselves, but it *is* possible to manage human activities that adversely affect the animals and/or their habitat. Thus, by their nature, the management actions associated with this CMP require a degree of control and limitation on human activities.

> *The overall goal of this CMP is to manage human activities that affect Risso's dolphin in the Mediterranean Sea in order to maintain a favourable conservation status throughout their historical range, based on the best available scientific knowledge.*
>
> *In pursuing this goal, the needs and interests of stakeholders will be considered to the extent possible, whilst recognising that favourable conservation status is the highest priority. Moreover, scientific uncertainty must be considered while setting priorities and determining appropriate actions.*

Ideally, all management actions are based on adequate scientific data. However, there are occasions when the potential conservation consequences of waiting for confirmatory scientific evidence are sufficiently serious that it is justified to take action immediately whilst continuing to study the problem. This means following the 'precautionary principle'.

# 2 LEGAL FRAMEWORK

## 2.1 INTERNATIONAL CONVENTIONS AND AGREEMENTS

A summary of information on relevant conventions, agreements and national regulations will be given in Annex 1.

## 2.2 NATIONAL LEGISLATION AND MANAGEMENT ARRANGEMENTS

A table to synthetize the Range states information

# 3 BIOLOGY AND STATUS OF MEDITERRANEAN RISSO'S DOLPHIN

**Summary and introduction**

(To be added based on all bibliographic references, from peer-reviewed or other scientific literature -Risso's dolphin workshop at the last ECS conference for example- and discussion with relevant stakeholders, as knowledge exist but is sometimes not published yet).

## 3.1 POPULATION STRUCTURE

Risso's dolphin remains one of the least-known species in the Mediterranean Sea, with a few dedicated studies, and little is known about its abundance in the Mediterranean Sea (Bearzi *et al*., 2010). A regional IUCN Red List workshop in March 2006 concluded that the Mediterranean subpopulation is Data Deficient (Gaspari & Natoli 2006). More recently interesting results off the central coast of Catalonia (NE-Spain), have been provided for the inclusion of the Risso's dolphin as vulnerable in the Spanish National Catalogue of Threatened Species (Gazo and Chicote, 2018 in Lanfredi et al., 2018).

Based on mitochondrial DNA analyses, Risso's dolphins in the Mediterranean Sea are genetically differentiated from those in U.K. waters, with limited gene flow between the two areas (Gaspari *et al*., 2007) and genetic analyses on 33 samples from the Mediterranean region (27 collected from the Ligurian Sea) suggested relatively high diversity. One possible reason for this differentiation could be the geophysical characteristics of the Mediterranean Sea, which has oceanographic and ecological characteristics that greatly differ from the Atlantic Ocean. The nature of a semi-enclosed sea such as the Mediterranean may have contributed to isolation between the Atlantic and the Mediterranean populations (Gaspari, 2004).

Understanding population structure and movements is essential to interpreting abundance and trend information.

In the Mediterranean basin, this species is found from Gibraltar to the Aegean Sea, and it is mostly encountered in deep pelagic waters, in particular over steep shelf slopes and submarine canyons (Cañadas *et al*., 2002).

Sightings of Risso's dolphin have been reliably and consistently reported from the waters of Spain (Cañadas *et al*., 2002), France (Di-Méglio *et al*., 1999), Monaco (Azzelino *et al.,* 2008), Italy (Notarbartolo di Sciara *et al*., 1993) and Greece (Frantzis *et al*., 2003), much less frequently elsewhere.

**Information gaps/needs :**

- comparison of all photo-id catalogues from the various part of the region is lacking that may provide valuable information on population structure and movements

- further research is needed to characterise population structure of Risso's dolphin within the Mediterranean Sea, with genetic, as well as the degree of genetic exchange with animals in the Atlantic, and also acoustic repertoire should be studied

## 3.2 DISTRIBUTION, MIGRATION AND MOVEMENTS

Risso's dolphin in the Mediterranean Sea are known to prefer deep waters and shelf break areas where the slope is steepest, which bring them close to the coast where the shelf is narrow, such as in western Liguria, western Corsica and south-eastern France (Notarbartolo di Sciara *et al*., 1993, Cañadas *et al.,* 2002, Azzelino *et al.,* 2008, Bearzi *et al*., 2010).
In the north-western Mediterranean Sea, hotspots of Risso's dolphin were found in the Genoa Canyon, mainly at water depths of approximately 1000 m (Moulins *et al.,* 2008). Sightings were also made far offshore and in deeper pelagic waters (Beaubrun *et al*., 1997; Airoldi *et al.,* 2000; Laran *et al.,* 2002; Laran *et al*., 2016 and Arcangeli *et al*., 2018), suggesting that distribution is not limited to the continental slope.

Preliminary photo-identification data suggest relatively wide movements but do not preclude some degree of fidelity or regular use of specific areas (Cañadas and Sagarminaga, 1997; David and Di Méglio, 1999; Casacci and Gannier, 2000; Mussi and Miragliuolo, 2003; Airoldi *et al*., 2005; Polo *et al*., 2009; Mariani *et al*., 2010).

However, the most recent studies (Azzelino *et al*., 2016; ECS workshop 2018). highlight changes in distribution and habitat in the northwestern Mediterranean Sea, with low encounters over the continental slope in recent years compare to what was known on the species before.

**Information gaps/needs** :

- comparison of all photo-id catalogue from the various part of the Mediterranean Sea is lacking that may provide valuable information on movements of animals

## 3.3 BASIC BIOLOGY

### 3.3.1 Feeding

Risso's dolphin in the western Mediterranean Sea feed mostly on oceanic cephalopods found in the middle slope (600-800 m). Species include the pelagic octopod *Argonauta argo* and various ommastrephid, histioteuthid and onychoteuthid squids (Blanco *et al*., 2006 in Notarbartolo di Sciara & Birkun, 2010). They seem to feed predominantly during the night (Shane, 1995a,b; Praca and Gannier, 2007; Soldevilla *et al*., 2010 in Bearzi *et al.,* 2010),

probably to take advantage of the circadian vertical movements of their prey (Roper and Young, 1975; Hanlon and Messinger, 1996; Soldevilla *et al.,* 2010 in Bearzi *et al*., 2010).

Gaspari's study in 2004 suggested that Risso's dolphin may use the environment in a vertical manner performing deep dives to forage. Azzelino *et al*. (2004) suggest that, in the Ligurian Sea, competition for food between different species of cetaceans, such as Cuvier's beaked whales, sperm whales, and Risso's dolphins, may be high, and these species have adopted different feeding strategies (Gaspari, 2004). Risso's dolphins were found associated with a definite depth and slope gradient, suggesting a feeding specialization. Oceanographic mechanisms may concentrate prey along the steep section of the continental slope, and this may be what attracted Risso's dolphins (Gaspari, 2004).

***Information gaps/needs:***

- Nocturnal observations/acoustic studies or suction cup to know dive profiles would be particularly useful to investigate feeding patterns

### 3.3.2 Life history

(To be completed later)

***Information gaps/needs:*** better understanding of population parameters, breeding behaviour and distribution to aid (a) population modelling efforts to integrate several threats, and (b) development of targeted mitigation measures e.g. to improve survival of mature females.

## 3.4 ABUNDANCE AND TRENDS

In all Mediterranean areas with suitable habitat that have been surveyed, encounter rates for Risso's dolphins have been low compared with rates for other more common delphinids (Bearzi *et al*., 2010).

An abundance estimate based on line-transect methods was conducted in a 32 270 km² area east of Spain, where aerial surveys in 2001-2003 yielded an estimate of 493 individuals (CV = 60.6%; Gómez de Segura et al., 2006). That estimate was not corrected for visibility bias and therefore likely underestimates the true abundance in the sampled area (Gómez de Segura et al., 2006).

*Laran et al.* in 2016 used aerial seasonal surveys over the north-western Mediterranean Sea (181 400 km² of study area) to provide estimates of abundance and distribution patterns for cetacean species including Risso's dolphin. This species was more rarely encountered than the others and total estimated abundance for Risso's dolphin was 2000 individuals (95% CI: 700–5900) in the winter and 1400 individuals (95% CI: 500–3700) in the summer.

Little is known about the abundance of Risso's dolphins in the Mediterranean Sea, although most observations have occurred in the Ligurian-Corso-Provençal basin during the summer (Airoldi *et al.,* 2015).

In 2016, Azzelino *et al*. presented local estimation of population size for Risso's dolphin in the western Ligurian Sea using mark-recapture method from 1990 to 2014. In the last period of the time series, Risso's dolphin population size significantly decreased, from an average of about 120–150 individuals in the period from 2000 to 2005 to an average of 70–100 dolphins in the period from 2010 to 2014. The results of the study also highlight a **dramatic change in the species use of the habitat** in the study area. Species **occurrence** appeared to be significantly decreasing in coastal and continental slope areas, while it seemed to be stable in the most pelagic area (Azzelino *et al*., 2016).

**Information gaps/needs:**

**-** Collection of the data, sightings and photo-ID must continue in the future to allow detection of seasonal and inter-annual fluctuations in distribution and abundance.

- Spatial analyses should be realised of existing sightings gathered from all structures to confirm the differences that appear in recent years compare to what was known on the species previously in terms of abundance, distribution and habitat..

- Spatial analyses and abundance should be realised in different regions of the Mediterranean Sea to allow to differentiate a shift of the population distribution (relocation) or a decrease in total abundance.

- Once the data are sufficient to adequately represent the spatial and temporal variability of the animal's distribution, spatial models can be applied from which predictive habitat maps can be derived.

## 3.5 ATTRIBUTES' OF THE POPULATION(S) TO BE MONITORED

Potential attributes (power analyses needed to examine ability to detect trends if they occur):

(1) abundance and trends by population (high);

(2) distribution and changes in that over time (high);

(3) Rate of natality and changes in that rate over years (medium)

(4) If changes are confirmed, then cause of changes in habitat and/or abundance and/or in natality should be addressed (medium)

# 4 SUMMARY OF ACTUAL AND POTENTIAL ANTHROPOGENIC THREATS

## 4.1 ACTUAL AND POTENTIAL ANTHROPOGENIC THREATS

Mediterranean Risso's dolphin face a number of both direct and indirect threats throughout their range (Table 1). Some of them are documented and others less studied for this species, but as they are known for other related species, it can be deduced that the Risso's dolphin will also be impacted.

Direct threats (i.e. those that may cause instantaneous or near instantaneous death of the animal) include :

- bycatch,

- impulsive noise (as severe blasts of extremely loud noise)

Indirect threats that may affect survival or reproduction but at a longer timescale, include:

- anthropogenic noise from different sources (e.g. industrial, extractive, prospective or military activities, or even from approaching vessels, such as during whale watching or research); and
- pollution including macro-, micro- and nano- plastic ingestion (both by Risso's dolphin and/or their prey);
- physical disturbance (e.g. intrusive whale watching and research)

Habitat degradation may influence/exacerbate several of these, especially depletion of preys.

**Table 1**
**Summary of information on actual and potential threats**

| Actual/potential threat | Human activity | Strength of evidence | Possible impact | Priority for action | Relevant actions |
|---|---|---|---|---|---|
| **Major threats (lethal or sub-lethal)** | | | | | Add later |
| Bycatch | Longline fisheries / driftnets | Strong, based on observer programs and occurrence of stranded animals | High in some areas: mortality and serious injury | High | - Investigate and assess the incidental mortality of Risso's dolphin through either onboard observation or studies of strandings<br>- Investigate the type of fishing gear used depending the areas and evaluate their impact on the species<br>- Identifying the main factors determining this bycatch (seasonality, geographic location)<br>- In long-term: monitoring of trends in abundance of the Risso's dolphin |
| Acoustic disturbance | Production of loud noise by industrial activities including those related to oil and gas extraction, military activities, general ship traffic incl. whale watching and research activities | Poor | Temporary or even permanent threshold shift, sound masking, temporary or permanent displacement from breeding or feeding areas | High | Improve PAM - Investigate the cumulative and synergistic effects of several noise sources<br>Adopt a precautionary approach : Reducing overall noise levels ("acoustic footprint") in the marine environment.<br>Distancing noise events from biologically important areas or concentrations of cetaceans |
| **Other threats** | | | | | |
| Prey depletion | depletion of food ressources caused directly or indirectly by fishing - Interspecific competition | Poor | Could be a cause of the population decrease in the western Ligurian Sea | Medium | Investigate the interspecific competition and the change of its use of habitat in the Western Ligurian Sea |
| Macro-, micro- and nano-plastic | Input of solid debris, mainly plastic, into the sea | unknown | Death of animal by stomachal or intestinal occlusion due to the ingestion of macro litter, and bioaccumulation of contaminants, with negative | Medium | Add later |

| | | | | | |
|---|---|---|---|---|---|
| | | | physiological effects, by micro- and nano-plastic | | |
| Chemical contamination | accumulation in the body tissues (mostly through the food web) | Clear evidence | cause-effects relations not demonstrated for most chemicals and for this species but levels of organochlorine compounds in Risso's dolphin from the Mediterannean Sea have been described as "high", as levels of trace metals | Medium | Monitoring of stranded animals -collect data on trace metals coupled with pathological examination |
| Physical disturbance / harassment | Whale-watching, boating, invasive research | High | Disrupt animals engaged in vital behaviours, stress and kill animals, and animals may avoid the area and go to a suboptimal area | Medium | Add later |
| | | | | | |

### 4.1.1 Incidental mortality and injury in fisheries (bycatch)

According to IUCN's Red List, the major recognized threat for Risso's dolphins in the Mediterranean Sea is fisheries bycatch (Gaspari and Natoli, 2012). A case of study is particularly well documented and mortality of this species occurs in the Spanish surface longline fishery in the western Mediterranean Sea, which targets swordfish, bluefin tuna *T. thynnus* and albacore *T. alalunga* (Caminas and Valeiras, 2001). Stranded animals show evidence of bycatch in fishing gear. In the Mediterranean, most bycatch of Risso's dolphins is by pelagic gillnets (also called driftnets) (Bearzi *et al.,* 2010 ; David *et al*., 2007). In the Ligurian Sea, 44% (eight out of 18) of the Risso's dolphins stranded between 1986 and 2014, were reported in the BDS as bycatches or as having signs of net entanglement. Based on the high level of Risso's dolphin bycatch that was documented by Macias Lopez *et al*. (2012), it seems that this species is highly susceptible to catch by some longline gear and that Risso's dolphins in the Ligurian Sea could have been impacted by the fishery (Azzelino *et al*., 2016).

**Information gaps/needs:**

- Investigate and assess the incidental mortality of Risso's dolphin through either onboard observation or studies of strandings. And have a strandings network able to recognize and diagnose the signs of fishery interactions.

- Collect information about the technical characteristics of fishing gears involved in Risso's dolphin injuries/death.

- Identify the main factors determining these bycatches, particularly seasonality and geographic location

- Map the risk areas of bycatch, when longline fisheries distribution overlap the distribution of Risso's dolphin fro example

### 4.1.2 Anthropogenic noise

Noise can adversely affect Risso's dolphin in a number of different ways. In the most severe cases (e.g. extremely high levels of acute noise e.g. from seismic vessels) this can result in permanent threshold shift or even death. Chronic noise at various time scales can affect Risso's dolphin e.g. by inducing temporary threshold shift and changing at least short-term and possibly long-term behaviour, excluding them from preferred habitat for shorter to longer time periods with the potential to impede successful feeding and reproduction. In the Mediterranean Sea there has been a great expansion of recreational boat traffic and shipping in recent decades (Dobler, 2002 in Bearzi *et al.,* 2010), but the possibility that this has led to disruption of behaviour or excluded Risso's dolphins from important habitat has not been investigated. Noise from human activities including seismic surveys, marine construction and the use of military or other sonars is a cause for concern for Risso's dolphins and other cetaceans (Nowacek *et al.,* 2007). Jepson *et al*., 2005 found gas emboli previously associated with sonar-related strandings, in the livers and other organs of several species of

cetaceans including Risso's dolphins. While such lesions were more common in deep-diving species, they were also present in species inhabiting shallower waters, raising the possibility that sonar, or other noise, impacts may be more widespread than previously thought (Weilgart, 2007).

**Information gaps/needs**:

- we need to better understand the impact on Risso's dolphin of impulsive noise

- Acoustic injuries should be identified by stranding networks.

- Identify "hot spots" and "cold spots" to avoid exposing concentrations of cetaceans, so the deserts could be more suitable for noise-producing activities,

- Assess cumulative and synergistic effects of noise together with other environmental stressors.

### 4.1.3 PREY DEPLETION

In addition to bycatch, other fisheries effects (e.g. prey depletion) could be a cause of the population decrease observed for Risso's dolphins in the western Ligurian Sea. Local fishery landings in the Ligurian Sea have been significantly decreasing, as have the catches in the Gulf of Lion (Azzelino et al., 2016). In the context of declining ecological resources, Risso's dolphins in the western Ligurian Sea may be competing with both sperm whales and striped dolphins, which might have forced the species to change its use of the habitat (Azzelino et al., 2016). Few of the main cephalopod prey species of Risso's dolphins are commercially important. Two factors however are of concern: (1) the possible expansion of Mediterranean deep-water fisheries (e.g. Politou et al., 2003), as observed elsewhere (Morato et al., 2006), and (2) the tendency of fisheries to target species lower and lower in the food web as populations of higher trophic level species are depleted (Pauly et al., 1998; Sala et al., 2004; Pauly and Palomares, 2005). These trends could lead to reductions in prey populations or otherwise disrupt food webs in continental slope waters where Risso's dolphins forage (Bearzi et al., 2010).

**Information gaps/needs**:

- Investigate the interspecific competition and the change of the habitat use of the Risso's dolphin in conditions of decreasing resources

### 4.1.4 MACRO-, Micro- and nano- plastic ingestion

To be updated at a later stage

Almost no information exists on ingestion of marine litter by Risso's dolphin, but as other teutophageous species have been highlighted to ingest plastics, the Risso's dolphin probably do not stay untouched by this phenomenon.

**Information gaps**:

- better evaluate the rate of macro- and micro- litter ingestion through necropsies on stranded animals, based on existing and standardised protocols (ACCOBAMS and MedSealitter protocols for example),

- better understanding of effects of nano-plastics on Risso's dolphin reproduction and survival at the individual and population level.

### 4.1.5 Contamination of cetaceans and their prey

At the top of the food chain, cetaceans are among the animals most exposed to toxic effects of pollutants (Marsili and Focardi, 1997). There is as yet no evidence that pollutants are causing the death of marine mammals, however organochlorine contaminants are known to cause immune and reproductive dysfunction (Brouwer *et al.*, 1989 in Marsili and Focardi, 1997). The results of the authors indicate that the Sea with the highest toxicological risk is the Ligurian Sea.

Prey contamination and emerging contaminants : to be added

***Information gaps:*** to be inserted when section is updated.

Monitoring stranding animals: Increase the sparse database of contaminant data available for this species and compare the concentration of contaminants found to those in other species in the area with high toxicological risks as the Ligurian Sea.

### 4.1.6 Physical disturbance / HARASSMENT

Either way, directly or indirectly human development activities (both coastal and pelagic) in preferred habitat can have a serious adverse impact.

Invasive approaches of boats (e.g. from whale watching activities or even non-careful research activities) can disturb Risso's dolphin through direct physical presence and/or via noise and interrupt important behaviour including feeding and reproduction (Miragliuolo *et al*., 2001). Long-term presence can exclude animals from preferred habitat.

Unregulated whale watching activities, which may grow very fast is specific areas, may have detrimental effects at the population levels, which needs to be mitigated and prevented.

***Information gaps:***

- better evaluate the frequency of physical disturbance on Risso's dolphin by approaching vessels like whale-watching (number of encounters of Risso's dolphin by whale watchers, map of risk areas of potential harassment for Risso's dolphin,…).

#### 4.1.7 Climate change

The potential effects of global climate change or ocean acidification on Risso's dolphin in the Mediterranean, are unknown, but cannot be neglected and need further investigation.

## 4.2 MONITORING

Any active species conservation effort requires that animals are monitored over time, but also human activities, in order to determine whether threats are worsening or lessening.

To be updated later

# 5 MITIGATION MEASURES

This section deals only with threats that are considered at this stage to be of high or moderate priority and where mitigation measures can be identified. This includes fisheries bycatch, noise, harassment and pollution.

## 5.1 INCIDENTAL MORTALITY AND INJURY IN FISHERIES (BYCATCH)

To be updated later, based on existing practices against bycatch.

## 5.2 ANTHROPOGENIC NOISE

To be added based *inter alia* on IWC, ACCOBAMS, CMS, IUCN and IMO work on chronic and acute noise mitigation

At least :

- Impact Assessment should be asked and done by cetacean experts before each human activity generating noise begin at sea. Cetacean experts should be able to postpone the noisy activity if this one impacts animals in a place or period important for them (breeding, feeding).

- Systematic use of Highly qualified Marine Mammal Observer and Passive Acoustic Monitoring operators aboard the platform generating noise

## 5.3 PREY DEPLETION

To be added later

## 5.4 MACRO-, MICRO- AND NANO PLASTIC INGESTION

To be added later

This is not a specific threat against cetaceans, it is a global threat for all marine life and even human being. So the mitigation actions should target production of plastics, use of it and cycle of elimination, at the scale of the countries surrounding the Mediterranean Sea.

## **5.5** CONTAMINATION OF CETACEANS AND THEIR PREY

To be added later

This is not a specific threat against cetaceans, it is a global threat for all marine life and even human being. So the mitigation actions should target production and use of toxicologic elements at the scale of the countries surrounding the Mediterranean Sea.

### 5.5.1 Physical disturbance / HARASSMENT

To be added in light of IWC and ACCOBAMS guidelines and label, national laws, ….

# 6 PUBLIC AWARENESS, EDUCATION AND CAPACITY BUILDING

To be added at a later stage

# 7 EXECUTIVE SUMMARY OF ACTIONS

Before moving to the specific actions, some general considerations that require elucidation regarding the nature and usefulness of CMPs (and see Donovan, Cañadas and Hammond 2008). So the parts from 7.1 to 7.3 of this paragraph could be common to all CMPs of ACCOBAMS.

## 7.1 DEALING WITH INADEQUATE DATA

While ideally, all CMPs and associated management actions are based on adequate scientific data, there are occasions when the potential conservation consequences of waiting for confirmatory scientific evidence mean that it is better to take action immediately whilst collecting the necessary information. This has become known as following the "precautionary principle" or taking a "precautionary approach." However, application of this principle must be carefully considered and well justified.

## 7.2 MONITORING

Establishing baseline information as a scientific reference for conservation actions is an important step towards effective conservation. Once this is achieved, monitoring (of the species or population, human activities, implementation and effectiveness of mitigation measures) **must** be an integral and essential part of management, not an optional extra.

## 7.3 LIFE OF THE CMP

Any CMP needs to be reviewed periodically so that the actions called for can be adjusted as appropriate in response to new information or changed circumstances. Once a coordinator has been appointed and a steering committee is functioning, it is expected that a regular review and revision process will be implemented. It is suggested that this CMP would be reviewed every two years and that an in-depth review would be conducted every four years.

## 7.4 TABLE OF ACTIONS

[includes a few examples at this stage – they will be based on information gaps and needs identified above and then developed into full actions following the template]

**Coordination actions**

| Nr. | Action | Impor-tance | Feasibi-lity | Crossref. |
|---|---|---|---|---|
| CORD-01 | Implementation of the CMP:<br><br>Coordinator and Steering Committee | ESSENTIAL | HIGH | |
| CORD-02 | Development of a workspace within http://www.netccobams.com/ for exchange between experts. | HIGH | HIGH | CBPA-01 |

**Capacity building and public awareness actions**

| Nr. | Action | Impor-tance | Feasibi-lity | Crossref. |
|---|---|---|---|---|
| CBPA-01 | Overview of needs on capacity building in range states in order to ensure a homogeneity in the data collected within the ACCOBAMS area with a focus on:<br><br>(3) Occurrence<br>(4) photo-ID and its associated database,<br>(5) Use of citizen science with validation, through an existing reliable tool, associated with a website database and a validation process | HIGH | HIGH | CORD-02 |
| CBPA-02 | Ensure that strandings networks are aware of the necropsy procedures in order to get information on sign of bycatch and ingested macro litter | HIGH | HIGH | RES-02 |

**Research actions essential for providing adequate management advice**

| Nr. | Action | Impor-tance | Feasibi-lity | Crossref. |
|---|---|---|---|---|
| RES-01 | Hold experts **workshop** to elaborate the final CMP report for the Risso's dolphin in the Mediterranean Sea and adjacent waters and list needed studies to improve the knowledge. | HIGH | HIGH | All |
| RES-02 | Analyses the existing strandings data in order to assess the number of Risso's dolphin with sign of bycatch | HIGH | HIGH | CBPA-02<br><br>MON-01 |

| | | | | |
|---|---|---|---|---|
| RES-03 | Investigate and assess the incidental mortality, type of fishing gear implied and main factors determining bycatches through onboard observation or any other useful means | HIGH | MEDIUM | |
| RES-04 | Create a metadata database of existing photo-ID catalogues for the Mediterranean Sea, based on common protocols and standardised procedures of coding and sorting. So the exchange of information and the analyses (CMR) are easier.<br>And then, analyses of all existing photo-ID catalogues in order to improve knowledge on population structure and movements, abundance and trends, and population parameters. | HIGH | HIGH | CBPA-01<br>RES-01 |
| RES-05 | Spatial analyses should be realised including all existing sightings collected in effort, gathered from all structures: this will allow to improve knowledge considering distribution, habitat and abundance over years. This will allow to confirm the differences that appear in recent years compare to what was known on the species previously in terms of abundance, distribution and habitat. | HIGH | HIGH | RES-01<br>RES-06 |
| RES-06 | Results obtained from the overlay of high density areas of Risso's dolphin or IMMAs with the available mapped human pressures, may facilitate the identification of the potential CCHs (Cetacean Critical Habitats) for by-catch, plastic ingestion, harassment… | HIGH | HIGH | RES-01<br>RES-05 |

## Monitoring actions

| Nr. | Action | Impor-tance | Feasibi-lity | Crossref. |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| MON-01 | Develop effective (i.e. with sufficient power) long-term monitoring programmes to collect data on individual (photo-ID and biopsy) to estimate population structure, population parameters, movements and abundance. | HIGH | HIGH | RES-04<br>CBPA-01 |
| MON-02 | Ensure effective (i.e. with sufficient power) long-term monitoring programmes to collect sightings in effort over large areas at different seasons to estimate abundance, distribution and trends. Focus on areas known to be frequented by Risso's dolphins (north western Med. Sea, Alboran,…). | MEDIUM | MEDIUM | RES-05<br>CBPA-01 |
| MON-03 | Ensure that within each stranding networks, necropsies are made in order to :<br>- record any sign of bycatch<br>- record any marine litter ingested | MEDIUM | MEDIUM | RES-02<br>CBPA-02 |

**Mitigation measure actions**

| Nr. | Action | Impor-tance | Feasibi-lity | Crossref. |
|---|---|---|---|---|
| MIT-01 | Wider adoption and implementation of standardized codes of conduct (IWC/ACCOBAMS/CMS) to mitigate adverse impact of whale watching activities and intrusive research towards Risso's dolphin | HIGH | HIGH | |
| MIT-02 | | | | |
| MIT-03 | | | | |

# 8 ACTIONS

[just a few possible examples are provided below that will need reviewing and finalising]

The Actions are described below, with each action beginning on a new page. One of the first tasks for the Coordinator and Steering Committee will be to develop detailed specifications for each action and where appropriate, assign costings and likely sources of funding.

## ACTION CORD-01: IMPLEMENTATION OF THE CMP COORDINATOR AND STEERING COMMITTEE

*Coordination Action* Priority*:* **HIGH**

### DESCRIPTION OF ACTION

- **Specific objectives:** to ensure timely progress is made on implementation of the CMP and the specific actions prescribed in it, and to provide progress reports to appropriate bodies including: ACCOBAMS, CMS, IWC, range states and regional stakeholders, thereby maximising the chances of survival and maintaining a favourable conservation status throughout the historical range of Mediterranean Risso's dolphin.
- **Rationale:** this CMP is complex and coordination is essential for it to be effective. Implementation will depend on stakeholders in several countries and a broad range of expertise. A dedicated, well-supported coordinator and a similarly committed Steering Committee are essential.
- **Target:** appointment of a suitably qualified Coordinator and Steering Committee, with the required logistical and financial support.

  Ideally, the Coordinator will be based in (but operationally independent of) an office capable of providing some level of support.

  It will be necessary for a broader stakeholder steering committee to be established as soon as possible, with specific terms of reference and *modus operandi*.

- **Timeline:**

  **To be define later**

- **Tasks of Coordinator in conjunction with Steering Committee:**

### INITIAL BUDGET ITEMS TO BE CONSIDERED BY ISC

**To be define later**

### ACTORS

**To be define later**

### ACTION EVALUATION

**To be define later**

### PRIORITY

- **Importance**: Essential
- **Feasibility**: high if political will is there

## ACTION CORD-02: DEVELOPMENT OF A WORKSPACE WITHIN HTTP://WWW.NETCCOBAMS.COM/ FOR EXCHANGE BETWEEN EXPERTS.

*Co-ordination Action* Priority: **HIGH**

### DESCRIPTION OF ACTION

- **Specific objective**: develop a workspace within the existing Netccobams website, where interested parties (experts, scientists,…) and the coordinator will exchange documents and information.
- **Rationale**: integration of information on Mediterranean Risso's dolphin from all areas where they are observed is of substantial value in understanding patterns of habitat use, movements, changes and threats.
- **Target:** creation of a workspace for information and documents exchanges within the existing and in use website manage by the ACCOBAMS Permanent Secretariat.
- ..
- **Method**: the CMP coordinator and/or the ACCOBAMS Permanent Secretariat will arrange the creation of the working space and the invitation for people to join. All interested parties should create a personal profile on Netccobams and accept the invitation to join the workspace. From then, they can share documents, ideas through the existing forum or even pictures.
- **Implementation-timeline**: As Netccobams is already in use, the creation of the workspace and invitation of all interested parties may be done in one day as soon as it is requested.

### ACTORS

- **Responsible for coordination of action:** CMP coordinator or ACCOBAMS Permanent Secretariat.
- **Stakeholders**: Range State Governments, ACCOBAMS, IWC, industry, local authorities, NGOs.

### Action evaluation

- IWC
- ACCOBAMS

### PRIORITY

- **Importance:** high
- **Feasibility:** high

# 9 REFERENCES

To be added on completion of draft

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# 10 ANNEXES

## III - STATUS REPORT ON DRAFT CONSERVATION MANAGEMENT PLAN ON COMMON DOLPHIN

DRAFT

# ACCOBAMS/IWC CMP for Mediterranean Common dolphins *(Delphinus delphis)*

Prepared by Joan Gonzalvo

DISCLAIMER: This document is a draft outline intended to facilitate discussion during the meeting of the ACCOBAMS Scientific Committee, to be held in Monaco, in November 2018. It is a work in progress and does NOT represent a final draft version of the CMP, particularly as contributions from key players in the ACCOBAMS area are still missing and could not be integrated during the preparation of this preliminary draft.

It is expected that a drafting workshop will be organized in spring 2019, where scientists involved in common dolphin research in the Mediterranean will be invited and will be able to collaborate towards a draft final CMP that will also be considered by the IWC Scientific Committee in May 2019 before submission to the ACCOBAMS Meeting of Parties and the IWC for consideration.

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## CONTENTS

Contents/index to be completed at later stage

# EXECUTIVE SUMMARY

(to be written when the plan will be ready)

# 1 INTRODUCTION

## 1.1 WHY A CONSERVATION MANAGEMENT PLAN IS NEEDED

To be completed at later stage, including the following:

- Why is active management needed for the identified cetacean population, threat or critical habitat?
- Why is a CMP the most appropriate management tool to achieve the stated conservation objectives?

This section should include:

- The scope, context and policy setting of the CMP.
- A detailed map of the known distribution of the population/critical habitat
  - If a CMP is being designed for a particular threat the map should include an outline of the area where the threat is encountered by the target cetacean population.
  - If the CMP is being designed for a particular critical habitat, the map should include the extent of the critical habitat.
- This section should also reference any current or previous conservation management actions relating to the draft CMP including conservation plans, legislation as well as any relevant peer reviewed papers or related documentation.

The common dolphin *Delphinus delphis* is globally classified as Least Concern (Hammond et al., 2008), but its Mediterranean subpopulation is classified as Endangered (Bearzi, 2012; Bearzi et al., 2003).

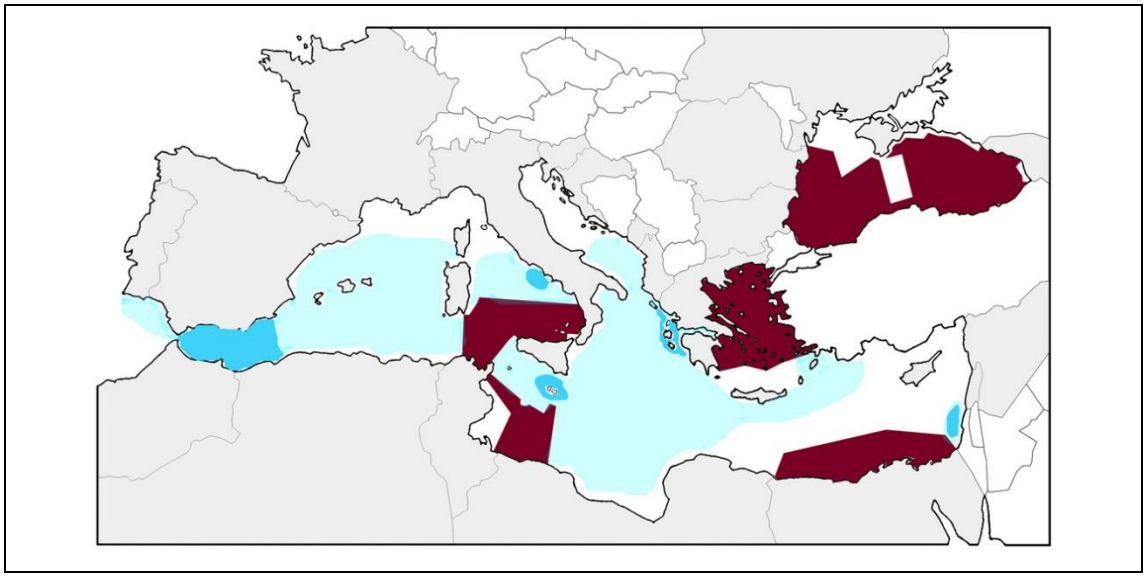

Fig.1. Presumed distribution of common dolphin *(Delphinus delphis)* populations in the ACCOBAMS area. In blue areas where the specie is considered as regular, in cyan where considered present, in white rare or absent, and in brown no data *Taken from Notarbartolo di Sciara G., Birkun A., Jr. 2010. Conserving whale, dolphins and porpoises in the Mediterranean and Black Seas: an ACCOBAMS status report, 2010. ACCOBAMS, Monaco. 212p.* **NEEDS TO BE UPDATED**

International collaboration on the conservation and management actions developed in this plan will be necessary. Support by both ACCOBAMS and the IWC will be key and will require co-operation by many stakeholders, ranging from local and national governments, through intergovernmental bodies to industry and NGOs.

This CMP follows the IWC template also adopted by ACCOBAMS (ACCOBAMS-MOP6/2016/Doc37/Annex12/Res6.21). This should be considered a dynamic and prone to changes document and therefore should go periodically through expert review for the development of new or modified actions as appropriate

TABLE OF RANGE STATES AND INCLUDE WHETHER MEMBERS OF ACCOBAMS AND/OR IWC

## 1.2 OVERALL GOAL OF THE CMP

To maximise the success of a plan and ensure that required changes are identified promptly; the measurable short, medium and long-term objectives should be identified. Thus, the monitoring of the target population, human activities affecting it, mitigation measures, and the effectiveness of those measures is essential.

Objectives of a CMP will not only relate to the conservation of the population but also to the interests of relevant stakeholders.

Insert the overall short, medium- and long-term objectives of the CMP.

# 2 LEGAL FRAMEWORK

To be provided by ACCOBAMS Secretariat?

# 3 GOVERNANCE

To be developed in accordance with other species CMPs currently also in progress (e.g., bottlenose dolphin, Risso's dolphin)

## 3.1 3.1 COORDINATION OF A CMP

As a CMP may cover a large geographical area ad involve several jurisdictions, it is important to establish an appropriate management structure for the CMP that identifies key stakeholders, their roles and responsibilities and the interaction between them during the development, implementation and review stages of the plan.

Insert an outline of the governance framework under which the CMP would be conducted, from the development stage through to the implementation and review stages.

## 3.2 3.2 TIMELINE FOR A CMP

To be defined

# 4 SCIENTIFIC BACKGROUND BIOLOGY AND STATUS OF MEDITERRANEAN COMON DOLPHINS

## 4.1 BIOLOGY AND STATUS OF MEDITERRANEAN COMON DOLPHINS POPULATION STRUCTURE

### 4.1.1 population structure

In the eastern North Atlantic the common dolphin is renowned for showing low levels of population structure (e.g. Natoli et al., 2006; Amaral et al., 2007; Mirimin et al., 2011; Moura et al., 2013) compared to other small cetacean species (e.g. Natoli et al., 2004; Fontaine et al., 2007; Gaspari et al., 2007, 2015; Louis et al., 2014). However, in the Mediterranean Sea, despite the limited geographic range, there is evidence for population structure, and recent studies in the neighbouring Atlantic waters do not exclude potential demographic/stock structure.

In the Mediterranean basin, genetic analysis based on nuclear (microsatellite loci) and mitochondrial DNA markers (control region), show a clear population division between Alboran Sea and the Eastern Mediterranean, represented mainly by samples from the Ionian Sea (Natoli et al., 2008; Moura et al., 2013a). Although significant, FST values are relatively small (microsatellite FST = 0.052, mtDNA FST = 0.107, p-values=0.001), there are shared haplotypes between the regions, and evidence for some level of directional gene flow from the Ionian to the Alboran seas (Natoli et al., 2008). The separation between the Atlantic and

Ionian populations, is further supported by differences in the frequency of varieties of MHC DQβ and β-casein genes (Moura et al., 2013b), suggesting the potential for some adaptation to local environments.

There is further evidence for separation between Black Sea and the Mediterranean (again, with evidence for directional gene flow westwards; Natoli et al., 2008), and further separation of dolphins in the Korinthiakos Gulf (Moura et al., 2013a), though sample sizes are low in both cases.

A comprehensive assessment of the common dolphin population structure within the Mediterranean is made difficult by the scarcity of samples from many regions (Moura et al., 2013a), due to ongoing population decline (Piroddi et al., 2011) and lack of survey effort in some areas. Simulation analyses suggest that the population structure between the Alboran and Ionian Seas likely evolved recently, and has likely been reinforced by a recent demographic bottleneck event (Moura et al., 2013a). The timing of this recent bottleneck was estimated to 50 generations before present, consistent with a proposed anthropogenic influence (Bearzi et al., 2003). Furthermore, there is some preliminary evidence suggesting the possibility of introgressive gene flow from striped dolphins (*Stenella coeruleoalba*) in Greek waters (Antoniou et al., 2018), which could further confound studies of genetic differentiation involving samples from this region. Therefore, without more comprehensive sampling across the Mediterranean regions, our current understanding of population structure might be biased by local demographic histories.

Samples from the Alboran Sea show no clear genetic differentiation from the contiguous Atlantic populations (Natoli et al., 2008; Moura et al., 2013a). Nevertheless, several lines of evidence suggest the possibility of some level of demographic/stock structure. Analysis of contaminant load shows clear difference between Alboran Sea and Atlantic populations for several indicators (Borrell et al., 2001), and there is also evidence for different feeding ecology based on stable isotopes and stomach contents (Silva, 1999; Giménez et al., 2017; Marçalo et al., 2018). Analyses of whistle characteristics, also separate the two basins with relatively high accuracy (Papale et al., 2014). Similar differences between contaminant signatures and stable isotopes were also observed between samples from different locations along the Atlantic European coast (e.g. Caurant et al., 2006; Pusineri et al., 2007; Quérouil et al., 2010), suggesting the potential for some level of local site-fidelity at shorter time scales than those typically detected by analyses of genetic structure.

Research on individual kinship structure in the Atlantic population, suggested the occurrence of some level of natal site-fidelity, with dispersal being female biased (Ball et al., 2017). This is

an unusual pattern for mammals, but consistent with previous estimates of population level gene flow for this species, which also suggested female biased gene flow (Natoli et al., 2008). This bias was hypothesised to be related to intraspecific competition for resources (Ball et al., 2017), which could be relevant in determining priority conservation areas given that the current decline of this species in the Mediterranean has also been attributed to changes in prey availability (Piroddi et al., 2011).

Morphological analyses also provide strong indication for some level of demographic/stock structure. Multivariate analyses of skull measurements clearly distinguish between Atlantic, Mediterranean and Black Sea samples, with Black Sea being particularly divergent (Amaha, 1994; Westgate, 2007). Along the Eastern North Atlantic coast, differences in certain skull measurements were also found, particularly between specimens from the Iberian coasts and those from further north (Murphy et al., 2006). More recently, 2D and 3D geometric morphometrics using 195 museum specimens from nine marine areas (Nicolosi & Loy, submitted) showed that Mediterranean dolphins are well differentiated from those sampled in the Atlantic and also presented the highest variability in shape. They also showed a distinction between the southern (Sicily, North Africa) and northern Mediterranean (Tyrrhenian Sea), with northern Mediterranean dolphins characterized by a slender cranium and a narrower occipital region (Nicolosi & Loy, submitted). A similar difference found in striped dolphins (Stenella coeruleoalba) was suggested to be related to feeding specializations (Loy et al., 2011).

Data on individual movement from field efforts is extremely limited, but there are individual records of long distance female dispersal (Genov et al., 2012), as well as some level of site-fidelity in the productive waters around the Isle of Ischia (Mussi et al., 2002), although sightings of this species appear to have reduced in recent years (Mussi et al., 2016).

Several studies on common dolphin habitat preferences, carried out in the eastern North Atlantic and Alboran Sea have consistently showed a preference for coastal productive regions, supplied with small to medium sized pelagic fish (Cañadas et al., 2002; Cañadas & Hammond, 2008; Moura et al., 2012; Correia et al., 2015; Bencatel et al., 2017). Areas where common dolphin sightings are frequent could therefore reflect the presence of local suitable habitat, and should therefore be considered as primary targets for further biological monitoring.

In addition to the areas mentioned above, where evidence for demographic/stock structure exist, samples from the coasts of Liguria, Southwest Sardinia, West Sicily, Southern Tyrrhenian, Greek Ionian, Levantine and Black sea would greatly improve our understanding of the population structure and status of this species in the Mediterranean. Observations of this species have been relatively frequent for those regions in previous surveys (Mussi et al., 2002; Bearzi et al., 2003; Gannier, 2005), but this could have changed in more recent years. For this purpose, museums and/or local stranding networks might be an ideal source of samples, as they require minimal disturbance of wild dolphins, and several methods currently exist to obtain data from degraded samples.

In conclusion, morphological and molecular studies (including genetics, stable isotopes and contaminant analyses) indicate the existence of some level of population structure in the Mediterranean common dolphin and further evidence for some degree of demographic/stock structure. However, sampling is low for some regions and a more geographically comprehensive sampling scheme is needed. Such population structure could be associated with patches of suitable habitat, and robust understanding of the geographic boundaries of such populations is thus of paramount importance. These should be carefully considered to plan effective conservation measures in the region, to ensure that all subpopulations are identified and properly protected.

### 4.1.2 abundance and population trends

To be completed

Comprehensive basin-wide estimates of density and abundance are largely lacking for common dolphins across the whole Mediterranean Region. Line transect ship surveys of the Alboran Sea in 1991-92 produced an estimate of 14736 (CV = 0.38; 95% CI = 6923–31 366), with a density of 0.16 dolphins/km$^2$, but no estimates were made for this species elsewhere in the western Mediterranean due to the low number of sightings (Forcada & Hammond, 1998).

The abundant qualitative data and limited quantitative data that are available for the Mediterranean common dolphins were sufficient to infer a reduction in population size of more than 50% over a three-generation period (i.e., the past 30-45 years; Reeves and Notarbartolo di Sciara, 2006). On the basis of this decline, the Mediterranean population of common dolphin is classified as 'Endangered' in the IUCN Red List of Threatened Animals. The species is also listed in Appendix I and II of the Convention on the Conservation of Migratory Species of Wild Animals (CMS), in Appendix II (Strictly Protected Fauna Species) of

the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention), and in Annex IV of the EU Habitats Directive (Council Directive 92/43/EEC).

### 4.1.3 distribution and movements

To be completed

In the past, this species was widely distributed throughout the Mediterranean basin and, until the 1960s, was considered the most abundant cetacean species. During the past decades, however, the species declined throughout the region Bearzi et al., 2003 with notable strongholds remaining only in the Alboran Sea (Cañadas & Hammond, 2008) and around the Maltese Islands (Vella, 2005). Long-term monitoring has been carried out around the islands of Malta (Vella, 2005), Lampedusa, Italy (Habitat Directive Reporting, 2014; Pace et al., 2015), Ischia, Italy (Mussi et al., 2016; Pace et al., 2015), the Inner Ionian Sea Archipelago (Bearzi et al.,2003, 2008; Piroddi et al., 2011) and Gulf of Corinth (Bearzi et al., 2011,2016; Santostasi et al., 2016, 2018) Greece, and in the Alboran Sea (Cañadas & Hammond, 2008). However, information on occurrence, distribution and habitat use in the Mediterranean Sea remains fairly sparse, with little published data.

Common dolphin is reported to be rare compared to other pelagic species in the middle latitudes of the western Mediterranean Sea (Balearic Sea and central Tyrrhenian Sea, Arcangeli et al., 2017: out the coast of Lazio Region, Pace et al., submitted). In the central Tyrrhenian even if rarely recorded, the presence of the species was however confirmed over a long time period since early '90s (Arcangeli et al., 2012). In the southern Tyrrhenian basin, including the Messina strait, the species is instead reported to be more abundant (Pace et al. 2015, 2016; Santoro et al., 2015) but with a significant steady decline around the Island of Ischia since 2000 (Pace et al., 2016). A latitudinal gradient in the frequency of mixed group with striped dolphin was recognised (Arcangeli et al., 2017) and likely linked with the decrease of specimens that in the upper latitudes tend to depend on striped dolphin pods.

### 4.1.4 basic biology

To be completed

### 4.1.5 Information Gaps/needs

To be completed

## 4.2 CRITICAL HABITATS

To be completed

## 4.3 ATTRIBUTES OF THE POPULATION MONITORED

description of the attributes of the population that will be monitored (e.g.: abundance (relative and/or absolute), reproductive rates, survivorship, health, prey status, range) and an evaluation of the feasibility of detecting trends with current methods given that changes occur (e.g. using power analyses).

# 5 THREATS, MITIGATION MEASURES AND MONITORING

## 5.1 ACTUAL AND POTENTIAL ANTHROPOGENIC THREATS

Table 1: Summary of information on actual and potential threats to Mediterranean common dolphins

| Actual/potential threat | Human activity | Strength of evidence | Possible impact | Priority for action | Relevant actions | Party Responsible |
|---|---|---|---|---|---|---|
| **Directly lethal threats** | | | | | | |
| Bycatch in bottom trawl nets | Trawl net fishing | Weak | Mortality and/or serious injury | Low to Moderate | | |
| Bycatch in other fishing gear | Set nets and purse seines fishing | Weak | Mortality and/or serious injury | Moderate | | |
| Acoustic Trauma | Production of loud noise by industrial activities including those related to oil and gas extraction, military activities, general ship traffic incl. nautical tourism, regulated or un-regulated dolphin watching and research activities | Strong or moderate | Temporary or even permanent threshold shift, sound masking, temporary or permanent displacement from breeding or feeding areas, | High | | |
| **Sub-lethal threats** | | | | | | |
| Noise pollution | Gas industry, construction, shipping and boat traffic incl. nautical tourism, regulated or un-regulated dolphin watching and research activities | Weak | Temporary displacement from key habitats, disruption of the dolphin's natural behaviours and stress. | High to Moderate | | |
| Overfishing | Prey depletion caused by overfishing. Specially relevant in the case of purse seining targeting epipelagic fish | Strong or Moderate | Malnutrition, habitat displacement | High to Moderate | | |
| **Other threats** | | | | | | |
| Contamination of cetaceans and their prey | Chemical pollution from industrial and development activities on land spreading into the sea or release of chemicals directly into the sea, including oil spills | Weak or Moderate | Leading to compromised health that may affect reproduction (e.g. affecting hormonal balance or production) and survival (e.g. through reduced immune response) | Moderate to High | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Marine litter | Marine litter is the solid portion of the material discarded or disposed in the marine and coastal environment and can directly threaten many marine organisms and habitats | Weak or Moderate | Ingestion of marine litter can have detrimental consequences, such as physical injuries, reduced mobility and predation success, digestive tract blockages, and malnutrition | Moderate | | |
| Physical disturbance | Intrusive marine activities including oil and gas developments, coastal developments, fishing, dolphin watching, nautical tourism and recreational/sports boating and research | Moderate | Avoidance, displacement, interruption of life cycle activities, detrimental effects at the population level | Moderate to High | | |
| Climate change | Production of green house gases | Weak or Moderate | May influence distribution and abundance of prey | Low | | |

### 5.1.1 bycatch in bottom trawl nets

In Israel, where bottom trawlers – common dolphins interactions have been reported, no entrapment in trawl nets, has been ever witnessed or directly documented for this species (IMMRAC, pers comm.). One report by skipper of two entrapped dolphins that answer the description of common dolphins but could not be confirmed. Indirect evidence of one beached individual that seemed to have dined just before drowning. Although many would like to see this bottom-habitat destructive fishing mode phased out, there is some evidence suggesting that a year-round presence of the local common dolphin population may be dependent on foraging in association with this kind of fishing gear when its natural schooling prey does not abound or is absent.

### 5.1.2 bycatch in other fishing gear

Pelagic driftnets have been prohibited and their use limited by EU regulations since 2002. However, the illegal use of driftnets targeting swordfish and bluefin tuna is still a concern in some Mediterranean countries. All of these operations are known to cause marine mammals and sea turtles mortality. For instance, in the Tyrrhenian Sea there is still an active illegal drifnetting fleet, mainly concentrated in the island of Ponza with few additional boats from Ischia (Oceanomare Delphis, unpublished data).
Despite the European Commission's intention to adopt a universal moratorium on driftnet fishing in EU waters, currently there are legal driftnets in the Mediterranean: driftnets of limited length and relatively small mesh size to catch small/medium sized species (those using nets < 2.5 km in length and not targeting species in the Annex VIII of EC regulation n. 1239/98). Despite their historical presence, the knowledge on these fisheries is still scarce and scattered. A recent study on the small scale driftnet fishery indicated that i) use of thin yarns and a mesh opening of less than 80 mm (or 70 mm according to a stricter approach) would allow the survival of most traditional métiers while preserving sensitive and protected species; ii) the requirement to carry on board a single gear type should be included in the regulatory framework; and iii) driftnet use within 3 miles of the coast would greatly reduce the risk of interactions with sensitive species (Lucchetti et al. 2017).

Direct interactions between common dolphins and main fishing fleets in the Alboran Sea were evaluated in a total of 111 observed fishing trips (70 in trawlers and 41 in purse seiners). No bycatch was recorded, however non-lethal interactions between dolphins and the gear were detected (Giménez et al. unpublished data). Although no dolphin fishing bycatch has been documented, the impact of this mortality factor on the common dolphin subpopulation in the Alboran Sea should not be ignored because 77 of 694 stranded common dolphins (11.1%) in the area had diagnostic signs of interactions with fisheries. These interactions are described to frequently occur along the coast of Malaga (Fernández-Maldonado, 2016) where the species is more abundant (Cañadas and Hammond, 2008)

(some references missing from list at the end of this document)

### 5.1.3 Acoustic Trauma

### 5.1.4 Noise pollution

Noise must be considered a critical threat in Mediterranean waters for common dolphins. Intense marine traffic, especially in the Alboran Sea and Sicily Channel, industrialized coastal areas, sonar for navy and fishing use, seismic exploration and offshore platforms could affect occurrence and behavior of the species. Even if no data are still present about the impact of noise on the species in the basin, common dolphins have been observed to modify their vocal emission, increasing the maximum frequency of their whistles when exposed to high anthropogenic noise levels masking the same frequencies in the eastern Atlantic (Papale et al., 2015). As other dolphin species, they could decrease some activities relevant for their survival such as resting and feeding or move from high impacted areas.

### 5.1.5 Overfishing

Unsustainable fishing has been implicated in dramatic ecological changes in the Mediterranean Sea (Sala 2004), where it has caused the decline of many fish stocks (Caddy and Griffiths, 1990; De Walle et al, 1993; Caddy, 1997; Coll et al., 2010). Some of the Mediterranean fish stocks that have been over-exploited include important prey species of common dolphins (Lleonart 2005). In recent years, as major fish stocks collapsed (Pauly et al., 2002, 2003) and human demand for seafood increased, competition between marine mammals and fisheries for same food resources has been cited as a source of concern (Plagányi and Butterworth, 2002; Kaschner and Pauly, 2005). Popular arguments point to marine mammals as a source of competition for marine fisheries in reducing valuable fish stocks (Jackson, 2007; Gerber et al., 2009). While some studies hypothesized the decline of several marine mammal species due to reduced prey availability (Demaster et al., 2001; Boyd et al., 2006; Bilgmann et al., 2008), they failed to demonstrate it. In the Mediterranean Sea, increased overexploitation of small pelagic fish (sardines and anchovies) has been suggested to be one of the major reasons of the decline of common dolphins throughout the region (Bearzi et al., 2003; Cañadas and Hammond, 2008), but such link has been difficult to be investigated. Behind the difficulty of assessing such interaction is the complexity of studying marine ecosystems and the difficulties to monitor and track changes and responses in complex systems (Trites et al., 2006).

(some references missing from list at the end of this document)

### 5.1.6 Contamination of cetaceans and their prey

### 5.1.7 Marine litter

Marine litter is the solid portion of the material discarded or disposed in the marine and coastal environment (Coe and Rogers 1997; Galgani et al. 2013) and can directly threaten many marine organisms and habitats. Ingestion of marine litter can have detrimental consequences, such as physical injuries, reduced mobility and predation success, digestive tract blockages, and malnutrition (Laist 1997; Derraik 2002; Gall and Thompson 2015). The fragmentation of these artificial materials produces the release of micro-particles and toxic compounds and enhances their accumulation in the food chain, increasing the exposure for top predators (Cole et al. 2011; Fossi et al. 2012). Areas of potential higher risk of exposure of pelagic cetaceans to marine litter were recognised in offshore waters in the western Mediterranean Sea, especially during the spring and summer season when a multiple combinations between sources and dispersal dynamics for litter and favourable conditions for cetacean species occur (Arcangeli et al., 2018; Campana et al., 2018).

(references missing from list at the end of this document)

### 5.1.8 Physical disturbance

Disturbance by boats, can determine short and long term changes in the behaviour and distribution of cetacean species such as bottlenose dolphin (e.g. Arcangeli and Crosti, 2009; Bejder et al., 2006; Pirotta et al., 2015), fin whale (e.g. Jahoda et al., 2003; Pennino et al., 2016) and also common dolphin (Neumann & Orams, 2006; Stockin et al., 2008; Meissner et al., 2015). Campana et al. (2015, 2017) observed that common dolphin was recorded in locations with relatively lower vessel abundance, suggesting a negative response of the animals towards vessels and a displacement in less disturbed areas. As discussed by Gill et al. (2001), the intensity of the response of a species to disturbance is however not a direct indication of its vulnerability: a stronger response may in fact indicate the possibility that the animals can change areas by moving to less impacted regions, still featuring adequate ecological conditions. Conversely, animals living under pressure can reduce the disturbance by applying short-term behavioural changes, but probably having negative effects over a longer period.

(references missing from list at the end of this document)

### 5.1.9 Climate change

The potential effects of global climate change or ocean acidification on Mediterranean common dolphins cannot be neglected and need further investigation. Climate variation may deviate migratory patterns, destroy habitat (particularly in nutrient-rich seas), and drastically change ocean circulation, vertical mixing and overall climate patterns. There may be changes in nutrient availability, biological productivity, and the structure of marine ecosystems from the bottom of the food chain to the top. Therefore, as with many other taxa, climate change is expected to result in geographic range shifts of cetacean species as they track changes in temperature to remain within their ecological niches. Such changes in geographic range could have implications for the conservation and management of cetaceans.

For instance a recent study by Cañadas and Vázquez (2017) related features of Mediterranean common dolphins ecology to climate change, focusing on distribution and density, by using two decades-long dataset on the species in the Alboran Sea and a time series of environmental changes. They found that at the small spatial scale of the Alboran Sea and Gulf of Vera, an increase in SST will potentially yield a reduction in suitable habitat for common dolphins, with a progressive reduction in density from east to west. The effect that climate change may have on the species at a larger scale or, at least in other small-scale areas with high density of common dolphins or offering critical habitat for the species should be also studies.

## 5.2 MITIGATION MEASURES AND MONITORING

Any active species conservation effort requires that human activities, as well as the animals, be monitored over time to evaluate the effectiveness of mitigation measures (i.e., whether the existing threats stationary, worsening or lessening)

Mitigation measures are presented below to address key threats (those with priority considered as high or moderate) TO BE DEVELOPED

### 5.2.1 Bycatch in bottom trawl nets

Identification of the factors triggering this kind of interaction and evaluation of possible modifications in the fishing gear or in the fishing routines to minimise the incidence of this interaction. TO BE DEVELOPED

### 5.2.2 A robust estimate Bycatch in other fishing gear

A robust estimate of bycatch rates across all fisheries and areas of the Mediterranean is needed. To achieve this, not only must there be greater sampling effort using independent observers, remote electronic monitoring, or some other means, but also fishing effort itself needs to be better quantified, including information on fishing gear/activity with appropriate spatial and temporal resolution, target prey species, immersion duration of gear and area swept, net dimensions (total length of set nets, aperture of trawl), fishing locations, and use of mitigation devices (presence/absence, type, setting interval) (ASCOBANS, 2015).

### 5.2.3 Acoustic Trauma

### 5.2.4 Noise pollution

### 5.2.5 Overfishing

Incorporation of fishery controls in MPA management to preserve ecosystem function. Establishment of no-take areas in common dolphin critical habitat, at least for fishing gears known to deplete common dolphin prey (e.g. purse seiners) and severely damage the coastal environment (e.g. bottom trawlers). Implementation of extensive stock assessments for fish and cephalopod species eaten by common dolphins, including non-commercial species and studies of diet. Illegal fishing activities to be eradicated in the critical habitat of the common dolphin.

### 5.2.6 Contamination of cetaceans and their prey

### 5.2.7 Marine litter

### 5.2.8 Physical disturbance

Speed limits, no-entry areas in common dolphin critical habitats, development and implementation of code of conduct/guidelines to be followed not only by dolphin watching operators but also to be promoted among tour boats and nautical tourism companies as well as among the large community of recreational boaters.

# 6 ACTIONS

The actions presented here are the key component of this CMP. While there may be some overlap, these have been incorporated under the following categories:

- co-ordination (COORD);
- public awareness and capacity building (PACB);
- research essential for providing adequate management advice or filling in knowledge gaps (RES);
- monitoring (MON);
- mitigation measures (MIT).

These actions are considered realistic and effective.

At this early drafting stage some of the actions have been well specified, generally including the information listed below, where relevant, while some others are simply briefly introduced and will be further developed at a later stage after collecting contributions from other experts and discussing them in a dedicated workshop to be held some time around spring 2019 (if possible in coordination with other cetacean species CMP preparatory workshops).

1. Description (including concise objective, threats to which relevant and how, rationale, target data or activity, method, implementation timeline);
2. Actors (responsible for implementation and relevant stakeholders);
3. Evaluation (actors responsible);
4. Priority (importance to the plan and feasibility);
5. Budget (where appropriate).

The CMP for Mediterranean Common Dolphins Coordinator and Steering Committee (see Action CORD-01 below) will be responsible for developing detailed specifications for each action and assign costs as appropriate, and identify possible sources of funding.

## *6.1* COORDINATION *(coord)*

# ACTION COORD-01: ESTABLISHMENT OF A CMP FOR MEDITERRANEAN COMMON DOLPHINS COORDINATOR AND STEERING COMMITTEE (MEDDDSC)

## DESCRIPTION

- **Specific objectives:** to ensure timely progress is made on implementation of the CMP and the specific actions prescribed in it, and to provide progress reports to appropriate bodies including: ACCOBAMS, CMS, IWC, range states and regional stakeholders, thereby maximising the chances of survival and maintaining a favourable conservation status throughout the historical range of Mediterranean fin whales.
- **Rationale:** this CMP is complex and considerable coordination is essential for it to be effective. Implementation will depend on stakeholders in several countries and a broad range of expertise. A dedicated, well-supported coordinator and a similarly committed Steering Committee are essential.
- **Target:** appointment of a suitably qualified Coordinator and Steering Committee, with the required logistical and financial support. Ideally, the Coordinator will be based in (but operationally independent of) an office capable of providing some level of support. While logistical and other support from a host institution should be paid for at an appropriate rate, it would not be appropriate for overheads to be charged on all actions funded.

  It will be necessary for a broader stakeholder steering committee to be established as soon as possible, with specific terms of reference and *modus operandi*. One of the first tasks of the Steering Committee will be to assess the need for national or Sub-coordinators in each of the range states.

- **Timeline:**

| | WHAT | WHO | WHEN |
|---|---|---|---|
| (1) | Identification of host institution and agreement on hosting conditions | Interim CMP for Mediterranean Common Dolphin Steering Committee (IMedDdSC) | First quarter 2020 |
| (2) | Development of detailed job description and conditions of work based on the tasks outlined below | IMedDdSC | First quarter 2020 |
| (3) | Identification of initial funds | IMedDdSC | Last quarter 2019 – first quarter 2020 |
| (4) | Recruitment of co-ordinator | IMedDdSC | First quarter 2020 |
| (5) | Co-ordinator begins work (initial 3-year contract) | Co-ordinator | Second quarter 2020 |

| | | | |
|---|---|---|---|
| (6) | Development of proposed terms of reference and *modus operandi* for stakeholder Steering Committee | ACCOBAMS, IWC, IMedDdSC, funders | Second quarter 2020 |
| (7) | Appointment of Steering Committee | ACCOBAMS, IWC, IMedDdSC, funders | Second or third quarter 2020 |

- **Tasks of CMP for Mediterranean Common Dolphins Coordinator in conjunction with Steering Committee:**
  - To assess the need for the establishment of sub-areas and subarea coordinators for the implementation of the Mediterranean Common Dolphins CMP, as it has been done for the Mediterranean bottlenose dolphin CMP. These areas to be defined, may be the same that for *T. truncatus* or not necessarily, although the former option may facilitate coordination between both CMPs in some actions likely to overlap.
  - Alternatively, to assess the need for national Sub-coordinators in each range state.
  - To promote and explain the CMP and progress with its implementation to relevant stakeholders, including:
    - International and regional bodies.
    - Range state officials.
    - Industry representatives including, fisheries, nautical tourism, coastal developers
    - Local authorities and communities in selected areas.
    - NGOs.
  - To raise funds for and manage the Mediterranean Common Dolphin CMP Fund including, where necessary, assigning contracts to ensure that the Actions of the CMP are undertaken and completed.
  - To liaise with relevant authorities to facilitate any permitting required to undertake Actions of the CMP.
  - To facilitate (and if necessary adapt or modify existing) data-sharing agreements to ensure that data are made available in timely fashion to maximise their value for conservation.
  - To develop a database or databases and coordinate the collation, in an appropriate electronic format, of relevant data and information on human activities, the environment and common dolphins, as far as possible in a GIS context. IN COORDINATION WITH SIMILAR DATABASES FOR OTHER CETACAN SPECIES (no need to re-invent the wheel)
  - To maintain and update the existing list of international and national regulations and guidelines relevant to the conservation of Mediterranean common dolphins.
  - To produce concise annual progress reports on the implementation of the CMP.
  - To arrange for periodic expert review of the CMP and the development of new or modified actions as appropriate (every 2 years?)
  - To develop a Common Dolphin CMP website as a resource for researchers, stakeholders and the general public. CONSIDERATION FOR DOING A UNIQUE WEBSITE DEDICATED TO THE EXISTING CMP FOR CETACEANS IN THE REGION IN COORDINATION WITH OTHER CETACEAN CMP STEERING COMMITTEES IN THE REGION

## ACTORS

- **Responsible for coordination of the action:** the IMedDdSC to identify the host institution, obtain initial funding and appoint the Coordinator; ACCOBAMS and IWC to appoint the broader stakeholder Steering Committee for the CMP.
- **Stakeholders**: as listed above under 'Tasks'.

### EVALUATION RESPONSIBLES

- ACCOBAMS, IWC.
- Regular (*e.g.* biennial or triennial) meetings open to stakeholders.

### PRIORITY

- **Importance**: Essential
- **Feasibility**: High (with political support)

### BUDGET CONSIDERATIONS

- Recruitment process (*e.g.* advertising, travel and subsistence for IMedDdSC and shortlisted candidates).
- Host institution annual costs (needs to be negotiated by IMedDdSC).
- Salary of Coordinator (level, tax and benefits issues).
- Initial working budget for Coordinator (travel and subsistence including visits to range states and meetings with stakeholders).

## ACTION COORD-02: REVIEW OF THE MEDITERRANEAN IMMAS AND EVALUATION OF COMMON DOLPHIN PRESENCE, THREATS AND CONSERVATION NEEDS

### DESCRIPTION

- **Specific objectives:** to ensure timely progress is made on implementation of the most adequate conservation measures for common dolphins in Mediterranean sites of recognized importance for marine mammals
- **Rationale:** The IUCN Joint SSC/WCPA Marine Mammal Protected Areas Task Force2 was created in 2013 by the International Committee on Marine Mammal Protected Areas (ICMMPA), the International Union for Conservation of Nature's (IUCN) World Commission on Protected Areas (WCPA) Marine Vice Chair, and members of the IUCN Species Survival Commission (SSC), to help support a global profile for the role of marine mammals in protected areas. The MMPA Task Force aims to provide a stronger voice for the MMPA constituency within the IUCN. The goal of the Task Force is to facilitate mechanisms to encourage collaboration, sharing of information and experience, accessing and disseminating knowledge and tools for establishing, monitoring, and managing MMPAs. The Task Force promotes effective spatial solutions and best practices for marine mammal conservation within MMPAs. For the period 2016-2021, the MMPA Task Force is rolling out a tool to apply criteria to begin to identify a worldwide network of Important Marine Mammal Areas (IMMAs) and to enhance their protection. Important Marine Mammal Areas — referred to as 'IMMAs' — are defined as discrete portions of habitat, important to marine mammal species, that have the potential to be delineated and managed for conservation. IMMAs may merit place-based protection and/or monitoring, or simply reveal additional zoning opportunities within existing MPAs. From 24 to 28 October 2016, the first IMMA Regional Workshop for the Mediterranean was held in Chania (Island of Crete, Greece) with the primary objective to identify and delineate IMMAs. Starting with initial Areas of Interest (AoI) submitted before and during the meeting, 41 candidate IMMAs (cIMMAs) were identified and proposed through an expert-based process utilizing selection criteria. In total 26 IMMAs were accepted for full status by the review panel, after receipt of revisions or additional information that was required before their confirmation as IMMAs meeting the IUCN Task Force criteria.

- **Target:** In coordination with the MMPA Task Force the MedDdSC should review the information related to these 26 IMMAs and identify those in which common dolphins are considered regularly present in order to define the most adequate actions to be undertaken in order to trigger conservation action for the species and their critical habitats (e.g., Gulf of Corinth MPA).
- **Timeline:**

| | WHAT | WHO | WHEN* |
|---|---|---|---|
| (1) | Establishment of contacts with IUCN MMPA Task Force to obtain the information available for all Mediteranean 26 IMMAs | CMP for Mediterranean Common Dolphins Steering Committee (MedDdSC) | 1st quarter 2021 |
| (2) | Preliminary review of the information obtained and establishing of contacts with experts working in those sites | MedDdSC | 1st quarter 2021 |
| (3) | Location of funds | MedDdSC | 1st quarter 2021 |
| (4) | Recruitment of co-ordinator for this task | MedDdSC | 2nd quarter 2021 |
| (5) | Co-ordinator begins work in collaboration with local experts | Co-ordinator | 2nd and 3rd quarter 2020 |
| (6) | Identification of IMMAs relevant to common dolphin conservation, identification of threats and most relevant conservation measures for the species in these sites | ACCOBAMS, IWC, MedDdSC, funders | 4th quarter 2021<br>1st quarter 2022 |
| (7) | Incorporation of the derived information in the regional CMP | ACCOBAMS, IWC, MedDdSC, funders | Within 2022 (see 7.2 Reporting Process) |

*The timeline above could be anticipated if the task to be executed by the MedDdSC was undertaken earlier by the interim IMedDdSC

## ACTORS

- **Responsible for coordination of the action:** MedDdSC together with the IUCN MMPAs Task Force
- **Stakeholders**: International and regional bodies, range state officials, local authorities and communities in selected areas, NGOs.

## EVALUATION RESPONSIBLES

- ACCOBAMS, IWC.
- Regular (*e.g.* biennial or triennial) meetings open to stakeholders.

## PRIORITY

- **Importance**: High
- **Feasibility**: High (in agreement with IUCN MMPAs Task Force)

## BUDGET CONSIDERATIONS

- TO BE DEVELOPED

## ACTION COORD-03: ESTABLISH AN INTERACTIVE REGIONAL NETWORK OF GROUPS INVOLVED IN COMMON DOLPHIN RESEARCH ANS CONSERVATION

### DESCRIPTION

- **Specific objectives:** Facilitation of information and data exchange as well as active research cooperation between neighboring states
- **Rationale:** Wide ranging animals do not recognize political borders; therefore, the study of a 'population' occurring within the limits of one state is fragmented by definition. In many cases political/military constraints hamper regional coordination, yet the active involvement all Mediterranean states in the CMP is essential in order to define the true extent of occurrence of the common dolphin populations throughout the region, as well as unique threats and to unify regional mitigation measures.

### ACTORS

- **Responsible for coordination of the action:** MedDdSC
- **Stakeholders**: Research groups involved in common dolphins research and conservation in the Mediterranean.

### EVALUATION RESPONSIBLES

- ACCOBAMS, IWC.
- Regular (*e.g.* biennial or triennial)

### PRIORITY

- **Importance**: High
- **Feasibility**: Moderate (High, if political/communication issues can be overcome)

### BUDGET CONSIDERATIONS

- TO BE DEVELOPED

## 6.2 PUBLIC AWARENESS, EDUCATION AND CAPACITY BUILDING *(pacb)*

# ACTION PACB-01: DEVELOP A STRATEGY TO INCREASE EDUCATION, PUBLIC AWARENESS AND STAKEHOLDERS ENGAGEMENT

## DESCRIPTION

- **Specific objective**: Raise awareness throughout the Mediterranean on the conservation status of common dolphins through the development of a strategy tailored specifically for each range State, including the production of education and awareness materials providing key information on the species, its ecology and conservation needs, as well as guidelines on how to behave when encountering them at sea or stranded.
- **Rationale:** While in some countries capacities exist and public awareness is adequately addressed, through effective educational programs and multimedia campaigns, and the presence of charismatic cetacean fauna in the region is recognized, this is not the case in all the Mediterranean states.
- Citizen science campaigns can provide extensive qualitative coverage and important information on the presence of this species that can be utilized to identify hotspot areas and better focus research efforts. Hence, it is important to develop initiatives to try to engage the public's interest and involvement in Mediterranean common dolphin science and conservation. In order to successfully do this and maximise the collection of data from opportunistic observations the most up-to-date multimedia communication tools should be used, including also social media platforms as well as more traditional communication means (e.g., journals, newspapers, radio and TV).

- **Target:** Since the strategy is to be tailored for each State, the 'targeted' may vary between countries, while in some other there will be an overlap. Nevertheless, some of the targeted audiences for these strategies will include: nautical tourism companies, coast guards, marinas and port authorities, shipping companies representatives (some shipping lines may pose interesting data collection platforms), fishermen cooperatives and representatives, whale watching operators, NGOs, research institutes, education centres as well as local authorities. The Common Dolphin CMP website as a resource for researchers, stakeholders and the general public will play an important role (see Actions COORD-01)

- **Timeline:**

| | WHAT | WHO | WHEN |
|---|---|---|---|
| (1) | Preparation for a small expert workshop to develop a strategy for the public awareness effort | MedDdSC (appointed by 3rd quarter 2020) – see Action COORD-01 | December 2020 |
| (2) | Workshop | Workshop participants (see methods below) | 1st quarter 2021 |
| (3) | Execution of the actions defined by the strategy established by workshop in agreement with all participants | National organizations identified during workshop in | Timeline to be defined during workshop |

| | | | |
|---|---|---|---|
| | | coordination with MedDdSC | |

- **Methods:** the MedDdSC will be coordinating a workshop in which the following key aspects of the strategy will be defined:
  - Identification of issues to be addressed and identification of the target groups in each state.
  - Evaluation/review of any previous education and awareness campaigns to identify priority actions and materials to be developed, keeping in mind specific needs for different audiences targeted.
  - Identification of the most adequate communication channels depending on states and on targeted audiences.
  - Development of the space and structure necessary within The Common Dolphin CMP website so it can host basic resources for researchers, stakeholders and the general public (See COORD-01).
  - Creation of a mechanism to guarantee the timely adoption of the developed strategies, definition of a timetable for the execution of the different actions, including some follow up and re-evaluation after a period no longer than three years since the beginning of this process in order to be able to tune-up and update the strategy as necessary.
- Workshop participants should include:
  - Coordinator of the Mediterranean common dolphin CMP and representatives of the stakeholder Steering Committee.
  - Scientists familiar with the Mediterranean common dolphin situation.
  - Researchers with success stories on citizen sciences programmes familiar with the effective use of data provided opportunistically by the general public and non-scientist collaborators.
  - Public awareness experts from each country.
  - Experts on communication tools the maximize the audience to be reached by the campaigns to be developed within the strategy defined at the workshop.

## ACTORS

- **Responsible for co-ordination of the action:** MedDdSC (appointed by 3rd quarter 2020) – see Action COORD-01
- **Responsible for carrying out the action:** to be determined at workshop (may differ among States)
- **Stakeholders**: all those identified relevant to each country (non necessarily the same)

## ACTION EVALUATION

- ACCOBAMS, IWC.
- Follow-up and evaluation mechanisms to be defined at the workshop

## PRIORITY

- **Importance**: high
- **Feasibility**: high

## BUDGET CONSIDERATIONS

- TO BE DEVELOPED (mostly related to the set-up and execution of the workshop and to the production of education and awareness materials)

# ACTION PACB-02: DEVELOP A STRATEGY FOR BUILDING CAPACITY IN RANGE STATES

## DESCRIPTION

- **Specific objective**: To assure that individuals and organisations in responsible positions within each of the range states have the motivation, skills and resources needed to function effectively in implementing this plan.
- **Rationale:** The degree of knowledge and expertise throughout the region is not uniformly distributed. The transfer of necessary skills is a key step in the process of successfully implementing this CMP. Training efforts should be diverse and target different aspects of the conservation process; by providing the knowledge needed to conduct adequate research and monitoring activities on the species and their ecosystems, but also by giving tools to effectively translate the newly acquired information on species distribution and conservation needs into both legislative and regulatory actions that will lead to direct conservation actions on Mediterranean common dolphins.
- **Target:** As for PACB-01 this strategy is to be tailored for each State, the 'targeted' may vary between countries, while some countries may be in need of very specific capacity building actions (i.e., training), some other States may be in a privileged position and play an active role in providing training opportunities for some of their Mediterranean neighbours. The Common Dolphin CMP website, assuming that it would include also a database of cetacean experts, may also help in identifying researchers with the right profile and needed expertise for each capacity building action (see Actions COORD-01)

- **Timeline:**

| | WHAT | WHO | WHEN |
|---|---|---|---|
| (1) | Identification of the States with a more urgent need for capacity building and the priority/basic skills to be developed | MedDdSC (appointed by 3rd quarter 2020) – see Action COORD-01 | December 2020 |
| (2) | Identification of a Capacity Building coordinator within the MedDdSC | MedDdSC | 1st quarter 2021 |
| (3) | Design of training packages for different cetacean research (e.g., photoidentification, strandings management and sampling protocols) and conservation tools | MedDdSC supported occasionally by National organizations to adapt the training programs to each local realities as necessary | To be accomplished within 2021 |
| (4) | Execution of the training programs | Experts previously identified by MedDdSC and coordinated by the Capacity Building coordinator | From 2022 |

## ACTORS

- **Responsible for co-ordination of the action:** MedDdSC (appointed by 3rd quarter 2020) – see Action COORD-01
- **Responsible for carrying out the action:** Capacity Building coordinator (ideally) from within the MedDdSC
- **Experts with the skills required for each training program**
- **Stakeholders**: all those identified as the best possible candidates for each training program (non necessarily the same always)

## ACTION EVALUATION

- ACCOBAMS, IWC.
- Follow-up and evaluation mechanisms to be defined by MedDdSC in order to help the trainees to implement the newly acquired skills in their respective fronts.

## PRIORITY

- **Importance**: high
- **Feasibility**: high

## BUDGET CONSIDERATIONS

- TO BE DEVELOPED

## 6.3 RESEARCH ESSENTIAL FOR PROVIDING ADEQUATE MANAGEMENT ADVICE OR FILLING IN KNOWLEDGE GAPS (*RES)*

## ACTION RES-01: DETERMINE MEDITERRANEAN COMMON DOLPHIN POPULATION STRUCTURE

### DESCRIPTION

Common dolphin is increasingly rare in the Mediterranean Sea, and current available studies only cover a limited range of its confirmed presence. Considering the observed population structure, there is the possibility of the presence of further population fragmentation within the considered range unknown at the moment.

The objective is to assess genetic isolation/continuity among different Mediterranean populations, with the rationale of whether or not to consider them as distinct Units of Conservation.

To support further genetic analyses:

- Coordination between groups in collecting samples (both from biopsies and strandings) from underrepresented areas.
- Coordination among museum collections
- Coordination among research groups and operators to report sightings in a joint platform

These analyses would be best implemented in the framework of Basin-wide project. Timeline dependent on the availability of material from all studied populations.

## ACTION RES-02: ESTIMATE ABUNDANCE AND MAP THE DISTRIBUTION OF COMMON DOLPHINS IN THE MEDITERRANEAN

### DESCRIPTION

A previous ACCOBAMS collaborative effort to estimate abundance and map the distribution of Cuvier's beaked whales in the Mediterranean was a great success that led to a recent publication (Cañadas et al., 2018). The results are also being used in a re-assessment of the IUCN Red-List status of this species in the Mediterranean. A similar collaborative effort with the participation of many researches from many riparian countries is in the "organization of data" phase, which up to date includes 758,759 km on effort and 1635 sightings of common dolphins. More data is expected to still be included.

Multiplatform and multiyear survey data will be used to analyse the distribution and abundance of common dolphins across the Mediterranean Sea; a novel approach combining heterogeneous data gathered with different methods to obtain a single density index for the region. This challenging task will require much time to be effectively executed. So far, the process is stuck, as those involved are giving priority and concentrating their efforts to other remunerated jobs. Funding should be made available to fuel this important initiative. Data gathered during the recently executed ASI may be merged with the already existing pool of data facilitated by different by numerous researchers throughout the Mediterranean.

Smaller scale population estimates will be also relevant in key Mediterranean areas for the species. This information is essential in order to follow trends and assure that known and unknown threats, climatic and/or anthropogenic are cumulatively sustainable. Methods may vary from mark-recapture estimates (photoidentification), to distance sampling methodology (i.e., boat based surveys, aerial surveys from planes or from unmanned aerial vehicles following fixed transects)

## ACTION RES-03: DESCRIBE UNDERWATER BEHAVIOR AROUND TOWED BOTTOM TRAWL NETS IN AREAS WHERE THIS INTERACTION IS PRESENT

### DESCRIPTION

- **Specific objective**: to document underwater behavior and thereby collect direct evidence for depredation and avoidance of entrance into the net. Another expected outcome would be the elucidation of whether this foraging mode is practiced all the time or is it less prevalent during the season(s) when the more conventional prey (sardines, anchovy) is abundant.
- **Rationale:** In Israel, from preliminary investigations of stomach analysis, as well as from direct above water observations, common dolphins are known to associate with trawlers. They however seem to be much less prone to be trapped inside the net. On the other hand, some trawl skippers are lately complaining that common dolphins damage their nets. The rationale would be (a) to back the claims of the fishermen and to help them receive compensation; (b) to better evaluate the consequences of the call to abolish trawling altogether, in case there is partial dependence on their existence.
- **Target:** Bottom trawl fisheries in areas where interaction with common dolphins has been reported.
- **Methodology** would involve underwater cameras fixed to the net and aimed fore and/or aft, prior to lowering the net for the tow. The relevant threats are bycatch and ill feelings of fishermen with possible retribution.

### ACTORS

- **Responsible for coordination of the action:** MedDdSC
- **Responsible for execution of the action:** Local researchers/research groups (e.g., IMMRAC, Israel)

- **Stakeholders**: local authorities, bottom trawlers representatives and fishermen communities in selected areas, NGOs.

## EVALUATION RESPONSIBLES

- ACCOBAMS, IWC.
- At the end of a 2-year study

## PRIORITY

- **Importance**: Moderate
- **Feasibility**: High (in agreement with IUCN MMPAs Task Force)

## BUDGET CONSIDERATIONS

- TO BE DEVELOPED

# ACTION RES-04: DEFINITION OF THE EXTEND OF OCCURRENCE OF COMMON DOLPHIN IN DIFFERENT ZONES THROUGHOUT THE MEDITERRANEAN BY COMPARING EXISTING PHOTOIDENTIFICATION CATALOGUES

## DESCRIPTION

- **Specific objective**: to document extend of occurrence of common dolphin population units scattered throughout the Mediterranean
- **Rationale:** Different common dolphin populations are being studied throughout the Mediterranean with considerable survey and photoidentification (photo-id) effort; coordination between groups working in the same or neighbouring areas to share photo-id catalogues would help shed light on the home ranges and extend of occurrence for the species, which would also help defining adequate conservation measures. Action directly related to COORD-03

## ACTORS

- **Responsible for coordination of the action:** MedDdSC
- **Responsible for execution of the action:** Reseach groups conducting photo-id effort on Mediterranean common dolpins
- **Stakeholders**: Those involved in citizen science programs opportunistically provided photo-id data

## EVALUATION RESPONSIBLES

- ACCOBAMS, IWC.
- Regular review of the existing catalogues in a collaborative manner among research groups (every 2-years).

## PRIORITY

- **Importance**: High
- **Feasibility**: Moderate (depending on how successful are the actors in collaborating)

## BUDGET

- TO BE DEVELOPED

# ACTION RES-05: ANALYSIS OF COMMON DOLPHINS' ACOUSTIC VARIABILITY IN ORDER TO HIGHLIGHT SUB-POPULATION GEOGRAPHIC SEGREGATION

## DESCRIPTION

- **Specific objective**: To study the acoustic behaviour of common dolphins within the Ionian Sea areas, in order to highlight any possible differentiation linkable to the potential geographical segregation within this sub-basin, that may imply genetic differentiation and the need of dedicated conservations measures.
- **Rationale:** Genetic analysis suggests that population structure between Greek Ionian and Western Mediterranean evolved recently. The adaptation to different environments and/or foraging strategies may have been the driving factors for this differentiation, and it is likely to have been reinforced by a recent bottleneck (Moura et al., 2013) that affected the Ionian common dolphins (Bearzi et al., 2003) in the last decades. Nevertheless, there is not information about a genetic differentiation within the all Eastern Mediterranean areas. To collect genetic sample could be a way to evaluate any further genetic differentiation, and the consequent level of conservation of the species within the Eastern Mediterranean Sea, in particularly within the Ionian Sea (See action RES-01). The common dolphin is a highly vocal species with a rich acoustic behaviour and the analysis of acoustic variability has been shown to be a useful not invasive technique for highlighting geographical differentiation, which may be due to little exchanges of individuals among areas (Azzolin, 2008; Azzolin et al., 2013; Papale et al., 2013a,2013b; Azzolin et al., submitted). In this regards a study of geographical variability of the acoustic behaviour of commons dolphin within the Ionian Sea in both Italian and Greek side would also help to shade light on individual's differentiation/exchange within the investigated area.
- **Method:** To achieve an even distribution of acoustic data, data collection would be carried out for 1 year in different areas of the Ionian Sea: Gulf of Corinth, Gulf of Taranto (North Western Ionian Sea), Northern Eastern Ionian Sea, Southern Western Ionian Sea.

## ACTORS

- **Responsible for coordination of the action:** MedDdSC
- **Responsible for execution of the action:** Reseach groups applying acoustic methods to their efforts on Mediterranean common dolpins (see evaluation responsibles below)
- **Stakeholders**: Local authorities, Management bodies

## EVALUATION RESPONSIBLES

- ACCOBAMS, IWC.
- Life and System Biology Department of the University of Torino, Gaia Research Institute Onlus. Department of Biology University of Bari, Jonian Dolphin Conservation, STIIMA National Research Council of Bari

## PRIORITY

- **Importance**: High
- **Feasibility**: High

### BUDGET

- TO BE DEVELOPED (Mostly related to data collection, boat, equipment, fuel, personnel, etc. in different areas of the Ionian Sea and data analysis)

## 6.4 MONITORING *(MON)*

## ACTION MON-01: LONG RANGE PASSIVE ACOUSTIC MONITORING OF COMMON DOLPHIN THROUGHOUT THE MEDITERRANEAN

### DESCRIPTION

- **Specific objective**: To carry out long range passive acoustic monitoring within the whole Mediterranean in order to verify the presence and occurrence of the species concurrently studies primarily through visual surveys, and consider acoustics as a tool to distinguish management units in combination with other source of data (genetic, morphological, etc).

### ACTORS

- **Responsible for coordination of the action:** MedDdSC
- **Responsible for execution of the action:** Research groups/individuals conducting with the expertise to undertake the action
- **Stakeholders**: shipping companies, fisheries authorities, nautical tourism companies, ports authorities and coastguards.

### EVALUATION RESPONSIBLES

- ACCOBAMS, IWC.

### PRIORITY

- **Importance**: Moderate
- **Feasibility**: Moderate

### BUDGET

- TO BE DEVELOPED

## 6.5 MITIGATION MEASURES *(MIT)*

### ACTION MIT-01: PROMOTION AND IMPLEMENTATION OF FISHERIES MANAGEMENT MEASURES TO REDUCE OVERFISHING AND PRESERVE MARINE ECOSYSTEMS

#### DESCRIPTION

- **Specific objective**: Adoption of fisheries management measures to reduce overexploitation of important fish stocks for Mediterranean common dolphins and preserve critical habitats for the species and marine ecosystems.
- **Rationale:** Once common and relatively abundant in the Inner Ionian Sea Archipelago common dolphins declined dramatically over the past couple of decades. From approximately 150 individuals using the Archipelago in 1996, only 15 were observed in 2007 (Bearzi et al., 2008). Monitoring of local fishing fleet and ecosystem modelling approaches showed that reduced prey availability, caused by overfishing of small pelagic stocks, induced this sharp decline (Bearzi et al., 2008; Piroddi et al., 2011; Gonzalvo et al.,2011). Continued survey effort in the Inner Ionian Sea Archipelago showed a regular presence of common dolphin groups although at low frequencies. There is evidence indicating that these dolphins, formerly showing a strong site fidelity towards the Inner Ionian Sea Archipelago are now using a much wider area along the coastal waters of the Ionian Islands, and occasionally still visit the Archipelago. This is presumably caused by the area's decreased carrying capacity, due to over fishing. Monitoring of local fishing fleet and ecosystem modelling approaches indicated a specially adverse impact by purse seiners, making up 3% of the total fishing fleet but removing on average 33% of the total biomass captured by local fisheries (Gonzalvo et al.,2011). Moreover, it is this kind of fishing gear the one that has the highest impact on common dolphin prey (Bearzi et al., 2008). Fishery management measures are needed to reduce current over-exploitation, protecting marine biodiversity, ensuring continued ecosystem services, in addition to preserving artisanal fisheries and bringing long-term benefits to the local community. This may pose also an example to be replicated in other areas facing a similar scenario.
- An similar case, not too far away, poses the common dolphins in the Gulf of Corinth, which reportedly are Critically Endangered (Santostasi et al., 2018) and immediate action should be taken to mitigate anthropogenic impacts known or suspected to have a negative impact on cetaceans in the Gulf. As stated above, fisheries management measures aimed at the recovery of depleted fish stocks (particularly of common dolphin key prey) have been identified as a priority in the Ionian Sea. Such measures should be implemented and enforced without delay in the Gulf of Corinth, targeting as a matter of priority those commercial fisheries known to cause food-web damage and deplete common dolphin prey, including purse seiners and trawlers.

- **Target:** Regional and national and local authorities, fishing industries representatives, fishermen cooperatives, general public/consumers, NGOs (see also Actions PACB-01 and MIT-02)

- **Timeline:**

| | WHAT | WHO | WHEN |
|---|---|---|---|

| | | | |
|---|---|---|---|
| (1) | Preparation workshop with all stakeholders involved in order to define the most urgent fisheries management measures | MedDdSC (appointed by 3rd quarter 2020) – see Action COORD-01 | December 2020 |
| (2) | Workshop (engagement of all stakeholders in the development of measures making them part of the conservation/management strategy) | Workshop participants (see methods below) | 1st quarter 2021 |
| (3) | Execution of the actions defined by the strategy established by workshop in agreement with all participants | National organizations identified during workshop in coordination with MedDdSC | Timeline to be defined during workshop |

- **Methods:** the MedDdSC will be coordinating a workshop in which the following key aspects of the strategy will be defined:
  - Identification of fisheries management measures needed.
  - If more data is considered necessary, collaboration between stakeholders and scientist must be established together with a timeline for the study, presentation of results and evaluation.
  - Identification of the most adequate education and awareness activities as well as communication channels depending on the stakeholders/audience (in coordination with PACN-01 and MIT-02)
  - Creation of a mechanism to guarantee the timely adoption of the developed strategies, and re-evaluation after a period no longer than three years since the beginning of this process in order to be able to tune-up and update the strategy as necessary.
- Workshop participants should include:
  - Coordinator of the Mediterranean common dolphin CMP and representatives of the stakeholder Steering Committee.
  - Fisheries representatives
  - Regional, national and local authorities relevant to the management of the area and fisheries.
  - Scientists familiar with the Mediterranean common dolphin situation
  - Local and regional fisheries scientist .
  - Researchers with success stories in similar initiatives in the region
  - Public awareness experts
  - Experts on communication tools the maximize the audience to be reached by the campaigns to be developed within the strategy defined at the workshop.
  - NGOs

## ACTORS

- **Responsible for co-ordination of the action:** MedDdSC (appointed by 3rd quarter 2020) – see Action COORD-01
- **Responsible for carrying out the action:** Local, national authorities with advice and support to be determined at workshop
- **Stakeholders**: see above

## ACTION EVALUATION

- ACCOBAMS, IWC.
- Follow-up and evaluation mechanisms to be defined at the workshop

## PRIORITY

- **Importance**: high
- **Feasibility**: Moderate (High, with political will)

## BUDGET CONSIDERATIONS

- TO BE DEVELOPED (mostly related to the set-up and execution of the workshop and to the production of education and awareness materials)

## ACTION MIT-02: PROMOTION OF SUSTAINABLE FISHERIES PRODUCTS

### DESCRIPTION

- **Specific objective**: Promote the implementation of adequate fisheries management actions in order of making them more sustainable by encouraging consumers to be more attentive to the way the consume fish and how sustainable it is (e.g., how was caught, where comes from)
- **Rationale:** Sustainability must become an important factor driving seafood sales, perhaps even more so than brand and price. Ideally, shoppers should only consume food from sustainable sources to ensure ocean longevity. In order to achieve that pro-active responsible attitude by consumers, the adequate messages must be effectively and clearly presented. By changing the general public attitudes the authorities will be more likely to listen to marine conservation strategies and conservation plans.
- **Target:** Regional and national and local authorities, fishing industries representatives, fishermen cooperatives, general public/consumers, NGOs (see also Actions PACB-01 and MIT-01)

# 7 EXECUTIVE SUMMARY OF ACTIONS

## 7.1 STAKEHOLDER ENGAGEMENT PUBLIC AWARENESS AND EDUCATION

Strategy and information on stakeholder engagement, public awareness and any education activities that will be undertaken during the CMP implementation stage

## 7.2 REPORTING PROCESS

Any CMP needs to be reviewed periodically so that the actions called for can be adjusted as appropriate in response to new information or changed circumstances. Once a coordinator has been appointed and a steering committee is functioning, it is expected that a regular review and revision process will be implemented. It is suggested that this CMP would be reviewed every two years and that an in-depth review would be conducted every four years.

Insert process for reporting on CMP progress to the IWC (including a timeframe).

## 7.3 ACTIONS

### 7.3.1 Coordination actions

| Nr. | Action | Impor-tance | Feasibi-lity | Crossref. |
|---|---|---|---|---|
| COORD-01 | Establishment of a CMP for Mediterranean Common Dolphins Coordinator and Steering Committee (MedDdSC) | ESSENTIAL | HIGH | |
| COORD-02 | Review of the Mediterranean IMMAs and evaluation of common dolphin presence, threats and conservation needs | HIGH | HIGH | CORD-01 |
| COORD-03 | Establish an interactive regional network of groups involved in common dolphin research and conservation | HIGH | MODERATE | RES-01 |

### 7.3.2 Capacity building and public awareness actions

| Nr. | Action | Impor-tance | Feasibi-lity | Crossref. |
|---|---|---|---|---|
| PACB-01 | Develop a strategy to increase education, public awareness and stakeholders engagement | HIGH | HIGH | CORD-01 |
| PACB-02 | Develop a strategy for building capacity in range states | HIGH | HIGH | |

### 7.3.3 Research actions essential for providing adequate management advice

| Nr. | Action | Impor-tance | Feasibi-lity | Crossref. |
|---|---|---|---|---|
| RES-01 | Determine Mediterranean common dolphin population structure | HIGH | HIGH | COORD-03 |
| RES-02 | Estimate abundance and map the distribution of common dolphins in the Mediterranean | HIGH | HIGH | COORD-03 |
| RES-03 | **DESCRIBE COMMON DOLPHIN UNDERWATER BEHAVIOR AROUND TOWED BOTTOM TRAWLS** | MODERATE | HIGH | |
| RES-04 | Definition of the extend of occurrence of common dolphin in different zones throughout the Mediterranean by comparing existing photo-id catalogues | HIGH | MODERATE | COORD-03 |
| RES-05 | Analysis of common dolphins' acoustic variability in order to highlight sub-population geographic segregation | HIGH | HIGH | |

### 7.3.4 Monitoring actions

| Nr. | Action | Impor- | Feasibi- | Crossref. |
|---|---|---|---|---|

| | | tance | lity | |
|---|---|---|---|---|
| MON-01 | Long range passive acoustic monitoring of common dolphin throughout the Mediterranean | MODERATE | MODERATE | RES-04 |

### 7.3.5 Mitigation measure actions

| Nr. | Action | Impor-tance | Feasibi-lity | Crossref. |
|---|---|---|---|---|
| MIT-01 | Promotion and implementation of fisheries management measures to reduce overfishing and preserve marine ecosystems | HIGH | MODERATE | MIT-02 |
| MIT-02 | Promotion of sustainable fisheries products | HIGH | MODERATE | PACB-01 |

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# IV - STATUS REPORT ON DRAFT CONSERVATION MANAGEMENT PLAN ON BOTTLENOSE DOLPHIN

## Conservation Management Plan for the Mediterranean Bottlenose dolphin (*Tursiops truncatus*) – 10.10.2018 (draft)

***by Guido Gnone (MBCP Coordinator)***

### INTRODUCTION

The bottlenose dolphin (*Tursiops truncatus*) is a cosmopolitan dolphin, distributed in all the oceans of the world, excepted the polar and sub-polar waters. The IUCN classifies this species in the "Least concern" category on a global level, while in the Mediterranean Sea it is considered Vulnerable (Reeves and Notarbartolo di Sciara, 2006).

Thanks to its behavioural flexibility and opportunistic behaviour, which make this dolphin able to exploit new resources and bypass impediments, the bottlenose dolphin seems not to be in an endangered status on a Mediterranean level. However the lack of data available, especially in the southern portion of the basin, and the scattered knowledge of the species abundance also in the north, could hide a negative trend in the species presence and. It is therefore urgent to fill up the knowledge gaps, identify outstanding potential threats and to put in place a consistent Conservation Management Plan (CMP) to consolidate the conservation status of the species and prevent future problems. The long term conservation experience teaches that it may be very difficult to intervene to protect a species when its decline is highly manifested, while prevention is much safer, cheaper and successful. An effective CMP should be developed and implemented before populations become critically endangered (Donovan *et al*., unpublished).

The present CMP will try to draw up the best possible management procedure of the Common bottlenose dolphin (meta)population of the Mediterranean sea, starting from the available present knowledge but with a perspective view to a time when the knowledge gaps will be filled and the CMP will be updated to fit these.

The main challenge will be to develop and implement an effective CMP in an area (the Mediterranean Sea) which, in spite of its geographical continuity, is fragmented in countries and continents with different conservation cultures, making more difficult to implement a fully shared management program.

Taking this into account, we tried to develop a CMP which could be **simple and feasible** in its implementation, starting from the regulatory framework already in force in most of the countries involved and trying to get the best from the current context.

The main potential threats identified for the target species are the contraction and degradation of the habitat, overfishing and conflict with fishermen, contamination of the food chain and epidemics. For each of this threat we identified mitigation actions, acting on three main items: political and regulatory, stakeholder engagement, and education and awareness (which should also include the valorisation of the natural environment). At the present state we did not identify any concrete, field activity which could further contribute to the conservation of the Mediterranean bottlenose dolphin (meta)population.

Fundamental component in the CMP implementation will be the **Monitoring system**, which will be based on the ACCOBAMS zonation (subareas), with a strong effort to connect the local realities in a solid network, coordinated by a Steering Committee and its Coordination Centre. The network will have to guarantee the continuity of the system over space and time, favouring the implementation of the mitigation actions (from the centre to the periphery) and monitoring data flow (from the periphery to the centre).

The monitoring network should be able to verify the goodness and feasibility of the mitigation actions and to observe possible changes in the presence and abundance of the target species. The system activity will also allow to identify and prioritize the knowledge gaps, in order to plan specific research campaigns.

**INDEX**

**THE TARGET SPECIES (*Tursiops truncatus*)**

The common bottlenose dolphin (*Tursiops truncatus* Montagu, 1821) is a cosmopolitan Delphinidae; its distribution is usually contained within the 45th parallel in both hemispheres, in tropical and temperate waters, but in the North Atlantic it can reach the 65th parallel (Rice, 1998; Wells and Scott, 1999). This wide distribution is associated with a remarkable morphometric differentiation among populations, which led to 20 species classified in the 1960s (Hershkovitz, 1966). Today most authors identify the majority of the forms in two species: the common bottlenose dolphin (*Tursiops truncatus* Montagu, 1821) widely distributed worldwide, and the Indo-Pacific bottlenose dolphin (*Tursiops aduncus* Ehrenberg, 1833) with an Indo-Pacific distribution (Ross and Cockcroft, 1990; Hale et al., 2000). A third species, with a limited distribution in Southern Australia and Tasmania, was recently proposed as a separated species with the common name of Burrunan dolphin (*Tursiops australis* sp. Nov.) (Charlton-Robb et al., 2011). Within the species *Tursiops truncatus*, the presence of two genetically different ecotypes, one with primarily coastal habits and the other with primarily offshore habits, has been described by various authors in different areas of the world (Ross, 1977, 1984; Walker, 1981; Duffield et al., 1983; Hersh and Duffield, 1990; Van Waerebeek et al., 1990; Mead and Potter, 1995; Hoelzel, 1998).

Bottlenose dolphins are found in a wide variety of habitats, and habitat use by resident populations differs between locations. This heterogeneity in habitat preference is associated with a behavioural flexibility; these dolphins are able to display a variety of tactics and strategies to capture different preys in different habitats, ranging from individual to highly coordinated group hunting techniques (Wells and Scott, 2002). These local specializations are most probably culturally transmitted through a matrilineal route (Barros and Odell 1990; Kopps et al. 2014), allowing a more efficient exploitation of local resources and a transgenerational update to changes. The plasticity in foraging behaviour is accompanied with a plasticity in the pattern of association, a flexible social model which was defined as “fission–fusion society” (Connor et al. 2000).

As part of this opportunistic behaviour, bottlenose dolphins can learn to get the fish from trawls, gillnets and fish cages for aquaculture as an integral part of their feeding strategies. This behaviour can generate a partial dependence on human activity, triggering conflicts with fishermen and is a concern in many areas of the world including the Mediterranean Sea (Chilvers and Corkeron, 2001; Lauriano et al., 2004; Diaz Lopez, 2006; Gonzalgo et al., 2008; Barros and Odell, 1990; Blasi and Boitani, 2012; Brotons et al., 2008; Corkeron et al., 1990; Fertl and Leatherwood, 1997; Pace et al., 2003).

The bottlenose dolphin is considered a commonly occurring species in the Mediterranean Sea (Pilleri and Gihr, 1969; Cagnolaro et al., 1983; Notarbartolo di Sciara and Demma, 1994) and occurs in most coastal waters of the basin (Bearzi and Fortuna, 2006). No differing ecotypes of bottlenose dolphin have been described in the Mediterranean Sea. According to Notarbartolo di Sciara and Demma (1994) the Mediterranean population is more related to the inshore ecotype, because of its shallow water habits, while Cañadas et al. (2002), reporting the distribution of the bottlenose dolphin off southern Spain, suggested a closer link with the

offshore Atlantic ecotype. Gnone et al. (2005) investigated the distribution of bottlenose dolphin strandings along the Italian peninsula over a period of 18 years (1986–2002) and found a strong positive correlation with the extent of the continental shelf facing the coast line, suggesting that bottlenose dolphins tend to be more abundant in shallow water areas, within the 100m isobath. However the presence of different ecotypes in the Mediterranean Sea cannot be excluded at this stage, since very few genetic studies have been conducted in the basin; Natoli et al. (2005) investigated the genetic diversity of bottlenose dolphin populations along a continuous distributional range from the Black Sea to the eastern North Atlantic and found clear population structures over the geographical range, coinciding with transitions between habitat regions. Laran and co-authors reported of an offshore distribution of a large number of individuals detected during aerial surveys (Laran et al., 2017).

The bottlenose dolphin is regularly present in the Pelagos Sanctuary (the SPAMI located in the NW portion of the basin, across Italian, French waters, including the principality of Monaco). About 1000 individuals were estimated to live within this area in 2006 (Gnone et al. 2011), with an heterogeneous distribution over the continental shelf (within 200 m depth). The dolphins here show a clear philopatric behaviour, performing maximum displacements of about 50 km (on average). Local specializations, possibly in the feeding techniques, seem to produce a segregation between neighbouring dolphins and a clusterization of the (meta)population in discrete geographical units or subpopulations (Gnone et *al*., 2011). The connectivity through the units seems to retrace the landscape traits and its habitat breakages (Carnabuci *et al*., 2016). This kind of distribution of the species along the continental may represent a model for the distribution of the bottlenose dolphin in the Mediterranean Basin.

The shallow water preference of the bottlenose dolphin in the Mediterranean waters seems be related to the feeding habits of the species, preying mostly on benthic and demersal fishes (Voliani and Volpi, 1990; Orsi Relini et al., 1994; Miokovi ć et al., 1999; Blanco et al., 2001).

The Mediterranean Bottlenose dolphin population has been classified as Vulnerable by the IUCN in its report on the Status of Cetaceans in the Mediterranean and Black Sea (Reeves and Notarbartolo di Sciara, 2006). *Tursiops truncatus* is also listed in the Annex II of the Habitats Directive (Council Directive 92/43/EEC), as a Species of Community Interest. According to *Bearzi et al*. (2004) deliberate killing, overfishing (prey depletion), and habitat degradation may have caused a considerable reduction (about 50%) of the bottlenose dolphin population in the northern Adriatic Sea. Bearzi and Fortuna (2006) and Bearzi et al. (2008) suggest a similar reduction should be applicable to the whole of the Mediterranean basin, with a current total population of less than 10,000 animals, representing a decrease of about 30% in the last 60 years. These results should be taken as the best possible estimate considering the extreme data shortage, especially in the southern portion of the Mediterranean Sea.

According to a survey carried out in 2013, through a questionnaire distributed to all the subarea coordinators within the ACCOBAMS framework, (see annex 1) the bottlenose dolphin would be regularly present in all the subareas of the basin (fig. 1), with different trends in abundance. The main potential threats for the bottlenose dolphin conservation would be overfishing, chemical pollution and boat traffic (the survey was actually testing the perception

of the subarea coordinators, despite the shortage of the data available so the results should be taken in this respect).

In table 1 are resumed the abundance estimates for some bottlenose dolphin geographical units within the Mediterranean Sea (Bearzi and Fortuna, 2006, integrated with data from Gnone et *al*., 2011; Lauriano *et al*., 2014)

| **Geographic Area** | **Study area** (km2) | **Sampled area** | **Years** | **Density** (animals / km2) | **N** | **CV** | **95% CI** | **Estimation method** | **Source** |
|---|---|---|---|---|---|---|---|---|---|
| Strait of Gibraltar | 500 | in- & offshore | 2005 | 0.51 | 258 | 0.08 | 226-316 | Mark-recapture (closed population) | De Stephanis *et al*., 2005 |
| Alboran Sea (Spain) | 11,821 | in- & offshore | 2000-2003 | 0.049 | 584 | 0.28 | 278–744 | Distance sampling & GAMs | Cañadas & Hammond, 2006 |
| Almeria (Spain) | 4,232 | in- & offshore | 2001-2003 | 0.066 | 279 | 0.28 | 146–461 | Distance sampling & GAMs | Cañadas & Hammond, 2006 |
| Asinara island National Park (Italy) | 480 2004 | inshore | 2001 | 0.05 | 22 | 0.26 | 22–27 | Mark-recapture (closed population) | Lauriano *et al*., 2003 |
| Balearic Islands & Catalonia (Spain) | 86,000 | in- & offshore | 2002 | 0.088 | 7,654 | 0.47 | 1,608-15,766 | Distance sampling | Forcada *et al.,* 2004 |
| Alboran sea and Murcia | 17,987 | in- & offshore | 2004-2005 | 0.072 | 1288 | - | - | Distance sampling & GAMs | Cañadas, unpublished |
| Gulf of Vera (Spain) | 6,164 | in- & offshore | 2003-2005 | 0.042 | 256 | 0.31 1 | 88–592 | Distance sampling & GAMs | Cañadas, unpublished |
| Valencia (Spain) | 32,270 | in- & offshore | 2001-2003 | 0.041 | 1,333 | 0.31 739- | 2,407 | Distance sampling | Gomez de Segura *et al.,* 2006 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Tunisian waters | ~ 750 | inshore | 2001 & 2003 | 0.19 | - | - | - | Distance sampling (uncorrected) | Ben Naceur *et al.,* 2004 |
| Lampedusa island (Italy) | 200 | inshore | 1996-2000 | - | 140 | | | | |
| Israeli Mediterranean coast (Israel) | - | inshore | 1999-2004 | - | 85 | | | | |
| Ionian Sea (Greece) | 480 | inshore | 1993-2003 | - | 48 | | | | |
| Amvrakikos Gulf (Greece) | 400 | inshore | 2001-2005 | 0.38 | 152 | - | 136-186 | | |
| Central Adriatic Sea (Kornati & Murtar Sea, Croatia) | 300 | inshore | 2002 | - | 14 | | | | |
| North-eastern Adriatic Sea (Kvarneric, Croatia) | 800 | inshore | 1990-2004 | - | 120 | | | | |
| North-eastern Adriatic Sea (Kvarneric, Croatia) | 1,000 | inshore | 1997 | 0.06 | 113 | | | | |
| North-eastern | 2,000 | inshore | 2003 | 0.05 | 102 | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Adriatic Sea (Kvarneric, Croatia) | | | | | | | | | |
| North Adriatic Sea (Gulf of Trieste, Slovenia) | 600 | inshore | 2002-2004 | 0.08 | 47 | | | | |
| Pelagos Sanctuary | 87,500 | in- & offshore | 2006 | - | 1,023 | - | 848-1234 | Mark-recapture (closed population) | Gnone *et al.*, 2011 |
| Western Mediterranean Sea | | in- & offshore | 2010-2011 | 0.005 | 1,676 | 0.3825 | 804-3492 | Distance sampling (aerial survey) | Lauriano *et al.*, 2014 |

Tab. 1 - Summary of abundance of bottlenose dolphins in the Mediterranean basin from Bearzi and Fortuna, 2006 (integrated with data from Gnone et *al*., 2011; Lauriano *et al*., 2014).

**CMP GOALS**

The present CMP will try to draw up the best possible management of the Common bottlenose dolphin (meta)population of the Mediterranean Sea, starting from the available present knowledge. According to the experience of the authors, the CMP implementation will start with simple and feasible objectives, taking advantage of already in force structures/systems whenever possible and adjusting the route along the way, according to the results produced.
The present goal of the bottlenose dolphin CMP (Tt-CMP) is to keep the Common bottlenose dolphin Mediterranean (meta)population to the present level (distribution, density, abundance - see the attributes) or (if future findings may suggest) to a higher level that could guarantee the subsistence of the same (meta)population despite potential negative events such as epidemics, climatic change, striking pollution events (oil spills) or other.

- Aim for the species
    - To keep at present level or higher (if needed for save conservation)
- Aim for the environment
    - To prevent further habitat constriction, deterioration, fragmentation
    - To prevent further anthropization of the bottlenose dolphin habitat
    - To prevent further decrease of fishery resources
    - To decrease the pollution level of the food chain
- Aim for stakeholders
    - To prevent environment deterioration
    - To promote environment valorisation
    - To keep the fishery resources at the present level or higher
    - To promote safer (less polluted) fish consumption

In order to optimize the costs and improve the results, the Tt-CMP should be developed and implemented together and consistently with the CMPs of other Cetacean species on a Mediterranean level, as each species may serve as a control for the others. The results over time and space should be compared to identify possible deviations in the presence of the each different species.

**GOVERNANCE**

The Tt-CMP will be organized following the ACCOBAMS zonation for the Mediterranea area and related subarea coordinators (fig. 1, tab. 1). In order to facilitate the role of the coordinators, the subareas have been designed trying to overlap their limits with the political borders.
The implementation of the Tt-CMP guidelines and actions will follow a centre-periphery flow (from the Coordinator centre to the subareas), while the data flow for the monitoring activity will follow a periphery-centre flow (from the subareas to the Coordinator centre).

Fundamental subjects of the Tt-CMP are the following:

- Steering Committee

- Coordination centre
- Tt-CMP Coordinator
- Tt-CMP subarea coordinators
- Scientific Committee

**Steering Committee**

The SC is composed by the Tt-CMP coordinator and the subarea coordinators. The SC checks that the Tt-CMP is implemented according to the original goals. It approves the annual report and possible adjustments of the Tt-CMP aims according to the contents of the same report, after listening to the technical opinion of the Scientific Committee.

**Tt-CMP Coordination centre**

It is an operational tool of the Steering Committee and is coordinate by the Tt-CMP Coordinator. Its role is to coordinate the monitoring network, validate the data and process the Annual report to be submitted to the Steering Committee.

**Tt-CMP Coordinator**

He/She coordinates and supervise the Coordination Centre and the proper implementation of the Tt-CMP, linking the activity of the different subareas and promoting the data flow to and from the subareas.

**Scientific Committee**

It is an independent body that gives a scientific evaluation of the annual report of the Tt-CMP and may suggest possible adjustments of the same Tt-CMP goals and actions.

**CMP subarea coordinators**

The subarea coordinators have to promote the right implementation of the Tt-CMP (and related actions) in their subarea of competence (from the centre to the periphery). At the same time they have to favour the data flow of the Monitoring system from to the periphery to the Coordinator centre. The subarea coordinators are part to the Steering Committee.

**Annual report**

Is the main document produced by the Tt-CMP (based on the Tt-CMP actions and monitoring activity) and has to work as a rudder for the Tt-CMP implementation and adjustment over time. The Annual Report is processed by the Coordination Centre (under the direction of the Tt-CMP Coordinator) on the base of the monitoring activity. It must be approved by the same Steering Committee after the technical opinion of the Scientific Committee

**Adjustment process**

On the base of the Annual Report redaction and approval, the Steering Committee may decide adjustments in the Tt-CMP goals and consequent actions.

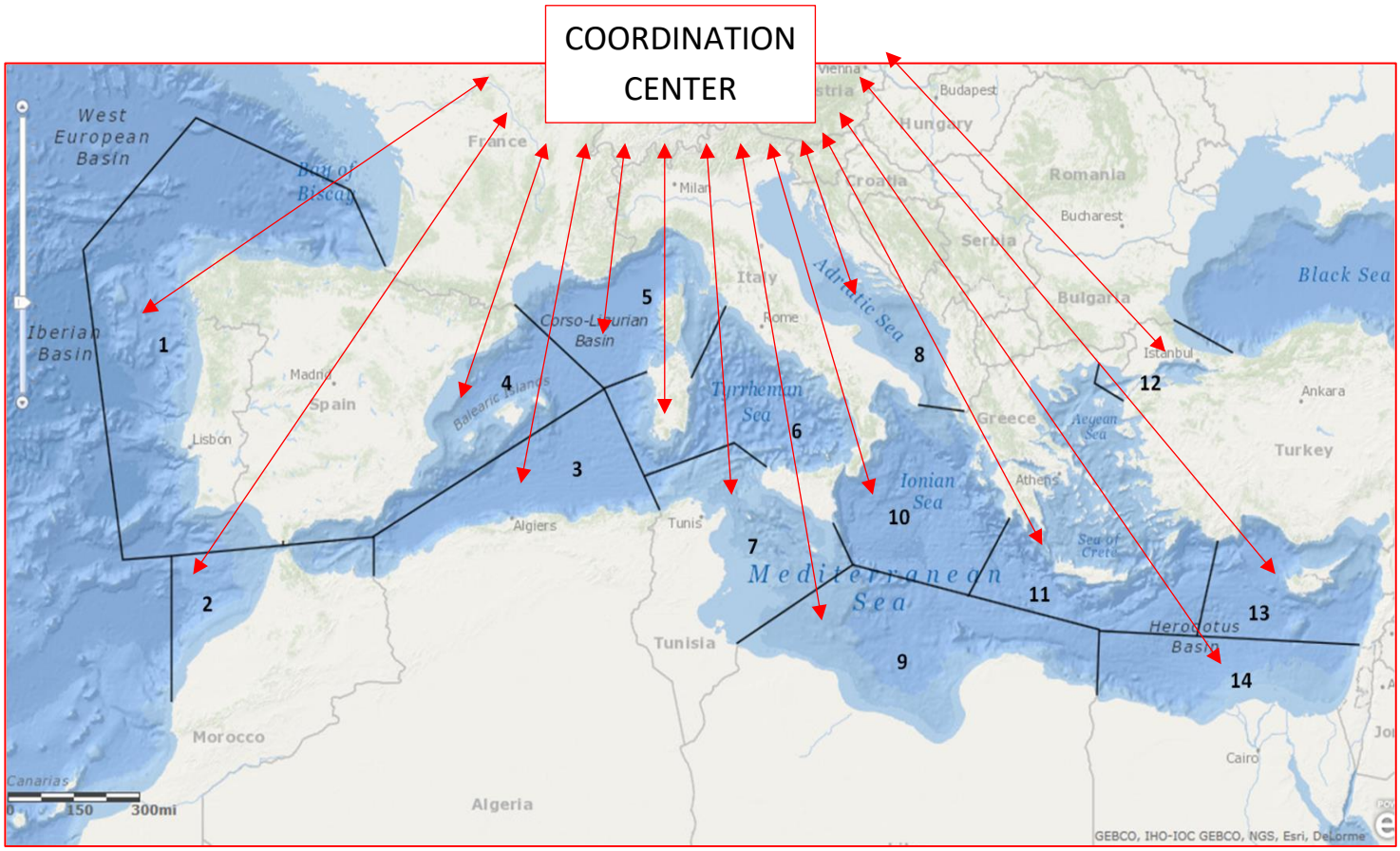


Fig. 1 – The ACCOBAMS zonation in 14 subareas (see tab. 2 for subarea coordinators)

| | | | | |
|---|---|---|---|---|
| | GENERAL COORD. | NATIONALITY | AFFILIATION | EMAIL |
| | Guido Gnone | Italy | Fond. Acquario di Genova | ggnone@acquariodigenova.it |
| SUB-AREA | SUBAREA COORD. | | | |
| 1 | Marina Sequeira | Portugal | ICNF | Marina.Sequeira@icnf.pt |
| 2 | Sadia Belcaid | Morocco | INRH | sadiabelcaid@hotmail.com |
| | Said Benchoucha | Morocco | INRH | bench2468@yahoo.fr |
| 3 | Assia Henda | Algeria | | henda_assia@yahoo.fr |
| 4 | Ana Cañadas (est) | Spain | ALNILAM | anacanadas@alnilam.com.es |
| | Manuel Gazo (west) | Spain | | manelgazo@submon.org |
| 5 | Léa David (est) | France | écoOcéan Institut | lea.david2@wanadoo.fr |
| | Guido Gnone (west) | Italy | | ggnone@acquariodigenova.it |
| 6 | Giancarlo Lauriano | Italy | ISPRA | giancarlo.lauriano@isprambiente.it |

| | | | | |
|---|---|---|---|---|
| 7 | Medhi Aissi | Tunisia | | mehdi.aissi@gmail.com |
| 8 | Drasko Holcer | Croatia | Blue World Institute | Drasko.Holcer@blue-world.org |
| 9 | Ibrahim Benamer | Lybia | | benamer.ly@gmail.com |
| | Almokhtar Saied | Lybia | | mok405@yahoo.com |
| 10 | Joan Gonzalvo Villegas | Spain | Tethys Res. Institute | joan.gonzalvo@gmail.com |
| 11 | Ayhan Dede | Turkey | Instanbul University | aydede@istanbul.edu.tr |
| 12 | Bayram Öztürk | Turkey | Instanbul University | ozturkb@istanbul.edu.tr |
| 13 | Milad Fakhri | Lebanon | | milosman@cnrs.edu.lb |
| 14 | Mahmoud Fouad | Egypt | | mahmoud_ncs@yahoo.com |

Tab. 2 – The subareas coordinators according to the ACCOBAMS zonation (see fig. 1).

**THREATS**

The Bottlenose dolphin, thanks to its behavioural flexibility and opportunistic attitude, was able to adapt to a changing and anthropizing environment to survive to the present time. Despite a possible decline in abundance, the species is still present along most of the Mediterranean coasts. Still it is possible to identify potential threats to its good conservation status, based on literature available and precautionary principles.

Following a survey conducted in 2013 within the ACCOBAM framework (see annex 1) through the subarea coordinators (see tab. 1) and asking to rank the potential threats for the bottlenose dolphin in their area of competence, overfishing, chemical pollution and boat traffic were indicated as the most impacting threats for the species.

Conflict with fisherman (possibly resulting in deliberate killing) and bycatch are a problem in many areas of the basin.

Epidemics may represent an unpredictable phenomenon that can affect severely some demographic units or subpopulation.

- Habitat change, reduction and fragmentation

  In the Mediterranean context the bottlenose dolphin seems to find its favourite habitat over the continental shelf, being the only Mediterranean dolphin sighted mostly in shallow waters <200m. This species seems to be able to exploit all the shelf waters right to the coast line (Gnone *et al*., 2011) but The presence of man in its original habitat has strongly increased in the last century, due to the new potential of exploitation produced by the industrial revolution and its technological conquests, first of all the petrol engine and its progressive implementation in fishing industry, maritime transport and tourism. As a consequence, the presence of man in the original bottlenose dolphin habitat has increased greatly together with the weight (impact) of its activity on the same habitat. This has

produced a change in the marine environment and most probably a reduction of the habitat potentially exploitable by the bottlenose dolphin. In particular we here refer to the rapid growth of maritime traffic, which has probably reached its peak in the last decades. In the summer, touristic season, pleasure boating may reach very high level in some portion of the coastal marine band, producing a (temporary) reduction and fragmentation of the habitat potentially exploited by the bottlenose dolphin in its vital activities, such as foraging and breeding (David, 2001; Papale *et al*., 2011). In some areas, where the continental shelf is very narrow, pleasure boating may almost saturate the bottlenose dolphin habitat, breaking its continuity and forcing the animals to aggregate in other areas. The impact is given by acoustic pollution produced by the engines but also (and may be more heavily) by the direct harassment of the boats (especially high speed boats). The continuous traffic of boats can make a wide portion of habitat poorly productive, since the animals have to keep continuous attention to vessels to avoid collisions and harassment. The potential threats increase as the speed of the boats increases, forcing the possibility of the dolphins to get safely away. However, since touristic activity are not traditionally associated to negative impact to wild animals, there is no limitation to the presence of pleasure boating, neither limitation to the speed of the boats (with very few exceptions). Even the Marine Strategy does not mention pleasure boating has a potential impact for wild marine population and no limitations are foreseen in this respect. Still the impact of pleasure boating in some sensitive areas of the bottlenose dolphin habitat may be significant and a further (and uncontrolled) development of this human activity should be of concern in the Tt-CMP.

- Overfishing and decrease of fish resources
  The new technologies in marine fishery also produced a great increase in the exploitation potential of the marine resources during the last century. This, together with the new techniques for fish conservation and transportation, has produced a strong increase in the fish request and consumption. Overfishing has produced a drastic reduction of some fish stocks, overexploited with new and more efficient fishing techniques, possibly including some bottlenose dolphin preys such as the Mediterranean hake (*Merluccius merluccius smiridus*) (Orsi Relini *et al*., 2002), which is usually fished with trawlers. However the bottlenose dolphin has learned to feed opportunistically on trawlers wake, taking advantage of the collection action of the net. In this context it may be difficult to understand if the advantage coming from the opportunistic feeding on trawlers could overcome the negative effect of overfishing (see also mitigation actions).

- Conflict with fishermen and bycatch
  As a consequence of their opportunistic attitude, bottlenose dolphins may be perceived as competitors or stealers by the fishermen. Furthermore their opportunistic action on nets (gillnets) can cause damages to the fishing gear and exacerbate the conflict (Diaz Lopez, 2006; Snape *et al.*, 2018). Fishermen may therefore adopt brutal solutions to discourage the dolphins and protect their fishing activity. Deliberate killing, as the most

extreme solution, could impact on small demographic units. Bycatch may also be a consequence of the opportunistic activity of the dolphins on the fishing gears.

- Pollution of the food chain
  Preying mostly on benthic and demersal fish, bottlenose dolphins are exposed more than other Cetaceans to chemical pollution from persistent organic pollutants, through bioaccumulation and biomagnification mechanisms. High level of PCB, DDT and heavy metals were found in the tissues of bottlenose dolphins sampled in the Mediterranean Sea, when compared with Atlantic individuals (Marsili and Focardi, 1997; Aguilar *et al*., 2002; Fossi and Marsili 2003; Storelli *et al*., 2007; Shoham-Frider *et al*., 2009; Romanić *et al*., 2014). These pollutant may cause a decrease of the fitness of the individual on a long term, causing immunodeficiency, decreased fertility and an increase in neonatal mortality (since the mother will release pollutants with lactation). The pollution of the food chain may therefore take part in decreasing the survival potential of the bottlenose dolphin Mediterranean (meta)population.

- Epidemics
  Epidemics such as Morbillivirus can cause mortality in bottlenose dolphin, especially on those individuals already debilitated by malnutrition and/or pollution from persistent organic pollutants. Local demographic units could be severely impacted by these epizootic outbreaks (Birkun, 2006).

**KNOWLEDGE GAPS**

To be able to implement a consistent Tt-CMP it will be needed to fill some knowledge gaps. According to Carnabuci and co-authors (2016) the Bottlenose dolphins is distributed over continental shelf with distinct geographical units or (sub)populations, residing in a certain area and with a local specialization on the habitat. For a proper Tt-CMP implementation and monitoring it is crucial to identify these units, their geographical borders and their size consistency on a Mediterranean level. At the present time these knowledges are partially

available only for a few units, mostly (but not only) in the northern portion of the Mediterranean Sea (see tab. 1).

New knowledges in this regard may come from some recent research projects, such as TursioMed. TursioMed is aimed at assessing the conservation status of the bottlenose dolphin in the Mediterranean Sea. The project is based on a Mediterranean network, using a Web-GIS platform as a common tool and support for data sharing (www.intercet.it). This project may also represent o fruitful experience for implementing the Tt-CMP monitoring system (see **Monitoring system** section).

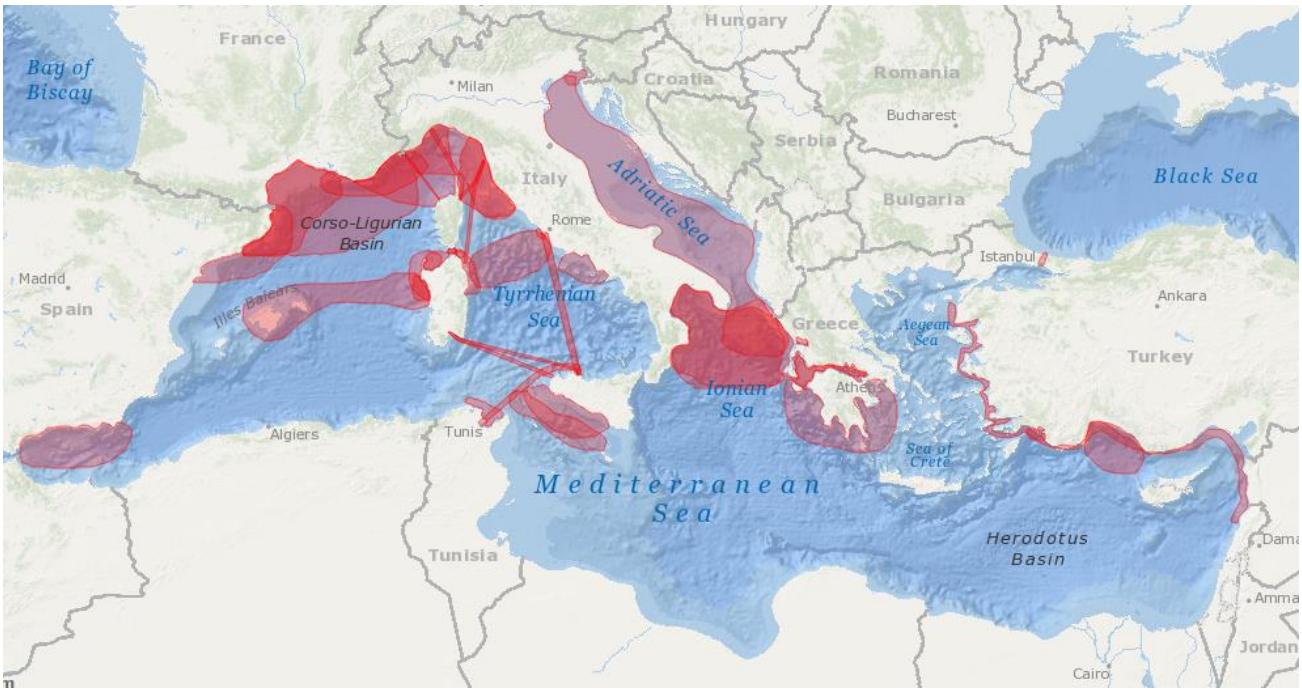


Fig. 2 – the study areas covered by the TursioMed project.

## REGULATORY FRAMEWORK

One of the main challenge of the Tt-CMP is to manage and protect the bottlenose dolphin in an area (the Mediterranean Basin) were many different cultures and traditions coexist on the same sea coasts. This can make quite difficult to overcome the regional and national regulatory framework to establish a general management and conservation strategy for the target species.

However there are at least some agreements and conventions that can give continuity and homogeneity to the conservation effort (see below). Despite the fact that only one of these was designed specifically for Cetaceans protection (ACCOBAMS), most of them have targets

that support Cetacean conservation on a certain level (see also the paragraph on the Marine Strategy Framework Directive).

- CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora, also known as the Washington Convention). The convention entered in to force in 1975 and is aimed at ensuring that international trade in specimens of wild animals and plants does not threaten the survival of the species in the wild. The Convention has 183 parties all over the globe (see fig. 3).

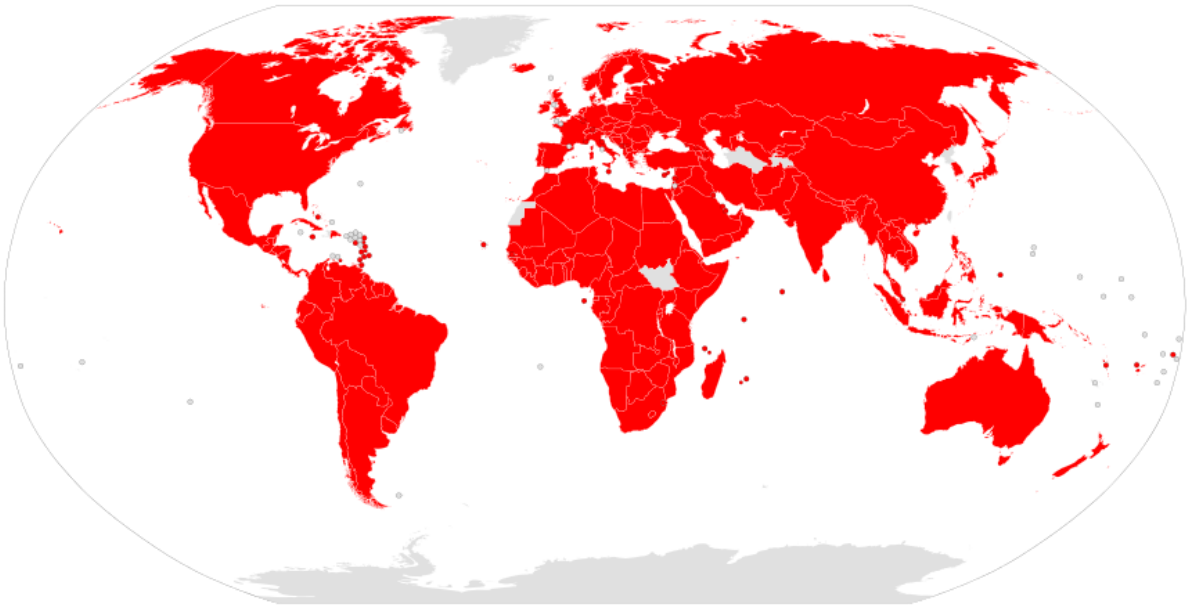

Fig. 3 - Parties to the CITES treaty (183)

- The Barcelona Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean. It is a regional convention adopted in 1976 to prevent and abate pollution from ships, aircraft and land based sources in the Mediterranean Sea. The Convention has 22 contracting parties, including all the Mediterranean countries (fig. 4)

Fig. 4 - Barcelona Convention contracting parties (22)

- The Bern Convention on the Conservation of European Wildlife and Natural Habitats. It is a binding international legal instrument in the field of Nature Conservation. The Convention came into force in 1982 and has 51 parties, including four in Africa. The appendices to the Bern Convention served as the model for the annexes to the Habitats Directive (see below).

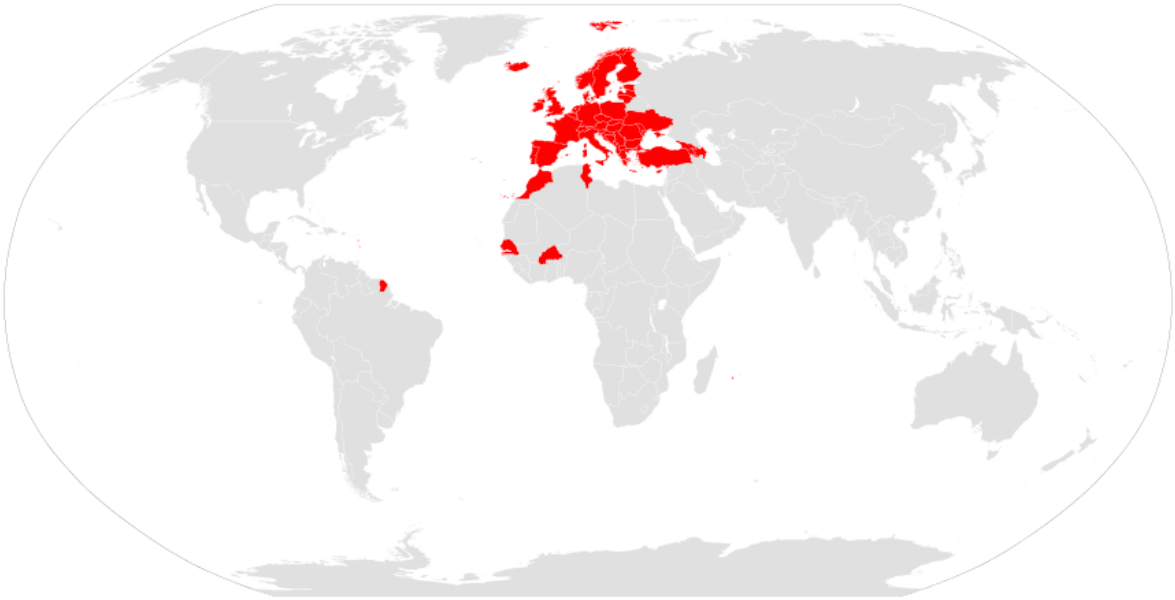

Fig. 5 – Bern Convention contracting parties (51)

- CMS (Bonn Convention) – The Convention on the Conservation of Migratory Species of Wild Animals. The Convention entered in to force in 1983 and is aimed at protecting the migratory animals and their habitats; CMS has 126 parties. The Mediterranean

bottlenose dolphin (*Tursiops truncatus*) is listed in Appendix II since 1991, while the Black Sea bottlenose dolphin (*Tursiops truncatus ponticus*) is listed in Appendix I since 2009.

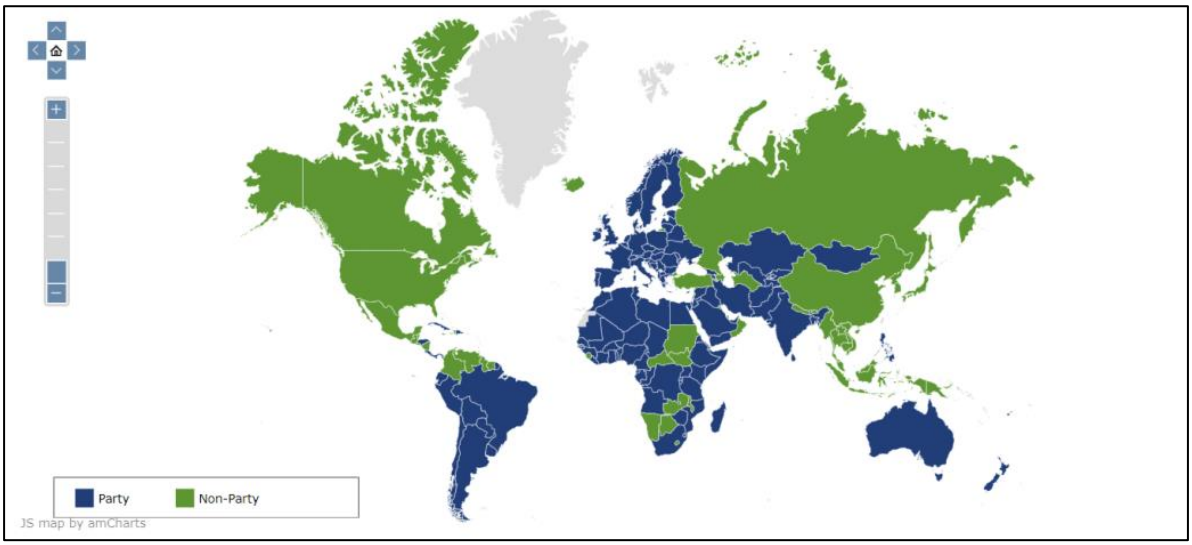


Fig. 6 – CMS contracting parties (126)

- Habitats Directive - Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora. It is a European Union directive adopted in 1992 as an EU response to the Berne Convention. Its goal is to protect nature and wildlife through a network (Natura 2000) of Special Areas of Conservation (SACs) and Special Protection Areas (SPAs). *Tursiops truncatus* is listed in Annex II of the Directive (species requiring designation of Special Areas of Conservation).

Fig. 7 – The EU countries (28) cover a good portion of the northern Mediterranean Sea.

- ACCOBAMS - Agreement on the Conservation of Cetaceans in the Black Sea, Mediterranean Sea and Contiguous Atlantic Area. The Agreement entered into force in 2001 as a legal conservation tool to reduce threats to Cetaceans by improving knowledges. ACCOBAMS has 24 parties which include almost the totality of the Mediterranean and Black Sea countries.

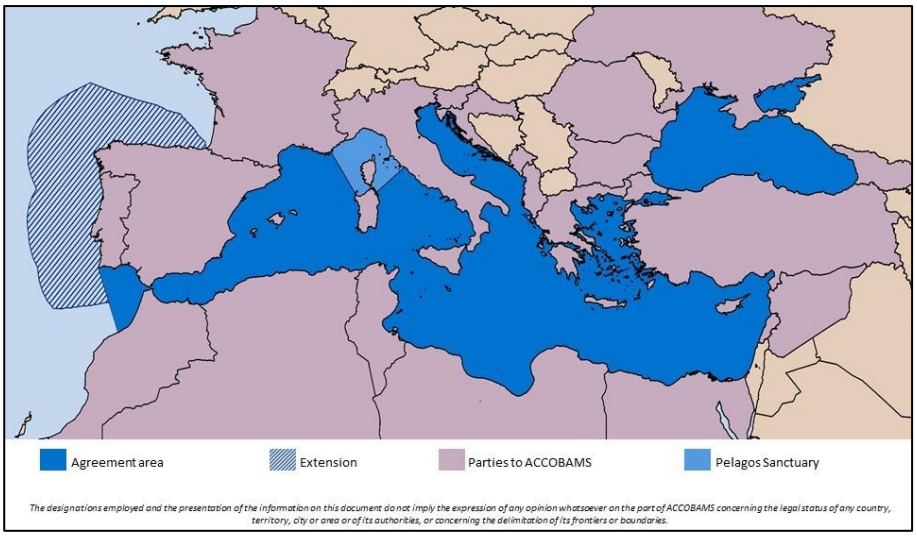


Fig. 7 - ACCOBAMS parties include almost the totality of the Mediterranean countries.

- Marine Strategy Framework Directive (MSFD)
  The MSFD is a EU directive adopted in 2008 and aimed at achieving or maintaining Good Environmental Status in European seas and has descriptors (see below) that should be able to target most of the threats identified by the Tt-CMP (with the only

possible exception of the harassment caused by pleasure boating where a specific awareness action may be needed - see **Threats** and **Mitigation actions** sections).

**Marine strategy Framework Directive** (descriptors)

- **Descriptor 1: Biodiversity**
  The quality and occurrence of habitats and the distribution and abundance of species are in line with prevailing physiographic, geographic and climatic conditions.

- **Descriptor 2: Non-indigenous Species**
  Non-indigenous species introduced by human activities are at levels that do not adversely alter the ecosystems.

- **Descriptor 3: Commercial Fish and shellfish**
  Populations of all commercially exploited fish and shellfish are within safe biological limits, exhibiting a population age and size distribution that is indicative of a healthy stock.

- **Descriptor 4: Food Webs**
  All elements of the marine food webs, to the extent that they are known, occur at normal abundance and diversity and levels capable of ensuring the long-term abundance of the species and the retention of their full reproductive capacity.

- **Descriptor 5: Eutrophication**
  Human-induced eutrophication is minimised, especially adverse effects thereof, such as losses in biodiversity, ecosystem degradation, harmful algae blooms and oxygen deficiency in bottom waters.

- **Descriptor 6: Sea-floor Integrity**
  Sea-floor integrity is at a level that ensures that the structure and functions of the ecosystems are safeguarded and benthic ecosystems, in particular, are not adversely affected.

- **Descriptor 7: Hydrographical Conditions**
  Permanent alteration of hydrographical conditions does not adversely affect marine ecosystems.

- **Descriptor 8: Contaminants**
  Contaminants are at a level not giving rise to pollution effects.

- **Descriptor 9: Contaminants in Seafood**
  Contaminants in fish and other seafood for human consumption do not exceed levels established by Community legislation or other relevant standards.

- **Descriptor 10: Marine Litter**
  **Properties and quantities of marine litter do not cause harm to the coastal and marine environment**

- **Descriptor 11: Energy incl. Underwater Noise**
  **Introduction of energy, including underwater noise, is at levels that do not adversely affect the marine environment.**

**MITIGATION ACTIONS**

Following the structure of the Tt-CMP, based on the zonation of the ACCOBAMS area (fig. 1. see also the **Governance** section), the mitigation actions will be implemented in each subarea with the support (and under the supervision) of the subarea coordinator (from the Coordination centre to the periphery), following the procedures established by the Steering Committee.
At the present state of the knowledge no concrete actions are foreseen to meet the goals of the Tt-CMP, believed that a strict compliance of the regulations already in force should guarantee the protection of the Bottlenose dolphin (meta)population at the present level. The mitigation actions are directed on three main items: a) political and regulatory, b) stakeholder engagement, c) education and awareness, which should also include the valorisation of the natural environment.

- **Habitat change, reduction and fragmentation**
  a. Political and regulatory
     - Promote a stricter regulation regarding pleasure boating, acting on local, national and supranational level (with special reference to navigation speed).
     - Avoid a further anthropization of the coasts limiting the construction of new marinas, acting on local, national and supranational level (MSFD – descript. 1, 11).
  b. Stakeholder engagement
     - Local, national and supranational decision makers.
     - Port Authorities and Coast Guard.
     - Boaters and related trade associations.
     - Whale watching operators
     - Research organizations
     - MPA and ASPIM
     - NGOs
     - EAZA (European Association of Zoos and Aquaria)
     - Schools (see education and awareness)
  c. Education, awareness and valorisation
     - Develop and promote an education and awareness campaign focused on the bottlenose dolphin (booklets, leaflets, posters, etc.) to be disseminated to and through the stakeholders (ecology, threats and relationships with man). The

awareness campaign should also be aimed at valorising the marine environment, outputting the importance of the Cetacean fauna in this regard.
    - Develop an education and awareness campaign to outline and promote a sea tourist who is correct and respectful of the sea environment and its fauna , with special focus on Cetaceans and potential impact of human activity on its habitat.

- **Overfishing and decrease of the fish resources**
    a. Political and regulatory
        - Promote a stricter compliance of the regulations already in force to guarantee a sustainable fish taking (fishing stop, maximum size of the net, minimum size of the fish, etc.), acting at local, national and supranational level (MSFD - descript. 3, 4).
    b. Stakeholder engagement
        - Local, national and supranational decision makers
        - Fishermen and related trade associations
        - Port Authorities and Coast Guard
        - Research organizations
        - MPA and ASPIM
        - NGOs
        - EAZA (European Association of Zoos and Aquaria)
        - Schools (see education and awareness)
    c. Education, awareness and valorisation
        - Work in strict relationship with fishermen and related trade associations to promote sustainable fish taking and limit overfishing.
        - Develop and promote an education and awareness campaign focused on the bottlenose dolphin (booklets, leaflets, posters, etc.) to be disseminated to and through the stakeholders (ecology, threats and relationships with man). The awareness campaign should also be aimed at valorising the marine environment, outputting the importance of the Cetacean fauna in this regard.

- **Conflict with fishermen and bycatch**
    a. Political and regulatory
        - Promote a stricter compliance with the regulations already in force that prohibit harming Cetaceans to limit as far as possible deliberate killing by fishermen, acting at local, national and supranational level.
        - Promote possible reimbursement for damaged fishing gears (after verification of the origin of the damage), acting at local, national and supranational level.
    b. Stakeholder engagement
        - Local, national and supranational decision makers
        - Fishermen and related trade associations

- Port Authorities and Coast Guard
- Research organizations
- MPA and ASPIM
- NGOs
- EAZA (European Association of Zoos and Aquaria)
- Schools (see education and awareness)

c. Education, awareness and valorisation

- Work in strict relationship with fishermen to mitigate the conflict with the dolphins and develop new (feasible) methods to limit the damages on the fishing gears.
- Develop and promote an education and awareness campaign focused on the bottlenose dolphin (booklets, leaflets, posters, etc.) to be disseminated to and through the stakeholders (ecology, threats and relationships with man).

- **Pollution of the food chain**

a. Political and regulatory

- Promote a stricter compliance with the regulations already in force that ask to keep contaminants levels in the marine environment and sea food within safety limits (MSFD - descript. 8, 9).

b. Stakeholder engagement

- Local, national and supranational decision makers.
- Port Authorities and Coast Guard.
- Zoo Prophylactic Inst.
- Research organizations.
- MPA and ASPIM.
- NGOs
- EAZA (European Association of Zoos and Aquaria)
- Schools (see education and awareness).

c. Education, awareness and valorisation

- Develop and promote an education and awareness campaign focused on the Bottlenose dolphin (booklets, leaflets, posters, etc.) to be disseminated to and through the stakeholders (ecology, threats and relationships with man). The awareness campaign should also be aimed at valorising the marine environment, outputting the importance of the Cetacean fauna in this regard.

- **Epidemics**

Epidemics are quite unpredictable events that may affects demographic units or (sub)population, causing the death of a certain percentage of individuals. It may be very difficult to prevent this kind of events or even to mitigate their effects. However a (sub)population in good health (in terms of the quality of the habitat, good food supply, low contaminants levels) has higher probability to support and overcome an

epidemics event. The best mitigation action in relation to this threat is then to act successfully on habitat deterioration and constriction, overfishing and contaminants pollution. The collection and analysis of data on stranded animals should allow to recognize these events and possibly to identify the pathogenic agent (see **Monitoring system** section).

**MONITORING SYSTEM**

Monitoring is a fundamental component of the Tt-CMP, to assess the conservation status of the target species, to evaluate the goodness and effectiveness of the mitigation measures implemented and to identify the knowledge gaps. The Tt-CMP Monitoring system should be able to observe possible trend or deviation in the attributes selected for the target species and to report these to the Coordination Centre, which works as an operational tool of the Steering Committee.

To perform this functions it is important that the data collected on a local level could be aggregated in a network being able to produce results on a Mediterranean scale. Following the zonation of ACCOBAMS (fig. 1), with its 14 subareas and coordinators (tab. 2), a monitoring network will be implemented. The subarea coordinators will have a critical role in promoting the flow of data from their zone of competence to the Coordination Centre. The data collected in each subarea will be shared and aggregated on a Web-GIS platform, which will serve as a common tool for the network implementation and activity.

At least in the starting phase of the Tt-CMP, we should expect an inhomogeneous covering of the Mediterranean area; especially in the southern portion of the basin some areas may have no data available. The system however will allow to monitor the data production over space/time and possibly to plan and support specific local campaigns to fill the gaps. At the same time the monitoring system will allow to plan scientific research on specific items such as genetic, toxicology, pathology, other.

Within the network material and methods for data collection should be normalized as possible and the results produced over time (possibly on a yearly base) should be consistent enough to be compared in historical series, to observe possible trends and deviation in the attributes. The data will be analysed at subarea and basin level, according to the survey effort performed. The Monitoring system should be able to detect a deviation in the attributes of 20-30% in 7-10 years.

**It would be important that the monitoring and research systems developed for the Bottlenose dolphin could be integrated as much as possible with the research and monitoring system designed and implemented for the other Cetacean species, to optimize the CMPs costs (especially in data collection) and to improve the results (as each species may work as a control for the others).**

The data collected on free ranging animals should be integrated with the data coming from stranded animals to identify possible epidemics and their causes. This will involve a further work of connection with local stranding network.

**Monitoring system**

- Structure
    - 14 subareas according to the ACCOBAMS zonation (see fig. 1)
    - 14 subareas coordinators (see tab. 2)
    - 1 Coordination Centre (operational tool of the Steering Committee)
- Attributes (see also tab. 3)
    - Distribution area of the target species ($km^2$)
    - Habitat exploited (theoretical %)
    - Density (Encounter Rate, sightings/km)
    - Abundance estimate of the geographical/demographic units under observation (mark-recapture preferred)
- Data collection (minimum needs)
    - Surveys should be conducted on a yearly base
    - Surveys should be conducted on random track or linear transects
    - The effort track of the research platform should be always recorded
    - Geographical position of each sighting should be recorded together with:
        - Species
        - Number of individuals
        - Number of new-borns and calves
        - Association with human activity (trawlers, gillnets, other)
    - Photo-ID data on the geographical/demographic units under observation should be collected
- Data analysis
    - Data should be analysed on an yearly base
    - Data should be analysed according to the survey effort per cell unit (2X2 km)
    - In each cell the minimum effort needed for standard analysis should be ≥ 4 km/year
    - Abundance should be calculated for the geographical units identified.
    - In order to be able to compare the estimates over time and space it is recommended to use analogous methodology (mark-recapture methodology through photo-ID may produce more accurate estimates on local units).
    - It would be good to have a homogeneous geographical distribution of the demographic units monitored (possibly at least one unit for each subarea).

The photo-ID data may allow to fill some knowledge gaps on the target species: identify the demographic units and their geographical borders, investigate the movements of the individuals, the structure and connectivity of the (meta)population network, demography and reproductive parameters, other.

| SUB-AREA[1] | SURFACE[2] ($km^2$) | EFFORT[3] (km) | COVER[4] (%) | DISTRIBUT. AREA[5] ($km^2$) | HABITAT EXP.[6] (%) | DENSITY[7] (ER) | ABUNDANCE EST.[8] |
|---|---|---|---|---|---|---|---|

| | | | | | | | |
|---|---|---|---|---|---|---|---|
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| 13 | | | | | | | |
| 14 | | | | | | | |
| MED | | | | | | | |

Tab. 3 – The attributes should be measured and analysed for each subarea of the ACCOBAMS zonation and for the all Mediterranean area.

[1] The Med subarea according to the ACCOBAMS zonation (see fig. 1)

[2] The surface ($km^2$) of the same subarea

[3] The effort (km) within the same sub-area

[4] The effort cover (in %, based on the cell units 2X2 km) within each sub-area

[5] The extension (in $km^2$) of the target species presence and distribution within the sub-area

[6] The ratio between the potential habitat extension and the extension of the habitat exploited by the target species (in relation to the effort covering).

[7] The density measured as an Encounter Rate (sightings/effort) of the target species in the surveyed cells

[8] The geographical unit/s id

with

Tt - CMP (gen. diagram)

GOALS

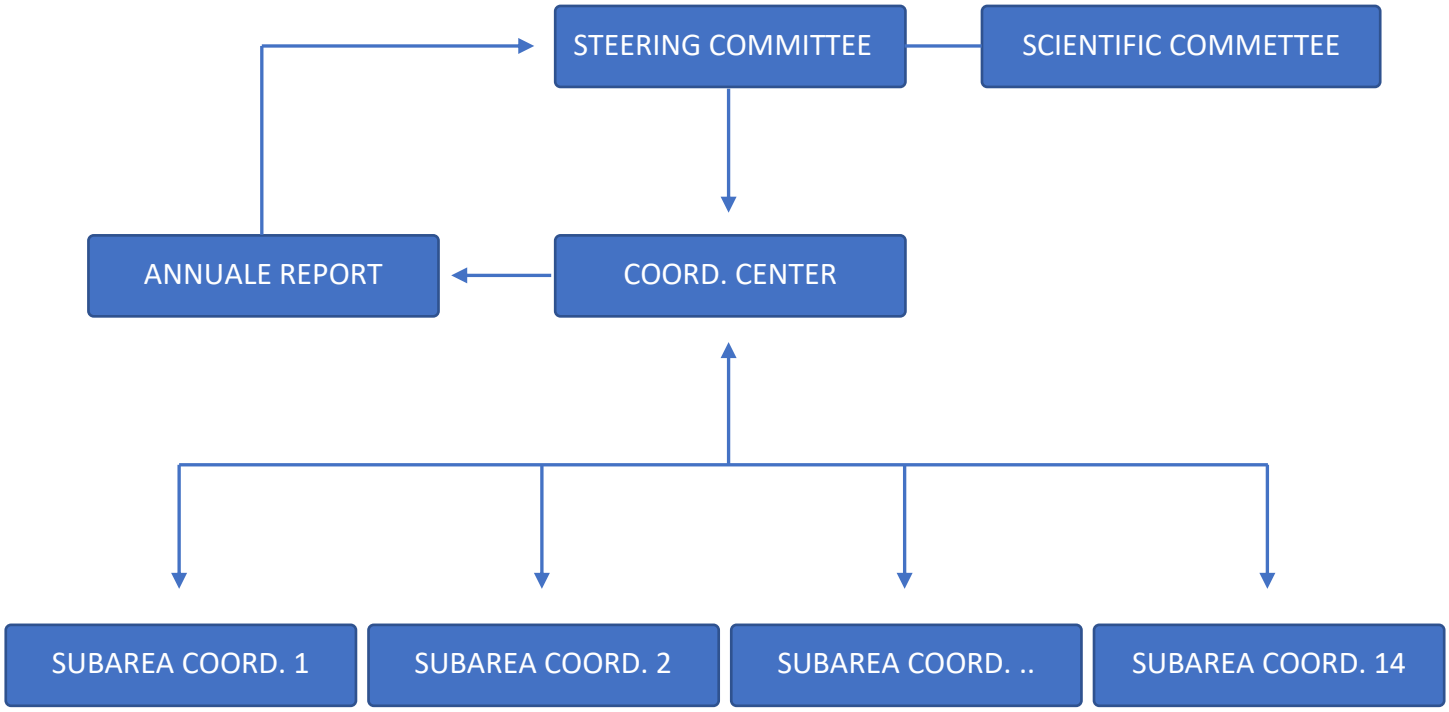
- To keep at present level or higher (if needed for save conservation)
- To prevent further habitat constriction, deterioration, fragmentation
- To prevent further anthropization of the BD habitat
- To prevent further decrease of fishery resources
- To decrease the pollution level of the trophic chain
- To prevent environment deterioration
- To promote environment valorization
- To keep the fishery resources at the present level or higher
- To promote safer (less polluted) fish consumption

GOVERNANCE

- Steering committee
- General coordinator
- Coordination center
- Subarea coordinators
- Annual report

THREATS

- Habitat change, reduction and fragmentation
- Overfishing and decrease of fish resources
- Conflict with fishermen and deliberate killing
- Pollution of the trophic chain
- Epidemics


STEERING COMMITTEE
SCIENTIFIC COMMETTEE
ANNUALE REPORT
COORD. CENTER
SUBAREA COORD. 1
SUBAREA COORD. 2
SUBAREA COORD. ..
SUBAREA COORD. 14

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ANNEX 1 – SURVEY RESULTS 2013

| SUB-AREA | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10a | 10b | 11 | 12 | 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| COORDINATOR | | M. Sequeira | A. Cañadas | Z. Boutiba | M. Gazo | L. David | G. Lauriano | M. N. Bradai | D. Holcer | I. Benamer | J. Gonzalvo | A. Dede | B. Öztürk | A. Öztürk | D. Kerem |
| Is *Tt* present in your sub-area? | | | | | | | | | | | | | | | |
| Regularly present | | X | X | | X | X | X | | X | X | X | X | X | X | X |
| Occasionally present | | | | | | | | | | | | | | | |
| Absent | | | | | | | | | | | | | | | |
| No idea | | | | | | | | | | | | | | | |
| What is the trend? | | | | | | | | | | | | | | | |
| Increasing | | X | | | | X | | | | | | | | | |
| Decreasing | | | | | | | | | | | | X | X | | |
| Stable | | | X | | X | | X | | | | X | | | | X |
| No idea | | | | | | | | | X | X | | | | X | |
| Can you give a size estimate? | | | | | | | | | | | | | | | |
| Yes (please give a number) | | 7989 | 1160 | | | >1000 | 600 | | ? | 43 | | | 150 | | 500 |
| No idea | | | | | X | | | | | | X | X | | X | |
| What are the main threats | Av. | | | | | | | | | | | | | | |
| Overfishing (11) | 1,4 | 3 | 1 | | 2 | 2 | | | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Pleasure boating (11) | 2,8 | 1 | 3 | | 3 | 3 | 3 | | 2 | 5 | 2 | 2 | 4 | 3 | |
| Chemical Pollution (11) | 2,4 | 1 | 2 | | | 4 | 1 | | 3 | 3 | 3 | 4 | 2 | 2 | 1 |
| By catch (9) | 2,6 | 3 | | | 1 | 1 | | | 3 | 4 | | 3 | 3 | 4 | 1 |
| Acoustic pollution (1) | 4,0 | | | | 4 | | | | | | | | | | |
| Habitat degradation (1) | 1,0 | | | | | | 1 | | | | | | | | |
| Trawlers destructive activity (1) | 4,0 | | | | | | | | | | | | | | 4 |
| Blast fishing (1) | 2,0 | | | | | | | | | 2 | | | | | |
| Oil/gas industry (1) | 4,0 | | | | | | | | | | | | | | 4 |
| No idea (0) | | | | | | | | | | | | | | | |

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