ACCOBAMS CONSERVATION MANAGEMENT PLANS (CMP)

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ACCOBAMS CMP for Mediterranean fin whales (*Balaenoptera physalus*)

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.

1 INTRODUCTION

CMPs are developed under the umbrella of ACCOBAMS and the IWC. ACCOBAMS is taking the lead on this CMP. All relevant bodies of ACCOBAMS and the IWC need to be involved in the process at the appropriate times. Strong links should be maintained between the ACCOBAMS Scientific Committee and its Secretariat and regular information should be provided to the national Focal Points (ACCOBAMS Res. 6.21) and other relevant stakeholders.

NB: A MAP OR MAPS WILL BE ADDED WITH ALL PLACE NAMES, RELEVANT GEOGRAPHICAL FEATURES, EEZS ETC

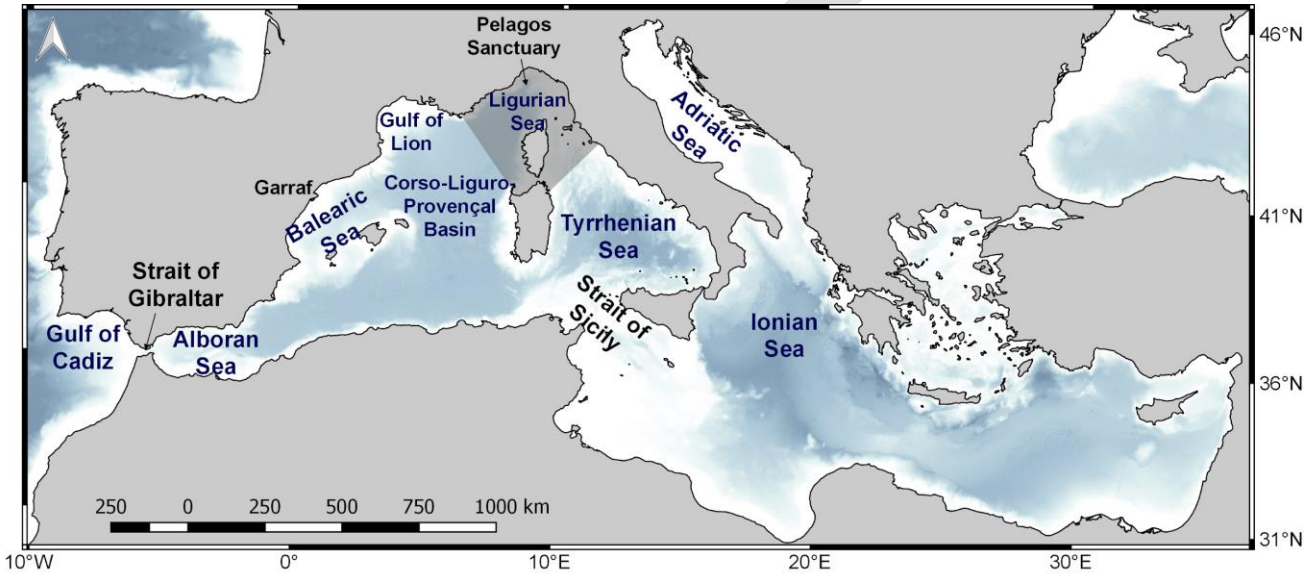


Fig X. Map showing Mediterranean Sea with location names mentioned in text..

1.1 WHY A CONSERVATION MANAGEMENT PLAN IS NEEDED

The most recent genetic, stable isotope, passive acoustic, and telemetry evidence points to the ACCOBAMS region containing a single 'Mediterranean' population of fin whales (*Balaenoptera physalus*). Fin whales cross the Strait of Gibraltar in both directions but the population identity of these individuals is still not clear. Mediterranean fin whales have been proposed to move into the adjacent North Atlantic in summer returning back in the winter (Gauffier et al., 2018; and see Fig.1). Passive acoustic information (Castellote *et al.,* 2012) suggests that animals crossing the Strait of Gibraltar have song characteristics attributed to northeastern North Atlantic fin whales but the implications from a population/conservation standpoint requires further investigation (see Section 3.1). For the purposes of this iteration of the CMP it is assumed that all animals that spend at least some of their life in the Mediterranean Sea comprise a single population although this may need revision in the future (see Castellote et al. 2011, 2012, and Giménez et al. 2013 for evidence of NENA (Northeast North Atlantic) fin whales into the western Mediterranean Sea).

No whaling operations took place in the Mediterranean Sea although intense whaling occurred near the Strait 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 vessel survey in 1991 that provided an estimate of around 3,500 animals (Forcada *et al.*, 1996).

In summer 2018, a synoptic survey was carried out across the Mediterranean Sea and contiguous Atlantic area (the ACCOBAMS Survey Initiative; ASI), combining visual methods (including aerial surveys)and passive acoustic monitoring (PAM) from vessels (focused primarily on deep diving species and areas where aerial surveys were not possible). Line-transect sampling methodology was applied to estimate density and abundance through design-based and model-based approaches. A design-based estimate of 1,835 fin whales (CV=0.26; 95% CI=1,099-3,065) was produced (uncorrected as yet for availability and/or perception biases that may be substantial) for the areas covered by aerial surveys (Fig. 1). A model-based estimate is yet to be developed.

There are two recent pieces of evidence that suggest that Mediterranean fin whales may be declining (the most recent IUCN Red List classifies these fin whales as Vulnerable - Panigada and Notarbartolo di Sciara, 2012). The first is that a comparison of summer abundance in the 'Pelagos' Sanctuary (an area previously identified as important to fin whales in the summer - see Fig. 1) from 1992 and 2009, showed an appreciable decline; that may represent a true decline in abundance although potentially could reflect a change in distribution (Panigada *et al.*, 2011). The second comes from a comparison of the 1991 vessel survey with the results for the even larger-scale summer 2018 ASI aerial surveys.

This information is sufficient to warrant conservation concern over this population. The potential threats (primarily ship strikes, pollution and noise) to the conservation status of fin whales in the Mediterranean Sea and mitigation approaches are detailed in this document.

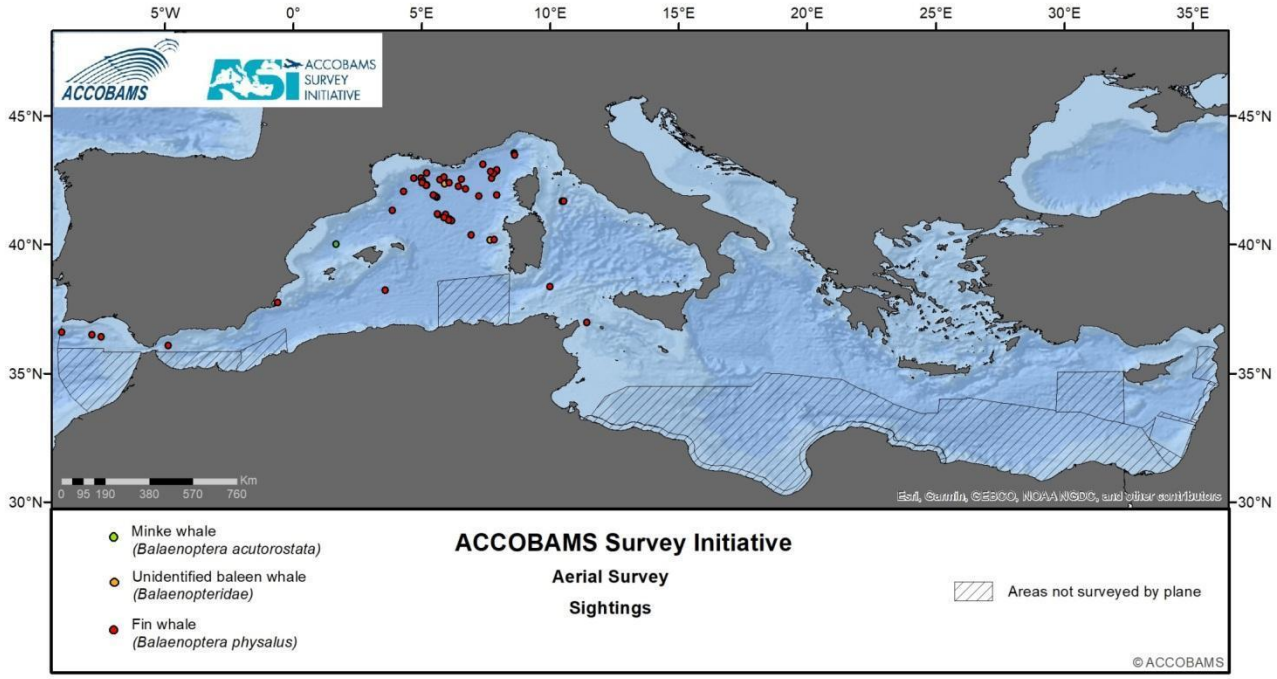


Fig. 1. Baleen whales' sightings during the aerial component of the ACCOBAMS Survey Initiative.

The distribution of fin whales in both national and international waters means that international collaboration is required 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 Sea 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 iteration of the plan, 'Mediterranean fin whales' are considered to be fin whales that spend all or much of their lives in the waters of the Mediterranean Sea (see below). The plan highlights the need to better understand the population/conservation implications of the differences in song identified between animals that spend some of their lives in the western areas of the Mediterranean Sea and move through the Strait of Gibraltar to and from adjacent North Atlantic waters, along with the need to understand any movements of Atlantic whales into the western Mediterranean. This is a priority for the next iteration of the CMP in around six year's time.

1.2 OVERALL GOAL OF THE CMP

It is not possible to 'manage' fin whales in the Mediterranean Sea 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. ADD A SECTION ON PROTECTION REGIME WITHIN THE MEDITERRANEAN, WITH REFERENCE TO PELAGOS SANCTUARY, MPAS, IMMAS, NATIONAL LEVEL CONSERVATION STATUS ETC.

3 BIOLOGY AND STATUS OF MEDITERRANEAN FIN WHALES

3.1 POPULATION STRUCTURE

Understanding population structure and movements is essential to interpreting abundance and trend information (see Item 3.3 below). The working hypothesis for this iteration of the CMP is that there is a single 'Mediterranean' population of fin whales, some of which move seasonally in and out of the Mediterranean through the Strait of Gibraltar based upon inferences from genetic, photo-ID, stable isotope and telemetry data. However, it is essential that additional work is undertaken before the next iteration of the CMP to better understand the population and conservation implications of the relationship between Mediterranean and North Atlantic fin whale populations inside or outside the Mediterranean basin.

The available information suggests that the summer ASI abundance surveys comprise most of the Mediterranean population although any animals that might have moved through the Strait of Gibraltar to adjacent waters in the North Atlantic, would have not been covered. Of course, if any whales from the Atlantic population moved into the Mediterranean Sea during the time of the survey effort would have been included in the ASI survey abundance estimate. Movements of a small number of fin whales have been observed through the Strait of Gibraltar, exiting the Mediterranean Sea in April-October and entering in November-March (Gauffier et al. 2018).

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).

Stable isotopes

Stable isotope analyses in baleen plates and skin samples have shown differences between sampled animals in the northeast Atlantic and those from the north-western Mediterranean (Bentaleb et al., 2011; Das et al., 2017; Giménez et al., 2013; Ryan et al., 2013). As fin whales are believed to feed predominantly on *Meganyctiphanes norvegica* (see feeding paragraph), it seems to indicate that these animals feed in different areas. Individuals sampled in the Strait of Gibraltar exhibited seasonal differences in stable isotope signatures between summer and winter, suggesting that these whales may feed in the North Atlantic during the summer and in the Mediterranean Sea in winter (Gauffier et al., 2020).

Acoustics

Male fin whales produce low frequency sounds, including typical 20-Hz note and backbeats (Clark et al., 2002; Watkins et al., 1987). These notes are usually repetitive and organized in songs, which are believed to be used as reproductive display (Croll et al., 2002; Moore et al., 1998; Watkins et al., 1987). Passive acoustic analyses have identified two types of songs within the Mediterranean Sea (Castellote et al., 2012; Clark et al., 2002). Recordings from the Ligurian Sea, Balearic Basin and Lampedusa Island had a different bandwidth (5 Hz vs 6.5 Hz) and inter-note intervals (>14s vs <13s of more than 14 s to those from south of the Balearic islands, the Alboran Sea and the Strait of Gibraltar in autumn and winter (Castellote et al., 2012; Clark et al., 2002; Sciacca et al., 2015). The latter were more similar to northeast Atlantic songs (Hatch and Clark, 2004). Few "Atlantic" songs were recorded in March in the Balearic basin, concurrently with Mediterranean songs (Castellote et al., 2011).

Fin whale acoustic presence was detected offshore Eastern Sicily (Ionian Sea), throughout the processing of about 10 months of continuous acoustic monitoring. The study confirms the hypothesis that fin whales are

present in the Ionian Sea throughout all seasons, with peaks in call detection rate during spring and autumn months (Sciacca et al., 2015).

- Important to add here new acoustic study from the South of Portugal when published.

Information gaps: Further PAM efforts are required in the Strait of Gibraltar and adjacent waters to provide information on the song types of passing whales and the spatio-temporal dispersal of Mediterranean (based upon song) whales within the North Atlantic . Also PAM in areas of high productivity based on modeling for the South and eastern Mediterranean, and transit channels to integrate with other Mediterranean basin-wide efforts.

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 concentrate for feeding purposes (Canese *et al*., 2006). The tagged animals from 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 in March remained mostly around Lampedusa 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 (probably *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/Gulf of Cadiz area, and between the western Mediterranean and the eastern Mediterranean, is 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) (updated in Panigada *et al.* 2017, Fossi *et al.* 2017, maps and data: https://fishreg.jrc.ec.europa.eu/web/fish-habitat).

3.1.2 PHOTOGRAPHIC EFFORT

Long-term photo-identification was used to estimate survival rate, population size, rate of change, sex ratio (assessed molecularly through biopsy samples) 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). Other estimates have been done from a dataset of 239 photo IDs taken in the northwestern Mediterranean from 2006 to 2014: 189 individuals have been identified and the Jolly-Seber open population model gave a population size of 1,129 (CI 95%: 705-1548 ; Tardy et al, 2016).

In the Spanish Mediterranean, two areas have maintained a photo-ID catalogue over the last decades. In the Strait of Gibraltar, about 50 animals were identified between 1999 and 2014, including 5 individuals sighted in different years (Gauffier et al. 2018). In the "Garraf coast", in Catalonia (NE Spain), more than 150 individuals have been identified between 2011 and 2018, with 13% recaptures in different years (EDMAKTUB 2018).

Information gaps: a general catalogue and 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. Use of shared protocols is highly recommended.

3.1.3 GENETIC ANALYSES

The first large-scale population genetic assessment of North Atlantic fin whales, based on ~400 mitochondrial control region DNA (mtDNA) 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 (Bérubé 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, suggests that the influx of North Atlantic fin whales is not sufficient to buffer a demographic decline in the Mediterranean Sea.

The spatial and temporal definition of the boundary between the North Atlantic and Mediterranean Sea fin whales is still being debated (Castellote et al. 2012, 2014; Giménez et al. 2013, 2014; Notarbartolo di Sciara et al. 2016). A recent study was undertaken with a larger sample size (N=1,600) and genetic markers (20 microsatellite loci and 450bp mitochondrial control region sequences). This increase in genetic markers made it possible to start studying the distribution of related individuals. The detection of four parent-offspring pairs between the Ligurian Sea and the Strait of Gibraltar (Schleimer *et al*. in prep) shows that the amount of connectivity between these areas should not be underestimated. In addition, one other pair was detected between a living animal from the northwestern Mediterranean and a stranded animal from the North Sea (Tardy et al, in prep).

New, as yet unpublished (Gauffier et al in prep, Schleimer et al in prep.) population analyses found that fin whales sampled in the Strait of Gibraltar (N=50) were more closely related to fin whales from the

Mediterranean Sea (N=150) than the northeastern Atlantic (N=300). In summary, the genetic analyses thus far suggests a Mediterranean population with occasional migration to and from the eastern North Atlantic basin. A well-defined estimate of the rate of contemporary gene flow between the eastern North Atlantic and Mediterranean Sea will require a much higher, coordinated sampling intensity and effort during a short period of time in both areas.

Based on 495 genetic samples collected from 2006 to 2019 in an area encompassing the Gulf of Lion and the Corso-Liguro-Provencal basin and using the likelihood method to estimate the effective population size (i.e. the number of individuals needed to maintain its genetic diversity; Wang 2009) was estimated at 396 individuals (95% CI: 343-467; Tardy et al, in prep,) although there are a number of uncertainties that must be recognised in this type of analysis.

Information gaps/needs: Intense coordinated sampling intensity and effort (biopsy, photo-Id, acoustics etc..) during a short period of time and in the eastern North Atlantic as well as the Mediterranean Sea using appropriate analytical approaches that integrate all relevant information (see 3.1.4)

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. As discussed above, at present, the most recent genetic (and stable isotope and telemetry) evidence points to the ACCOBAMS region primarily containing a single 'Mediterranean' population of fin whales (*Balaenoptera physalus*). Some of these animals move out through the Strait of Gibraltar into the adjacent North Atlantic in summer and move back in the winter (Gauffier et al., 2018; and see Fig.1). However, acoustic analysis of the song characteristics recorded in the Strait of Gibraltar in 2008-2009 more closely match those of animals from the Northeast Atlantic (Castellote et al. 2012). This suggests that (a) Mediterranean fin whales rarely exit the Mediterranean basin but also (b) that a priority is for additional focussed work to further identify the whales passing through the Straits of Gibraltar and in the adjacent Atlantic waters.

For the purposes of this iteration of the CMP it has been assumed that all animals that spend at least some of their life in the Mediterranean Sea comprise a single population although this will need revisiting in the light of the results of the focussed research actions recommended in this iteration. This may be best achieved through a well-prepared 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:

- the relationship between the acoustic, genetic, and stable isotope information for animals from the Straits of Gibraltar, Alboran basin, and the Gulf of Cadiz.
- Basin-wide winter distribution, particularly off northern African coast and eastern basin

(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, e-DNA, etc.) within and between seasons relevant to population structure;
- increased biopsy sampling/photoID/acoustic tagging work on 'singing' animals;

- identification of areas which may need more effort (spatial and other ecological modelling, PAM, biopsy samples, photo-id, etc.)
- creation and maintenance of a single photo-identification catalogue – ideally in conjunction with a genetic-ID catalogue;
- increased targeted satellite tagging and PAM effort to address:
  long-term seasonal movements and origins of Strait of Gibraltar/Gulf of Cadiz whales;
  - where and when fin whales mate and conceive;
  - winter distribution, with a special emphasis on the eastern and southern basin.

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 based on the satellite-derived identification of chlorophyll-a fronts (model updated in Panigada *et al.* 2017, Fossi *et al.* 2017, maps and data: https://fishreg.jrc.ec.europa.eu/web/fish-habitat). Meso-scale productivity fronts were shown to be sufficiently resilient to ensure an efficient energy transfer from phytoplankton to mesozooplankton (Druon *et al.* 2019).

In the last decade, a feeding aggregation was confirmed off the “Garraf coast”, in Catalonia (NE Spain) in March-May, where whales have been observed actively surface feeding on *Meganyctiphanes norvegica* (EDMAKTUB 2018).

Stable isotope analyses indicate that fin whales sampled in the Strait of Gibraltar may feed in the North Atlantic in the summer and in the Mediterranean in winter (Gauffier et al. in review).

Information gaps: better knowledge of feeding areas outside the summer, including in the southern and eastern basin, e.g. by testing the Druon *et al*., spatial model with observations in other areas. Combine modeling results with PAM sampling.

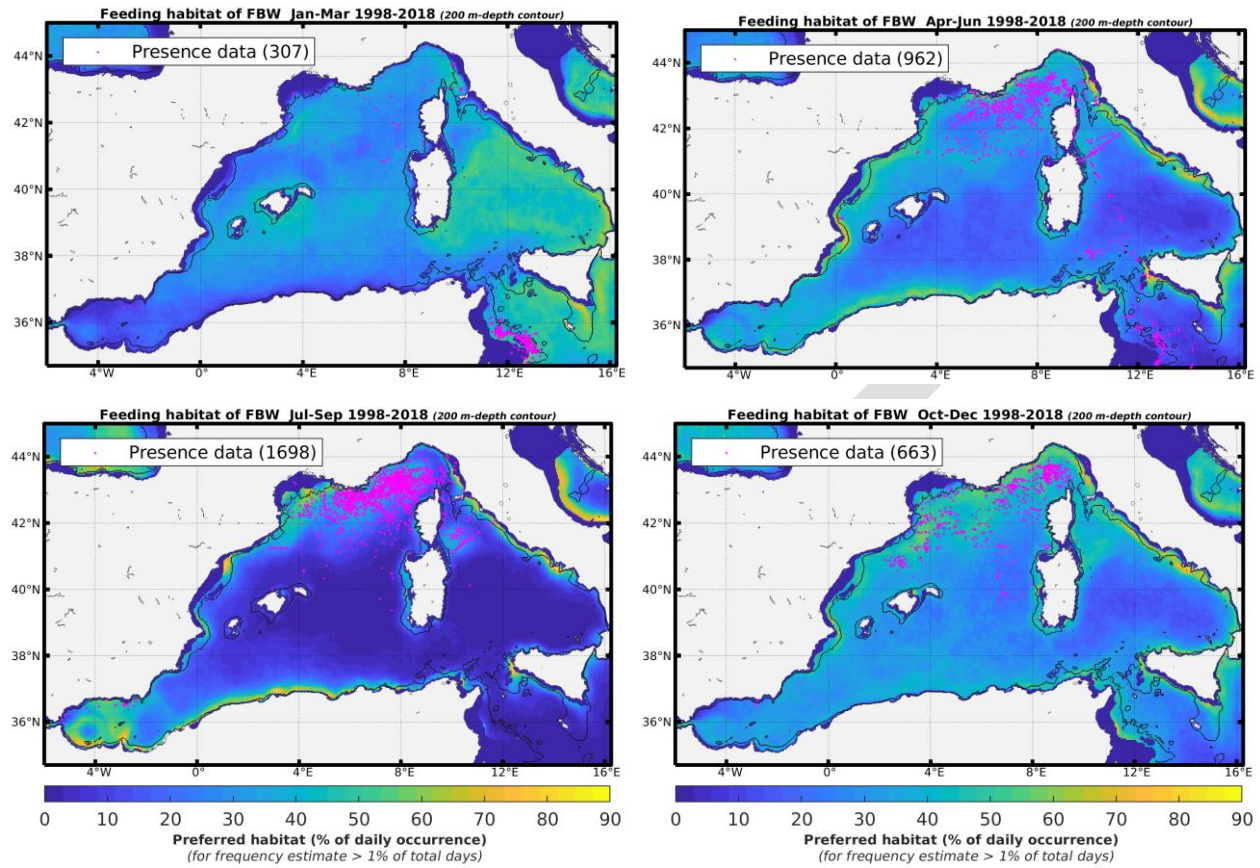


Fig.2. Seasonal potential habitat of fin whale (*Balaenoptera physalus*) in the western Mediterranean Sea derived from the frequency of chlorophyll-a fronts (model of Druon *et al.* (2012), updated in Panigada *et al.* 2017, Fossi *et al.* 2017) with overlay of presence data (pink dots, n = 3,630) over the period 1998-2018 (Upper left panel – winter, upper right panel – spring, lower left panel – summer, lower right panel autumn). Although effort in highly uneven in space and time, the spreading and contraction of favourable feeding habitat in winter and summer respectively is coherent with the observations. Note that 75% of fin whale observations were closer to 11 km of the highly favourable habitat (>50%) and 2 km of any favourable habitat level (>0%, n = 2,852) showing that whales are not always in their optimum feeding habitat, but they are frequently nearby likely searching for it.

3.2.2 LIFE HISTORY

Population parameters specific to fin whales in the region are poorly understood.

There is some evidence (seasonal distribution of whales estimated or measured to be ≤8m i.e. assumed recently born) that breeding in Mediterranean fin whales is not strictly seasonal unlike other areas of the world where they generally undertake regular migrations associated with feeding and reproduction, as discussed in Notarbartolo di Sciara *et al*. (2003; 2016). Most newborn calves were seen (as would normally be expected) between September and January (6-10/month), but there were still a number (1-3/month) from February to August. This protracted period may reflect the milder environmental conditions in the Mediterranean providing more protracted feeding and placing less pressure on a narrow birth season.

As expected, records of newborn whales originated mostly from the western portion of the region where whale density is higher. However, newborns also occurred in the Eastern Mediterranean, supporting the hypothesis that fin whales, rather than gathering in specific breeding grounds, engage in breeding activities wherever favourable physiological conditions occur (Notarbartolo di Sciara *et al.* 2016).

There are no formal baseline data on reproductive or survival rates (e.g. from longitudinal studies) of Mediterranean fin whales. Such information would assist in the conduct of population status and viability

assessments, although obtaining estimates of such parameters with sufficient accuracy and precision to detect significant changes is difficult.

A collaboration amongst four photo-identification research groups resulted in a dataset of 505 individuals spanning 18 years (give them). Zanardelli et al. (In Prep) used a Jolly-Seber open population model to estimate: apparent survival rate (0.88, 95% CI = 0.76 - 0.94); population size in 1990 (980, 95% CI 670-1,437) and annual rate of population change (0.99, 95% CI = 0.92 – 1.07). A similar approach for a smaller area in the northwestern Mediterranean Sea (239 individuals over 9 years (give them) yielded an apparent survival rate at 0.92, 95% CI = 0.85-0.99 (Tardy et al., 2016).

The 'best' apparent survival rates above are lower compared to estimates from other large whale populations. If true, possible reasons include: (a) underestimation because of "transient" animals (animals that are seen once and then never again and are assumed to be just passing through; (b) permanent emigration (animals moving out of the study area), and (c) mortality additional to natural mortality (ship strikes?).

Apparent pregnancy and sexual maturation rates were estimated from biopsies collected in the Northwestern Mediterranean from 2010 to 2016 (over 174 females and 194 males). Some 42.5% of the females had progesterone levels consistent with early pregnancy while almost 65% of males were sexually mature (Siliart et al, 2012 ; WWF report, 2016).

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 DISTRIBUTION AND MOVEMENTS

A variety of sources of information on distribution are available including sightings from a variety of platforms, strandings, acoustics, individual identification (photographic and genetic). Most information is available from the western Mediterranean.

In describing a general pattern of fin whale distribution in the Mediterranean Sea, Notarbartolo di Sciara et al. (2003) identified a major feeding summer aggregation in the Northwestern Mediterranean, in an area between the Gulf of Lion, the Corsican Sea and the western Ligurian Sea (a.k.a. the Corso-Liguro-Provençal Basin). Whales are found there throughout winter although in much smaller numbers.

In the western Mediterranean Sea, a southwest movement of fin whales is observed in autumn along the Spanish shelf edge, as well as the Balearic basin towards the Alboran Sea. A broadly 'opposite' direction of movement (northeasterly) is observed in these same areas in spring. Whales have been observed feeding along the coast of Garraf in Catalonia in March-May (Edmaktub 2018), near the Columbretes Islands and from spring to summer along the coast of southern Spain (Gozalbes et al. 2009), and in the Strait of Gibraltar and into the Atlantic (Gauffier et al. 2018).

During winter, whales appear to move eastward through the Strait of Gibraltar and are persistently acoustically detected in the Alboran Sea (Castellote et al., 2012).

Other locations where fin whales have been observed outside of the Corso-Liguro-Provençal Basin at various times of the year include: the east coast of Sicily in spring and late summer-autumn (Sciacca et al. 2015), the Strait of Sicily in winter, the east coast of Sardinia in spring, the eastern Ionian Sea off Greece in summer (Notarbartolo di Sciara et al. 2016), and the Adriatic sea in spring – late summer (Lipej et al., 2004; Holcer, unpublished) where feeding on krill in the Jabuka pit area during spring has also been confirmed (Holcer, unpublished).

A few individuals were photographically recaptured between the Alboran Sea in spring-summer and the Strait of Gibraltar (CIRCE/Alnilam, unpublished data). Other photo-ID catalogues comparisons are underway but have not detected recaptures so far. Two females were genetically recaptured between the Corso-Liguro-Provençal Basin and subsequently the Strait of Gibraltar and one male was first sampled in the Strait of Gibraltar and then off the coast of Garraf (Gauffier et al. in prep, Schleimer et al. in prep). Satellite tagging and stable isotopes also provided a link between the Corso-Liguro-Provençal Basin and the Strait of Gibraltar (Bentaleb et al. 2011, Giménez et al. 2013, Gauffier et al. 2020 , CIRCE, unpublished data).

Photographic recaptures and satellite tagging revealed movements of individual whales from the Strait of Sicily in late winter to the Pelagos Sanctuary in summer (Panigada et al., 2017; Aissi et al., 2008).

Fin whales are known to occur to the east of Greece (Notarbartolo di Sciara et al. 2003). Although the species' occurrence there during summer appears to be significantly lower than in the western Mediterranean Sea.

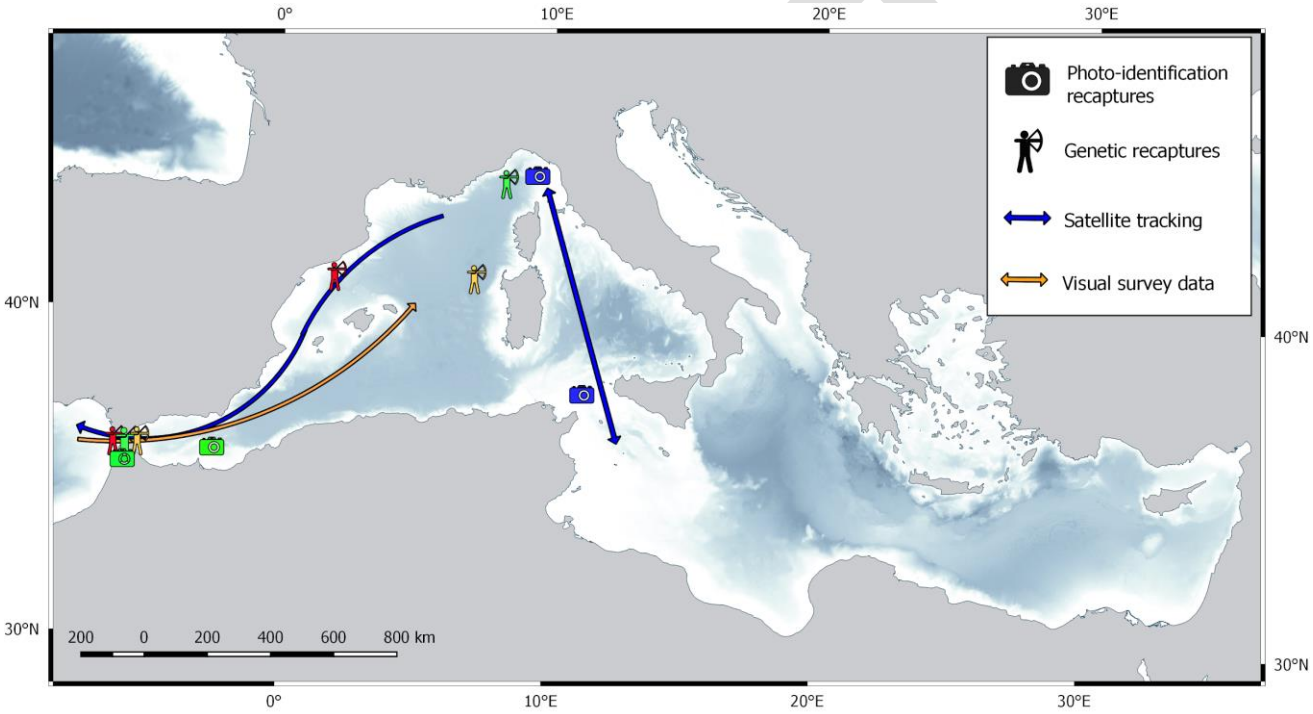


Fig X.Map showing the confirmed movements of individual fin whales in the Mediterranean Sea through means of photo-identification, genetic, telemetry and visual survey data.

Information gaps: Understanding distribution and movements outside the summer (including in the eastern Mediterranean) is a priority for research in order to *inter alia* determine temporal and geographical overlaps between whales and threats.

3.4 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 during summer; it covered the region from the Strait of Gibraltar to as far as the coast of north-western Italy. Almost all fin whales were seen in the Liguro-Provençal basin. Total estimated (uncorrected) 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 in winter and summer.

Most recently, in summer 2018 the basin wide ASI synoptic survey was undertaken across the Mediterranean Sea and contiguous Atlantic area, combining visual methods (aerial surveys) and visual and passive acoustic monitoring (PAM) from vessels (focused primarily on deep diving species and areas where aerial surveys were not possible). Line-transect sampling methodology was applied and density and abundance estimated through design-based and model-based approaches. Uncorrected for availability and/or perception biases, design-based results for fin whales for the areas covered by aerial surveys (Fig. 1) estimated a total of 1,835 fin whales (CV=0.26; 95% CI=1,099-3,065).

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, 2009 and 2018 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, including in the eastern basin, will enhance the ability to develop targeted mitigation approaches throughout the year. As referred to in the section on population structure, focussed research on assessing levels of temporal and spatial overlap between Mediterranean and Atlantic fin whales is important in interpreting abundance and trend information.

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 throughout the Mediterranean region and changes over time (medium);

(3) body and health condition, reproductive rates (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. Fin whales seem to be less vulnerable than most Mediterranean cetaceans to fishery entanglements, even by pelagic drift nets (Notarbartolo di Sciara, 1990), and their effect on the population is therefore considered negligible. Indirect threats that may affect survival or reproduction but at a longer timescale, include:

- anthropogenic noise from different sources (e.g. industrial (extractive and prospective), military activities (sonar, detonations), commercial shipping traffic (long-distance additive noise, or even from approaching vessels, such as during whale watching or research, in particular geophysical); 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, 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 heaviest 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. It should be noted that reported strikes greatly underestimate the true number of strikes.

By far, the majority of reported fatal strikes (over 82.2%) were reported in or adjacent to the Pelagos Sanctuary which contains high numbers of fin whales, especially in summer, but is also subject to high levels of traffic and seasonal whale concentrations (Panigada et al., 2006). A recent analysis of fin whale strandings in the French Mediterranean coast attributed 22,5% (± 7,3%) to vessel strikes; they occurred throughout the year but mostly between July and November (Peltier et al. 2019).

It has been estimated that about 3,500 'near miss events' occur in the Pelagos Sanctuary over one year (WWF France, Quiet Oceans, Ecooceans Institut, 2016) whilst the Strait of Gibraltar is also a high risk area for fin whales due to the intensity of maritime traffic concentrated in a migration corridor (Gauffier et al. 2018). Although the IMO has recommended that ships slow down to below 13 knots in the area between April and August, compliance is low, especially for ferries and fast-ferries (Gauffier et al. 2010, Silber et al 2012) and does not cover the winter presence of fin whales (Gauffier et al. 2018). Ship strikes have also been identified as an issue in the Balearic basin (Borrell et al. 2000, EDMAKTUB 2018).

A recent study in the California current system reveals that annual nighttime strike risk was twice as high as the daytime risk (Keen et al. 2019). The difference between the day- versus night time risk of vessel strikes must be accounted for when designing mitigation measures.

Efforts are being undertaken to assess whether Important Marine Mammal Areas (IMMAs) can be used as management tools to better delineate high density whale areas for the evaluation of the potential high risk areas for ship strikes.

Statistical models can be used to highlight recurring high collision risk areas and the results showed that the chlorophyll a spring bloom was a useful predictor allowing a yearly forecast of summer fin whale distribution and demonstrated the possibility to dynamically manage whale-vessel collisions in the Pelagos Sanctuary (Gin Swen Ham, abstract WMMC 2019).

The high likelihood of unreported fatal strikes, combined with other anthropogenic threats, suggests an urgent need for a comprehensive, basin-wide conservation strategy, including ship strike mitigation requirements, like real-time monitoring of whale presence, reduction of speed and re-location of shipping routes in the risk-hotspots, while considering the whales' yearly spatial distribution, as well as seasonal persistence. If avoidance of areas with fin whales is impossible, the only known mitigation measure that is effective in reducing the mortality of ship strikes is low vessel speed.

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.

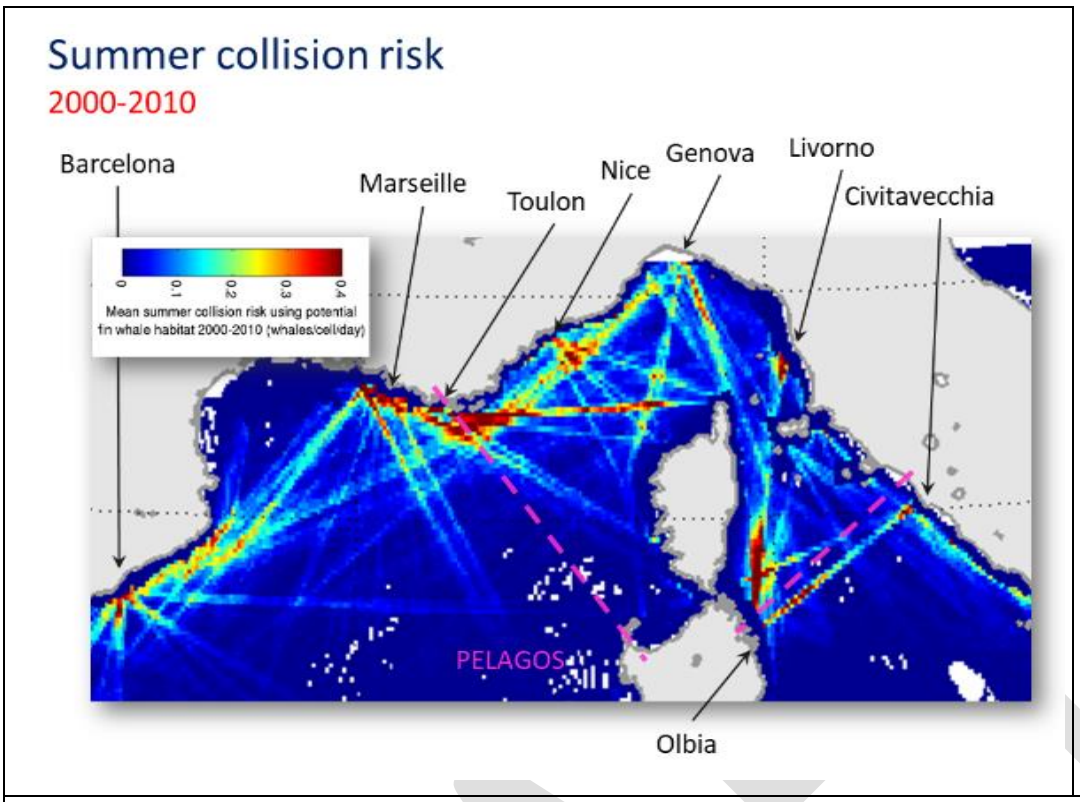


Fig.3. Spatial distribution of the potential risk of collision for fin whale merging data on favourable habitat (Druon et al. 2012) and on maritime traffic (Automatic Identification System) for the summer months of 2000-2010 (see Vaes and Druon 2013 for details). Note that 73% of fin whale observations were closer to 10 km of the highly favourable habitat (>50%) and 69% of observations are inside any favourable habitat level (>0%, n = 2,852). This result does not take into account the total annual nighttime strike risk which was found to be twice than daytime risk (Keen et al. 2019).

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 tissue damage conducive to death. Both acute and chronic noise at various time scales can affect whales e.g. by inducing temporary threshold shift and spatial displacement 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/or reproduction. Chronic noise can also generate communication masking and reduction of acoustic space (Clark et al. 2009). In addition to vessel traffic of all types (cargo, transport, fishing, tourism) noisy activities can arise from geophysical exploration, military activities (sonar and explosions), dredging and coastal and offshore development (e.g. offshore windfarms), whale watching and research. Potentially, the noise emitted by vessels may affect the ability of whales to avoid collisions.

Information gaps: understanding of the hearing abilities (audiogram) of fin whales and the physical, vocal, 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 cumulative noise effects from vessels and other noisy activities. QuietOceans (https://www.quiet-oceans.com/) is mapping all components of marine noise (natural and anthropogenic).

- Add Quietmed and Quietmed 2, MSFD D11.

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.* (2012) found considerable quantities of microplastics and plastic additives in surface water samples of and adjacent to the Pelagos Sanctuary. More recent studies suggest that debris, including micro-plastics and chemical additives (e.g., phthalates), tend to accumulate in pelagic areas in the Mediterranean (Fossi et al 2016, 2017), indicating a potential overlap between debris accumulation areas and fin whale feeding grounds. 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 This fact highlights the potential risks posed to endangered, threatened and endemic species of Mediterranean biodiversity.

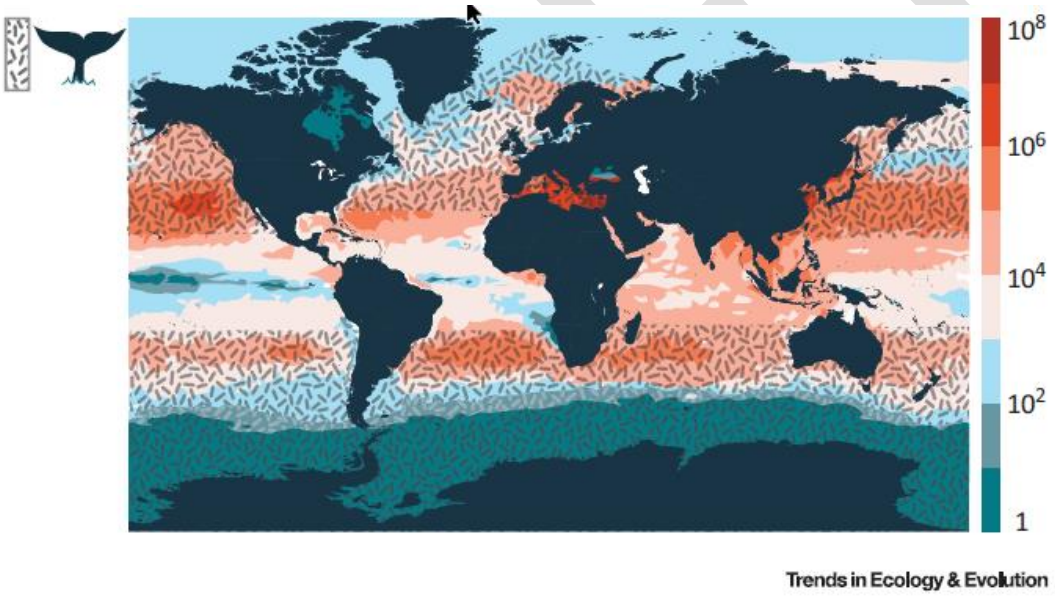


Figure X. Key Buoyant Microplastic Hot spots Overlap with Habitat Ranges of Filter-Feeding Marine Megafauna. Balaenoptera physalus, overlap with regions containing high levels of buoyant microplastic pollution. (Germanov et al. 2018)

Understanding the effects of microplastic contamination through metabolomics studies and monitoring of biomarkers responses (Fossi et al. 2016, Fossi et al 2018) can help to shed light on the health of populations in response to plastic-associated toxins. Long-lived species that are resident in specific regions can be monitored throughout their lives, providing an indication of toxin exposure overtime. The levels of toxins, especially those that are unique to plastics, in resident large filter feeders might provide indirect indicators, for microplastic pollution in local marine environments (Fossi et al 2018, Baini et al 2017).

Phthalates, as indicators of plastic contamination, have been analysed in 232 fin whale samples from 2016 to 2019 (WWF & AKINAO report, 2019). All individuals showed contamination from this family of chemical compounds, but the concentrations were highly variable among individuals and years. The results suggested rapid metabolisation and therefore, there was no evidence of bioaccumulation along the food chain (Gobas

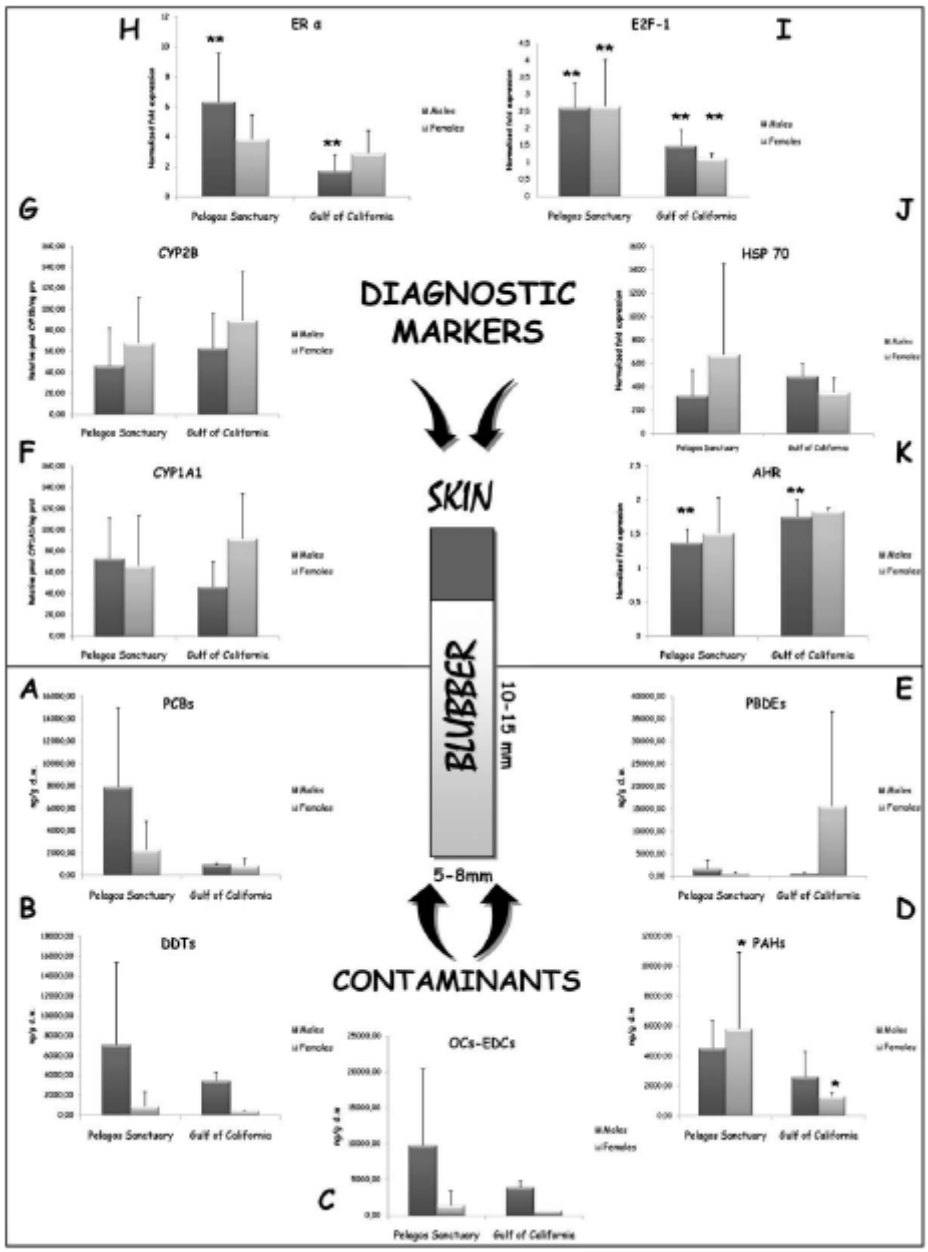
et al, 2003). Four of them (DEHP, DiBP, DBP, DNHP-BBP) are recognised as toxic by the European regulation REACH. Analysed samples showed significant concentrations of these four compounds in particular DiBP and DBP with concentrations ranging from 1229±1016 ng/g to 9681±2398 ng/g (DiBP) and from 777±567 ng/g to 1.82±0.62 mg/g (DBP) are detected in higher concentration than the others for three years (more than twice).

As for other pollutants, lack of knowledge on the effects on cetaceans is not sufficient reason to postpone taking action on reducing/eliminating their presence in the marine environment – their effect is likely to be harmful or at best neutral.

Information gaps: better understanding of effects of micro- and nano-plastics and plastic additives on whale reproduction and survival at the individual and population level. Investigation of new plastic tracers in tissues and the identification (through omics techniques) of the toxicological effects caused to plastic debris ingestion in these species (Panti et al 2019).

4.1.4 CONTAMINATION OF CETACEANS AND THEIR PREY

Systematic studies of the contamination by environmental contaminants of free-ranging and stranded Mediterranean fin whales first started in 1990 and revealed the presence of organochlorine compounds (OCs), polycyclic aromatic hydrocarbons (PAHs) and heavy metals. Particular interest was given to some Persistent Organic Pollutants (POPs), such as Dichlorodiphenyltrichloroethane and metabolites (DDTs) and Polychlorinated Biphenyls (PCBs), which were particularly high in the Mediterranean specimens compared to those of other seas (Fossi et al., 2010; Fossi & Marsili 2011; Pinzone et al., 2015), with significant differences between stranded and free-ranging specimens (Mazzariol et al., 2012; Marsili et al., 2018), between males and females (Fossi et al., 2003), and according to age (Marsili & Focardi, 2000), although almost no specimens exceeded the estimated threshold toxicity value of 17 mg/kg l.w. set by Jepson et al. (2005) and Kannan et al. (2000) for blubber in marine mammals, above which deleterious effects on the specimen health may occur. The ecotoxicological risk to some cetacean species is also related to their 'biochemical vulnerability' to xenobiotic lipophilic contaminants. Tanabe and Tatsukawa (1992) report that "…these animals have a low capacity for degradation of organochlorines due to a specific mode of their cytochrome P450 enzyme system". An interesting correlation was found by Marsili et al. (1998) in male specimens of fin whale between PCBs and DDTs in subcutaneous blubber and mixed-function oxidase (MFO) activity (BPMO) in epidermis. High induction of BPMO may be an early warning sign of exposure to endocrine disruptors such as OCs and potential alert of transgenerational effects, related to exposure of future generations via the placenta and milk. It is therefore a powerful 'prognostic' indicator of the health of cetacean populations (Fossi et al., 2000). A review about the OC levels in Mediterranean fin whales was published by Marsili et al. (2018).



Contaminant levels (PCBs (A), DDTs (B), OCs-EDCs (C), PAHs (D), PBDEs (E)) and biomarker responses WB of CYP1A1 (F), CYP2B (G), gene expression (qRT-PCR) of ERa (H), E2F-1 (I), HSP70 (J), AHR (K) in skin biopsies of specimens from the two populations of fin whales (*= $p < 0.1$; ** = $p < 0.05$). Pelagos Sanctuary (n = 12); Sea of Cortez (n = 5). (Fossi & Marsili, 2011).

PBDEs and MeO-PBDEs were analysed in the liver of 1 fin whale female specimen stranded in 1990, in the Tyrrhenian coasts, among other odontocete species showing the highest levels of total PBDEs =3625 µg/kg l.w.; MeO-PBDEs =104 µg/kg l.w.) compared to the other odontocetes (range total PBDEs = 886 µg/kg l.w.) (Pettersson, et al. 2004). The contamination for PCBS, PBDEs and DTT has been analysed in fin whale biopsies collected from 2006 to 2014 (N=125; WWF report, 2015; Tapie et al, 2012). The contamination for ∑6PCBs was 5425.3 ±2799.6 ng/g lp for males and 2352.4 ±3177.9 ng/g lp for females, ∑PBDEs is 190.2 ± 147.4 ng/g lp (males) and 102.3 ±184.8 ng/g lp (females), p,p'DDE is 6039.9 ±4840.3 ng/g lp (males) and 2955 ±48798.3 ng/g lp (females), p,p'DDD is 587.1 ±541.7 ng/g lp (males) and 145.9 ±135.4 ng/g lp (females). Males are about two times more contaminated than females ($p<0.0001$ Mann-Whitney). Among all the species studied by Pinzone et al. (2015), fin whales presented the lowest PBDE concentrations, in accordance with its trophic position (ΣPBDEs: 177 ± 208 µg/kg l.w.).

Concentrations of PFOS, FOSA, PFHxS, and PFOA were measured in tissues from stranded fin whales, collected from Italian coasts of the Mediterranean Sea (Tyrrhenian Sea). PFOS, FOSA, PFOA and PFHxS, measured in muscle of 1 specimen showed levels of <19 <19 <38 <19 µg/kg w.w., respectively (Kannan et al., 2002).

Twenty three fin whales were sampled in the summer of 1993 and 1996 in the Ligurian Sea. A fingerprint of 14 PAHs was obtained in subcutaneous blubber; the median value of total PAHs was 1970 ppb fresh weight (f.w.) while median carcinogenic PAH values were 89.80 ppb f.w.. The sampling period significantly influenced PAH concentrations of fin whales. In fact, the first sampling was carried out in 1993, after two ship disasters (the wreck of the tanker Haven and the collision between the ferry Moby Prince and the Agip Abruzzo oil tanker) had occurred in 1991 in the area, so a considerable amount of PAHs in the marine environment in 1993 was present (Marsili et al., 2001)

Prey contamination:
As for the presence of contaminants in the zooplanktonic euphausiid *Meganyctiphanes norvegica*, the main food of fin whale, in Fossi et al. (2002) Hg showed mean levels of 0.141 ppm d.w., Cd 0.119 ppm d.w. and Pb 0.496 ppm d.w.. Total PAHs ranged from 860.7 to 5,037.9 ng/g d.w., carcinogenic PAHs from 40.3 to 141.7 ng/g d.w., HCB from 3.5 to 11.6 ng/g d.w., DDTs from 45.3 to 163.2 ng/g d.w. and the PCBs from 84.6 to 210.2 ng/g d.w. It is interesting to explore the relationship between "prey" (*M. norvegica*) and "predator" (*B. physalus*) in the bioaccumulation of lipophilic contaminants (Marsili, 2000). The rate between contaminant levels in *B. physalus* and *M. norvegica* is 23.1 for PCBs and only 3.4 for total PAHs confirming the higher biomagnifications capacity of PCBs with respect to PAHs.

Information gaps:

- To explore the temporal trend of these contaminants in the Mediterranean fin whale to understand if they are decreasing after the regulation of the 2001 Stockholm Convention.
- To correlate xenobiotic data with the presence of pathologies.
- To create statistical models to evaluate the potential toxicological risk of the Mediterranean fin whale.
- To carry out non-destructive "in vitro" tests to explore the whale's immune system and its response in the presence of environmental contaminants.

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 in specific areas, may have detrimental effects at the population levels, which needs to be mitigated and prevented.

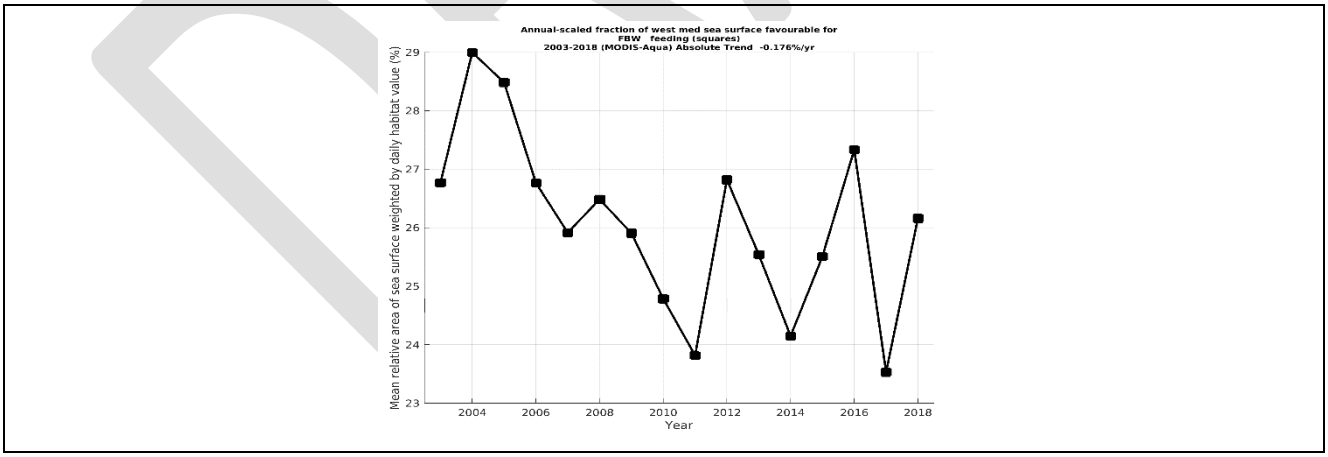
Currently, whale watching for fin whales is mainly concentrated in the Ligurian Sea and Pelagos Sanctuary-Gulf of Lions and specific attention should be dedicated to this area. Close and invasive approaches, such as those related to swim-with whales operations, should be prohibited in accordance with guidance from ACCOBAMS, the Pelagos Sanctuary Agreement and the IWC, as they may lead to severe disturbance to the animals.

Information gaps: better understanding of the direct and indirect of physical disturbance on fin whales and their prey. Data collection on whale watching activities (e.g. vessel positions using AIS (Automatic Identification System) and declarations for non-equipped AIS vessels).

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.

Current effects of climate change on feeding opportunities can be assessed using satellite-derived chlorophyll-a concentration and horizontal gradient (frontal features). The frequency of surface productivity fronts, which was shown to be linked to zooplankton biomass (Druon et al. 2019), reveals regional positive or negative trends over the last 16 years (Fig. 3) likely driven by atmospheric processes (unusual wind, evaporation and precipitation events affecting vertical mixing of the surface ocean, Druon *et al.* 2019). In particular, the loss of feeding opportunities in the most productive areas is of 15-20% per decade in relative value as induced by climate change in the western Mediterranean Sea for the period 2003-2018 (see legend of Fig. 3 for details).



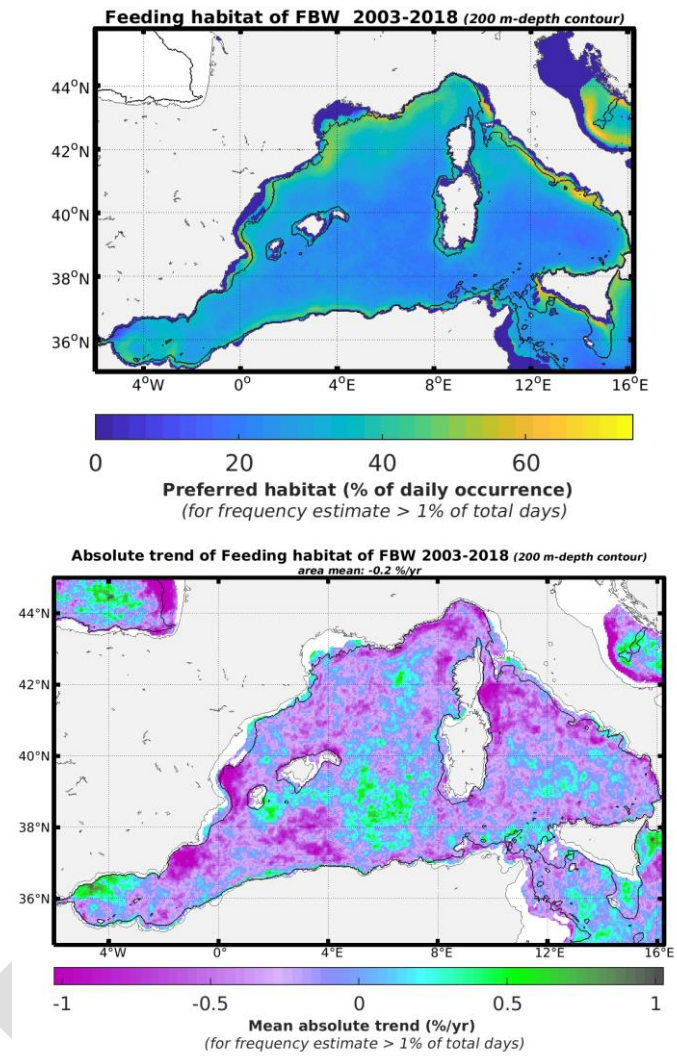


Fig.3. Annual variability (upper panel), inter-annual mean (lower left panel) and absolute trend distribution (lower right panel) of potential habitat of fin whale (*Balaenoptera physalus*) in the western Mediterranean Sea derived from the frequency of chlorophyll-a fronts (model of Druon *et al.* (2012), updated in Panigada *et al.* 2017, Fossi *et al.* 2017) over the period 2003-2018 (MODIS-Aqua sensor). The absolute trend map shows a general decrease of productivity fronts of about 1% per year in the most productive areas (40-50% of favourable habitat) resulting in a relative loss of feeding opportunities of 15-20% per decade induced by climate change. Although inter-annual variability is high at basin level (±12% in relative levels), a main loss of productivity fronts and related habitat occurred in the late 2000s (upper panel).

4.1.7 CUMULATIVE EFFECTS

The above sections discuss threats individually. However, it is clear that some or all of them may interact temporally and/or spatially. An initial approach to determine threat hot spots is to map threats against distribution (IWC-IUCN-ACCOBAMS report April 2019).

Cumulative effects can be considered as changes in reproduction and/or survivorship that negatively affect population dynamics and thus status as a result of repeated exposure to the same stressor(s) over time or the combined effects of multiple stressors. Developing robust ways to evaluate this is a complex problem. Perhaps the best-developed framework to date is the Population Consequences of Disturbance (PCoD) model (New et al. 2014) which has been extended to consider the Population Consequences of Multiple Stressors (PCoMS) (National Academies of Sciences, Engineering, and Medicine 2017). This approach moves through the effects of stressors on individuals' behaviour and physiology which is converted to effects on vital rates and then on to population trends and sustainability. However, the approach is extremely data

demanding and requires quantitative temporal and spatial information on whales (distribution, demographics and physiology), their prey and environment, human activities and models linking these - this complexity also contains inherent large levels of predictive uncertainty. In view of this, the present iteration of the CMP focuses initially on addressing individual threats whilst recognising the need ultimately to work towards evaluation of cumulative effects should mitigation measures on the individual threats proves insufficient.

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 biologically important) 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.

- PAM to monitor both noise and fin whale presence & identity – link to MSFD

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 vessel strikes, noise and pollution. [refer to Pelagos Sanctuary actions where they exist]

5.1 VESSEL STRIKES

Mitigation measures for ship strikes with fin whales have been discussed during dedicated IWC-ACCOBAMS workshops (Beaulieau sur Mer, 2010; Panama, 2014), during which different recommendations were discussed and suggested. Measures that separate whales from vessels (or at least minimise co-occurrence) in space and time to the extent possible are the most effective, where this is possible (e.g. routing schemes). The most effective and only demonstrated measure to reduce fatal collisions with most large whales is to reduce speed to 10 knots (Vanderlan and Taggert, 2007; Conn and Silber, 2013; Laist et al., 2014).

Emphasis should also be placed on the collection and reporting of data to the IWC Global Ship Strikes Database which will both: (1) facilitate a proper evaluation, prioritisation and monitoring of ship strikes as a threat to various populations and regions; and (2) assist in the development of mitigation measures.

One of the key components of the IWC Ship Strikes Strategic Plan is to identify high risk areas for ship strikes (a high-risk area is defined as the convergence of either areas of high volume shipping and whales, or high numbers of whales and shipping); Important Marine Mammal Areas (IMMAs) represent a systematic and biocentric approach to identifying important habitats, and that as such they can be helpful in identifying potential high risk areas for ship strikes. In particular, if an IMMA contains a species or population that is vulnerable to ship strikes, and it is transited by significant shipping, the area can be "flagged" for further investigation and potential mitigation.

The latest IWC-IUCN-ACCOBAMS workshop (Messinia, 2019) recommends the following steps are undertaken as part of a process to identify High Risk Areas for Ship Strikes based on IMMAs:

(1) Traffic information (e.g. Types of vessel, size, speed, flag, etc.): plotting major ship routes and see if they cross IMMAs which host significant or high density populations of species that are threatened and/or vulnerable to ship strikes.
(2) Species information (e.g. Relative abundance, status, Animal Behaviour/seasonality/key lifecycle use in and within IMMAs)
(3) Management and Mitigation

The workshop had recommended to further develop the process for the designation of a PSSA by IMO at a scale that includes the North West Mediterranean Sea, Slope and Canyon IMMA, plus potentially the Spanish corridor, to take into account whale population movement and distribution. Zoning within the area with ship strike mitigation tools such as speed reduction and routing measures could be proposed as part of Associated Protective Measures within the PSSA.
Co-operation with IMO, other IGOs, national authorities, the shipping industry, port authorities and the whale watching industry is essential if effective mitigation is to occur.

5.2 ANTHROPOGENIC NOISE

In recent years there has been a rapid growth in anthropogenic ocean noise, generated from a range of sources including shipping, seismic exploration, military exercises, drilling and construction. Anthropogenic noise in the marine environment can be generally classified as either acute or chronic. Acute noise is high in intensity and 'short' in duration (often pulsed) and key sources include seismic surveys and military sonar. Chronic noise refers to long-term, lower intensity noise, for example from shipping and industrial activity and this has been increasing considerably. Both have been shown to be likely to have some adverse effects on fin whale behaviour and physiology (as well as other cetaceans and marine fauna) although quantifying these effects at the population level is complex.

Problems associated with noise have been recognised by several international bodies including ACCOBAMS, CMS, IUCN,IWC and the UN and have been the subject of a number of resolutions (maybe a table?) that are applicable to range states within the Mediterranean, including guidelines for rigorous environmental impact assessments (e.g. UNEP/CMS/Resolution 12.14).

- Add here MSFD D11

5.2.1 ACUTE NOISE

Major sources of acute noise include geophysical (seismic) surveys by the oil and gas industry and some academic institutions, the use of active sonar (especially by the military) and the use of pile drivers in coastal and offshore construction work. Based upon work undertaken in a number of fora and agreed inter alia by the IWC, IUCN has published a practical approach to effective planning strategies for managing environmental risk associated with geophysical and other imaging surveys (with a focus on cetaceans (Nowacek and Southall, 2016). It offers a structured, systematic evaluation and decision-making framework for industry, regulators and scientists. The process (the principles of which are applicable to other types of threat) is summarised in the figure below and includes examples from a variety of situations. It should be noted that many countries may have national approaches (pull together and list?)

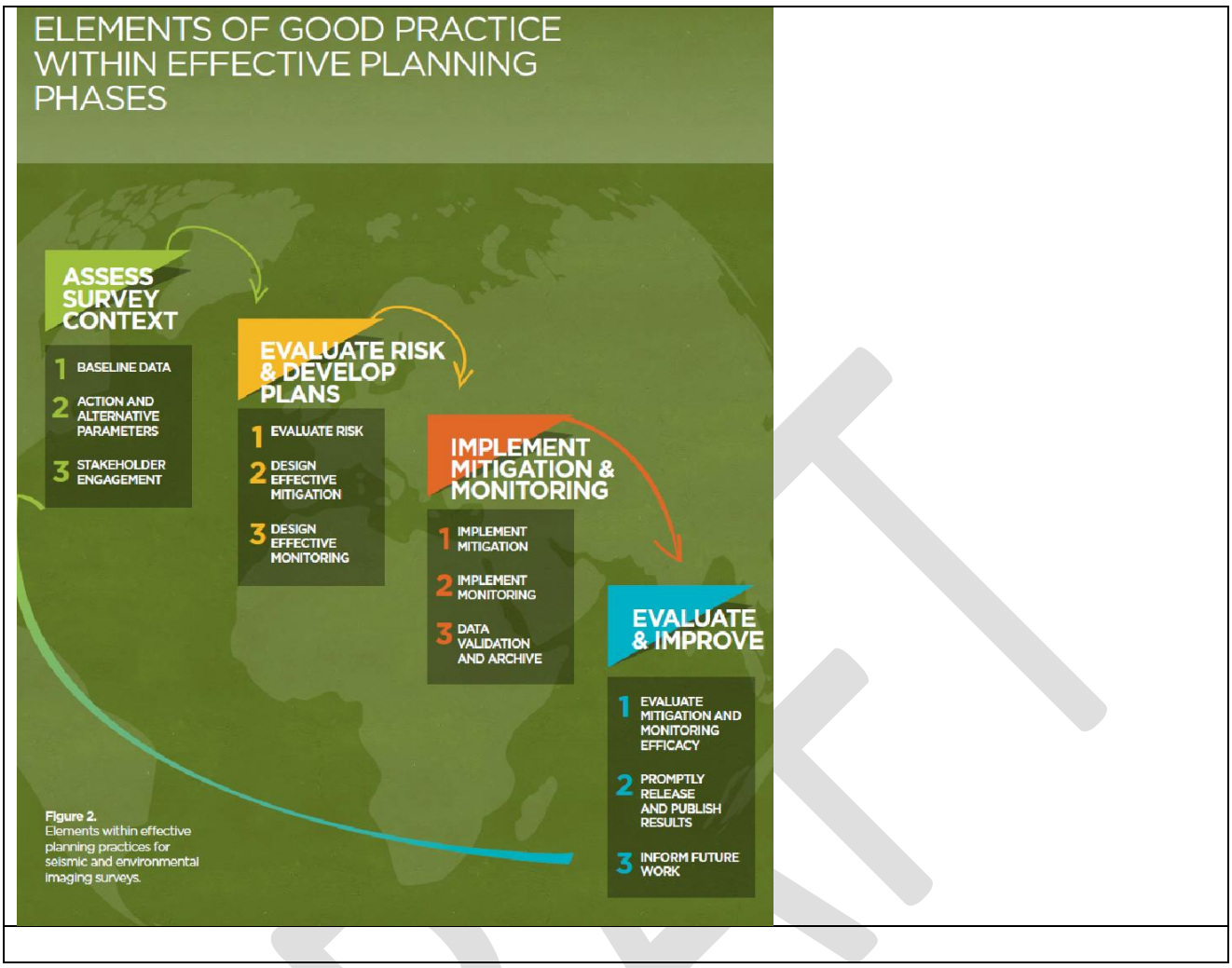


Figure 2.
Elements within effective planning practices for seismic and environmental imaging surveys.

5.2.2 CHRONIC NOISE

There are many sources of chronic noise in the environment and it is generally accepted (e.g. IWC, 2017) that there is compelling evidence that chronic anthropogenic noise is affecting the marine acoustic environment in many regions and that compromised acoustic habitat can affect some cetacean populations adversely.

Several IGOs (including ACCOBAMS, CMS, IWC) have agreed that absence of scientific certainty should not prevent their member nations from undertaking management efforts now to keep quiet areas quiet and make noisy areas quieter.
The general approach to addressing the issue of noise is applicable to all marine life not just fin whales and will benefit the ecosystem. Key measures include:

(1) ensuring that anthropogenic noise is properly quantified and effects on cetaceans considered for major activities in the Mediterranean, under a rigorous EIA system (see the CMS Guidelines), especially in areas/times where fin whales are present (the IMMA process will be helpful in this);

(2) continued improvements to sound mapping at appropriate spatial and temporal scales and the implementation of guidelines to reduce noise levels from shipping (e.g. IMO's 2014 Guidelines for the

Reduction of Underwater Noise from Commercial Shipping to Address Adverse Impacts on Marine Life - MEPC.1/Circ.833);

(3) working with industry and IMO to encourage the development of effective mitigation to minimise acoustic energy released into the environment - commercial shipping noise is by far the most relevant source of chronic noise for fin whales

5.3 MICRO AND NANO PLASTIC INGESTION

Micro- and nano-plastics enter the marine environment either directly from improperly treated water waste management or result from the degradation of larger items breaking down into smaller particles.

Mitigation measures in relation to marine plastic pollution should focus on 1) preventing the leakage of new micro- and macro-plastic material into the environment and 2) instigating the removal of macro-plastics from the marine environment.

The Directive (EU) 2019/904 of the European Parliament and of the Council of 5 June 2019 was established to reduce the impact of plastic on the environment (including marine ecosystems) by promoting the establishment of a circular economy. Considering that single-use plastics and fishing-related items represent the vast majority of marine litter, these products should be the main target of mitigation measures.

The transboundary spread of plastic litter in the marine environment will require the participation of all states bordering the Mediterranean Sea. The transition to a circular economy framework will involve the phasing out of single-use plastics, extended producer responsibilities, and recycling schemes.

Educational programmes and awareness campaigns should encourage the general public to reduce their plastic footprint (cross-reference to public awareness paragraph).

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 three years and that an in-depth review would be conducted every six years (to match the work-programme time frame of ACCOBAMS).

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

Coordination actions

Nr.	Action	Impor-tance	Feasibi-lity	Crossref.
CORD-01	Implementation of the CMP: Coordinator and Steering Committee	ESSENTIAL	HIGH	
CORD-02	Development of a Web-based exchange of scientific information – assess whether this is feasible, by contacting each potential partner. Standardized protocols and procedures.	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: (1) Occurrence, especially outside known range (outside known summer habitat); (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 of available in situ data/samples on fin whales from a variety of techniques (except Photo ID in RES-05)	HIGH	HIGH	RES-02 RES-03 RES-04 PACB-01 CORD-02
RES-02	Creation and maintenance of a single photo-identification catalogue - 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	RES-01
RES-03	Relationship between animals from the Mediterranean with those from adjacent Atlantic waters ● Extent & seasonality of Med whales exiting ● Extent & seasonality of NENA entering			
RES-04	Consider presence, abundance and distribution of fin whales in the Eastern Mediterranean, and their relationship to fin whales in the western Mediterranean	HIGH	MEDIUM-HIGH	RES-01 CORD-02 PACB-01
	Relationship between acoustic behavior and population identity (concurrent biopsing, acoustic tagging, and sonobuoy survey)			
RES-05	Assessing the seasonal distribution of fin whale exposure to threat	HIGH	MEDIUM-HIGH	RES-01 CORD-02
RES-06	Investigate the feasibility of using demographic parameters and population dynamics to			

	quantify the impacts of anthropogenic pressure on the fin whale population			

Monitoring actions

Nr.	Action	Impor-tance	Feasibi-lity	Crossref.
MON-01	Develop effective long-term monitoring programmes at basin scale to characterize seasonal distribution, movement patterns, and estimate abundance and trends through dedicated surveys	HIGH	HIGH	RES-04
MON-02	Ensure effective systematic long-term monitoring of distribution, abundance and trends in the main summer distribution area (Liguro-Corso-Provencal Basin/Gulf of Lions)	HIGH	HIGH	
	Dedicated efforts to identify wintering grounds basin-wide			
	Spanish Migration corridor monitoring and mitigation program			
MON-03	Monitor threats at the basin level			
	Integration to MSFD D1 and D11			
MON-04	Monitor existing adopted measures and guidelines			

Mitigation measure actions

Nr.	Action	Impor-tance	Feasibi-lity	Crossref.
MIT-01	Inventory and assess any proposed, existing or new technical mitigation measures for ship strikes and their implementation	HIGH	MEDIUM-HIGH	
MIT-02	Implementation of appropriate mitigation measures for ship strikes in ACCOBAMS area and specifically in high risk areas	HIGH	MEDIUM-HIGH	PACB-01 RES-03

	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 (including swim-with operations) and intrusive research	HIGH	HIGH	
	Analysis and implementation of noise exposure reduction from commercial shipping and ferry in areas and periods of high exposure or critical functions (i.e., feeding, breeding)			

8 ACTIONS

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
(0)	Selection AND Constitution of the Interim Steering Committee (ISC)	The experts from the CMP workshop	First quarter 2020
(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 support the development of 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 linked to ACCOBAMS domain 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 platform 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 first step is the CMP coordinator will organize a workshop to define the IT aspects of the platform. The second step is the identify the IT in charge of the action. Then, the CMP coordinator will support the design and implementation of a web-based forum (see CORD-01). The platform will host, link 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, EC, ACCOBAMS, Pelagos Agreement, IWC, industry, local authorities, NGOs, research organisations.

○ 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 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). 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 operators, 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 Web-based forum/platform 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 (including expert in communication)	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
(4)	Establish indicators to assess the efficiency of the strategic plan and fix objectives		
(5)	Assess strategic plan according to indicators and review		

- **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 and how to report 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. The development and use of a smartphone application as a data collection tool for citizen science and whale watching operators could be an efficient way to proceed. (See example here for alien species: https://digitalearthlab.jrc.ec.europa.eu/app/invasive-alien-species-europe)

- 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.
- Disseminate according to the strategic plan

- 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

• ACTION RES-01: COLLATION OF AVAILABLE IN SITU DATA/SAMPLES ON FIN WHALES FROM A VARIETY OF TECHNIQUES

Research Action Priority: **HIGH**

○ DESCRIPTION OF ACTION

Specific objective: The collation of available data (as outlined in CORD-02) from various techniques (genetic, photographic, surveys etc..) to facilitate the implementation of RES-01, RES-02, RES04, RESXX, MIT-XX (to be completed) and conduct interdisciplinary studies.

- **Rationale**: Along with the data inventory generated by CORD-02, data types from different sources will require standardisation (in terms of language, format, methods, etc) before datasets can be merged and analysed. Such a collation of datasets will facilitate the implementation of other research and mitigation actions outlined in the fin whale CMP and allow for interdisciplinary studies to be conducted to improve the scientific basis for mitigation actions. Through the increased sampling effort in the eastern Mediterranean Sea (RES-02) and the Strait of Gibraltar (RES-01), the newly available data can be integrated to conduct population structuring analyses throughout the range of the Mediterranean Sea fin whales. The photo-identification component of this work is described in RES-05.
- **Target:** At the first stage the Coordinator of the fin whale CMP should coordinate the collation of available data (cf CORD-02). Standardised protocols for each data type should be agreed on (e.g. using pre-existing IWC/ACCOBAMS recommendations), where possible. The Coordinator will appoint curators in charge of collating the databases from different techniques.
- **Method**:

The Coordinator of the fin whale CMP will work with all known data holders (past and present) to develop an agreed MoU dealing in particular with ownership of the data, data access (and subsequent analyses), publication arrangements. Once this has been agreed for each data type then steering groups (including a curator) will be formed by data type.

(1) *genetic data*: the steering group to standardise methods/markers before merging datasets. A database curator will be assigned to collate the data.

(2) *acoustic data*: the steering group will propose a standardised protocol/definition for the detection of fin whale calls and the curator will collate the data.

4) *telemetry data:* the steering group will propose a standardised approach to classifying location data and the curator will compile available satellite telemetry information (movements and diving behaviour).

(5) *sighting surveys*: the assigned curator will aggregate data from visual shipboard and aerial line transect surveys that followed distance sampling methodology (e.g. ASI) and from land-based sighting records.

(6) *strandings*: integrate stranding data from MEDACES and review the results on a regular basis.

(7) *stable isotope:* the steering group will assess whether stable isotope data generated from different laboratories are comparable before they are collated by the curator.

(8) *phot0-idnetification data:* the steering group will develop this in line with RES-02

The steering groups will determine priority analyses (both by data type and integrated) to assist the determination of appropriate units to conserve and to assist with monitoring and mitigation actions.

Implementation-timeline:

○ ACTORS

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

○ ACTION EVALUATION

- IWC
- ACCOBAMS

- PRIORITY

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

• ACTION RES-02: 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

Research Action Priority*:* **HIGH**

○ DESCRIPTION OF ACTION

- **Specific objectives:** to merge all existing photo-identification (and possibly genetic-id as well) catalogues in the entire fin whale range owned by different research organizations; establish an agreed common standardization of data collection for future research effort. This is a fundamental data source to inform other conservation and management actions.
- **Rationale:** individual identification (and the following of known individuals over time) is a powerful tool to inform evaluation of *inter alia* status, monitoring, temporal and spatial movements, population structure, population parameters and health (including evidence of ship strikes). A single unified photo-identification catalogue (there are several smaller scale catalogues) provides the best way to enable robust analyses of questions directly relevant to developing and/or evaluating mitigation measures. The value of such a catalogue will be enhanced greatly if it is linked to or contains information on individual identification (and sex) using genetic techniques (again several such catalogues exist).
- **Target:** development of a single photo-identification catalogue to inform conservation related research within the Mediterranean.
- **Methods:** the Coordinator of the fin whale CMP should work with all known data holders (past and present) to develop an agreed MoU for the creation of a joint catalogue (the IWC data sharing and photo-catalogue guidelines will assist in this), dealing in particular with ownership of the data, data access (and subsequent analyses), publication arrangements. The initial focus will be on photo-identification data followed by genetic data

  Assuming an agreed MoU is developed and there is a commitment from the major contributors then they shall:

  - agree an appropriate software and cataloguing system including data fields;
  - identify a host institution, co-ordinator and steering group to develop a budget and oversee the unification process including developing matching protocols and a validation approach for incorporating existing and new data (and a timeframe for catalogue review every few years;
  - develop a cost proposal for analyses to assist objectives of the CMP, including dissemination and publication.

  Consideration as to the most efficient way to undertake this – initially by correspondence followed by an expert workshop?

- **Timeline:**

	WHAT	WHO	WHEN
(1)	Identification of initial funds		
(2)	Development of MoU between organizations		
(3)	Identification of host institution and agreement on hosting conditions		
(4)	Recruitment of group of work and its coordinator		
(5)	Collection of available data		
(6)	Consensus on cataloguing system		
(7)	Analysis of data		
(8)	Dissemination and publication		

- **Tasks of Coordinator in conjunction with Steering Committee:**
  - To raise funds for the Mediterranean fin whales joint catalogue.
  - To facilitate (and if necessary adapt or modify existing) data-sharing agreements to ensure that data are made available in a 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
- To produce concise annual progress reports on the implementation of the task
- To arrange for periodic expert review of the catalogue and the development of new or modified actions as appropriate

INITIAL BUDGET ITEMS TO BE CONSIDERED BY ISC

- Catalogue host institution annual costs (needs to be negotiated by ISC).
- Salary of Group coordinator and ? (level, tax and benefits issues).

ACTORS

- **Responsible for coordination of the action:** Co-ordinator of Conservation Plan
- **Stakeholders**: Range State Governments, ACCOBAMS, IWC, industry, local authorities, NGOs

ACTION EVALUATION

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

PRIORITY

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

• ACTION RES-03: RELATIONSHIP BETWEEN ANIMALS FROM THE MEDITERRANEAN WITH THOSE FROM ADJACENT ATLANTIC WATERS

Research Action Priority: **HIGH**

○ DESCRIPTION OF ACTION

- **Specific objective**:

Clarify the extent of the connectivity of Mediterranean whales with the Atlantic Ocean through the Strait of Gibraltar and Atlantic whales with the Mediterranean Sea.

- **Rationale**:

The most recent genetic stable isotope and telemetry evidence points to the ACCOBAMS region containing a single 'Mediterranean' population of fin whales (*Balaenoptera physalus*) and this is the working hypothesis for this iteration of the CMP. Some animals move out of the Mediterranean through the Straits of Gibraltar into the adjacent North Atlantic in summer and move back in the winter (Gauffier et al., 2018; and see Fig.1). However, acoustic song information (Castellote *et al.,* 2012) suggests that these animals have different song characteristics to those that spend all year within the Mediterranean and also that Atlantic animals may enter the western Mediterranean. The implications of the acoustic information from the perspective of appropriate units-to-conserve requires further investigation. Information from the eastern Mediterranean is sparse. Due to the possible conservation implications of more than one population in the Mediterranean, population structure must be clarified before the next iteration of the CMP in six year's time. This is also relevant to the 'Atlantic Adjacent Waters' to be included in the ACCOBAMS region.

- **Target:**

To provide new information (with a focus on the western Mediterranean Sea, Strait of Gibraltar and poorly studied adjacent Atlantic area, see map XX) from a variety of techniques to contribute towards the determination of appropriate unit(s) to conserve (and their temporal and spatial distribution) within the ACCOBAMS region (and see RES-02)

Method:

- Design and implement visual line transect surveys (aerial and/or boat surveys) of the poorly studied Atlantic areas adjacent to the western Mediterranean (initially covering the waters within Spanish-Portugal-Morocco EEZ) in summer and winter to provide information about seasonal presence and fin whale density;
- Use these data to extend potential feeding habitat models to these poorly studied areas;
- Collect photo-ID and biopsy samples from animals encountered (either as part of a line transect boat survey or a targeted individual ID cruise) in adjacent Atlantic waters and increase the number of samples from the Strait of Gibraltar, especially during the winter.
- Assess the feasibility (and if yes undertake) of collecting photo-ID and biopsy samples from vocalising individuals using directional sonobuoys and acoustic tags to match acoustic recordings with genetics and stable isotopes analysis.
- Deploy passive acoustic moorings in the Strait of Gibraltar, Gulf of Cádiz, Moroccan-Spanish-Portugal EEZ (up to Galicia) to assess distribution, year-long or seasonal presence, and possible inter-annual or seasonal variability in song patterns.
- Assess the need to deploy additional satellite tags in the western Mediterranean and adjacent Atlantic waters and if deemed necessary and feasible design and implement a targeted programme.

- **Implementation-timeline**: This will be an iterative process

○ ACTORS

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

○ ACTION EVALUATION

- IWC

- ACCOBAMS

  - PRIORITY

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

• ACTION RES-04: CONSIDER PRESENCE, ABUNDANCE AND DISTRIBUTION OF FIN WHALES IN THE EASTERN MEDITERRANEAN, AND THEIR RELATIONSHIP TO FIN WHALES IN THE WESTERN MEDITERRANEAN.

Research Action Priority: **HIGH**

○ DESCRIPTION OF ACTION

- **Specific objective**: To better understand the use of the Eastern Mediterranean by fin whales (i.e., east of the Italian Peninsula): movements across the eastern basin, presence and whereabouts of feeding and breeding grounds, seasonality of occurrence to enable focussed mitigation efforts to be developed on identified threats.
- **Rationale**: Ecological knowledge of fin whales in the Eastern Mediterranean is fragmented and mostly limited to summer occurrence. Thus the available information is insufficient to understand the spatial and temporal extent to which fin whales use the Eastern Mediterranean. This is of conservation importance since it is possible that locations in the Eastern Mediterranean hold significant numbers of fin whales during the colder months, and could be a destination of at least part of the whales that assemble in the NW Mediterranean in summer during the remainder of the year.
- **Targets:** Improving knowledge of fin whales in the eastern Mediterranean using a variety of techniques (telemetry, eDNA, acoustic recorders, satellite imagery) to enable a better assessment of threats in the region and the need for targeted mitigation.
- **Methods**:
- Satellite tag whales found off the east coast of Sicily in Spring or Autumn to ascertain where those whales travel to in subsequent months and see whether there is a difference in destination between the two seasons.
- Initially based upon the modelled presence of fin whale feeding habitat based upon summer data:
    - Sample eDNA to detect whale presence during two replicate cruises (summer and winter) in specific locations of the Eastern Mediterranean
    - Deploy acoustic recorders (year-round) in specific locations of the Eastern Mediterranean to provide information on distribution, identity, and seasonality of fin whales. And examine data collection from already existing listening stations (i.e. neutrino telescopes).
    - Examine appropriate high-resolution satellite imagery to detect presence of fin whales in specific locations of the Eastern Mediterranean.
- **Implementation-timeline**:

○ ACTORS

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

○ ACTION EVALUATION

- IWC
- ACCOBAMS

○ PRIORITY

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

● ACTION RES-05: ASSESSING THE SEASONAL DISTRIBUTION OF FIN WHALE EXPOSURE TO THREATS

Research Action Priority: **HIGH**

○ DESCRIPTION OF ACTION

- **Specific objective**: to map the seasonal exposure to a suite of threats, including ship strike, anthropogenic noise, micro- and nano-plastics ingestion, chemical contaminant exposure, physical disturbance and climate change with a final goal of assessing the potential risk caused by cumulative effects in the entire Mediterranean Sea.
- **Specific threats to be mitigated**: all potential threats are considered, including direct and indirect. Several basic data to assess these threats are relatively well defined in space and time (AIS data for ship strike, noise and physical disturbance, environmental data for climate change) while others are relatively data-poor (plastics and contaminants).
- **Rationale**: Knowledge on the impact and distribution of threats to fin whale is key information for efficient mitigation. The development of spatial and temporal layers of threats on one hand and on fin whale distribution for feeding and reproduction on the other hand will allow identifying the exposure to single and multiple threats. When new data become available, this framework shall allow improvement of the exposure assessment.
- **Target:** creation of a Geographic Information System (GIS) platform hosting the habitat and threat layers to facilitate the exposure analysis and cumulative impacts.
- **Method**: Use of data collated by RES-01-02 and of model outputs to develop spatial and temporal layers of fin whale habitats (feeding and reproduction) and of threats - PAM related actions can provide noise metrics.

  Effective (observation per unit effort, IMMAs) and potential habitats are to be developed and confronted in order to assess accuracy and ensure coherent estimates at large scale. The habitats of feeding, mating and nursing should ideally be analysed. Various modelling methods for identifying potential habitats should be foreseen if possible (deterministic, statistical, artificial intelligence). Trends in potential habitat will inform on the current impact of climate change.

  Both acute and chronic noises likely have variable levels of adverse effects on fin whale behaviour, distribution and physiology ranging from disturbance to lethal effect. Major sources of acute noise include geophysical (seismic) surveys by the oil and gas industry and some academic institutions, active sonar (especially by the navy) and pile drivers in coastal construction work. Chronic noise is mostly originating from maritime traffic. Identifying the various sources of anthropogenic noise and its components from short to long time scales are required.

  Precise information on maritime traffic, such as data from vessel positioning systems, is essential to identify the distribution of the risk of ship strike. Similarly, the quantification of the risk of physical disturbance requires detailed information on whale watching activity.

  Point sources and diffusion/concentration processes of pollutants (plastics, contaminants) shall provide information on the exposure. Modelling of processes (e.g. plastic fragmentation) shall be used where necessary.
- **Implementation-timeline**:

○ ACTORS

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

○ ACTION EVALUATION

- IWC
- ACCOBAMS

○ PRIORITY

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

• ACTION RES-06: INVESTIGATE THE FEASIBILITY OF USING DEMOGRAPHIC PARAMETERS AND POPULATION DYNAMICS MODELS TO PROVIDE ROBUST PREDICTIVE CONCLUSIONS AND CONSERVATION FOR MEDITERRANEAN FIN WHALES

Research Action Priority*:* **TBD**

○ DESCRIPTION OF ACTION

- **Specific objectives:** Investigate the feasibility of estimating key population parameters (e.g. pregnancy rate, calving rate, age at sexual maturity, survival rate) with sufficient precision and accuracy to be able to (a) detect changes in these should they occur and (b) use in population dynamics modelling in a robust predictive manner to inform conservation actions.

- **Rationale:** Use of population dynamics models to provide robust predictive modelling of the effects of direct removals has been undertaken by the IWC Scientific Committee for a number of years. For fin whales this has been undertaken for the aboriginal subsistence hunt off West Greenland (ref) and the commercial hunt off Iceland using a general age-and sex-structured model. For populations such as western gray whales off Sakhalin Island for which there is a large body of photo-identification data, the modelling approach used is a modified IBM (individually based model) that directly integrates resightings data by sex and age-class. Such models provide an integrated way to examine the effects of human activities on populations (it is easier to model the effects of direct removals such as ship strikes than it is to model the effects of indirect effects -the latter can be approximated by making assumptions about changes in carrying capacity or reproductive/survival rates). The value of the modelling exercises depends on the robustness of the predictions/inferences to the inevitable uncertainties in the input parameters as well as the assumptions within the models themselves. Such modelling may be valuable in the case of the Mediterranean fin whale and this proposal is to examine, given the available information whether (a) one or more modelling approaches are suitably robust to provide management advice and (b) whether they can be used to focus research or monitoring efforts (e.g. by identifying which parameters are most important in influencing conclusions) and at what level of precision they need to be determined to allow models to provide robust conclusions. The Mediterranean datasets of interest include photo-identification data and genetic data from biopsy samples. The latter for example have produced estimates of pregnancy rate and numbers of calves produced over a lifetime within part of the western Mediterranean (Siliart et al. 2012).

- **Target:** to determine the feasibility of population dynamics modelling (given the levels of precision/accuracy in estimating reproductive and survival rates for Mediterranean fin whales) to provide robust predictive conclusions relevant to conservation and mitigation, including consideration of whether improved future research effort to refine key parameters may allow robust conclusion to be developed in the future if the present data are inadequate.

- **Methods:**
  - Estimate the precision and accuracy of key reproductive and survival parameters using existing datasets (primarily photo-identification and genetic data) from the Mediterranean and undertake power analyses to investigate the ability to detect changes in these should they occur.
  - Using these data, investigate the use of general age- and sex-structured population dynamics models (where parameters are direct inputs) and individually-based or modified individually-based models (where parameters are estimated within the model itself and provided as output) to determine the robustness of model predictions for the provision of conservation advice (e.g. on status and trends) or advice on research or mitigation focus, taking into account both direct and indirect impacts of human activities.
  - Compare results for the Mediterranean with those for fin whales in other areas.

- **Timeline:**

	WHAT	WHO	WHEN
(1)			
(2)			
(3)			
(4)			
(5)			
(6)			

(7)			
(8)			

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

○ INITIAL BUDGET ITEMS TO BE CONSIDERED BY ISC

○ ACTORS

- **Responsible for coordination of the action:**
- **Stakeholders**:

○ ACTION EVALUATION

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

○ PRIORITY

- **Importance**: TBD
- **Feasibility**: Medium

• ACTION MON-01: DEVELOP EFFECTIVE LONG-TERM MONITORING PROGRAMMES AT BASIN SCALE TO ESTIMATE ABUNDANCE AND TRENDS THROUGH DEDICATED SURVEYS

Monitoring actions Priority: **HIGH**

○ DESCRIPTION OF ACTION

- **Specific objective**: obtain robust and unbiased population estimates and distributional information of Mediterranean fin whales at regular intervals (suggested 6 years).
- **Rationale**: promote suitable monitoring programme for the Mediterranean region to enable trends and potential distributional changes to be identified, in order to suggest timely mitigation actions. The systematic monitoring of the abundance and distribution of wild species constitutes a crucial element of any conservation strategy, but it is often neglected in many regions, including much of the Mediterranean. Importantly, it represents a priority for ACCOBAMS. Robust baseline information on parameters such as abundance and density is necessary to inform conservation actions and to implement and evaluate the efficacy of any measures currently in place.

  The European Habitat Directive, the Marine Strategy Framework Directive, and the Ecosystem Approach not only require the monitoring of the Good Environmental Status (GES) of species and habitats of community interest, but also require reporting on this status every 6 years. This is essential to guarantee regulations enforcement in the ACCOBAMS Member States, as well as to gain continuous information on species trends.
- **Target:** determine whether ACCOBAMS is meeting its conservation objectives with regards to Mediterranean fin whales; properly assess whether in place mitigation measures from actual threats are effective (ref. RES-04). Efforts should be made to survey those regions that did not previously receive either aerial or vessel survey effort (ref ASI, 2018).
- **Method**: A synoptic survey, applying line transect distance sampling methodologies, to be carried out in a short period of time across the whole Mediterranean Sea, combining visual survey methods (boat- and ship-based surveys) and passive acoustic monitoring (PAM). The main aim in both aerial and vessel-based surveys is to assess density and abundance and assess potential trends over time. Standardized and agreed protocols should be used for the monitoring actions, following the ACCOBAMS Survey Initiative (ASI, 2018) experience. Abundance estimates will be corrected for availability bias.
- Use existing ongoing programs, such as those on ferry routes, to integrate abundance estimates and trend estimates.
- Consider the possibility to perform photoID and biopsy and eDNA sampling during large scale surveys to: (1) sample poor-data areas, (2) monitor changes in hormones levels, stable isotopes, contaminants in areas of interest as identified by previous surveys
- Power analysis will be used to design the specific monitoring framework to detect a trend of a given magnitude and to detect specific rates of population change.

- **Implementation-timeline**:

○ ACTORS

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

○ ACTION EVALUATION

- IWC
- ACCOBAMS

○ PRIORITY

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

• ACTION MON-02: ENSURE EFFECTIVE SYSTEMATIC LONG-TERM MONITORING OF DISTRIBUTION, ABUNDANCE AND TRENDS IN THE MAIN DISTRIBUTION AREA (LIGURO-CORSO-PROVENCAL BASIN/GULF OF LIONS)

Monitoring actions Priority: **HIGH**

Description of action

- **Specific objective**: Ensure that annual and seasonal monitoring of distribution, abundance and trends is regularly conducted in the Corso-Ligurian-Provencal Basin, Gulf of Lions and North Tyrrhenian through mark recapture methods (photo-identification and genetic biopsy sampling and analysis).
- **Rationale**: Continued monitoring of the Mediterranean fin whale population and regular updates of a population assessment are essential for meeting conservation objectives. Photo-identification is a widely used technique in cetacean research that can provide estimates of abundance and population parameters e.g. survival and calving rate. This method can be used for population level monitoring of species with appropriate markings, if data can be collected across the distribution of the population. A long time series of photo-identified fin whales will be available (ref. RES-05), creating the possibility of detecting changes in abundance over time (ref MIT-02). Similarly, biopsy sampling can be used to describe population parameters and to estimate abundance through mark-recapture analysis. This action would also further improve our understanding of interannual distributional fluctuations, particularly if observed distribution changes can be compared with modelled feeding habitat changes.
- **Target:** Collection of photographic and genetic data on an annual/seasonal basis.

- **Method**: Monitoring at the regional level may require data collection throughout the year, to better understand seasonal patterns in distribution, whereas monitoring at the population level would mainly address inter-annual changes. A power analysis will be needed to determine the scale of photo-identification effort, in terms of both days in the field and time interval between surveys, needed to detect any change in abundance or trends for this population. Mark-recapture models must be applied to photo-identification and genetic data to estimate abundance for specific areas that populations or part of populations occupy during one or more seasons of the year. Collate information coming from different research groups in these areas.
  Evaluate the feasibility of monitoring demography of Mediterranean fin whale by means of photo-identification studies, to detect potential changes. An additional aspect that should be assessed is the possibility of monitoring body condition of individual whales in the feeding areas.

  If new areas are identified by previous actions (RES-01 and RES-02), these should also be monitored within this action.
- **Implementation-timeline:**

Actors

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

Action evaluation

- IWC
- ACCOBAMS

Priority

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

ACTION MON-03: MONITOR THREATS AT THE BASIN LEVEL

Monitoring Action Priority: **HIGH**

DESCRIPTION OF ACTION

- **Specific objective**: to periodically assess the status and trends of threats, including ship strike, anthropogenic noise, micro- and nano-plastics ingestion, chemical contaminant exposure, physical disturbance and climate change and their cumulative effects in the entire Mediterranean Sea, and the emergence of new possible threats, following actions RES-04 and MIT-01.
- **Specific threats to be mitigated**: all potential threats are considered, including direct and indirect, and potential new emerging threats.
- **Rationale**: Status and trends of threats to fin whale is key information to assess the efficiency of existing mitigation measures (MIT-02 and MIT-03, and future mitigations actions) and the needs for adaptation of the mitigation strategy. Trend maps will inform on the evolution of known threats in previously identified risk areas compared to the last assessment, the identification of new risk areas and the emergence of new threats.
- **Target:** use of the Geographic Information System (GIS) platform from RES-04 hosting the habitat and threat layers to evaluate every 3 years the exposure levels and cumulative impacts.
- **Method**: Status and trend maps of single and multiple exposure (e.g. Micheli et al. 2013) are performed using the layers of RES-04 on threats and habitat. When new data are collated or new methods are used to create any layer, the re-evaluation of trend is performed over the entire time-series.

  Trend maps will be computed in absolute change of risk over three periods:

  - in the last 6 years to assess progress from the last assessment,
  - since a given mitigation measure was implemented, to assess progress,
  - since a fixed reference year to be determined based on historic information about threat, to facilitate the identification of target levels.

  Any presentation of a trend map will be associated to a mean status map to evaluate the rate of change over the given period.
- **Implementation-timeline**:

This action highly depends on the completion of RES04.

ACTORS

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

ACTION EVALUATION

- IWC
- ACCOBAMS

PRIORITY

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

● ACTION MON-04: MONITOR EXISTING ADOPTED MEASURES AND GUIDELINES

Monitoring Action Priority: **HIGH**

○ DESCRIPTION OF ACTION

- **Specific objective**: to assess the implementation by Countries of all relevant Resolutions / Guidelines adopted in the framework of relevant bodies including ACCOBAMS, CMS, Barcelona Convention, IWC, Pelagos Agreement,
- **Specific threats to be mitigated**: all Resolutions / Guidelines directed to address: ship strike, noise, physical disturbance, micro and nano plastics and contaminants (climate change?)
- **Rationale**: existing adopted measures and Guidelines need to be monitored to ensure compliance and ultimately benefit fin whale conservation
- **Target:** improve compliance with all the provisions of the relevant bodies including ACCOBAMS, CMS, Barcelona Convention, IWC, Pelagos Agreement.
- **Method:**
    - consult National Reports of relevant bodies including ACCOBAMS, CMS, Barcelona Convention, IWC, Pelagos Agreement,
    - ?
- **Implementation-timeline**: ?

○ ACTORS

- **Responsible for coordination of action:** CMP coordinator, Secretariats and National Focal Points of relevant bodies.
- **Stakeholders**: Range State Governments, ACCOBAMS (including the Follow up Committee), IWC, industry, local authorities, NGOs.

○ ACTION EVALUATION

- IWC
- ACCOBAMS

○ PRIORITY

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

• ACTION MIT-01: INVENTORY AND ASSESS SHIP STRIKE MITIGATION MEASURES AND THE EFFICIENCY OF THEIR IMPLEMENTATION

Mitigation Action Priority: **MEDIUM-HIGH**

DESCRIPTION OF ACTION

- **Specific objective**: Identify efficient mitigation measures for ship strike to be implemented in MIT-02
- **Specific threats to be mitigated**: ship strike
- **Rationale**:

Ship strikes is one of the most important threats for fin whales worldwide and specifically in the Mediterranean Sea. Therefore there is a high priority to reduce the impacts of this threat for Mediterranean fin whales. Measures that separate whales from vessels (or at least minimise co-occurrence) in space and time are the most effective (e.g. re-routing schemes), additionally reducing speed to 10 knots have been shown to significantly reduce fatal collisions with large whales. However, these measures are not always feasible. A panel of mitigation measures have been implemented worldwide and their effectiveness needs to be assessed to decide which should be implemented in the Mediterranean (MIT-02).

- **Target**:

Inventory and review any proposed, existing or new measures to mitigate ship strike for fin whales in the Mediterranean. This will be used to inform action MIT-02 and implement selected mitigation measures in high risk areas, which need to be identified and/or confirmed on a seasonal/yearly basis. Periodically assess the efficiency of measures that have been implemented in MIT-02 based on MON-03.

- **Method**:

(1) Inventory and assess ship strike mitigation measures, included the following measures proposed or implemented worldwide:

- separating whales and ships via re-routing schemes, Traffic Separation Scheme (TSS) and Areas to be avoided, implemented through the IMO;
- reducing speed in high density areas where re-routing is not possible, implemented through measures such as PSSAs within the framework of IMO;
- real time alerting (such as REPCET, infrared vision system, acoustic technologies like whale Auto-Detection Buoy System, Whale Alert platform and App);
- training of crew personnel and presence of independent observers

➔ create an inventory of mitigation measures used;

➔ assess the efficiency of each implemented measures:

- ◆ quantity of shipping companies/stakeholders involved;
- ◆ legal analysis of each mitigation measures
- ◆ recommended actions put in force to reduce ship strikes by each measure;
- ◆ existence of reporting from shipping company;
- ◆ assessment of compliance by shipping company to specific recommendations of mitigation measures;
- ◆ existence of feedback from stakeholders to shipping companies about compliance to mitigation measure recommendations.
- ◆ existence of process to update the mitigation measure recommendations.

➔ update the inventory and assessment when new mitigation measures are developed

(2) Implement the most appropriate measures in the ACCOBAMS area and specifically in the high risk areas identified in RES-04 and through MIT-02

(3) Review the efficiency of the measures implemented in MIT-02

- **Implementation-timeline**:

	WHAT	WHO	WHEN
(1)	Identification of existing mitigation measures		

(2)	Collection of available data for the efficiency assessment		
(3)	Analysis of data		
(4)	Reporting		
5	Assess the efficiency of in place measures		

ACTORS

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

ACTION EVALUATION

- IWC
- ACCOBAMS

PRIORITY

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

• ACTION MIT-02: IMPLEMENTATION OF APPROPRIATE MITIGATION MEASURES FOR SHIP STRIKES IN ACCOBAMS AREA AND SPECIFICALLY IN HIGH RISK AREAS

Mitigation Action Priority: **MEDIUM-HIGH**

○ DESCRIPTION OF ACTION

- **Specific objective**: Reduce mortality and injuries of fin whales in high risk areas using efficient mitigation measures
- **Specific threats to be mitigated**: ship strikes
- **Rationale**:

Ship strike is one of the most important threats for fin whales worldwide and specifically in the Mediterranean Sea. There is a high priority to reduce the impacts of this threat for Mediterranean fin whale. Ship strike mitigation measures have been reviewed in MIT-01, which provides indications to select the most efficient measures to implement in the ACCOBAMS area and specifically in high-risk areas. IWC define high-risk areas as the convergence of either areas of high volume shipping and whales, or high numbers of whales and shipping. IMMAs proved to be an efficient tool to flag areas where fin whales may be at risk of ship strike, but since they mainly encompass areas with high numbers of whales, mitigation should also apply for areas with high volume of shipping that may limit the presence of whales despite favourable habitats.

- **Target:**

Implement appropriate mitigation measures for ship strike based upon the information reviewed in MIT-01 and depending on the characteristics of each high risk area identified in RES-04, and in areas already defined as priority for fin whales by member states (e.g. Ligurian Sanctuary, Spanish migratory corridor) in the ACCOBAMS area.

- **Method**:

The tasks will be to :

- ➔ constitute a ship strike committee composed of all stakeholders including National authorities, scientific experts and shipping companies;
- ➔ assess the feasibility of the mitigation measures evaluated in MIT-01 according to the characteristics of each high risk area;
- ➔ assess the feasibility of the mitigation measures evaluated in MIT-01 in the ACCOBAMS area;
- ➔ contact the appropriate stakeholders based on legal analysis for each mitigation measures described in MIT-01, such as the IMO, and including shipping companies and National authorities;
- ➔ implement the selected mitigation measures;
- ➔ implement a reporting system from and to shipping companies;
- ➔ increase international collaborations about ship strike issues (e.g. International Maritime Organization, IWC, ACCOBAMS, ASCOBANS, NGOs, ...);
- ➔ increase public and industry awareness about the issue and measures used to reduce this threat (PACB01).
- ➔ Consider the use of dedicated certificates to be given to ships and companies which comply with mitigation measures.
- ➔ Assess the efficiency of in place measures

- **Implementation-timeline**:

	WHAT	WHO	WHEN
(1)	Assess the feasibility of the mitigation measures assessed in MIT-01 for each defined high risk area		
(2)	Contact the appropriate stakeholders including shipping companies, IMO, national authorities		
(3)	Design an implementation scheme		

(4)			

○ ACTORS

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

○ ACTION EVALUATION

- IWC
- ACCOBAMS

○ PRIORITY

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

• ACTION MIT-03: WIDER ADOPTION AND IMPLEMENTATION OF STANDARDIZED MEASURES (IWC/ACCOBAMS/CMS) TO MITIGATE ADVERSE IMPACT OF WHALE WATCHING ACTIVITIES

Mitigation Action Priority: **HIGH**

DESCRIPTION OF ACTION

- **Specific objective**: reduce the negative impacts of commercial whale watching activities thanks to efficient management of the activity through a suitable management framework and thanks to the implementation of relevant standardized codes of conduct (IWC, ACCOBAMS, CMS).
- **Specific threats to be mitigated**: physical disturbance
- **Rationale**:

Harassment risk begins when a vessel is deliberately closer than the minimum distance identified in common rules for commercial cetaceans watching or when the vessel stays for a period longer than prescribed. This is especially true for swim-with cetacean activities. Moreover, direct interactions between swimmers and animals is demonstrated as presenting risks of animal violent behaviour and transmission of diseases.

Additionally, individuals that are regularly approached (even in respect of the code of conduct) can have significant stress and this may lead to impact at the population level on medium to long term (New Zealand study on bottlenose) (Chronic impact vs acute impact).

- **Target:**

Minimize the risk of whale watching activities having negative impacts on cetaceans, by the implementation of effective management strategies including the adoption and implementation of standardized codes of conduct (IWC, ACCOBAMS, CMS).

- **Method**:
    - collate and review of scientific literature, on potential adverse effects of whale-watching on cetaceans and means to mitigate them, with an emphasis on population-level impacts, swim-with activities, feeding and use of spotter aircraft, and recreational drones and also on the concept of “carrying capacity”
    - review and update guidelines / codes of conduct for sustainable cetacean-watching
    - review and update whale-watching certifications and other mitigation measures
    - analysis of the efficiency of whale-watching mitigation measures
    - increase international collaborations working for whale-watching mitigation (e.g. IWC, ACCOBAMS, ASCOBANS, NGOs, ...);
    - increase public and industry awareness about the issue and measures used to reduce this threat (PACB01).
    - Assess the efficiency of in place measures

- **Implementation-timeline**:

	WHAT	WHO	WHEN
(0)	Constitution of group of work and its coordinator		
(1)	Identification of existing mitigation measures		
(2)	Collection of available data for the efficiency assessment		
	Data collection about negative impacts of whale-watching activities on cetaceans		
	Analysis of data		
	Reporting		
	Collaboration		

ACTORS

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

ACTION EVALUATION

- IWC
- ACCOBAMS

PRIORITY

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

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• 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.

1 INTERNATIONAL CONVENTIONS AND AGREEMENTS

1.1 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

1.2 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.

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

xxxx

1.4 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.

1.5 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.

+Convention on Biological Diversity ?

1.6 REGIONAL FISHERIES BODIES

To be added

1.7 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…….

2 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)

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

Coordinated by Léa David, with the participation of Antonella Arcangeli, Greg Donovan, Drasko Holcer and Caterina Lanfredi and inputs from Sabina Airoldi, Frank Dhermain, Cristina Fossi, Hélène Labach, Ada Natoli, Gianni Pavan and Massimiliano Rosso.

This document has been mainly built during a dedicated workshop of five days in December 2019, followed by more contributions from key players in the ACCOBAMS area and finalised in parallel with the document of the new assessment of the IUCN status of the species at the Mediterranean level (Lanfredi et al., 2021).

CONTENTS

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 the spreading existing documents toward focused public should be the priority.*

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 and perhaps more, 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

CMPs are developed under the umbrella of ACCOBAMS. All relevant bodies of ACCOBAMS must be involved: strong links with the Scientific Committee, the Secretariat and regular information to National Focal Point (ACCOBAMS Res. 6.21) and other relevant stakeholders.

1.1 WHY A CONSERVATION MANAGEMENT PLAN IS NEEDED

ACCOBAMS has agreed to develop Conservation Management Plans (CMPs) for species/populations within its region following an agreed approach and template (Resolution 6.21). This CMP is a framework to stimulate and guide the conservation of the relatively poorly known Risso's dolphin found in the Mediterranean. The 'Mediterranean subpopulation' was classified as Data Deficient (Gaspari and Natoli, 2012) and the still in revision new assessment for the re-evaluation launched in 2021 should give another status for the species as some knew knowledge have been brought up. Like all CMPs, it is intended as a living document and it will be re-evaluated and updated regularly (see section 7.3).

There have been few systematic studies of population structure or abundance in the Mediterranean. Understanding status and prioritising management actions requires definition of appropriate units to conserve and knowledge of abundance, range and trends for those units.

With respect to mitigation, a number of general threats can be identified, although evaluating their priority and extent will need to be undertaken at the next iteration of the CMP after the clarification of the scientific issues identified here. However, general mitigation approaches to noise, harassment, bycatch, habitat degradation including chemical pollution and plastics, of benefit to a wide range of species including Risso's dolphins have already been adopted by range states - these must be implemented now and not wait for the next iteration of the plan.

Given the lack of knowledge on population structure, one key focus of this iteration of the CMP is to develop research actions that will facilitate definition of appropriate management units. This has added importance as it will contribute towards an understanding of a recent major observed decrease in occurrence of animals in the western Ligurian Sea after many years of relatively stable numbers and animals exhibiting site fidelity. At present it is not possible to determine if this is a matter for concern (e.g., movement of animals away from a preferred habitat due to human activity/ies or decline in a small local population unit due to human activity) or represents normal shifts in distribution.

The only basin-wide survey undertaken is the 2018 ASI survey. A **first uncorrected** estimate of abundance for the whole area from the aerial survey is 26,659 animals (95% CI=15,129-46,975) with large numbers offshore as well as in the more expected slope areas and with greater numbers in the western Mediterranean (ACCOBAMS, 2021). Interpretation of the abundance estimate from a conservation perspective requires a better understanding of population structure and units to conserve. The implications of the summer distribution information obtained from ASI and possible shifts from previous years will also be an important component of this iteration of the CMP.

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

To date, no specific conservation measures have been taken for Risso’s Dolphins in the Mediterranean Sea. The Mediterranean Subpopulation was originally assessed as Data Deficient in 2010 (Gaspari and Natoli, 2012) and a new reassessment is ongoing toward another more definite status.

However, the species is listed in Appendix II of Convention on the Conservation of Migratory Species of Wild Animals (CMS), in Appendix II of the Bern Convention, in Appendix II of CITES, and in Annex 2 of the Protocol on Specially Protected Areas and the Biological Diversity in the Mediterranean of the Barcelona Convention.

2.2 NATIONAL LEGISLATION AND MANAGEMENT ARRANGEMENTS

A national Conservation Plan was proposed in 2011 for Risso’s Dolphins in Spanish waters. Furthermore, two large Marine Protected areas encompass some of the species natural range: the Pelagos Sanctuary for Mediterranean Marine Mammals, declared by the Governments of Italy, France and Monaco and recently established and listed among SPAMIs (Barcelona Convention SPA Protocol) and the Spanish Marine Protected Area “Corredor de Migración de Cetáceos del Mediterráneo”, declared in 2018 encompassing most of the Balearic Sea and proposed as SPAMI, where at least, all seismic surveys are prohibited.

In 2017, 26 areas within the Mediterranean region received the status of Important Marine Mammal Areas (IMMAs), defined as “discrete portions of habitat, important to marine mammal species, that have the potential to be delineated and managed for conservation” (IUCN Marine Mammal Protected Areas Task Force 2017). Among Mediterranean IMMAs, two areas have been designated for their recognised importance to Risso’s Dolphin: the Alborán Deep located in the

southwestern Mediterranean and the northwest Mediterranean Sea, Slope and Canyon System. In addition, the presence of Risso's Dolphins is reported, without meeting the IMMA criteria individually, in ten others areas as: the Strait of Gibraltar and Gulf of Cádiz, Balearic Islands Shelf and Slope, Shelf of the Gulf of Lion, western Ligurian Sea and Genoa Canyon, Campanian and Pontino Archipelagos, Waters of Ischia and Ventotene, Hellenic Trench, Gulf of Corinth and the Northern Sporades the Central Tyrrhenian Sea and the Waters Surrounding the Island of Malta. Finally, three Areas of Interest (AoI) for the species have been recognize by the Marine Mammal Protected Areas Task Force: Adriatic and Ionian Sea, Myrton Sea and Israeli Slope.

Existing best practices against or to deal with bycatch/entanglements (Hamer & Minton, 2020) in fishing gears could benefit Risso's Dolphin if they were implemented and supported. Considering noise pollution, several IGOs (including ACCOBAMS, CMS, IWC) have agreed that absence of scientific certainty should not prevent their member nations from undertaking management efforts to mitigate the potential impact of underwater noise emission. In addition, underwater noise is listed as Descriptor 11 in the Marine Strategy Framework Directive (2008/56/EC; MSFD). The Directive and its following implementation, states that, to attain the Good Environmental Status (GES), underwater noise should be at levels that do not adversely affect populations of marine animals" (Commission Decision 2017/848/EU). Implementing and supporting existing Directives, best practices or guidelines (such as ACCOBAMS, CMS, IUCN, UN) on noise issues will benefit Risso's Dolphin conservation status (Pavan et al., 2015). Considering harassment, as with bycatch and noise, implementing and supporting existing guidelines as the ACCOBAMS/PELAGOS code of conduct for approaching cetaceans and best practices such as adopting the High-Quality Whale-Watching label, will benefit Risso's Dolphin. Moreover, Whale-watching regulations should be incorporated into national legislation in the near future.

3 BIOLOGY AND STATUS OF MEDITERRANEAN RISSO's DOLPHIN

Summary and introduction

This paragraph presents what is known about the species in terms of population structure, distribution, habitat, abundance and basic biology and life history.
To summarize: although Risso's dolphins are distributed worldwide, little is known about their **population structure**, but Mediterranean Risso's Dolphin constitute a distinct subpopulation compare to other part of the world. **The range** of the species is from Gibraltar to the Levantine basin, including the Adriatic Sea and the Aegean Sea. The recent results from the ACCOBAMS Survey Initiative (aerial survey in summer 2018) and Fix Line Transect Network (surveys from ferries, 2008-2018) **seems to show a reduced range** of the species compare to previous knowledge, mostly concentrated in the westernmost part of the Mediterranean basin. **Habitat suitability models** in the north-western Mediterranean confirmed in the 2000s a strong preference with steep slope habitat and a narrow band of suitable habitat in proximity to the 200 m contour. The **most recent changes** highlight low encounters over the coastal and continental slope, while the presence seems to be stable in the most pelagic area. Studies based on photo-identification show mainly high **site fidelity** and also wide range **movements**, including from offshore locations to the continental slope habitat, suggesting that inter-regional movements are possible.

Several **local scale estimations of abundance** exist in different part of the Mediterranean, mostly in the western basin. At this local scale, long-terms studies in the Ligurian-Corso-Provençal provided a first indication of a decreasing trend for the species over 25 years from an average of 120–150 individuals in the period between 2000 and 2005, to an average of 70–100 individuals during 2010 and 2014. At the **sub regional scale**, in the whole north-western Mediterranean Sea (Gulf of Lion and Pelagos Sanctuary area) seasonal abundance estimates and maps of prediction of densities were realised for winter and summer, and for two periods (2011/2012 versus 2018/2019) from aerial surveys. The results show that there are almost no changes between seasons or years, with a population around 1,700 individuals in the same location. Aerial surveys carried out in the Adriatic Sea show that Risso's Dolphin were only observed in the southern part of the Adriatic Sea and along steep slope areas with an abundance estimates around 480 individuals. Additional preliminary results of the ASI for the western Mediterranean Sea estimated a total abundance of 16,651 individuals. Smaller abundances of about 5,116 individuals are estimated for the eastern Mediterranean, and 1,467 individuals for the Adriatic Sea area. **At the basin wide scale, the recent ASI abundance estimates** over the full Mediterranean basin and a small portion of Atlantic Ocean, reach 26,659 animals (95% CI=15,129-46,975). Another total predicted abundance for the Mediterranean area has been estimated incorporating most of the historical existing data from both aerial and vessel-based line transects surveys, carried out between 1999 and 2016, yielding a total predicted abundance of 43,889 individuals (CV=0.31).

However, comparison of results at this scale should be taken with cautious, as results present wide confidence intervals, mean predicted abundances are not corrected for some bias and CVs do not take into account all types of uncertainty. In addition, coverage of effort of surveys are spatially different, and platforms heterogeneous, so total predicted abundances should be interpreted with substantial caution. The lack of any previous abundance estimates for some particular areas highlighted as important for the species by ASI results, make it difficult to explore any potential changes in the occurrence and distribution of the Risso's dolphin.

Regarding **basic biology**, the lifespan of Risso's dolphin is estimated at 30-40 years, with attainment of sexual maturity around 11 years. The duration of gestation was estimated at about 14 months, with an interval between births of at least three years. Group of Risso's dolphins observed in the Mediterranean Sea reach an average group size between 12-37. Considering **social structure**, results show different pattern, and therefore group structure and cohesiveness of Risso's dolphins in the western Ligurian Sea is not conclusive at this time. Considering **feeding**, Risso's dolphin in the western Mediterranean Sea feed mostly on bathypelagic and meso-pelagic cephalopods found in the middle slope (600-800 m), and this association with a definite depth and slope gradient, suggest a feeding specialization, perhaps as a result of competition for food between different species of cetaceans.

Finally, the overall **assessment under the art. 17 of the Habitat Directive** for the period 2013-2018 in the marine Mediterranean region is unfavourable- inadequate (U1). The species overall conclusion for the region was unknown in 2007. In the **IUCN Red List** of threatened species, the Risso's dolphin is considered as 'data deficient' (DD) and the new assessment for the re-evaluation launched in 2021 is still in revision.

So, gaps of knowledge remain, and will be highlighted for each parameter exposed of this wide paragraph about biology and status of the species in the sections below.

3.1 POPULATION STRUCTURE

Although Risso's dolphins are distributed worldwide, little is known about their population structure. In particular, in the Mediterranean Sea there are very few published studies (Gaspari, 2004; Gaspari et al., 2007). Based on mitochondrial DNA analyses, Risso's dolphins in the Mediterranean Sea are genetically differentiated from those inhabiting the waters of Azores, United Kingdom, and from other ocean's subpopulations (Gaspari *et al.* 2007, Chen *et al.* 2018), with limited gene flow, so that Mediterranean Risso's Dolphin constitute a distinct subpopulation. 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). Further genetic analyses on 33 samples from the Mediterranean region (27 collected from the Ligurian Sea) suggested a possible subdivision, with apparent differentiation between samples collected from the western (Tyrrhenian Sea) and eastern (Adriatic Sea) coasts of Italy (Gaspari *et al.* 2007) although more data to confirm it are needed.

Information gaps/needs:

- 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 stable isotopes,
    - through enhancing the efficiency of strandings network to get samples
    - and to launch study on free-ranging biopsy in several parts of the Mediterranean Sea
- in order to help with population structure, acoustic repertoire should be studied. This can help in defining management units.

- improve knowledge about stressors/impacts that may affect individuals and communities.

3.2 DISTRIBUTION, MIGRATION AND MOVEMENTS

<u>Range</u>

In the Mediterranean basin, this species is found from Gibraltar to the Levantine basin, including the Adriatic Sea and the Aegean Sea (Figure 1).

Most of the studies are focused on the western Mediterranean Sea, since the nineteens, where sightings of Risso's dolphin have been reliably and consistently reported from the Alboran Sea (Canadas et al., 2002, 2005; Gannier, 2005), Ligurian Sea and the offshore waters of Gulf of Lion (Azzellino et al., 2008, 2012, 2016; Di Meglio et al., 1999; Gannier, 2005; Labach et al., 2015; Moulins et al., 2008; Bompar, 1997; Notarbartolo di Sciara et al., 1993), the Sardinian-Balearic Seas (Gomez de Segura et al. 2008, Arcangeli et al. 2018, Chicote et. al. 2015; P. Verborg pers. comm. 2020), Tyrrhenian Sea (Campana et al., 2015; Arcangeli et al., 2012).), the southern Adriatic Sea (Holcer et al. 2015, Fortuna et al. 2011) and the Ionian Sea, including the Gulf of Taranto (Dimatteo et al. 2011, Frantzis et al. 2003, Bearzi et al. 2011, Santoro et al. 2015, Carlucci et al. 2020) the Gulf of Catania and the Strait of Sicily (Vella et al. 1998, Tringali et al. 2008, Santoro et al. 2015, Monaco et al. 2016, Pellegrino et al. 2016; M. Tringali pers comm. 2020).

Sightings and strandings confirms the presence of Risso's Dolphin in Greek Aegean waters (Frantzis et al. 2003). Particularly, the species is more often encountered in the Myrtoon Sea, between Evvoia and the southern part of Northern Sporades and likely the area of Chalkidiki Peninsula (Foskolos et al. in press). Few Risso's Dolphins have been observed in mixed-species groups with Striped Dolphin and Short-beaked Common Dolphin in the deep waters of the semi

closed Gulf of Corinth (Frantzis and Herzing 2002, Azzolin et al. 2010, Bearzi et al. 2011, Bearzi et al. 2016). The presence of the species in confirmed in the Turkish Aegean waters, particularly in the northern Aegean (waters off Gökçeada Island) (A. Akkaya pers. comm. 2020) and in Turkish Levantin Sea waters (Öztürk et al. 2007, Öztürk et al. 2011, Dede et al. 2012, Boisseau et al 2010, Akkaya et al. 2020). Other two mixed-species groups with Striped Dolphin are recorded in the northern Aegean Sea (Tonay et al. 2015) and in the open waters off Finike, Levantine Sea (Dede et al. 2012). Both sightings and strandings are reported in the Cypriot waters and along the coast of Israel (Goffman et al. 2000, Hadar et al. 2008, Elad et al. 2011, Kerem et al. 2012, Ryan et al. 2014).

The species is rarely sighted off Tunisia (Ktari-Chakroun 1980, Chakroun 1994). The presence of the species in North African waters is mainly reported by occasional stranding events recorded along the northern coast of Tunisia, particularly in proximity of Bizerte and Tabarca (H. Attia El Hili pers. comm. 2020), and along the coast of Morocco (Gannier 2005, Masski and De Stéphanis 2018), Libya (Bearzi 2006), Lebanon (Gonzalvo 2009). Recently, the presence of the species has been reported offshore from Algerian, Syrian and Egyptian waters (ACCOBAMS, 2021). The apparent scarcity of Risso's Dolphin in the southern Mediterranean may be due to the paucity of observational effort.

Risso's Dolphin seem to be rare in the Strait of Gibraltar and adjacent waters (Beaubrun and Roussel 2000, De Stephanis et al. 2008) although some individuals have been observed transiting the area (Stekke et al. 2011).

Only a stranding record is reported in the Marmara Sea as part of the Turkish Straits system (Dede et al. 2013). Risso's Dolphin do not occur in the Black Sea (Reeves and Notarbartolo di Sciara 2006).

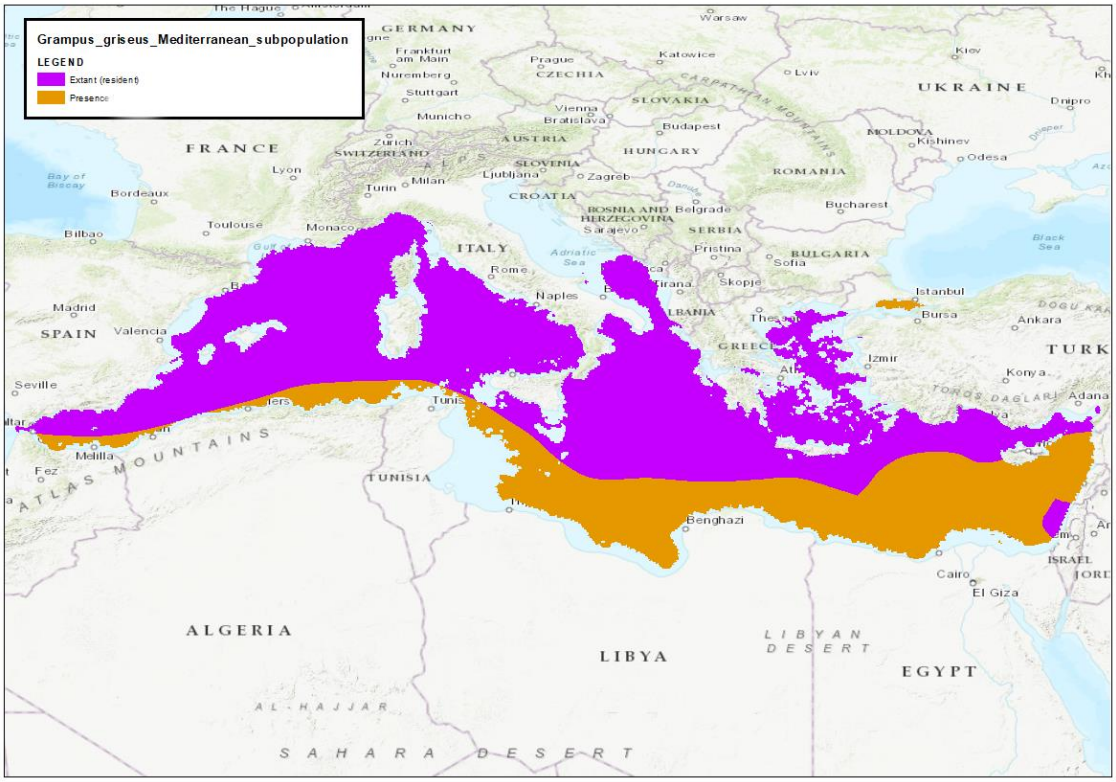

Figure 1 : Map of range of extent of the Risso's dolphin (from Lanfredi et al., 2021)

At the regional scale, the results of the first IMMA regional workshop provided additional information to better understand the spatial extent of the areas used by Risso's dolphin Mediterranean sub-population. Over 16 areas where the evidence under the IMMA criteria have been reported, the Alborán Deep and the North West Mediterranean Sea, Slope and Canyon System were classified as the most known areas (Figure 2).

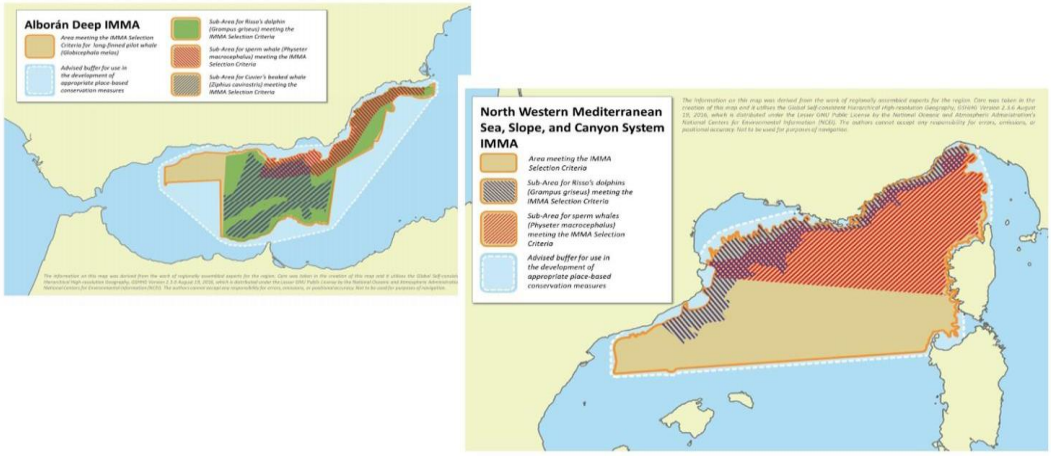

Figure 2: Alborán Deep IMMA and the North West Mediterranean Sea, Slope and Canyon System IMMA were classified as the main Important Marine Mammals Areas. Risso's dolphins' sub-areas highlighted in green (Alboran Sea) and in blue dashed lines (North Western Mediterranean). From https://www.marinemammalhabitat.org/imma-eatlas

In addition, the presence of Risso's dolphins is reported in ten others areas as: the Strait of Gibraltar and Gulf of Cádiz, Balearic Islands Shelf and Slope, Shelf of the Gulf of Lion, Western Ligurian Sea and Genoa Canyon, Campanian and Pontino Archipelagos, Waters of Ischia and Ventotene, Hellenic Trench, Gulf of Corinth and the Northern Sporades the Central Tyrrhenian Sea and the Waters Surrounding the Island of Malta. (Reported in Figure X in yellow and candidate IMMa in red in Figure 3)

Finally, Areas of Interest (AoI) for the species has been included in the following three Areas of Interest AoI: Adriatic and Ionian Sea, Myrton Sea and Israeli Slope.

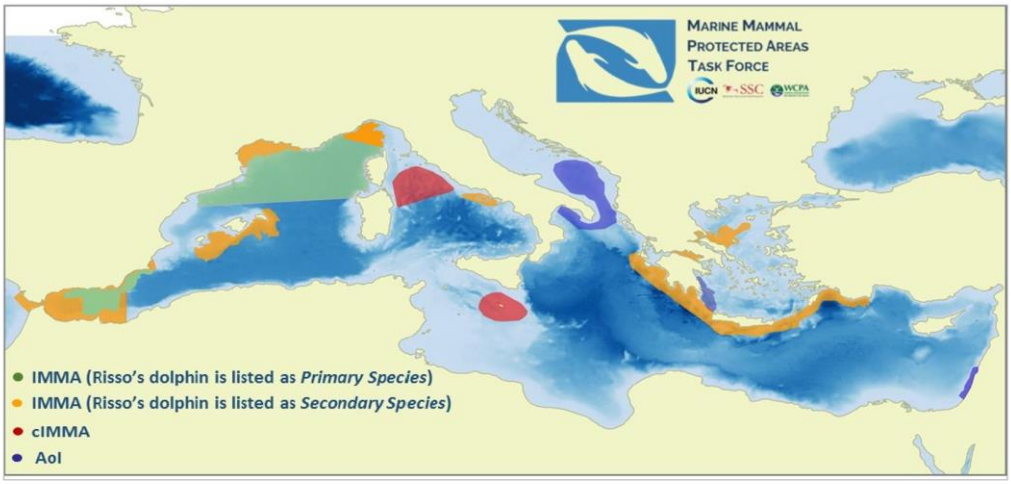

Figure 3: Map showing the areas identified as Important Marine Mammal Areas where Risso's dolphin is listed as Primary (in green) and Secondary (in orange) species.; candidate IMMA (in red) and Areas of Interest (in blue), where the species presence is reported, are also shown (Lanfredi et al., 2018).

The recent results from the ACCOBAMS Survey Initiative (summer 2018, Figure 4) seems to show a reduced range mostly concentrated in the westernmost part of the Mediterranean basin.

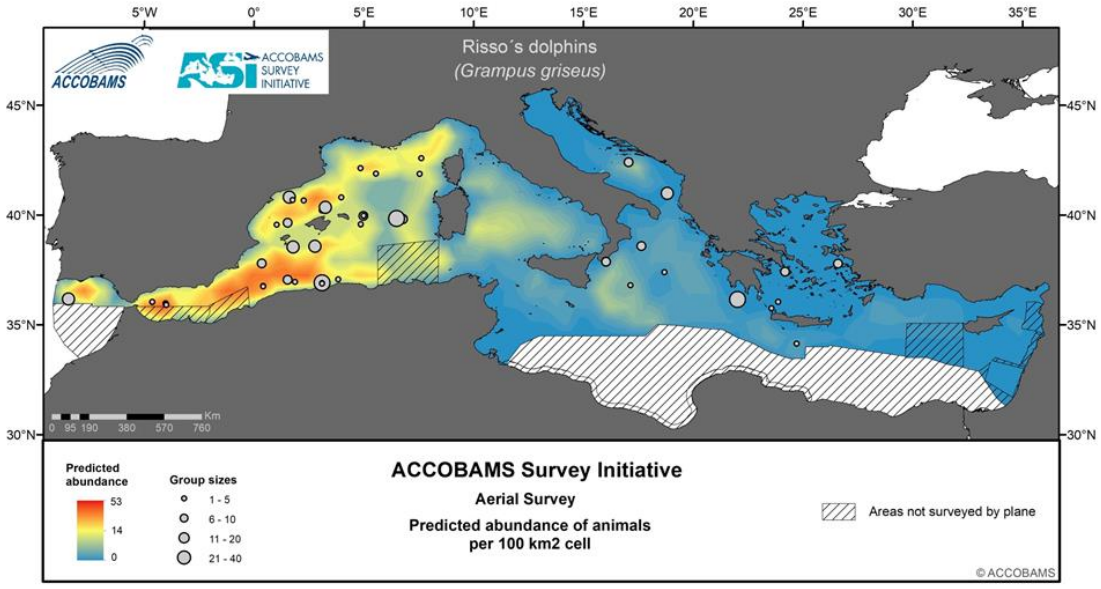

Figure 4: Predicted abundance of Risso's dolphin based on ASI dataset from summer 2018 (ACCOBAMS, 2021).

Habitat:

In many places, Risso's dolphins were found over the continental slope and over sub-marine canyons, mainly at water depths of approximately 500-1500 m as in the north-western Mediterranean Sea or in the Alboran Sea (Azzellino *et al.* 2008, 2012, 2016; Mangion and Gannier 2002; Gómez de Segura *et al.* 2008; Moulins *et al.* 2008; Notarbartolo di Sciara *et al.* 1993; Gannier 2005, Gaspari 2004; David 2000, Chicote *et al*. 2015; Cañadas *et al.* 2002, 2005). Sightings were also reported far offshore and in deeper pelagic waters (Beaubrun et al., 1997; Airoldi et al., 2000; Laran et al., 2002; de Segura et al., 2008), suggesting that the species also use offshore areas far from continental slope.

Habitat suitability models in the northwestern Mediterranean confirmed in the 2000s a strong preference with steep slope habitat (Praca and Gannier 2007, Azzellino *et al.* 2008) and a narrow band of suitable habitat in proximity to the 200 m contour (Praca and Gannier 2007). The most recent studies (Azzelino et al., 2016; Lanfredi et al., 2018, Laran et al., 2021) highlighted changes in distribution and habitat in the northwestern Mediterranean Sea, with low encounters over the coastal and continental slope in recent years compared to what was known on the species before, while the presence seemed to be stable in the most pelagic area. Moreover, at a large scale, the model prediction made by Mannocci et al. (2018) based on almost all historical data (1998-2015) shows highest abundance over the Mediterranean basin, mostly in slope areas (Figure 5; Mannocci et al. 2018), while a model based on more recent data (2012-2018) predicted highest suitable habitat along the slope habitat but also on large offshore areas, especially in the western Balearic sector (Figure 6; Arcangeli et al., 2019). This last result is in coherence with the predicted abundance reported by the 2018 ASI results (ACCOBAMS, 2021) with large numbers of sightings observed offshore as well as in the more expected slope areas, and with greater numbers in the Western Mediterranean (fig…).

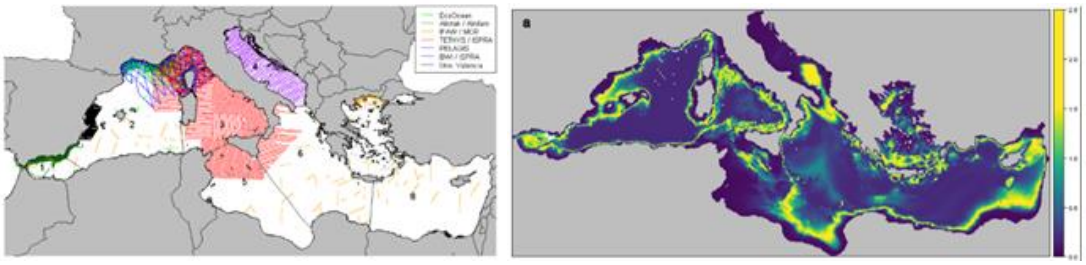

Figure 5: Effort (left) and mean annual predicted densities expressed as individuals per 25 km² (right) over the period 1998-2015, from Mannocci et al., 2018.

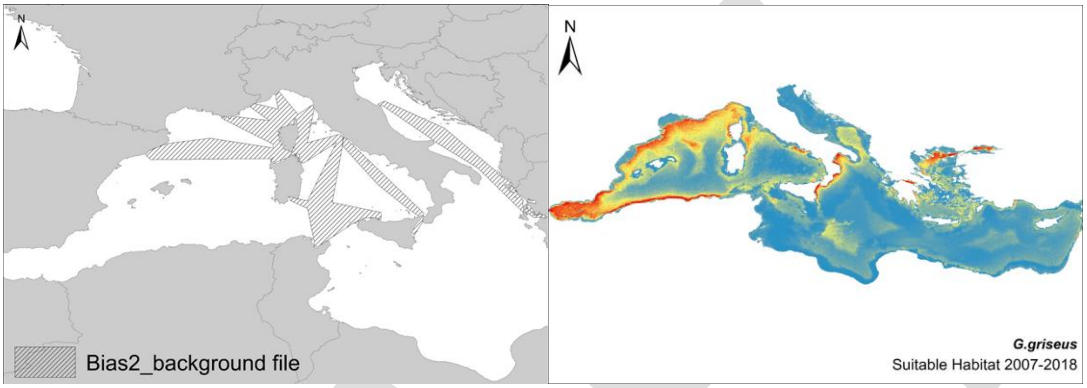

Figure 6: Effort (left) and predicted suitable habitat over the period 2007-2018 (right), from Arcangeli et al., 2019.

Current data do not allow assessing the likelihood of different hypotheses with different conservation consequences. One hypothesis is that there are different populations, one more specialized in the steep slope environment that is declining, versus another associated to the deep basin. Another hypothesis is that apparent declines resulted from animals moving from the steep slope habitat into the deep basin habitat. A contraction or shift in the species range can be hypothesized. The analysis of data collected at a sub-regional level (western Mediterranean Sea) along fixed trans-border transects, allowed modelling of the area of occupancy for the species over two different time periods (2007-2012 and 2013-2018): a reduction of 50% in the area of occupancy (AOO) was estimated at a Mediterranean basin level, using spatially predicted sites estimated on the basis of habitat models (IUCN 2019). If confirmed by additional evidence, this estimated shift in species range is very concerning, however until there is a better understanding of population structure, we take the precautionary approach that the observed declines are real and may signal the loss of populations that specialize in slope habitats.

Movement:

Studies based on photo-identification show high site fidelity up to 0.78 in West Provence for a part of the population called “resident” (short movements, 63% of the recapture are within 50 km), sometimes recaptured up to 18 years, and also wide range movements for “transients” animals up to 300 km (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; Delroq and Gannier, 2016; Remonato *et al*., 2018). These long-distance movements, including from offshore locations to the continental slope habitat, suggest that inter-regional movements are possible (Delrocq and Gannier, 2016).

Information gaps/needs:

- carry out comparison of all existing photo-id catalogues from different parts of the Mediterranean Sea in order to obtain information on movements, residency, connectivity, etc.;
- carry out analyses with all existing data with effort and sightings to answer questions about decline and/or shifts of habitat;
- carry out analysis of trends in strandings vs trends in sightings for different regions;
- carry out comparison of changes in the "local" ecosystem compared to changes in the distribution of animals in well-known areas (such as the Liguro-provençale sea);
- support studies aimed to compare the observed vs the predicted suitable habitat, in order to highlight the actual range of distribution and the proportion of suitable habitat that is actually used by the species
- performing isotope analysis to detect shift in diet during recent past decades / recent years (i.e., sampling museum specimens)
- improve the effort in collecting photo-ID data (particularly the Adriatic Sea, Aegean and Levantine area);
- performing monitoring programmes at both regional and subregional scale to highlight short and long-terms potential changes/trends;
- launch targeted studies to lesser-known areas appearing as important for the Risso's dolphin (e.g., Balearic sector from Spain to Algeria) and use sightings to validate the results of spatial modelisation;
- perform standardised and regular acoustic sampling, coupled with visual sampling, if possible, to support a better understanding of the distribution of the species.

3.3 BASIC BIOLOGY

3.3.1 FEEDING

Risso's dolphin in the western Mediterranean Sea feed mostly on bathypelagic and meso-pelagic cephalopods found in the middle slope (600-800 m). Species include the pelagic octopod *Argonauta argo* and various squids belonging to the families of *Ommastrephidae*, *Histioteuthidae*, *Onychoteuthidae* and *Crachiidae* (Blanco *et al*., 2006 in Notarbartolo di Sciara & Birkun, 2010; Koutouzi *et al*., 2018; Pedà et al. 2015; Ozturk et al., 2007; Luna *et al.* submitted, Bello and Bentivegna 1996, Podesta and Meotti 1991, Wurtz *et al.* 1992). The species is strictly teutophageous but feed on a wide variety of squid's species.

They seem to feed predominantly during the night even if they can also reach preys sometimes during the day (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:

- Studies using suction-cupped Digital Acoustic Recording Tag (non-invasive tool) would be particularly useful to investigate acoustic /feeding and diving behaviour;
- performing isotope analysis to detect shift in habitat / diet during recent past decades (i.e., sampling museum specimens)
- need new results on the current diet in order to verify if there is a shift in the diet compared to previous knowledge, through stomach content (need to standardise the protocol for Risso's dolphin and process to act on stranding animals)

3.3.2 LIFE HISTORY

The lifespan is estimated at 30-40 years (Kruse et al 1999, Hartman et al 2016). Animals reach sexual maturity when they reach between 2.6-2.8 m in length in both sexes. A demographic model estimates the age of attainment sexual maturity around 11 years (Kruse et al., 1999; Perrin & Reilly, 1984).

Group of Risso's dolphins observed in the Mediterranean Sea can reach a size of 130 individuals (review in Bearzi et al, 2010) with average group size between 12-37.

The duration of gestation was estimated at about 14 months by Raduàn et al. (2007), which in practice suggests an interval between births of at least three years. This is in coherence with photo-ID recapture of given mother which was identified and recaptured with different calves on four occasions between 1989 and 2001, suggesting an interval of 3-4 years between two successive parturitions (Delrocq and Gannier, 2016).

Considering social structure, from analysis and review of Azzelino et al., 2016, based on photo-identification, only a few small groups showed high individual fidelity. Outside of these potentially stable small groups, the structure of Risso's dolphin society appeared to be labile. The results of Gaspari (2004) suggest a relatively fluid model of kin structure with a trend for female philopatry, and male dispersal.

However, Polo et al., (2009) gathered two catalogues of French and Italian organisms, and among 801 records, only 113 individuals identified on both sides and which have been sighted more than once have been used for computing the Hierarchical clustering analysis (HWI). The result shows that the population can be divided into 8 main groups composed by individuals in preferred association (HWI at 0.075), with 3 of them are the main groups and represent the 65% of the entire population, the 5 smaller represent the 35% of population.

It seems that data on group structure and cohesiveness of Risso's dolphins in the western Ligurian Sea is not conclusive at this time.

Information gaps/needs:

- Perform analysis on existing data to understand or confirm population parameters (intercalving interval, age at maturation, calf's survival) and social structure;
- launch studies in order to get data to improve our understanding of biological/population parameters

3.4 ABUNDANCE AND TRENDS

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

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

Local scale abundance estimates

Long-term studies in the Ligurian-Corso-Provençal basin (north-western Mediterranean Sea) provided abundance estimates, based on mark recapture methods, for the period from 1998 to 2012 in an area of about 25,000 km^2 that includes both coastal and offshore waters. This area is located in western portion of the Pelagos Sanctuary. All studies give abundance estimates in the same order of magnitude. An open population assumption estimates an average abundance of 110 individuals (95% CI: 29–192), and a peak of 177 individuals (95% CI: 52–271) in 2005 (Azzellino *et al.* 2016). A French-Italian study conducted in the Pelagos Sanctuary area, considering a 12 years' period (1998 -2009), determined an average of 130 individuals (95% CI = 90 – 230) (Airoldi *et al.* 2015). Finally, estimates of abundance from a previous French-Italian study reported 123 individuals (95% CI: 86-189) in larger area that includes the Ligurian Sea and Gulf of Lion area (Polo *et al.* 2006).

Those local scale long-terms studies in the Ligurian-Corso-Provençal provided a first indication of a decreasing trend for the species. An observed change in Risso's Dolphin relative abundance detected over 25 years of research (from 1990 to 2014 basin, suggests that the population is declining in the region (Azzellino et al. 2016). Photographic mark–recapture methods detected a marked decline in population size from an average of 120–150 individuals in the period between 2000 and 2005, to an average of 70–100 individuals during 2010 and 2014. Moreover, the Risso's Dolphin encounter rate in the area has dramatically decreased in the period 2014-2019, despite continual research effort (S. Airoldi pers. comm. 2020; M. Rosso pers. comm. 2020). The species stranding frequency reflects the time pattern of the sighting frequencies and no Risso's Dolphin stranding has been reported in the area since 2008. This dramatic change has been detected after the species has been regularly observed, associated to the slope area, for 24 consecutive years. Indications of species decline in the Pelagos Sanctuary area has also been detected by Airoldi and colleagues (2015) by merging French and Italian data. An average population size of approximately 130 individuals (95% CI = 90 – 230) was calculated, showing a peak in the period 2000-2005 followed by a subsequent decreasing trend, with half of the average values (60-70 individuals) in 2012-2013.

The analysis of strandings of this species along the Italian coasts suggests a decline in the number of stranded animals during the study period (1987-2017), with numbers in the last decade greatly reduced in comparison to the previous years, and with strandings mainly concentrated in the south of Italy and along the Sardinian coasts (Podestà and Pavan 2018). On the other hand, analysis of strandings data of Risso's Dolphin collected along the French coastline since 1972 show a stable trend between 16 and 18 standings per year (F. Dhermain, pers.comm. 2020).

In the southeast of Spain (waters off Murcia, south-western Mediterranean Sea), population size from photographic mark recapture estimated a population of approximately 59 individuals (95%

CI: 32–159) in 2004, 217 (95% CI: 144-368) in 2011 and 148 (95% CI: 89-294) in 2015. However, estimates are based on small sample size and low numbers of recaptures (P. Verborg pers. comm. 2020).

In the Alboran Sea (most south-western portion of the Mediterranean Sea), modelling data from ship-based surveys, in an area of about 45,000 km^2 located the northern third of the Alboran Sea with an extension to the Alboran Island, estimated a population size of 864 individuals (CV=15.65) between 2009-2012 (INDEMARES 2013).

For Spanish Mediterranean waters (western Mediterranean Sea), results from aerial surveys conducted between 2001-2003 in an area of approximately 32,270 km^2 with depths ranging from 10 to 2,800 m, produced an estimate of 493 individuals (95% CI= 162–1,498). This estimate is not corrected for visibility bias and therefore is believed to have underestimated the true abundance in the sampled area (Gómez de Segura *et al.* 2006).

Sub regional scale abundance estimates

Seasonal abundance estimates are available for an area of about 181,400 km^2, located in the north-western Mediterranean Sea (Gulf of Lion and Pelagos Sanctuary area) from aerial surveys conducted in winter 2011 and summer 2012, and then again in summer 2018 and winter 2019. A comparison of estimates of abundance for those four samples (*Table 1*) and also maps of prediction of densities (*Figure 7*) show that there are almost no changes between seasons nor years (Laran *et al.* 2016; Laran et al., 2021). Prediction of densities are higher in the western offshore part of the study area at the north-east of the Balearic Islands and around Corsica Island.

Table 1: density and abundance of Risso's dolphin over the north-western Mediterranean Sea for four samples (aerial surveys), from Laran et al., 2021.

Seasons	Density (ind.km²)	SE	CV %	Number of animals	Low CI (80%)	High CI (80%)
Winter 2011-12	0.0099	0.0033	34%	1 688	933	2 329
Summer 2012	0.0101	0.0033	33%	1 718	916	2 351
Summer 2018	0.0104	0.0034	33%	1 769	1 063	2 557
Winter 2019	0.0095	0.0031	33%	1 620	882	2 233

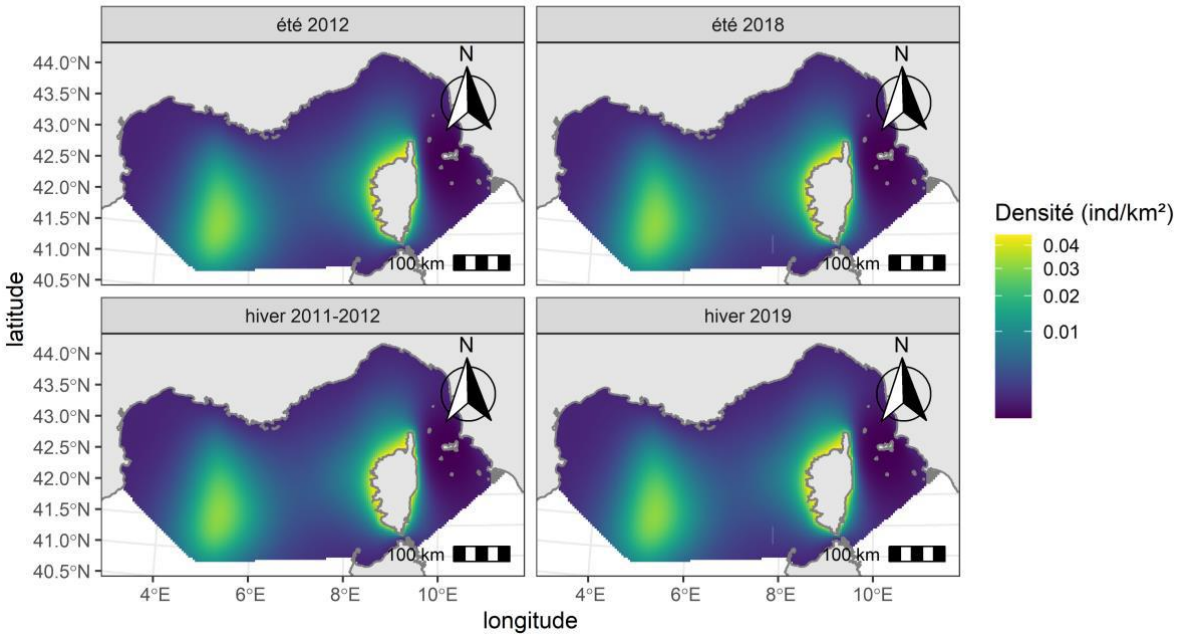

Figure 7 : Densities of Risso's dolphin, stacked predictions, from Laran et al., 2021 ("été" means summer and "hiver" means winter).

Aerial surveys carried out in the Adriatic Sea (central Mediterranean Sea) show that Risso's Dolphin were only observed in the southern part of the Adriatic Sea and along steep slope areas (Fortuna *et al*. 2011). A preliminary uncorrected abundance estimates (so, probably underestimated) suggest a population size in the area of about 510 individuals (CV: 78.1%; 95% CI: 124-2,089; Fortuna *et al.* 2011, Holcer *et al.* 2015). And recently, in the same area, the model-based analysis from the ASI data estimated an abundance of 448 individuals (CV=0.726; 95% CI=211-1611) (ACCOBAMS, 2021).

Additional preliminary results for the western Mediterranean Sea in an area of about 500,000 Km^2, of design-based analysis of data collected during the ASI aerial surveys, estimated a total abundance of 16,651 individuals (CV = 0.34; 95% CI: 8,545-32,448). Smaller abundances of about 5,116 individuals, are estimated for the eastern Mediterranean, 632.000 Km^2 (CV: 0.51; 95% CI: 1,989-13,163) and 1,467 individuals for the Adriatic Sea area, 135,000 km^2 (CV: 0.70; 95% CI: 419-5,130). However, these estimates are based on a very small sample size (ACCOBAMS, 2021).

Basin wide abundance estimates

A total predicted abundance for the Mediterranean area has been estimated incorporating most of the historical existing data from both aerial and vessel-based line transects surveys, carried out between 1999 and 2016 covering a total of 166,333 km of research effort, yielding a total predicted abundance of 43,889 individuals (CV=0.31) (Mannocci *et al.* 2018). However, mean predicted abundances are not corrected for perception bias, and CVs only incorporate spatial uncertainty. In addition, surveys were heterogeneous throughout the Mediterranean Sea where eastern and southern waters were sparsely and poorly surveyed compared to north-western waters so total predicted abundances should be interpreted with substantial caution.

ACCOBAMS Survey Initiative (ASI) design-based analysis estimated, with a total of 58 sightings, a total abundance for this species of 26,659 animals (95% CI=15,129-46,975) in an area of 2,012,329 km2 (ACCOBAMS, 2021). This area contains the full Mediterranean basin and a small portion, of about 33,779 km2, of Atlantic Ocean that includes the Gulf of Cadiz and the southern Portuguese coastal waters. In this Atlantic portion 1,358 individuals of Risso's Dolphin are estimated (ACCOBAMS, 2021). As for the previous basin wide estimates, ASI preliminary results present wide confidence intervals, therefore they should be taken with caution.

Most of the sightings collected during the ASI survey (47%) occurred in the south-western Mediterranean sub-region, which shows the highest density (0.056 animals/km2) with predicted density decreasing in an eastward direction (ACCOBAMS, 2021). Highest abundance and density values have been obtained for the Alborán Sea, the Moroccan and Algerian waters and the Balearic Islands. However, the lack of any previous abundance estimates for these areas, in particular the north-western Africa coast, make it difficult to explore any potential changes in the occurrence and distribution, and therefore abundance of this species in the area (ACCOBAMS, 2021).

To conclude, campaigns exist, results of habitat and abundance too, but comparison over time is limited as geographical areas where not completely overlapping between studies as already stated, and also different types of platforms were used. Indeed, sailing vessels, ferries or airplanes do not spend the same proportion of time over the different types of habitats (coastal, slope, offshore) and this difference in sampling scheme may also influence the results. Therefore, more analysis is needed in order to be able to conclude about changes in habitat and abundance for the Risso's dolphin at the scale of the sub-region or the region.

Information gaps/needs:

- Analyses should be performed on existing datasets (e.g., mark-recapture data, boat based and aerial surveys) gathered from different organizations to improve abundance estimates;

- analysis on trends in abundance should be performed in different regions where long-term monitoring exists;

- continuation of surveys which provide data for abundance estimates and trends at both sub-regional and regional scales should be encouraged;

- increase the survey effort in lesser-known areas such as Balearic sector (from Spain to Algeria) and the central (Ionian, Adriatic) and eastern Mediterranean Sea areas (Levantine, Aegean) should be supported;

- long term monitoring must be put in place in areas that are supposed to be important for the species.

- improve acoustic detection (PAM) capabilities in sea surveys and in fixed monitoring platforms

3.5 ATTRIBUTES OF THE POPULATION(S) TO BE MONITORED

In line with the main legislative framework (e.g., MSFD, HD, EcAp...) the attribute to be monitored intends to give indication to assess the status of the population in the Mediterranean basin to be linked to the anthropogenic pressures that can adversely affect its long-term viability.

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

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

(2) species distributional range and pattern over time (high);

(3) Survival rates (at different age and sex classes) (high);

(4) Baseline data on other demographic /morphologic parameters (e.g., body size, sex ratio, fecundity) and changes in that rate over years (medium)

4 SUMMARY OF ACTUAL AND POTENTIAL ANTHROPOGENIC THREATS

4.1 ACTUAL AND POTENTIAL ANTHROPOGENIC THREATS

Mediterranean Risso's dolphins face a number of both direct and indirect threats throughout their range (Table 2). 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 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 or acute noise (as severe blasts of extremely loud noise, e.g., sonar, airgun, explosion)

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

- anthropogenic noise (continuous or chronic) from different sources (e.g., maritime traffic, coastal activities, seismic survey even at great distance…);
- pollution including macro-, micro- and nano- plastic ingestion (both by Risso's dolphin and/or their prey);
- Entanglement in marine debris (e.g., prolonged entanglement resulting in death from infection);
- Harassment (e.g., intrusive whale watching and research)
- Physical disturbance by the passage of numerous vessels (maritime traffic)
- Cumulative and synergistic effects of multiple stressors

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

Table 2: 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)					
Bycatch	Longline fisheries / driftnets	Strong, based on observer programs and occurrence of stranded animals	High in some areas: mortality and serious injury (resulting in a decrease of fitness)	High	Implement existing resolutions, guidelines and best practices
Acoustic disturbance (impulsive or acute)	Production of loud impulsive noise by industrial activities including those related to oil and gas extraction and military activities	Poor	Temporary or even permanent threshold shift, sound masking, temporary or permanent displacement from breeding and/ or feeding areas	High	Improve PAM and acoustic research Adopt a precautionary approach: Reducing overall noise levels ("acoustic footprint") in the marine environment. Distancing noise events from biologically important areas or concentrations of cetaceans (IMMA, CCH) Implement existing resolutions, guidelines and best practices
Other threats					
Noise (continuous or chronic, cumulative ?)	continuous noise from general ship traffic incl. whale watching and research activities, and also coastal activities	Poor	temporary or permanent displacement from breeding or feeding areas	Medium	Improve PAM monitoring and acoustic research
Prey depletion	depletion of food resources caused directly or indirectly by fishing	Poor	Could be a cause of the population decrease in the western Ligurian Sea	Medium	Add later
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 physiological effects, by micro- and nano-plastic	Medium	Add later
Entanglement in marine debris	Part of fishing gears, macro-plastic and other massive marine litter debris	unknown	i) short-term and non-lethal: decrease in fitness. ii) prolonged: a) death from infection, loss of appendages or drowning due to constricted body part, b) starvation due to impaired foraging ability, and exhaustion due to hydrodynamic drag.	Medium	Add later
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 Mediterranean 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
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 (displacement)	Medium	Implement existing resolutions, guidelines and best practices

Physical disturbance	Maritime traffic, boating, invasive research	poor	temporary or permanent displacement from breeding or feeding areas, stress, avoidance, interruption of life cycle activities, detrimental effects at the population level	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, both basins, 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). Another study over Turkish coasts (Levantine basin) records two Risso's dolphins entangled in driftnet targeting swordfish too (Ozturk *et al*., 2007), whereas Zucca (2006) witnessed the rescue of a Risso's dolphin stranded alive with a hook in its jaw in the Adriatic Sea. Moreover, stranded animals show evidence of bycatch in fishing gear in the western and eastern basin (Podestà & Pavan in Lanfredi et al., 2019; Jourdan et al., 2017; Dede *et al*., 2013). 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 be trapped by some longline gear and that Risso's dolphins in the Ligurian Sea could have been impacted by the fishery (Azzelino *et al*., 2016), even if the impact on the local or global population are not assessed.

Information gaps/needs:

- Investigate and assess the incidental mortality of Risso's dolphin linked to fisheries, through direct observation and studies of strandings (high).
- ensure the strandings networks are able to recognize and diagnose the signs of fishery interactions (high).
- Collect information about the type and characteristics of fishing gears involved in Risso's dolphin injuries/death.
- Identify the main factors determining these bycatches, particularly seasonality, geographic location and also including biological factors
- Risk maps of bycatch exposure, when fisheries distribution overlaps the distribution of Risso's dolphin (e.g., longliners and pelagic drift nets)

4.1.2 ANTHROPOGENIC NOISE

<u>Impulsive noise:</u>

It is well known that underwater noise can potentially cause an impact on cetaceans. Several studies conducted in different parts of the world reported that, particularly impulsive noise sources (i.e., seismic survey, military sonar, pile driving), might cause adverse effects on cetaceans (Nowacek *et al.,* 2007, Monaco *et al.* 2016). Accordingly, the rapid increase of the impulsive noise-generating activities in the Mediterranean Sea (i.e., seismic activities) are a cause for concern for Risso's dolphins and other cetaceans (Nowacek *et al.,* 2007). Studies on hearing sensitivity have been made for Risso's dolphin (Nachtigall et al. 2005, Mooney et al. 2006, 2015). However, most of the knowledge about the species' hearing thresholds are inferred from studies done in different areas than the Mediterranean Sea. Potential effects of noise on Risso's dolphins can vary, ranging from communication masking, reduced environment sensing, stress, behavioural disturbance, to hearing loss (i.e., temporary threshold shift (TTS) permanent threshold shift (PTS)), direct physical damage (i.e., the enhanced gas bubbles growth and traumatic brain injury) to death (Richardson *et al*. 1995, Nowacek et al. 2007, Southall 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). Chronic exposure to sound emission can produce effect at population level excluding them from their preferred/critical habitat (for both short to long time periods) influencing feeding and reproduction.
Implementation of MSFD (D11) requires the development of a noise registry to map the occurrence of impulsive sources, and ACCOBAMS recommend to develop a Mediterranean wide public access noise registry and mapping (Maglio et al. 2015-2016; Pavan et al. 2015; Drira 2018).

Continuous noise:
A great expansion of maritime traffic has been observed in the last decades in the Mediterranean Sea (Dobler, 2002 in Bearzi *et al.,* 2010, Maglio et al., 2015, 2016), but the possibility that this source of continuous noise might cause a direct effect on the species has not been investigated yet through chronic exposition. Further research is required and the adoption of precautionary management approach is suggested.

Information gaps/needs:
- better understanding the hearing abilities (audiogram) of the Risso's dolphin and the level of impact of both impulsive and continuous noise,
- monitoring eventual change in vocalization frequencies
- get information on noise through maps of noise (both impulsive and continuous)
- Acoustic injuries should be identified by stranding networks.
- Identify "hot spots" and "cold spots" of Risso's dolphin to avoid exposing concentrations of cetaceans spatially or temporally,
- The intersection of noise maps with Grampus distribution could help in evidencing critical overlaps
- define effects of noise at individual and population level

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 fish catches in the Gulf of Lion (Azzelino et al., 2016). Few of the main cephalopod prey species of Risso's dolphins are commercially important. Nevertheless, the main threat is that these decreasing trends could directly lead to reductions in prey populations of Risso's dolphins or otherwise indirectly disrupt food webs in habitat where Risso's dolphins forage (Bearzi et al., 2010). So, overfishing, impact of other stressors (contaminants, noise…) and also global warming and acidification of the Mediterranean Sea can lead to squid's prey of Risso's dolphin depletion.

Information gaps/needs:
- Link the diet of Risso's dolphin to the assessment of the squid's status if possible

4.1.4 MACRO-, MICRO- AND NANO- PLASTIC INGESTION

Only very few information exists on ingestion of marine litter by Risso's dolphin. In greek sea, stomach content of 5 Risso's dolphin have been examined and one individual had plastic in his stomach, and even died because of gastric blockage (Alexiadou et al., 2019).
As other teutophageous species (sperm whale, Cuvier's beaked whales) that have been highlighted to ingest plastics even to a lethal level (de Stephanis et al., 2013; Gomerčić

et al., 2006; Panti et al., 2019; Alexiadiou et al., 2019), the Risso's dolphin is likely touched by this phenomenon. In the Ligurian Sea, Risso's Dolphins have been observed interacting with macro plastic litter (Di-Méglio pers. comm. 1995; M. Rosso pers. comm. 2020).

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),
- The intersection of relevant types of marine litter maps with Grampus distribution could help in evidencing critical overlaps, and if possible, on different relevant time frame (weekly, seasonal, annual)

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. Limited research has been undertaken on containment burdens in Risso's dolphins however they are likely to be affected through exposure to bioaccumulated contaminants such as cadmium, copper and zinc found in their prey. Studies that have been undertaken show the Mediterranean sub-population to be perhaps especially affected.

Heavy metals

Mercury loads in local adult animals of Risso's dolphin found stranded in Israelian waters and from the Adriatic Sea appear unusually high by Mediterranean standards (Shoham-Frider et al., 2014; Storelli, M. M., et al., 1999; Zucca, P., et al., 2005), ranging from 478.32 mg/kg up to 1326 mg/kg. The tolerance limit for mercury in the mammalian liver seems to be in the range of 100–400 mg/kg w/w, over which hepatic damage occurs (Wageman and Muir, 1984). The mercury levels found in the liver of Risso's dolphins may have contributed to the occurrence of the liver damage observed for animals and may have compromised their immune response, making them more vulnerable to parasitic infections to which they may have previously been resistant (Zucca, P., et al., 2005).

Organochlorine toxicants

Among the chemical pollutants, POPs are the main group of concern due to their highly toxic properties, persistence, bioaccumulation, and long-range transport potential (Marsili et al 2019). Currently, a total of 23 chemicals or groups of halogenated compounds, comprising pesticides, industrial chemicals, and unintentional products are included on the list of POPs regulated under the Stockholm Convention (UNEP, 2009). Given that POPs are bioaccumulative and magnify through food chains, mobile—though resident—top predators, such as dolphins, have been proposed as potential indicator species. Moreover, they feed at high trophic levels, have a small body size—and thus, a high metabolic rate—and their body contains a large amount of fat that is capable of retaining lipophilic compounds. These three biologic traits synergistically place cetaceans in an ecologic situation where they are more likely to be adversely affected by POPs (Marsili et al 2019). Furthermore, their lower capacity for degrading these chemicals means these compounds accumulate more readily than in other mammals or birds with comparable biologic traits; as a result, the toxic effects of the compounds are exacerbated.

Most of the available literature addresses legacy organochlorine contaminants (OCs), including polychlorinated biphenyls (PCBs), dichlorodiphenyltrichloroethanes (DDTs), hexachlorocyclohexanes (HCHs), and hexachlorobenzene (HCB), most of which were banned in the late 1970s in many countries. The more recent polybrominated diphenyl ethers (PBDEs) were highly used in a wide variety of industrial applications until they started being regulated under the Stockholm Convention (UNEP, 2009). To date, the group of compounds imposing more emerging concern are the per- and polyfluoroalkylated substances (PFASs). Some of these compounds (i.e., PFOS and its salts) are already listed under Annex B of restricted substances under the UNEP Stockholm Convention on POPs, and others are candidate substances (i.e., PFOA, its salts, and related compounds). The main families of chlorinated, brominated, and fluorinated POPs are reviewed for each cetacean species within the Mediterranean basin.

Very limited data are reported in the ACCOBAMS area on the target species of this report.

Information gaps:

- monitor levels of contaminants at a local/subpopulation scale in a standard way
- Monitoring stranding and free ranging animals to increase the sparse database of contaminant levels and toxicological impact on this species through standardised sampling and analysis
-

4.1.6 HARASSMENT

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

As Risso's dolphin are quiet animals, they may be the focus of approaching vessels, including swim-with activity. Invasive approaches of boats (e.g., from whale watching activities, swim-with program, curious boating or even non-careful research activities) can disturb Risso's dolphin through direct physical presence and intrusive behaviour towards the animals. This can interrupt important behaviour including feeding and reproduction (Miragliuolo *et al*., 2004), even can stress and kill weak or youngs animals like for the bottlenose dolphin (Scarpaci *et al*., 2010; Bejer et al., 2006; Arcangeli and Crosti, 2009; Parson, 2012; New et al., 2015; Papale *et al*., 2012). Long-term intrusive presence can exclude animals from preferred habitat.

Unregulated whale watching activities, which may grow very fast in specific areas, may have detrimental effects at the (sub)population levels, which needs to be mitigated and prevented. For example, Visser *et al*. 2011 reported that changes in Risso's dolphin's behaviour have been observed in Azores (i.e., reduced resting and socializing rates) This might have negative impacts on the build-up of energy reserves and on reproductive success. We suggest the adoption of precautionary management measures to regulate the timing and intensity of whale watching activities.

Information gaps:

- better evaluate the effect of approaching/harassing whale-watching vessels and pleasure boats on Risso's dolphin behaviour (high);

- Maps of risks of exposure to potential harassment from commercial whale-watching activities

4.1.7 PHYSICAL DISTURBANCE

Maritime traffic is one of the major threats for the marine environment, and a disturbance towards marine fauna (e.g., Halpern et al., 2008; Coll et al., 2012). Shipping can have direct and indirect effect on species, causing reactions at an individual level (e.g., short-term changes in behaviour) or at a population level (e-g-

long-term changes in distribution) (David, 2002; Bejer *et al.,* 2006; Pennino *et al*., 2016; Pirotta *et al.,* 2015). It is not easy to separate physical disturbance (i.e., related directly to presence) from factors associated with presence (e.g., high levels of noise), but on the other hand, even sailing vessels can lead to physical disturbance even if they are more silent than motor boat. At date, very few information is available specifically on the effect of maritime traffic on Risso's dolphin in the Mediterranean basin. Results of Campana *et al.* (2015) showed that in high sea areas during summer time all cetacean species, but bottlenose dolphin, were observed in location with lower vessel abundance: indeed, the nautical traffic in the Risso's sighting location was significantly lower, by more than 40%, compared to random location were no sightings occurred suggesting a disturbance by traffic that induce the animals to increase dive duration, or displaced in less disturbed areas.

The maritime traffic is also made partly by pleasure boating, which may use more coastal areas than commercial traffic. So, in many coastal areas where the habitat of Risso's dolphin is near the coast (ex.: French Ligurian-Corsica area), those dolphins maybe at risk (physical disturbance, noise, harassment and/or collision) mostly during the summer months (Mayol *et al*., 2012).

Information gaps:

- Maps of risks of exposure to potential physical disturbance from maritime traffic

- increase information on the response of animals to physical disturbance by maritime traffic

4.1.8 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. The effect can be seen through the observed potential changes in abundance and distribution for example (see related paragraphs).

Information gaps:

- after confirmation of the changes in abundance and distribution, abiotic and biotic factors can be compared to see if some links exist.

4.1.9 CUMULATIVE AND SYNERGETIC EFFECTS

The above sections discuss threats individually. However, it is clear that some or all of them may interact temporally and/or spatially (Maglio et al., 2015, 2016). An initial approach to determine threat hot spots is to map threats against distribution (IWC-IUCN-ACCOBAMS report April 2019). Indexes of risk could also be calculated considering the cumulative effect of different threats and the parameters that increase the sensitivity of the species (e.g., area/season of biological importance for the species, presence of juveniles, particular concentration of animal, high site fidelity, etc.)
Cumulative and synergistic effects can be considered as the loss of suitable habitat, changes in reproduction and/or survivorship that negatively affect population dynamics and thus status as a result of repeated exposure to the same stressor(s) over time or the combined effects of multiple stressors. Developing robust ways to evaluating this is a complex problem. An ecosystem approach is needed (Pavan et al., 2016) to understand the complex relationship among all the components of the sea environment. Perhaps the best-developed framework to date is the Population Consequences of Disturbance (PCoD) model (New et al. 2014) which has been extended to consider the Population Consequences of Multiple Stressors (PCoMS) (National Academies of Sciences, Engineering, and Medicine 2017). This approach moves through the effects of stressors on individuals' behaviour and physiology which is converted to effects on vital rates and then on

population trends and sustainability. However, the approach is extremely data demanding and requires quantitative temporal and spatial information on whales (distribution, demographics and physiology), their prey and environment, human activities and models linking these - this complexity also contains inherent large levels of predictive uncertainty. In view of this, the present iteration of the CMP focuses initially on addressing individual threats whilst recognising the need ultimately to work towards evaluation of cumulative effects should mitigation measures on the individual threats proves insufficient.

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 abundance and distribution of animals, number and trends in strandings and bycatch, how vessel traffic (commercial, boating and whale-watching) is changing (e.g., number and size of vessels, speeds, routing, densities) and levels and characteristics of underwater noise in vital areas. In all cases, the first step is to establish a baseline.

Information gaps:

- Support long term monitoring scheme for visual and acoustic records, at basin wide scale and also in specific areas (e.g., feeding areas, IMMAs) to monitor Risso's dolphin and human activities abundance, distribution, behaviour and sounds production
- Support long term monitoring scheme for strandings and photo-ID
- a good amount of data is already available all over the Mediterranean basin, both as stranding and sighting records, and it would be critical to pool all this information together and share data using common platform as MEDACES for strandings and Intercet for photo-identification
- a network focusing on Risso's dolphin should be launched to improve collaboration and information exchange among organizations working on the species

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)

Implement and support existing (IWC, CMS, FAO…) best practices against bycatch/entanglements and it will benefit Risso's dolphin (Hamer & Minton, 2020; FAO, 2021).
See also ACCOBAMS Resolution 7.11

5.2 ANTHROPOGENIC NOISE

Several IGOs (including ACCOBAMS, CMS, IWC) have agreed that absence of scientific certainty should not prevent their member nations from undertaking management efforts now to keep quiet areas quiet and make noisy areas quieter.
Implement and support existing best practices or guidelines (ex/ ACCOBAMS, CMS, IUCN, UN, French Ministry of Environment: Persohn et al., 2020) on noise issue and it will benefit Risso's dolphin (Pavan et al., 2016).

5.3 PREY DEPLETION

Implement and support existing (GFCM, FAO, national…) best practices and laws against bycatch of non-commercial species, illegal/unnoticed and unregulated fishing and conservation measures as no-take zone (FRA or within MPA) or time-area closure.

At least, useful and relevant measures have proven to be successful in limiting species/areas/food web depletion, and those should be developed and reinforced as closure of the fishery on the nursery grounds or at reproduction periods, no-take zone (within Marine Protected Areas or around important areas as buffer zone), diminish the number of fish/squids that is allowed to be removed (fished) from the sea (quotas), change fishing practices or gear types to be more selective.

5.4 MACRO-, MICRO- AND NANO PLASTIC INGESTION

The Mediterranean Sea has one of the highest concentrations of marine litter in the world (Lebreton et al. 2012), Entanglement and ingestion events have been reported for many marine species with detrimental consequences, such as physical injuries, reduced mobility and predation success, digestive tract blockages, and malnutrition (Gregory 2009; 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 or filter feeding species (Fossi et al. 2012; Wright et al. 2013). Even if little is still known on the specific impact of litter on Risso's dolphin, mitigation measures against this threat must be sustained. The harm caused by marine litter to animals is determined by the combination of the likelihood of colliding with, ingesting, or becoming entangled in plastic items, and the consequences of these interactions (Guerrini et al. 2019).

The transboundary spread of plastic litter in the marine environment will require the participation of all states bordering the Mediterranean Sea. Implement and support existing best practices, guidelines and Directives (ex: EU) on marine litter issue and it will benefit Risso's dolphin.

5.5 CONTAMINATION OF CETACEANS AND THEIR PREY

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, use and final ending of toxicologic elements at the scale of the countries surrounding the Mediterranean Sea. At least, support existing guidelines and legal frameworks as well as practical initiatives toward reducing toxically components that could reach the sea.

5.6 PHYSICAL DISTURBANCE / HARASSMENT

Implement and support existing best practices or guidelines as the ACCOBAMS/PELAGOS code of conduct for approaching cetaceans and the High-Quality Whale-Watching label, and it will benefit Risso's dolphin.

6 PUBLIC AWARENESS, EDUCATION AND CAPACITY BUILDING

- The great difficulty of locating Mediterranean Risso's dolphin 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 Risso's dolphin science and conservation.
- Providing range state parties and the public with easy access to up-to-date, accurate information on Mediterranean Risso's dolphin 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 and pleasure 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 Risso's dolphin.
- 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 Risso's dolphin throughout their range.

Some actions that could be launched:

- spread existing documents and/or guides through fishermen and their organisations about "how to disentangle" a cetacean, and who to contact in case of a large cetacean entangled
- spread existing code of conduct to all boaters, mariners, harbour authorities…
- spread the ACCOBAMS "HQ WW label" and train the WW companies to collect easy and useful data for scientific community
- Rise awareness on existing national or regional citizen program to all stakeholders at sea, and involve more citizen to join these programs

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 six years (to match the work-programme time frame of ACCOBAMS).

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 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. In the case of the Risso's dolphin, at the beginning, this position could be combined with the coordination of other CMPs until the work is too much and may be split with another coordinator. Ideally, the Coordinator should have a strong 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.

CMP are developed under the umbrella of ACCOBAMS. All relevant bodies of ACCOBAMS must be involved: strong links with the Scientific Committee, the Secretariat and regular information to National Focal Point (ACCOBAMS Res. 6.21) and other relevant stakeholders.

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 three years on a 6 years cycle. 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

Coordination actions

Nr.	Action	Impor-tance	Feasibi-lity	Crossref.
CORD-01	Implementation of the CMP: Coordinator and Steering Committee *(Need to check for mutualisation with other CMP)*	ESSENTIAL	HIGH	ALL
CORD-02	Development of a workspace/website/webpage (repository on documents, metadata of databases) within an existing ACCOBAMS website for exchange between experts *(Need to check for mutualisation with other CMP)*	ESSENTIAL	HIGH	ALL

Capacity building and public awareness actions

Nr.	Action	Impor-tance	Feasibi-lity	Crossref.
CBPA-01	Development of a strategy to increase stakeholders' awareness and build capacity in range states with a focus on: (1) Occurrence; (2) Threats and mitigation *(Need to check for mutualisation with other CMP)*	HIGH	HIGH	CORD-01 CORD-02

Research actions essential for providing adequate management advice

Nr.	Action	Impor-tance	Feasibi-lity	Crossref.
RES-01 (Greg)	Examine the population structure of Risso's dolphins in the Mediterranean with a focus on developing management unit(s)	HIGH	MEDIUM	ALL
RES-02	Analyses the existing strandings data in order to provide information on anthropogenic threats	HIGH	HIGH	CBPA-01 MON-01
RES-03	Establishment of a grampus network to facilitate the cross-match of the photo-identification catalogues and analyse data in order to improve information on population structure, movements, abundance and trends	HIGH	HIGH	CBPA-01 RES-01 RES-04 RES-05 MON-01
RES-04	Improve knowledge considering spatial and temporal distribution and abundance through dedicated surveys	HIGH	HIGH	RES-01 RES-03 RES-05 MON-01
RES-05	Improve knowledge on habitat for the species and effect of pressures	HIGH	MEDIUM-HIGH	RES-03 RES-04 MIT-01
RES-06	Identify the areas of distribution of Risso's dolphin that are at high risk of exposure of anthropogenic pressure	HIGH	MEDIUM-HIGH	ALL

Monitoring actions

Nr.	Action	Impor-tance	Feasibi-lity	Crossref.
MON-01	Develop or support effective (i.e., with sufficient power) long-term monitoring programmes collecting data to estimate population structure, population parameters, movements, distribution and abundance.	HIGH	HIGH	ALL

Mitigation measure actions

Nr.	Action	Impor-tance	Feasibi-lity	Crossref.
MIT-01	Wider adoption and implementation of guidelines, resolutions… (such as IWC/ACCOBAMS/CMS) to mitigate adverse	HIGH	HIGH	RES-02 RES-05 RES-06

	impact of anthropogenic activities affecting Risso's dolphin			

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, Barcelona Convention, 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 on a less-known species, so coordination is essential for guiding the effort towards the best knowledge. 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.

  It will be necessary to define if the coordinator is full-time dedicated to the CMP Gg or can be mutualise for other CMPs too.

- **Timeline:**

	WHAT	WHO	WHEN
(1)	Constitution of the Interim Steering Committee (ISC)	The experts from the CMP workshop, the ACCOBAMS Scientific Committee, relevant National experts and the ACCOBAMS Permanent Secretariat	3 months
(2)	Development of detailed job description and conditions of work based on the tasks outlined below	Interim Steering Committee (ISC)	3 months
(3)	Identification of initial funds	ISC	3 months
(4)	Identification of host institution and agreement on hosting conditions	Interim Steering Committee (ISC)	3 months
(5)	Recruitment of co-ordinator	ISC	3 months
(6)	Co-ordinator begins work (initial 3-year contract)	Co-ordinator	6 months
(7)	Development of proposed terms of reference and *modus operandi* for stakeholder Steering Committee	ACCOBAMS, IWC, ISC, funders	6 months
(8)	Appointment of Steering Committee	ACCOBAMS, IWC, ISC, funders	6-9 months

- **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 Risso's 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 Risso's dolphin, 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 Risso's dolphin (see Annex 1).
  - To produce concise progress reports on the implementation of the CMP for relevant scientific and national authorities and international bodies at relevant time frame.
  - To arrange for periodic expert review of the CMP and the development of new or modified actions as appropriate
  - To develop a Mediterranean Risso's dolphin CMP website/webpage/webspace (probably combined with other CMP coordination) 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 develop a detailed job description and see if there is a need of one full-time or partial-time Coordinator that can be mutualised for several CMP, obtain initial funding, appoint the coordinator, identify the host institution, and to appoint the broader stakeholder Steering Committee for the CMP.
- **Stakeholders**: as listed above under 'Tasks'.

ACTION EVALUATION

- ACCOBAMS Scientific Committee and Secretariat, and relevant experts.
- 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 WORKSPACE/WEBSITE/WEBPAGE WITHIN AN EXISTING ACCOBAMS WEBSITE FOR EXCHANGE BETWEEN EXPERTS.

Co-ordination Action Priority: **HIGH**

DESCRIPTION OF ACTION

- **Specific objective**: develop a workspace within an existing website (as Netccobams), where interested parties (experts, scientists…) and the coordinator will exchange documents, information and data.
- **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/website/webpage for information, documents and data exchanges within an existing and in use website, preferably managed by the ACCOBAMS Permanent Secretariat.
- **Method**: the CMP coordinator and/or the ACCOBAMS Permanent Secretariat will evaluate if all CMPs within ACCOBAMS need to have a workspace and mutualise then a workspace/website/webpage for all CMPs if needed. Then, arrange the creation of the working space(s). From then, they can share documents, ideas and data.
- **Implementation-timeline**: depending on the place needed, and the type of web-tool chosen, it can vary. At least, the creation of a workspace for each CMP for the launch of the process within Netccobams can be done quickly.

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

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

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 Risso's dolphin and what they should do if they see animals either at sea or stranded.
- **Rationale:** it is difficult to obtain information on Mediterranean Risso's dolphin given the low level of knowledge and the vast Sea where they live. Also, citizen barely know the Risso's dolphin and its status needing conservation and management. It is important to involve citizen, as numerous observers at sea or along the coasts (strandings), but within a frame including: standard and simple method, training by experts, expert's networks acting in a coordinated manner. With that in place, 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 Risso's dolphin and on how citizens can assist in conservation efforts including what they should do if they encounter living or dead Mediterranean Risso's dolphin. '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/webpage 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	9 months
(2)	Organise workshop	Identified participants (see methods below)	12 months
(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 Risso's dolphin; 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.
  - 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 Risso's dolphin situation.
  - Scientists familiar with incorporating data from the general public…
  - 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**

Action RES-01: EXAMINE THE POPULATION STRUCTURE OF RISSO'S DOLPHINS IN THE MEDITERRANEAN WITH A FOCUS ON DEVELOPING MANAGEMENT UNIT(S)

Research Action *Priority: HIGH*

DESCRIPTION OF ACTION

Specific objective: Clarify the population structure of Risso's dolphins in the ACCOBAMS region and identify whether there is one or more management units (units-to-conserve)

Rationale: Although it has been shown that Mediterranean Risso's dolphins differ genetically from those in UK waters, there has been no review of their population structure within the ACCOBAMS region. Understanding population structure and determining management units is essential to assess status and to assist in the prioritisation of threats and mitigation efforts. Understanding population structure requires information from a suite of techniques including genetic and stable isotope analyses, distribution and movement information (visual and acoustic surveys, photoID and telemetry)

Target: To review existing and obtain new information from a variety of techniques to determine management unit(s) (and their temporal and spatial distribution) within the ACCOBAMS region in time for the next iteration of the CMP.

Methods: Existing information will be used to identify initial focus areas for the collection of new data to complement existing data. This will require:

(1) compilation of existing information and sample availability:

- sightings data with effort and distribution maps (including from spatial modelling exercises)
- photoID data (including catalogues and cross matching)
- tissue samples (and any associated analyses) from stranded animals or biopsy samples from free-ranging animals;
- other relevant data (e.g., stranding locations, opportunistic sightings)

(2) targeted collection of new data to enable the identification of one or management units and if possible, to determine their distribution throughout the year and over years;

(3) develop and conduct agreed analyses of the combined datasets;

(4) hold an expert workshop to agree at least provisional management divisions 18 months prior to the next iteration of the CMP

Implementation-timeline: This will be an iterative process with the objective of completing the work before the next iteration of the CMP

ACTORS

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

ACTION EVALUATION

- ACCOBAMS

PRIORITY

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

Action RES-02: Analyses the existing strandings data in order to provide information on anthropogenic threats

Research Action *Priority: HIGH*

DESCRIPTION OF ACTION

- **Specific objectives:** Collate and analyse the data on stranded Risso's dolphins throughout the range with the aim to identify the main threats and potential areas or causes of particular concern.

- **Rationale:** Throughout the Mediterranean Sea Risso's dolphins face numerous threats with most notable impact of by-catch and entanglement causing mortality. Analysis of data obtained through different monitoring schemes – stranding and marine rescue centres networks, fisheries on-board observing, citizen science, (social) media reporting etc. may provide a valuable insight into impact of different anthropogenic stressors on the population. Understanding the main threats, mapping their temporal and spatial presence pattern and impact may provide opportunities for development of targeted mitigation actions.

- **Target:** To collate and review existing information on Risso's dolphins strandings obtained from a variety of sources

- **Methods:** The assigned action coordinator(s) should proceed with preparation and collection of the available data on strandings including:
  (1) preparation and understanding the main sources from where the info could be obtained. A list may include (but is not definitive): stranding networks or groups collecting stranding information throughout the range, rescue facilities and emergency response teams, fisheries monitoring schemes targeting different fisheries, opportunistic information from different sources like research groups, citizen science and social network etc. ;
  (2) carry out compilation of all available information from different previously identified sources;
  (3) develop and conduct agreed analyses of the combined datasets.

- **Timeline:**

	WHAT	WHO	WHEN
1	Development of the Risso's dolphin stranding analysis report	Assigned action coordinator	12 months
2	Reporting and feedback from the CMP Steering Committee	Action coordinator & Steering Committee	18 months

- **Tasks of Coordinator in conjunction with Steering Committee:**
  - To carry out planning and preparation of the data collation activity
  - To compile and collate available data and carry out analysis
  - To report to CMP Steering Committee and produce a scientific report highlighting the main findings

INITIAL BUDGET ITEMS TO BE CONSIDERED BY ISC

- Depending on the sources availability this may be commissioned as a study by identified expert

ACTORS

- **Responsible for coordination of the action:** assigned action coordinator(s) in coordination with the CMP steering group
- **Stakeholders**: different data holders, ACCOBAMS, ACCOBAMS Focal points, researchers and research groups, Cetacean stranding and rescue networks

This action would benefit from establishment of the Grampus network as action coordinator could have more support in obtaining the needed relevant information

PRIORITY

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

ACTION RES-03: ESTABLISHMENT OF A GRAMPUS NETWORK TO FACILITATE THE CROSS-MATCH OF THE PHOTO-IDENTIFICATION CATALOGUES AND ANALYSE DATA IN ORDER TO IMPROVE INFORMATION ON POPULATION STRUCTURE, MOVEMENTS, ABUNDANCE AND TRENDS

Research Action *Priority: HIGH*

DESCRIPTION OF ACTION

- **Specific objectives:** Create a network of experts on Risso's dolphin within the ACCOBAMS area, and establish a coordinated and standardised way to share and/or pool the photo-ID catalogues. Carry out comparison of all existing photo-id catalogues (and possibly genetic-id as well) in the entire Risso's dolphin range within ACCOBAMS, owned by different research organizations operating in different parts of the Mediterranean Sea. The results will be to obtain information about movements, residency, and connectivity among areas, links between groups and individuals. This global analysis could help in defining management units and population structure. Analysis based on photographic mark-recapture will improve abundance estimate at local and sub regional scale. This is a fundamental data source to inform other conservation and management actions.

- **Rationale:** Individual identification (and the following of known individuals over time) is a powerful tool to inform evaluation of *inter alia* status, monitoring, temporal and spatial movements, population structure, population parameters and health. The preliminary cross-matching of the existing catalogues, based on a standardized approach, will allow to understand the level of connectivity among units and the entity of the movements. The optimal scale (sub-regional; regional) for the development of a unified common catalogue for the Mediterranean areas will be evaluated based on the evidence obtained by the preliminary investigation. The development of a common catalogue (using existing and new data) will provide the best way to enable robust analyses (mark recapture, movements) of questions directly relevant to developing and/or evaluating mitigation measures. The value of such a catalogue will be enhanced greatly if it is linked to or contains information on individual identification using genetic techniques.

- **Target:** Development of a collaboration network of Institutes aimed to share the existing information and promote the collection of new information. Development of a unified photo-identification catalogue to inform conservation related research within the Mediterranean Sea.

- **Methods: The** Coordinator of the Risso's dolphin CMP should work with all known data holders (past and present) to establish the *Grampus Network*. This network will develop an agreed MoU for the exchange of the data and the creation of a joint catalogue (ex.: the IWC data sharing and photo-catalogue guidelines), dealing in particular with ownership of the data, data exchange procedures, data access (and subsequent analyses), publication arrangements. The initial focus will be on photo-identification data followed by genetic data if available.

  A comprehensive Inventory of all the existing groups working on Risso's dolphin in the Mediterranean Region should be performed in order to establish the *Grampus Network*.
  A common protocol with specific guidelines should be prepared on how to manage the photo-id images collected by the different contributors of the Network, in order to standardize their catalogues before proceeding with the matching.

  Assuming an agreed MoU is developed and there is a commitment from the major contributors then this "Grampus Network", with the CMP Gg coordinator, shall:

  - agree an appropriate software and cataloguing system including data fields;
  - identify a host institution, co-coordinator and steering group to develop a budget and oversee the unification process including developing matching protocols and a validation approach for incorporating existing and new data (and a timeframe for catalogue review on a regular basis, every few years);
  - develop a cost proposal for analyses to assist objectives of the CMP, including dissemination and publication.
  - Improve the communication among Network's Partners by selecting the most efficient communications strategies to keep the Network active and alive (correspondence, common work-space where to share news and update the status information available, social networks, dedicated expert workshops, skype meetings).

- **Timeline:**

	WHAT	WHO	WHEN
1	Inventory of the Institutions working on the species	CMP coordinator	12 months
2	Identification of the Initial funds for a workshop and for a project for the analysis	CMP coordinator	12 months
3	Development of MoU between organizations	CMP coordinator	18 months
4	Launch of Network's Partner and identification of the co-coordinators (from hosting institutions) at sub-regional level (Western-Central-Eastern Med)		24 months
5	Organization of the dedicated expert workshop/ACCOBAMS Meeting at regional or sub regional level to establish the Networks and the project about the analysis	ACCOBAMS, CMP coordinator	24 months
6	Consensus on a standardized protocol for the matching and cataloguing system	Gg network's partners	24 months
7	Data sharing at sub-regional and regional level	Networks partners/subregional co organizers	24 months
8	Analysis of data at local, sub-regional and regional level	Networks partners	Before next CMP
9	Comparison of results with different methodologies (abundance estimate obtained with distance sampling methods, predictive species distribution models to assess the habitat used by the species vs home range of the management units)	Networks partners	Before next CMP
10	Dissemination and publication	Networks partners	Before next CMP
11	Development of a common catalogues for the Mediterranean area.		

- **Tasks of Coordinator in conjunction with Steering Committee:**
  - To list all institutions, organisations working on Risso's dolphin within the ACCOBAMS area
  - To facilitate (and if necessary, adapt or modify existing) data-sharing agreements to ensure that data are made available in a timely fashion to maximise their value for conservation.
  - To identify sub-regional co-coordinators (sub-regional representants)
  - To raise funds for the Mediterranean Grampus Network for the analysis
  - To develop a database or databases and coordinate the collation, in an appropriate electronic format, of relevant data
  - To produce concise annual progress reports on the implementation of the task
  - To arrange for periodic expert review/workshop the existing information and the development of new or modified actions as appropriate

INITIAL BUDGET ITEMS TO BE CONSIDERED BY ISC

- Workshop costs
- Salary of Group coordinators and expenses (level, tax and benefits issues).

ACTORS

- **Responsible for coordination of the action:** Co-ordinator of Conservation Plan
- **Stakeholders**: Range State Governments, ACCOBAMS, IWC, industry, local authorities, NGOs, WW operators,

ACTION EVALUATION

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

PRIORITY

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

ACTION RES-04: IMPROVE KNOWLEDGE CONSIDERING SPATIAL AND TEMPORAL DISTRIBUTION AND ABUNDANCE THROUGH DEDICATED SURVEYS

Research Action *Priority: HIGH*

DESCRIPTION OF ACTION

- **Specific objectives:** Given the possible changes or shifts in distribution and abundance through time of the Risso's dolphin (see CMP part.3), a focus and further analysis must be realised to confirm those facts or define better those parameters through time. This is a fundamental base to fix those questions and therefore the status of the species.

- **Rationale:** The most recent studies highlighted changes in distribution and habitat in the north-western Mediterranean Sea where this species has been studied since the 90s, with lower encounters over the coastal and continental slope in recent years compared to what was known on the species before, while the presence seemed to be stable in the most pelagic area. At a large scale, the model prediction based on historical data (1998-2015) shows highest abundance over the Mediterranean basin, mostly in slope areas, while results based on more recent data (2012-2018) predicted highest suitable habitat along the slope habitat but also on large offshore areas, especially in the western Balearic sector. This last result is in coherence with the predicted abundance reported by the 2018 ASI results in the western part of the basin, with the offshore areas being more important for the species. But those studies use different data sets, collected with different kind of platforms, from low sailing vessel to fast airplane, following different sampling scheme and resulting also in differences in effort over the main habitats (slope and offshore). A specific analysis should be run on the effort done per habitat and resulting abundance (index) over time.

- **Target:** Analysis of existing datasets of data collected in effort from the 90s until nowadays, in order to define past and present distribution and abundance, and possible shifts.

- **Methods:**
- Ask the Grampus Network (RES-03) to make the inventory of all existing sightings and effort collected in standardised effort.
  Define a "minimal common data form" to gather all relevant data and also a MoU for this sharing of data.
  Assuming an agreed MoU is developed and there is a commitment from the major contributors then they shall:
  - agree on the different analysis and tests: distribution and abundance index
  - develop a cost proposal for analyses to assist objectives of the CMP, including dissemination and publication.
  - Agree on the institutions/organisms/teams that will run the analysis
  - Run the analysis
  - Disseminate the results

- **Timeline:**

	WHAT	WHO	WHEN
1	Inventory of the datasets	CMP coordinator and Grampus Network	Same time as RES-03 12 months
2	Identification of the Initial funds, tasks and coordinator(s)	CMP coordinator and Grampus Network	12 months
3	Development of MoU between organizations and consensus of a standard sharing form for minimal common data	CMP coordinator and Grampus Network	18 months
4	Data sharing	CMP coordinator and Grampus Network	24 months

5	Analysis of data (abundance index, distribution with geostatistical analysis, trends…)	Networks designed partners	Before next CMP
6	Definition of the status of the Risso's dolphin	CMP coordinator and Grampus Network	Before next CMP
7	Dissemination and publication	CMP coordinator and Grampus Network	Before next CMP

- **Tasks of Coordinator in conjunction with Steering Committee:**
  - To raise funds for the Mediterranean Grampus Network establishment (as for RES-03).
  - To facilitate (and if necessary, adapt or modify existing) data-sharing agreements to ensure that data are made available in a 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
  - To produce concise annual progress reports on the implementation of the task
  - To arrange for periodic expert review/workshop the existing information and the development of new or modified actions as appropriate

INITIAL BUDGET ITEMS TO BE CONSIDERED BY ISC

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ACTORS

- **Responsible for coordination of the action:** Co-ordinator of Conservation Plan
- **Stakeholders**: Grampus Network and other relevant person/organism/institution

ACTION EVALUATION

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

PRIORITY

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

ACTION RES-05: IMPROVE KNOWLEDGE ON HABITAT FOR THE SPECIES AND EFFECT OF PRESSURES

Research Action *Priority: HIGH*

DESCRIPTION OF ACTION

Specific objective: Improve knowledge on the habitat for the species and verify if changes occurred through time, and then if that can be linked to environmental parameters or to the effect of pressures.

Rationale: Recent results from local and regional large-scale research programmes seems to show that a change in the range and in the use of habitat occurred during recent years (see CMP part 3). If this change is effective (see RES-04) it is still not known if the change is due to environmental parameters or pressures (human activities). Improving knowledge by combining and analyse existing information from a wider scale as possible in the ACCOBAMS area is recommended in order to highlight potential priority for conservation.

Target: To review existing data and obtain new information from research programme within the ACCOBAMS region and improve home range mapping and habitat suitability modelling analysis at different spatial and temporal scales.

Methods: Existing data will be used for modelling analysis at different spatial (target local sites, subregional and regional) and temporal scales. This will require:

(1) compilation of existing information and sample availability:

- o sightings data with effort (from RES-04);
- o sightings data without effort from citizens based programme;
- o spatial data on relevant environmental variables and pressures.

(2) perform analysis on home range and modelling taking into account different temporal period (e.g., six years) and at both local and large regional spatial scale;

(3) verify the effect of different pressure, for which spatial information are available, on the suitable habitat;

(4) disseminate the results

Implementation-timeline: This will be an iterative process with the objective of completing the work before the next iteration of the CMP

- **Timeline:**

	WHAT	WHO	WHEN
1	Inventory of the datasets of sightings without effort (researcher, NGOS, citizen based programs…), of environmental parameters and of pressures (human activities)	CMP coordinator and Grampus Network	Same time as RES-03 12 months
2	Identification of the Initial funds, tasks and coordinator(s)	CMP coordinator and Grampus Network	12 months
3	Development of MoU between organizations and consensus of a sharing form for minimal common standardised data	CMP coordinator and Grampus Network	18 months
4	Data sharing, gathering, homogenising	CMP coordinator and Grampus Network	24 months

5	Analysis of data (MAXENT…)	Networks designed partners	Before next CMP
6	Definition of the habitat and effect of pressure	CMP coordinator and Grampus Network	Before next CMP
7	Dissemination and publication	CMP coordinator and Grampus Network	Before next CMP

- **Tasks of Coordinator in conjunction with Steering Committee:**
  - To raise funds for the Mediterranean Grampus Network establishment (as for RES-03 and RES-04)
  - To facilitate (and if necessary, adapt or modify existing) data-sharing agreements to ensure that data are made available in a 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
  - To produce concise annual progress reports on the implementation of the task
  - To arrange for periodic expert review/workshop the existing information and the development of new or modified actions as appropriate

INITIAL BUDGET ITEMS TO BE CONSIDERED BY ISC

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ACTORS

- **Responsible for coordination of the action:** Co-ordinator of Conservation Plan and appointed steering group
- Expert coordinating the modelling analysis
- Grampus Network and other stakeholder sharing the dataset of sightings data

ACTION EVALUATION

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

PRIORITY

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

ACTION RES-06: IDENTIFY THE AREAS OF DISTRIBUTION OF RISSO'S DOLPHIN THAT ARE AT HIGH RISK OF EXPOSURE OF ANTHROPOGENIC PRESSURE

Research Action *Priority: HIGH*

DESCRIPTION OF ACTION

Specific objective: Highlight the areas where Risso's dolphin could be at high risk of exposure of anthropogenic pressure.

Rationale: In order to manage threats, it is fundamental to know where and possibly when they occur. Aware of the areas, and sometimes period, of potential or known direct threats (bycatch, harassment, impulsive noise…), relevant measures of mitigation or conservation can be implemented.

Target: To use the maps of distribution and habitat of Risso's dolphin to overlap with maps of the distribution of some human activities at sea (fisheries, whale-watching, oil&gas…) within the ACCOBAMS region and highlight areas of high overlap.

Methods: Existing results of action RES-04 and RES-05 data will be used for G.I.S. analysis, at different spatial (target local sites, sub-regional and regional), and if possible and relevant, also at different temporal scales. This will require:

(1) get the resulting maps of distribution and habitat of Risso's dolphin of RES-04 and RES-O5 in G.I.S. format,

(2) compile or find existing information on human activities at sea (maps, density, position, type of activity…):

(3) perform analysis on overlap of distribution of Risso's dolphin and each pressure at both local and large regional spatial scale;

(4) discuss the areas under pressure and the potential or known threats resulting in close links with the results of action RES-01 on management units, on RES-02 on strandings of non-natural causes and with the effect of the pressure highlighted from the modelling of action RES-05 (habitat under pressure);

(5) Identify best relevant measures to mitigate the threat

(6) disseminate the results

Implementation-timeline: This will be an iterative process with the objective of completing the work before the next iteration of the CMP

- **Timeline:**

	WHAT	WHO	WHEN
1	Inventory of the datasets on human activities	CMP coordinator and Grampus Network	
2	Identification of the Initial funds, tasks and coordinator(s)	CMP coordinator and Grampus Network	
3	Data sharing, gathering, homogenising	CMP coordinator and Grampus Network	
4	Analysis of data (G.I.S.)	Networks designed partners	
5	Discuss the results of areas under risks with the results of RES-01, RES-02 and RES-04 at least, identify main areas and main threats	CMP coordinator and Grampus Network	

6	Identify best relevant measures to mitigate the threat		
7	Dissemination and publication	CMP coordinator and Grampus Network	

- **Tasks of Coordinator in conjunction with Steering Committee:**
  - To raise funds for the Mediterranean Grampus Network establishment (as for RES-03 and RES-04)
  - To facilitate (and if necessary, adapt or modify existing) data-sharing agreements to ensure that data are made available in a 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
  - To produce concise annual progress reports on the implementation of the task
  - To arrange for periodic expert review/workshop the existing information and the development of new or modified actions as appropriate

INITIAL BUDGET ITEMS TO BE CONSIDERED BY ISC

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- …

ACTORS

- **Responsible for coordination of the action:** Co-ordinator of Conservation Plan and appointed steering group
- Expert coordinating the spatial overlapping analysis
- Grampus Network and other stakeholder sharing the dataset of sightings data

ACTION EVALUATION

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

PRIORITY

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

ACTION MON-01: DEVELOP OR SUPPORT AND ENSURE EFFECTIVE (I.E. WITH SUFFICIENT POWER) SYSTEMATIC LONG-TERM ANNUAL MONITORING PROGRAMMES COLLECTING DATA TO ESTIMATE POPULATION STRUCTURE, POPULATION PARAMETERS, MOVEMENTS, DISTRIBUTION AND ABUNDANCE

Monitoring actions Priority: **HIGH**

Description of action

- **Specific objective**: Ensure that annual and seasonal monitoring of distribution, abundance and trends is regularly conducted in the main areas of Risso's dolphin in order to update the status of the species regularly.
- **Rationale**: Continued monitoring of the Risso's dolphin population and regular updates of a population assessment are essential for meeting conservation objectives. All type of techniques (Photo-identification, strandings, visual and acoustic survey at sea, free-ranging biopsies) are already be implemented within the ACCOBAMS area, sometimes in a regularly or continuous time but sometimes not, more within some region less in others.

  Photo-identification is a widely used technique in cetacean research that can provide estimates of abundance and population parameters e.g. survival and calving rate and abundance. Similarly, biopsy sampling can be used to describe population parameters and to estimate abundance through mark-recapture analysis. Both techniques can be implemented together at sea. Surveys on effort at sea from sub-regional to regional scales should be developed or supported where network or project already exist (FLT, ASI…). Those data ensure to update knowledge on the species 'abundance, distribution, use of areas (behaviour) habitat and trends over time. Strandings should be monitored along each coast, as the data coming from strandings help in defining the effect of human activities (bycatch, pollution…) and biological parameters.

- **Target:** Collection of photographic and biopsy samples, sightings, acoustic recordings and group data (position, behaviour, group structure…), health and biological parameters through strandings, all data that can be analysed on an annual or seasonal base depending on the frequency of collection.

- **Method**: Standardized and agreed protocols should be used for the monitoring actions. Many standardised protocols for the different techniques already exist within the ACCOBAMS (strandings, ACCOBAMS Survey Initiative for survey air-based or boat-based, Fix Line Transect for ferry, photo-identification…) or in other relevant institutions/organisms (IWC, …).
  (1) inventory of Standardized protocols in each technique relevant for the monitoring
  (2) Inventory of existing monitoring within ACCOBAMS for each technique, and cross-monitoring for other CMP species
  (3) inventory of needs to ensure and improve the efficiency of the different types of monitoring (ex: capacity building, funds, area coverage, frequency…)
  (4) Identification of the funds for each need
  …

Implementation-timeline: This will be an iterative process with the objective of completing the work before the next iteration of the CMP

- **Timeline:**

	WHAT	WHO	WHEN
1	inventory of Standardized protocols in each technique relevant for the monitoring	CMP coordinator	
2	Inventory of existing monitorings within ACCOBAMS for each technique	CMP coordinator	
3	Analyse characteristics of the different monitoring and develop a strategy to ensure monitoring are harmonised in terms of methodology within the ACCOBAMS area	CMP coordinator	
4	inventory of needs to ensure the efficiency of the different monitoring	CMP coordinator	

5	Identification of the funds for each need	CMP coordinator and Grampus Network	

- **Tasks of Coordinator in conjunction with Steering Committee:**
  - To raise funds for the Mediterranean Grampus Network establishment (as for RES-03 and RES-04)
  - To make the inventory of existing monitoring of all kinds (strandings, photo-ID, surveys…), their methodological characteristics (method, frequency, spatial and temporal coverage, historic…), their financial support and their needs.
  - To develop a meta-database of this information and coordinate the collation, in an appropriate electronic format, of relevant data
  - To help to identify funds to ensure the relevant monitoring to be run
  - To produce concise annual progress reports on the implementation of the task
  - To arrange for periodic expert review/workshop the existing information and the development of new or modified actions as appropriate

INITIAL BUDGET ITEMS TO BE CONSIDERED BY ISC

- …
- …

ACTORS

- **Responsible for coordination of the action:** Co-ordinator of Conservation Plan
- Grampus Network and other relevant stakeholder

ACTION EVALUATION

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

PRIORITY

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

ACTION MIT-01: MONITOR EXISTING ADOPTED MITIGATION MEASURES AND GUIDELINES

Monitoring Action Priority: **HIGH**

DESCRIPTION OF ACTION

- **Specific objective**: to assess the implementation by Countries of all relevant Resolutions / Guidelines adopted in the framework of relevant bodies including ACCOBAMS, CMS, Barcelona Convention, IWC, Pelagos Agreement,
- **Specific threats to be mitigated**: all Resolutions / Guidelines directed to address: harassment, noise, physical disturbance, micro and nano plastics and contaminants…
- **Rationale**: existing adopted measures and Guidelines need to be monitored to ensure compliance and ultimately benefit Risso's dolphin conservation
- **Target:** improve compliance with all the provisions of the relevant bodies including ACCOBAMS, CMS, Barcelona Convention, IWC, Pelagos Agreement.
- **Method:**
    - consult National Reports of relevant bodies including ACCOBAMS, CMS, Barcelona Convention, IWC, Pelagos Agreement,
    - find way to push for the implementation
- **Implementation-timeline**:

	WHAT	WHO	WHEN
1	inventory of relevant Resolutions / Guidelines adopted in the framework of relevant bodies including ACCOBAMS, CMS, Barcelona Convention, IWC, Pelagos Agreement…	CMP coordinator	
2	Inventory of implementation or lack of these R/G within the countries in the ACCOBAMS area	CMP coordinator	
3	Inventory of the process to push for implementation when it is lacking	CMP coordinator	
4	Launching process to push for implementation	CMP coordinator	

ACTORS

- **Responsible for coordination of action:** CMP coordinator, Secretariats and National Focal Points of relevant bodies.
- **Stakeholders**: Range State Governments, ACCOBAMS (including the Follow up Committee), IWC, industry, local authorities, NGOs.

ACTION EVALUATION

- ACCOBAMS

PRIORITY

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

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ANNEXES

ACCOBAMS CMP for Mediterranean Common dolphins *(Delphinus delphis)*

Prepared by Joan Gonzalvo – Tethys Research Institute, Italy

DISCLAIMER:

This document is a revised version of a draft presented at the SC14 (ACCOBAMS-SC14/2021/Doc17). This new version includes all actions that were produced during a workshop held in Monaco in March 2022. A number of new publications have been produced and new studies have been undertaken since it was first drafted. Some of them have been added in this newer version and others will be taken under consideration during a round of consultation with scientists involved in common dolphin research in the Mediterranean, who will be invited to contribute the final CMP.

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CONTENTS

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 by IUCN as Least Concern (Hammond et al., 2008), but its Mediterranean population is classified as Endangered (Bearzi, 2012; Bearzi et al., 2003, 2021-Inner Mediterranean Subpopulation)

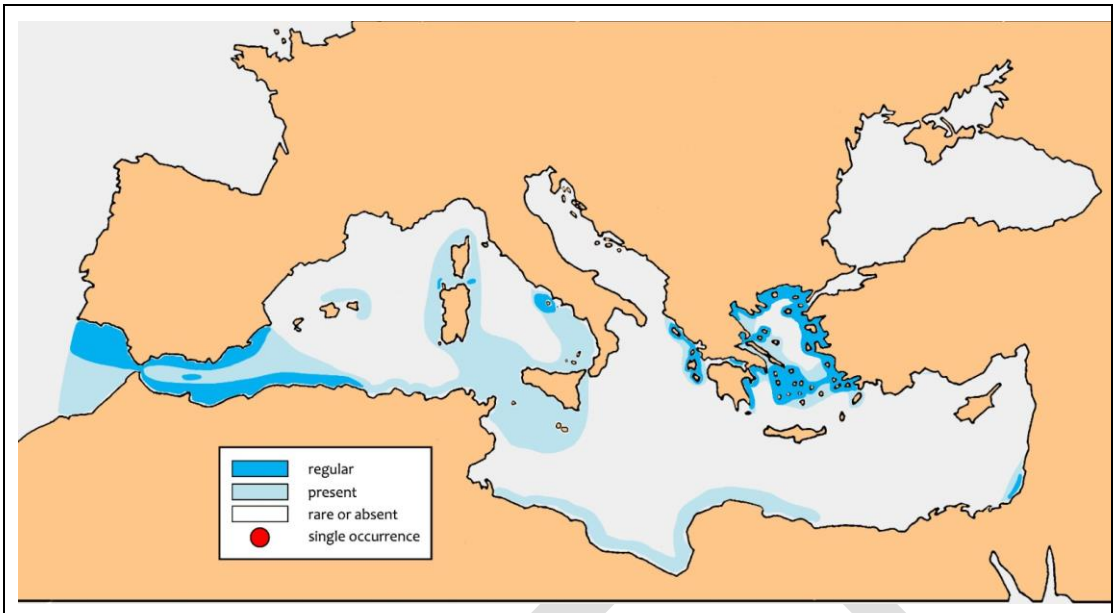

Fig.1. Presumed distribution of common dolphin *(Delphinus delphis)* populations in the ACCOBAMS area. In blue areas where the specie is considered as regular, in cyan where considered present and in white rare or absent. *Taken from ACCOBAMS, 2021. Conserving Whales, Dolphins and Porpoises in the Mediterranean Sea, Black Sea and adjacent areas: an ACCOBAMS status report (2021). By: Notarbartolo di Sciara G., Tonay A.M. Ed. ACCOBAMS, Monaco. 160 p.*

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

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

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 comMon dolphins Population structure

4.1.1 population structure

In the eastern North Atlantic the common dolphin shows low levels of population structure (e.g., Natoli et al., 2006; Amaral et al., 2007; Mirimin et al., 2011; Moura et al., 2013a) 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 the Alboran Sea and the Eastern Mediterranean, represented mainly by samples from the Ionian Sea (Natoli et al., 2008; Moura et al., 2013a). Although significant, F_{ST} values are relatively small (microsatellite F_{ST} = 0.052, mtDNA F_{ST} = 0.107, p-values=0.001), there are shared haplotypes between the regions, and there is 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 mtDNA haplotypes (Tonay et al., 2020) and 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 the Black Sea and the Mediterranean (again, with evidence for directional gene flow westwards; Natoli et al., 2008; Tonay et al., 2020), and further separation of dolphins in the Gulf of Corinth (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 a presumably 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 possibly 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. An individual hybrid with bottlenose dolphin (*Tursiops truncatus*) has also been described in Spain (Espada et al., 2019). Therefore, without more comprehensive sampling across the Mediterranean regions, our current understanding of population structure might be biased by local demographic histories and low sample sizes.

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., 2018; 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 levelss and stable isotope profiles were also observed among 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), as well as documented long-distance movements (Genov et al. 2012). 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; Cañadas & Vázquez, 2017).

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, 2021) showed that Mediterranean dolphins are well differentiated from those sampled in the Atlantic and 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, 2021). 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, 2019; Bencatel et al., 2017; Giralt et al., 2019). 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

The ACCOBAMS Survey Initiative (ASI) aerial surveys carried out in 2018 (ASI, 2020) suggest low abundance across most of the subpopulation's range, and absence or near-absence of common dolphins across most of the

Mediterranean Sea, except the Alboran Sea (Bearzi et al. 2021). Few groups of were encountered in each of the five inner Mediterranean strata where the species was recorded, and no groups were encountered at all in the remaining six strata (ASI 2020). The estimates from ASI have not been corrected for perception and availability bias and may be underestimates, also considering that some areas off the North African coast were not surveyed. Nevertheless, the overall abundance is still likely to be low. While the low encounter rate resulted in high imprecision, a sum of mean estimates for the inner Mediterranean Sea (excluding the Alboran Sea, see Bearzi et al. 2021 for rationale) yielded an estimated total of 5,200 common dolphins (95% CI 1,890–14,305; Bearzi et al. 2021). West of the Almería-Orán thermohaline front, common dolphin abundance is much higher than in the rest of the Mediterranean Sea, and the species is still relatively abundnat in the Alboràn Sea and the adjacent North Atlantic waters (Cañadas & Hammond 2008, Cañadas & Vázquez 2017).

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; Cañadas & Vázquez 2017). Their occurrence declines steeply east of the Almería-Orán thermohaline front, which led to the "inner" Mediterranean subpopulation being assessed separately from the Alboran Sea (Bearzi et al. 2021).

Common dolphin was 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, Italy, 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.

The recent ACCOBAMS Survey Initiative (ASI) in 2018 resulted in few or no records of common dolphins in most parts of the Mediterranean (apart from the Alboran Sea), including the Balearic Sea, the Gulf of Lion, the Pelagos Sanctuary, the Adriatic Sea and the Levantine basin. The species occurs more regularly in the northern and eastern Aegean Sea (Frantzis *et al.* 2003, Alan et al. 2018, Milani *et al.* 2019, Pietroluongo et al. 2020), and off the south-western coast of Turkey. A local population has been observed in the coastal Mediterranean waters off southern Israel (Kerem *et al.* 2014, Brand et al. 2019). Otherwise, common dolphins appear rare in, or completely absent from, the inner Mediterranean areas for which information is available (Bearzi & Genov, 2021).

Little is known about movements, but long-distance movement has been documented (Genov et al. 2012).

4.1.4 basic biology

To be completed

4.1.5 Information Gaps/needs

- Continued basin-wide monitoring (ASI) for regional abundance
- Local abundance estimates in various areas
- Genetic population structure
- Toxicological status assessment

To be completed

4.2 critical habitats

To be completed

4.3 atributes 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	Moderate	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. Especially relevant in the case of purse seining targeting epipelagic fish	Moderate to strong	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	Moderate to High	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 greenhouse gases	Weak or Moderate	May influence distribution and abundance of prey, and induce thermal stress.	Moderate		

5.1.1 bycatch in bottom trawl nets

In Israel, where interactions with bottom trawlers have been reported, no entrapment in trawl nets, has ever been witnessed or directly documented for this species (IMMRAC, pers comm.). One report of two entrapped dolphins corresponding to the description of common dolphins was obtained from a boat skipper but could not, be confirmed. Indirect evidence exists of one stranded individual with evidence of recent feeding and with bycatch being a potential cause of death. 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 driftnetting fleet, mainly concentrated in the island of Ponza with a 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) the 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. 2021). Although no dolphin fishing bycatch has been documented, the impact of this mortality factor on the common dolphin population 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

No direct evidence exists for the Mediterranean, however (Jepson et al. 2013) showed that acoustic trauma is a threat to this species. See below for more detail.

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 military activities and fishing use, seismic exploration and offshore platforms could affect occurrence and behaviour of the species. Even if no data are currently available 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). Furthermore, a recent study on the effects of concurrent ambient noise levels on social whistle calls produced by bottlenose dolphins (*Tursiops truncatus*) in the western North Atlantic reported that increases in ship noise resulted in higher dolphin whistle frequencies and a reduction in whistle contour complexity (Fouda et al., 2018). The noise-induced simplification of dolphin whistles may reduce the information content and decrease effective communication, parent–offspring proximity or group cohesion.

In addition, as other dolphin species, common dolphins could decrease some activities relevant for their survival, such as resting and feeding, deviate from normal activity, including changes in swimming speed and breathing/diving activity and avoidance of an area, or even strand. For example, a group of common dolphins mass stranded in 2008 in UK waters, possibly following a "two-stage process" where a large group of normally pelagic dolphins initially entered a coastal bay (possibly to avoid a perceived acoustic threat) and then, after 3–4 days, a second acoustic or other type of disturbance event occurred, causing them to strand *enmasse* (Jepson et al., 2013). The international naval activities that took place in very close temporal and spatial proximity to this mass stranding were the only established cause of cetacean mass strandings which cannot be eliminated and was ultimately considered the most probable (but not definitive) cause (Jepson et al., 2013).
Physiological responses on the hearing abilities, such as temporary or permanent reductions in hearing sensitivity (auditory threshold shifts), and symptoms associated with decompression sickness, are of particular concern. Chronic exposure may also cause stress reactions.

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; Vasilakopoulos et al., 2014). 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

Contamination through the food web may expose common dolphins to the effects of chemical pollutants (Borrell *et al.* 2001, Aguilar *et al.* 2002, Jepson *et al.* 2016). Despite serious implications for reproduction, the population-level impacts are still poorly understood (Murphy *et al.* 2018).

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). Very limited knowledge is available on impacts of microplastics in common dolphins; however, a recent analysis on stranded and bycaught common dolphins in Irish waters reported that the incidence of ingestion of microplastics in this species was 2.5 times higher than in the Atlantic Ocean and on a global scale (Lusher et al., 2018).

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 specific 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; need to incorporate info from Lambert C., Authier M., Dorémus G., Laran S., Panigada S., Spitz J., Van Canneyt O., Ridoux V. (2020): Setting the scene for Mediterranean litterscape management: The first basin-scale quantification and mapping of floating marine debris. Environmental Pollution 263: 114430)

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 also be studied.

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.
Acoustic deterrent devices (ADD) have been used in both static and trawl gear to varying success in the Atlantic (Murphy et al., 2013). In the Irish tuna trawl

fishery, changes in operational procedures (e.g., lowering the trawl headline and cessation of fishing activities when dolphins were in the vicinity) have been applied as a bycatch mitigation technique, producing a decrease in the incidental capture of common dolphins (Murphy et al., 2013).

TO BE DEVELOPED FURTHER

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

No direct evidence exists for the Mediterranean, however (Jepson et al. 2013) showed that acoustic trauma is a threat to this species.

5.2.4 Noise pollution

Investigation and monitoring of behavioural responses of common dolphins to anthropogenic sound with the potential to cause disturbance is needed and any significant effects of noise should be considered in models to define possible consequences at population level of such disturbance.

5.2.5 Overfishing

Incorporation of fishery controls in MPA management to preserve ecosystem function. Establishment of no-take and/or fisheries restricted 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.

Conservation of the endangered common dolphin population in the Alboran Sea may be difficult or even unrealistic with only a spatial solution based on marine protected areas because common dolphin distribution and fishing effort largely overlap. A recent study (Giménez et al., 2021) proposes to combine an area-based approach (i.e., marine protected areas) with a cetacean orientated threat-based approach where threat mitigation actions are implemented to preserve cetacean populations. According to it the addition of a threat-based approach may be more successful and cost-efficient than relying only on a conventional area-based approach.

5.2.6 Contamination of cetaceans and their prey

TO BE DEVELOPED

5.2.7 Marine litter

TO BE DEVELOPED

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).

COORD	COORD-01: ESTABLISHMENT OF A CMP FOR MEDITERRANEAN COMMON DOLPHINS COORDINATOR AND STEERING COMMITTEE (MedDdSC) COORD-02: ESTABLISH AN INTERACTIVE REGIONAL NETWORK OF GROUPS INVOLVED IN COMMON DOLPHIN RESEARCH AND CONSERVATION
PACB	PACB-01: DEVELOP A STRATEGY TO INCREASE STAKEHOLDER PARTICIPATION, EDUCATION AND PUBLIC AWARENESS PACB-02: DEVELOP A STRATEGY FOR BUILDING CAPACITY WHERE NEEDED
RES	RES-01: DETERMINE MEDITERRANEAN COMMON DOLPHIN POPULATION STRUCTURE (E.G., THROUGH GENETICS, ACOUSTIC ANALYSIS AND/OR OTHER VALID METHODS) RES-02: ESTIMATE ABUNDANCE AND MAP THE DISTRIBUTION OF COMMON DOLPHINS IN THE MEDITERRANEAN RES-03: DEVELOP AND/OR SUPPORT RESEARCH CAMPAIGNS IN POORLY COVERED AREAS TO FILL KNOWLEDGE GAPS IN RELATION TO RES-01 AND RES-02 RES-04: IMPACT OF AMBIENT NOISE ON COMMON DOLPHINS
MON	MON-01: MONITORING COMMON DOLPHINS - FISHERIES INTERACTION MON-02: DEVELOP AND MAINTAIN EFFECTIVE LONG-TERM MONITORING PROGRAMMES AT LOCAL LEVEL TO ESTABLISH ABUNDANCE AND TRENDS THROUGH DEDICATED SURVEYS MON-03: MONITORING THREATS HAVING AN IMPACT ON THE SPECIES AND MARINE ECOSYSTEMS MON-04: DEVELOP AND MAINTAIN MONITORING OF STRANDINGS AT LOCAL/NATIONAL LEVEL
MIT	MIT-01: PROMOTION AND IMPLEMENTATION OF FISHERIES MANAGEMENT MEASURES TO REDUCE OVERFISHING AND PRESERVE MARINE ECOSYSTEMS MIT-02: DEVELOPMENT, PROMOTION AND IMPLEMENTATION OF FISHERIES BYCATCH MITIGATION MEASURES MIT-03: WIDER ADOPTION AND IMPLEMENTATION OF STANDARIZED CODES OF CONDUCT (IWC/ACCOBAMS/CMS) TO MITIGATE ADVERSE IMPACT OF DOLPHIN WATCHING

	MIT-04: COMPLIANCE WITH EXISTING ADOPTED MEASURES AND GUIDELINES

These actions are considered realistic and effective.

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.

Given the potential overlap with actual or potential CMPs for other species within the region, it is important that the relevant Steering Committees work together, as much of the work will be very similar if not identical.

6.1 coordination *(coord)*

ACTION COORD-01: ESTABLISHMENT OF A CO-ORDINATOR AND STEERING COMMITTEE FOR THE CMP FOR MEDITERRANEAN COMMON DOLPHINS

Co-ordination Action Priority: High

Description

- **Specific objectives:** (1) to ensure timely progress is made on implementation of the CMP and the specific actions described in it, and (2) 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 its range.
- **Rationale:** this CMP requires considerable co-ordination for it to be effective. Its 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 Co-ordinator and Steering Committee (initially an interim Steering Committee ISC and later the final Steering Committee) with the required logistical and financial support. The Tasks for the co-ordinator and interim steering committee are provided below.
- **Timeline:**

	WHAT	WHO*	WHEN
(1)	Identification of a host institution for the CMP co-ordinator and agreement on hosting conditions	Interim Steering Committee (ISC),	First quarter (after the adoption of the CMP)
(2)	Development of detailed job description for the Co-ordinator and conditions of work based on the tasks outlined below	ISC, ACCOBAMS Secretariat	First quarter year1
(3)	Identification of source of initial funds	ISC	Last quarter year1
(4)	Recruitment of co-ordinator	ISC	First quarter year 2
(5)	Co-ordinator begins work (initial 3-year contract)	Co-ordinator	Second quarter year 2
(6)	Development of proposed terms of reference and modus operandi for the stakeholder Steering Committee (MedTtSC)	ACCOBAMS, IWC, ISC, funders	Second quarter year 2
(7)	Appointment of MedTtSC	ACCOBAMS, IWC, ISC, funders and Co-ordinator	Third quarter year 2
	* In each case with assistance from the ACCOBAMS Secretariat if required		

- **Tasks of CMP for Mediterranean Common Dolphins Coordinator in conjunction with the Steering Committee (with assistance from the ACCOBAMS Secretariat as required):**
    - To assess the need for the establishment of sub-area and/or national coordinators for the implementation of the Mediterranean Common Dolphin CMP based upon the identified units-to-conserve, recognising that the definition of such management units will take some time (RES-01).

- 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 (and see COORD-2).
- To liaise with ACCOBAMS and its Scientific Committee to ensure appropriate interactions at regular intervals, including provision of data/results from the various actions to facilitate integration of the information on dolphins and humans to determine the timing of the periodic (normally every 6 years but potentially earlier if a need is identified) expert reviews of the CMP and the development of new or modified actions or recommendations to the ACCOBAMS Meeting of Parties as appropriate.
- To liaise with relevant authorities to facilitate any permitting required to undertake Actions of the CMP.
- To produce concise annual progress reports on the implementation of the CMP for all stakeholders.
- To promote and explain the CMP and progress with its implementation to 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 an ACCOBAMS Mediterranean Common Dolphin CMP Fund including, where necessary, assigning contracts to ensure that the Actions of the CMP are undertaken and completed.
- To maintain and update the existing list of international and national regulations and guidelines relevant to the conservation of Mediterranean Common dolphins.
- To work with the ACCOBAMS Secretariat to provide information for a web page on the Mediterranean Common Dolphin CMP within a section of the ACCOBAMS website dedicated to CMPs as a resource for researchers, stakeholders and the general public.

Actors

- Responsible for coordination of the action: initially the ISC, then the co-ordinator and the ISC and finally the co-ordinator and the ISC, with assistance from ACCOBAMS [and IWC]
- Stakeholders: as listed above under 'Tasks'.

evaluation

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

Priority

- Importance: Essential
- Feasibility: High (with institutional support)

budget considerations

- 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, if any).
- Initial working budget for Coordinator (travel and subsistence including visits to range states and meetings with stakeholders).

ACTION COORD-02: ESTABLISH AN INTERACTIVE REGIONAL NETWORK OF GROUPS INVOLVED IN MEDITERRANEAN COMMON DOLPHIN RESEARCH AND CONSERVATION

Co-ordination Action Priority: High

DESCRIPTION

- **Specific objectives:** (1) establish an interactive regional network of research groups involved in Common dolphin research, conservation, and public awareness; (2) facilitation of data exchange and research co-operation between neighbouring regions and public awareness initiatives; (3) support the existing research units of the network and facilitate (also with training activities) the genesis of new research units in the areas not covered.
- **Rationale:** as the Common dolphin dolphin is a widely distributed species, it is essential to have all of the regional groups that collect/hold data on a local level and raise local public awareness, connected in a collaborative network. Networking/data sharing/collaboration is essential for effective conservation of the species throughout the Mediterranean.
- **Target:** Establish a network that will enable the aims of the CMP and individual action to be most effectively met and implemented.
- **Methods:** Members of the network will agree to share the CMP aims (see RES-01, RES-02, MON-02,…) and follow agreed protocols for data collection, sharing and analysis (taking into account local situations as appropriate). Members will collect data to target the research objectives (RES-01, RES-02) and monitoring objectives (MON-01, MON-02). It is essential for effective conservation that data are shared and co-operatively analysed in an aggregated form - the value of uploading data on a common platform (such as Intercet?) with appropriate data safeguards to facilitate this will be evaluated. The members of the network will be involved in the implementation of PACB actions on a local level (see PACB-02).

- **Timeline:**

	WHAT	WHO	WHEN (starting month being 0)
(1)	Draft an initial MoU to be discussed and approved by the potential network membership	Relevant CMP Coordinators and ACCOBAMS secretariat	3
(2)	Confirmation of network membership (MoU signing)	Relevant CMP Coordinators and ACCOBAMS secretariat	6
(3)	Identification of need for and source of initial funds	Relevant CMP Coordinators and ACCOBAMS secretariat	10
(4)	First Workshop/Training to agree on common protocols for data collection, data sharing and analysis.	Relevant CMP Coordinators and ACCOBAMS secretariat	12
(5)	Develop a template and elaborate a periodic (annual) report	Relevant CMP Coordinators and ACCOBAMS secretariat	24

Actors

- Responsible for co-ordination of the action: Relevant CMP Coordinators and interim Steering Committees in collaboration the ACCOBAMS secretariat
- Stakeholders: local research units being able to provide data to target RES-01, RES-02, MON-01, MON-02. Local groups being able to support PACB-02, MPAs, WW companies, "ARPA",

Action evaluation

- Evaluation by Relevant Coordinators and SC
    - Number of members actively participating to the network (annual report)
    - Distribution of the units in the network (annual report)
    - Data flow to the common platform (annual report)
    - Data covering on a Mediterranean level (annual report)

Priority

- Importance: high
- Feasibility: high

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

ACTION PACB-01: DEVELOP (AND SUBSEQUENTLY IMPLEMENT) A STRATEGY TO INCREASE PUBLIC AWARENESS OF THE MEDITERRANEAN COMMON DOLPHIN CMP

Public Awareness and Capacity Building Action Priority: High

Description

- **Specific objective:** Raise awareness throughout the Range States on the existence of the Common Dolphin CMP with the objective of achieving or maintaining favourable conservation status. An overall common strategy will be 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, latest research findings, as well as guidelines on how to behave when encountering them at sea or stranded.

- **Rationale:** While in some Mediterranean countries there are effective educational programmes and multimedia campaigns to raise awareness about cetaceans, in many others there is a lack of such activities. There is an urgent need to fill this gap in the context of the objectives and prioritised actions of the CMP, several of which require collaboration of stakeholders (see below). Informing the relevant stakeholder groups is crucial to fully implement the conservation measures presented in this CMP.

- **Target:** The main targets of the awareness campaign include, in no specific order: the general public; schools and educational centres; NGOs; whale watching/dolphin watching operators and nautical tourism companies; shipping companies; marina and port authorities; fishing industry (large and small scale); oil and gas companies; Coast Guards and navies, local authorities. The strategy will be tailored by State and stakeholder group. for the different target audience, creating different contents for the general public, schools and relevant stakeholders. This action is to be executed by professionals and experts in communication and consideration should be given to the development of a dedicated central website (and see Actions COORD-01 and COORD-2).

- **Timeline**:

	WHAT	WHO	WHEN (starting month being 0)
(1)	Preparation for an expert workshop to develop the strategy	Relevant CMP Coordinators and ACCOBAMS secretariat	9
(2)	Workshop to develop the strategy and a prioritised list of actions	Workshop participants (see methods below)	14
(3)	Execution of the actions defined by the strategy established by workshop in agreement with all participants	National and regional actors organizations identified during workshop in coordination with the Steering Group	Timeline to be established at workshop

- **Methods:**

The workshop will:

- Identify issues to be addressed and identification of the target groups in each state.
- Review/evaluate previous education and awareness tools/campaigns to assist in identifying priority actions and materials to be developed, in accord with the various stakeholder groups and national requirements.
- Identify most appropriate communication channels by stakeholder groups and national requirements, including consideration of a central resource website (See COORD-01).
- Develop a prioritised list of actions to implement (and evaluate the effectiveness) of the strategy, including resources required (personnel and costs) and a mechanism to update the strategy as necessary.

- Workshop participants should include:
  - Relevant CMP Co-ordinators and Steering Group members;
  - Representatives of the stakeholder groups;
  - Communication and public awareness professionals;
  - Scientists familiar with the CMP.
  - Researchers/groups with experience in developing existing awareness campaigns (including use of citizen science).

Initial budget items to be considered by ISC

Costs associated with preparatory materials and holding of a workshop

Actors

- Responsible for co-ordination of the action: Med DdSC – see Action COORD-01
- Responsible for carrying out the action: to be determined at workshop for each state/stakeholder group

Action evaluation

- ACCOBAMS, IWC.
- Feedback system built into materials.

Priority

- Importance: Moderate
- Feasibility: High

ACTION PACB-02: DEVELOP A STRATEGY FOR BUILDING CAPACITY WHERE NEEDED

Public Awareness and Capacity Building Action Priority: HIGH

Description

- **Specific objective:** to develop a strategy or strategies consistent in message but specific to each range State and key stakeholders, for the timely production of a series of resources to build capacity of range states on data collection, analysis and design and implementation of conservation measures for common dolphins.
- **Rationale:** long-term systematic programmes to collect and analyse data on cetacean population attributes, human threats and mitigation and management measures are required to implement the CMP and meet national and international commitments but are not uniformly distributed throughout the Mediterranean Sea. This action will complement (and be undertaken in conjunction with) other actions including COORD-01, RES-01, RES-02, RES-03, MON-01, MON-02 to identify those areas where specific targeted and focused capacity building measures are needed.
- **Target:** to develop a strategy and initiatives to produce a variety of targeted research and management resources that will inform representatives of national authorities and other targeted stakeholders on the status of Mediterranean bottlenose This will include provision of resources to both establish new long-term projects and strengthen the existing ones, to facilitate the implementation of national and international research and conservation priorities, including those listed in the CMP.
- **Methods:** Specific research and management resources, ranging from basic to more advanced, will be provided both through theoretical lessons and practical sessions. To achieve this the ISC, taking into account the work being undertaken under the actions listed in the Rationale above, will oversee preparations for a small expert working group to determine a strategy for developing and disseminating building capacity materials, including:
    - Identification of priority target groups, by range state where appropriate, and identification of who will benefit from the capacity building actions and resources
    - Identification of existing/development of new research and management training modules/materials for cetaceans in general, with a specific emphasis on common dolphins, including, but not limited to, data collection, storage and analysis, policy and management frameworks. Consideration should be given to whether, and if so how, this material needs to be modified for any of the priority target groups.
- **Working group** members should include:
    - Coordinator of the CMP and representatives of the stakeholder Steering Committee.
    - Experts familiar with the Mediterranean bottlenose dolphin situation and familiar with other relevant actions (see list under Rationale)
    - Experts familiar with the research, management and conservation resources considered.
- **Timeline:**

	WHAT	WHO	WHEN (months after start of CMP)

(1)	Identification of priority target groups, by range state where appropriate	CMP co-ordinator, ISC, local experts	2 months
(1)	Identify potential resources (e.g., ACCOBAMS Training Modules, University courses, internships) within and outside the Mediterranean.	CMP co-ordinator, ISC	4 months
(2)	Identification and modus operandi for a small expert working group to develop a strategy for building capacity, including identification of existing materials and development of new materials (and trainers) by range state and target group, measures to review success in light of agreed objectives	CMP co-ordinator, ISC then small working group	12 months - ongoing
(3)	Implement the strategy and dedicated actions agreed under (2) following an established timeline (probably a staged process)	CMP co-ordinator, small working group, trainers	12 months - ongoing
(5)	Assess and if needed update strategic plan according to indicators	CMP co-ordinator, DdSG	24 months

Initial budget items to be considered by ISC

Costs associated with preparatory materials and holding of training sessions, both online and in situ.

Actors

- Responsible for co-ordination of the action: the ISC to identify and establish the expert working group
- Responsible for carrying out the action: working group
- Stakeholders: to be determined

Action evaluation

- ACCOBAMS, IWC.
- Feedback system built into materials.

Priority

- Importance: High
- Feasibility: High

6.3 research essential for providing adequate management advice or filling in knowledge gaps *(RES)*

ACTION RES-01: IDENTIFY THE GEOGRAPHICAL / MANAGEMENT UNITS OF COMMON DOLPHINS WITHIN THE MEDITERRANEAN AREA AND CHARACTERISE THEIR AREA OF OCCURRENCE

Research Action Priority: HIGH

Description

- **Specific objectives**: Identify the management units (units-to-conserve) for common dolphins throughout the Mediterranean Sea as the basis for the evaluation of status, threats and mitigation measures and evaluate the extent of any connectivity between Mediterranean individuals with those from the Black Sea and contiguous Atlantic waters.
- **Rationale:** Common dolphins are widely distributed throughout the Mediterranean Sea but there is sufficient evidence (e.g. from genetic analysis and other data) that common dolphins in the Mediterranean form several broadly demographically isolated 'units-to-conserve'. Understanding population structure and determining management units is essential to assess status and to assist in the prioritisation of threats and mitigation efforts to enable the meeting of the CMP objective to achieve favourable conservation status throughout its historical range. Defining management units requires information from a suite of techniques encompassing different approaches and time-frames including for example genetic and ecological markers (e.g. isotopes), acoustics, sightings and photo-identification. Once defined, it will be possible to allow an assessment of the conservation status (e.g. see RES-02) and help to prioritise threats and monitoring and mitigation efforts in each of the different management units throughout the ACCOBAMS region (e.g. see RES-04, MON-01 and MON-02).
- **Target:** Determine common dolphin management units (including characterisation to the extent possible of the habitat drivers leading to the spatio-temporal distribution) within the Mediterranean Sea (and potential links with the Black Sea or adjacent Atlantic waters). Given the disparity in available data throughout the Mediterranean this may be a staged process with the identification of management units in data rich areas occurring first whilst the collection of adequate data for areas with little or no data proceeds in accordance with RES-03 before management units for those areas can be determined.
- **Methods:** Existing information (e.g. from the techniques noted above) will be used to identify its suitability and adequacy for identifying management units and characterising habitat. Where information is lacking this will be identified and research programmes to collect the necessary data will be developed under RES-03 (this may include additional techniques e.g. environmental DNA as well as approaches already used). Experience has shown (e.g. within the IWC Scientific Committee) that an iterative approach is needed to finalise the definition of management units – even in data rich circumstances and it is likely that at least three such workshops will be needed if this action (critical to the ultimate success of the CMP) is to be completed relatively quickly.

(1) Compilation of existing information and availability of data on the spatio-temporal distribution of the species and research effort carried out across the study area, with an emphasis on trying to ensure that all of the known data for the region are made available (and see COORD-02), ideally in light of an agreed protocol to provide safeguards for data owners in respect of combined analysis of the datasets. This first step will make it possible to

determine (a) the areas/periods for which sufficient data are available to determine at least 'draft' management units in some parts of the basin and (b) areas/periods in which additional sampling is necessary (RES-03).

(2) This information (and agreed analyses of the existing data) will be discussed at a first expert workshop to

> (a) determine at least 'draft' management units for Common dolphins in the Mediterranean Sea where adequate data/analyses exist;
>
> (b) develop additional analyses to help finalise these initial drafts at a second workshop and
>
> (c) to assist with developing research programmes for poorly covered areas to enable management units to be defined and thus contribute to RES-03.

(3) At this first expert workshop, emphasis will be placed on receiving information from agreed (by the workshop Steering Group in conjunction with relevant scientists) analyses of:

> (a) the available mark-recapture data to look at movements, connectivity, home ranges;
>
> (b) the available sightings data with respect to spatial and temporal distribution (including gaps in these even where good effort exists)
>
> (c) possible relationships between environmental variables and the presence/absence of Common dolphins using spatial modelling techniques;
>
> (d) genetic data to determine if genetic signals can be identified that suggest population structure recognising that several analytical techniques and markers should be explored in light of their strength weaknesses in light of providing practical information on population structure to provide information on management units
>
> (e) analyses of other available data (e.g., genetic, isotopes and acoustics) that may provide information on management units and/or associated habitat characterisation
>
> (f) for each of (a)-(e) the Workshop will develop proposals for additional analyses as necessary to try to finalise management units for data rich areas at a Second Workshop.
>
> (g) also in light of (a)-(f), the workshop will develop proposals for dedicated research to facilitate the identification of management units for data poor areas taking into account local conditions to the extent possible (in conjunction with RES-03) and recognising that a minimum of two years of data collection will be required and probably more.

(4) Hold a second expert workshop to (a) receive the results of the analyses identified at the first workshop to try to finalise management units to be used up to the next iteration of the CMP; and (b) receive any new information for data poor areas and provide additional advice if needed.

(5) Hold a Third workshop when it is deemed that sufficient data are available and have been suitably analysed for it to be successful in identifying management units for the remainder of the Mediterranean.

- **Timeline:** This will be an iterative process with the objective of completing the work before the next iteration of the CMP. The timeline is approximate and dependent on funding and cooperation amongst data holders

	WHAT	WHO*	WHEN
1	Inventory of the organizations and institutions working on studies related to stock structure of bottlenose dolphins in the Mediterranean (especially but not only, photo-identification, distribution, genetics) (and see COORD-2)	Steering Committee, CMP coordinator	3 months after CMP adopted
2	Approach all identified in (1) with respect to data sharing/ combined analyses in the context of the CMP, ideally with an agreed data sharing protocol (and see COORD-2)	CMP coordinator, Steering Committee	6 months
3	Appoint workshop steering group to develop detailed agenda, list of participants, budget and expected papers/analyses/leaders for the First workshop	CMP coordinator Workshop Steering Group	9 months
3	Identification of the funds for a workshop	ACCOBAMS	1 year
4	Hold the First Workshop and submit report to ACCOBAMS SC	Workshop Steering Group	2 years
5	Undertake and complete additional analyses identified at the First Workshop	CMP coordinator, analysts	3 years
5	Data collection in data poor areas following the established protocol and sampling needs developed at the First Workshop and in conjunction with RES-03	Research units in the network	Ongoing (up to three years of field work)
6	Hold Second Workshop with the objective of finalising the management units for the data rich areas and reviewing progress for data poor areas and submit report to ACCOBAMS SC	Research units in the network, CMP coordinator and Workshop Steering Group	3 years
7	Provide progress report for ACCOBAMS MoP including any recommended management units	CMP coordinator	3 years
8	Hold Third Workshop to determine where possible the management units for the data poor areas – the timing	CMP coordinator and	Before next CMP review

	will depend on the success of the data collection/analyses	Workshop Steering Group	
9	Periodic review of the management units to confirm its validity		

Initial budget items to be considered by ISC

Actors

- Responsible for coordination of the action: CMP coordinator, Networks partners
- Stakeholders: ACCOBAMS, Local and national authorities, scienfic community, NGOs, general public

Action evaluation

Priority

- Importance: high
- Feasibility: medium-high

ACTION RES-02: ESTIMATE THE ABUNDANCE OF EACH MANAGEMENT UNIT IDENTIFIED IN RES-01 AND MAP THE DISTRIBUTION OF COMMON DOLPHINS IN THE MEDITERRANEAN

Research Action Priority: HIGH

Description of action

- **Specific objective:** Estimate the abundance of each management unit (unit-to-conserve) identified in RES-01 of Common dolphins and provide updated information on the distribution in the Mediterranean in the Sea.
- **Rationale:** Knowledge of abundance (and associated demographic parameters) and distribution is essential to determine a reference level as part of determining the conservation status for each management unit (See RES-01), to understand the likely effects of human activities and to apply appropriate management measures for those. This will form the basis for designing the long-term monitoring discussed under MON-01 and contribute towards the ACCOBAMS LTMP. It will also be complementary to the requests of the Barcelona Convention (IMAP) and the Habitat Directive and Marine Strategy of the EU.
- **Target:** To estimate the abundance of Common dolphins for each identified management unit under RES-01 building upon the results from the ACCOBAMS Survey initiative and to update the density/distribution following the approach of Cañadas et al. (2018) for beaked whales.
- **Methods:** Existing data will be used to estimate the abundance of the species in the different management units (using a multi-platform approach based on the characteristics of each geographical area: distance sampling and passive acoustic monitoring will probably be the chosen methods, supplemented by information from mark-recapture and other studies). This will require development of a collaborative network (COORD-2) to share existing information and to establish a Mediterranean dataset (ideally through a single catalogue for photo-identification data or at least a protocol for regular cross-referencing of local catalogues). This and the development/promotion of the use of common protocols of data collection and analytical approaches will greatly assist future monitoring (see MON-01 and the ACCOBAMS LTMP) and obtaining good data for data poor areas (see RES-03). It should be noted that the management units will not all be defined at the same time as discussed under RES-01, with units being defined first for data rich areas (expected about 3 years after the adoption of the CMP).

The proposed steps to complete this Action are:

(1) Compilation of existing information and availability of relevant data for the species in each management unit with a view to creating a collaborative network to share existing information. This is related to COORD-02 and will also assist in identifying areas where additional data are required (RES-03).

(2) Whenever possible, (taking into account management unit size and location) priority will be given combining heterogeneous data gathered with different methods to obtain a single density index for management units and the region as well as obtaining abundance estimates by management unit. This challenging task will require much time to be effectively executed (expected results for mid 2024) and will be carried out primarily by Duke University.

(4) Targeted collection of new data using the most appropriate techniques will be undertaken to enable the abundance estimation for those management units in areas where information

is lacking at the moment – initially this might be by distance sampling and passive acoustic monitoring (see RES-03).

(5) Once the first management units are defined, an expert workshop will be convened to carry out the abundance estimation of each management unit. It will also be valuable to review basin wide estimates (e.g., ASI, and the ACCOBAMS LTMP) for comparison. A similar workshop will be held when the remaining management units are defined.

Implementation-timeline: This will be an iterative process

	WHAT	WHO*	WHEN
1	Inventory of the organizations and institutions working on the species with relevant data and identifying available datasets (COORD-02)	CMP co-ordinator	6 months after CMP
2	Collaborate with the work of the University of Duke on the updated distribution/density maps using heterogenous datasets	ASSOBAMS SC identified experts	Ongoing until work complete (exp.2024)
2	Develop a data sharing agreement/MoU and investigate the development of a single photoidentification catalogue and/or an arrangement for regular comparisons of local catalogues (COORD-02)	CMP co-ordinator, potential data sharers	18 months
3	Plan for a specialist workshop to develop a proposal for implementing this Action, including methods to obtain data for poorly known areas (and see 2 above). Appoint workshop steering group to develop detailed agenda, list of participants, budget and expected papers/leaders.	CMP co-ordinator, potential data sharers, Steering Group	24 months
4	Appoint workshop steering group to develop detailed agenda, list of participants, budget and expected papers/analyses/leaders for the First workshop to estimate abundance, ensuring participation from each defined management unit	CMP co-ordinator, workshop steering group	36 months or whenever the units are agreed
5	Hold expert workshop to agree abundance estimates for each management unit (this may include Integration of results from different data sources and analytical methods and report to the ACCOBAMS SC	CMP co-ordinator, workshop steering group	48 months
6	Dissemination and publication of the results about the abundance of each management unit in the ACCOBAMS region.	CMP co-ordinator,	
7	Follow steps (4), (5) and (6) whenever the remaining management units are defined		

Actors

- Responsible for coordination of action: Appointed steering group
- Stakeholders: Network members (COORD-02), Range State Authorities, ACCOBAMS, IWC, NGOs.

Action evaluation

- ACCOBAMS SC

Priority

- Importance: High
- Feasibility: High (once management units are defined; RES-01)

ACTION RES-03: DEVELOP AND/OR SUPPORT RESEARCH CAMPAIGNS IN POORLY COVERED MEDITERRANEAN AREAS TO FILL COMMON DOLPHIN KNOWLEDGE GAPS IN RELATION TO RES-01 AND RES-02

Research Action Priority: High

Description of action

- **Specific objective:** To collect data in poorly covered areas to fill the knowledge gaps required to identify management units (units-to-conserve) of common dolphins throughout the Mediterranean, characterise their areas of occurrence (RES-01) and estimate their abundance (RES-02) and ultimately monitor their status through the ACCOBAMS LTMP..
- **Rationale:** The objective of the CMP is to achieve favourable conservation status throughout the historical range of common dolphins that show a scattered, patchy distribution. For several areas within the Mediterranean there is little or no information on matters required for good conservation e.g., management units, distribution and abundance - these are necessary to determine status and assist in the development and implement and implementation of any needed mitigation measures. This action has been developed to fill those gaps either by establishing new research campaigns or supporting existing ones.
- **Target:** develop and/or support research campaigns in collaboration with national researchers, in order to fill necessary knowledge and data gaps.
- **Methods:** Collating of information, knowledge gaps and poorly covered areas identified in COORD-02, RES-01 and RES-02 and then developing and/or support research programme to fill these gaps.

  This will include:

  - Identification of local research groups or the establishment of new ones as necessary (and see COORD-02) to address the knowledge gaps
  - The identification of adequate method(s) to apply to address the knowledge gaps taking into account local conditions and ACCOBAMS guidelines (e.g., initial aerial campaign especially for offshore areas, photo-ID for any identified coastal areas, and see RES-01) – this may require one or a series of local workshops
  - The identification of resources (human, platform, material, fund) to implement these methods and build capacity when necessary (PACB-02)
  - Data collection and sharing (COORD-02)
- Timeline:

	WHAT	WHO	WHEN (starting month being 0)
(1)	Collate the knowledge gaps and uncovered areas	CMP Coordinator, Network (COORD-02), local/national research groups	After COORD-01 and 02 are finalised + 12 months
(2)	Develop new and/or support existing research campaigns (may require one large or several local workshops)	CMP Coordinator, local/national research groups	+ 12 months and ongoing

(3)	Implement these campaigns and link to RES-01, RES-02, MON-01, COORD-02	CMP Coordinator, local/national research groups, national institutions	Ongoing

INITIAL BUDGET ITEMS TO BE CONSIDERED

Consideration of funding opportunities to enable speedy implementation of research campaigns once identified

ACTORS

- Responsible for co-ordination of the action: Co-ordinator & MedDdSC
- Stakeholders: local/national research groups, national institutions

ACTION EVALUATION

By Coordinator & MedDdSC coinciding with the reporting scheduled in the timeline above

PRIORITY

- Importance: High
- Feasibility: High

ACTION RES-04: DETERMINE THE LEVEL OF IMPACT, IF ANY, OF ANTHROPOGENIC NOISE ON COMMON DOLPHINS IN THE MEDITERRANEAN

Research Action Priority: Moderate to High

Description of action

- **Specific objective:** To investigate whether anthropogenic noise in the Mediterranean has a detrimental impact on common dolphins
- **Rationale:** Increasing noise levels from anthropogenic sources and acute noise events may have harmful short- and long-term consequences on common dolphins. It is thus essential to determine whether the potential threats are actual threats and if so to characterise and quantify the nature of any effects to determine effective mitigation actions.
- **Method:**
    - Building upon existing work by the ACCOBAMS SC, identify the various sources of anthropogenic noise in the Mediterranean, the main characteristics including frequency distribution and levels (from short to long time scales if appropriate), with a focus on frequencies and levels that are believed to be most sensitive for common dolphins
    - Again building upon existing work by the ACCOBAMS SC, develop 'local' sound maps (seasonal where appropriate) with a focus on the above characteristics e.g. using data obtained through PAM (Passive Acoustic Monitoring) in identified hotspot areas of common dolphin occurrence in the Mediterranean (RES-02)
    - Using the above maps and knowledge of common dolphin occurrence, undertake targeted simultaneous boat-based visual (to collect information on inter alia local density and behaviour) and acoustic surveys (including PAM and perhaps towed arrays to measure anthropogenic noise and dolphin calls) to allow analysis of potential variation in local distribution in density and behaviour in conjunction with variation in noise (this may require undertaking such surveys in 'low' and 'high' noise areas and/or seasons if there is insufficient variation in noise in a particular area/time). The exact behavioural data and abundance data protocols will need to be developed once the survey areas and times have been decided and taking account similar work elsewhere.
    - Review results and determine the likely effect of anthropogenic noise on common dolphins
- **Timeline:**

	WHAT	WHO	WHEN (starting month being 0)
(1)	Definition of pilot hotspot area(s) and inventory of the potential anthropogenic noise sources	CMP coordinator and Dd Network	3
(2)	Development of equipment/personnel/funding needs, field protocols and analytical requirements by an expert Steering Group (perhaps in a small workshop) and task co-ordinators	Expert Steering Group	6

(3)	Cruise planning including timing, area(s), choice of vessels, equipment, personnel, funding and logistics including permits	CMP coordinator and Expert Steering Group	12
(4)	Deployment/recovering of acoustic instruments (PAMs)	Expert Steering Group	18?
(5)	Vessel Surveys	Expert Steering Group	18?
(6)	Data analysis and report generation	Analysts identified by Expert Steering Group	24
(7)	Workshop to review results and determine next steps including mitigation if required	CMP coordinator, Dd Network, ACCOBAMS SC	26

Initial budget items to be considered by ISC

Consideration of need for expert workshop (Step 2) and funding if deemed necessary. More significant funding will be needed to implement the research in the field and analyse the results

Actors

- Responsible for co-ordination of the action: CMP coordinator, Secretariat and National Focal Points of relevant bodies.
- Stakeholders: Local and national authorities, Management bodies, ACCOBAMS, Scientific community, Representatives of the pressure

Action evaluation

- Expert workshop (see Step 7)

Priority

- Importance: Moderate
- Feasibility: Moderate

6.4 monitoring *(MON)*

ACTION MON-01: MONITORING COMMON DOLPHINS - FISHERIES INTERACTION

Monitoring Action Priority: High

Description

- **Specific objective**: To monitor the interaction of common dolphins and fishing activities, namely bycatch and depredation, in each range state, following the standardized protocol.
- **Rationale:** Bycatch in fishing gears poses one of the most severe threats to cetaceans in the Mediterranean Sea, including the common dolphin. In some areas, it has been monitored regularly, while in others the effort has been limited. While local national initiatives are valuable, a basin-wide understanding on this issue would be important to ensure that bycatch levels are limited and do not go beyond a sustainable level (RES-02 and MON-02). There have been regional initiatives for bycatch monitoring and mitigation in selected pilot sites (e.g., MAVA Bycatch Project). Such initiatives should be continued and extended across the basin. A protocol by GFCM, which is currently being developed in the context of the MAVA project, can be easily adopted for the long-term monitoring in all range states.

  Depredation has serious socioeconomic implications for fishers, which occasionally might lead to the adoption of some retaliation measures among concerned fishers towards cetaceans. Moreover, it can also cause mortality in case of ingestion of fishing gear.
- **Target**: Fisheries related stakeholders (fishers of concerned metiers, fish cooperatives, national authorities on fisheries)
- M**ethods**
  - Design of monitoring program for fisheries interaction
  - Identification of observers by national/local authorities and the setup of an observer network (refer to MAVA Project)
  - Training of observers by Expert Group
  - Identification of fishers who will be collaborating for the data collection by onboard and/or questionnaire surveys (NOTE: Fishing metiers can be selected according to previous studies but they may change during the implementation of this action.)
  - Collecting data from the stranding networks (MON-04) for the evidence of bycatch and depredation
  - Evaluation of the damage caused by depredation for fishermen through regular monitoring of different fishing gears by onboard observations, questionnaire surveys and interviews. Interviews can also be carried out in ports where the landing takes place.

- **Timeline: (4 year duration)**

	WHAT	WHO	WHEN (starting month being 0)
(1)	Establish a small Expert Group for this action	SC	1st quarter year 1
(2)	Monitoring program design	Expert Group	2nd quarter year 1

(3)	Identification and recruitment of observers, identification of fishers	National/local authorities	3rd quarter year 1
(4)	Observer training for data collection	Expert Group	4th quarter year 1
(5)	Actual monitoring in each range state	Observers	Year 2
(6)	Data analysis and interim reporting (bycatch and depredation)	Expert Group and SC	End Year 2
(7)	Actual monitoring in each range state	Observers	Year 3
(6)	Data analysis, final reporting (bycatch and depredation)	Expert Group and SC	Year 4

Initial budget items to be considered by ISC

- Cost for training observers (salary for experts, educational materials, etc)
- Cost for field work, such as onboard monitoring and port monitoring

Actors

- Responsible for co-ordination of the action: Expert Group in liaison with SC
- Stakeholders: fisheries related stakeholders (commercial/recreational fishers, fisheries cooperatives, national/local authorities on fisheries)

Action evaluation

To be proposed by the Expert Group.

Priority

- Importance: High
- Feasibility: Moderate

ACTION MON-02: DEVELOP AND MAINTAIN EFFECTIVE LONG-TERM MONITORING PROGRAMMES AT LOCAL LEVEL TO ESTABLISH ABUNDANCE AND TRENDS THROUGH DEDICATED SURVEYS

Monitoring Action Priority: HIGH

Description

- **Specific objective**: Ensure that effective long-term monitoring programmes are developed and maintained at the local level, in order to estimate abundance and allow for the detection of trends.
- **Rationale:** In addition to basin-level monitoring, it is vital to monitor local population numbers, to detect potential local declines and ensure an early warning system before potential declines are manifested throughout the basin. To detect trends, effective monitoring programmes need to be put in place. Such monitoring programmes should be standardised across the basin.
- **Target:** Develop new monitoring programmes in areas where the species is known to occur but where monitoring is lacking, and ensure the long-term continuity of existing and new monitoring programmes. Standardize methodologies for comparability.
- **Methods:** Existing results of action RES-01, RES-02 and RES-03 will be built upon. This will require:
  (1) Determine Mediterranean common dolphin population structure (e.g., through genetics, acoustic analysis and/or other methods (RES-01),
  (2) Map the distribution of common dolphins in the Mediterranean, to identify potential priority areas and data gaps (RES-02),
  (3) Where needed, develop and/or support research campaigns in poorly covered areas to fill knowledge gaps in relation to RES-01 and RES-02 (RES-03),
  (4) Identify areas for local monitoring programmes, based on available evidence (e.g. long-term study areas or areas of known occurrence),
  (5) Ensure financial support for new and existing long-term monitoring in key areas,
  (6) Establish new monitoring programmes, based on available best practice,
  (7) Carry out monitoring with regular reporting
  (8) Disseminate the results
- **Timeline:**

	WHAT	WHO	WHEN (starting month being 0)
(1)	Identify areas for local monitoring programmes	Coordinator of CMP, in collaboration with Dd research groups	0-3
(2)	Ensure financial support for new and existing long-term monitoring in key areas	Coordinator of CMP, in collaboration with Dd research groups	3-8
(3)	Establish new monitoring programmes	Coordinator of CMP, in collaboration with Dd research groups	8-14
(4)	Carry out monitoring with regular reporting	Coordinator of CMP, in collaboration with Dd research groups	14-∞

(5)	Disseminate the results periodically	Coordinator of CMP, in collaboration with Dd research groups	14-∞

- Tasks of Coordinator in conjunction with Steering Committee:
  - To raise funds for the establishment of an interactive regional network of groups involved in common dolphin research and conservation (COORD-02)
  - To facilitate data-sharing to ensure that data are made available in a timely fashion to maximise their value for conservation.
  - To produce concise annual progress reports on the implementation of the task
  - To arrange for periodic expert review/workshop the existing information and the development of new or modified actions as appropriate

Initial budget items to be considered by ISC

Actors

- Responsible for co-ordination of the action: Coordinator of CMP
- Stakeholders: Research groups

Action evaluation

- ACCOBAMS Scientific Committee

Priority

- Importance: High
- Feasibility: High

ACTION MON-03: MONITORING THREATS HAVING AN IMPACT ON THE SPECIES AND MARINE ECOSYSTEMS

Monitoring Action Priority: HIGH

Description

- **Specific objective**: Identify and monitor the main known and potential threats for the species and monitor the effect of mitigation measures over time
- **Rationale:** different threats could have an impact on common dolphin's, the level of which can vary among different areas and seasons. In order to effectively manage threats, it is essential to identify the more harmful threats, the high-risk areas/seasons, and to monitor the effect over time to early detect situation that require urgent mitigation action (to inform MIT-01, MIT-02, MIT-03) and to monitor the effectiveness of mitigation measures already in place (MIT-04).
- **Target:** with reference of the identified actual/potential threats for the species (e.g., chemical contaminants, marine litter, physical disturbance, climate change) priority risk areas/season are identified for threats having a spatially defined effect, and specific monitoring of the most harmful threats are established. This action integrates the action MON-01 on fishery interaction. In regards to the impact of ambient noise, specific monitoring protocol are provided based on the results and output of RES-04. The identified threat/s are monitored over time based on standard methods in order to assure the early detection of any changes that require urgent mitigation action (to inform action MIT-04) and to assess the effectiveness of mitigation measures.
- **Methods:** results of RES action will be integrated with risk analysis to identify the most harmful threats, at different spatial-temporal scales. In particular:
    - focusing on the relevant areas for the species (output of RES-01 and RES-02), compile or find existing information including Local Knowledge on human activities at sea that can have an impact on local dolphin's population (maps, density, position, type of activity, etc);
    - assess the level of impact of coastal based human activities (e.g., shipping, recreational power boat, regulated or unregulated dolphin watching, research activities and coastal development) based on risk assessment analysis and on outputs from RES-01 and RES-02 to categorise the more harmful threats for each area on which prioritise the monitoring activities based on standard methodologies;
    - in regards to chemical pollution, support the collection of standard information on contaminants on stranded animals (action MON-04) to monitor the impact on species and to identify eventual trends and/or areas at higher risk;
    - implement the seasonal based monitoring of marine litter (i.e. floating marine macro litter as indicator of litter distribution) to identify areas/seasons of accumulation to be overlapped with the important areas for the species (form output of actions RES-01, RES-02);
    - when long time series are available integrate the monitoring data on species (MON-02) with long term time-series of climate change indicators (e.g. SST) for the identification of any sign of potential climate related changes on species distribution or seasonality;
    - periodically inform action MIT-04 on the results of the monitoring.
- **Timeline:**

	WHAT	WHO	WHEN (starting month being 0)

(1)	Acquire the GIS layers resulting from actions output of RES-01 and RES-02	CMP coordinator and Tursiops Network	
(2)	Assess the level of impact of coastal based human activities in the important areas for the species and implement standard monitoring on the more harmful threats for each area	CMP coordinator and Tursiops Network	
(3)	Implement the monitoring of contaminants on stranded animals through the stranding network/s	CMP coordinator and Tursiops Network	
(4)	Implement a seasonal based standard monitoring of marine litter in the identified important areas for the species	CMP coordinator and Tursiops Network	
(5)	Integrate the monitoring data on species (MON-02) with long term time-series of climate change indicators	CMP coordinator and Tursiops Network	When long time series are available
(8)	Transfer results to action MIT-01	CMP coordinator and Tursiops Network	

Initial budget items to be considered by ISC

Actors

- Responsible for coordination of action: CMP coordinator, Secretariats and National Focal Points of relevant bodies.
- Stakeholders: ACCOBAMS (including the Follow up Committee) Stakeholders representatives of the main pressures sectors, local, regional and national management authorities…

Action evaluation

- ACCOBAMS
- Regular meetings open to stakeholders.

Priority

- Importance: High
- Feasibility: Medium – High

ACTION MON-04: DEVELOP AND MAINTAIN MONITORING OF STRANDINGS AT LOCAL/NATIONAL LEVEL

Monitoring Action Priority: HIGH

Description

- **Specific objective**: Develop new stranding expertise and networks in areas where common dolphins are present, but no stranding research occurs and maintain and improve the existing stranding networks.

  Rationale: Throughout the Mediterranean Sea, common dolphins face numerous threats, the level of which can vary among different areas. Analysis of data obtained through stranding network schemes provide a valuable insight into impact of different anthropogenic stressors on the population. Understanding the main threats, mapping their temporal and spatial presence pattern and impact may provide opportunities for development of targeted mitigation actions. In areas where such researches are limited, maximizing the use of available data, that is those collected from stranding surveys, is extremely important.

  In order to effectively detect and manage threats, it is essential to monitor both natural and human-induced mortalities. Functioning stranding networks and timely analysis on the stranded specimens are crucial to understand trends in mortality, which enables early detection of emergency situations, such as mass mortality due to various causes such as epidemics. Stranding specimens also provide the evidence of fisheries interaction in the area (MON-01). General public can also participate a local stranding network by assisting the experts when and where such experts are limited. In this regard, PACB-01 and -02 play a significant role for this action.

- **Target:** To understand the main threats to the common dolphin populations across the Mediterranean Sea by means of high-quality stranding data. This will be achieved by new and upgraded existing stranding networks.

- **Methods:** The assigned action coordinator(s) should proceed with the
  (1) preparation of a list of existing stranding networks or groups collecting stranding information throughout the Mediterranean Sea. This may include rescue facilities, emergency response teams, fisheries monitoring schemes, opportunistic information sources like websites and social network platforms, etc. Short description on their activities and reports will be collected as well.
  (2) The assigned coordinators identifies areas where stranding network does not exist or function effectively based on the list prepared and their reports. They will contact national focal points and local partners for their support to develop stranding networks in those identified areas.
  (3) National/local workshops will be organized to establish stranding networks, inviting relevant authorities, local scientists and NGOs, with the support of the action coordinator(s). The workshops facilitates the training of data collection on strandings, in connection with PACB-01 and -02 and strengthen the networking between the groups.
  (4) A dedicated online platform will be created to facilitate the exchange of information between stranding networks and to receive advice from experts and other networks. Unusual patterns of strandings and emergency situations can be shared as well.

  (Note: All these activities can be facilitated for other cetacean species, not only common dolphins.)

- **Timeline:**

	WHAT	WHO	WHEN (starting month being 0)
(1)	Assign coordinator(s) for this action	SC (ACCOBAMS SC or Secretariat for more general framework)	0-3
(2)	Preparation of the list of existing stranding networks or relevant schemes and collection of reports	Stranding Network Coordinator(s)	4-6
(3)	Evaluation of the list and identification of the gaps	Stranding Network Coordinator(s)	7-9
(4)	Preparation and implementation of the workshops for establishing stranding networks	Stranding Network Coordinator(s), national focal points, local partners, relevant authorities	10-15
(5)	Establishment and maintenance of a dedicated website for stranding networks	Stranding Network Coordinator(s), local partners involved in stranding networks	3-
(6)	Yearly reporting of the stranding networks	Local partners involved in stranding networks, focal points	13-

- Tasks of Coordinator in conjunction with Steering Committee:
  - To carry out planning and preparation of the data collation activity
  - To compile and collate available data and carry out analysis
  - To report to CMP Steering Committee and produce a scientific report highlighting the main findings

Initial budget items to be considered by ISC

Actors

- Responsible for coordination of the action: assigned action coordinator(s) in coordination with the CMP steering group
- Stakeholders: Cetacean stranding and rescue networks

Action evaluation

- By Coordinator & SC coinciding with the reporting scheduled in the timeline above

Priority

- Importance: High
- Feasibility: medium – high

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 last 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 has shown 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 visiting the Archipelago. This is presumably caused by the area's decreased carrying capacity, due to over fishing. Although this is just a case-study, a similar pressure from fisheries is likely to be suffered by the species in other Mediterranean area. A similar case, not too far away, poses the common dolphins in the Gulf of Corinth, which reportedly are Critically Endangered (Santostasi et al., 2018). Fishery management measures are needed to reduce current over-exploitation (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), protecting marine biodiversity, ensuring continued ecosystem services, in addition to preserving artisanal fisheries and bringing long-term benefits to the local communities.
- **Target:** Regional 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	SC – see Action COORD-01	1st quarter year1
(2)	Workshop (engagement of all stakeholders in the development of measures making them part of the conservation/management strategy)	Workshop participants (see methods below)	2nd quarter year 1
(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 SC	Timeline of the next steps to be defined during workshop

- Methods: the SC 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 PACB-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 scientists.
    - 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

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)

Actors

- Responsible for co-ordination of the action: SC and coordinator
- 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)

ACTION MIT-02: DEVELOPMENT, PROMOTION AND IMPLEMENTATION OF FISHERIES BYCATCH MITIGATION MEASURES

Mitigation Action Priority: HIGH

Description

- Specific objective: Develop, promote and implement measures aimed to reduce and, where possible, eliminate common dolphin bycatch in fishing gear.
- **Specific threats to be mitigated**: Bycatch in fishing gear.
- Rationale: Bycatch is a direct threat affecting the conservation status of the common dolphin. Specific mitigation measures need to be developed and implemented in order to reduce to a sustainable level (in relation to RES-01 and RES-02) and ultimately eliminate common dolphin bycatch.
- Target: Develop effective mitigation measures to reduce or eliminate common dolphin bycatch in fishing gear. Promote and implement the mitigation measures in relevant fishing fleets or areas.
- Methods: Existing results of action MON-01 and MON-02 will feed into this action, to better understand where bycatch may be occurring and at what levels. Existing mitigation schemes, which have already proven effective elsewhere for common dolphins, should be reviewed. With that information, mitigation measures should be developed in line with the specificity of the area, fishing gear and the mechanisms of bycatch, as well as the feasibility of implementation. This should include expert consultation as well as stakeholder engagement (fisheries).
- Timeline:

	WHAT	WHO	WHEN (starting month being 0)
(1)	Determine where bycatch is occurring and at what level	CMP Coordinator	0-4
(2)	Review existing mitigation measures	CMP Coordinator	4-7
(3)	Develop mitigation measures	CMP Coordinator and experts	7-19
(4)	Promote the use of developed mitigation measures (stakeholder engagement)	CMP Coordinator	19-25
(5)	Implement mitigation measures	CMP Coordinator, fishers, local scientists	25-37
(6)	Monitor (MON-01) effectiveness of implemented measures	CMP Coordinator and experts	37-∞
(7)	Disseminate results	CMP Coordinator	37-∞

- Tasks above to be taken by Coordinator in conjunction with Steering Committee:

Initial budget items to be considered by ISC

- Mitigation devices
- Training

Actors

- Responsible for co-ordination of the action: Coordinator of CMP
- Stakeholders: Fishers, fishers cooperatives, national/local fishery authorities, Research groups (incl. species experts and experts on bycatch mitigation)

Action evaluation

- ACCOBAMS Scientific Committee
- GFCM?
- IWC?

Priority

- Importance: High
- Feasibility: Moderate

ACTION MIT-03: WIDER ADOPTION AND IMPLEMENTATION OF STANDARIZED CODES OF CONDUCT (IWC/ACCOBAMS/CMS) TO MITIGATE ADVERSE IMPACT OF DOLPHIN WATCHING

Mitigation Action Priority: MODERATE

Description of action

- **Specific objective**: reduce the negative impacts of commercial dolphin watching activities thanks to efficient management of the activity through a suitable management framework and thanks to the implementation of relevant standardized codes of conduct (IWC, ACCOBAMS, CMS). To assess the implementation by Countries of all relevant Resolutions/Guidelines adopted in the framework of relevant bodies including ACCOBAMS, CMS, Barcelona Convention, IWC, Pelagos Agreement.
- **Specific threats to be mitigated**: harassment, physical disturbance, habitat displacement, behavioural alteration.
- **Rationale:** existing adopted measures and Guidelines need to be monitored to ensure compliance and ultimately benefit common dolphin conservation. Harassment risk begins when a vessel is deliberately closer than the minimum distance identified in common rules for commercial dolphin watching or when the vessel stays for a period longer than prescribed. This is especially true for swim-with cetacean activities. Moreover, direct interactions between swimmers and animals are demonstrated as presenting risks of animal violent behaviour and transmission of diseases.

  Additionally, individuals that are regularly approached (even in respect of the code of conduct) can have significant stress or can alter even significant behaviour (e.g., feeding activity) and this may lead to impact at the population level on medium to long term (Stockin et al., 2008) (Chronic impact vs acute impact).
- **Target:** Minimize the risk of whale watching activities having negative impacts on cetaceans, by the implementation of effective management strategies including the adoption and implementation of standardized codes of conduct (IWC, ACCOBAMS, CMS). Improve compliance with all the provisions of the relevant bodies including ACCOBAMS, CMS, Barcelona Convention, IWC, Pelagos Agreement.
- **Method:**
  - review and update guidelines/codes of conduct for sustainable cetacean-watching
  - review and update cetacean-watching certifications and other mitigation measures
  - analysis of the efficiency of cetacean-watching mitigation measures
  - increase international collaborations working for cetacean-watching mitigation (e.g., IWC, ACCOBAMS, ASCOBANS, NGOs, ...);
  - increase public and industry awareness about the issue and measures used to reduce this threat (PACB-01)
  - assess the efficiency of in place measures
  - consult National Reports of relevant bodies including ACCOBAMS, CMS, Barcelona Convention, IWC, Pelagos Agreement,
  - find way to enhance the implementation of existing measures (e.g., High Quality Whale Watching)
- **Timeline:**

	WHAT	WHO	WHEN (starting month being 0)
1	Constitution of group of work and its coordinator	SC	0-3
2	inventory of relevant Resolutions/Guidelines adopted in the framework of relevant bodies including ACCOBAMS, CMS, Barcelona Convention, IWC, Pelagos Agreement…	CMP coordinator	4-6
3	Collection of available data for the efficiency assessment	CMP coordinator	7-9
4	Data collection about negative impacts of whale-watching activities on cetaceans	CMP coordinator	10-12
	Launching process to push for implementation	CMP coordinator	13-

Actors

- Responsible for coordination of action: CMP coordinator, Secretariats and National Focal Points of relevant bodies.
- Stakeholders: Range State Governments, ACCOBAMS (including the Follow up Committee), IWC, cetacean watching industry, local authorities, NGOs.

Action evaluation

- ACCOBAMS

Priority

- Importance: To be assessed
- Feasibility: High

ACTION MIT-04: COMPLIANCE WITH EXISTING ADOPTED MEASURES AND GUIDELINES

Mitigation Action Priority: HIGH

Description

- **Specific objective**: to assess the implementation by Countries of all relevant Measures / Resolutions / Guidelines adopted in the framework of relevant national and international bodies including ACCOBAMS, CMS, Barcelona Convention, IWC, Pelagos Agreement, GFCM, EU Directives…
- **Specific threats to be mitigated**: all Laws / Measures / Resolutions / Guidelines directed to address: depletion of resources, bycatch, harassment, noise, physical disturbance, micro and nano plastics and contaminants, …
- **Rationale:** Since decades human impact are known and several relevant bodies wrote measures in order to mitigate impact on the species and ecosystem as a whole. Many countries adopted measures and guidelines, but few are concretely and effectively implemented. This action intends to monitor existing adopted measures and Guidelines in order to ensure compliance and ultimately benefit Common dolphin conservation
- **Target:** improve compliance with all the provisions of the relevant national and international bodies including GFCM, EU Directives, ACCOBAMS, CMS, Barcelona Convention, IWC, Pelagos Agreement.
- **Method**:
  - consult National Reports of relevant bodies including GFCM, EU Directives, ACCOBAMS, CMS, Barcelona Convention, IWC, Pelagos Agreement,
  - find way to push for the implementation of existing measures and guidelines and to regularly check for possible improvement
- **Timeline:**

	WHAT	WHO	WHEN (starting month being 0)
1	inventory of relevant Laws/ Measures / Resolutions / Guidelines adopted in the framework of relevant national and international bodies	CMP coordinator, national focal points	0-3
2	Inventory of implementation or lack of these L/M/R/G within the countries in the ACCOBAMS area	CMP coordinator, national focal points, MedDdSC	4-9
3	Inventory of the process to push for implementation when it is lacking	CMP coordinator, national focal points, MedDdSC	10-12 months
4	Launching process to push for implementation	CMP coordinator, national focal points, MedDdSC	13-18 (or/and at relevant MOP frequency)

Actors

- Responsible for coordination of action: CMP coordinator, Secretariats and National Focal Points of relevant bodies.
- Stakeholders: Range State Governments, ACCOBAMS (including the Follow up Committee), IWC, GFCM, industry, local authorities, NGOs, SC.

Action evaluation

- ACCOBAMS

Priority

- Importance: High
- Feasibility: High

6.6 actions overview

Coordination actions

Nr.	Action	Impor-tance	Feasibi-lity	Crossref.
COORD-01	Establishment of a CMP for Mediterranean Common Dolphins Coordinator and Steering Committee (SC)	Essential	High (with institutional support)	RES-01 COORD-02
COORD-02	Establish an interactive regional network of groups involved in common dolphin research and conservation	High	High	RES-01 RES-02 MON-01 MON-02 PACB-02

Capacity building and public awareness actions

Nr.	Action	Impor-tance	Feasibi-lity	Crossref.
PACB-01	Develop a strategy to increase stakeholder participation, education and public awareness	Moderate	High	COORD-01 COORD-2
PACB-02	Develop a strategy for building capacity where needed	High	High	COORD-01 RES-01 RES-02 RES-03 MON-01 MON-02

Research actions essential for providing adequate management advice

Nr.	Action	Impor-tance	Feasibi-lity	Crossref.
RES-01	Determine Mediterranean common dolphin population structure (e.g., through genetics, acoustic analysis and/or other valid methods)	High	Medium-High	COORD-02 RES-02 RES-03 RES-04 MON-01 MON-02
RES-02	Estimate abundance and map the distribution of common dolphins in the Mediterranean	High	High (once management units are defined)	COORD-02 RES-01 RES-03
RES-03	Develop and/or support research campaigns in poorly covered areas to fill knowledge gaps in relation to RES-01 and RES-02	High	High	COORD-01 COORD-02 PACB-02 RES-01 RES-02

RES-04	Impact of ambient noise on common dolphins	Moderate	Moderate	RES-02

Monitoring actions

Nr.	Action	Impor-tance	Feasibi-lity	Crossref.
MON-01	Monitoring common dolphins - fisheries interaction	High	Moderate	RES-02 MON-02 MON-04
MON-02	Develop and maintain effective long-term monitoring programmes at local level to establish abundance and trends through dedicated surveys	High	High	COORD-02 RES-01 RES-02 RES-03
MON-03	Monitoring threats having an impact on the species and marine ecosystems	High	Medium-High	RES-01 RES-02 MON-01 MON-02 MON-04 MIT-01 MIT-02 MIT-03 MIT-04
MON-04	Develop and maintain monitoring of strandings at local/national level	High	High	MON-01 PACB-01

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 (High, with political will)	COORD-01 PACB-01 MIT-02
MIT-02	Development, promotion and implementation of fisheries bycatch mitigation measures	High	Moderate	RES-01 RES-02 MON-01 MON-02
MIT-03	Wider adoption and implementation of standarized codes of conduct (iwc/accobams/cms) to mitigate adverse impact of dolphin watching	To be assessed	High	PACB-01
MIT-04	Compliance with existing adopted measures and guidelines	High	High	

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ACCOBAMS CMP for Mediterranean Bottlenose Dolphin *(Tursiops truncatus)*

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CONTENTS

EXECUTIVE SUMMARY

This CMP is directed towards bottlenose in the Mediterranean Sea. As for other species CMPs (e.g. fin whales, Risso's dolphins, common dolphin), the overall goal is to manage human activities that affect this species in the Mediterranean Sea in order to maintain a favourable conservation status throughout its historical range, based on the best available scientific information.

However, the complexity of bottlenose dolphin population structure (see Section 3.1) within the Mediterranean Sea renders developing a CMP to meet this objective a more complex exercise than for species with less complex structure. Although the most recent 2021 IUCN listing (reference), considers the species as a whole to be of 'Least Concern' within the basin, as noted in the listing, there are a relatively large number of 'units-to-conserve' (see Sections 3.1) within the basin, each of which may have its own habitat requirements (Section 3.2), interactions with human activities (Section 4), conservation status (Section 3.4) and thus conservation needs. In addition, there are large areas of the basin where the information on bottlenose dolphins is poor or absent and this must be remedied to meet the overall goal of the plan.

For this reason, an important part of the present CMP relates to (a) properly defining the local units-to-conserve using all the available data and a suite of techniques (including analysis of photo-identification, distribution and genetic data) where sufficient data exist and (b) obtaining sufficient data to undertake such analyses for data poor areas. The present section on threats and potential mitigation measures covers the known and suspected threats to bottlenose dolphins in at least some parts of the Mediterranean. The relative balance of these (and appropriate mitigation measures) will vary by unit-to-conserve.

Developing Actions for specific units-to-conserve will thus be an iterative process that will require additional local input especially after the units-to-conserve have been defined given the different habitats, human activities and resources available. This will mean a more frequent updating of the CMP than usually envisaged.

Main threats identified:

- Habitat change, reduction and fragmentation
- Overfishing and prey depletion
- Conflict with fishermen, aquaculture and bycatch
- Chemical pollutants
- Epizootics
- Climate change
- Cumulative and synergetic effects

In its current form the bottlenose dolphin CMP includes 12 different actions to accomplish its objectives, divided in Coordination actions (2), Public awareness and capacity building actions (2 actions), Research actions (4 actions), Monitoring actions (2 actions) and Mitigations actions (2 actions).

Coordination actions:

1. Establishment of a coordinator and steering committee for the CMP for Mediterranean bottlenose dolphins.
2. Establish an interactive regional network for Mediterranean bottlenose dolphin research and conservation.

Public awareness and capacity buildings actions:

1. Develop and implement a strategy to increase public awareness of the Med bottlenose dolphin CMP.
2. Develop a strategy for building capacity where needed.

Research actions:

1. Identify the geographical/management units of bottlenose dolphins within the Mediterranean area and characterise their areas of occurrence.
2. Estimate the abundance (and possible abundance trends) of each management unit identified in RES-01.
3. Develop and/or support research campaigns in poorly covered Mediterranean areas to fill bottlenose dolphin knowledge gaps in relation to RES-01 and RES-02.
4. Identification of areas of detrimental interactions between bottlenose dolphins and human activities.

Monitoring actions:

1. Monitor for possible changes in the population attributes as referred to in RES-01 and RES-02 and in accordance with the ACCOBAMS LTMP
2. Monitor human pressure (known and potential threats)

Mitigation actions:

1. Wider and stricter adoption of the management and conservation measures already in place to mitigate adverse impact of anthropogenic activities.
2. Assess the performance of existing mitigation measures and develop new tools to address specific needs.

1 INTRODUCTION

CMPs are developed under the umbrella of ACCOBAMS. All relevant bodies of ACCOBAMS must be fully involved: the Scientific Committee, the Secretariat, the National Focal Point (ACCOBAMS Res. 6.21) and the relevant stakeholders.

1.1 WHY A CONSERVATION MANAGEMENT PLAN IS NEEDED

ACCOBAMS has agreed to develop Conservation Management Plans (CMPs) for species/populations within its region following an agreed approach and template (Resolution 6.21). This CMP is a framework to stimulate and guide the conservation of the bottlenose dolphin in the Mediterranean Sea. Like all CMPs, the present is intended as a living document, and it will have to be re-evaluated and updated regularly.

The bottlenose dolphin is regularly present in Mediterranean basin and is the most sighted species over the continental shelf, which represents its preferential habitat. Because of this habitat preference, the bottlenose dolphin is probably the dolphin whose habitat was mostly modified by human activities. Despite this human pressure on its habitat, the bottlenose dolphin is still present over most of the Mediterranean continental shelf, therefore showing a resilience to anthropic pressures. The 'Mediterranean subpopulation' was classified as Least Concern by the International Union for the Conservation of Nature. The Mediterranean bottlenose dolphin population has been recently reassessed as Least Concern by the International Union for Conservation of Nature (Natoli *et al*., 2021), with the exception of the subpopulation inhabiting the Gulf of Ambracia (Greece), which has been assessed as Critically Endangered (Gonzalvo and Notarbartolo di Sciara, 2021).

Thanks to its behavioural flexibility and opportunistic behaviour, which make it able to exploit new resources and bypass impediments, the bottlenose dolphin seems to keep a relatively safe conservation status in the Mediterranean. However, the lack of available data, especially in the eastern and southern portion of the basin, and the fragmentation of knowledge, could prevent potentially negative trends in abundance to be detected, with considerable error bars on any basin-wide estimations. 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 or minimise future problems. The long-term conservation experience teaches that it may be very difficult 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 endangered (Donovan *et al*., unpublished).

The bottlenose dolphin colonizes the continental platform forming geographical resident units whose size and home range may change according to the physiographic and ecological threats of the residency area (Gnone *et al*., 2022). These units develop local specializations to better exploit the local resources, including the opportunistic feeding on gill nets, trawlers, aquaculture cages, etc.).

Because of the wide distribution (limited in most of the areas to the continental platform) and the frequent contacts and interactions with human activities (with special reference to fishing activities), the bottlenose dolphin needs a CMP that could guarantee (at least) the present status of conservation and a peaceful coexistence with man.

The main potential threats identified for the target species are the contraction and degradation of the habitat (including marine traffic, noise pollution, marine debris), overfishing and conflict

with fishermen, contamination of the food chain, epidemics and climate changes.

The geographical units (with their local specialization and traditions) should be considered as the basic conservation and management target of the CMP. Their number, the residency areas and home range, the size and size trend, the (local) anthropic pressures and threats should be known and monitored over time.

1.2 OVERALL GOAL OF THE CMP

The overall goal of the present 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 should 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.

The single geographical units of bottlenose dolphin should be considered as the basic target of the CMP (management units, units-to-conserve), which should be designed to act on a local level to maintain a favourable conservation status of the bottlenose dolphin throughout its historical range, based on the best available scientific knowledge but following a 'precautionary principle'.

A proper implementation of the CMP should produce benefits also to the marine environment and related stakeholders.

- Aim for the species (*Tursiops truncatus*)
    - To keep the Mediterranean (meta)population size at present level or higher (if needed for safe conservation).
- Aim for the environment
    - To prevent further habitat constriction, deterioration, fragmentation.
    - 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.

To optimize the costs and improve the results, the bottlenose dolphin CMP should be developed and implemented together and consistently with the CMPs of the other cetacean species at the Mediterranean level and the results of the monitoring activity should be compared to detect possible correlations or deviations.

2 LEGAL FRAMEWORK

2.1 INTERNATIONAL CONVENTIONS AND AGREEMENTS

One of the main challenges of the CMP is to manage and protect the bottlenose dolphin in an area (the Mediterranean basin) where many different cultures and traditions coexist on the same seacoasts. 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 different agreements and conventions that can give continuity and homogeneity to the conservation effort (see below). Even though only one of these was designed specifically for the protection of cetaceans (ACCOBAMS), most of them have targets that support cetacean conservation on a certain level (see also the paragraph on the Marine Strategy Framework Directive).

The bottlenose dolphin is listed in Appendix II of Convention on the Conservation of Migratory Species of Wild Animals (CMS), in Appendix II of the Bern Convention, in Appendix II of CITES, and in Annex 2 of the Protocol on Specially Protected Areas and the Biological Diversity in the Mediterranean of the Barcelona Convention.

- 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.
- The UNEP/MAP 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.
- In the context of the above-mentioned Barcelona Convention, the Ecosystem Approach (EcAp) is a strategy for the integrated management of land, water and living resources and is the guiding principle to all policy implementation and development undertaken under the auspices of UNEP/MAP Barcelona Convention. The Contracting Parties have committed to implement the ecosystem approach with the ultimate objective of achieving the good environmental status (GES) of the Mediterranean Sea and Coast. This process aims to achieve GES through informed management decisions, based on integrated quantitative assessment and monitoring of the Marine and Coastal Environment of the Mediterranean.

  EcAp is based on 11 ecological objectives (ECOs) that should be able to target most of the threats identified by the present CMP (with the possible exception of the disturbance directly caused by marine traffic): 1. Biodiversity is maintained or enhanced; 2. Non-indigenous species do not adversely alter the ecosystem; 3. Populations of commercially exploited fish and shellfish are within biologically safe limits; 4. Alterations to components of marine food webs do not have long-term adverse effects; 5. Human-induced eutrophication is prevented; 6. Sea-floor integrity is maintained; 7. Alteration of hydrographic conditions does not adversely affect coastal and marine ecosystems; 8. The natural dynamics of coastal areas are maintained and coastal ecosystems and landscapes are preserved; 9. Contaminants cause no significant impact on coastal and marine ecosystems and human health; 10. Marine and coastal litter does not adversely affect coastal and marine ecosystems; 11. Noise from human activities cause no significant on marine and coastal ecosystems.

  Vice versa, the Tt-CMP should be able to target the ecological objectives of the EcAp, with special reference to biodiversity (ECO 1) and its associated common Indicators: CI4 (Population abundance), CI5 (Population demographic characteristics), CI3 (Species distributional range).
- Regional Activity Centre for Specially Protected Areas (SPA/RAC) was established by the Contracting Parties to the Barcelona Convention and its Protocols in order to assist Mediterranean countries in implementing the Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean. Tunisia has been hosting the Centre since its establishment in 1985.
- 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).

- 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 common bottlenose dolphin (*Tursiops truncatus*) is listed in Appendix II since 1991, while the Black Sea bottlenose dolphin subspecies (*Tursiops truncatus ponticus*) is listed in Appendix I since 2009.
- 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 Bern 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 and IV of the Directive as a priority species requiring designation of Special Areas of Conservation.
- ACCOBAMS - Agreement on the Conservation of Cetaceans of 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 knowledge. ACCOBAMS has 24 parties which include almost all of the Mediterranean and Black Sea countries.
- Marine Strategy Framework Directive (MSFD). The MSFD is a EU directive adopted in 2008 and aimed at achieving or maintaining the Good Environmental Status in European seas and has descriptors (see below) that, similarly to the UNEP/MAP EcAp (see above), should be able to target most of the threats identified by the present CMP (again with the possible exception of the disturbance caused by pleasure boating, where a specific awareness action may be needed - see Threats and Mitigation actions sections):

  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; 2. Non-indigenous Species - Non-indigenous species introduced by human activities are at levels that do not adversely alter the ecosystems; 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; 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; 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; 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; 7. Hydrographical Conditions - Permanent alteration of hydrographical conditions does not adversely affect marine ecosystems; 8. Contaminants - Contaminants are at a level not giving rise to pollution effects; 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; 10. Marine Litter - Properties and quantities of marine litter do not cause harm to the coastal and marine environment; 11. Energy incl. Underwater Noise - Introduction of energy, including underwater noise, is at levels that do not adversely affect the marine environment.

2.2 NATIONAL LEGISLATION AND MANAGEMENT ARRANGEMENTS

To be completed (ACCOBAMS, IWC if needed, other relevant management agreements…)

Table 1 – List of Mediterranean countries in relation to main international agreements

COUNTRY	CITES	UNEP/MAP	EcAp	SPA/RAC	BERN CONV.	CMS	HABITATS DIRECTIVE	ACCOBAMS	MSFD
Portugal	X	X		X	X	X	X	X	X
Spain	X	X		X	X	X	X	X	X
France	X	X		X	X	X	X	X	X
Monaco	X			X	X	X		X	
Italy	X	X		X	X	X	X	X	X
Slovenia	X	X		X	X	X	X	X	X
Croatia	X	X		X	X	X	X	X	X
Montenegro	X	X		X	X	X		X	
Albania	X	X		X	X	X		X	
Greece	X	X		X	X	X	X	X	X
Cyprus	X	X		X	X	X	X	X	X
Malta	X	X		X	X	X		X	
Türkiye	X	X		X	X			X	
Syria	X	X		X		X		X	
Lebanon	X	X	X	X		X		X	
Israel	X	X	X	X		X		X	
Egypt	X	X	X	X		X		X	
Libya	X	X	X	X		X		X	
Tunisia	X	X	X	X	X	X		X	
Algeria	X	X	X	X		X		X	
Morocco	X	X	X	X	X	X		X	

3 BIOLOGY AND STATUS OF MEDITERRANEAN BOTTLENOSE DOLPHIN

3.1 POPULATION STRUCTURE

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 being classified in the 1960s (Hershkovitz, 1966). At today, most authors identify only two species: the common bottlenose dolphin - *Tursiops truncatus* (Montagu, 1821) - widely distributed worldwide; the Indo-Pacific bottlenose dolphin - *Tursiops aduncus* (Ehrenberg, 1833) - distributed in coastal areas of the Indo-Pacific Ocean (Ross and Cockcroft, 1990; Hale *et al*., 2000; Moura *et al*., 2013, 2020). Within the species *Tursiops truncatus*, two sub-species with coastal distributions are currently listed by the SMM Committee on Taxonomy: *Tursiops truncatus ponticus*, in the Black Sea, and *Tursiops truncatus gephyreus*, in South American Atlantic coastal regions.

The divisions between several different coastal ecotypes and a globally distributed offshore ecotype, have been described by various authors in different areas of the world (e.g. Walker, 1981; Van Waerebeek *et al*., 1990; Parsons *et al*., 2006; Tezanos-Pinto *et al*., 2008; Mirimin *et al*., 2011; Louis *et al*., 2014; Chen *et al*., 2017; Bayas-Rea *et al*., 2018; Segura-García *et al*., 2018). This separation is particularly marked in the Atlantic coast of North America, where separation has been detected by several ecological, physiological and genetic measures (e.g. Duffield *et al*., 1983;

Hersh and Duffield, 1990, Mead and Potter, 1995; Hoelzel, 1998; Torres *et al*., 2003; Moura *et al*., 2013; Moura *et al*., 2020).

According to Notarbartolo di Sciara and Demma (1994), the Mediterranean population is more akin to the coastal ecotype, while Cañadas *et al*. (2002), reporting the distribution of this species in the Alboran Sea, suggest a closer link with the Atlantic pelagic ecotype. This apparent contradiction could in fact derive from the different ecological habits of the dolphins that inhabit the Alboran Sea (Gnone *et al*., 2022).

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. Moore (2020) found a similar pattern based on genomic (3500 neutral RADseq) markers.

Gaspari *et al*. (2015a, 2015b) noted that samples from deeper parts of the Mediterranean (e.g. Ionian Sea) were genetically more similar to samples from the Atlantic pelagic ecotype, and thus suggested a potential differentiation between coastal and nearshore waters also in the Mediterranean context. Further evidence for genetic differentiation within the Mediterranean were found by Gonzalvo *et al*. (2016) and Brotons *et al*. (2019).

However, the results from TursioMed, a networking project compiling census data on Mediterranean bottlenose dolphin, showed that most sightings occur within the 200 m isobath marking the border of the continental shelf, with sightings outside this limit being quite rare (despite the research effort). This habitat preference seems to be consistent in all the study areas covered by the network, except for the Alboran Sea (Gnone *et al*., 2022). It is unclear, then, to what extent the genetic differences found by Gaspari and co-authors should be correlated to ecological habits. The issue deserves further investigation and the presence of different ecotypes in the Mediterranean Sea cannot be excluded at this stage (see also Louis *et al*., 2014). Laran and co-authors reported of an offshore distribution of a large number of bottlenose dolphins detected during aerial surveys in the French territorial waters of Pelagos Sanctuary (Laran *et al*., 2017). Several offshore encounters of bottlenose dolphins were also reported by the FLT Med Net (Fixed Line Transect Mediterranean Network) but were likely linked to an opportunistic behaviour mainly performed during the spring-summer season (Azzolin *et al*., 2016).

As already reported, the bottlenose dolphins form geographical resident units, which show a certain level of behavioural specialization on the area of residence and might be considered as “behavioural types” (Vassallo *et al*., 2021), meaning a behavioural variety whose components all show similar behavioural traits, as a response to local ecological pressure and opportunities. These specialization behaviours are most probably transmitted from one generation to the next as a local tradition (culture), allowing the dolphins to better exploit the residency area and to colonize new habitats. The behavioural specialization, which is always associated with residency, could also produce a certain level of isolation (Gnone *et al*., 2011; Carnabuci *et al*., 2016), possibly producing the genetic fine-scale structure described by Gaspari *et al*. (2015a, 2015b).

Information gaps/needs

The single geographic units of bottlenose dolphin, being the basic target of the CMP effort, should be identified, together with the level of genetic differentiation (if any). This could be achieved by improving the efficiency of the stranding network to obtain samples and implementing biopsy campaign on different geographical units within the Mediterranean Sea.

3.2 DISTRIBUTION, MIGRATION AND MOVEMENTS

3.2.1 Distribution

The bottlenose dolphin is considered a regularly present species in the Mediterranean basin (Pilleri and Gihr, 1969; Cagnolaro *et al*., 1983; Notarbartolo di Sciara and Demma, 1994; Bearzi *et al*., 2009). The available literature suggests that this species could be sighted over most (if not all) the continental shelf of the Mediterranean basin, wherever a proper sampling effort is performed, even if with different density.

Within the TursioMed project (Gnone *et al*., 2021; Gnone *et al*., 2022), the bottlenose dolphin is the only species whose sightings have been reported by all partners of the network, from Spain to Tunisia, mostly within the 200 isobaths marking the boundary of the continental shelf (see table 1 and figure 1). These findings seem quite consistent with the results of the ACCOBAMS Aerial Survey Initiative (ASI), although in this case the preference for the continental platform habitat is less clear (figure 2).

Information gaps/needs

There is a lack of data over a large portion of the continental platform in the southern Mediterranean, especially in the eastern basin (Libya and Egypt). It would be crucial to verify the presence of the species also in these regions.

Table 2 – The sightings of the TursioMed network (from Gnone *et al*., 2021). The bottlenose dolphin (*Tt*) is the only species sighted by all the partners of the network (the number of sightings from SEA ME Sardinia Onlus - in red - are a "false zero", since the related data had already been uploaded to the Intercet platform).

Research Group	Study area	Country	n sight.	*Tt*	*Sc*	*Dd*	*Gg*	*Gm*	*Zc*	*Pm*	*Bp*	*Sb*	*Oo*	*Pp*	*Mb*	*Ba*	*Mn*
Alnilam Research and Conservation	Alboran Sea	Spain	1402	210	470	403	35	210	44	10	20	0	0	0	0	0	0
SUBMON	Spain SE	Spain	10	10	0	0	0	0	0	0	0	0	0	0	0	0	0
Association BREACH	Gulf of Lion	France	176	95	41	2	2	1	0	0	37	0	0	0	0	0	1
EcoOcéan Institut	Med French coast	France	1845	65	1277	2	24	27	1	94	355	0	0	0	0	0	0
GECEM	French riviera, Corsica	France	443	212	148	1	11	3	0	19	49	0	0	0	0	0	0
Tethys Research Institute - Cetacean Sanctuary Research	Pelagos W	Italy	2639	31	1924	3	52	25	34	310	261	0	0	0	0	0	0
CIMA Research Foundation	Savona - Bastia Nice - Calvi	Italy-France	2086	39	1152	10	42	16	32	70	725	0	0	0	0	0	0
Università di Genova - DISTAV	Liguria E, Elba Island	Italy	49	49	0	0	0	0	0	0	0	0	0	0	0	0	0
Delfini Metropolitani	Pelagos N, Liguria E	Italy	283	233	39	4	2	0	2	2	4	0	0	0	0	0	0
CE.TU.S. Cetacean Research Centre	Tuscany	Italy	503	428	54	7	4	0	0	3	11	0	0	0	0	0	1
Università di Pisa (LIBA)	Livorno - Bastia FLT	Italy-France	330	114	160	6	2	0	0	6	44	0	0	0	0	0	0
Università di Pisa (LIGA)	Livorno - Olbia FLT	Italy	321	79	183	3	3	0	5	10	38	0	0	0	0	0	0
Accademia del Leviatano ONLUS	Rome - Barcelona FLT	Italy-Spain	1006	44	490	5	16	2	16	38	394	0	0	0	0	1	0
Oceanomare Delphis Onlus	Rome, Naples	Italy	1084	103	521	33	26	2	0	359	40	0	0	0	0	0	0
Bottlenose Dolphin Reasearch Institute	Sardinia NE	Italy	1660	1637	14	3	0	0	0	0	6	0	0	0	0	0	0
SEA ME Sardinia onlus	Sardinia NE	Italy	469	**0**	271	2	4	0	64	10	117	0	0	0	1	0	0
MareTerra Onlus	Sardinia NW	Italy	218	217	1	0	0	0	0	0	0	0	0	0	0	0	0
Associazione CRAMA	Sardinia NW	Italy	27	24	0	0	0	0	0	0	3	0	1	0	0	0	0
Ketos	Civitavecchia - Catania FLT	Italy	596	150	339	56	17	1	2	7	23	1	0	0	0	0	0
	Civitavecchia - Tunis FLT Palermo - Tunis FLT	Italy-Tunisia															
Associazione Me.Ri.S.	Agrigento	Italy	8	7	0	1	0	0	0	0	0	0	0	0	0	0	0
Università di Torino - DBios	Lampedusa Island	Italy	209	209	0	0	0	0	0	0	0	0	0	0	0	0	0
Morigenos	Gulf of Trieste	Slovenia	456	456	0	0	0	0	0	0	0	0	0	0	0	0	0
Gaia Research Institute Onlus	Ancona - Patras FLT	Italy-Greece	98	49	47	0	0	0	2	0	0	0	0	0	0	0	0
Thalassa	Ionian Greece, Gulf of Corinth	Greece	175	36	128	17	1	0	0	0	0	0	0	0	0	0	0
Tethys Research Institute - Ionian Dolphin Project	Gulf of Ambracia	Greece	859	838	5	16	0	0	0	0	0	0	0	0	0	0	0
Marine Mammal Research Association - DMAD	Montenegro coast	Montenegro	163	113	1	19	0	0	4	0	0	0	0	26	0	0	0
	Boshporus, Turkey coast SW	Turkey															
Istanbul University and Turkish Marine Research Foundation	Turkey coast W	Turkey	114	63	29	21	2	0	0	1	0	0	0	0	0	0	0
	Beirut	Lebanon															
the Tunisian Dolphin Project	Bizerte	Tunisia	39	39	0	0	0	0	0	0	0	0	0	0	0	0	0

Figure 1 - Bottlenose dolphin sightings (5,550 points) shared on the Intercet platform within the TursioMed project (from Gnone *et al*., 2021).

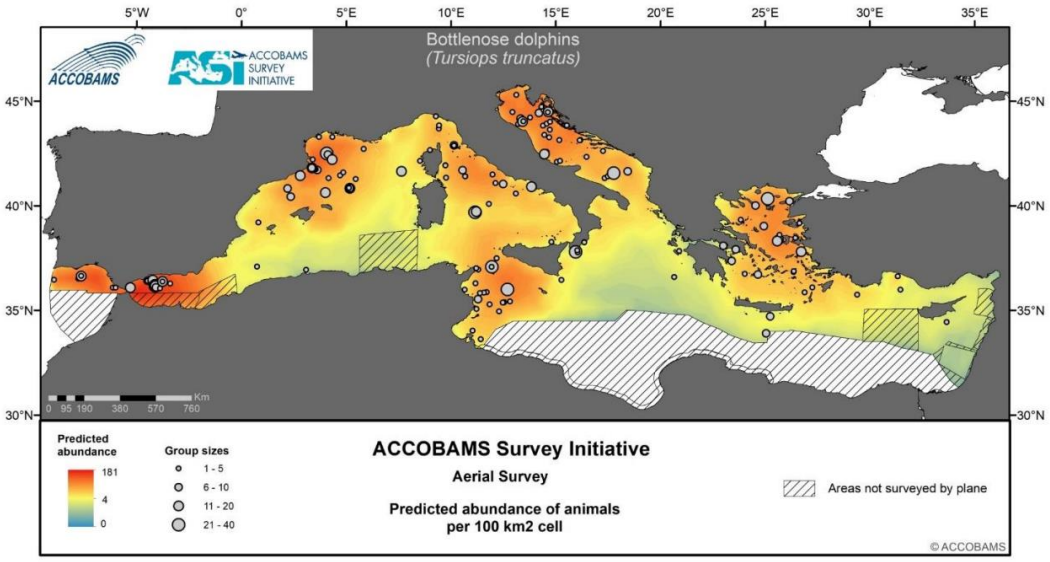

Figure 2 – Predicted abundance of bottlenose dolphin according to the ASI (Aerial Survey Initiative) from ACCOBAMS (ACCOBAMS, 2021).

3.2.2 Habitat

As already reported, the bottlenose dolphin, in the Mediterranean context, can be found mostly within the bathymetric border of the continental platform (Bearzi *et al*., 2009). Genetic investigations, however, seem to suggest the presence of two ecotypes of bottlenose dolphin, coastal and pelagic, also in the Mediterranean Sea, as reported in the Atlantic (see the section Population structure). However most recent studies, based on sightings localization on a large scale and photo-ID data, strength the idea that the bottlenose dolphin finds its privileged habitat on the continental platform (figure 3), while sightings in deeper waters seem to be occasional (Gnone *et al*., 2022). This pattern appears quite consistent in most of the areas sampled, except

for the Alboran Sea, where bottlenose dolphins are sighted with good success also in deeper waters (Cañadas *et al*., 2005).

Within the continental platform, the bottlenose dolphin can inhabit a large variety of habitats, such as rocky coasts, large sandy platforms, archipelagos, enclosed seas, lagoons, etc. (Bearzi *et al*., 2009), including highly anthropized contexts such as ports and channels (Akkaya Baş *et al*., 2018). This variety in the habitat choice seems to be relate to high levels of site-fidelity and behavioural plasticity, which produce a local specialization on the residency habitat (Gnone *et al*., 2011; Vassallo *et al*., 2020), and should be considered as a characteristic feature of the species. The local specialization (mainly in feeding techniques) can produce a segregation between neighbouring dolphins and a clusterization of the (meta)population in geographical units or subpopulations (Gnone *et al*., 2011; Gnone *et al*., 2022). The connectivity through the units seems to retrace the landscape traits and its habitat breakages (Carnabuci *et al*., 2016; Vassallo *et al*., 2020).

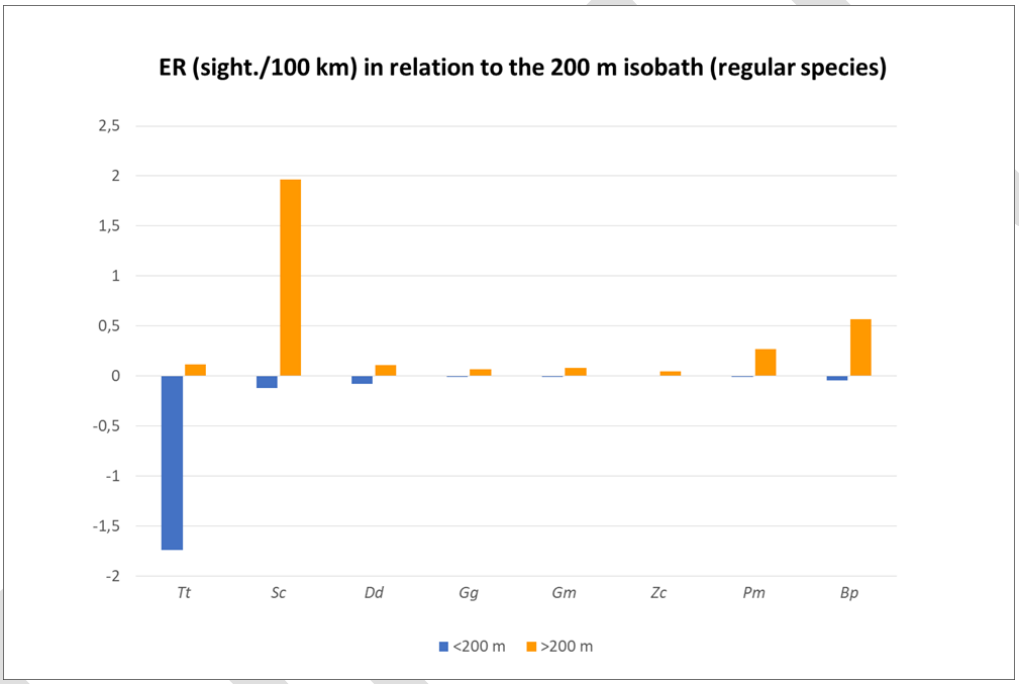

Figure 3 – Encounter rate (sightings/100 km) outside the continental shelf border (>200 m isobath) and within it (<200 m isobath). Tt: *Tursiops truncatus* - Sc: *Stenella coeruleoalba* - Dd: *Delphinus delphis* - Gg: *Grampus griseus* - Gm: *Globicephala melas* - Zc: *Ziphius cavirostris* - Pm: *Physeter macrocephalus* - Bp: *Balaenoptera physalus* (from Gnone *et al*., 2021).

These findings are fundamental when designing a proper conservation and management plan, as the single geographical units show different and peculiar local specialization (depending on the physiographic and ecological traits of the residence area and the anthropic activities developed on site) and should be considered as the first target for conservation.

Information gaps/needs

Collection of (genetic) samples on stranded and free ranging individuals, coupled with the photo-ID data, could help to better understand the possible genetic differentiation of the Mediterranean bottlenose dolphin in relation to the habitat and the area of residence.

3.2.3 BEHAVIOURAL ECOLOGY

Bottlenose dolphins are found in a wide variety of habitats and this diversity in habitat preference is associated with a remarkable flexibility in feeding behaviours. Bottlenose dolphins can 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 environmental changes. The plasticity in foraging behaviour is accompanied with 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 obtain fish from trawlers, gillnets and aquaculture fish cages, which can become 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 (Barros and Odell, 1990; Corkeron *et al*., 1990; Fertl and Leatherwood, 1997; Bearzi *et al*., 1999; Chilvers and Corkeron, 2001; Pace *et al*., 2003; Lauriano *et al*., 2004; Diaz Lopez, 2006, 2019; Brotons *et al*., 2008; Gonzalvo *et al*., 2008; Buscaino *et al*., 2009; Blasi and Boitani, 2012; Milani *et al*., 2017a; Genov *et al*., 2019a; Milani *et al*., 2019; Papale *et al*., 2020; Buscaino *et al*., 2021).

Gill-net fisheries and finfish aquaculture introduced spatial habitat complexity and fragmentation, leading to an increase in food availability for bottlenose dolphins, either directly, though anthropogenic food (e.g., farmed fish and fish entangled in gillnets, Díaz López, 2006; 2017; 2019), but also indirectly in the form of modified habitat that could be favourable for feeding (e.g., increase input of nutrients from aquaculture activities: Díaz López *et al*., 2008; Piroddi *et al*., 2011).

Information gaps/needs
The opportunistic interaction between bottlenose dolphins and fishing gears is a common problem in many areas of the Mediterranean Sea. Nevertheless, the real extension of this problem (both in space and time) and the economic consequences on the fishing industries are still largely unknown. Proper mapping and monitoring of this phenomenon in space and time, also with the aid of automatic acoustic devices, would be necessary and could help find strategies to mitigate the conflict with fishermen.

3.2.4 HOME RANGE AND MOVEMENTS

Most of the studies based on photo-identification data are consistent in describing the bottlenose dolphin as a resident species. As already described in the previous sections, this species colonizes the continental platform forming resident geographical units whose connectivity appears to be related to geographical and ecological distance (Carnabuci *et al*., 2016).

The physiographic characteristics of the area of residences seem to affect the home range and the group size of the different geographical units: in areas characterised by a wide continental platform, dolphins have wider home ranges and aggregate into larger groups, while in areas characterized by a narrow continental platform dolphins show much smaller home ranges and aggregate into smaller groups, possibly as a strategy to better exploit the local food resources (Gnone *et al*., 2022).

According to Gnone *et al*. (2011), studying the bottlenose dolphin in the context of the Pelagos Sanctuary, the dolphins here perform maximum movements of about 50 kms(on average), but a minority of individuals (the so called "long travellers"), can travel over 400 km. Bearzi *et al*. (2011) described 9 bottlenose dolphins who travelled 265 km in western Greece, confirming that some individuals can move outside the usual area of residence. These "long travellers", despite being a

minority, might represent a means of continuity between the different geographical units (Carnabuci *et al*., 2016).

Information gaps/needs

Each management unit should be described in terms of site-fidelity, area of residence, home range and connectivity with the neighbouring units. The data aggregation on a common platform such as Intercet (www.intercet.it) has proven to be a valuable strategy to improve our knowledges in this regard. This kind of networking experience should be encouraged to complete the picture, including new partners in the network and implementing field research campaign in poorly covered areas (see actions COORD-02, RES-01, RES-02, RES-03).

3.3 BASIC BIOLOGY

3.3.1 Feeding

The shallow water preference of the bottlenose dolphin in the Mediterranean waters could 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; Mioković *et al*., 1999; Blanco *et al*., 2001; Giménez *et al*., 2017; Milani *et al*., 2017a).

Bottlenose dolphin preys include the hake (*Merluccius merluccius*) and a variety of other fish species (*Diplodus annularis, Pagellus erythrinus, Spicara flexuosa, Lesurigobius sp.*) and cephalopods (*Eledone cirrhosa*) (Scuderi *et al*., 2011).

As already reported, bottlenose dolphins can include in their feeding habits the opportunistic exploitation of gillnets, trawlers, and fish cages. These opportunistic strategies can become predominant in the feeding economy of the dolphins, triggering conflict with fishermen (see Behavioural ecology section).

Information gaps/needs

Research on the stomach contents of stranded dolphins may be very useful to better know the feeding habits of the bottlenose dolphins in the different seasons and geographical contexts and should be increased and extended on a wider range.

3.3.2 Life history

Bottlenose dolphins are quite long-lived animals. Studies on dentin and cementum rings (Hohn *et al.*, 1989) have shown that females can live more than 57 years, while males up to 48 (Wells and Scott, 1999). The age at which females begin to reproduce varies from individual to individual (Connor *et al.,* 2000), but sexual maturity generally occurs between 7 and 12 years of age (Mann *et al*., 2000). The males, on the other hand, mature around the age of 13 years (Wells and Scott, 2009).

Once sexual maturity is reached, the female bottlenose dolphin seems to remain fertile for the entire duration of its life (Cockroft and Ross, 1990), as individuals up to 48 years of age have given birth to young and have successfully raised them (Wells and Scott, 1999). As for males, paternity tests in Florida have shown that individuals can produce offspring between 13 and 40 years of age (Duffield and Wells 2002; Wells, 2003).

Gestation lasts just over a year: 12.3 months or 347 days (Cockroft and Ross, 1990). Bottlenose dolphins, like all cetaceans, in which twin births are very rare, give birth one offspring at a time (Mann *et al*., 2000), but if the baby dies premature, the female is immediately ready for a new gestation (Cockroft and Ross, 1990; Mann *et al*., 2000).

There are very few studies investigating the reproductive parameters of the bottlenose dolphin in the Mediterranean Sea. According to Rossi *et al*. (2017), analysing the data of a long-lasting research program in the eastern Ligurian Sea, the fertility rate was 0.29-0.41, the calving interval 2.45-3.45 years, and the cub mortality rate (the mortality rate within the first year) 0.25.

Information gaps/needs

Research investigating the reproductive parameters are very important to assess the conservation status of the management units and to evaluate their resilience to mortality events. It would be crucial to extend and increased these kinds of studies.

3.4 ABUNDANCE AND TRENDS

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*. (2009) 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. However, more recent studies suggest these estimates could be over conservative.

Fortuna *et al*. (2013) estimated a total of 10,000 bottlenose dolphins only in Italian waters, while according to Gnone *et al*. (2021), analysing the data coming from the TursioMed network, the Mediterranean (meta)population of bottlenose dolphins might exceed the 15.000 individuals (more conservative estimate) and could reach 40.000 individuals. This last estimate appears more consistent with the ASI results (ACCOBAMS, 2021), estimating about 60,000 individuals of bottlenose dolphin in the Mediterranean basin (57,120 individuals with Model-base analysis, 63,398 with Design-based analysis). However, all these estimates still present significant uncertainties and must be taken with due caution.

Table 3 summarizes some independent abundance estimates for different management units in the Mediterranean Sea.

Table 3 - Summary of some abundance estimates of bottlenose dolphins in the Mediterranean basin (modified and integrated from Bearzi and Fortuna, 2006).

Geographic Area	**Study area** (km2)	**Sampled Area**	**Years**	**Density** (animals / km2)	**Estimate**	**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
Strait of Gibraltar	500	in- & offshore	2002-2005	0.25-0.47	123-234	-	98-158 207-265	Mark-recapture	Tenan *et al*., 2020
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
Almeria (Spain)	-	-	2010-2011	-	812	0,12	655-1039	Mh jackknife	J. L. Murcia (unpublished)
Asinara island National Park (Italy)	480 2004	inshore	2001	0.05	22	0.26	22–27	Mark-recapture (closed population)	Lauriano *et al*., 2003
North Eastern Sardinia (Italy)	750	inshore	2005 - 2013	0.016 – 0.09	12 - 68	-	12 – 13 62 – 87	Mark-recapture (Robust Pollock Open/closed population)	Díaz López 2019
North Western Sardinia (Italy)	200	inshore	2008 - 2011	0.275	55	-	45 – 70	Mark-recapture model	Díaz López et al., 2013

								(Open population)	
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	1,288	-	-	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				
Lampedusa island (Italy)	2500	in- & offshore	2003-2006	-	135 (average value for the 4 years)		**70-320**	Mark-recapture (open population)	Azzolin *et al.*, 2007
Israeli Mediterranean coast (Israel)	-	inshore	1999-2004	-	85				
Ionian Sea (Greece)	480	inshore	1993-2003	-	48				
Ionian Sea (Greece)	5500	in- & offshore	2008-2010	-	94			Mark-recapture (open population)	
Amvrakikos Gulf (Greece)	400	inshore	2001-2005	0.38	152	-	136-186		
North Aregean Sea (Greece)	2000	in- & offshore	2005-2013	-	377	18.37	289–465	Distance sampling & GAMs	Milani *et al.*, 2017b
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 Adriatic Sea (Kvarneric, Croatia)	2,000	inshore	2003	0.05	102				
North Adriatic Sea (Gulf of Trieste, Slovenia)	600	inshore	2002-2004	0.08	47				
Adriatic Sea		in- & offshore (aerial survey)	2010, 2013, 2019		5,700		4,300-7,600	Aerial survey	Fortuna *et al.*, 2018
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

French Mediterranean continental shelf	2,350	inshore	2013-2015				1,827-3,135	Mark-recapture (closed population)	Labach *et al*. (in press)

In relation to abundance tendency in recent years, there seem to be very few research contexts where the data available (and their continuity over time in historical series) could allow to test for significant trends.
Within the TursioMed project (Gnone *et al*., 2021), only for two geographical units the continuity of sampling (≥ 8 years) allowed to carry out a trend analysis: the small unit residing between Corsica and Sardinia and the larger unit of Liguria-Tuscany. In the first case, no significant trend emerges (2005-2013), while in the case of Liguria-Tuscany a statistically significant positive trend has been detected (2004-2016). It is important to remind that, due to the diversity of the Mediterranean basin and the different ecological contexts where the bottlenose dolphin is present, it is not possible to generalize this trend to other areas.

Information gaps/needs
As the single geographical units of bottlenose dolphin are the basic target of the CMP, the size and size trend of these units should be monitored over time. Research activity in the field should be encouraged and supported to improve the data collection. The survey effort should be strongly increased in those area poorly covered, such as the south-eastern basin, where there are virtually no data available.To detect possible trends in abundance, the management units should be monitored over time with continuity (≥ 8 years).

3.5 ATTRIBUTES OF THE POPULATION(S) TO BE MONITORED

In line with the main legislative framework (e.g. MSFD, HD, EcAp) the attribute to be monitored intends to give indication to assess the status of the population in the Mediterranean basin to be linked to the anthropogenic pressures that can adversely affect its long-term viability.

The bottlenose dolphin is distributed over the Mediterranean continental platform with distinct geographical (and demographical) units, inhabiting a certain area and with a potential local specialization on the (micro)habitat and/or the ecological context of the area of residence (including human activity). For a proper CMP implementation and monitoring it is crucial to identify these units, their area of residence (and its geographical borders), their size consistency and trend and possibly also the level of genetic differentiation. At the present time, these knowledges are partially available only for a few geographical units. Great effort should be implemented to increase the data coverage on a Mediterranean level.

Attributes to be monitored:

MONITORING THE SPECIES

- Distribution of the target species including habitat characteristics.
- Abundance estimates and trend of the geographical units under observation, using mark recapture technique where possible or other methods (distance sapling).
- Demographic parameters (reproduction, survival rate, migration).
- Stranding monitoring and necropsy to detect the cause of mortality.

MONITORING HUMAN ACTIVITY AND THREATS

- Fishing effort
- Bycatch
- Vessel traffic (pleasure boating)
- Noise
- Chemical pollution

4 SUMMARY OF ACTUAL AND POTENTIAL ANTHROPOGENIC THREATS

4.1 ACTUAL AND POTENTIAL ANTHROPOGENIC THREATS

The bottlenose dolphin, thanks to its behavioural flexibility and opportunistic habit, was able to adapt to a changing environment, with an increasing anthropogenic presence, to survive to the present day. Still, it is possible to identify potential threats to its good conservation status, based on literature available and precautionary principles. We should consider, however, that it is quite difficult to measure the long-term impact of an underhand threat such as prey depletion or chemical pollution.

Table 4 - 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
HABITAT CHANGE, REDUCTION AND FRAGMENTATION	MARITIME TRAFFIC	HIGH	REDUCTION OF EXPLOITABLE HABITAT	HIGH	RES-01, RES-02, RES-03, RES-04, MON-01, MON-02, MIT-01, MIT-01
OVERFISHING AND PREY DEPLETION	OVERFISHING	HIGH (for some species)	PREY DEPLETION	HIGH	RES-01, RES-02, RES-03, RES-04, MON-01, MON-02, MIT-01, MIT-01
CONFLICT WITH FISHERMEN AND COASTAL AQUACULTURE, BYCATCH	SMALL-SCALE FISHERIES AND COASTAL AQUACULTURE	HIGH	BYCATCH (INCLUDING OBSTRUCTION), DELIBERATE KILLING	HIGH	RES-01, RES-02, RES-03, RES-04, MON-01, MON-02, MIT-01, MIT-01
CHEMICAL POLLUTANTS	INDUSTRIAL DISCHARGES, AGRICOLTURE, URBAN-WASTE, ETC.	HIGH	IMMUNODEFICIENCY, DECREASED FERTILITY, INCREASED NEONATAL MORTALITY	HIGH	RES-01, RES-02, RES-03, RES-04, MON-01, MON-02, MIT-01, MIT-01
EPIZOOTICS	URBAN-WASTE, CHEMICAL POLLUTION	HIGH	INCREASED MORTALITY OR MASS MORTALITY	MEDIUM	RES-01, RES-02, MON-01
CLIMATE CHANGES	HOME EATING, TRANSPORT, FARMS, ETC.	HIGH	HABITAT CHANGE, HABITAT REDUCTION, DECREASE OF FOOD RESOURCES, OTHERS	MEDIUM-HIGH	RES-01, RES-02, RES-03, MON-01, MON-02

Following a survey conducted in 2013 within the ACCOBAM framework (see annex 1) through the subarea coordinators, asking to rank the potential threats for the bottlenose dolphin in their area of competence, overfishing, chemical pollution, and boat traffic (including noise) were identified as the most impacting threats for the species. Conflicts with fisherman (possibly resulting in deliberate killing) and bycatch are described as a potential threat in many areas of the basin. Epidemics could represent an unpredictable phenomenon that can severely affect some demographic units or subpopulations (see table 4).

4.1.1 Habitat change, reduction and fragmentation

In the Mediterranean context the bottlenose dolphin seems to find its preferential habitat over the continental platform, being the only Mediterranean dolphin sighted mostly in shallow waters <200 m. This species can exploit all the platform waters, up to the coastline (Bearzi *et al.*, 2009;

Gnone *et al*., 2011), but the anthropogenic pressure in its privileged habitat has strongly increased in the last century, due to demographic growth and technological achievements (such as the petrol engine), which have produced a rapid improvement in the fishing, transport and tourism industries. In some touristic areas the recreational maritime traffic (pleasure crafts) can produce a (seasonal) reduction and fragmentation of the habitat potentially exploitable by the bottlenose dolphin in its vital activities, such as foraging, breeding, and nursing (David, 2002; Papale *et al*., 2011; La Manna *et al*., 2013). Especially in those areas where the continental platform is very narrow, pleasure crafts can saturate the habitat of the bottlenose dolphin, breaking its continuity and forcing animals to aggregate in other areas (Manfredini *et al*., 2007). The impact is given by acoustic pollution produced by the engines but also (and possibly more heavily) by the direct disturbance caused by the boats, especially high-speed boats. Continued vessel traffic can make it difficult to exploit a large portion of habitat, since the animals must keep continuous attention to boats to avoid collisions and harassment. The disturbance increases as the speed of the boats increases, forcing the ability of the dolphins to get safely away. However, since touristic activity is not traditionally associated to negative impact to wild animals, there is no limitation to the presence of crafts, neither limitation to their speed (with few exceptions). Even the EU Marine Strategy Framework Directive does not mention pleasure boating as a potential impact for wild marine population and no limitations are foreseen in this respect. Still the impact of pleasure crafts in some sensitive areas of the bottlenose dolphin habitat might be significant and a further (and uncontrolled) development of this human activity should be of concern in the bottlenose dolphin CMP.

Information gaps/needs:
Research on the short and long-term impact of pleasure boating on bottlenose dolphins in the different areas of residence should be encouraged.

4.1.2 Overfishing and prey depletion

Overfishing has led to a drastic reduction of some fish stocks, overexploited with new and more efficient fishing techniques, including some bottlenose dolphin preys such as the Mediterranean hake (*Merluccius merluccius smiridus*), which is usually fished with trawlers (Orsi Relini *et al*., 2002). On the other hand, the bottlenose dolphin has learned to opportunistically feed on trawlers and gillnets, taking advantage of the collection action of the net, and in some areas this opportunistic feeding has become a fundamental food intake strategy for the dolphins (see section 3.2.3 Behavioural ecology). In this context, it can be difficult to understand whether the benefit of opportunistic feeding can outweigh the negative impact of overfishing.

Information gaps/needs
The fishing effort and the fishing success should be monitored over time to detect possible overfishing phenomena. At the same time, the opportunistic behaviour of the dolphins on fishing gears (i.e. trawlers and gillnets) should be monitored and quantified to understand how much different units rely on this feeding strategy for their own sustenance.

4.1.3 Conflict with fishermen, coastal aquaculture and bycatch

Interactions between cetaceans and fisheries have been documented for centuries, and an increase in frequency and intensity has been reported in recent decades (Read *et al*., 2006). Because of their opportunistic behaviour, bottlenose dolphins may be perceived as competitors by the fishermen. Furthermore, their opportunistic action on the nets can cause damages to the fishing gear, exacerbating the conflict (Diaz Lopez, 2006; Milani *et al*., 2017a; Snape *et al*., 2018;

Milani *et al*., 2019; Giménez *et al*., 2021). Fishers can take brutal solutions to discourage the dolphins and protect their fishing activity. Deliberate killing, as the most extreme action, could impact on small demographic units.

Bycatch can also be a consequence of the opportunistic activity of dolphins on the fishing gears (Cuvertoret-Sanz *et al*., 2020) and coastal aquaculture (Díaz López and Shirai, 2007). Opportunistic behaviour on gillnets can also lead to the ingestion of shreds of net, causing the obstruction of the esophagus or digestive system (Gomerčić *et al*., 2009).

Information gaps/needs

The interactions between bottlenose dolphins and fishing gears and aquaculture should be monitored in the different management units (also with the support of passive acoustic devices), to characterise the impact on fishing activity over time and space. Fatal events, such as bycatch and occlusions, should also be monitored and quantified through stranding analysis.

4.1.4 Chemical pollutants

Preying mostly on benthic and demersal fish, bottlenose dolphins are exposed more than other cetaceans to chemical pollution from persistent organic compounds, 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; Barón *et al*., 2015a; Barón *et al*., 2015b; Genov *et al*., 2019b). These pollutants may cause a decrease of the fitness of the individual on a long term, causing immunodeficiency, decreased fertility and an increase in neonatal mortality (as the mother releases pollutants during lactation). The pollution of the food chain may therefore take part in decreasing the survival potential of the bottlenose dolphin Mediterranean (meta)population.

Physical harassment by marine litter is also cause of concern for the species and entanglement and ingestion of marine debris is reported also for bottlenose dolphin, with potential detrimental consequences, such as physical injuries, reduced mobility and predation success, digestive tract obstructions, and malnutrition (e.g. Poeta *et al*., 2017; Claro *et al*., 2019).

Information gaps/needs

Since the bottlenose dolphin tend to form discrete geographical units, scattered over the continental platform, it would be useful to map the pollution levels in the tissue of the bottlenose dolphins belonging to the different units, looking for possible differences related to the area of residence and/or feeding habits (including opportunistic feeding).

4.1.5 Epizootics

Epizootics such as Morbillivirus can cause mortality in bottlenose dolphin, especially on those individuals already debilitated by malnutrition and/or pollution persistent organic pollutants. Local demographic units could be severely impacted by these epizootic outbreaks (Birkun, 2006). Morbillivirus is known to be lymphotropic, causing potentially compromising immune response to other opportunistic infections (Van Bressem *et al*., 2014). Epidemiological studies on other Mediterranean dolphins show co-infections with other pathogens, such as *Brucella* and *Toxoplasma* (e.g. Profeta *et al*., 2015). These pathogens are commonly found in human associated

animals, and there is evidence that they can be discharged into the sea from urban and industrial runoff with high lethality to susceptible wildlife (e.g. Shapiro *et al*., 2019). Therefore, local populations showing high site-fidelity to coastal areas with high human density, could be particularly vulnerable to this type of threat.

Information gaps/needs

The data from the analysis of stranded individuals should be compared with the analysis of urban waste waters, to identify the possible anthropogenic origin of epidemic events. The data of strandings should also be integrated with those relating to connectivity between geographical units, in an attempt to predict the possible spread of infections through forecasting models.

4.1.6 Climate change

The Mediterranean is an oligotrophy sea, due to the anti-estuarine circulation of the Strait of Gibraltar, which causes an export of nutrients to the Atlantic (Huertas et *al*., 2012; Tanhua, 2013). The Mediterranean relies therefore on the main rivers for the nutrients supply, as in the case of the Rhone, which contributes to the productivity of the Gulf of Lion and north-western Mediterranean, and of the Po in the northern Adriatic Sea (Béthoux, 1981; Estrada, 1996; Notarbartolo di Sciara *et al*., 2008). According to Ludwig *et al*. (2010), in 2050 the Mediterranean could have lost more than one fourth of the freshwater flow from rivers compared to 1960, mainly because of climate change. In the sub-basins of the north, the flux of nitrates is predicted to decrease in the future, in consequence of climate change, population decrease and implementation of antipollution measures. This could negatively affect the productivity of some areas and the availability of prey for bottlenose dolphins and other cetaceans. Furthermore, the potential effects of global climate change or ocean acidification on bottlenose dolphin in the Mediterranean cannot be neglected and need further investigation and monitoring.

Information gaps/needs

The short- and long-term effect of climate changes should be investigated, both on a Mediterranean and local scale.

4.1.7 Cumulative and synergistic effects

The above sections discuss threats individually. However, some or all of them may interact temporally and/or spatially (Maglio *et al*., 2016). Cumulative and synergistic effects can be considered as the loss of suitable habitat, changes in reproduction and/or survivorship that negatively affect population dynamics as a result of repeated exposure to the same stressor(s) over time or the combined effects of multiple stressors. Developing robust ways to evaluating this is a complex problem. An ecosystem approach is needed (Pavan *et al*., 2015) to understand the complex relationship among all the components of the sea environment. Perhaps the best-developed framework to date is the Population Consequences of Disturbance (PCoD) model (New *et al*., 2014), which has been extended to consider the Population Consequences of Multiple Stressors (PCoMS) (National Academies of Sciences, 2017). This approach moves through the effects of stressors on behaviour and physiology of individuals, which are converted into effects on vital rates and therefore on population trends and sustainability. However, the approach is extremely data demanding, as it requires quantitative temporal and spatial information on cetaceans (distribution, demographics, and physiology), their prey and environment and human activities (and models linking these), and contains inherent large levels of predictive uncertainty. In view of this, the present iteration of the CMP focuses initially on addressing individual threats, whilst recognising the need ultimately to work towards evaluation of cumulative effects, should mitigation measures on the individual threats proves insufficient.

4.2 MONITORING

Monitoring is a fundamental component of the 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 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 CMP Coordinator and Steering committee.

The data collected on a local level should be aggregated in a network to produce results on a larger scale. For this purpose, the data collected in each study area could be shared and aggregated on a common Web-GIS platform, such as Intercet (www.intercet.it), which will act as a common tool for the network implementation and activity.

In the starting phase of the CMP, we should expect an inhomogeneous covering of the Mediterranean area (especially in the southern portion of the basin some areas could have no data available). However, the system should be able to monitor the data production over space/time and 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, etc.

Methodology for data collection should be normalized as possible and the results produced over time (possibly on a yearly basis) 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.

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 costs (especially in data collection) and to improve the results (as each species can work as a control for the others).

The data collected on free ranging animals should be integrated with the data coming from stranded individuals to identify and monitor death causes (bycatch, occlusions, epizootics, etc.). This will involve a further work of connection with local stranding network.

5 MITIGATION MEASURES

At the present state of the knowledge the bottlenose dolphin CMP does not identify new specific conservation measures (in addition to those already in place), 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.

However, due to the organization of the bottlenose dolphin in discrete units, with local behavioural specializations, specific management and mitigation measures may be required for certain areas/geographical unis (see Mitigation actions).

Particular attention should be paid to overfishing and recreational maritime traffic, the uncontrolled development of which could limit the ability of the bottlenose dolphin to exploit its privileged habitat.

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).

5.1 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 (enforce speed limit in the coastal zones in critical habitats of bottlenose dolphins).
   - 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 authorities.
   - Port Authorities and Coast Guard.
   - Boaters and related trade associations.
   - Whale watching operators.
   - Research organizations.
   - MPA and ASPIM.
   - NGOs.
   - Schools (see education and awareness).

c. Education, awareness and valorisation
   - Develop and promote an education and awareness campaign focused on the bottlenose dolphin 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 respectful of the sea environment and its fauna, with special focus on cetaceans and potential impact of human activity on their habitat.

5.2 OVERFISHING AND PREY DEPLETION

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.), control and prosecute illegal and destructive practices, acting at local, national and supranational level (MSFD - descript. 3, 4).

b. Stakeholder engagement
   - Local, national and supranational authorities.
   - Fishermen and related trade associations.
   - Port Authorities and Coast Guard.
   - Research organizations.
   - MPA and SPAMI.
   - NGOs.
   - Schools (see education and awareness).

c. Education, awareness and valorisation
   - Work in close relationship with fishers 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 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.

5.3 CONFLICT WITH FISHERMEN, COASTAL AQUACULTURE 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, acting at local, national and supranational level.
   - Improve the monitoring activity of the interactions between bottlenose dolphins and fishing gears/coastal aquaculture and related bycatch events.
   - Promote possible reimbursement for damaged fishing gears (after verifying the origin of the damage), acting at local, national and supranational level.
   - Promote sustainable fishing methods.

b. Stakeholder engagement
   - Local, national and supranational authorities.
   - Fishermen and related trade associations.
   - Aquaculture industry.
   - Port Authorities and Coast Guard.
   - Research organizations.
   - MPA and SPAMI.
   - NGOs.
   - 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 to be disseminated to and through the stakeholders (ecology, threats, and relationships with man).

5.4 CHEMICAL POLLUTANTS

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 SPAMI.
   - NGOs
   - Schools (see education and awareness).

c. Education, awareness and valorisation
   - Develop and promote an education and awareness campaign focused on the bottlenose dolphin 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.

5.5 EPIZOOTICS

Epidemics are quite unpredictable events (especially when caused by novel pathogens) that may affects demographic units or (sub)populations, causing the death of a certain percentage of individuals. It may be very difficult to prevent this kind of events, even if some research from striped dolphins shows that Morbillivirus epizootics have occurred with a certain regularity (i.e. Gaspari *et al*., 2019). The level and direction of dispersal should depend on the level of connectivity between neighbouring geographical units, particularly for pathogens with a direct transmission mechanism (such as Morbillivirus). It is therefore important to determine this level of connectivity between units with some degree of resolution, to possibly predict the epizootic dispersal (see also Carnabuci *et al*., 2016). However, a (sub)population in good health (in terms of the quality of the habitat, good food supply, low contaminants levels) has higher probabilities to support and overcome an epizootic 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.

5.6 CLIMATE CHANGES

In the current state of knowledge, it is very difficult to predict the short- and long-term effect of climate change on the Mediterranean bottlenose dolphin population. It is necessary to close the knowledge gap, increase the monitoring effort and develop reliable forecasting models. Based on the results, existing mitigation measures may need to be reviewed or new and more stringent ones developed, targeting other threats as well (see 4.1.7 Cumulative and synergistic effects).

6 PUBLIC AWARENESS, EDUCATION AND CAPACITY BUILDING

Public awareness and involvement are a fundamental component for promoting wildlife conservation. If citizens know the value of a species or habitat, they are also more willing to commit to contributing to its conservation. The CMP should therefore promote greater knowledge of the cetacean fauna and the awareness that it is a common heritage to be protected.

While in some Mediterranean countries there are effective educational programmes and multimedia campaigns to raise awareness about cetaceans, in many others there is a lack of such activities. There is an urgent need to fill this gap in the context of the objectives of the CMP, by activating a network of experts acting on a local level but with a common target.

Awareness-raising campaigns should also be addressed and involve local authorities and public administration, to encourage a greater commitment of resources and promote capacity building in cetacean research, monitoring and conservation.

7 EXECUTIVE SUMMARY OF ACTIONS

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.

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 three years and that an in-depth review would be conducted every six years (to match the work-programme time frame of ACCOBAMS).

7.4 IMPLEMENTATION OF THE CMP, COORDINATION, INVOLVEMENT OF STAKEHOLDERS

Experience has shown that in order to be effective, CMPs must have a recognized Coordinator, who is either hired 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. Ideally, the Coordinator should have a strong 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.

CMP are developed under the umbrella of ACCOBAMS. All relevant bodies of ACCOBAMS must be involved: strong links with the Scientific Committee, the Secretariat and regular information to National Focal Point (ACCOBAMS Res. 6.21) and other relevant stakeholders.

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 three years on a six-year cycle. 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

Coordination actions

Nr.	Action	Impor-tance	Feasibi-lity	Crossref.
COORD-01	Establishment of a cooordinator and steering committee for the CMP for Mediterranean bottlenose dolphins. *(Need to check for mutualisation with other CMP)*	ESSENTIAL	HIGH	ALL
COORD-02	Establish an interactive regional network of groups involved in Mediterranean bottlenose dolphin research and conservation. *(Need to check for mutualisation with other CMP)*	ESSENTIAL	HIGH	ALL

Public awareness and capacity building actions

Nr.	Action	Impor-tance	Feasibi-lity	Crossref.
PACB-01	Develop and implement a strategy to increase public awareness of the Mediterranean bottlenose dolphin CMP. *(Need to check for mutualisation with other CMP)*	MEDIUM	HIGH	COORD-01 COORD-02
PACB-02	Develop a strategy for building capacity where needed. *(Need to check for mutualisation with other CMP)*	HIGH	MEDIUM-HIGH	COORD-01 COORD-02 PACB-01

Research actions essential for providing adequate management advice

Nr.	Action	Impor-tance	Feasibi-lity	Crossref.
RES-01	Identify the geographical/management units of bottlenose dolphins within the Mediterranean area and characterise their areas of occurrence.	HIGH	MEDIUM-HIGH	COORD-01 COORD-02
RES-02	Estimate the abundance (and possible abundance trends) of each management unit identified in RES-01.	HIGH	HIGH	COORD-01 COORD-02 RES-01
RES-03	Develop and/or support research campaigns in poorly covered Mediterranean areas to fill bottlenose dolphin knowledge gaps in relation to RES-01 and RES-02.	HIGH	MEDIUM	COORD-01 COORD-02 RES-01 RES-02
RES-04	Identification of areas of detrimental interactions between bottlenose dolphins and human activities.	HIGH	MEDIUM-HIGH	COORD-01 COORD-02 RES-01

Monitoring actions

Nr.	Action	Impor-tance	Feasibi-lity	Crossref.
MON-01	Monitor for possible changes in the population attributes as referred to in RES-01 and RES-02 and in accordance with the ACCOBAMS LTMP.	HIGH	MEDIUM-HIGH	COORD-01 COORD-02 RES-01 RES-02
MON-02	Monitor human pressure (known and potential threats).	HIGH	MEDIUM-HIGH	COORD-01 COORD-02 RES-04

Mitigation measure actions

Nr.	Action	Impor-tance	Feasibi-lity	Crossref.
MIT-01	Wider and stricter adoption of the management and conservation measures already in place to mitigate adverse impact of anthropogenic activities.	HIGH	MEDIUM-HIGH	MON-01 MON-02
MIT-02	Assess the performance of existing mitigation measures and develop new tools to address specific needs.	HIGH	MEDIUM	RES-04 MON-01 MON-02

8 ACTIONS

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 COORD-01: ESTABLISHMENT OF A COORDINATOR AND STEERING COMMITTEE FOR THE CMP FOR MEDITERRANEAN BOTTLENOSE DOLPHIN

DESCRIPTION OF ACTION

- **Specific objectives:** (1) to ensure timely progress is made on implementation of the CMP and the specific actions described in it, and (2) 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 its range.
- **Rationale:** this CMP requires considerable coordination for it to be effective. Its 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.
- **Methods:** appointment of a suitably qualified Coordinator and Steering Committee (initially an interim Steering Committee and later the final Steering Committee) with the required logistical and financial support. The Tasks for the coordinator and interim steering committee are provided below.
- **Timeline:**

	WHAT	WHO*	WHEN (starting month being 0)
(1)	Identification of a host institution for the CMP Coordinator and agreement on hosting conditions	CMP Interim Steering Committee (CMP-ISC)	0-3 months
(2)	Development of detailed job description for the Coordinator and conditions of work based on the tasks outlined below	CMP-ISC, ACCOBAMS Secretariat	0-3 months
(3)	Identification of source of initial funds	CMP-ISC	0-12 months
(4)	Recruitment of CMP Coordinator (initial 3-year contract)	CMP-ISC	15 months
(5)	Development of proposed terms of reference and *modus operandi* for the CMP Steering Committee (CMP-SC)	ACCOBAMS, IWC, CMP-ISC, funders	15-18 months
(6)	Appointment of CMP-SC	ACCOBAMS, IWC, CMP-ISC, funders and CMP Coordinator	21 months
	* In each case with assistance from the ACCOBAMS Secretariat if required		

- **Tasks of CMP for Mediterranean Bottlenose Dolphins Coordinator in conjunction with the Steering Committee (with assistance from the ACCOBAMS Secretariat as required):**
    - To assess the need for the establishment of sub-area and/or national coordinators for the implementation of the Mediterranean Bottlenose Dolphin CMP based upon the identified units-to-conserve, recognising that the definition of such management units will take some time (RES-01).

- 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 (and see COORD-2).
- To liaise with ACCOBAMS and its Scientific Committee to ensure appropriate interactions at regular intervals, including provision of data/results from the various actions to facilitate integration of the information on dolphins and humans to determine the timing of the periodic (normally every 6 years but potentially earlier if a need is identified) expert reviews of the CMP and the development of new or modified actions or recommendations to the ACCOBAMS Meeting of Parties as appropriate.
- To liaise with relevant authorities to facilitate any permitting required to undertake Actions of the CMP.
- To produce concise annual progress reports on the implementation of the CMP for all stakeholders.
- To promote and explain the CMP and progress with its implementation to 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 an ACCOBAMS Mediterranean Bottlenose Dolphin CMP Fund including, where necessary, assigning contracts to ensure that the Actions of the CMP are undertaken and completed.
- To maintain and update the existing list of international and national regulations and guidelines relevant to the conservation of Mediterranean bottlenose dolphins.
- To work with the ACCOBAMS Secretariat to provide information for a web page on the Mediterranean Bottlenose Dolphin CMP within a section of the ACCOBAMS website dedicated to CMPs as a resource for researchers, stakeholders and the general public.

BUDGET CONSIDERATIONS

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

ACTORS

- **Responsible for coordination of the action:** initially the IMedTtSC, then the coordinator and the IMedTtSC and finally the coordinator and the MedTtSC, with assistance from ACCOBAMS [and IWC]
- **Stakeholders**: as listed above under 'Tasks'.

EVALUATION

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

PRIORITY

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

ACTION COORD-02: ESTABLISH AN INTERACTIVE REGIONAL NETWORK OF GROUPS INVOLVED IN MEDITERRANEAN BOTTLENOSE DOLPHIN RESEARCH AND CONSERVATION[1]

Coordination Action Priority: High

DESCRIPTION OF ACTION

- **Specific objectives**: (1) establish an interactive regional network of research groups involved in bottlenose dolphin research, conservation, and public awareness; (2) facilitation of data exchange and research cooperation between neighbouring regions and public awareness initiatives; (3) support the existing research units of the network and facilitate (also with training activities) the genesis of new research units in the areas not covered.
- **Rationale:** as the bottlenose dolphin is a widely distributed species (forming discrete geographical units, with local characteristics and threats), it is essential to have all of the regional groups that collect/hold data on a local level and raise local public awareness, connected in a collaborative network. Networking/data sharing/collaboration is essential for effective conservation of the species throughout the Mediterranean.
- **Target:** Involve local research units to establish a network that will enable the aims of the CMP and individual action to be most effectively met and implemented.
- **Methods:** Members of the network will agree to share the CMP aims (see RES-01, RES-02, RES-04, MON-01, MON-02, MIT-02) and follow agreed protocols for data collection, sharing and analysis (taking into account local situations as appropriate). Members will collect data to target the research objectives (RES-01, RES-02, RES-04) and monitoring objectives (MON-01, MON-02). It is essential for effective conservation that data are shared and cooperatively analysed in an aggregated form - the value of uploading data on a common platform (such as Intercet, www.intercet.it), with appropriate data safeguards, will be evaluated. The members of the network will also be involved in the implementation of PACB actions on a local level (see PACB-02).
- **Timeline:**

	WHAT	WHO	WHEN (starting month being 0)
(1)	Draft an initial MoU to be discussed and approved by the potential network membership	CMP Coord., CMP-SC and ACCOBAMS secretariat	15-22 months (after recruitment of CMP Coord. and CMP-SC)
(2)	Confirmation of network membership (MoU signing)	CMP Coord. and CMP-SC, ACCOBAMS Secretariat	22-28 months
(3)	Identification of need for and source of initial funds	CMP Coord. and CMP-SC, ACCOBAMS Secretariat	15-28 months
(4)	First Workshop/Training to agree on common protocols for data collection, data sharing and analysis.	CMP Coord. and CMP-SC, ACCOBAMS Secretariat	30 months

[1] **NB: Given the potential overlap with research groups for other species within the region, including those with actual or potential CMPs such as the common dolphin, it is important that the relevant Steering Committees work together, as much of the work (and many of the research groups) will be very similar if not identical. For practical purposes to maintain the internal completeness of each CMP, each draft CMP will keep its own Action along with this footnote.**

(5)	Develop a template and elaborate the first periodic (annual) report	CMP Coord. and CMP-SC, ACCOBAMS Secretariat	30-36 months

- **Tasks of CMP for Mediterranean Bottlenose Dolphins Coordinator in conjunction with the (Interim) Steering Committee (with assistance from the ACCOBAMS Secretariat as required):**
    - Draft of the MoU for the members of the network (1) (with assistance from ACCOBAMS Secretariat).
    - List of potential members of the CMP network to be contacted (with assistance from ACCOBAMS Secretariat).
    - Identification of need for and source of initial funds (3) (with assistance from ACCOBAMS Secretariat).
    - Organization of the first Workshop/Training (4) to agree on common protocols for data collection, data sharing and analysis (with assistance from ACCOBAMS Secretariat).
    - Periodic (annual) report.
    - To assist with fund raisings.

BUDGET CONSIDERATIONS

- Costs for hosting the first Workshop/Training (4).
- Costs for supporting data uploading on the common platform.

ACTORS

- **Responsible for coordination of the action:** Relevant CMP Coordinators and interim Steering Committees in collaboration with the ACCOBAMS secretariat.
- **Stakeholders**: local research units being able to provide data to target RES-01, RES-02, RES-04, MON-01, MON-02. Local groups being able to support PACB-02, MPAs, WW companies, “ARPA”, others.

ACTION EVALUATION

- Evaluation by Relevant Coordinators and SC
    - Number of members actively participating to the network (annual report)
    - Distribution of the units in the network (annual report)
    - Data flow to the common platform (annual report)
    - Data covering on a Mediterranean level (annual report)

PRIORITY

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

ACTION PACB-01: DEVELOP (AND SUBSEQUENTLY IMPLEMENT) A STRATEGY TO INCREASE PUBLIC AWARENESS OF THE MEDITERRANEAN BOTTLENOSE DOLPHIN CMP[2]

Coordination Action Priority: High

DESCRIPTION OF ACTION

- **Specific objective:** Raise awareness throughout the Range States on the existence of the Bottlenose Dolphin CMP with the objective of achieving or maintaining favourable conservation status.
- **Rationale:** While in some Mediterranean countries there are effective educational programmes and multimedia campaigns to raise awareness about cetaceans, in many others there is a lack of such activities. There is an urgent need to fill this gap in the context of the objectives and prioritised actions of the CMP, several of which require collaboration of stakeholders (see below). Informing the relevant stakeholder groups is crucial to fully implement the conservation measures presented in this CMP.
- **Target**: The main targets of the awareness campaign include, in no specific order: the general public; schools and educational centres; NGOs; whale watching/dolphin watching operators and nautical tourism companies; shipping companies; marina and port authorities; fishing industry (large and small scale); oil and gas companies; Coast Guards and navies, local authorities. This action is to be executed by professionals and experts in communication and consideration should be given to the development of a dedicated central website (see Actions COORD-01 and COORD-2).
- **Methods:** An overall common strategy will be tailored specifically for each State and target audience, including the production of education and awareness materials providing key information on the species, its ecology and conservation needs, latest research findings, as well as guidelines on how to behave when encountering them at sea or stranded. A dedicated workshop of experts will be organized to develop the appropriate strategy.

  The workshop will:
  - Identify issues to be addressed and identification of the target groups in each state.
  - Review/evaluate previous education and awareness tools/campaigns to assist in identifying priority actions and materials to be developed, in accord with the various stakeholder groups and national requirements.
  - Identify most appropriate communication channels by stakeholder groups and national requirements, including consideration of a central resource website (see COORD-01).

[2] **NB: Given the potential overlap with actual or potential CMPs for other species within the region, it is important that the relevant Steering Committees work together, as much of the work will be very similar if not identical. For practical purposes to maintain the internal completeness of each CMP, each draft CMP will keep its own Action along with this footnote.**

- Develop a prioritised list of actions to implement (and evaluate the effectiveness) of the strategy, including resources required (personnel and costs) and a mechanism to update the strategy as necessary.

Workshop participants should include:

- Relevant CMP Coordinators and Steering Group members.
- Representatives of the stakeholder groups.
- Communication and public awareness professionals.
- Scientists familiar with the CMP.
- Researchers/groups with experience in developing existing awareness campaigns (including use of citizen science).

- **Timeline:**

	WHAT	WHO	WHEN (starting month being 0)
(1)	Preparation for an expert workshop to develop the strategy	CMP Coord., CMP-SC, ACCOBAMS Secretariat	15-24 months (after recruitment of CMP Coord. and CMP-SC)
(2)	Workshop to develop the strategy and a prioritised list of actions	CMP Coord., workshop participants, ACCOBAMS Secretariat	30 months
(3)	Execution of the actions defined by the strategy established by workshop in agreement with all participants	National and regional organizations identified during workshop in coordination with CMP Coord. and CMP-SC	Timeline to be established at workshop

- **Tasks of CMP for Mediterranean Bottlenose Dolphins Coordinator in conjunction with the (Interim) Steering Committee (with assistance from the ACCOBAMS Secretariat as required):**
  - Preparation for an expert workshop to develop the strategy (1) (with assistance from ACCOBAMS Secretariat).
  - Coordination of the actions defined by the expert workshop (3) in conjunction with regional organizations (with assistance from ACCOBAMS Secretariat).
  - To assist with fund raisings.

BUDGET CONSIDERATIONS

- Costs associated with preparatory materials and holding of a workshop (1, 2).
- Costs associated with the implementation of the action (3)

ACTORS

- **Responsible for coordination of the action:** Relevant CMP Coordinators and Steering Committees in collaboration with the ACCOBAMS secretariat.
- **Responsible for carrying out the action:** To be determined at workshop for each state/stakeholder group.

ACTION EVALUATION

- ACCOBAMS, IWC
- Feedback system built into materials, on the basis of the number of subjects reached and the effectiveness of the communication on each subject (i.e. verification questionnaires).

PRIORITY

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

ACTION PACB-02: DEVELOP A STRATEGY FOR BUILDING CAPACITY WHERE NEEDED[3]

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

DESCRIPTION OF ACTION

- **Specific objective**: to develop a strategy or strategies consistent in message but specific to each range State and key stakeholders, for the timely production of a series of resources to build capacity of range states on data collection, analysis and design and implementation of conservation measures for bottlenose dolphins.
- **Rationale:** long-term systematic programmes to collect and analyse data on cetacean population attributes, human threats and mitigation and management measures are required to implement the CMP and meet national and international commitments but are not uniformly distributed throughout the Mediterranean Sea. This action will complement (and be undertaken in conjunction with) other actions including COORD-01, COORD-02, RES-01, RES-02, RES-03, RES-04, MON-01, MON-02 to identify those areas where specific targeted and focused capacity building measures are needed.
- **Target:** to develop a strategy and initiatives to produce a variety of targeted research and management resources that will inform representatives of national authorities and other targeted stakeholders on the status of Mediterranean bottlenose. This will include provision of resources to both establish new long-term projects and strengthen the existing ones, to facilitate the implementation of national and international research and conservation priorities, including those listed in the CMP.
- **Methods:** Specific research and management resources, ranging from basic to more advanced, will be provided both through theoretical lessons and practical sessions. To achieve this the CMP Coordinators and SC, taking into account the work being undertaken under the actions listed in the Rationale above, will oversee preparations for a small expert working group to determine a strategy for developing and disseminating building capacity materials, including:
  - Identification of priority target groups, by range state where appropriate, and identification of who will benefit from the capacity building actions and resources.
  - Identification of existing/development of new research and management training modules/materials for cetaceans in general, with a specific emphasis on bottlenose dolphins, including, but not limited to, data collection, storage and analysis, policy and management frameworks. Consideration should be given to whether, and if so how, this material needs to be modified for any of the priority target groups.

  Working group members should include:
  - Coordinator of the CMP and representatives of the stakeholder Steering Committee.
  - Experts familiar with the Mediterranean bottlenose dolphin situation and familiar with other relevant actions (see list under Rationale)
  - Experts familiar with the research, management and conservation resources considered.

[3] **NB: Given the potential overlap with actual or potential CMPs for other species within the region, it is important that the relevant Steering Committees work together, as much of the work will be very similar if not identical. For practical purposes to maintain the internal completeness of each CMP, each draft CMP will keep its own Action along with this footnote.**

- **Timeline:**

	WHAT	WHO	WHEN (starting month being 0)
(1)	Identification of priority target groups, by range state where appropriate	CMP Coord., CMP-SC (CMP-ISC), experts	15-24 months (after recruitment of CMP Coord. and CMP-SC)
(2)	Identify potential resources (e.g., ACCOBAMS Training Modules, University courses, internships) within and outside the Mediterranean	CMP Coord., CMP-SC (CMP-ISC), experts	24-28 months
(3)	Identification and *modus operandi* for a small expert working group to develop a strategy for building capacity, including identification of existing materials and development of new materials (and trainers) by range state and target group, measures to review success in light of agreed objectives	CMP Coord., CMP-SC working group of experts	28-34 months
(4)	Implement the strategy and dedicated actions agreed under (3) following an established timeline (probably a staged process)	CMP Coord., CMP-SC working group of experts, trainers	36 months ongoing
(5)	Assess and if needed update strategic plan according to indicators	CMP coordinator, CMP Steering Committee (CMP-SC)	48 months

- **Tasks of CMP for Mediterranean Bottlenose Dolphins Coordinator in conjunction with the (Interim) Steering Committee (with assistance from the ACCOBAMS Secretariat as required):**
    - Coordination of activities (1-5) as described in the above table.
    - To assist with fund raisings.

BUDGET CONSIDERATIONS

- Costs associated with preparatory materials and holding of training sessions, both online and in situ (2, 3).
- Costs associated with the implementation of the action (4)

ACTORS

- **Responsible for coordination of the action:** CMP coordinator and CMP-ISC to identify and establish the expert working group
- **Responsible for carrying out the action:** working group
- **Stakeholders**: to be determined

ACTION EVALUATION

- ACCOBAMS, IWC.
- Feedback system built into materials, on the basis of the subjects reached and the effectiveness of the communication on each subject (i.e. verification questionnaires).

PRIORITY

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

ACTION RES-01: IDENTIFY THE GEOGRAPHICAL/MANAGEMENT UNITS OF BOTTLENOSE DOLPHINS WITHIN THE MEDITERRANEAN AREA AND CHARACTERISE THEIR AREAS OF OCCURRENCE

Research Action *Priority: HIGH*

DESCRIPTION OF ACTION

- **Specific objective**: Identify appropriate management units (units-to-conserve) for bottlenose dolphins throughout the Mediterranean Sea as the basis for the evaluation of status, threats and mitigation measures and evaluate the extent of any connectivity between Mediterranean individuals with those from the Black Sea and contiguous Atlantic waters.
- **Rationale**: Bottlenose dolphins are widely distributed throughout the Mediterranean Sea but there is sufficient evidence (e.g., from analysis of photo-identification and other data) that these dolphins form relatively small, broadly demographically isolated groupings that are the appropriate 'units-to-conserve' in order to meet the CMP objective of favourable conservation status throughout the historical range. Understanding population structure and defining management units requires a multidisciplinary approach (e.g. integrating information on spatial distribution, movements and social connectivity, feeding ecology etc. from analyses of data from photo-identification studies, sightings surveys, genetic studies, isotopic studies and acoustic studies). This is fundamental to determining workable definitions (e.g. geographical borders recognising that they are not perfect) of management units and thus effective monitoring and mitigation strategies. It should be noted that most of the available information is limited to the summer and that ideally seasonal changes in distribution should be incorporated when defining management units. Once defined, it will be possible to allow an assessment of the conservation status (e.g. see RES-02) and help to prioritise threats and monitoring and mitigation efforts in each of the different management units throughout the ACCOBAMS region (e.g. see RES-04, MON-01, MON-02).
- **Target:** Determine bottlenose dolphin management units (including characterisation to the extent possible of the habitat drivers leading to the spatio-temporal distribution) within the Mediterranean Sea (and potential links with the Black Sea or adjacent Atlantic waters). Given the disparity in available data throughout the Mediterranean this may be a staged process with the identification of management units in data rich areas occurring first whilst the collection of adequate data for areas with little or no data proceeds in accordance with RES-03 before management units for those areas can be determined.
- **Methods**: Existing information (see above) will be used to identify its suitability and adequacy for identifying management units and characterising habitat. Where information is lacking this will be identified and research programmes to collect the necessary data will be developed under RES-03. Experience has shown (e.g. within the IWC Scientific Committee) that an iterative approach is needed to finalise the definition of management units – even in data rich circumstances and it is likely that at least three such workshops will be needed if this action (critical to the ultimate success of the CMP) is to be completed relatively quickly.

  The proposed steps to complete this Action are:

  (1) Compilation of existing information and availability of data on the spatio-temporal distribution of the species and research effort carried out across the study area, making use of existing efforts such as TursioMed (Gnone et al., 2021), with an emphasis on trying to ensure that all of the known data for the region are made available (see COORD-02), ideally in light of an agreed protocol to provide safeguards for data owners in respect of combined analysis of the datasets. This first step will make it possible to determine (a) the areas/periods for which sufficient data are available to determine at least 'draft'

management units in some parts of the basin and (b) areas/periods in which additional sampling is necessary (RES-03).

(2) This information (and agreed analyses of the existing data) will be discussed at a first expert workshop to:

(a) determine at least 'draft' management units for bottlenose dolphins in the Mediterranean Sea where adequate data/analyses exist;

(b) develop additional analyses to help finalise the drafts at a second workshop and

(c) to assist with developing research programmes for poorly covered areas to enable management units to be defined and thus contribute to RES-03.

(3) At this first expert workshop, emphasis will be placed on receiving information from agreed (by the workshop Steering Group in conjunction with relevant scientists) analyses of:

(a) the available mark-recapture data to look at movements, connectivity, home ranges;

(b) the available sightings data with respect to spatial and temporal distribution (including gaps in these even where good effort exists);

(c) possible relationships between environmental variables and the presence/absence of bottlenose dolphins using spatial modelling techniques;

(d) enetic data to determine if genetic signals can be identified and used to provide practical information on population structure of management units, recognising that several analytical techniques and markers should be explored in light of their strength/weaknesses;

(e) analyses of other available data (e.g. isotopes and acoustics) that may provide information on management units and/or associated habitat characterisation;

(f) for each of (a)-(e) the Workshop will develop proposals for additional analyses as necessary to try to finalise management units for data rich areas at a Second Workshop;

(g) also in light of (a)-(f), the workshop will develop proposals for dedicated research to facilitate the identification of management units for data poor areas taking into account local conditions to the extent possible (in conjunction with RES-03) and recognising that a minimum of two years of data collection will be required (and probably more).

(4) Hold a second expert workshop to (a) receive the results of the analyses identified at the first workshop to try to finalise management units to be used up to the next iteration of the CMP; and (b) receive any new information for data poor areas and provide additional advice if needed.

(5) Hold a Third workshop when it is deemed that sufficient data are available and have been suitably analysed for it to be successful in identifying management units for the remainder of the Mediterranean.

- **Timeline**: This will be an iterative process with the objective of completing the work before the next iteration of the CMP. The timeline is approximate and dependent on funding and cooperation amongst data holders

	WHAT	WHO*	WHEN (starting month being 0)
(1)	Inventory of the organizations and institutions working on studies related to stock structure of bottlenose dolphins in the Mediterranean (especially but not only, photo-identification, distribution, genetics) (see COORD-2)	CMP Coord. and CMP-SC	15-22 months (after recruitment of CMP Coord. and CMP-SC)
(2)	Approach all identified in (1) with respect to data sharing/ combined analyses in the context of the CMP, ideally with an agreed data sharing protocol (see COORD-2)	CMP Coor. and CMP-ISC	22-28 months
(3)	Identification of funds for a dedicated First Workshop, list of participants, budget and expected papers/analyses/leaders	CMP Coord., CMP-SC, ACCOBAMS Secr.	15-28 months
(4)	Hold the First WS and submit report to ACCOBAMS SC	CMP Coor., CMP-SC, workshop experts and ACCOBAMS Secr.	28 months
(5)	Undertake and complete additional analyses identified at the First Workshop and report to ACCOBAMS SC	CMP Coor., analysts	28-36 months
(6)	Data collection in data poor areas following the established protocol and sampling needs developed at the First Workshop and in conjunction with RES-03	Research units in the CMP Network, other local res. units	Ongoing (up to three years of field work)
(7)	Hold Second Workshop with the objective of finalising the management units for the data rich areas and reviewing progress for data poor areas and submit report to ACCOBAMS SC	CMP Coor., CMP-SC, workshop experts and ACCOBAMS Secr.	40 months
(8)	Provide progress report for ACCOBAMS MoP including any recommended management units	CMP coordinator	48 months
(9)	Hold Third Workshop to determine, where possible, the management units for the data poor areas – the timing will depend on the success of the data collection/analyses (see RES-03)	CMP Coord. and Workshop Steering Group	Before next CMP review
(10)	Periodic review of the management units to confirm its validity	CMP Coor., CMP SC, CMP network and experts	Ongoing through the action

- **Tasks of CMP for Mediterranean Bottlenose Dolphins Coordinator in conjunction with the (Interim) Steering Committee (with assistance from the ACCOBAMS Secretariat as required):**
  - Coordination of activities (1-10) as described in the above table.
  - To assist with fund raisings.

BUDGET CONSIDERATIONS

- Costs associated with preparatory materials and holding of the workshops (5, 8, 10).
- Costs associated with data analysis and reporting (6, 11)

ACTORS

- **Responsible for coordination of action:** CMP Coor. and appointed steering committee

- **Stakeholders**: Range State Authorities, ACCOBAMS Secretariat, Local research groups, NGOs.

ACTION EVALUATION

- ACCOBAMS SC

PRIORITY

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

ACTION RES-02: ESTIMATE THE ABUNDANCE OF EACH MANAGEMENT UNIT IDENTIFIED IN RES-01

Research Action *Priority: HIGH*

DESCRIPTION OF ACTION

- **Specific objective**: Estimate the abundance of each management unit (unit-to-conserve) of bottlenose dolphins identified in RES-01 in the Mediterranean Sea.
- **Rationale**: Knowledge of abundance (and associated demographic parameters) is essential to determine a reference level as part of determining the conservation status for each management unit (See RES-01), to understand the likely effects of human activities and to apply appropriate management measures for those. This will form the basis for designing the long-term monitoring discussed under MON-01 and contribute towards the ACCOBAMS LTMP. It will also be complementary to the requests of the Barcelona Convention (IMAP) and the Habitat Directive and Marine Strategy of the EU.
- **Target:** The target of the action RES-02 are the geographical units of bottlenose dolphins (see RES-01), whose abundance will have to be estimated.
- **Methods**: Existing data will be used to estimate the abundance of the species in the different management units (through the use of different sampling techniques based on the characteristics of each geographical area: mark-recapture and distance sampling will probably be the chosen methods). This will require development of a collaborative network (see COORD-2) to share existing information (mark-recapture and distance sampling), and to establish a Mediterranean dataset (ideally through a single catalogue for photo-identification data or at least a protocol for regular cross-referencing of local catalogues). This and the development/promotion of the use of common protocols of data collection and analytical approaches will greatly assist future monitoring (see MON-01) and obtaining good data for data poor areas (see RES-03). It should be noted that the management units will not all be defined at the same time as discussed under RES-01, with units being defined first for data rich areas (expected about 3 years after the adoption of the CMP).

  The proposed steps to complete this Action are:

  (1) Compilation of existing information and availability of data about mark-recapture and distance sampling for the species in each management unit with a view to creating a collaborative network to share existing information. This is related to COORD-02 and will also assist in identifying areas where additional data are required (RES-03).

  (2) Whenever possible (taking into account management unit size and location), priority will be given to mark-recapture analyses to provide the abundance estimates by management unit (particularly since these provide an estimate of abundance of animals using the area at any time rather than the 'snapshot' provided by distance sampling surveys but also because they provide additional estimates of other population attributes for monitoring related to reproduction and survivorship).
  (3) Based on (1), great efforts should be made to develop (a) a protocol for data sharing and combined analyses of photo-identification data and (b) a regional catalogue (using existing and new data); this will provide the best way to enable prompt, robust analyses (mark recapture, movements) of not only abundance (and monitoring of abundance) but other questions directly relevant to developing and/or evaluating mitigation measures. This will be best achieved by holding an in-person workshop.
  (4) Targeted collection of new data to enable the abundance estimation for those management units in areas where information is lacking at the moment – initially this might be by distance sampling (see RES-03).

(5) Once the first management units are defined, an expert workshop will be convened to carry out the abundance estimation of each management unit. It will also be valuable to review basin wide estimates (e.g., ASI, TursioMed and the ACCOBAMS LTMP) for comparison. A similar workshop will be held when the remaining management units are defined.

- **Timeline**: This will be an iterative process

	WHAT	WHO*	WHEN (starting month being 0)
(1)	Inventory of the organizations and institutions working on the species with relevant data and identifying available datasets (see also COORD-02).	CMP Coord. and CMP-ISC	15-22 months (after recruitment of CMP Coord. and CMP-SC)
(2)	Develop a data sharing agreement/MoU and investigate the development of a single photoidentification catalogue and/or an arrangement for regular comparisons of local catalogues (see also COORD-02).	CMP Coord., CMP-ISC, potential data sharers	22-28 months
(3)	If agreement on a single catalogue is reached, plan for a small specialist workshop to develop a proposal for implementing this. Appoint workshop steering group to develop detailed agenda, list of participants and budget, ensuring participation from each defined management unit.	CMP Coord., CMP-SC, Workshop Steering Group	22-28 months
(4)	Hold expert workshop to agree abundance estimates for each management unit, this may include Integration of results from different data sources (mark-recapture and distance sampling) and analytical methods (e.g., open and closed population methods) and report to the ACCOBAMS SC.	CMP Coord., workshop steering group, potential data sharers	28 months
(5)	Submit a report about the abundance of each management unit identified to the ACCOBAMS SC.	CMP Coord., and CMP-SC	36 months
(6)	Follow steps (3), (4) and (5) whenever the remaining management units are defined.		Ongoing through the action

- **Tasks of CMP for Mediterranean Bottlenose Dolphins Coordinator in conjunction with the (Interim) Steering Committee (with assistance from the ACCOBAMS Secretariat as required):**
  - Coordination of activities (1-6) as described in the above table.
  - To assist with fund raisings.

BUDGET CONSIDERATIONS

- Costs associated with preparatory materials and holding of the workshops (5).
- Costs associated with data analysis and reporting (6)

ACTORS

- **Responsible for coordination of action:** CMP Coord., CMP-SC, appointed steering group
- **Stakeholders**: Network members (COORD-02), Range State Authorities, ACCOBAMS, IWC, NGOs.

ACTION EVALUATION

- ACCOBAMS SC

PRIORITY

- **Importance:** High
- **Feasibility:** High (once management units are defined; RES-01)

ACTION RES-03: DEVELOP AND/OR SUPPORT RESEARCH CAMPAIGNS IN POORLY COVERED MEDITERRANEAN AREAS TO FILL BOTTLENOSE DOLPHIN KNOWLEDGE GAPS IN RELATION TO RES-01 AND RES-02

Research Action Priority: HIGH

DESCRIPTION OF ACTION

- **Specific objective**: To collect data in poorly covered areas to fill the knowledge gaps required to identify management units (units-to-conserve) of bottlenose dolphins throughout the Mediterranean, characterise their areas of occurrence (RES-01) and estimate their abundance (RES-02) and ultimately monitor their status through the ACCOBAMS LTMP.
- **Rationale:** The objective of the CMP is to achieve favourable conservation status throughout the historical range of bottlenose dolphins. For several areas within the Mediterranean there is little or no information on matters required for good conservation e.g. management units, distribution and abundance - these are necessary to determine status and assist in the development and implementation of any needed mitigation measures. This action has been developed to fill those gaps either by establishing new research campaigns or supporting existing ones.
- **Target:** develop and/or support research campaigns in collaboration with national researchers, in order to fill necessary knowledge and data gaps**.**
- **Methods:** Collating of information, knowledge gaps and poorly covered areas identified in COORD-02, RES-01 and RES-02 and then developing and/or support research programmes to fill these gaps.

  This will include:
  - Identification of local research groups or the establishment of new ones as necessary (see COORD-02) to address the knowledge gaps.
  - Identification of adequate method(s) to apply to address the knowledge gaps taking into account local conditions and ACCOBAMS guidelines (e.g. initial aerial campaign especially for offshore areas, photo-ID for any identified coastal areas, see RES-01) – this may require one or a series of local workshops.
  - Identification of resources (human, platform, material, funds) to implement these methods and build capacity when necessary (see PACB-02).
  - Data collection and sharing (see COORD-02).
- **Timeline:**

	WHAT	WHO	WHEN (starting month being 0)
(1)	Collate the knowledge gaps and uncovered areas	CMP Coord., CMP-SC, CMP Network (COORD-02), local/national res. groups	15-24 months (after recruitment of CMP Coord. and CMP-SC)
(2)	Develop new and/or support existing research campaigns (may require one large or several local workshops)	CMP Coord., CMP-SC, local/national res. groups	24-36 months and ongoing
(3)	Implement these campaigns and link to COORD-02, RES-01, RES-02, MON-01, MON-02	CMP Coord., CMP-SC, local/national res.	Ongoing through the action

		groups, national institutions	

- **Tasks of CMP for Mediterranean Bottlenose Dolphins Coordinator in conjunction with the (Interim) Steering Committee (with assistance from the ACCOBAMS Secretariat as required):**
    - Coordination of activities (1-3) as described in the above table.
    - To assist with fund raisings.

BUDGET CONSIDERATIONS

- Costs associated with preparatory materials and holding of the workshops (2).
- Costs associated with data implementation of research campaigns (3).

ACTORS

- **Responsible for co-ordination of the action:** CMP Coordinator.
- **Stakeholders**: local/national research groups, national institutions.

ACTION EVALUATION

- ACCOBAMS SC
- The action will be evaluated on its capability to include new research groups/areas in the CMP Network to fill the knowledge gaps (see COOR-02, RES-01, RES-02).

PRIORITY

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

ACTION RES-04: IDENTIFICATION OF AREAS OF DETRIMENTAL INTERACTIONS BETWEEN BOTTLENOSE DOLPHINS AND HUMAN ACTIVITIES.

Research Action Priority: HIGH

DESCRIPTION OF ACTION

- **Specific objective**: Identify the areas where detrimental interactions between the bottlenose dolphin and human activities occur or are likely to occur.
- **Rationale:** Given that interactions between bottlenose dolphins and human activities (such as fishing, fish farming, recreational boat traffic, coastal development, etc.) are likely to negatively impact the conservation status of at least some management units, it is imperative to understand where, how and at what level these interactions occur, as well as whether these interactions are specific to a certain area or anthropogenic activity, so that tailored mitigation measures can be implemented. This action is in line with two other ACCOBAMS-related processes: the identification of IMMAs and of CCHs (see recommendation [resolutions] [INSERT CODES HERE]).
- **Target:** To identify areas of intense, potentially detrimental, interactions, based on existing literature and expert opinion. Once identified to obtain more detailed information about the nature and scale of the interactions via the same process. Finally, consider the cumulative effects, at population level, of multiple types of interactions. This information will allow the development of prioritised targeted management actions.
- **Methods**: This work shall be conducted in conjunction with the ACCOBAMS SC working groups on Cetacean Critical Habitats (CCHs) or by following the same ToRs and working methods (see recommendation [resolutions] [INSERT CODES HERE]).

  To achieve the objectives, for each of the potential threats, the following steps are envisaged:

  (1) Obtain information on reported interactions based on existing literature and expert opinion, solicitated through the regional network of research groups (COORD-02). A small working group may be set up to meet remotely, to present and compile the available relevant evidence.

  (2) Determine whether the available information is up to date and obtain potential new information via relevant experts, research groups and dedicated surveys (if needed).

  (3) Existing results of actions RES-01, RES-02, RES-03, MON-01 may provide additional relevant insights that may help clarifying the context.

  (4) Place the resulting information into a management unit level context, based on results of actions RES-01 on management units and RES-02 and MON-01 on abundance and distribution (e.g., in line with available abundance estimates, interactions in certain areas may be more detrimental than in others).

  (5) The results of step (4) shall be endorsed by the ACCOBAMS Scientific Committee before feeding this information into MON-02, MIT-O1 and MIT-02.

  (6) Disseminate the results.

- **Timeline:**

	WHAT	WHO	WHEN (starting month being 0)
(1)	Obtain information on reported interactions based on existing information.	CMP Coord. with the help of CMP network	15-22 months (after recruitment of CMP Coord. and CMP-SC)
(2)	Potentially update information based on new evidence and dedicated surveys (if needed).	CMP Coord. with the help of CMP network	22-28 months
(3)	Place the resulting information into population-level context, based on results of actions RES-01, RES-02 and MON-01, and obtain ACCOBAMS SC endorsement.	CMP Coord. and CMP-SC, with the help of CMP network	28-36 months
(4)	Feed this information into MON-02 and MIT-01.	CMP Coord., CMP-SC	36 months ongoing

- **Tasks of CMP for Mediterranean Bottlenose Dolphins Coordinator in conjunction with the (Interim) Steering Committee (with assistance from the ACCOBAMS Secretariat as required):**
  - Coordination of activities (1-4) as described in the above table.
  - To assist with fund raisings.

BUDGET CONSIDERATIONS

- Costs for organizing meetings of small working groups to undertake steps (1), (2), (3).
- Possible costs associated to the need of dedicated surveys to collect more info (2).

ACTORS

- **Responsible for coordination of the action:** CMP Coord. and CMP SC.
- **Stakeholders**: Experts, research groups, industry representatives (fisheries, tourism offices, ports) where needed.

ACTION EVALUATION

- ACCOBAMS SC.
- Regular meetings open to stakeholders.

PRIORITY

- **Importance:** High
- **Feasibility**: Medium-High (depending on the type of pressure)

ACTION MON-01 MONITOR FOR POSSIBLE CHANGES IN THE POPULATION ATTRIBUTES AS REFERRED TO IN RES-01 AND RES-02 AND IN ACCORDANCE WITH THE ACCOBAMS LTMP

Monitoring Action Priority: HIGH

DESCRIPTION OF ACTION

- **Specific objective:** Monitoring possible changes in the population attributes identified in the CMP (i.e. absolute abundance, distribution of the target species, including habitat characteristics and demographic parameters) for each 'unit-to-conserve' to update the status of the species regularly.
- **Rationale:** The 'conservation status' of any species must be assessed regularly (e.g. every six years) by comparison of selected attributes using accepted methods over time. This allows Parties to evaluate whether the objectives of favourable conservation status throughout the range are met. Agreed methods within the ACCOBAMS Long-Term Monitoring Programme (LTMP) shall be used (RES-02). This action also allows Parties to meet their national commitments under e.g. the Barcelona convention EcAp/IMAP and the EU MSFD. This action is an integral part of the ACCOBAMS LTMP (ACCOBAMS SC recommendation 14.1).
- **Target:** To monitor absolute abundance, distribution (including habitat characteristics) and demographic parameters of the bottlenose dolphin management units (see RES-01 and RES-02), at appropriate frequencies to detect changes should they occur.
- **Method**: After completion of RES-01 and RES-02 (in conjunction with RES-03 for poorly known areas), periodic monitoring will be carried out, normally through collection of data on individual identification, but in special cases distance sampling may be used, according to methods identified by the ACCOBAMS LTMP and it will be performed on each identified unit-to conserve (see RES-01 and RES-03).

  Mark-Recapture models applied to individual identification data (usually using photo-identification data) will be used to estimate abundance and demographic parameters (e.g., reproduction, survivorship, migration).

  N.B. It is important to run power analyses (see Component 1 of the ACCOBAMS LTMP) to evaluate whether the data are sufficient to detect changes over the agreed timeline (e.g., every six-years).

  Regular reporting of progress (every 3 years) and results every 6 years to the ACCOBAMS SC (see COORD-01). Reports may be provided earlier in case of emergency situations. (i.e. where the analysis of the data imply a conservation issue).
- **Timeline:**

	WHAT	WHO	WHEN (starting month being 0)
(1)	Undertake the broad scale monitoring (see LTMP aerial surveys strategy).	CMP Coord. in conjunction with LTMP coordinator	15-24 months (after recruitment of CMP Coord. and CMP-SC)
(2)	Develop monitoring plan for each 'unit-to-conserve' through a series of local expert workshops (in coordination with COORD-01, COORD-02, RES-01, RES-02 and RES-3)	CMP Coord., CMP SC, ACCOBAMS PS and local Tt groups	24-36 months

(3)	Regular reporting of progress to the ACCOBAMS SC (see COORD-01).	CMP coordinator and CMP SC	Every 3 years
(4)	Regular reporting of results to the ACCOBAMS SC (see COORD-01) probably via an expert workshop	CMP coordinator and CMP SC	Every 6 years

- **Tasks of CMP for Mediterranean Bottlenose Dolphins Coordinator in conjunction with the (Interim) Steering Committee (with assistance from the ACCOBAMS Secretariat as required):**
    - To assist with fund-raising.
    - Coordination of activities (1-4) as described in the above table.
    - To facilitate data-sharing to ensure that data are made available in a timely fashion to maximise their value for conservation.
    - To produce concise triannual progress reports on the implementation of the action.
    - To arrange for periodic expert review/workshop of the results every six years that may develop new or modified action(s) as appropriate.

BUDGET CONSIDERATIONS

- This will be determined after the programmes are established and whether they are extensions of existing programmes or new programmes (see RES-03).

ACTORS

- **Responsible for coordination of the action:** CMP Coord in conjunction with ACCOBAMS LTMP coordinator.
- **Stakeholders**: National competent authorities and implementation bodies, CMP network as in COORD-02.

ACTION EVALUATION

- ACCOBAMS Scientific Committee

PRIORITY

- **Importance:** High
- **Feasibility**: Medium (based on the ongoing EcAp/IMAP and MSFD efforts) to High

ACTION MON-02: MONITOR HUMAN PRESSURE (KNOWN AND POTENTIAL THREATS)

Monitoring Action Priority: HIGH

DESCRIPTION OF ACTION

- **Specific objective**: Identify and monitor the main known and potential threats for the species within the identified geographical/management units and evaluate the effect over time.
- **Rationale**: Different threats (individual or cumulative) could have a negative impact on bottlenose dolphin geographical/management units, the level of which can vary among different areas. It is essential to categorise the most harmful threats for each unit, identify areas at particular risk (see RES-04, MON-01), and to monitor the effect over time to early detect situation that require further mitigation actions (see MIT-01, MIT-02).
- **Target:** Based on the results of actions RES-01 and RES-04, the most harmful threats are categorised, targeting the geographical/management units (target local sites, sub-regional and regional) and the local human activities (i.e. fishery, fish farming, maritime traffic, others) they interact with.
- **Methods**: The results of action RES-01 and RES-04 will be integrated with risk analysis to identify the most harmful threats, at different spatial-temporal scales (target local sites, sub-regional and regional). These will be monitored over time through the CMP Network (see COORD-02) and available information on a local level. The results will be transferred to action MIT-01 or MIT-02 to strength/develop proper mitigation measures. This will require:
    - get the resulting maps of distribution of the geographical/management units from RES-01 and the identified areas of detrimental interactions between bottlenose dolphins and fishing and other human activities from RES-04;
    - for each area compile or find existing information including Local Knowledge on human activities at sea (maps, density, position, type of activity, etc.) that can have an impact on local dolphin population;
    - assess the level of impact based on risk assessment analysis also based on outputs from RES-01 and RES-02 to categorise the most harmful threats for each area on which prioritise the monitoring and mitigation activities (MIT-01, MIT-02);
    - establish monitoring programmes of the identified threat/s based on standard methodologies (the same programme can be performed including contiguous areas-geographical/management units-areas of detrimental interaction);
    - periodically inform action MIT-01 on the results of the monitoring.
- **Timeline:**

	WHAT	WHO	WHEN (starting month being 0)
(1)	Revision and inventory of the human activity that determine a known and potential threats on species	CMP Coord., CMP Network, local experts and stakeholders	15-22 months (after recruitment of CMP Coord. and CMP-SC)
(2)	Acquire the GIS layers resulting from actions RES-01 and RES-04	CMP Coord. and CMP Network	36 months (after RES-01, RES-02 and RES-04)
(3)	Perform risk assessment analysis to categorise the more harmful threats	CMP Coord., CMP-SC, experts	36-42 months

(4)	Identify the already existing monitoring protocol for the specific threats	CMP Coord., CMP-SC, experts	36-42 months
(5)	Plan monitoring programmes on the identified most harmful threats considering linking contiguous areas where to implement the same activity (also considering methods for data collection and storing)	CMP Coord., CMP SC and CMP Network	36-48 months
(6)	Implement the monitoring	CMP Coord., CMP Network and local units	48 months ongoing
(7)	Periodical data analysis	CMP Coord., CMP SC, experts	Every 3 years
(8)	Transfer results to action MIT-01	CMP Coord. and CMP SC	Ongoing

- **Tasks of CMP for Mediterranean Bottlenose Dolphins Coordinator in conjunction with the (Interim) Steering Committee (with assistance from the ACCOBAMS Secretariat as required):**
  - To assist with fund-raising.
  - Coordination of activities (1-8) as described in the above table.

BUDGET CONSIDERATIONS

- Costs to plan and implement the monitoring programmes (4, 5).
- Costs for specific data analysis (7).

ACTORS

- **Responsible for coordination of action:** CMP Coord., CMP SC, ACCOBAMS PS, National Focal Points of relevant bodies.
- **Stakeholders**: ACCOBAMS (including the Follow up Committee), stakeholder representatives of the main pressures sectors, local, regional and national management authorities.

ACTION EVALUATION

- ACCOBAMS
- Regular meetings open to stakeholders.

PRIORITY

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

ACTION MIT-01: WIDER AND STRICTER ADOPTION OF THE MANAGEMENT AND CONSERVATION MEASURES ALREADY IN PLACE TO MITIGATE ADVERSE IMPACT OF ANTHROPOGENIC ACTIVITIES

Research Action *Priority: HIGH*

DESCRIPTION OF ACTION

- **Specific objective**: To ensure that ACCOBAMS Parties fully implement their national and international policy commitments, particularly on fisheries, pollution and shipping (not

only ACCOBAMS Resolutions and agreement commitments but also GFCM (General Fisheries Commission for the Mediterranean) decisions and recommendations and EU Regulations (Barcelona Convention protocols against pollution and on biodiversity, EU Water Directive, Habitats Directive, Marine Strategy Framework Directive, IMO decisions on pollution, shipping noise, security at sea and traffic, etc.) and all related national implementing laws (see also section 2 – Legal framework).

- **Rationale:** Believed that rigorous adoption of management and conservation measures already in place should ensure the conservation of the bottlenose dolphin at the present status in most of the Mediterranean areas, Parties must ensure that national and international environmental laws, directly or indirectly related to cetacean conservation, are fully implemented and enforced. MIT-01 should be focused on those areas/countries where this action is most needed, based on the available knowledge and the results of the research and monitoring actions (see COORD-1, COORD-2, RES-4, MON-1, MON-02), allocating the necessary financial and human resources to the investigation activity**.**
- **Target:** National and international authorities of the Mediterranean countries. Increase financial and human resources for implementation and enforcement of legislation.
- **Methods:** The Parties will be asked to produce a triennial report on the enforcement of national laws directly or indirectly related to cetacean conservation. Based on the report, a checklist of requirements for each country will be submitted to a follow-up committee (ACCOBAMS Secretariat, CMP SC) and a targeted promotion of existing ACCOBAMS guidelines (or any other relevant guidelines) will be developed to assist Parties in implementing conservation and management measures. Research and monitoring actions (RES-04, MON-01, MON-02) will help to alert on potential detrimental situation and to target action MIT-01, through the Follow-up Committee. Action MIT-01 will have to be coordinated with actions PACB-01 and PACB-02 to favour its implementation.
- **Timeline:**

	WHAT	WHO	WHEN (starting month being 0)
(1)	Develop/update a repository of existing national and international legislation and a checklist of all different measures/objectives	ACCOBAMS Secr.	0-6 months
(2)	National reports on needs to improve implementation and enforcement	Each Party	By 2025 MoP9
(3)	Triennial national reports on enforcement	Each Party	6 months before each Follow-up Committee
(4)	Based on (3) and CMP report a summary by country on the checklist requirements will be forwarded to the Follow-up Committee	ACCOBAMS Secretariat; CMP Coord. and CMP-SC	3 months before each Follow-up Committee
(5)	Targeted promotion of existing ACCOBAMS, or any other relevant guidelines, that assist Parties with the implementation of conservation and management measures	ACCOBAMS Secretariat CMP Coord. and CMP-SC	Throughout the action

- **Tasks of CMP for Mediterranean Bottlenose Dolphins Coordinator in conjunction with the (Interim) Steering Committee (with assistance from the ACCOBAMS Secretariat as required):**
    - Analysis of the national triennial report (3) in conjunction with ACCOBASM Secr.
    - Assist ACCOBAMS Secr. in targeted promotion of existing ACCOBAMS guidelines (or any other guidelines relevant to cetacean management and conservation).

BUDGET ITEMS CONSIDERATIONS

- Costs associated with the implementation of step (5).

Actors

- **Responsible for co-ordination of the action:** CMP Coord. in conjunction with CMP SC and ACCOBAMS PS
- **Stakeholders**: ACCOBAMS Parties, ACCOBAMS Secretariat, ACCOBAMS SC, ACCOBAMS Follow-up Committee, Parties' relevant authorities, relevant Inter-Governmental Organisations.

ACTION EVALUATION

- ACCOBAMS SC, ACCOBAMS Follow-up Committee

PRIORITY

- **Importance:** High
- **Feasibility:** Medium to high

ACTION MIT-02: ASSESS THE PERFORMANCE OF EXISTING MITIGATION MEASURES AND DEVELOP NEW TOOLS TO ADRESS SPECIFIC NEEDS

Research Action *Priority: HIGH*

DESCRIPTION OF ACTION

- **Specific objective**: To assess the performance of implemented management and conservation measures to mitigate conflicts between bottlenose dolphins and human activity in the Mediterranean context and develop new tools to address specific needs.
- **Rationale:** In order to improve the conservation status of the species and reduce conflicts with human activities (with particular reference to fisheries and maritime traffic), it is important to reconsider existing measures, assess their performance, updated their implementation and develop new tools if needed.
- **Target:** National and international authorities of the Mediterranean countries.
- **Methods:** ACCOBAMS and its institutional bodies, on the recommendation of the CMP Coord and CMP SC, will consider the need to develop new tools (or update existing ones) to meet specific management and conservation needs and mitigate the conflicts, with particular reference to interactions between dolphins and fisheries (including fish farming) and maritime traffic. The need will be assessed based on the periodic reports of the CMP itself (see also RES-04, MON-01, MON-02, MIT-01), the latest assessments of other internationally recognized organizations, the bibliographic review, the meetings of experts and stakeholders and on local knowledge and specificities.
- **Timeline:**

	WHAT	WHO	WHEN (starting month being 0)
(1)	Analysis on performance of mitigation tools, based on RES-04, MON-01, MON-02, MIT-01 and bibliographic review, to identify potential detrimental situations	CMP Coord. and CMP SC	Every 3 years since the research and monitoring actions are implemented
(2)	Meetings with local experts and stakeholder to further investigate the situation (including socio-economic aspects related to the interactions).	CMP Coord. and CMP SC	Every 3 years since the research and monitoring actions are implemented
(3)	Organization of a dedicated workshop of experts to review existing protocols and/or develop new tools to target specific needs and mitigate the conflicts.	CMP Coord., CMP SC, experts	Every 3 years since the research and monitoring actions are implemented
(4)	Transfer results to ACCOBAMS SC for approval and Parties	CMP Coord., CMP SC, ACCOBAMS Secretariat	Every 3 years since the research and monitoring actions are implemented

- **Tasks of CMP for Mediterranean Bottlenose Dolphins Coordinator in conjunction with the (Interim) Steering Committee (with assistance from the ACCOBAMS Secretariat as required):**

- Coordination of activities (1-4) as described in the above table (with assistance from ACCOBAMS Secretariat)

BUDGET CONSIDERATIONS

- Costs associated with the organization of a dedicated workshop of experts (3).

ACTORS

- **Responsible for coordination of the action:** CMP Coord., CMP SC, ACCOBAMS Secretariat.
- **Stakeholders**: National and local competent authorities, CMP network, local experts, local stakeholders (depending on the kind of alert reported).

ACTION EVALUATION

- ACCOBAMS Scientific Committee

PRIORITY

- **Importance:** High
- **Feasibility:** Medium (the MIT-02 feasibility is directly linked to the feasibility of MON-01 and MON-02 actions. The adoption of new specific management and conservation measures could be rejected by the country/countries involved).

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