



Review conducted in 2005

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Souffleurs d'Écume



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Working together to encourage changes in individual and collective behaviour at a local level.*

Collisions between commercial vessels and whales are a threat to several populations of large cetaceans around the world even to the point of extinction, as is the case for North Atlantic right whales. These accidents are an unfortunate reality which affects the safety of both personnel and passengers on board certain vessel types. In the Mediterranean, the scientific community and certain navigation companies are worried about these accidents, particularly within the Pelagos Sanctuary, an area which is protected from international waters by a recently established Franco-Italo-Monegasque agreement. It is for these reasons that since 1999, researchers and maritime transport companies have been developing a collision risk limitation program, which will be tested with a view to expanding it to other regions in the world.

1- Context: the Pelagos Sanctuary in the northwestern Mediterranean Sea

The Corso-Liguro-Provençal basin has a very unique current activity, which combined with the local climate, gives this zone a particularly significant primary productivity. These phenomena attract great biological interest from cetacean populations of the Mediterranean: Dolphins and whales find indispensable food resources in these waters, particularly during the summer months. At the same time, the area has high levels of human activity which though essential to the local economy, can also compromise this fragile ecological balance if not developed in a sustainable manner.

For these reasons, on 25 November 1999 in Rome, France, Italy and Monaco signed an agreement to create a Sanctuary for Mediterranean marine mammals in this zone (*Figure 1*). Given the name Pelagos and a defined area of 87 500 km², the aim of this agreement is to ensure a favourable conservation status for marine mammal populations by means of research, improving relations with human activities, proposing technical and legal management tools, and informing the public.

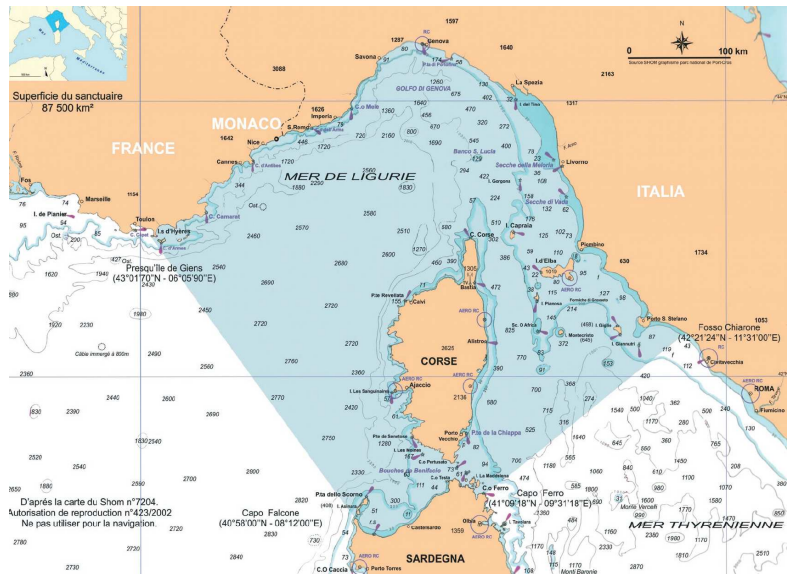


Figure 1: The Pelagos Sanctuary

The Pelagos Sanctuary, founded on 21 February 2002, is now on the list of SPAMIs (Specially Protected Areas of Mediterranean Importance), as part of a protocol relating to the Barcelona Convention. This status gives Pelagos official recognition from Mediterranean countries as being part of a network whose aim is the efficient conservation of Mediterranean heritage.

On a larger scale, under the aegis of the Bonn Convention, the Agreement on the Conservation of Cetaceans in the Black Sea, Mediterranean Sea and contiguous Atlantic area (ACCOBAMS) was signed in 1996 and came into effect in 2001. The two entities (Pelagos and ACCOBAMS) share the same objectives concerning cetacean conservation and have complementary approaches, Pelagos being able to test measures which will eventually be applied in the ACCOBAMS area.

2- Collisions between large cetaceans and commercial vessels

a- Why do collisions occur in this zone?

With an annual average of 140 000 crossings for over 10 000 vessels (SCOT, 2004), shipping is particularly intense in the western Mediterranean Sea (Figure 2). The Pelagos Sanctuary accounts for 2 of the 8 “concentration knots of maritime traffic” (Genoa and Marseille) identified throughout the basin, and 15 links are ensured by at least 6 passenger transport companies between the continent, Corsica and Sardinia. To be more precise, 68% of all passenger traffic in summer between Corsica and the continent is by sea (ORTC, 2010). Four fifths of transits operate between May and September – in 2010, a total of 8 686 215 seats and berths were offered for 5 888 crossings. These figures, which have been steadily rising over the last 10 years, illustrate the density of traffic in the area as well as its seasonal nature.

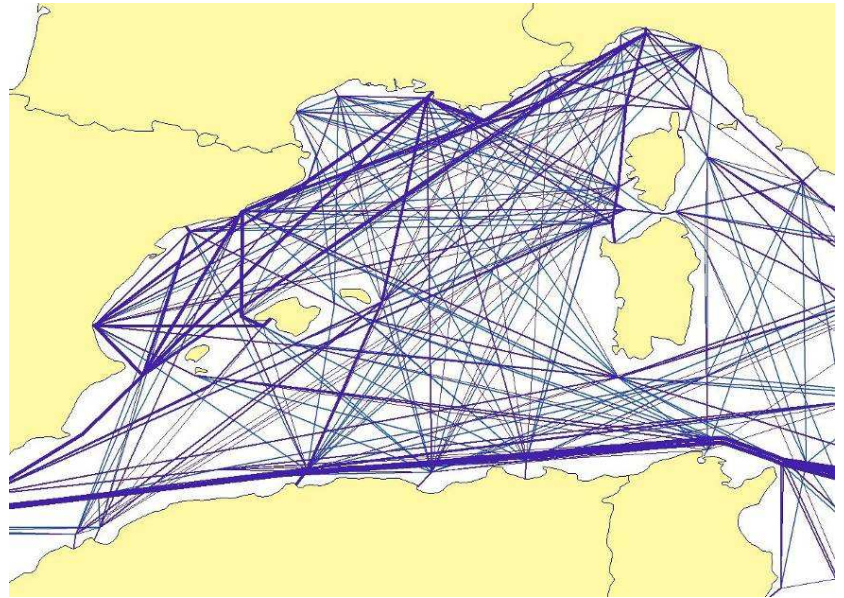


Figure 2: Gridding pattern created by maritime traffic in the Mediterranean. In Di-Méglio & David (2006), based on data from SCOT (2002).

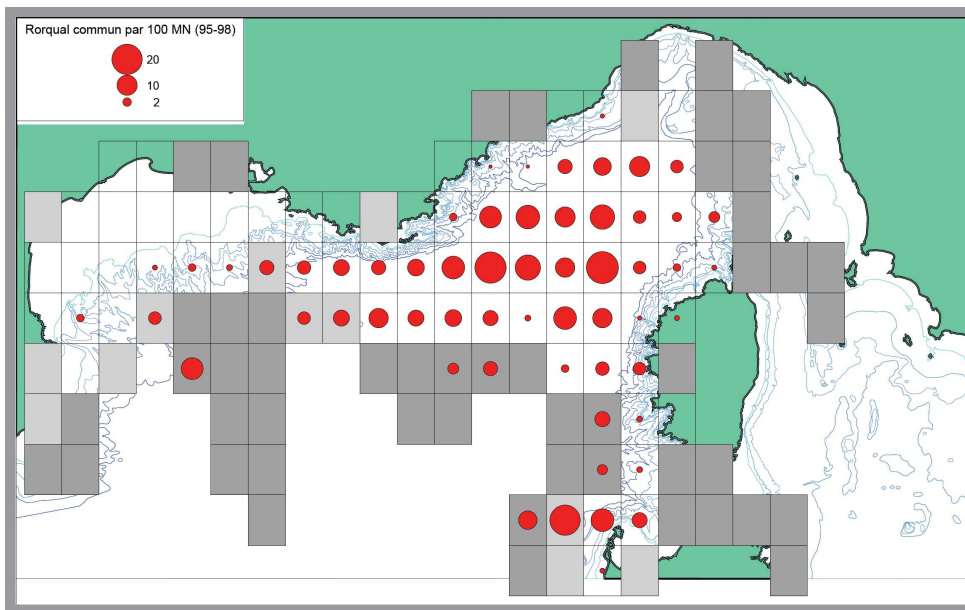


Figure 3: Summer distribution of fin whales in the northwestern Mediterranean Sea from relative abundance indices. The white rectangles correspond to zones where observation has ensured the reliability of the data, the grey indicating a lack of certainty. Distribution appears to be concentrated around the centre of the Liguro-Provençal basin, above 2000 m, although a few observations indicate the presence of individuals close to coastal areas. Image from the Poseidon Programme (Roussel et al., 2000).

When the concentration of several hundred large cetaceans during this same period (Figure 3) is considered alongside the density of marine traffic, it is easy to explain the increased risks of collision. The growth of traffic in this zone, especially that of freight transport (motorways of the sea), increases the necessity of developing collision risk limitation measures.

Finally, it is important to note that, in the northwestern Mediterranean Sea, Known collisions essentially concern car-ferries (62.5%), followed by merchant ships (15%), yachts (12.5%) and high speed vessels (10%).

a- Impacts on cetacean populations

The number of collisions as well as their impacts on populations of large cetaceans in the Mediterranean remain difficult to evaluate with precision. However, the creation of the Pelagos Sanctuary has allowed better collaboration between researchers and navigation companies, thus leading to progressive improvement in our knowledge of the phenomenon. Thus today we can say with confidence that two species are significantly affected: The fin whale (*Balaenoptera physalus*) and the sperm whale (*Physeter macrocephalus*). Why should we protect these species? From a pragmatic point of view, preserving these super predators is absolutely essential in maintaining an ecological balance in the Mediterranean. However, their value as natural heritage must also be considered, as both species are classified as being amongst the largest animals the planet has ever known, and actually play an important role in the development of ecotourism (whale watching) in the zone. Finally, from a biodiversity point of view, it has recently been discovered that the populations of these two species are isolated and unique to the Mediterranean, i.e. they are genetically different to those in the Atlantic. Particular attention thus needs to be paid to their preservation by environmental managers, all the more so considering that they are already subject to a whole range of anthropogenic disturbances, that their populations are reduced (around 3 500 individuals for the fin whale and no more than a few hundred for the sperm whale), that they achieve sexual maturity quite late in life, and their reproductive rates are very low.

Since the 70's, studies showed that at least 65 large cetaceans were killed from collisions, that is to say 1-2 known cases each year, in the northwestern Mediterranean. Nevertheless, the scientific community agrees that this number is severely underestimated (perhaps by a factor of 20–30 according to certain authors) as it only takes into account known collisions. Although the number of whales actually killed is as yet undetermined, thanks to the contribution of several shipping companies and scientific investigation into stranded cetaceans, estimations have been made of at least 16–20% of known fin whale deaths being attributable to collisions, a rate which is particularly worrying bearing in mind the population's ecological characteristics.

All these elements unite scientists and managers alike, in the following thought: that it is crucial to rapidly develop measures to limit the risks of collisions which pose a serious threat to the fin and sperm whale populations of the Mediterranean.

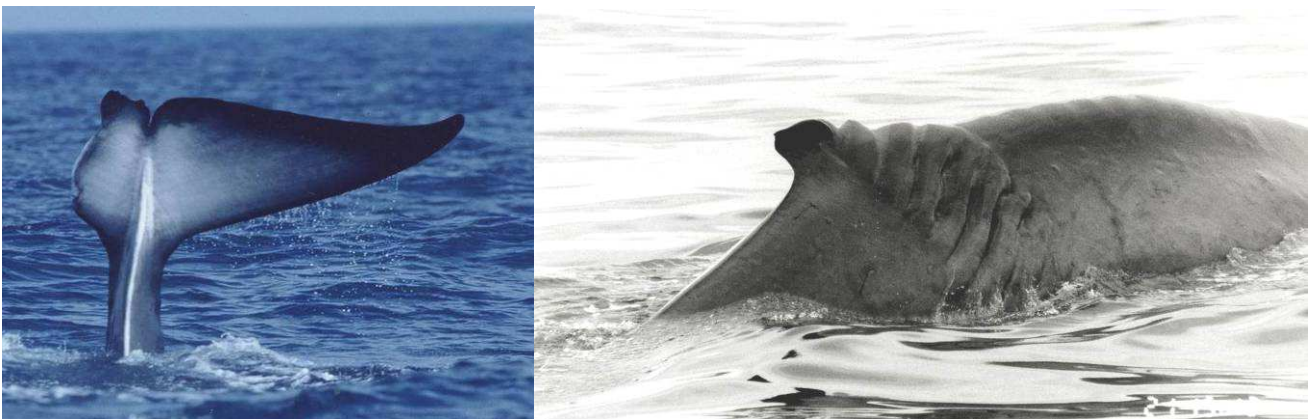


Figure 4: Photo-identification studies have showed that some individuals do not succumb to collisions, but the often very serious resultant injuries remain. The long term impacts from such injuries are still unknown, though one would imagine that the ability of these animals to meet their vital needs would be affected (photos: Tethys Research Institute).

b- Safety of vessels and passengers at risk

Nowhere in the literature is a single incident mentioned where passengers of traditional vessels (ferries or cargo ships) are placed in danger. Their low speeds, reinforced structure and imposing mass mean that only very rarely do they actually feel the impact of a collision with a large cetacean, and even then it would not be particularly intense. Damage to panelling at the point of impact can be a risk, but the integrity of the hull is not affected. Aboard certain vessels where propellers must be cleaned monthly, pieces of flesh belonging to various cetacean species have occasionally been found.

Risks relating to collisions involving high speed vessels are however much more substantial. On impact with a 40–70 tonne whale at 30 to 40 knots, the hull can sometimes be ripped open, meaning leaks are possible. This is precisely what happened in August 1998 and 1999 on board the high speed craft Asco and Aliso of the SNCM between Corsica and the French continent. An even more serious incident occurred in February 1992, when a jetfoil passenger was fatally wounded during a violent collision with sperm whale in the Canary Islands. Injuries to people have remained negligible until only recently (2004–2007) when a series of collisions in Japanese waters involving Humpback whales and Baird's beaked whales caused injuries to hundreds of jetfoil passengers, including one fatality.

c- Concerns for operating companies and ports

Following impact with a large vessel, a whale can remain attached to the bulbous bow until the boat docks. The said vessel then experiences a reduction in speed, thus a delayed arrival, and all the inconveniences that that entails. Furthermore, a 40-tonne carcass poses serious health risks and must be disposed of quickly at the expense of the port concerned and using extremely expensive methods: explosives for blasting the animal out at sea cost up to 25 000 Euros. Although this method is in common usage, it should be stressed that it is the source of serious acoustic disturbances for cetaceans in the vicinity at the time of the explosion. Other techniques are sometimes attempted, as in 2001 when the autonomous port of Marseille brought in a team of professional butchers to carve up the carcass of a fin whale which had been hit by a container ship, in order to fulfil knackery service requirements (*Figure 5*)! Authorities and scientists are looking into this issue in order to find a satisfactory solution from economic, health and ecological perspectives (like the “whale sinking protocol” developed by Dr Craig Smith from the University of Hawaii for instance). Additionally, when a vessel brings in a dead cetacean on its bow, the media tend to demonise the “liable” companies, often neglecting to mention other companies' efforts in this area.



Figure 5 : Fin whale brought in on the bulbous bow of a cargo ship in 2001 to the autonomous port of Marseille following a collision.

Where high speed vessels are concerned, in the event of a collision, crew members are confronted by an emergency situation that is rather delicate as well as extremely disadvantageous in terms of the scheduled arrival time in port. In addition, if the vessel is damaged it will be out of action for several days and the company must face major expensive repairs: more than 3.5 million Euros have been spent since 2004 for just such reasons by one of the companies operating high speed vessels between Japan and Korea. In the Ligurian Sea, such events have occurred during operation, and passengers have been seen turning towards traditional vessels that do not necessarily correspond to their needs.

3- Potential solutions

To this day there do **not appear to be any technological solutions** designed to detect (sonar, radar, infrared etc.) or deter (acoustic emissions) cetaceans without risk of adversely affecting their populations. Other systems under development overseas are promising for the future (e.g. the *Whale Anti-Collision System* in the Canary Islands).

Some countries use **alternative routes** to avoid concentrations of whales (modifications of the Bay of Fundy Traffic Separation Scheme in Canada). In the Mediterranean, envisaging such a solution involves understanding the driving forces behind cetacean distribution, an aspect that is currently being investigated by several research groups. However, rerouting shipping lanes is a particularly delicate alternative, both ecologically (possibly just displacing the disturbances to other habitats or populations), and economically (time

management, fuel consumption, etc.). A more promising alternative would be to **limit the speed of the vessels** in certain zones and during certain periods. The US *National Marine Fisheries Services (NMFS)* proposed a similar measure for vessels over 19.8m in certain zones in the North Atlantic, with the aim of protecting a population of right whales in severe decline due to collisions (fewer than 350 individuals remain). The Spanish government on the other hand has had a 13-knot recommended maximum speed in place since 2007 in the strait of Gibraltar, in areas of high concentrations of sperm whales. Recent reports however, show that this recommendation is only partially being followed, due to lack of enforcement.

Although it may be impossible to reduce the risk of collision to zero in the short term, applied studies and the development of certain tools should allow this objective to be obtained progressively. It is for these reasons that since 1999, researchers and maritime transport companies have been developing a programme to limit collision risks. The programme aims to improve the “detectability” of large cetaceans from the bridge of commercial shipping vessels. A study conducted on board three High Speed Craft along with other data gathered from traditional car ferries and cargo ships have actually shown that several factors reduce the ability of watchkeeping personnel to detect cetaceans from their vantage point on the bridge. The reasons for this reduced “detectability” include: operational requirements related to navigation, the ergonomics of the bridge, vessel speed, the weather, recognition and interpretation of visual signals produced by cetaceans, as well as awareness of the issue.

Recommendations for surveillance have thus been established, and having a specialised observer has been proven to be beneficial - of all whales identified as potentially heading for collision, 65% were detected by the specialised observer. Other recommendations have also been made **for bridge designs** with improving detectability of large cetaceans in mind.

Since 2005, the ENMM (French National Merchant Marine School) of Marseille has been running a **training programme** for seagoing personnel and cadets which teaches awareness of the collision problem as well as methods and principles of risk limitation. This course is currently being developed for expansion in Italy.

Finally in 2010, a collaborative tool has been established for use within Pelagos. Known as **REPCET** (Real time Plotting of CETaceans), it is a software system dedicated to navigation where every sighting of a large cetacean made by the watch from a REPCET-equipped vessel is transmitted by satellite in semi-real-time to a server on land. The server then centralises the data and sends out an alert to equipped vessels that are likely to be affected. The alerts are displayed cartographically on a dedicated screen on board (www.repcet.com).

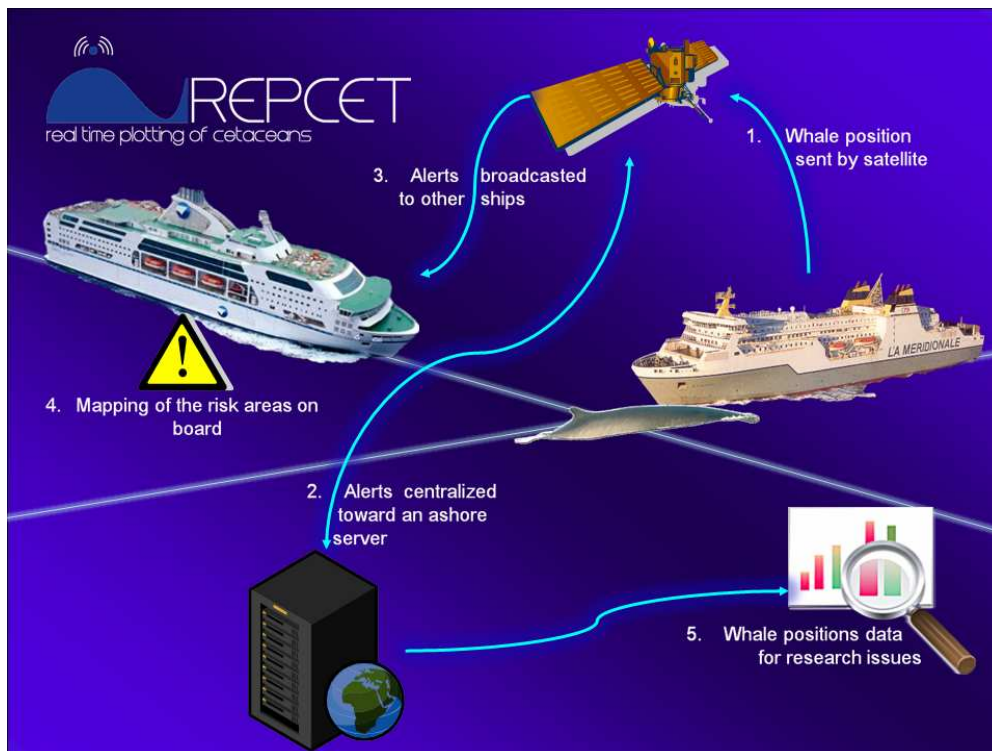


Figure 6: System overview diagram

4- Awareness of international and national bodies

a. IMO recommendations

Since 1999, the **IMO (International Maritime Organisation)** has regarded the heightened risk of hitting marine mammals as being part of the effects of shipping on the environment, in particular where high speed vessels are concerned. This awareness was made concrete in 2002 when the international maritime traffic management body accepted an amended Traffic Separation Scheme (TSS) in the Gulf of Maine (Nova Scotia, Canada) in order to protect one of the North Atlantic right whales' main habitats. In 2007, to complete this scheme, the IMO designated part of the site (Roseway basin) as an "area to be avoided" by commercial shipping, on a seasonal basis. The designation "area to be avoided" is only a recommendation. It is aimed at vessels weighing over 300 gross tonnes, in the period 1st June to 31st December, when whales are found in this zone.

b. International Whaling Commission

In 1946, the International Whaling Commission (IWC) was created, which today includes 66 countries. Every year since 2005, a working group has been meeting on the theme of collisions. The aim of this group is to evaluate scientific information relating to the collisions issue from around the world and to provide recommendations to its member states. The following are some of the recommendations from the 2007 report:

- ✓ sharing data on known collisions (a collaborative database where anyone can report a collision is available online: http://www.iwcoffice.org/sci_com/shipstrikes.htm),
- ✓ adopting local and national regulations, rules and action plans to limit the risks of collision,
- ✓ designating training programs for officers and crew members.

In addition, a collaborative project between the IWC and the IMO was initiated in 2007.

c. ACCOBAMS and Pelagos recommendations

In November 2009 in Monaco, Pelagos' 4th Conference of the Parties (the decision-making body) voted for a resolution on maritime traffic, which involved the States contributing to the REPCET project (see above) and promoting the Pelagos Sanctuary's recognition as a Particularly Sensitive Sea Area (PSSA) to the IMO. Concerning this point, a study was first carried out by a group of experts, at the request of the French Ministry of the Environment and in consultation with Monaco and Italy. The associated propositions are being validated by the French Ministry and will be presented shortly to ship-owners for consultation, before being submitted to the IMO.

At a Mediterranean level, ACCOBAMS' 4th Conference of the Parties, which took place in Monaco in November 2010, voted for a resolution called "collisions between vessels and large cetaceans in the Mediterranean Sea". The following are some of their main recommendations addressed to the parties:

- ✓ Improve knowledge of collisions, in particular by facilitating information exchange between scientists and maritime companies
- ✓ Deploy the REPCET system, tested in PELAGOS with some companies, throughout the entire ACCOBAMS area
- ✓ Consider adaptive measures, such as Mandatory Ship Reporting Systems or the establishment of Particularly Sensitive Areas (PSSA), as part of the IMO
- ✓ Request for notification of collisions from maritime companies to competent authorities
- ✓ Consider collisions between vessels and cetaceans as a complementary topic for the training of companies crew
- ✓ Use the Strait of Gibraltar and the Pelagos Sanctuary as models and experimental areas to test the measures efficiency

d. National commitments

Finally, at a national level, the *Grenelle de la Mer* was the occasion to reaffirm the French commitments relative to PELAGOS. Commitment 16b from the Blue Book of the Oceans Round Table (*Grenelle de la Mer*) stipulates that the necessary measures will be taken to limit collisions between vessels and marine mammals (République Française, 2009). These perspectives were transformed in the "Vessels of the future" and "Sea Transports" operational committees into the following terms:

- **Revision of the territorial continuity mechanism between Corsica** and the mainland considering the ecological aspects and the PELAGOS Sanctuary in the public service delegation.
- Preparation of the **PELAGOS Sanctuary classification into a PSSA** (Particularly Sensitive Sea Area).
- Encourage the **development of real-time alert systems of cetaceans' positions in order to limit the risks of collision** and initiate, when possible, avoidance procedures.

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MAIN REFERENCES USED TO WRITE THIS DOCUMENT

- ACCOBAMS (2005) – *Report of the Joint ACCOBAMS/Pelagos Workshop on Large Whale Ship Strikes in the Mediterranean Sea*. Monaco, 12-15 November 2005. 35 p.
- ACCOBAMS (2010) – *Rapport de la quatrième réunion des Parties contractantes à l'ACCOBAMS*. Monaco, 9-12 novembre 2010. 394 p.
- ACCOBAMS (2010) – *Résolution 4.10. sur les collisions entre navires et grands cétacés en mer Méditerranée*. Votée en novembre 2010, 4^{ème} Conférence des Parties à l'ACCOBAMS, Monaco. 3 p.
- BEAUBRUN P., CAPOULADE F., et DAVID L. (2001) – First experiment on the fin whale (*Balaenoptera physalus*) visual detectability on board of a French high speed craft in the N.-W. Mediterranean Sea. *Poster presented at the 15th European Cetacean Society Conference*, Roma, 6-10 may 2001, **15** : 289-291.
- BEAUBRUN P., CAPOULADE F. & MAYOL P. (2005) - Visual detection of large cetaceans from High Speed Crafts in order to limit the risks of collision: Context, results and applications. *Joint ACCOBAMS/Pelagos workshops on fin whale and collisions*. Monaco, 12 - 15 November 2005 (com. or).
- CAPOULADE F. (2001) – Whales and ferries in Ligurian Sanctuary: Captain's experience and owner's actions. *Proceedings of the workshop "collisions between cetacean and vessels: can we find solutions?" of the 15th Annual Meeting of the European Cetacean Society*, Rome, Italie, 6 mai 2001. ECS newsletter n° 40, Mars 2002, édition spéciale. PESANTE G., PANIGADA S. et ZANARDELLI M. éd., **40** : 18-25.
- CAPOULADE F. et MAYOL P. (2004) - *Compte-rendu de l'opération REPCET 2004 au Directeur de l'Armement et de la Sécurité Maritime Terrestre de la SNCM*. 4p.
- DI-MÉGLIO N. et DAVID L. (2006) – Etude préliminaire du trafic maritime en vue d'une meilleur gestion de son impact dans le Sanctuaire Pelagos. *3^{ème} Journée Nationale Pelagos*, 4 mars 2006, Hyères. Com. or.
- GAMBAIANI D., MAYOL P., CAPOULADE F., MCKENZIE C., MCKENZIE E., SCHNEIDER M. (2010)- *Impact du trafic maritime sur les cétacés*. Synthèse des connaissances sur l'impact du trafic maritime (étude réalisée par le GIS3M pour le compte de Pelagos France). **1** : 25-88
- IWC (International Whaling Commission) (2007) – *Ship strikes working group, Second progress report to the conservation committee (doc IWC/59/CC 3)*. 59th Annual Meeting of the International Whaling Commission. 31 p.
- LABACH H., MAYOL P., GAMBAIANI D. & CAPOULADE F. (2010) - *Eléments pour la désignation du Sanctuaire PELAGOS en tant que ZMPV (Zone Maritime Particulièrement Vulnérable)*. Document rédigé par le GIS3M pour le compte de la Partie Française du Sanctuaire PELAGOS, dans l'objectif d'un dépôt auprès de l'Organisation Maritime Internationale. 40 p.
- MAYOL P. (2005) - Enjeux des collisions entre grands cétacés et navires de commerce en Méditerranée et moyens de limiter les risques. *Actes des 4^{ème} Rencontres Régionale de la Mer. Atelier n°1 (Ports – Transports maritimes – Sécurité Maritime)*. 15 novembre 2005, Marseille. **4** : 19-21
- MAYOL P., CAPOULADE F., BEAUBRUN P. (2004) – Déteçtabilité Visuelle des Grands Cétacés à Bord des Navires à Grande Vitesse (NGV) pour Limiter les Risques de Collision. *Journées Nationales PELAGOS*, Hyères-les-Palmiers, 7 et 8 mai 2004. **1** : 20 et com. or.
- MAYOL P., CAPOULADE F. & BEAUBRUN P. (2005) – Comment améliorer la Déteçtabilité Visuelle des Grands Cétacés depuis les NGV pour limiter les Risques de Collision ? *Sciences et technologies marines du futur : Un enjeu pour la Méditerranée (Toulon Var Technologie)*. 19 mai 2005, Marseille. Poster.
- MAYOL P., CAPOULADE F. & BEAUBRUN P. (2007) - Navires de commerce et collisions avec les grands cétacés en Méditerranée nord-occidentale : Enjeux et mesures de limitation des risques. *Annales 2007 de l'Institut Méditerranéen des Transports Maritimes*. **2007** : 205-227.
- MAYOL P., BEAUBRUN P., CAPOULADE F. & MUGNIER P. (2008) - Whale-ship collisions: Work and outlook from a team in the Pelagos Sanctuary. The example of the REPCET project. *60th International Meeting Commission (IWC/60/CC9rev - Agenda item 4)*. Santiago, Chile, 12 p.
- ORTC (Observatoire Régional des Transports de la Corse) (2010) – *L'offre « passagers » sur les lignes maritimes au cours de la saison 2010 (mai à septembre)*. 8 p.
- PANIGADA S., CAPOULADE F., CASTELLOTE M. LEAPER R. and MAYOL P. (2010) – *Fin whales: progress report on the evaluation of ship strikes in the ACCOBAMS area and protocol to assess ship strikes*. Document: SC6-Doc 11. ACCOBAMS Scientific Committee, 11-13 January 2010.
- PANIGADA S., PESANTE G., ZANARDELLI M., CAPOULADE F., GANNIER A. et WEINRICH M.T. (2006) - *Marine Pollution Bulletin*. **52** : 1287–1298.
- PELAGOS (2009) – *Recommandation trafic maritime, COP4/REC4/FR*. Votée en octobre 2009, 4^{ème} Conférence des Parties Pelagos, Monaco.

ROUSSEL E., BEAUBRUN P., DAVID L., DI-MÉGLIO N., AIROLDI S., ZANARDELLI M., NOTARBARTOLO DI SCIARA et coll. (2000) – *Programme POSEIDON (1995-1998) : Distributions des cétacés et des activités humaines en Méditerranée nord-occidentale*. 104p.

REPUBLIQUE FRANCAISE (2009) – *Livre Bleu des engagements du Grenelle de la Mer*. 71 p.

SCOT (Services et Conception de systèmes en Observation de la Terre) (2004) – *Etude du trafic maritime en Méditerranée*. Pour le Ministère de l'Équipement, des Transports, du Logement, du Tourisme et de la Mer et la Direction des Affaires Maritimes et des Gens de Mer, 60 p. + annexes.

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