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ACCOBAMS CMP FOR MEDITERRANEAN RISSO'S DOLPHIN (*GRAMPUS GRISEUS*)

Draft outline: MEDITERRANEAN RISSO'S DOLPHIN CMP

Draft Outline
- version 25/02/2020 -

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

Coordinated by Léa DAVID
with the inputs of Greg Donovan, Antonella Arcangeli, Caterina Lanfredi, Drasko Holcer,
Massimiliano Rosso, Gianni Pavan, Sabina Airoidi...

Attention please :

This document is a draft which has been mainly built during a dedicated workshop of five days in December 2019. Contributions from key players in the ACCOBAMS area are now needed.

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



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EXECUTIVE SUMMARY

(To be finalised when the plan is ready)

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

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

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

Section 6, dealing with **public awareness and education**, concludes that (To be finalised when the plan is ready)

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

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

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

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

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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

(To be finalised when the plan is ready)

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' is classified as Data Deficient (Gaspari and Natoli, 2012). 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 **preliminary uncorrected** estimate of abundance for the whole area from the aerial survey was around 26,700 individuals (CI 15,000 - 47,000) with large numbers offshore as well as in the more expected slope areas and with greater numbers in the western Mediterranean. 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.

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1.2 OVERALL GOAL OF THE CMP

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

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

In pursuing this goal, the needs and interests of stakeholders will be considered to the extent possible, whilst recognising that favourable conservation status is the highest priority. Moreover, scientific uncertainty must be considered while setting priorities and determining appropriate actions.

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

2 LEGAL FRAMEWORK

2.1 INTERNATIONAL CONVENTIONS AND AGREEMENTS

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

2.2 NATIONAL LEGISLATION AND MANAGEMENT ARRANGEMENTS

A table to synthesize the Range states information (ACCOBAMS, IWC if needed, other relevant management agreements...)

3 BIOLOGY AND STATUS OF MEDITERRANEAN RISSO'S DOLPHIN

Summary and introduction

(To be added based on all bibliographic references, from peer-reviewed or other scientific literature and discussion with relevant stakeholders, as knowledge exist but is sometimes not published yet).

The overall assessment under the art. 17 of the Habitat Directive for the period 2013-2018 in the marine Mediterranean region is unfavorable- inadequate (U1), mainly due to the population and range in Greece that is reported to be fragmented. The species overall conclusion for the region

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was unknown in 2007. The species is considered as 'data deficient' (DD) in the IUCN Red List of threatened. Thus, more data is needed for the species. Main pressures and threats to this species are linked to acoustic disturbance, accidental capture in fishing gear such as long-lines and gillnets, disturbance from recreational activities, and water pollution.

(<https://nature-eionet.europa.eu/article17/reports2012/species/summary/?period=5&group=Mammals&subject=Grampus+griseus®ion=MMED>)

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 in U.K. waters, with limited gene flow between the two areas (Gaspari *et al.*, 2007) and genetic analyses on 33 samples from the Mediterranean region (27 collected from the Ligurian Sea) suggested relatively high diversity. One possible reason for this differentiation could be the geophysical characteristics of the Mediterranean Sea, which has oceanographic and ecological characteristics that greatly differ from the Atlantic Ocean. The nature of a semi-enclosed sea such as the Mediterranean may have contributed to isolation between the Atlantic and the Mediterranean populations (Gaspari, 2004). Within the Mediterranean samples, Gaspari *et al.* (2007) suggested a possible subdivision, with apparent differentiation between samples collected from the western (Tyrrhenian Sea) and eastern (Adriatic Sea) coasts of Italy.

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

Range: In the Mediterranean basin, this species is found from Gibraltar to the Levantine basin, including the Adriatic Sea and the Aegean Sea.

Most of the studies are focused on the western Mediterranean Sea, since the ninetees, 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 (Azzellino et al., 2008, 2012, 2016; Di Meglio et al., 1999; Gannier, 2005; Labach et al., 2015; Moulins et al., 2008; Notarbartolo di Sciarra

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et al., 1993), Tyrrhenian Sea (Campana et al., 2015; Arcangeli et al., 2012). Mostly sightings but also strandings have been reported from the Adriatic Sea (UNEP MAP-RAC/SPA, 2014 ; Fortuna et al., 2015), the Ionian (Dimatteo et al., 2011; Frantzis et al., 2003; Bearzi et al., 2011, Carlucci et al., 2020) as well as from the Greek and Turkish Aegean waters (Frantzis et al., 2003; Dede et al. 2009; Frantzis & Herzing, 2018; Azzolin et al. 2010; Dede & Ozturk, 2007; Dede et al. 2009; Ryan et al., 2014; Ozturk et al., 2007). Some sightings and strandings were reported in Levantine basin particularly in Cypriot waters and along Israel and North African waters (Goffman et al. 2000; Hadar et al., 2008; Kerem et al., 2012; Elad et al., 2011), but still knowledge is scarce.

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 (Fig.X).

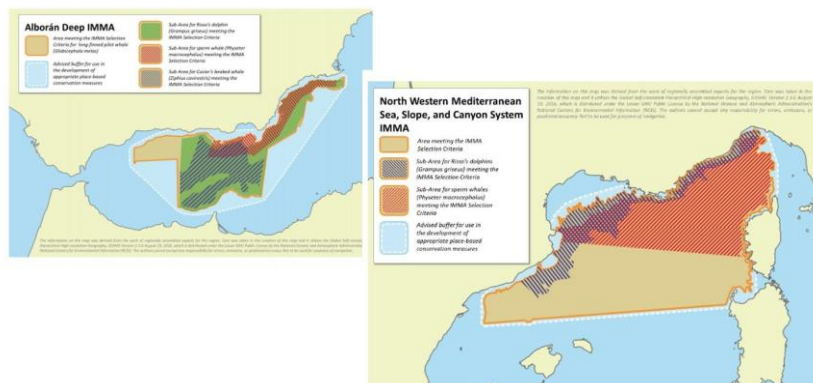


Fig.X Alborán Deep IMMA and the North West Mediterranean Sea, Slope and Canyon System IMMA were classified as the main Important Marine Mammals Areas. Risso's dolphins' sub-areas highlighted in green (Alboran Sea) and in blue dashed lines (North Western Mediterranean).

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 X)

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.

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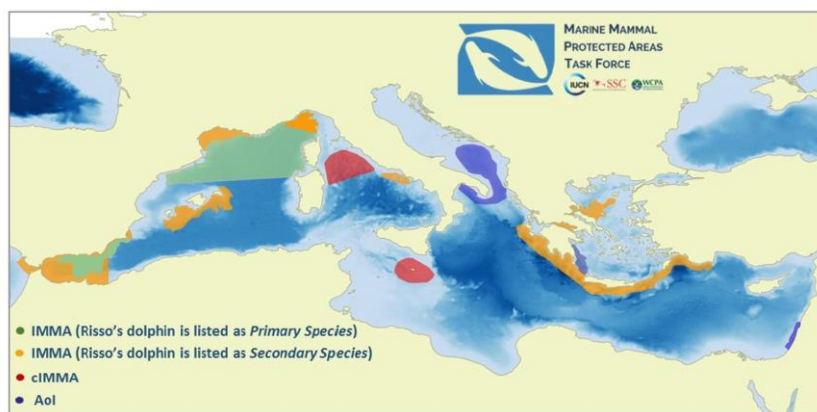


Fig. X. Map showing the areas identified as Important Marine Mammal Areas where Risso's dolphin is listed as Primary (in green) and Secondary (in orange) species.; candidate IMMA (in red) and Areas of Interest (in blue), where the species presence is reported, are also shown (Lanfredi et al., 2018).

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

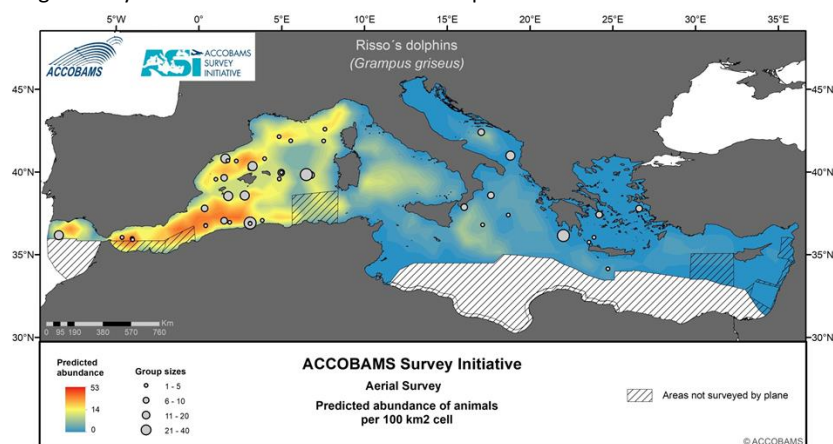


Fig XX predicted abundance of Risso's dolphin based on ASI dataset from summer 2018.

Habitat:

In many places, hotspots of Risso's dolphins were found in the canyons, mainly at water depths of approximately 500-1500 m as in the north-western Mediterranean Sea (David, 2000; Moulins et al., 2008; Azellino et al. 2008, 2012) or in the Alboran Sea (Canadas et al., 2002). Sightings

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were also reported far offshore and in deeper pelagic waters (Beaubrun et al., 1997; Airoidi et al., 2000; Laran et al., 2002; de Segura et al., 2008; Laran et al., 2016 and Arcangeli et al., 2018), suggesting that the species also use offshore areas far from continental slope. The most recent studies (Azzelino et al., 2016; Lanfredi et al., 2018) 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.

At a large scale, the model prediction based on historical data (1998-2015) shows highest abundance over the Mediterranean basin, mostly in slope areas (Fig. XX; Mannocci et al. 2018), 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 (Arcangeli et al. 2019). 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.

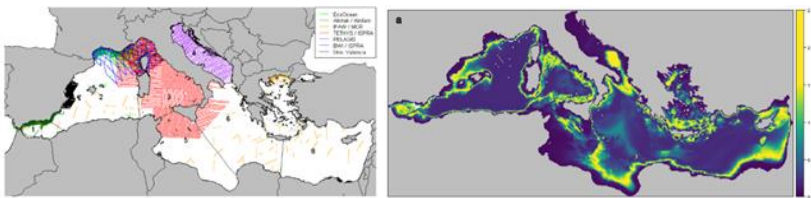


Fig XX Mean annual predicted densities (individuals per 25 km²) over the period 1998-2015 (Mannocci et al., 2018)

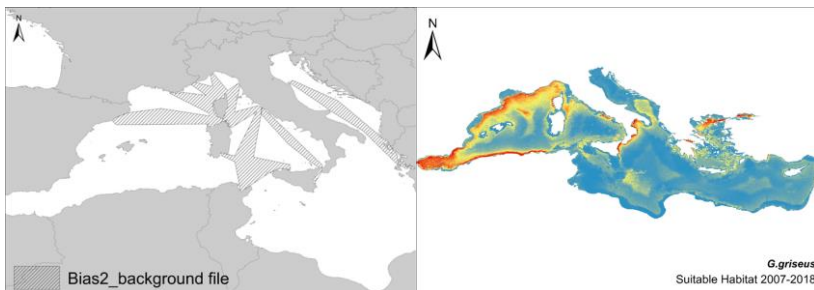


Fig XX predicted suitable habitat over the period 2007-2018 (Arcangeli et al., 2019)

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 Méglia, 1999; Casacci and Gannier, 2000; Mussi and Miragliuolo, 2003; Airoidi et al., 2005; Polo et al., 2009; Mariani et al., 2010; Delroq and Gannier, 2016; Remonato et al., 2018). These long-distance movements,

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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.
-
- *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. (stranding => MEDACES)*
 - *a network focusing on Risso's dolphin should be launched to improve collaboration and information exchange among organizations working on the species.*

Commenté [1]: is general to all subjects, to homogenise later

3.3 BASIC BIOLOGY

3.3.1 FEEDING

Risso's dolphin in the western Mediterranean Sea feed mostly on ocean 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). The species is strictly teutophageous but feed on a wide variety of squid's species.

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They seem to feed predominantly during the night even if they could 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 (ref). 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 Raduà *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.

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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 population parameters (intercalving interval, age at maturation, calves 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).

Long-terms studies on local or sub-regional scales gave first indication on abundance and trends. An abundance estimate based on line-transect methods was conducted in a 32 270 km² area east of Spain, where aerial surveys in 2001–2003 yielded an estimate of 493 individuals (CV = 60.6%; Gómez de Segura et al., 2006). That estimate was not corrected for visibility bias and therefore likely underestimates the true abundance in the sampled area (Gómez de Segura et al., 2006). A more recent abundance estimate for Risso's dolphins is of 864 (CV=15.6%) animals only in the northern third of the Alboran Sea with an extension to include the Alboran Island (Indemares report 2010). Laran et al. in 2016 used aerial seasonal surveys over the north-western Mediterranean Sea (181 400 km² of study area) to provide estimates of abundance and distribution patterns for cetacean species including Risso's dolphin. This species was more rarely encountered than the others and total estimated abundance for Risso's dolphin was 2000 individuals (95% CI: 700–5900) in the winter and 1400 individuals (95% CI: 500–3700) in the summer. In the Central and south Adriatic, the first aerial survey gives an uncorrected estimate of 510 Risso's dolphins (CV78.1%; 95% CIs 124–2,089) (Fortuna, C. M., et al., 2011).

Estimates of abundance based on photographic mark-recapture methods from a French-Italian study over the slope from Ligurian Sea to the west border of the Gulf of Lion slope reported 123 individuals (closed population models only, 95% CI : 86–189) (Polo, 2006); the abundance of another French-Italian study over the Pelagos Sanctuary, considering 12 years, ranged in average around 130 individuals (open and closed population models, 95% CI of 90 – 230 individuals), with

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peaks in 2000 and 2005 followed by a subsequent decreasing trend, with half of the average values (60-70 individuals), referring to the whole time series, in 2012 – 2013, (Airoldi et al., 2015). Azzellino *et al.* (2016) presented local estimation of population size for Risso's dolphin in the western Ligurian Sea using mark-recapture method from 1990 to 2014, confirming the decreasing trend in the Risso's dolphin abundance. Photographic mark-recapture methods provided a population size estimate for the period 1998-2012 of about 100 individuals

(open and closed population models, 95% CI 60-220). The same methods detected a decline in population size in the last period of the time series (1990-2014). Risso's dolphin population size significantly decreased, from an average of about 120–150 individuals in the period from 2000 to 2005 to an average of 70–100 dolphins in the period from 2010 to 2014. The species stranding frequency in the area reflects the time pattern of the sighting frequencies and no Risso's dolphin stranding has been reported in the area since 2008.

The analysis of all the strandings data occurred along the Italian coast from the online strandings data bank (1987-2017) (Banca Dati Spiaggiamenti) shows 159 Risso's dolphins strandings events recorded in thirty-one years. Strandings are distributed over all the Italian coasts. However, a decline in numbers of stranded animals along the Italian coast results during the study period (1987 – 2017), with 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 & Pavan in Lanfredi et al., 2018). Even if these data cannot represent the distribution at sea, comparisons of stranding data with sighting data have demonstrated that stranding records can be a good indicator of species composition at sea and can sometimes be used to infer species distribution.

The recent ACCOBAMS aerial Survey Initiative results give a total amount of 26,659 individuals (15,129 - 46,975) for the entire Mediterranean Sea, which appears higher than expected if compared to the strandings frequency and the local estimation of abundance from long-term monitoring.

Commenté [2]: (still wait for ASI boat estimates...)

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

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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 /morphological 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 1). Some of them are documented and others less studied for this species, but as they are known for other related species, it can be deduced that 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.

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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)					
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

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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	

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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 (eg. longliners and pelagic drift nets)

4.1.2 ANTHROPOGENIC NOISE

IMPULSIVE NOISE:

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). 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

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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).

GUIDELINES?

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.

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 lead to reductions in prey populations of Risso's dolphins or otherwise disrupt food webs in habitat where Risso's dolphins forage (Bearzi *et al.*, 2010).

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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 teutophagous species that have been highlighted to ingest plastics even to a lethal level (sperm whales, Cuvier's beaked whales ^{+++ref}), the Risso's dolphin is likely touched by this phenomenon.

Information gaps:

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

Commenté [3]: Ask experts to write this paragraph

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.

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).

heavy metals (MeHg, Se, Cd, Pb, Cr)

Organochlorine toxicants

PCB family, DDT :

Levels of PCB in some region of the Med (northwestern) are notably higher than in the Atlantic.

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Levels are higher in male than in female (as known for other species : finwhales and spermwhales).

Levels are different for different region of the Med. : less in adriatic and more in italian coastal waters (where ?) (expert, who ?)

Prey contamination and emerging contaminants : to be added

Information gaps: to be inserted when section is updated.

- 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.

Invasive approaches of boats (e.g. from whale watching activities, 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.*, 2001), even can stress and kill weak or young 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 dolphins behavior 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

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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 where 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

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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: ?

- Distribution and dynamics of the species
- Long term Passive Acoustic Monitoring in specific areas (e.g. feeding areas, IMMAs) to monitor both noise and presence/behaviour of the species
- Effects of noise at individual and population level

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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 best practices against bycatch/entanglements and it will benefit Risso's dolphin.

(add ref guidelines and resolution)

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...) on noise issue and it will benefit Risso's dolphin (Pavan et al., 2016).

(add ref guidelines and resolution)

5.3 PREY DEPLETION

To be added later

Prey depletion by fisheries

Prey depletion by other stressors/impacts on the trophic web

Prey field changes due to global warming

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.

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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.

(to be written by experts on contaminants)

5.5.1 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

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- 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,

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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	Importance	Feasibility	Crossref.
CORD-01	Implementation of the CMP: Coordinator and Steering Committee <i>(Need to check for mutualisation with other CMP)</i>	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	ESSENTIAL	HIGH	ALL

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	<i>(Need to check for mutualisation with other CMP)</i>			
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Capacity building and public awareness actions

Nr.	Action	Importance	Feasibility	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 <i>(Need to check for mutualisation with other CMP)</i>	HIGH	HIGH	CORD-01 CORD-02

Research actions essential for providing adequate management advice

Nr.	Action	Importance	Feasibility	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 (Drasko)	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

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				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
	Develop/improve acoustic monitoring programs and provide description of species-specific and/or population specific sound signatures			

Monitoring actions

Nr.	Action	Importance	Feasibility	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	Importance	Feasibility	Crossref.
MIT-01	Wider adoption and implementation of guidelines, resolutions... (such as IWC/ACCOBAMS/CMS) to mitigate adverse impact of anthropogenic activities affecting Risso's dolphin	HIGH	HIGH	RES-02 RES-05 RES-06

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.

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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	Feb 2020
(2)	Development of detailed job description and conditions of work based on the tasks outlined below	Interim Steering Committee (ISC)	First quarter 2020
(3)	Identification of initial funds	ISC	Last quarter 2019 – first quarter 2020
(4)	Identification of host institution and agreement on hosting conditions	Interim Steering Committee (ISC)	First quarter 2020
(5)	Recruitment of co-ordinator	ISC	First quarter 2020
(6)	Co-ordinator begins work (initial 3-year contract)	Co-ordinator	Second quarter 2020

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(7)	Development of proposed terms of reference and <i>modus operandi</i> for stakeholder Steering Committee	ACCOBAMS, IWC, ISC, funders	Second quarter 2020
(8)	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 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/webpace (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'.

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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

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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

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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	December 2020
(2)	Organise workshop	Identified participants (see methods below)	March 2021
(3)	Implement strategy and actions agreed by workshop following a timeline established by the workshop (probably a staged process)	Workshop, coordinator of CMP	To be determined

- **Methods:** the ISC begin preparations for a small expert workshop to determine the strategy for public awareness materials, including:
 - Identification of target groups, by range state where appropriate.
 - Identification of existing/development of new text, audio and visual material to provide general background to the situation of Mediterranean 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.

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- 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

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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-serve)

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:

- o sightings data with effort and distribution maps (including from spatial modelling exercises)
- o photoID data (including catalogues and cross matching)
- o tissue samples (and any associated analyses) from stranded animals or biopsy samples from free-ranging animals;
- o 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

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PRIORITY

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

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

Commenté [4]: Drasko ??

Research Action

Priority: HIGH

DESCRIPTION OF ACTION

- Specific objectives:
- Rationale:
- Target: Development.
 - the number of Risso's dolphin with sign of bycatch
 - noise impacts
 - contaminants
 - temporal and spatial pattern
- Methods:

• Timeline:

	WHAT	WHO	WHEN

- 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
- .

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PRIORITY

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

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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);

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- 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/sub regional 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

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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

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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 northwestern 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

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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

- ...
- ...

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

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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	18 months

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		and Grampus Network	
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

- ...
- ...

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

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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-05 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	

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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

- ...
- ...

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

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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	

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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

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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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9 REFERENCES

To be added on completion of draft

- Airoidi S., Azzellino A., David L., Dhermain F., Di-Meglio N., Jimenez V., Jourdan J., Lanfredi C., Remonato E., Rosso M., Roul M., Scuderi A. 2015 Final report "Absolute abundance of Risso's dolphin (*Grampus griseus*) in the north-western part of the Pelagos Sanctuary "Pelagos Sanctuary Convention No. 03/2014, 59 pages.
- Arcangeli A., Marini L., Crosti R. (2012). Changes in cetacean presence, relative abundance and distribution over 20 years along a trans-regional fixed line transect in the Central Tyrrhenian Sea. *Marine Ecology* Vol.34 No.1.
- Azzellino A., Airoidi S., Gaspari S., Lanfredi C., Moulins A., Podestà M., Rosso M. and Tepsich P. 2016. Risso's Dolphin, *Grampus griseus*, in the Western Ligurian Sea: Trends in Population Size and Habitat Use. In: Giuseppe Notarbartolo Di Sciara, Michela Podestà and Barbara E. Curry, editors, *Advances in Marine Biology*, Vol. 75, Oxford: Academic Press, 2016, pp. 205-232.
- Bearzi, G., Reeves, R. R., Remonato, E., Pierantonio, N. & Airoidi, S. Risso's dolphin *Grampus griseus* in the Mediterranean Sea. *Mamm. Biol.-Z. Für Säugetierkd.* 76, 385–400 (2011).
- Bejder L., Samuels A., Whitehead H., Gales N., 2006, Interpreting short-term behavioural responses within a longitudinal perspective. *Anim. Behav.* 72. 1149-1158.
- Campana, I., Crosti, R., Angeletti, D., Carosso, L., David, L., Di-Méglio, N., ... & Arcangeli, A. (2015). Cetacean response to summer maritime traffic in the Western Mediterranean Sea. *Marine environmental research*, 109, 1-8.
- Cañadas, A., Sagarminaga, R., & Garcia-Tiscar, S. (2002). Cetacean distribution related with depth and slope in the Mediterranean waters off southern Spain. *Deep Sea Research Part I: Oceanographic Research Papers*, 49(11), 2053-2073.
- Carlucci et al., 2020. "Residency patterns and site fidelity of *Grampus griseus* (Cuvier, 1812) in the Gulf of Taranto (Northern Ionian Sea, Central-eastern Mediterranean Sea)". *Mammal research*. DOI:10.1007/s13364-020-00485-z
- Coll, M., Piroddi, C., Albouy, C., Ben Rais Lasram, F., Cheung, W. W., Christensen, V., ... & Palomares, M. L. (2012). The Mediterranean Sea under siege: spatial overlap between marine biodiversity, cumulative threats and marine reserves. *Global Ecology and Biogeography*, 21(4), 465-480.
- Corsolini, S., et al. (1995). "Congener profile and toxicity assessment of polychlorinated biphenyls in dolphins, sharks and tuna collected from Italian coastal waters." *Marine Environmental Research* 40(1): 33-53.
- David, L. (2002). Disturbance to Mediterranean cetaceans caused by vessel traffic. *Cetaceans of the Mediterranean and Black Seas: State of Knowledge and Conservation Strategies*. G. Notarbartolo de Sciara (ed.). Section, 11.
- David L., 2007. Thonaille....
- Dede, A. & Öztürk, B. Cetacean observations in the Marmara and Aegean Sea in spring season 2005. *Rapp Comm Int Expl Sci Mer Médit* 38, 455 (2007).
- Dede, A., Saad, A., Fakhri, M. & Öztürk, B. 2008. Cetacean sightings in the eastern Mediterranean Sea during the cruise made in summer. In *Proceedings of the Annual Conference of the European Cetacean Society*, ECS 2009, 02–04 March 2009, Istanbul, Turkey 23 (2009).
- Drira A., Bouzidi M., Maglio A., Pavan G., Salivas M., 2018. Modelling underwater sound fields from noise events contained in the ACCOBAMS impulsive noise register to address cumulative

Draft outline: MEDITERRANEAN RISSO'S DOLPHIN CMP

- impact and acoustic pollution assessment. EEA Proceedings EuroNoise 2018, ISSN: 2226-5147: 2819-2824. http://eurnoise2018.eu/docs/papers/465_Eurnoise2018.pdf
- Druon JN, H  laou  t P, Beaugrand G., Fromentin JM, Palialexis A and Hoepffner N (2019) Satellite-based indicator of zooplankton distribution for global monitoring, Nature Scientific Reports 9:4732, DOI: 10.1038/s41598-019-41212-2
- Fortuna, C. M., et al. (2011). The first cetacean aerial survey in the Adriatic sea: summer 2010. 7th Meeting of the ACCOBAMS Scientific committee: 16pp.
- Fossi MC, Casini S, Caliani I et al (2012) The role of large marine vertebrates in the assessment of the quality of pelagic marine ecosystems. Mar Environ Res 77:156–158. <https://doi.org/10.1016/j.marenvres.2012.03.003>
- Fossi MC, Romeo T, Bains M, Panti C, Marsili L, Campani T, Canese S, Galgani F, Druon JN, Airolti S, Taddei S, Fattorini M, Brandini C and Lapucci C (2017) Plastic debris occurrence, convergence areas and fin whales feeding ground in the Mediterranean Marine Protected Area Pelagos Sanctuary: a modelling approach, Frontiers in Marine Science 4:167 | DOI: 10.3389/fmars.2017.00167
- Frantzis, A. & Herzog, D. L. Mixed-species associations of striped dolphins (*Stenella coeruleoalba*), short-beaked common dolphins (*Delphinus delphis*), and Risso's dolphins (*Grampus griseus*) in the Gulf of Corinth (Greece, Mediterranean Sea). Aquat. Mamm. 28, 188–197 (2002).
- Gall SC, Thompson RC (2015) The impact of debris on marine life. Mar Pollut Bull 92:170–179. <https://doi.org/10.1016/j.marpolbul.2014.12.041>
- Gannier A., 2014. - L'impact des nuisances acoustiques sur les c  tac  s du Sanctuaire et de la M  diterran  e nord-occidentale. Klymene Recherche Marine et Sanctuaire Pelagos (Partie fran  aise) : 182 p.
- Gaspari, S., 2004. Social and population structure of striped and Risso's dolphins in the Mediterranean Sea. Ph.D. thesis, University of Durham, Durham, UK.
- Goffman, O. et al. Cetaceans from the Israeli coast of the Mediterranean Sea. Isr. J. Zool. 46, 143–147 (2000).
- Gomez de Segura, A. G., Hammond, P. S., & Raga, J. A. (2008). Influence of environmental factors on small cetacean distribution in the Spanish Mediterranean. Journal of the Marine Biological Association of the United Kingdom, 88(6), 1185-1192.
- Gregory MR (2009) Environmental implications of plastic debris in marine settings—entanglement, ingestion, smothering, hangers-on, hitch-hiking and alien invasions. Philos Trans R Soc Lond B Biol Sci 364:2013–2025. <https://doi.org/10.1098/rstb.2008.0265>
- Guerrini F, Mari L, Casagrandi R (2019) Modelling plastics exposure for the marine biota: risk maps for fin whales in the Pelagos Sanctuary (North-Western Mediterranean). Front Mar Sci 6:299
- Hadar, N., Goffman, O., Scheinin, A. & Kerem, D. Summary of reported cetacean strandings along the Israeli Mediterranean coast (1993–2005). In Proceedings of the Annual Conference of the European Cetacean Society, ECS 2008, 10–12 March 2008, Egmond aan Zee, The Netherlands 22 (2008).
- Halpern, B. S., Walbridge, S., Selkoe, K. A., Kappel, C. V., Micheli, F., D'agrosa, C., ... & Fujita, R. (2008). A global map of human impact on marine ecosystems. Science, 319(5865), 948-952.
- INDEMARES Report. 2010. Available from Fundacion Biodiversidad, Spain. Parrilla, G. y Kinder, T.H., 1987. Oceanograf  a f  sica del mar de Albor  n. Bolet  n del Instituto Espa  ol de Oceanograf  a, 4(1): 133-165.
- Jourdan J., Dhermain F., Labach H., Gimenez O., 2017. Interactions c  tac  s - p  cheries sur le littoral m  diterran  en fran  ais. XIXe s  minaire du R  seau National Echouages, Presqu  le du Croisic, 12 novembre 2017

Draft outline: MEDITERRANEAN RISSO'S DOLPHIN CMP

- Keen Eric M., Scales Kylie L., Rone Brenda K., Hazen Elliott L., Falcone Erin A., Schorr Gregory S. (2019) Night and Day: Diel Differences in Ship Strike Risk for Fin Whales (*Balaenoptera physalus*) in the California Current System. *Frontiers in Marine Science*, 6, 730, 10.3389/fmars.2019.00730 <https://www.frontiersin.org/article/10.3389/fmars.2019.00730>
- Kerem, D. et al. Update on the cetacean fauna of the Mediterranean Levantine basin. *Open Mar. Biol. J.* 6 (2012).
- Kruse, S., D.K. Caldwell & M.C. Caldwell (1999). Risso's dolphin *Grampus griseus*. In: *Handbook of Marine Mammals; The Second Book of Dolphins and the Porpoises*. Volume 6::183-212. Academic Press, San Diego.
- Labach, H., Dhermain, F., Bompar, J.-M., Dupraz, F., Couvat, J., David, L. & Di-Méglio, N. 2015.— Analysis of 23 years of Risso's dolphin's photo-identification in North-Western Mediterranean Sea, first results on movement and site fidelity. *Sci. Rep. Port-Cros natl. Park*, 29: 263-266.
- Lanfredi C., Remonato E. and Airoidi S. (Eds) 2018. Preliminary Report of the Mediterranean Grampus Project 2.0: Improving knowledge and conservation of the Mediterranean population of Risso's dolphins through effective partnerships. 48 pp. La Spezia, Italy, 7th April 2018.
- Lebreton LCM, Greer SD, Borrero JC (2012) Numerical modelling of floating debris in the world's oceans. *Mar Pollut Bull* 64:653–661. <https://doi.org/10.1016/j.marpolbul.2011.10.027>
- Maglio A., Castellote M., Pavan G., Frey S., 2015. Overview of the noise hotspots in the ACCOBAMS area. Part I – The Mediterranean Sea. Report to ACCOBAMS. DOI: 10.13140/RG.2.1.2574.8560 <https://www.researchgate.net/publication/290084063>
- Maglio A., Soares C., Bouzidi M., Zabel F., Souami Y., Pavan G., 2015. Mapping Shipping noise in the Pelagos Sanctuary (French part) through acoustic modelling to assess potential impacts on marine mammals. *Sci. Rep. Port-Cros Natl. Park*, 29: 167-185.
- Maglio A., Pavan G., Castellote M., Frey S., 2016. Progress report of a noise demonstrator: development of a demonstrator of a mediterranean impulsive noise register managed by ACCOBAMS. Report ACCOBAMS-MOP6/2016/Doc29
- Mannocci L., J.J. Roberts, and P.N. Halpin. 2018. Development of Exploratory Marine Species Density Models in the Mediterranean Sea. Final Report. Report prepared for Naval Facilities Engineering Command, Atlantic under Contract No. N62470-15-D-8006, Task Order TO37, by the Duke University Marine Geospatial Ecology Lab, Durham, North Carolina. March 2018.
- Mayol P., Di-Méglio N., David L., Serre S. And Dhermain F. 2012. Whale-watching et plaisance : précision des connaissances et des mesures de gestion. Rapport Final du Programme de recherche 2010/2012 de PELAGOS France. GIS 3M / EcoOcéan Institut / Souffleurs d'écume / GECEM, 200p
- New, L. F., Hall, A. J., Harcourt, R., Kaufman, G., Parsons, E. C. M., Pearson, H. C., ... & Schick, R. S. (2015). The modelling and assessment of whale-watching impacts. *Ocean & Coastal Management*, 115, 10-16.
- Öztürk, B., Salman, A., Öztürk, A.A., Tonay, A. (2007) Cephalopod remains in the diet of striped dolphins (*Stenella coeruleoalba*) and Risso's dolphins (*Grampus griseus*) in the eastern Mediterranean Sea. *Vie et Milieu* 57(1/2): 53-59.
- Papale, E., Azzolin, M., & Giacoma, C. (2012). Vessel traffic affects bottlenose dolphin (*Tursiops truncatus*) behaviour in waters surrounding Lampedusa Island, south Italy. *Journal of the Marine Biological Association of the United Kingdom*, 92(8), 1877-1885.
- Pavan G., Maglio A., Castellote M., Salivas M., Descroix-Comanducci F., 2015. Achieving underwater noise regulation through an ecosystem-based approach: the "Mediterranean strategy on Underwater Noise Monitoring". Proceedings ECS Workshop "NEW MITIGATION METHODS AND EVOLVING ACOUSTIC

Draft outline: MEDITERRANEAN RISSO'S DOLPHIN CMP

- EXPOSURE GUIDELINES". Editors Wright A.J. & Robertson F.C., ECS 2015, ECS Special Publication Series 59: 42-50.
- Perrin W.F. & Reilly, S.B. Reproductive parameters of dolphins and small whales of the family Delphinidae. Rep Int Whal. Comm. Special Issue 6:97:133. .
- Pennino, M. G., Arcangeli, A., Fonseca, V. P., Campana, I., Pierce, G. J., Rotta, A., & Bellido, J. M. (2017). A spatially explicit risk assessment approach: Cetaceans and marine traffic in the Pelagos Sanctuary (Mediterranean Sea). PloS one, 12(6), e0179686.
- Pirotta, E., Merchant, N. D., Thompson, P. M., Barton, T. R., & Lusseau, D. (2015). Quantifying the effect of boat disturbance on bottlenose dolphin foraging activity. Biological Conservation, 181, 82-89.
- Polo et al., 2009**
- Raduan, A., Blanco, C., Fernandez, M. & Raga, J.A. (2007).— Some aspects of the life history of the Risso's dolphin (*G. griseus*) in the western Mediterranean Sea. 21th Conference of the European Cetacean Society (San Sebastian, 22-25 April). Abstracts: 74.
- Ryan, C. et al. A visual and acoustic survey for marine mammals in the eastern Mediterranean Sea during summer 2013. Unpubl. Rep. Int. Fund Anim. Welf. Mar. Conserv. Res. Int. Kelvedon UK (2014).
- Remonato E., Airoidi S., Rosso M., Lanfredi C., Bittau L., Renata M., Chicote C., Gazo M., Moulins A., Tepsich P., Verga A., Azzellino A. 2018. Where are the Risso's dolphins (*Grampus griseus*) of the North Western Mediterranean Sea? Study of Movements Within and Outside the Pelagos Sanctuary. 32nd annual European Cetacean Society conference. La Spezia (Italy) 8-10 April, 2018.
- Scarpaci, C., Lück, M., & Parsons, E. C. M. (2010). Recent advances in whale-watching research: 2008–2009. Tourism in Marine Environments, 6(1), 39-50.
- Sciacca V., Viola S., Pulvirenti S., Riccobene G., Caruso F., De Domenico E., Pavan G., 2016. Shipping noise and seismic airgun surveys in the Ionian Sea: Potential impact on Mediterranean fin whale. Proceedings of Meetings on Acoustics, 27 040010. [DOI: 10.1121/2.0000311]
- Shoham-Frider E., Kerem D., Roditi-Elasar M., Goffman O., Morick D., Yofe O., Kress N. 2014. Heavy metals in tissues of cetacean species rarely stranded along the Israeli Mediterranean coast. Marine Pollution Bulletin 83: 376-382.
- Shoham-Frider, E., et al. (2002). "Risso's dolphin (*Grampus griseus*) stranding on the coast of Israel (eastern Mediterranean). Autopsy results and trace metal concentrations." Science of the Total Environment 295(1–3): 157-166.
- Storelli, M. M., et al. (1999). "Heavy metals and methylmercury in tissues of Risso's dolphin (*Grampus griseus*) and Cuvier's beaked whale (*Ziphius cavirostris*) stranded in Italy (South Adriatic Sea)." Bulletin of Environmental Contamination and Toxicology 63(6): 703-710.
- Storelli, M. M. and G. O. Marcotrigiano (2000). "Persistent organochlorine residues in Risso's dolphins (*Grampus griseus*) from the Mediterranean Sea (Italy)." Marine Pollution Bulletin 40(6): 555-558. –
- Tonay, A. M., Dede, A., Öztürk, A. & Öztürk, B. Cetacean strandings in the Turkish Straits System (TSS) and the Northern Aegean Sea coast of Turkey during 1999–2008. In Proceedings of the Annual Conference of the European Cetacean Society, ECS 2009, 02-04 March 2009, Istanbul, Turkey 23 (2009).
- Vaes and Druon 2013 Mapping of potential risk of ship strike with fin whales in the Western Mediterranean Sea. A scientific and technical review using the potential habitat of fin whales and the effective vessel density, European Commission Report (EUR 25847 EN), doi: 10.2788/8520
- Visser, F., Hartman, K. L., Pierce, G. J., Valavanis, V. D., & Huisman, J. (2011). Timing of migratory baleen whales at the Azores in relation to the North Atlantic spring bloom. Marine Ecology Progress Series, 440, 267-279.
- Wright SL, Thompson RC, Galloway TS (2013) The physical impacts of microplastics on marine organisms: a review. Environ Pollut 178:483–492

Draft outline: MEDITERRANEAN RISSO'S DOLPHIN CMP

Zucca, P., et al. (2005). "Causes of stranding in four Risso's dolphins (*Grampus griseus*) found beached along the North Adriatic Sea coast." *Veterinary Research Communications* 29: 261-264.

