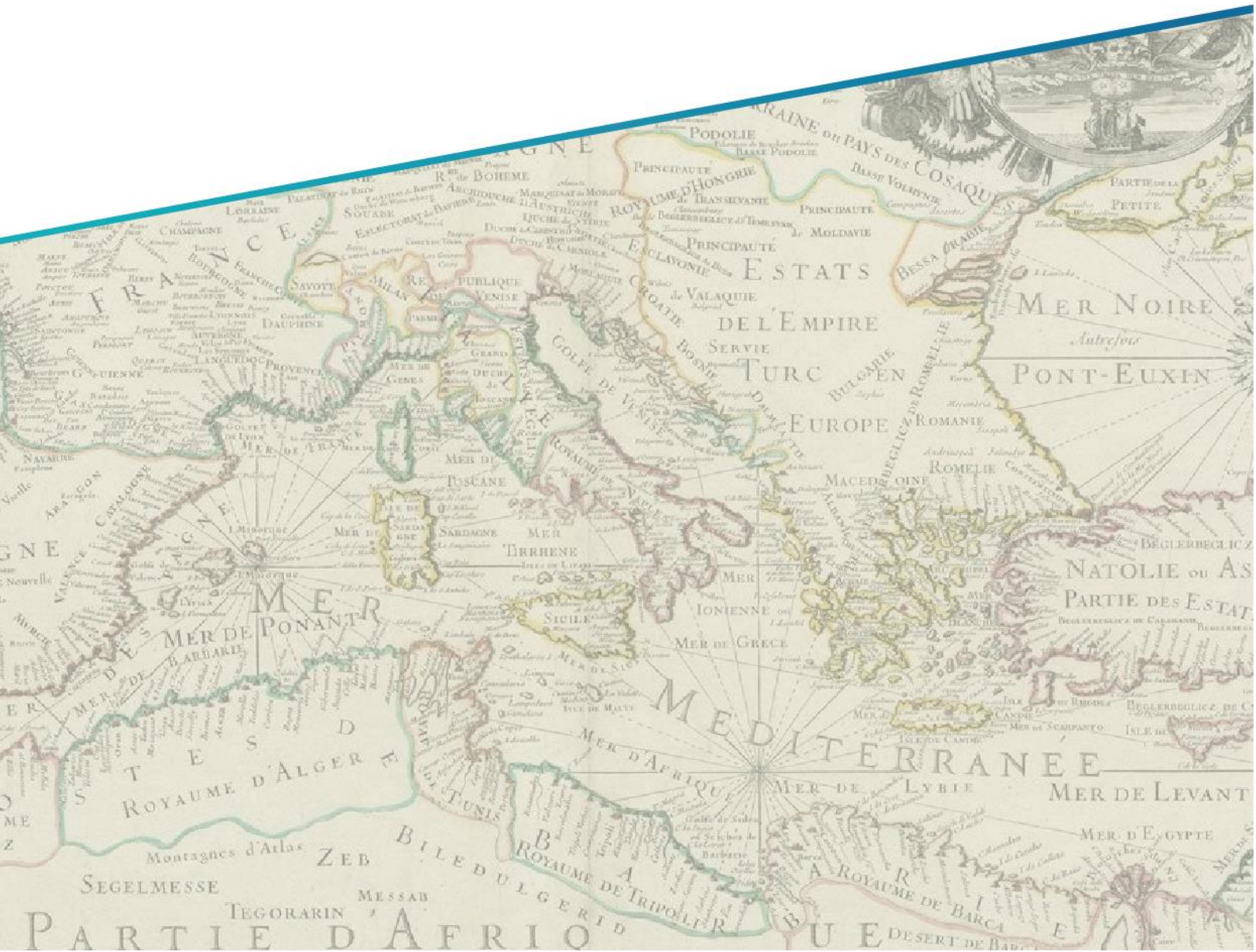
FMES
Fondation Méditerranéenne
d'Études Stratégiques

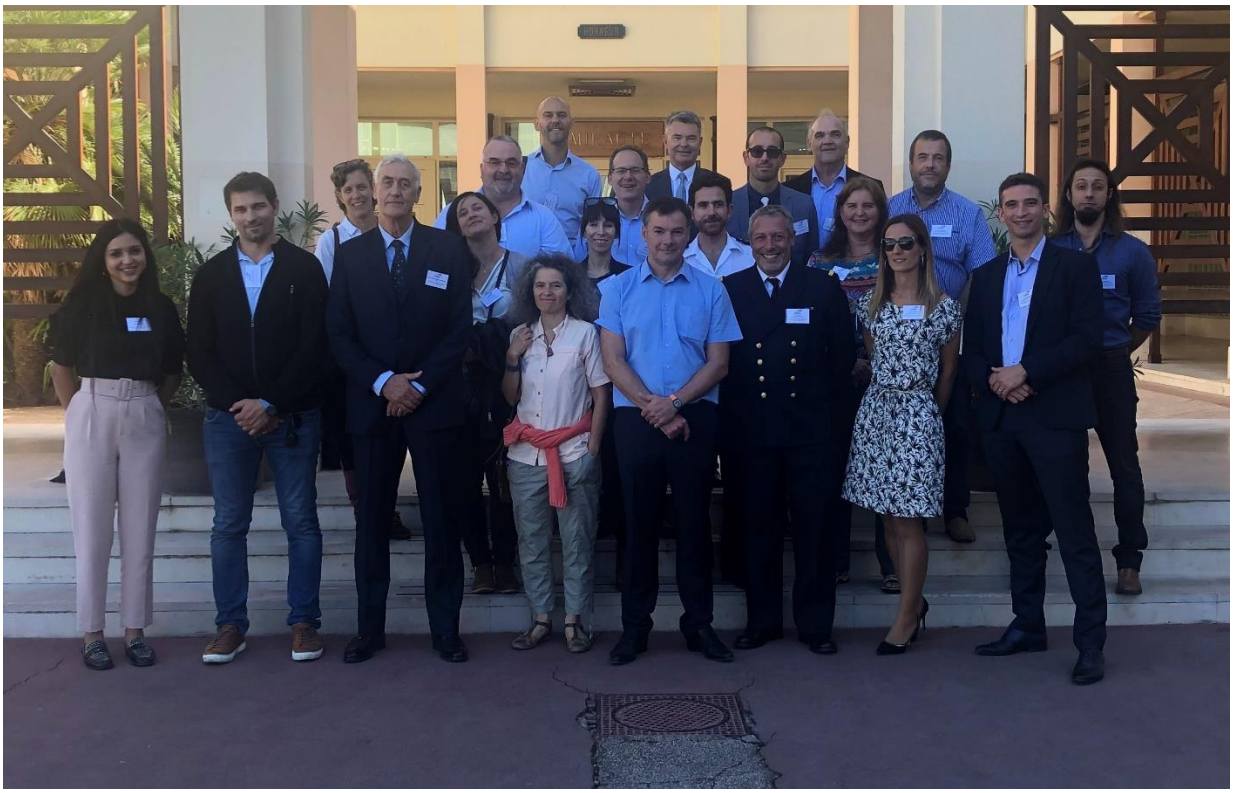
ACCOBAMS

ACCOBAMS WORKSHOP ON SONARS AND CETACEANS INTERACTIONS

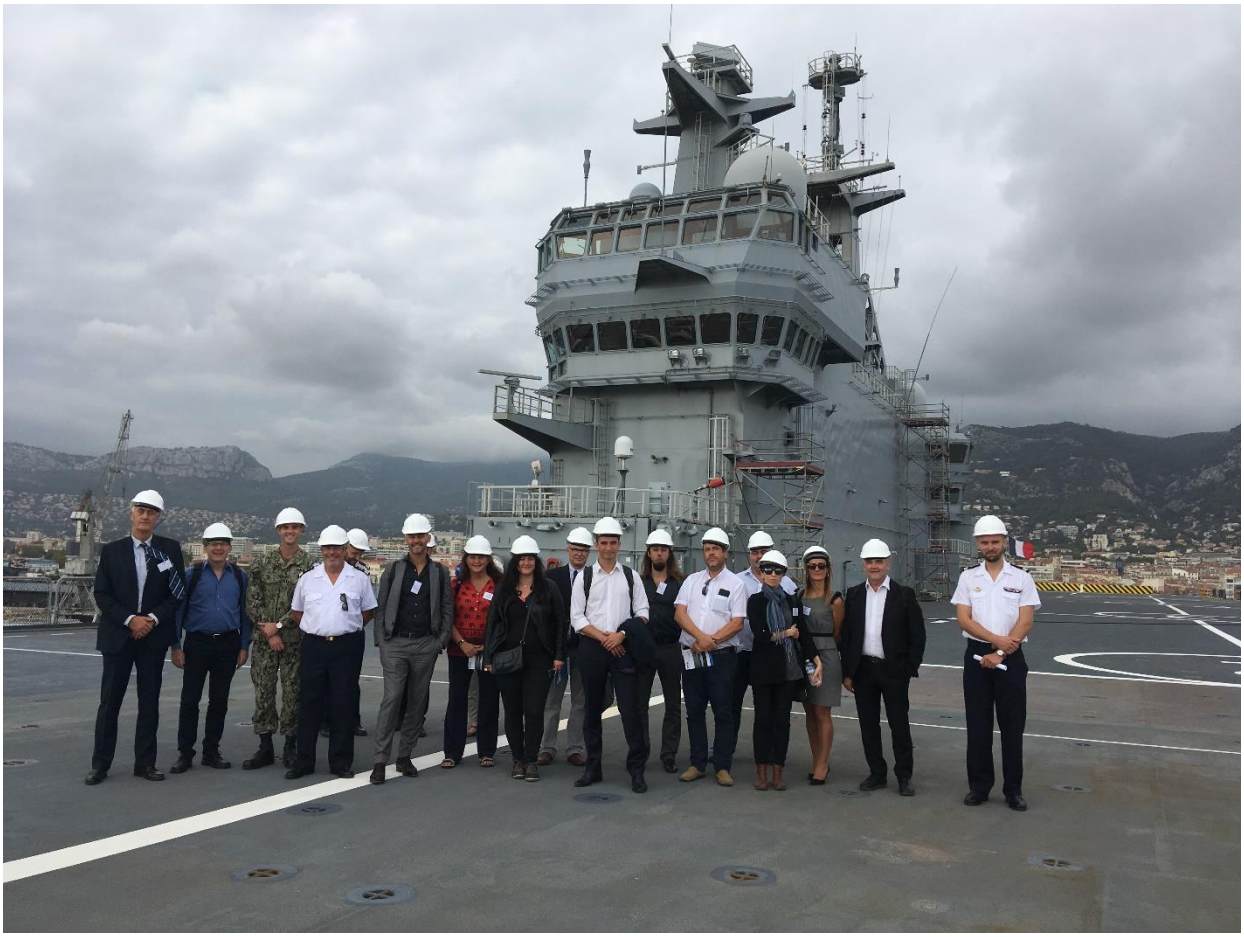
(Toulon 8th and 9th October 2019)

Proceedings





Workshop participants in front of *Préfecture maritime*



Workshop participants on board Amphibious helicopters-carrier *Mistral*

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Presentation and context

ACCOBAMS refers to the Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and contiguous Atlantic Area created in 1996 and which entered in force in 2001. It is a regional international treaty that binds its States Parties on the conservation of Cetaceans in their territories. The Agreement aims is to reduce threats to Cetaceans in the Mediterranean and Black Seas, as well as in the contiguous Atlantic area west of the Straits of Gibraltar.

Cetaceans depend on sound for food, communication, detecting predators and navigating. The intensification of mechanized use of the sea, for navigation, military activities, exploration for hydrocarbons and entertainment, has increased the amount of noise that humans introduce into the oceans. Underwater anthropogenic noise is a relatively new element for cetaceans that they may not be able to accommodate powerful underwater sounds cause trauma to the auditory systems and can cause disorientation, disconnection of the bench, group or community, internal bleeding, tissue breakdown, deafness and strandings, and physiological injuries.

Anthropogenic sources of noise vary in space and time but can be grouped into generalized categories such as explosions, large commercial vessels, air rifles and other seismic exploration devices, acoustic harassment devices (AHD) and pingers, polar icebreakers, offshore wells and other industrial activities, small vessels, boats, and personal aircraft (Hildbrand, 2005) and military sonar, navigation and discovery of the seabed. As such, the Scientific Committee of the Agreement on cetacean Conservation (ACCOBAMS) published at the end of its meeting in May 2005 a very comprehensive document containing recommendations and guides to take into account the impact of noise pollution on marine mammals in the Mediterranean.

As for sonars, the word which is an acronym for Sound Navigation and Ranging, a wide variety of sonar systems is used for civilian and military applications. They intentionally create acoustic energy to probe the ocean. They can be categorized as low-frequency (20 kHz) and medium-frequency (1-5 kHz) sonars. Active low-frequency sonars (AFLs) are used for large-scale monitoring. Medium-frequency tactical sonars for anti-submarine warfare (ASW) are designed to detect submarines within tens of kilometres. They are incorporated into the hulls of ships chasing submarines. All active sonars emit loud pulses or pings. These sounds bounce off the target surface (like a submarine) and return as echoes that are detected by hydrophones.

In the past decade, the multiple mass strandings of beaked whales have been documented as a result of acoustic exposure to anthropogenic sounds, especially medium-frequency sonar, in Europe, the United States and Asia. Affected whales had a condition called gas and fat embolic syndrome (GFES) characterized by a gas embolism (nitrogen bubbles), a set of lesions very similar to those encountered in a decompression accident (DCS) in human diving. The main hypothesis is that GFES is induced by supersaturating of N2 tissue coupled with a behavioural response (increase or decrease in surface passage time, upwelling or diving time, leading to an increase in supersaturating, and therefore increasing the risk of DCS) in response to acoustic exposure.

Other suggestions include an acoustic signal that could activate existing stabilized bubble cores that allow them to grow by passive diffusion, and/or lead activated bubbles to develop through a rectified scattering. These hypotheses assume that these beaked whales live with significantly high blood and tissue tension of N2 levels, a fact supported by a recent mathematical model. In the Mediterranean, strandings linked to acoustic tests occurred in Greece in May 1996 (Frantzis, 1998).

It is with this in mind that the last Meeting of the Parties to the Agreement on the Conservation of Cetaceans in the Black Sea, the Mediterranean and the adjacent Atlantic area has adopted in 2016 several resolutions (including 2.16; 3.10; 4.17; 5.15 and 6.17) by which it has requested to the Permanent Secretariat, in collaboration with the Scientific Committee, "to enter into dialogue with NATO and the national navies of non-NATO countries, if necessary, inviting them to provide information on the past military exercises in the area of THE ACCOBAMS for example Exercise Dynamic Manta in September 2015, especially on:

a) the use of active sonar or other sources of noise, including explosions (time, area, source levels),
b) cetacean sightings, if any, during the year,
c) approaches, if any, to assess potential negative effects on cetaceans (e.g. through sound modelling and the study of data on the likely presence of cetaceans),
d) mitigation measures taken, if any, and the basis for these measures;

Also calls on the Permanent Secretariat to hold a workshop inviting NATO and the national navies to show how the ACCOBAMS Scientific Committee can provide advice and assistance with regard to mitigation adverse effects on cetaceans for future exercises."

Therefore, ACCOBAMS Permanent Secretariat organised a workshop in October 2019, to enhance the dialogue and the cooperation between national navies and ACCOBAMS, meaning that it addresses military activities of navies including NATO and Non-NATO countries in the ACCOBAMS area and to reduce disturbances in the life of cetaceans created by the sonar emissions of warships. The FMES institute has been contracted by ACCOBAMS in order to assist in the organization of the workshop, in the facilitation of debates and in the final reporting.

The workshop was held in the French Maritime Prefecture in Toulon, France, on October 8th and 9$^{th.}$., in (cf. agenda in annex 1). More than 20 participants attended the workshops: representatives from Navies, National representatives, Members of the EU-TG Noise, Members of the joint CMS/ACCOBAMS/ASCOBANS Working Group on Noise, Members of the ACCOBAMS Scientific Committee and representative of other intergovernmental Agreements (list of participants in annex 2). During this workshop, the work has been focused on three main issues:

- **organisation** to improve ACCOBAMS efficiency regarding noise issue;
- **information sharing** between Parties, Scientific Committee & navies;
- **protocols/procedures** in planning and use of sonar implemented by navies during exercises.

The goal assigned by the chairman to the participants was to build an action plan including concrete recommendations in these three domains that could be proposed to ACCOBAMS 7th Meeting of Parties (MOP7) in Istanbul at the beginning of November 2019.

Abstract

After one day and a half of work, the group has identified several tracks that need to be explored in order to identify actions to be carried out in ACCOBAMS organisation, information sharing and protocols/procedures. The detailed actions identified are summed up in the following action plan.

First of all, regarding organisation, the main objective is to improve the link between ACCOBAMS Secretariat and each navy trough relevant Points of contact (POC). Then, the future workshop should include additional navies.

The information sharing needs to be improved:

- on the concept of "operations" and "exercises" which must be clarified because it's more the activity - operation or exercise - than the area which need to be considered. Indeed, real operations that cannot be subject to emission constraints due to national defence requirements may take place in exercise areas. On the contrary, exercises that occur outside dedicated areas can be subject to emission restriction to protect cetaceans;
- on cetacean distribution (map) and seasonality as well as data collections on cetaceans, CCH, IMMAs, protected areas from ACCOBAMS to navies;
- on principles exercises areas and information from navies to ACCOBAMS;
- with EU MFSD, NATO MILOC, ECAP (Barcelona convention) and individual champion which has been identified.

Procedures and protocols carried out by navies and appropriate bodies have to be compared and analysed, especially for further guidelines from international fora. Investigating information and best practices (studying for example Germany pile driving) is also important as much as considering spatial and temporal maritime planning possibility. In addition, the EU Marine Strategy Framework Directive (MSFD) has to be explored in the use as driver to EU navies.

At last but not least the formation/training given by ACCOBAMS of planners of exercises and warship Commanding Officer (observers, sonar operators) (ACCOBAMS Resolution) has to be studied.

Action plan

N°	Action	Pilot
	Organisation	
1	Request the TG-Noise/MSCG[1] chairs to share information on EU parties point of contact (POC)	ACCOBAMS Secretariat
2	Request MEDPOL Focal Points to share information on POC for non-EU Contracting Parties	ACCOBAMS Secretariat
3	**Encourage Parties (Focal Points) to assign a POC in national navies by MOP7 using Resolution 6.17**	ACCOBAMS Secretariat
4	Allow the ACCOBAMS secretariat to get in direct contact with navies' POC for the purpose of implementing the action plan	Parties
5	Allow the Secretariat to get into contact with NATO (working group)	Parties
6	Request the ACCOBAMS Secretariat, with the engagement of the Scientific Committee, to organize information/training/formation session of appropriate bodies in navies (planners and CO), also recalling final report of MOP6	Parties
	Information Sharing	
7	Provide ACCOBAMS with clarification of the distinction between exercises and operations, for purposes of informing how impacts from naval sonar activities can be mitigated (consider more the activity rather than the area)	French Navy
8	Map/identify sonar exercise areas, including where major NATO exercises are carried out	ACCOBAMS Secretariat in coordination with navies
9	Produce an overview of sonar types	ACCOBAMS Secretariat in coordination with navies
10	Consider listing and prioritizing areas for avoiding or limiting active sonar use	ACCOBAMS SC
11	Provide navies with available practical information on cetacean distribution (map) and seasonality, in a way that is understandable by navy planners and crews	ACCOBAMS Secretariat
12	Improve knowledge on cetacean distribution and seasonality, particularly on beaked Whales and unsurveyed areas, and provide updated information to navy planners and crews	ACCOBAMS SC
13	Provide feedback to ACCOBAMS SC and Secretariat on how information on cetacean distribution and seasonality has been used in planning and mitigation of active sonar activities	Navies
14	Ask the appropriate scientific organisations in countries to establish cooperation (e.g. data collection) with ACCOBAMS SC	ACCOBAMS Secretariat
15	Collect data from appropriate bodies (e.g. CMRE[i]) on cetacean distribution	ACCOBAMS SC
16	Analyse data gaps pertaining to marine mammal conservation and request the ACCOBAMS SC to fill these gaps; priority should be given to areas planned for exercises	ACCOBAMS SC
17	Hold follow-up workshop(s), inclusive of additional navies and NATO, to aid in implementing the elements of this action plan	ACCOBAMS Secretariat, in coordination with navies
	Protocols/Procedures	

[1] Marine Strategy Coordination Group

18	**Prioritize areas of high risk to beaked whales for spatial avoidance (following Bernaldo de Quiros et al. 2019)**	ACCOBAMS Secretariat and SC, in coordination with Navies
19	Ask the navies to provide standing protocols they use, then synthesize and propose a global protocol	ACCOBAMS Secretariat with ACCOBAMS SC
20	Propose a pilot project to perform scientific surveys of the exercise areas before and after the exercise	ACCOBAMS SC
21	Propose sending gliders (with hydrophones) to monitor a proposed exercise area ahead of exercises in suitable beaked whale habitat to avoid beaked whales	Navies
22	Support permanent monitoring of areas used recurrently	Parties
23	Investigate how to transpose to sonar the best practices used by Germany's Sound Protection Concept (StUk3) for pile driving	ACCOBAMS SC
24	Ask the relevant bodies to provide guidelines they have already published (e.g. TG Noise)	ACCOBAMS Secretariat
25	Encourage national navies to make use of relevant guidelines (ACCOBAMS/CMS)	ACCOBAMS Secretariat
26	Explore the possibility of replacing the notion of "moratorium area" with that of "sensitive zone"	ACCOBAMS SC
27	Use information on cetacean distribution and seasonality provided by ACCOBAMS in planning and mitigating active sonar activities, and provide feedback to ACCOBAMS on actions taken to reduce impact of sonar on cetaceans	Navies
28	Give available information relating to use of sonar before, during and after exercises	Navies
29	Include risk assessment for marine mammals in the planning of major exercises or of regular sonar activity in an exercise area	Navies

Introduction

Vice-Admiral Laurent Isnard, maritime prefect and French Commander-in-Chief for the Mediterranean and Vice-Admiral (Ret) Pascal Ausseur, CEO of the Institute FMES made the honour to introduce this workshop.

Vice-Admiral Laurent Isnard underlined the international dimension of the ACCOBAMS Agreement, the unique position to conduct outreach initiatives and provide recommendations aimed at preserving sea mammals and conduct actual actions to that end. As he recalled in his welcome address, France is resolutely involved in the preservation of biodiversity and this responsibility falls directly to him in the Mediterranean as maritime prefect, representative of the French State and responsible for the coordination between state action at sea under the direct authority of the Prime Minister. Furthermore, as commander of the Mediterranean maritime zone under the authority of the Military Chief of Staff, the security of France's maritime approaches and military operations in the Mediterranean, particularly in the field of combat anti-submarine. It also needs ships and aircrafts under its command to be able to use their sonars. For these reasons, he wanted to welcome the ACCOBAMS working group into his home and hoped that he could find ways to improve that the situation, without compromising the effectiveness of anti-submarine operations, which would contribute to improve cetacean's protection regarding the effects of sonar emissions from warships consequences. He mentioned that a balance must be struck between protecting the environment and securing states, monitoring the marine environment and combating illegal activities.

In this regard, he said, "the discussions held on the various protocols used by the navies represented today, but also those of other structures, must be a source of inspiration for us to draw on, in order to reach a common framework, as it is the case for the observation of sea mammals. Sonar emissions is a sensitive subject: we need to find solutions together that must be acceptable to navies in terms of operational constraints, on the one hand, and that can be justified scientifically on the other… Information sharing is also a subject of paramount importance: what type of information can be shared, by whom, and how? These important questions must find a collective answer in order to further progress on this front."

Vice-admiral (ret) Pascal Ausseur underlined the numerous stakes faced by the Mediterranean basin and why NATO and European Union have to preserve the security of this region, especially regarding underwater issues. The question raised by this workshop perfectly illustrates one of the Mediterranean Sea current issues today confronted with two contradictory injunctions.

On one hand one of the more volatile and sensitive area in the world with crisis rising everywhere - in Syria, Libya, Sahel, Ukraine, Cyprus, Lebanon, Turkey, Algeria, Balkans –and arms forces rising up, especially on and under the sea.

At the same time, Mediterranean Sea must overcome a huge environmental challenge with the deterioration of the quality of the water and its biodiversity as far as it could become a dead sea at the end of this century. It would be dramatic, ethically, politically, economically, socially, and in terms of security.
We cannot say "we will focus on environment in peace time, and on security during war time", because we are for decades on a new paradigm of permanent crisis. Hence, we are obliged to find ways to answer both injunctions at the same time, to solve both problems that we cannot afford to evacuate. That is the reason why this workshop is so important and why FMES institute is so happy and proud to organise it.

In the opening address, Maÿlis Salivas, ACCOBAMS Programme Officer underlined that the impacts of anthropogenic noise on cetaceans are considered as a priority for ACCOBAMS Parties. The ACCOBAMS Resolution 4.17 on "Guidelines to address the impacts of anthropogenic noise on cetaceans in the ACCOBAMS area" was adopted in 2010. Even though several important achievements have been made in the recent years, the noise issue is still facing numerous stakes. Therefore, the Programme officer emphasized the main objective of this workshop. The first concerns improving dialogue and cooperation among national navies and ACCOBAMS in order to preserve cetaceans' conservation. The ACCOBAMS commitment combines total protection of threatened species with stronger habitat protection. The second aim is about introducing how the ACCOBAMS Scientific Committee could provide updated advice and specific assistance with respect to mitigating adverse effects on cetaceans for any future exercises.

Then, Yanis Souami, co-chairman and CEO of Sinay mentioned the two main goals of this event. First, this ACCOBAMS workshop aims to create communication with a very small number of people in order to facilitate the dialogue. Above all, this workshop has to bring recommendations out to be presented in Istanbul during the next meeting of Parties.

Before the first session, vice-admiral (ret) Gérard Valin, facilitator of the whole workshop, remembered to all participants the Chatham house rules, meaning that the words of the various participants should not be repeated outside. Thus, the debate can be friendly opened between people looking for options together. He also insisted on the necessity to be pragmatic and to look for concrete actions that can be implemented more or less quickly. He reminded everyone the purpose of the workshop: provide ideas and recommendations to improve the use of sonars in order to have the best protection for cetaceans.
Of course, everybody understands that in real naval operations against submarines, it is difficult for the navies to restrict the use of sonars. On the contrary, during exercises, it is possible to share information and implement procedures or protocols to reduce nuisances on cetaceans.

1. The impacts of naval sonars on cetaceans

Beaked whales and blue whales responded to Mid-Frequency Active (MFA) naval sonars at sometimes surprisingly low received levels, from 89 to 138 dB re 1µPa at the animal, with an average of around 118 dB, based on five published studies. Based on six published papers, reactions in beaked whales included avoidance of the sonar, unusual silent dives with no echolocation and thus presumably no feeding, faster swimming, longer and deeper dives, no normal fluking (propulsion), and in blue whales, only half the time spent on foraging calls, which would likely impact their foraging.

Most importantly, a possible population impact has been demonstrated in a 15-year period. A study has compared a local population of Blainville's beaked whales on a naval range and one about 100 km away, showing fewer calves per female in the naval range population. Because of the extremely long and deep dives beaked whales undertake, females may be at a special risk from the energetic costs for being repeatedly driven away and reduced feeding rates because of naval manoeuvres involving sonars. Females show high site fidelity to naval ranges, making them especially vulnerable. Fatal mass stranding occurring with naval sonars are particularly harmful to small, local, genetically-distinct beaked whale populations.

As such, a 2019 paper co-authored by 22 beaked whale experts recommended to restrict naval sonar use to areas where sonar exercises are regularly conducted without mass strandings occurring and without beaked whales' populations. Areas with beaked whales where sonar exercises have rarely or never been conducted should be especially avoided, as these pose a greater threat to beaked whales.

Responses of beaked and blue whales to sonar
(modified from Hooker et al. 2019)

Study species	Sound source	Reaction	RL (dB)
Baird's beaked *(Stimpert et al. 2014)*	PB of simulated MFA sonar (3.5-4 kHz)	Avoidance, faster swimming, silent dives	127
Blainville's beaked *(Tyack et al. 2011)*	PB of simulated MFA sonar (3–4 kHz)	No biosonar during deep foraging dives, mvmt away	138
Cuvier's beaked *(DeRuiter et al. 2013)*	PB of MFA sonar	Stopped normal fluking and biosonar, swam rapidly, silently away, longer dives	89–127
Cuvier's *(Falcone et al. 2017)*	Ship-based and helicopter-deployed MFA sonar (3.5–4 kHz)	Longer deep foraging dives, stronger responses when closer and for quieter helicopter sonar	n/a
Northern bottlenose *(Milleret al. 2015)*	PB of MFA sonar (1–2 kHz)	Mvmt away, long and deep dives, stopped biosonar	107
Blue whale *(Melcón et al. 2012)*	MFA sonar (1-8 kHz)	Halved time spent on foraging calls, esp. when sonar closer and louder	100-120

Solutions have to be found in order to settle this highly important subject. These solutions should be suitable for navies in terms of operational constraints but they have mostly to be justified in scientific ways. For this purpose, a point of contact (POC) must be established.

The Secretariat of ACCOBAMS wishes to invite a large number of interlocutors around this subject. Nevertheless, this is difficult because the majority of national representatives in the ACCOBAMS structure are experts on environmental issues, while the main issue of sonar use is defence. As a result, National Focal Points have difficulty identifying, for reasons also related to procedures, and mobilizing those responsible for their national navy. It is a difficulty that has been encountered for too long and it is now important to overcome. Therefore, during next MOP, each party must be requested to give to ACCOBAMS Secretariat a point of contact (POC) in their navy to establish a direct link between them.

Recommendation 3: encourage Parties (Focal Points) to assign a POC in national navies by MOP7 using Resolution 6.17. (ACCOBAMS Secretariat)

Recommendation 4: allow the ACCOBAMS Secretariat to get in direct contact with navies' POC for the purpose of implementing the action plan. (Parties)

The type of sonars is also an important issue that leads to question about genetic effects. Indeed, it is possible to have eight different sonars in the same area. Then, if we have to talk about regulation, we have to underline which type of sonars, emission frequency and type, and what consequences at the ecosystem scale, the community level and not just about animal effects, including cetaceans. Therefore, identifying with more accuracy the part of the sonar emission which affect cetaceans must be clarified. However, exercises are more frequent than operations and it could be a danger to multiply exercises in the same area especially if this area is sensitive for the cetaceans.

Recommendation 9: produce an overview of sonar types. (ACCOBAMS secretariat with navies)

2. The use of sonars by navies

Navies are operating sonars in operation and exercise. Restrictions in use can only be considered in exercises or testing. In this way, it is very important to have a clear common understanding of these notions. In addition, the restriction of use of sonars can be considered at two levels. First during the planning phase of exercises or tests. Then, on board the ship, by the sonar operator under the responsibility of the commanding officer (CO).

a. Operations and exercises notions

Even though the Mediterranean Sea represents only 2% of the area of the Earth, it accounts for 25% of commercial traffic and it is a space of high geopolitical tensions. Therefore, it is very important to monitor this maritime area to use submarines and ships, especially in the two points of concentration of maritime traffic that are Gibraltar and the Sicilian Canal. Similarly, national navies use sonars to combat illicit activities, including terrorism (ISIS, AQIM, particularly around the southern shores and off Syria and Libya). In addition, national navies deploy military vessels throughout the Mediterranean region and off their own coasts to train. Nevertheless, sonars are

causing important emissions. This noise is harmful for the marine environment, especially cetaceans. That is why sonar emissions is a burning current issue and a sensitive subject.

On the other hand, the distinction between “operations” and “exercises” areas is not the good approach to establish procedures or protocols to avoid disturbing the life of cetaceans. Indeed, real operations which cannot be subject to emission constraints due to national defence requirements may take place in exercise areas. On the contrary, exercises taking place outside areas dedicated for exercise can be subject to emission restriction to protect cetaceans. Therefore, it is more the activity - operation or exercise - than the area which need to be considered.

In addition, terms to have a common understanding of what an operation is and what an exercise represents should be spelt out. Finally, solutions have to be found, not only to develop knowledge about problems but mostly for intellectual question.

Recommendation 7: Provide ACCOBAMS with clarification of the distinction between exercises and operations, for purposes of informing how impacts from naval sonar activities can be mitigated (consider more the activity rather than the area). (French navy)

b. Operation planning

The first level at which preventive measures can be taken to protect the life of marine mammals is exercise planning. If the authority and officers in charge of planning exercises and testing is well aware of the necessity to protect cetaceans and has the knowledge and information concerning biodiversity in his areas of responsibility, they will be able to choose the appropriate exercise areas to reduce or even cancel the impacts on marine mammals.

It is therefore essential to sensitize these people to the protection of cetaceans and to give them the relevant information concerning the life of these animals. This information has two components: a geographic one and a technical one.

Therefore, to avoid inflicting damage on cetaceans without operational reason, navies must include risk assessment for marine mammals in the planning of major exercise or of regular non-operational sonar activity in exercise areas.

Recommendation 29: include risk assessment for marine mammals in the planning of major exercises or of regular sonar activity in an exercise area. (Navies)

Geographical information

Geographical information concerns the cetacean's areas of activity, particularly those of high sensitivity linked, for example, to periods of reproduction or access to food. Indeed, the harmfulness of emissions in the area depends first on the presence of cetaceans, on their activity - reproduction in particular - and then on the distance of the sonar emissions. It is therefore essential that the areas of high vulnerability of cetaceans are well identified and communicated to the different navies.

Recommendation 11: provide navies with available practical information on cetacean distribution (map) and seasonality, understandable by navies planners and crews. (ACCOBAMS Secretariat)

Bernaldo de Quirós *et al*. (2019), based on the Spanish example, recommend a moratorium on MFAs in the regions where atypical mass strandings occur, especially around the Mediterranean Sea and where beaked whale populations are known or suspected to be. Finally, a moratorium could be useful where MFAs is rarely or never used. The authors prescribe to restrict sonar use to areas where training and testing show atypical mass strandings. Nonetheless, shifting from an exercise to an operation is easy for national navies. Also, during operation, the sonar emissions are not limited. To the recommendations made by Bernaldo de Quiros *et al*., we can add a limitation of time and a restricted area regarding exercises.

Recommendation 18: prioritize areas of high risk to beaked whales for spatial avoidance (following Bernaldo de Quiros *et al*. 2019. (ACCOBAMS Secretariat and SC in coordination with Navies)

The question of moratorium evocated is linked to geopolitics and it is quite interesting to observe the historical development of navy operations before establishing a moratorium. However, a moratorium remains a touchy area causing rejection reactions. It turns out that the notion of "moratorium", considered too radical by many, is counterproductive for the advancement of consultation between stakeholders. It seems better to consider the concept of "sensitive zone" in which sonar restriction protocols would be easier to achieve.

Recommendation 26: explore the possibility of replacing the notion of “moratorium” with that of “sensitive zone”. (ACCOBAMS Scientific Committee)

Finally, to be able to provide the navies with such geographical information, it is necessary to have a good knowledge of the presence and the vulnerability of the marine mammals in the areas involved. Since these elements evolve according to the seasons, it is essential to maintain this knowledge through regular monitoring of these areas.

Recommendation 22: support permanent monitoring of areas used recurrently. (Parties)

Technical information

During planning exercises can be taken into account the number of warships involved in the exercise as well as the type of sonar they are operating, its characteristics and its emission frequencies. So, the technical information to be provided to the authorities and officers in charge to plan exercises relates to the types and frequencies of sonar emissions that are harmful to marine mammals.

c. Operating sonar aboard ships

At the end of the chain, sonars are implemented by operators under the direction of officers and the responsibility of the CO of the ship. It is therefore essential that these seamen aboard warships have good information. This information is necessary for their motivation to preserve marine mammals, for their knowledge of the impact of sonar emissions on these animals and for the correct application of the procedures to be applied in order to limit harmful effects on these animals.
Finally, to be able to provide navies with such geographical information, it is necessary to have a good knowledge of the presence and the vulnerability of the marine mammals in the zones concerned. Since these elements evolve according to the seasons, it is essential to maintain this knowledge through regular monitoring of these areas.

Actions must be led because marine life has a non-replaceable role in the oceans ecosystems. First, noise is a threat to cetaceans and other marine life, both for acute noise exposure and chronic exposure to non-lethal level. Other factors must be taken into account:

- particular attention should be given to critical habitats, migration routes, and habitats that host sensitive species such as beaked whales;
- new concepts should be developed to define acceptable “noise doses” and guarantee adequate “acoustic comfort” to all marine creatures;
- improve the understanding of the “biology of disturbance” and cumulative and synergistic effects of multiple stressors;
- whenever there is a lack of scientific information, the precautionary principle should apply (EU Parliament Motion).

This observation highlights ACCOBAMS key role for the Mediterranean Sea. But the first challenge lies on the quality of the information exchange between stakeholders without which no effective action can be taken.

3. From NATO to EU and Barcelona Convention, many stakeholders involved

The impact of noise on the marine environment is a growing concern as shown by numerous scientific studies. That is why all the actors need to coordinate themselves and join their information for the common stake. It is good to have a general overview of what it is happening in the Mediterranean area to make sense between the community borders, scientists, NGOs, the ACCOBAMS organisation and all actors involved in the protection of marine mammals.

Besides, several efforts have been made but they have to be deeper. The departments in charge are different depending on the states.

Information is the key. ACCOBAMS is very collaborative by exchanging data and joining effort. The best example is the ACCOBAMS initiative project (ASI) which was implemented in the Mediterranean Sea in summer 2018. ACCOBAMS survey initiative (ASI) aims to develop a coherent monitoring system for the cetaceans in the Mediterranean and Black Seas, based on objective, robust and comparable data, with a view to improving the conservation status of these species and their habitats through appropriate management for the good status of the marine and coastal environments in the area of the study.

Other international organisations, such as NATO, European Commission, Barcelona Convention are also preoccupied by impact of sonar emissions on cetaceans and some of them have already taken measures to reduce its harmful effects. Therefore, it could be interesting for ACCOBAMS Secretariat to have a direct contact with these organisations to identified good practices and be able to propose them to Parties.

For example, NATO has established a working group on damage to marine mammals from sonar emissions from Member States' ships. It would be interesting for ACCOBAMS to see the results of this working group.

Recommendation 5: allow the Secretariat to get into contact with NATO (Working group). (Parties)

In addition, NATO is a large organisation that organises many exercises involving a lot of navies operating many sonars. It thus has a strong feedback of experience. Organizing follow-up workshops with the Parties' navies by inviting NATO and possibly other navies from non-member countries could help implementing the ACCOBAMS Action Plan.

Recommendation 17: hold follow-up workshop(s), inclusive of additional navies of Parties and invite NATO, to aid in implementing the elements of this action plan. (ACCOBAMS Secretariat in coordination with navies)

On the other hand, the European Union (EU) created in 2010 different technical groups. A specific group (EU-TG-Noise) was assigned to noise problem. Sharing information with this group would certainly help ACCOBAMS.

Recommendation 1: Request the TG-Noise/MSCG chairs to share information on EU Parties point of contact (POC). (ACCOBAMS Secretariat).

Finally, the MEDPOL program for assessing and controlling marine pollution in the Mediterranean has useful information for ACCOBAMS.

Recommendation 2: request MEDPOL Focal Points to share information on POC for non-EU Contracting Parties. (ACCOBAMS Secretariat)

4. Dissemination and sharing of information and data

To improve information and knowledge of threats, maps of cetaceans must be created, especially regarding distribution and quantities. Different maps can be joined - localisation of the different animals or human activities - in order to form a complete document. Nonetheless, it is not quite simple to get data and create maps while it is really important to have data. Until now, there is no really concrete cooperation being brought out from it.

Recommendation 8: map/identify sonar exercise areas, including where major NATO exercises are carried out. (ACCOBAMS Secretariat with navies)

As mentioned below, to carry out protocols, every actor, especially navies, have to better consider activity than the area. If the question of mapping and identify sonar exercises areas emerged, in particular because the French navy did it, this question is based on the goodwill of each state. Indeed, ACCOBAMS is a non-binding agreement one. This case requires collaboration between nations, which includes dialogue between navies, research centres or universities. In addition, it could be really complicated to get data and available information which means practical and understandable information by navies crews for example. Also, the secretariat of ACCOBAMS which will be in charge to assist Parties in implementing these new measures.

Recommendation 14: ask the appropriate body (Scientific organisations) in countries to establish cooperation (e.g. data collection…) with ACCOBAMS Scientific Committee. (ACCOBAMS Secretariat)

Recommendation 15: collect data from appropriate bodies (e.g. CMRE) on cetacean distribution. (ACCOBAMS Secretariat)

One important point for scientists is how information on cetacean distribution and seasonality has been used by navies in planning and mitigation of active sonar activities.

Recommendation 13: provide feedback to ACCOBAMS SC and Secretariat on how information on cetacean distribution and seasonality has been used in planning and mitigation of active sonar activities. (Navies)

ACCOBAMS SC should also collect data from all the different bodies (Parties, NATO, EU, other appropriates bodies) and merge all of them in order to identify gaps and propose corrective measures. The priority to fill gaps must be given to areas most often planned for exercises. Data gaps are really concerning. The Scientist have a big role to play in this subject.

Recommendation 16: analyse data gap pertaining to marine mammal conservation and request the ACCOBAMS SC to fill these gaps; priority should be given to areas planned for exercises. (ACCOBAMS SC)

Recommendation 27: use information on cetacean distribution and seasonality provided by ACCOBAMS in planning and mitigating active sonar activities, and provide feedback to ACCOBAMS on actions taken to reduce impact of sonar on cetaceans. (Navies)

The ACCOBAMS Scientific Committee plays a key role in the management and sharing of information. Consequently, all the information concerning marine mammals and the risks they incur must converged to the ACCOBAMS SC in order to improve knowledge on this issue.

Recommendation 12: improve knowledge on cetacean's distribution & seasonality, particularly on Beaked Whales and unsurvey areas and provide updated information to navy planners and crews. (ACCOBAMS SC)

Another method of prevention is to send gliders (with hydrophones) to monitor a proposed exercise area ahead of exercises in suitable beaked whale habitat to avoid beaked whales.

Recommendation 21: propose sending gliders (with hydrophones) to monitor a proposed exercise area ahead of exercises in suitable beaked whale habitat to avoid beaked whales. (Navies)

To improve scientist's knowledge about the impact of sonar emissions on cetaceans, navies could send them during and after exercise unprotected information available on the use of sonars.

Recommendation 28: give available information relating to use of sonar before, during and after exercises. (Navies)

However, they also need information. When a good exchange of information will be effective between ACCOBAMS and the navies and when they will have all the necessary information, the navies will face a problem of information dissemination and training of the use of this information by their people involved, ashore or aboard warships. The ACCOBAMS Secretariat along with the Scientific committee will then be the appropriate bodies at the disposal of the navies to help them.

Recommendation 6: request the ACCOBAMS Secretariat, with the engagement of the Scientific Committee, to organise information/training/formation session of appropriate bodies in navies (planners and CO), also recalling final report of MOP6. (Parties)

According to the Italian doctrine, the protocols for the protection of marine mammals are applicable primarily in the Pelagos sanctuary but they are general and applied to all maritime areas. These are general procedures for all peacetime activities, i.e. exercises, monitoring and experimentation. On the other hand, it is clear that once human life is at stake, protocols no longer apply. These protocols can be divided into three main blocks: prevention, conservation and eventuality.

Prevention is both short-term and long-term. The short term concerns when starting a sonar and the long term is about the collection of scientific data and the choice of exercise zones. Conservation is based on the observation of marine mammals from the three dimensions (under the sea, on the surface and above water) by ships. Finally, the potential field concerns the action in case of discovery which results in the cessation of sonar emissions and the remoteness of this particular area. From the various available data that have been studied and identified, it appears that the intensity and duration of sonar emissions can be painful and dangerous for marine mammals. As a result, Italy has many rules in place to follow. For example, the sonar emissions should not exceed 150db, last no more than 100 seconds and not exceed 3 hours in a day for anti-submarine warfare exercises. Similarly, low-intensity emissions are planned to alert cetaceans before the start of an emission. Limiting exercises is a good manner to respect maritime environment. All the data collected is given to Genova NATO centre.

In the other hand, France has determined areas of exercises also which are 300 m of depth. French navy ships must reduce SE at 2000 meters from marine life and stop at 300m. The state respects the NATO Code of conduct (MC 0547/2 June 12, 2018) to ensure protection of marine life. This code of conduct is topical both for exercises and operations and highlight places to avoid.

Recommendation 10: consider to produce a list of places to avoid sonar use. (ACCOBAMS SC)

For each country, guidelines are highly important. Many international organisations have produced guidelines to mitigate noise effects such as ACCOBAMS, ASCOBANS, NATO. However, they must be extended. As underlined above, there is a necessity to share information between navies and scientists. Also, in the file, scientists are putting their credibility at stake.

Most of all, guidelines must be applied with a whole transparency between European and south Mediterranean shore. However, guidelines document adopted by each country has no enforcement mean. Regarding this question, progress can also be made. Indeed, quieter sonars are possible but not before about 20 years. Studies are led nowadays to investigate about the noise problems.

Several actions should be led. Among them, there is a comparison and an analysis of navies' protocols. It is required to develop a common platform to know when and where Navies' exercise occur or have occurred.

Recommendation 25: Encourage national navies to make use of relevant guidelines (ACCOBAMS/CMS). (ACCOBAMS Secretariat)

Recommendation 19: asks the navies to provide standing protocols they use, then synthesize and propose a global protocol. (ACCOBAMS Secretariat with ACCOBAMS SC)

However, navies are not the only ones to control their underwater emissions to avoid harmful impacts on the environment. Germany, for example, has put in place a sound protection concept called StUk3 for pile driving. It might be interesting for the Scientific Committee to study this concept in order to identify if any good practices could be transposed for the protection of marine mammals.

Recommendation 24: ask the relevant bodies to provide guidelines they have already published (e.g. TG Noise). (ACCOBAMS Secretariat)

Recommendation 23: investigate how to transpose to sonar the best practices used by Germany's Sound Protection Concept (StUk3) for pile driving. (ACCOBAMS SC)

Also, there is a pilot project which consists to perform the need of scientific surveys of the exercise areas before and after the exercise and evaluation the real implementation of the mitigation protocol.

Recommendation 20: propose a pilot project to perform scientific surveys of the exercise areas before and after the exercise. (ACCOBAMS Scientific Committee)

Conclusion

As a major international Agreement between 24 countries around the Mediterranean, the Black Sea and the Atlantic contiguous area, ACCOBAMS is in a unique position to conduct outreach initiatives, provide recommendations aimed at preserving sea mammals and conduct actual actions to that end.

This Agreement, which brings together several countries bordering an area that is rich both in biodiversity and in threats, has proved its dynamism throughout the numerous issues and topics raised, but also thanks to the ever-growing cooperative actions undertaken.

In this respect, the impact of noise on the marine environment is a growing concern as shown by numerous scientific studies. Organising this working group in Toulon reflects the common desire to push forward this subject and to associate not only specialists but also Navies and different organisations.

Protecting marine mammals is a subject of particular interest and the ACCOBAMS workshop will certainly be fruitful and bring positive change, especially because so many different representatives agreed to sit in the same table for the common good.

This first and important step in establishing a collaboration between Navies and scientific in the ACCOBAMS Area is a major step and all the Parties are looking forward to pursue the development with other relevant organisation in order to establish a joint approach towards strategic common conservation objectives in the Mediterranean Sea.

The above action plan proposed by the participants of the workshop was developed with a pragmatic and a consensual approach. The recommendations are realistic and should lead to a real improvement in cooperation between stakeholders to protect marine mammals. But the key factor is the cooperation and exchange of information between the navies and ACCOBAMS: its Scientific Committee and its Permanent Secretariat.

Annexe 1 – Workshop Agenda

Tuesday 8th of October		
Time	**Activity**	**Place**
08h30	Welcome – Coffee	Préfecture maritime Director room
08h45	**Welcome speech** - Vice-admiral Laurent Isnard, French *Commander*-in-Chief, *Mediterranean*, - Vice-admiral (Ret) Pascal Ausseur, CEO FMES	
09h10	**Opening speech** - Maylis Salivas, ACCOBAMS Permanent Secretariat - Yanis Souami, co-chair of the joint CMS/ACCOBAMS/ASCOBANS Noise working Group	
09h30	**Session 1: use of sonar and Impact on cetaceans** *Facilitator: vice-admiral (Ret) Gérard Valin (FMES)* - French Navy: Presentation of context in Mediterranean Sea and use of sonar - Lindy Weilgart: Impact of sonars on cetacean	
10h30	Coffee break	
11h00	**Session 2: current procedures implemented by Navies to consider impact on cetaceans and ACCOBAMS initiatives** *Facilitator: vice-admiral (Ret) Gérard Valin (FMES)* - French Navy + Italian Navy: sonar and Marine Mammals protocols of French Navy and Italian Navy - Michael Jasny: What have been done in US - Gianni Pavan: ACCOBAMS Guidelines - Nicolas Entrup: What could be done to improve cetacean conservation	
13h00	**Lunch**	Uniform Museum
14h30	**Session 3: information sharing on mutual needs and Harmonisation of guidelines / procedures** *Facilitator: vice-admiral (Ret) Gérard Valin (FMES)* - Vassilios Petropoulos: What information would be useful for navies (to be completed by National Navies) - Lea David: ACCOBAMS survey initiative and other data collected by ACCOBAMS - Fabrizio Borsani: European initiatives: Marine Strategy Framework Directive / noise register	Préfecture maritime Director room
16h00	Coffee break	
16h30	**General conclusions of Session 1,2 and 3** *Facilitator: vice-admiral (Ret) Gérard Valin (FMES)*	
18h00	End of Work	
Wednesday 9th of October		
09h00	**Session 4: Action Plan** - All participants *Facilitator: vice-admiral (Ret) Gérard Valin (FMES)*	Préfecture maritime Director room
10h30	Coffee break	
11h00	**Session 5: Classification of actions and Final roadmap to be presented at the ACCOBAMS MOP** - All participants *Facilitator: vice-admiral (Ret) Gérard Valin (FMES)*	
12h10	**Closing of the Workshop** - Maylis Salivas, ACCOBAMS Permanent Secretariat Yanis Souami, co-chair of the joint CMS/ACCOBAMS/ASCOBANS Noise working Group	
12h20	**Goodbye speech** CRG Thierry Duchesne, deputy French *Commander*-in-Chief *Mediterranean* for State action at sea.	
12h30	Departure By bus to Fort Saint Louis	
12h45	**Lunch**	Fort Saint-Louis
14h00	Departure By bus to Toulon naval base	
14h30	Visit of Helicopter carrier FNS MISTRAL - *Vice-admiral (Ret) Gérard Valin (FMES)*	Naval base
16h30	End of visit and seminar	

Annexe 2 - List of participants

Participant	Organisation
Maylis SALIVAS	ACCOBAMS Permanent Secretariat
Yanis SOUAMI	ACCOBAMS/ASCOBANS/CMS JNWG
Alessio MAGLIO	ACCOBAMS/ASCOBANS/CMS JNWG
Gianni PAVAN	ACCOBAMS/ASCOBANS/CMS JNWG
Lindy WEILGART	ACCOBAMS/ASCOBANS/CMS JNWG EU TSG Noise
Vasilios PETROPOULOS	ACCOBAMS Regional Representative
Léa DAVID	ACCOBAMS Scientific Committee
Jenny RENELL	ASCOBANS Secretariat
Commissioner general Thierry DUCHESNE	Préfecture maritime de Toulon
André GROSSET	Préfecture maritime de Toulon
Lieutenant-Commander (Ret) Ariel FUCHS	Préfecture maritime de Toulon
Vice-Admiral (Ret) Gérard VALIN	FMES
Chief Commissioner (Ret) Philippe DÉZÉRAUD	FMES
Sarah HADJAZI	FMES
Nicolas ENTRUP	OceanCare
Michael JASNY	NRDC
Commander Romain CHATARD	French Navy
Lieutenant-Commander Simone LA RIVIERA	Italian Navy
Fabrizio BORSANI	EU TSG Noise
Jukka PAJALA	EU TSG Noise
Auriane VIRGILI	Université de La Rochelle – Laboratoire Pelagos
Odile GÉRARD	DGA

Annexe 3 – Abbreviations

ACCOBAMS	Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and contiguous Atlantic Area.
AFLs	Active low-frequency sonars
AHD	Acoustic harassment devices
AQIM	Al-Qaeda in the Islamic Maghreb
ASCOBAMS	Agreement on the Conservation of Small Cetaceans of the Baltic, North East Atlantic, Irish and North Seas
ASI	ACCOBAMS survey initiative
ASW	Anti -submarine Warfare
CCH	Cetacean Critical Habitats
CEO	Chief executive officer
CMRE	Centre for Maritime Research and Experimentation
CMS/JNWG	Convention on Migratory Species - Joint noise working group
CO	Commanding officer
dB	Decibel
DCS	Decompression sickness
DGA	Délégation Générale de l'armement – France Ministry of defence
EcAp	Ecosystem Approach – specific process under the UNEP/MAP: United Nations Environment Programme. Mediterranean Action Plan (Barcelona Convention)
EU	European Union
EU TSG noise	European Union Technical Group on Underwater Noise
FMES	Fondation méditerranéenne d'études stratégiques
GFES	Gas and fat embolic syndrome
IMMAs	Important Marine Mammals Areas
ISIS	Islamic State of Iraq and Syria
JNCC	Joint Nature Conservation Committee
MEDPOL	United Nations MED POL program for the assessment and control of marine pollution in the Mediterranean
MFA	Mid-frequency Active
MILOC	Military Oceanography Group
MSCG	Marine Strategy Coordination Group of EU
MOP	Meeting of party
MSFD	Marine Strategy Framework Directive
NATO	North Atlantic Treaty Organisation
NATO MILOC	North Atlantic Treaty Organisation Military Oceanography Group
POC	Point of contact
SC	ACCOBAMS Scientific committee
StUk3	Standard Investigation of the Impacts of Offshore Wind Turbines on the Marine Environment - German Federal Maritime and Hydrographic Agency (BSH)

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