IMO environmental management, and potential interactions with OSPAR High Seas Marine Protected Areas

Document completing the presentation on shipping impacts held in the OSPAR - Madeira II workshop

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Foreword

Following the designation of six High Seas Marine Protected Areas (HSMPAs) in 2010, the OSPAR Commission aims at drawing management plan for these areas.

For that purpose has taken place in January 2012 in Paris the second informal meeting of competent authorities on the management of selected areas in Areas Beyond National Jurisdictions (ABNJ) in the North-East Atlantic, also known as the Madeira II workshop.

Contrary to the Marine Protected Areas (MPAs) we are used to deal with in national jurisdiction, these HSMPAs do not have a managing authority, and therefore the idea of management relies more on a cooperation of sector-based authorities.

Bearing in mind this idea, the content of this document was presented during the workshop in order point out the interactions between the existing environmental management of the International Maritime Organization (IMO) and the protection of the selected areas. A specific objective is to study the relevance of IMO’s spatial tools for environmental protection: the Particularly Sensitive Sea Area (PSSA) and the Special Area (SA).

Institutional background and mission

IMO, which has its headquarters in London, United Kingdom, has been established in 1948, and the IMO Convention entered into force in 1958. At the end of the year 2011, IMO was composed of 170 Member States, representing almost 100% of the world merchant fleet.

As summarized by Article 1(a) of the Convention, the purposes of the Organization are "to provide machinery for cooperation among Governments in the field of governmental regulation and practices relating to technical matters of all kinds affecting shipping engaged in international trade; to encourage and facilitate the general adoption of the highest practicable standards in matters concerning maritime safety, efficiency of navigation and prevention and control of marine pollution from ships".

The Organization is also entitled to deal with administrative and legal matters related to these purposes.

For the six year period 2010-2015, the Strategic plan for IMO is framed by the following mission statement (Resolution 1.1011, 26): "The mission of the International Maritime Organization (IMO) as a United Nations specialized agency is to promote safe, secure, environmentally sound, efficient and sustainable shipping through cooperation. This will be accomplished by adopting the highest practicable standards of maritime safety and security, efficiency of navigation and prevention and control of pollution from ships, as well as through consideration of the related legal matters and effective implementation of IMO’s instruments with a view to their universal and uniform application."

An agreement of cooperation between OSPAR and IMO was adopted in 1999.

The Organization is composed by an Assembly, a Council and five main Committees: the Maritime Safety Committee (MSC), the Marine Environment Protection Committee (MEPC), the Legal Committee, the Technical Co-operation Committee and the Facilitation Committee and a number of
Sub-Committees support the work of the main technical committees. Among these Committees, in the scope of the OSPAR HSMPAs, the MEPC is obviously of particular interest, and we will provide more details on it. Even if of course the work of other Committees and especially the MSC has direct environmental implications.

As defined by IMO, “the MEPC, which consists of all Member States, is empowered to consider any matter within the scope of the Organization concerned with prevention and control of pollution from ships. In particular it is concerned with the adoption and amendment of conventions and other regulations and measures to ensure their enforcement. The MEPC was first established as a subsidiary body of the Assembly and raised to full constitutional status in 1985.”

As mentioned above, the MEPC (as well as the MSC) is assisted in their work by nine sub-committees which are also open to all Member States. They deal with the following subjects:

- Bulk Liquids and Gases (BLG);
- Carriage of Dangerous Goods, Solid Cargoes and Containers (DSC);
- Fire Protection (FP);
- Radio-communications and Search and Rescue (COMSAR);
- Safety of Navigation (NAV);
- Ship Design and Equipment (DE);
- Stability and Load Lines and Fishing Vessels Safety (SLF);
- Standards of Training and Watchkeeping (STW);
- Flag State Implementation (FSI).

**Environmental management in IMO**

Again, we will focus on the regulations for the preservation of the environment, what, in IMO, consists of the Conventions relating to the prevention of marine pollution.

Among those regulations, the MARPOL Convention (International Convention for the Prevention of Pollution from Ships, 1973) distinguished itself as one the three most important Convention, along with the International Convention for the Safety of Life at Sea (SOLAS, 1974) and the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW, 1995).

This central Convention for the prevention of marine pollution, has been completed by a series of Convention, about which, we will detail the key facts for the preservation of the marine environment from shipping impacts. All these Conventions are summarized in the table in Annex I, with information regarding year of creation, entry into force, and percentage of adoption.

**MARPOL 73/78**

MARPOL 73/78 was the primary international legal instrument covering prevention of pollution of the marine environment by ships from operational or accidental causes. It comes from the combination of two treaties adopted in 1973 and 1978 respectively, completed later by the 1997 Protocol (Annex VI, regarding air emissions). So that the MARPOL Convention is today composed of the following six Annexes, each of them dealing with a pollution type.

It should be noted that the MARPOL Convention provides through the Special Areas a status enabling to set discharge restrictions, which can be acquired for areas of particular interest.
**MARPOL Annex I—Oil**

The Annex I (Regulations for the Prevention of Pollution by Oil) provides a set of discharge criteria for operational discharge of oil. Two types of such discharges can be distinguished:

- Discharge of oil from tanks in the case of oil tankers (see figure 1).
- Discharge of oil from machinery, for all ships (see figure 2).

In both cases, restricted discharges are allowed. Regarding the oil cargo of oil tankers, under the condition that the ship is more that 50 nautical miles off the coast.

<table>
<thead>
<tr>
<th>Sea area</th>
<th>Discharge criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Within 50 nautical miles from land</strong></td>
<td>No discharge except clean* or segregated ballast</td>
</tr>
<tr>
<td><strong>Within a special area</strong></td>
<td>No discharge except clean* or segregated ballast</td>
</tr>
<tr>
<td>**More than 50 nautical miles from land (outside a special area <strong>)</strong></td>
<td>No discharge except either : 1. clean or segregated ballast or 2. when - the tanker is in <em>en route</em> ; and - the instantaneous rate of discharge of oil does not exceed 30 litres per nautical miles ; and - the total quantity of oil discharged does not exceed 1/15,000 (for existing tankers) or 1/30,000 (for new tankers) of the total quantity of cargo which was carried on the previous voyage ; and - the tanker has in operation an oil discharge monitoring and control system and slop tank arrangements as required by regulation 15.</td>
</tr>
</tbody>
</table>

*Clean ballast means that the effluent does not create a visible or the oil content exceed 15ppm

**Figure 1 : control of discharge of oil from cargo-tank areas of oil tankers**

<table>
<thead>
<tr>
<th>Sea area</th>
<th>Ship size and type</th>
<th>Discharge criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>More than 12 nautical miles from land</strong></td>
<td>Ships of 400 grt and above delivered before 6 July 1993 not fitted with oil filtering equipment</td>
<td>No discharge except when : - the tanker is proceeding <em>en route</em> ; and - the oil content of the effluent is 100 ppm or less ; and - the ship has in operation oily-water separating equipment of an approved design.</td>
</tr>
<tr>
<td>**Anywhere outside a special area **</td>
<td>Oil tankers of all sizes and other ships of 400 grt and above</td>
<td>No discharge except when : - the tanker is proceeding <em>en route</em> ; and - the oil content of the effluent is 15 ppm or less ; and - the ship has in operation an oil discharge monitoring and control system, oily-water separating or filtering equipment or other installation required by the regulation ; and - on oil tankers, the bilge-water does not originate from cargo pump-room bilges or is not mixed with oil cargo residue.</td>
</tr>
<tr>
<td><strong>Other ships of less than 400 grt</strong></td>
<td>The conditions for ships of more than 400 grt apply as far as practicable and reasonable.</td>
<td>The conditions for ships of more than 400 grt apply as far as practicable and reasonable.</td>
</tr>
</tbody>
</table>

Special areas are the Mediterranean Sea, the Black Sea, the Baltic Sea, the "Gulf area", the Gulf of Aden and the Antarctic.

**Figure 2 : control of discharge of oil from machinery of all ships**
**MARPOL Annex II—Chemicals (Noxious Liquid Substances)**

The Annex II (Regulations for the Control of Pollution by Noxious Liquid Substances in Bulk) is implemented through the International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (IBC Code, ships built after 1986) and the Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (BCH Code, for older ships). These two Codes provides detail for the construction and equipment of three types of chemical tankers, varying from the ships presenting the greatest overall hazard : type 1 to the ships presenting sufficiently severe environmental and safety hazards : type 3, allowed to carry respectively a maximum of 1250 m³ (respectively 3000 m³ for type 2, respectively no filling restrictions) in any one tank.

Moreover, Annex II sets out discharge criteria for the ships carrying in bulk liquid dangerous chemical. The noxious liquid substances are split in the four following categories : A, B, C and D (listed in the chapter 17 of the IBC code). The range of categories varies gradually from Category A where the substances are those posing the greatest threat to the marine environment, whilst category D represents those posing the least threat (substances not posing a threat). The conditions for discharge are determined quantitatively and qualitatively by these categories (see figure 3).

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Substance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Maximum concentration at time of discharge</strong></td>
<td>Category A</td>
</tr>
<tr>
<td></td>
<td>Virtually nil</td>
</tr>
<tr>
<td><strong>Maximum quantity of cargo discharged from each tank</strong></td>
<td>Virtually nil</td>
</tr>
<tr>
<td><strong>Discharge of effluent</strong></td>
<td>Below the waterline</td>
</tr>
<tr>
<td><strong>Minimum depth</strong></td>
<td>25 metres</td>
</tr>
<tr>
<td><strong>Minimum distance from land</strong></td>
<td>12 nautical miles</td>
</tr>
<tr>
<td><strong>Minimum speed :</strong></td>
<td>7 knots</td>
</tr>
<tr>
<td>- self-propelled</td>
<td></td>
</tr>
<tr>
<td>- not self-propelled</td>
<td></td>
</tr>
</tbody>
</table>

**Note**: the Baltic Sea and Black Sea areas are designated as special areas in which stricter restrictions are applied for the discharge of noxious substances

**MARPOL Annex III – harmful substances carried in packaged form**

The Annex III (Prevention of Pollution by Harmful Substances Carried by Sea in Packaged Form) regulates the transport of harmful substances, i.e. pollutants as defined by the International Maritime Dangerous Goods Code (IMDG Code, chapter 24), in packaged form. Packaged form means any form of containment other than the structure of the ship.

Annex III precises the conditions for the carriage of harmful substances, including requirements on packaging, marking, labelling, documentation and stowage, as well as quantity limitations.

Whatever they are, it is prohibited to jettison harmful substances in packaged form, except for extreme safety reasons (securing the safety of the ship or saving life at sea).
MARPOL Annex IV - sewage

The Annex IV (Prevention of Pollution by Sewage from Ships) contains regulations for the discharge of sewage into the sea, as well as ships equipment and systems for the control of sewage discharge, provision of facilities at port and terminals for the reception of sewage, and requirements for survey and certification. The Annex VI applies to ships of more than 400 gross tonnage or which are certified to carry more than 15 people.

More precisely, regarding equipment, all ships to which the sewage requirements apply must have at least one of the following:

- a sewage treatment plant which complies with the Merchant Shipping (Marine Equipment) Regulations 1999 as amended; or
- a sewage comminuting and disinfecting system which meets the standards for such systems set out in MSN 1807, and is fitted with facilities for temporary storage of sewage which meet the standards set out in that MSN; or
- a holding tank for the retention of sewage which meets the construction standards set out in MSN 1807, and has sufficient capacity, and has a visual indicator of the amount of its contents.

The conditions for discharging sewage are detailed below. The raw sewage cannot be discharged within the 12 nautical miles off the coast, but is possible beyond this limit under special speed and discharge conditions. However, compared to the substances of the other MARPOL Annexes, the High Seas may bear with no impact such discharges of sewage.

<table>
<thead>
<tr>
<th>Ship type</th>
<th>Sewage type</th>
<th>Discharge criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ships on international voyages</td>
<td>Communitied and disinfected sewage using an approved sewage treatment system</td>
<td>More than 3 nautical miles from land.</td>
</tr>
<tr>
<td></td>
<td>Sewage stored in holding tanks (untreated and treated sewage)</td>
<td>- More than 12 nautical miles from land; and&lt;br&gt;- Discharge at a moderate rate; and&lt;br&gt;- Ship proceeding en route at a minimum speed of 4 knots.</td>
</tr>
<tr>
<td></td>
<td>Treated sewage effluent discharged through an IMO approved Sewage Treatment Plant (STP). Also integrated system where the STP includes: grey water input, food processing input.</td>
<td>- Effluent not to produce visible floating solids nor cause discolouration of the surrounding water.&lt;br&gt;- When within port limits, check with port authority as permission may be acquired.</td>
</tr>
</tbody>
</table>

Figure 4: discharge conditions for sewage

MARPOL Annex V—Garbage

The Annex V (Prevention of Pollution by Garbage from Ships) regulates the disposal of garbage according to their types. It is noteworthy (figure 5) that whereas the disposal of plastics is prohibited everywhere, the High Seas may receive dunnage, lining, packing and general garbage (paper, rags, glass, metal, ashes). Food wastes are also disposable everywhere, but with a negligible impact.

It is important to note that a revision of the Annex V occurred in 2011, and will, when entered into force, provide by far more stringent restrictions for the disposal of garbage. Indeed the discharge of...
dunnage, lining and packing materials, general garbage mentioned above should be prohibited everywhere. As well further restrictions are foreseen regarding food waste, cargo residues, cleaning agents for deck washing, animal carcasses and non-synthetic fishing gear.

<table>
<thead>
<tr>
<th>Discharge prohibited</th>
<th>Plastics</th>
<th>Dunnage, lining and packing materials</th>
<th>General garbage (i.e. other than plastics, dunnage, lining and packing materials)</th>
<th>Food wastes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Everywhere</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distance from land less than 25 nautical miles</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distance from land less than 12 nautical miles</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distance from land less than 3 nautical miles</td>
<td>x</td>
<td>x</td>
<td>Only permissible if macerated and comminuted*</td>
<td>Only permissible if macerated and comminuted*</td>
</tr>
<tr>
<td>In special areas</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
</tbody>
</table>

*Should be macerated and comminuted to pass through a screen with openings no greater than 25mm

Figure 5: discharge controls imposed by the 2008 Regulations for garbage discharge outside special areas

**MARPOL Annex VI—Air pollution**

The Annex VI (Prevention of Air Pollution from Ships) was the last Annex added to MARPOL and aims at minimizing airborne pollutions from ships. This Annex sets emissions rates on sulphur oxides (SOx), nitrogen oxides (NOx) and emissions from incinerators; and prohibits emissions of ozone-depleting substances (ODS).

These regulations applied to all ships wherever they are, some sub-categories only exists for the different types of engines used.

**Ballast Water Management**

IMO has started to tackle the issue of invasive aquatic species by focusing on the ballast vector initially, through the development in 2004 of the International Convention for the Control and Management of Ships Ballast Water and Sediments, which has not entered in force yet. So that the current management of ballast water is voluntary and relies in a large extent on the IMO’s “guidelines for the control and management of ships ballast water, to minimise the transfer of harmful aquatic organisms and pathogens”. The main principles set out by these guidelines are:

- Reducing to minimum the admission of harmful aquatic organisms, sediments and harmful agents;
- Regular removal of ballast water sediments;
- Avoiding unnecessary discharge of ballast waters.

Regarding the management of ballast water exchange itself, the guidelines recommend:

- The exchange of the ballast water at sea, replacing it with clean ocean water, by one the two following methods:
  - Complete empty and refill of the ballast tanks; or
Using the flow through method, by pumping at least three times the volume of the tank.
- No release or minimal release of ballast waters;
- The discharge to onshore reception and treatment facilities.

The efficiency of both water exchange methods remain largely doubtful, and can even present some risks when undertaken in the open ocean in adverse weather conditions.

Moreover, it should be noted that the guidelines recommend the exchange of ballast water in deep water, open-ocean and as far as possible from the shore.

**London Protocol – dumping at sea**
The Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (the London Convention, 1972) was one of the first global conventions to protect the marine environment from human activities. Its objective is to promote the effective control of all sources of marine pollution and to take all practicable steps to prevent pollution of the sea by dumping of wastes. Sea dumping means the dumping at sea of waste that has been loaded on a ship for that purpose.

In 1996, the so-called London Protocol was adopted to modernize the Convention and, eventually, replace it. Under the Protocol all dumping is prohibited, but Parties may issue permits to allow the dumping of the following specified materials, subject to certain conditions:

- dredged material;
- sewage sludge;
- fish wastes;
- vessels and platforms;
- inert, inorganic geological material (e.g., mining wastes);
- organic material of natural origin;
- bulky items primarily comprising iron, steel and concrete; and
- carbon dioxide streams from carbon dioxide capture processes for sequestration (CCS).

Furthermore, the dumping of nuclear waste has been prohibited since 1993 through a resolution of the London Convention.

**Response to accidents and emergencies**
IMO has also developed Conventions in order to respond to marine pollution accidents and emergencies. Namely the International Convention on Oil Pollution Preparedness, Response and Cooperation 1990 (OPRC 90) and the Protocol on Preparedness, Response and Cooperation to Pollution Incidents by Hazardous and Noxious Substances 2000 (HNS Protocol), require ships to carry shipboard pollution emergency plans and require masters of ships to report pollution incidents to the nearest coastal State. Furthermore, in case of pollution incident, the Convention and the Protocol require a coastal State that receives a report of an incident to undertake a risk assessment and without delay inform all States whose interests might be affected. They also call for joint action to be taken with other States if necessary.

As this should apply to pollution incidents on the high seas indifferently, we can wonder to what extent States could take action as long as their own resources are not threatened? Therefore we can question the efficiency of such arrangements for tackling pollution accidents and emergencies on the
high seas, and maybe suggest that specific recommendations to foster fast and coordinate response should be drawn in the case of the High Seas.

In addition, the possibility of coastal States intervention in case of pollution in the High Seas is specially covered by both the International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties (INTERVENTION Convention, 1969) and the Protocol Relating to the Intervention on the High Seas in Cases of Pollution by Substances Other than Oil (1973). These two instruments provide powers to coastal States to take action against a vessel on the high seas in respect of marine casualties resulting in or likely to result in major environmental or economic damage within the coastal State’s jurisdiction.

**Anti-fouling**
The International Convention on the Control of Harmful Anti-fouling Systems on Ships (2001), prohibits the use of tributyltin (TBT) in paints on ships hulls. This regulation enables to ban a very noxious substance which lethal properties for marine life have been largely proven. However the anti-fouling paints generally carry biocides other than TBT which are not under particular control.

**Ship recycling**
IMO adopted in May 2009 the Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships (the Hong Kong Convention, 2009). The new Convention aims at giving more weight to the safety and environmental concerns compared to the commercial realities of seaborne trade and the ship recycling industry.

Currently IMO is still working on the development and adoption of guidelines associated with the Hong Kong Convention as six guidelines are envisaged by the Convention. The “guidelines on the development of the Inventory of Hazardous Materials” and the “guidelines for the development of the Ship Recycling Plan” have already been adopted. The remaining guidelines are expected to be finalized and adopted during 2012.

**Special Areas and Particularly Sensitive Seas Areas**
As we have already evoked the status of **Special Area** enables to confer a special protection under MARPOL to a given area. In particular more stringent restrictions of the different Annexes can apply to such areas, making the Special Area a relevant tool for the conservation of areas in the High Seas as they tend to be neglected in those regulations.

The concept of **Particularly Sensitive Sea Area** (PSSA) emerges later and was adopted in IMO to provide specific protection to an area presenting ecological, socio-economical or scientific significance, and which may be vulnerable to damage by marine activities. Any member State or group of member States could submit an area for designation as a PSSA. This submission shall enclose one or many Associated Protective Measures (APMs) tackling the vulnerability(ies) previously brought out. A Special Area under MARPOL can be an APM (Baltic sea for example).

Applications are reviewed by the MEPC, and when the PSSA is approved in principle (not necessary at the first submission, as the MEPC can ask for revision of the proposal), the sub-committee NAV, at its next meeting examine the APMs and the way they are intended to be implemented. In case of success, the PSSA and the AMPs will be submitted again to the MEPC for final approval.
**Note**: the possible use of PSSA for the preservation of selected areas beyond national jurisdiction has been largely discussed in OSPAR, so the present document does not aim at questioning the relevance of PSSA in the High Seas but rather to prepare a potential PSSA submission in the frame of the OSPAR HSMPAs (see for example document BDC 11/3/7-E: *Proposal to give further consideration to a pilot Particularly Sensitive Sea Area (PSSA) study*, by Julian Roberts, 2010, and also document ICG- MPA 11/5/Info.2-E, *Particularly Sensitive Sea Area*, by Elisabeth Druel, 2011, focusing more on the procedure of designation).

**Shipping activity**

**Main facts at the global scale**

As the following map shows, although the shipping activity occurs almost everywhere, it tends to concentrate on major routes. In some cases, as the Northeast Atlantic the set of routes is so important and dense that the area seems to be shipped almost uniformly. Indeed it is estimated that, by 1960, 60 % of world maritime trade involved the North Atlantic.

![Figure 6: global shipping density (data source: NCEAS)](image)

NCEAS: National Center for Ecological Analysis and Synthesis (USA)

This map has been drawn from the Voluntary Observing Ships dataset that we will detail further. However, according to other sources (see figure 11) the pattern of global shipping is the same and despite some perceptible seasonal variations is more or less steady through the year (figure 11). Indeed by recalling the fact that shipping represents 90% of world trade, we understand that this activity cannot take a break.

**Different types of ship in the world merchant fleet**

Obviously the volume of the world traffic imposes a wide variety of ships types. This volume is difficult to evaluate as clearly depending on the set of ships you consider. According to Lloyd’s (2000) around 97,000 ships are registered on the books of flag states (above 100 Gross Tonnage). The International Chamber of Shipping (ICS) provides the number of 50,000, but considering only the
largest ships (above 1,000 GT). It is well admitted that in the broader consideration a number of 100,000 is a good estimation nowadays, but the evolution is fast.

ICS provides a rough classification of ships dividing the world fleet in the five following main categories:

- Container Ships: which carry most of the world's manufactured goods and products, usually through scheduled liner services.
- Bulk carriers: the work horses of the fleet, these transport raw materials such as iron ore and coal. Identifiable by the hatches raised above deck level which cover the large cargo holds.
- Tankers: transport crude oil, chemicals and petroleum products. Tankers can appear similar to bulk carriers, but the deck is flush and covered by oil pipelines and vents.
- Ferries and Cruise ships: ferries usually perform short journeys for a mix of passengers, cars and commercial vehicles. Most of these ships are Ro-Ro (roll on - roll off) ferries, where vehicles can drive straight on and off, making it a speedy and easily accessible way to travel. Demand for cruise ships expanded rapidly during the 1980s, leading to a new generation of large and luxurious 'floating hotels'.
- Specialist ships: such as anchor handling and supply vessels for the offshore oil industry, salvage tugs, ice breakers and research vessels.

According to ICS, as of 31st October 2010, the 49,514 ships were split in the different categories in the following percentages. However considering the carrying capacity makes significant changes by putting liquid tankers up to 39% of the world capacity, bulk carriers 35%, container ships 13%, general cargo ships 9% and passenger vessels less than 1%. To an economical point of view the repartition is even different, the oil transport accounting for one third of the global trade value, and reaching 60% along with the transport of iron ore and coal.

![Pie chart showing the percentage of the world fleet by ships types](Image)

**Figure 7: percentage of the world fleet by ships types (from International Chamber of Shipping)**

To bear in mind that these figures are subject to permanent evolution, we display below (figure 8) the evolution of a fast growing sector of the shipping activity: the containers world fleet size.
The Voluntary Observing Ships (VOS) dataset

Ships from many countries voluntarily collect and report meteorological data globally under the WMO VOS programme. As of the 30 September 2010, the total VOS-fleet includes about 4,500 vessels, and a broad range of different vessel types.

The VOS programme is managed by the World Meteorological Organization (WMO) which collects the data. The present data have been provided by Météo France as a partner of the VOS programme, through their esurfmar project (see details on the esurfmar website). These data are free, Météo France charges 100 € for extraction fees.

The ship location data are based on reporting of routine meteorological observations, ideally at 6-hour intervals according to procedures by the WMO, sometimes more frequently. Hence the data points from ship reports can be used as a spatial proxy of global shipping traffic. This is based on the assumption that the reporting fleet is representative of the world fleet and that the spatial distribution of ship reporting frequencies represents the distribution of ship traffic intensity.

The VOS dataset provides more detailed categories of ships, as described in the table below:

<table>
<thead>
<tr>
<th>Ships type</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulk carrier</td>
<td>10,86%</td>
</tr>
<tr>
<td>Cable ships</td>
<td>0,25%</td>
</tr>
<tr>
<td>Coastguard ships</td>
<td>1,48%</td>
</tr>
<tr>
<td>Container ships</td>
<td>32,47%</td>
</tr>
<tr>
<td>Dredgers</td>
<td>0,02%</td>
</tr>
<tr>
<td>Passenger ferries</td>
<td>1,69%</td>
</tr>
<tr>
<td>Floating production</td>
<td>0,17%</td>
</tr>
<tr>
<td>Fishing vessel</td>
<td>1,17%</td>
</tr>
<tr>
<td>General cargo</td>
<td>11,29%</td>
</tr>
<tr>
<td>Liquefied gas tanker</td>
<td>4,66%</td>
</tr>
<tr>
<td>Icebreaking vessel</td>
<td>0,11%</td>
</tr>
<tr>
<td>Livestock carrier</td>
<td>0,17%</td>
</tr>
<tr>
<td>Liquid tanker</td>
<td>9,13%</td>
</tr>
<tr>
<td>Light vessels</td>
<td>0,06%</td>
</tr>
<tr>
<td>Mobile installations</td>
<td>0,47%</td>
</tr>
<tr>
<td>Military ships</td>
<td>0,30%</td>
</tr>
<tr>
<td>Other</td>
<td>3,75%</td>
</tr>
<tr>
<td>Ocean weather ships</td>
<td>0,08%</td>
</tr>
<tr>
<td>Passenger ships</td>
<td>3,56%</td>
</tr>
<tr>
<td>Other</td>
<td>3,75%</td>
</tr>
<tr>
<td>Passenger ships</td>
<td>3,56%</td>
</tr>
<tr>
<td>Refrigerated cargo</td>
<td>1,52%</td>
</tr>
<tr>
<td>Research vessel</td>
<td>3,45%</td>
</tr>
<tr>
<td>Refrigerated cargo</td>
<td>1,52%</td>
</tr>
<tr>
<td>Surveillance vessel</td>
<td>4,05%</td>
</tr>
<tr>
<td>Research vessel</td>
<td>3,45%</td>
</tr>
<tr>
<td>Research vessel</td>
<td>3,45%</td>
</tr>
<tr>
<td>Large sailing vessel</td>
<td>0,30%</td>
</tr>
<tr>
<td>Trawler fishing vessel</td>
<td>1,48%</td>
</tr>
<tr>
<td>Tugs</td>
<td>0,57%</td>
</tr>
<tr>
<td>Vehicle carriers</td>
<td>0,17%</td>
</tr>
<tr>
<td>Yachts</td>
<td>0,44%</td>
</tr>
</tbody>
</table>

Figure 9: repartition of the Voluntary Observing Ships by types
The comparison between the previous figures is difficult to make as the categories are different and the statistics does not concern the same set of ships (for example contrary to ICS, a lot of ships in the VOS dataset can be less than 1,000 GT). However we picked and grouped the “VOS categories” fitting in one of the “ICS categories” for comparison (figure 10).

<table>
<thead>
<tr>
<th>ICS categories</th>
<th>Percentage of ships (VOS)</th>
<th>Percentage of ships (ICS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>General cargo ships</td>
<td>16,06%</td>
<td>32,77%</td>
</tr>
<tr>
<td>Bulk carriers</td>
<td>13,26%</td>
<td>17,54%</td>
</tr>
<tr>
<td>Container ships</td>
<td>39,68%</td>
<td>9,76%</td>
</tr>
<tr>
<td>Tanker</td>
<td>16,85%</td>
<td>26,61%</td>
</tr>
<tr>
<td>Passenger ships</td>
<td>14,14%</td>
<td>13,32%</td>
</tr>
</tbody>
</table>

Figure 10: grouped repartition of the Voluntary Observing Ships

The result is that all the categories are significantly represented but there is a clear imbalance due to the large number of container ships in the VOS data. One of the reasons that may be advanced is that there might be a different definition regarding General cargo ships and Container ships between both sets. Another likely reason is a potential bias introduced, either by the voluntary aspect of the VOS dataset, or by the ships sizes (ICS does not account ships less than 1,000 GT).

To conclude we must say that this table is a good illustration of the advantages and drawbacks of the VOS datasets. On the one hand, the dataset appears to be clearly consistent and well representing the whole range of ships types. On the other hand, this dataset carries inevitable biases that should be reminded in order to avoid rapid conclusions.

Other datasets

**Lloyd’s register**

The Lloyd’s register of shipping is probably the best source of shipping data. However those data are not for free, and the price of delivery of such data though the IHS-Fairplay is prohibitive even for restricted times slices and areas like OSPAR HSMPAs.

**Long Range Identification and Tracking (LRIT)**

The Long Range Identification and Tracking (LRIT) of ships is an IMO instrument developed under a SOLAS amendment in 2006. LRIT is mandatory for all ships over 300 Gross Register Tonnage since the entry into of force, the 1st July 2009. Coastal states are entitled to receive information about ships navigating within 1000 off their coasts (most commonly live data). Nonetheless these data are not free, so that generally the countries does not order the whole “1,000 nautical miles” area but a restricted subset, namely the data within 400 nautical off their coast for most European Countries.

Anyway, nothing impedes in the future to order data in a selected area (for instance an OSPAR MPA), through National Competent Authority of a given state which 1,000 nautical miles limit encompasses the selected area (for instance Portugal, Ireland, Iceland, Denmark-Greenland for OSPAR HSMPAs).

Such “standing order” shall be made to the European Maritime Safety Agency (EMSA, in Lisbon) which centred the data at the European countries.

So LRIT data seems to be the most interesting track, in terms of compromise price/consistency, for obtaining shipping data, and further cooperation on this topic could be discussed within OSPAR.
Figure 11: monthly global shipping in 2011 (AMVER maps)
Figure 12: Monthly averages of ships density in the North Atlantic in 2003 (maps provided by SHOM, France)
Figure 13: Traffic intensity of Voluntary Observing Ships in the Northeast Atlantic (one year of data, from October 2004 to September 2005)
Shipping in OSPAR HSMPAs
As the previous map (figure 13) shows, the OSPAR HSMPAs are not the main shipped places (compared to the Channel or Gibraltar for instance), but nonetheless the traffic intensity in those areas is far from being negligible reminding that the North Atlantic is the most shipped area in the world. In particular some major routes cross the HSMPAs and more precisely we would point out that the Josephine seamount area (as at the exit of the Mediterranean) and the Mid-Atlantic Ridge North of the Azores (as being at the stand for the most exposed to shipping).

Shipping impacts
We examine below a series of shipping impacts that are acknowledged as being the most common ones, in particular in the high seas. They can be relative to the lacks of the Regulations detailed previously. See for example, the shipping section of the IUCN paper (Kristina M. Gjerde et al., 2008).

Pollution from accidents

Main accidents in the High Seas
As the following map displays (figure 14), the accidents are more concentrated in the coastal area. Nonetheless, this figure clearly shows several cases in the High Seas and sometimes close to the current OSPAR HSMPAs. Some of them concerned major oil spills we detail below. For references, the Amoco Cadiz released 227,000 tons of oil, the Prestige 64,000 tons, the Erika 31000 tons (based on ITOPF and Cedre information):

- Odyssey, the 10th November 1988, approximately in the Charlie-Gibbs Fracture Zone. A spill of 132,157 tons of crude oil, recorded as the 6th major oil spill from ship in history.
- Khark 5, the 19th December 1989, around 300 nautical miles east-north-east of Funchal. A spill of 70,000 tons of crude oil.
- Anastasia J.L., the 7th October 1970, 360 nautical miles north-east of the Azores. A spill of 18,500 tons of crude oil.
- Al Bacruz, the 14th January 1970, 300 nautical miles, east of the Azores. A spill of 20,400 tons of crude oil.

Figure 14: top 100 tanker incidents (source ITOPF)
The conclusion of the following report (Hooke, N., 1997, Maritime casualties, 1963-1996) of the Odyssey accident raises particular concern; whether the common idea that the High Seas can absorb such spills persists or not?

*On November 10th 1988, the Liberian tanker ODYSSEY, almost fully loaded with a cargo of 132,157 tonnes of North Sea Brent crude oil, broke into two and sank in heavy weather in the North Atlantic 700 miles off the coast of Nova Scotia while on voyage from Sullom Voe, Shetland Islands to Come by Chance Newfoundland. Fire started on the stern section as it sank and the surrounding oil caught fire.*

*Due to the rough weather conditions, the Canadian coast guard was only able to come within 1.75 miles of the vessel whilst on fire. As the incident occurred 700 miles from the nearest coastline, there were no concerns about pollution as the oil was expected to dissipate naturally.*

**Causes of accidents**

Whether we look on minor or major spills, the causes of accidents are not distributed in the same manner. Anyway, regarding the major spills (i.e. more than 700 tonnes), ITOPF has established that the two main causes are groundings accounting for 35% and collisions accounting for 29% (see *figure 15*). Even if grounding is excluded in the High Seas, more than 50% of the causes of accidents remain likely to occur in the High Seas. Especially, collisions stand for a significant concern as some remote areas have high traffic intensities (as we saw before the Josephine seamount area or the North of the Azores crossroads for instance).

![Figure 15: incidence of spills >700 tonnes by cause, 1970-2010 (ITOPF)](image)

**Operational discharges of oil and noxious liquid substances**

As we explained before the authorised operational discharges of oil are of two different natures: discharge of oil from tanks in the case of oil tankers and discharge of oil from machinery, for all ships (as described in Annex I). In both cases, except that they are less likely to reach the seabed they generate the same kind of impacts on the marine environment. Namely the principal resources directly threatened by oil slicks on the seas surface are seabirds, cetaceans and marine reptiles, with seabirds being the main species at risk in the High Seas.
It must be recalled that “even small amounts of hydrocarbons may act as toxins, mutagens and carcinogens. Once in the environment, hydrocarbons spread into inanimate and biological systems. Biological systems will often accumulate (bio-accumulate) rather than metabolise hydrocarbons. Accumulation is not limited to primary ingestion of hydrocarbons but can occur through consumption of biota containing bio-accumulated hydrocarbons. This effect is known as bio-magnification and can affect all members of the food web including humans. In general, the longer hydrocarbons persist in the environment the greater will be the risk to the ecosystem and the more difficult they are to eliminate from the area”.

It should be remembered that accurate data on the concentration of pollutant are dramatically lacking but apart from pollution accidents and emergencies, the operational (and generally undetected) discharges generate a chronic source of pollution especially within the more shipped areas. This is particularly true knowing the higher permissiveness of discharge in the High Seas, making this part of this ocean more susceptible to undergo these operational discharges.

The impacts of discharge of noxious liquid substances (described in Annex II) are similar in terms of contamination so the seabirds become less vulnerable as the risk of being trapped no longer exists in this case.

**Garbage**

Although the disposal of plastics is now prohibited several types of garbage are still released in the Ocean and a lot of examples show that the marine environment is pervaded by human waste.

The main consequences of the presence of marine debris are ingestion and entanglements by marine species, and the International Coastal Cleanup (ICC) has proven in 2003 that they are a serious cause of mortality for marine mammals, marine turtles, seabirds and even fish.

It is noteworthy that garbage also favours the dispersion of invasive species, topic we are going to detail further after.

The issue is of particular concern in areas of convergence, i.e. where the meteorological and oceanic conditions tend to concentrate drifting elements whether they are natural or not. The well-named Azores anticyclone would be likely to generate some favourable conditions for accumulation of marine debris, especially on the big crossroad north of the Azores we pointed out before. Further research on that topic would greatly help and maybe would call for a cleanup of this area, as it would be needed for the “continent of garbage” found in several places of the oceans.

**Sewage**

Ship’s sewage mainly consists of water-borne human waste, and of wastewaters generated in preparing food, washing laundry, dishes and in showering.

In terms of quantity, the discharge of sewage is not particularly significant knowing that the ships crews are not as disproportionate as the ships sizes. With a notable exception of the cruise ships, which carry much more passengers and consequently produce more significant quantities of sewage. In some touristic destinations like the Azores, this must be kept in mind.

In terms of the nature of sewage, it is widely considered as biodegradable and that it dilutes easily in the deep waters where it is rejected in moderate quantities. However, the sewage generally contains
pathogens, usually treated, and on the other hand nutrients and chemicals which are not treated in general and could impact sensitive marine areas.

**Atmospheric emissions**
Contrary to most of the other Annexes of MARPOL, the Annex VI is not more permissive in the High Seas. So the main local (not considering the contribution to climate change) impact results from the airborne pollution caused by the fuel combustion, more likely to occur in the dense areas of shipping, being more or less affected by the meteorological conditions. For example the Josephine seamount area is probably the OSPAR HSMPA receiving the highest rates of emission but this might be mitigated by the average windy conditions. On the other as we mentioned above the present of the Azores anticyclone may decrease the dispersion around the Azores and probably makes the Mid Atlantic Ridge north of the Azores the most polluted OSPAR HSMPA and similarly the Charlie-Gibbs the less (as located on the way of depressions). These are suppositions and further investigation would enable to confirm or nor these assumption. As well, the possibility of having spatial heterogeneity in air pollution entering the ocean is not well-known and it is therefore difficult to consider derived impacts.

**Transfer of invasive aquatic species**
This phenomenon means the transfer of species in an environment where they have never naturally thrived. Shipping has enabled to overcome the natural barriers such as temperature and salinity regimes as well as landmasses, and the number of bio-invasions recorded is huge sometimes disturbing the natural ecosystems of areas as big as bays or closed seas, like the Baltic Sea (see for examples the GloBallast poster “ten of the Most Unwanted”).

The range of impacts is wide varying from ecological, to economical as well as sanitary. What is maybe the most important aspect of bio-invasions is that they are irreversible in terms of ecological impacts and they generally gain more severity over time. To date no eradication of aquatic invasive species have been recorded.

**The ballast vector**
The modern ships cannot operate without ballast for balance and stability considerations when they ship unloaded. Such operations involve huge volumes of water transferred and inevitably of aquatic species. Although the surviving conditions for these organisms are very hostile, when all factors are favourable, some species can survive to the transfer and may find the conditions to reproduce.

Despite the development of specific regulations, the water ballast exchange methods are not really satisfactory and do not completely eliminate the risk of invasion. As the figure 16 below illustrates, the occurrence of water exchange in the High Seas is quite important, bearing in mind that the figure represent Canadian ships. This can be seen as a direct consequence of the recommendation calling for water exchange in deep waters, far from coastline.
The hull vector
While ballast water has been acknowledged as the main vector of transfer of aquatic invasive species, the fouling of hulls has been given less consideration but is suspected to have significant impacts in several recent studies (see for instance *The importance of ship hull fouling as a vector of species introductions into the North Sea*, S. Gollasch, 2002). This could explain that the vast majority of exotic species are found in the port areas, and the current lack of regulation on this topic is a concern.

Sea dumping
Is understood by “sea dumping” the dumping of wastes that have been specifically loaded on a vessel for that purpose. As the London Convention imposes such dumping are restricted to “clean” materials (listed previously), so that the impacts of sea dumping are limited to physical ones. Furthermore, it is quite unlikely that States charting ships to dump waste at sea will send them outside the EEZ for evident practical and economical reasons.

However the restrictions do not prevent from dumping floating waste and may generate physical and biological impacts (entanglement, ingestion).

Anti-fouling paints
Most of the ships use antifouling paints on their hull to reduce the settings of living organisms and enhance the performance of the ships. As we said, the use of TBT is now prohibited in such paints, however the basic principle of the anti-fouling is to release biocides to kill the living organism trying to fix on the hull.

In the same way as the former use of TBT lead to, the biocides may have been spread all over the world and contaminated a wide range of species. Information on that is quite sparse, but for comparison, several decades of TBT’s use generate its presence in sediments and in the different steps of the food chain (from the livers of seabirds to those of all marine mammals).
**Ship strikes**

Cetaceans and other mammals are present with very significant densities in the OSPAR HSMPAs as highlighted in the respective background documents (notably through Mar-Eco campaign). Another feature of interest is the migration routes which tend to follow south-north patterns for a number of them, meaning that they are crossing the major shipping routes of the North Atlantic. For illustration purposes we provide below (figure 17) some migration routes or different whales’ species issued from the Azores Great Whales Telemetry Program (thanks to Ricardo Santos).

![Migration routes of different whales' species](image)

*Blue Whales in bluefish colours, Sei Whales in greenish colours, Fin Whales in reddish colours*

Several studies have been driven to assess the quantity of ships strikes affecting marine mammals and even if those researches have generally focused on coastal, the conclusions were that the number of strikes can reach very significant proportions in terms of mammals’ mortality. According to a specific study on right whales (*Collisions between ships and whales*, Knowlton and Kraus, 2001); up to 35% of death were attributed to ships strikes.

Another kind of study evoked by the Organisation for Economic Co-operation and Development (OECD in *The Impacts of Globalisation on International Maritime Transport Activity*, Corbett J. J. and Winebrake J., 2008 ), established a relationship between the annual reported North Atlantic right whale strikes and average global ship momentum (defined by the product of the speed and the tonnage).

In conclusion we can state that although specific studies in the High Seas are lacking all the factors are present to make the marine mammals vulnerable to ships strikes in the OSPAR HSMPAs : important density records of marine mammals, increasing sizes, speeds and densities of ships and collision routes.

**Impacts from ships noise**

Among physical impacts of shipping, the concern of disturbance from noise has been raised for a while, in particular the way it could affect the cetaceans. The physical rationale for that being that shipping noise now dominates the background noise over the frequency ranges (20 Hz - 300 Hz), and
that these low frequency are the same used for communication by baleen whales. Though several studies have showed that whales are sensitive to ships noise, the long-term effects have not been explicitly set out remain to some extent unknown. To sum up the issue is gaining increasing concern and may not be considered as marginal, but, at that stage, further investigation would be required to better assess the impacts.

Safety considerations and indirect environmental benefits
Although we have only detailed here the regulations directly related to the environment, of course the work on safety of ships has also a great impact on the environment preservation by reducing the risks of accidents and consequent environmental damages, and safety must be acknowledged as a major instrument for the protection of the environment. We would even go further and say that the environmental management should not be made to the detriment of safety.

Flag state control
An important principle under UNCLOS is the so-called “flag State jurisdiction”. Concretely a State has legal jurisdiction over the ships registered in and flying its flag, including in the High Seas. In theory, this principle enables to overcome the lack of jurisdiction inherent in the High Seas. But in practice, several abuses are common knowledge, since all the States do not take equally their responsibilities.

Obviously any initiative to protect or conserve particular features in the High Seas must goes with, in parallel, an effort of the flag States to improve the compliance of their ships.
### OSPAR HSMPAs

<table>
<thead>
<tr>
<th>Marine Debris</th>
<th>Josephine Seamount</th>
<th>Charlie-Gibbs Fracture zone</th>
<th>Altair Seamount</th>
<th>Antialtair Seamount</th>
<th>Mid Atlantic Ridge North of the Azores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air emissions</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oil spills</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HNS spills</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Underwater noise</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>+</td>
</tr>
</tbody>
</table>

Likely but not clearly demonstrated

<table>
<thead>
<tr>
<th>Ship strikes</th>
<th>+</th>
<th>+</th>
<th>+</th>
<th>+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil discharge</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>HNS discharge</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Garbage discharge</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Invasive species</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Antifouling</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Sewage discharge</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

**Impact risk**

- **Absent**
- **Low or unknown**
- **Moderate**
- **Significant**

*Figure 18: matrix of shipping impacts on OSPAR HSMPAs*

This scaling of impacts is totally arbitrary and aims at summarizing what has been detailed previously. This can be relative to the lacks of different regulations we examine, in particular for the more permissive context of discharge in the High Seas. The Josephine Seamount and the Mid Atlantic Ridge North of the Azores are often marked with a “+” as they concentrate more traffic intensity combined with the crossing of shipping routes. The Charlie-Gibbs Fracture Zone has also been marked with a “+” for pollution accidents as the weather conditions are generally more hostile in this area. These climatic conditions and the lower density of ships in the CGFZ, encourage considering it as less exposed to air emissions from ships.
Potential for Associated Protective Measures (APMs) in the scope of PSSAs

As we already explain above, a PSSA submission must address the way to mitigate the impacts through Associated Protective Measures (APMs). The APMs can be selected among a set of measures that have been or are to be adopted by IMO, but they can as well consist of development of new measures as long as they have an identified legal basis.

Special Area under MARPOL

An important set of impacts that we describe above are the ones we identified as lacks in MARPOL regulations. As it has been the case for the Baltic Sea, a PSSA can entail a MARPOL special area and the consequent regulations as APMs. It has been the case for the Baltic Sea (SOx Emission Control Area and Special Area for Annex IV : discharge of sewage) and for the Wadden Sea. These are precedents of PSSAs including Special Areas, but another feature of interest in the context of the High Seas is the designation of the whole Antarctic as a Special Area (Annex I, II and V).

As we saw a major deficiency in the MARPOL Annexes is the raising permissiveness of discharge when the distance from land increases. APMs to address these issues would consist of reducing the discharge permitted to the lowest levels (i.e. equivalent to the levels authorised in the territorial waters). This could involve the Annex I, II, IV and V (discharge rates for oil, noxious liquid substances, garbage, sewage). Regarding the Annex VI, it is of major concern especially for the areas close to the big crossroad north of the Azores, however the implementation of an emission control system would represent some difficulties.

Restriction of ballast water exchange

The ballast water exchanges methods are still imperfect and have direct implications for the High Seas where the water exchange is encouraged to take place under the guidelines. Therefore, although these guidelines do not provide indications of areas where the ballast water exchange should not occur it would be reasonable to explore the possibility to restrict it, in the context of a PSSA.

Prohibition of waste dumping

The London Protocol already provides a comprehensive prevention from the dumping of waste, and we have not considered this as a major impact as only inert waste is allowed to be dumped. However some risks do exist, as entanglement for instance, so as long as these issues are not clearly addressed by the regulations it would be relevant to ban the dumping of waste in MPAs, where many species present vulnerabilities to the presence of waste.

Prevention of ships strikes

The different OSPAR HSMMPs do not present the same level of vulnerability to ships strikes, however the problem remains similar in the different zones so we would provide general ideas which intend to apply in general. Studies have shown that the presence on board of observers significantly reduces both the number of strikes and their level of damage when they still occur. Obviously, it is not realistic to impose the presence of an observer on any ship going through these areas; nevertheless the training of crews or at least some pedagogic material could only improve the situation with least efforts. Systems of positional report of large cetaceans, such as the Real-time Plotting of Cetaceans...
(REPCET) system, using the internet and preventing ships strikes, experimented in the Mediterranean Sea (Pelagos) could also be put in place jointly or separately, the reporting of strikes or likely strikes would greatly help the knowledge on this topic, still speculative to some extent nowadays. Of course the practical questions for reporting - like how ? to whom ? - must be sorted out.

**Accident prevention or response**

Even being less important the risk of accident does not disappear in the High Seas. However finding the instruments to prevent such threats is quite a challenging question. As areas to be avoided, traffic separation scheme or routeing mechanism would be almost impossible to implement, there is not plenty of solutions. A particular attention could be paid to the cargo carrying hazardous and noxious substances, but once again such a reporting raises practical questions to be put into practice.

Another track of progress would be to work on a cooperation framework for the intervention in case of emergency, as the Intervention Convention does not tackle explicitly how to deal with the particularities of ABNJ.

**Main blocking points and tracks of (cooperative) work**

The difficulties in having exhaustive shipping data weaken slightly the study, even if the samples used clearly show that our areas of interest cannot be neglected / are relevant in terms of shipping. As we explain above the LRIT data is the best track to remedy the solution and it would be appropriate to develop a joint effort within OSPAR.

Shipping impacts still remain, to a large extent, difficult to be clearly highlighted, because of the lack of comprehensive availability of data. As long as other OSPAR contracting parties have evidence of impacts, they would be encouraged to share them in the purpose of the creation of a PSSA (but it will also be profitable for the management of HSMPAs in general). In particular, regarding ships strikes, it would be appropriate to further develop the cooperation effort of OSPAR in link with the others competent conventions: International Whaling Commission (IWC), or the Agreement on the Conservation of Small Cetaceans of the Baltic, North East Atlantic, Irish and North Seas (ASCOBANS) for instance.

Last but not least, a PSSA and its APMs must be thought as a unique entity, as the rationale for creating a PSSA would determine the way to protect the area. So, a potential submission must present a coherent framework from the vulnerability of the area to the measures to mitigate it, including the feasibility of the measures (cf. ICG-MPA 11/5/Info. 2 Particularly Sensitive Sea Areas). Indeed in the theoretical process, after the approval in principle of the relevance of a PSSA by the MEPC, the NAV sub-committee would examine how the applicant plans to implement the measures. So it is important to bear in mind that at the end the effective protection will depend on the ability to bring the measures into play, and they would better be defined through a collective exercise.

**Conclusion**

This overview of the shipping activity in the Northeast Atlantic and the generated impacts with a particular focus on OSPAR HSMPAs, has clearly brought out that shipping is a main stake in frame of the preservation of the marine environment.
The IMO regime already provides a wide framework for the environmental management of the shipping activity, and has enabled to make noticeable progresses, but our purpose was to identify the potential remaining gaps and incidentally there are some tracks of improvement for the preservation of areas of particular interest, such as the OSPAR HSMPAs.

A recurrent feature in our analysis was the issue of the ever-decreasing stringency of discharge limits for various pollutants with increasing distances from the coast (as well as the ballast water exchange), notably under the several annexes of MARPOL but we fear that this follows a general statement, evoked with the incident of the Odyssey, that the High Seas could undergo impacts of more significant magnitude. The impression of infinite resilience to human activities of the planet has already proven its obsolescence, regarding climate change for instance, and to allocate this status to the High Seas would obviously lead to an unsustainable management. If in our words, we were centred on a specific topic, i.e. to get rid of these principles in the context of the OSPAR HSMPAs, we necessarily agree that it should also apply to the rest of the oceans.

On the other hand we learnt that, despite some nuances, the OSPAR HSMPAs are places of continuous traffic and that such activity carries several permanent physical harms such as ships strikes but also cannot totally eliminate the risk of accident.

Whatever the considerations of extending this point of view to all the High Seas are, at that stage we think that the previous elements, however noting that they can be thorough, provide sufficient arguments to establish special protection for the OSPAR HSMPAs and that IMO provides relevant tools for that with the PSSA and Special Area.

We should not forget that the creation of a PSSA is not an end in itself but goes together with the selection of relevant Associated Protected Measures and an their effective implementation. Hence, this calls for further collaborative work.

Last but not least, we did not investigate the fields of safety and flag state control, but there are obviously compromising factors of the efficiency of environmental management and must be addressed equal importance.
Annex 1: main IMO Conventions for the preservation of the environment

<table>
<thead>
<tr>
<th>Date</th>
<th>Short name</th>
<th>Entry into force</th>
<th>Full name</th>
<th>Ratifications</th>
<th>World tonnage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1948</td>
<td>IMO convention</td>
<td>17 March 1958</td>
<td>Full name</td>
<td>170</td>
<td>97.16 %</td>
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<tr>
<td>1973</td>
<td>MARPOL</td>
<td>2 October 1983</td>
<td>International Convention for the Prevention of Pollution from Ships</td>
<td>151</td>
<td>98.91 %</td>
</tr>
<tr>
<td>73-78</td>
<td>MARPOL PROT</td>
<td>2 October 1983</td>
<td>Regulations for the Prevention of Pollution by Oil</td>
<td>151</td>
<td>98.91 %</td>
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<tr>
<td></td>
<td>(Annex I)</td>
<td></td>
<td>Regulations for the Control of Pollution by Noxious Liquid Substances in Bulk</td>
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<tr>
<td>73-78</td>
<td>MARPOL PROT</td>
<td>1 July 1992</td>
<td>Prevention of Pollution by Harmful Substances Carried by Sea in Packaged Form</td>
<td>136</td>
<td>96.23 %</td>
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<tr>
<td></td>
<td>(Annex II)</td>
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<td></td>
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<tr>
<td>73-78</td>
<td>MARPOL PROT</td>
<td>27 September 2003</td>
<td>Prevention of Pollution by Sewage from Ships</td>
<td>129</td>
<td>86.69 %</td>
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<td>(Annex IV)</td>
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<tr>
<td>73-78</td>
<td>MARPOL PROT</td>
<td>31 December 1988</td>
<td>Prevention of Pollution by Garbage from Ships</td>
<td>143</td>
<td>97.14 %</td>
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<td>(Annex V)</td>
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<tr>
<td>1997</td>
<td>MARPOL PROT 1997</td>
<td>19 May 2005</td>
<td>Prevention of Air Pollution from Ships (Annex VI of MARPOL)</td>
<td>68</td>
<td>91.16 %</td>
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<tr>
<td>1969</td>
<td>INTERVENTION</td>
<td>6 May 1975</td>
<td>International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties</td>
<td>87</td>
<td>75.1 %</td>
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<tr>
<td>1973</td>
<td>INTERVENTION PROT</td>
<td>30 March 1983</td>
<td>Protocol relating to Intervention on the High Seas in Cases of Pollution by Substances other than Oil, as amended</td>
<td>54</td>
<td>50.36 %</td>
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</tbody>
</table>

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French Marine Protected Areas Agency
<table>
<thead>
<tr>
<th>Date</th>
<th>Short name</th>
<th>Entry into force</th>
<th>Full name</th>
<th>Ratifications</th>
<th>World tonnage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1972</td>
<td>LC</td>
<td>30 August 1975</td>
<td>Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter</td>
<td>87</td>
<td>67.17 %</td>
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<td>1990</td>
<td>OPRC</td>
<td>13 May 1995</td>
<td>International Convention on Oil Pollution Preparedness, Response and Co-operation</td>
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<td>69.58 %</td>
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<td>2000</td>
<td>OPRC-HNS Protocol</td>
<td>14 June 2007</td>
<td>Protocol on Preparedness, Response and Co-operation to pollution Incidents by Hazardous and Noxious Substances</td>
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<td>36.7 %</td>
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<td>2001</td>
<td>AFS</td>
<td>17 September 2008</td>
<td>International Convention on the Control of Harmful Anti-fouling Systems on Ships</td>
<td>56</td>
<td>78.78 %</td>
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<td>2004</td>
<td>BWM</td>
<td>Not in force yet</td>
<td>International Convention for the Control and Management of Ships' Ballast Water and Sediments</td>
<td>32</td>
<td>26.46 %</td>
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<tr>
<td>2009</td>
<td>HONG KONG SRC</td>
<td>Not in force yet</td>
<td>The Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships</td>
<td>-</td>
<td>-</td>
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</tbody>
</table>