

# 15 Years of Shipping Accidents: A review for WWF

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## Executive Summary

Shipping accidents, many involving spills of mineral oil, have been a catalyst for environmental protection regulation over the past 40 years. Environmental risk is linked to the type and amount of oil and/or hazardous substances being carried and the sensitivity of the marine area where any accident happens. A clear link can be made between environmental protection and shipping safety, with shipping accidents, often the subject of dramatic media coverage, provoking a strong response from civil society and politicians.

2012 has been a significant year for shipping safety issues. The IMO used Maritime Day (2012) to mark the 100 year anniversary of the sinking of the Titanic and as a watershed of safety at sea. Recent shipping incidents such as the Hebei Spirit and MV. Rena, and the 10<sup>th</sup> year anniversary of the sinking of the Prestige (2002) further highlight the need to identify and understand the factors contributing to shipping accidents. These incidences among others renew the spotlight on the main causes of shipping accidents, including the role played by flag States. Despite the continual increase in the world's shipping fleet a decrease in overall numbers of shipping accidents has been seen over the last few decades. Whilst the data shows that poorly performing flag States are still an associated factor, there are other criteria that also strongly contribute to accidents, including: vessel age, vessel type, area of operation and challenging sea states (linked to the most common incident type – foundering) and vessel size. Behind these criteria there are layers of administrative complexities within the shipping industry which are connected to port and flag State control, flag registration and ratification of IMO conventions. Economic factors also have an impact on shipping safety, such as turn-around times and use of the minimum number of crew required to handle a vessel which often has implications such as staff working whilst fatigued.

The key criteria contributing to shipping accidents have been researched for this report through an extensive review of the world's casualty statistics over the past 15 years and a review of all the port State Control Agreements and Memorandums of Understanding. More specific examples were drawn from a review of current literature to provide context and the wider picture. The research statistics were then verified through interviews with six expert industry stakeholders including a major European shipping insurer, the MAIB, the IMO, Lloyds Register, a Naval Architect and an English P and I club from the International Group. These criteria, and complexities associated with shipping accidents and the industry generally were also examined, including insurance and underwriting requirements, the role of IACS, port State control and class societies.

This is one of the first independent studies to look in detail at the collective data associated with shipping accidents. The report produces consolidated evidence of factors that have contributed to shipping accidents over the last 15 years. This time period includes maritime disasters such as the Prestige and Erika incidents, which subsequently provoked changes in maritime safety regulations, which are

graphically summarised in the report as a timeline. The report highlights areas of concern and contributory factors to shipping accidents as well as the general implications these incidents have on the marine environment. The report focuses in particular on the issues surrounding the role of flag States and the extent of their responsibilities with respect to vessel safety and the implementation of international regulations.

The evidence confirms that the majority of accidents can be linked with older vessels, a predominance of general cargo carrier accidents and a suite of worst performing flags. By far the most common accident is that the ship founders. However it is also encouraging that an outcome of this report is also confirmation of an overall improvement in vessel safety standards and a reduction of shipping accidents relative to the growth of the world fleet. This reflects the development of technology (e.g. electronic charts), the success of enforcement regimes (e.g. Port State control), and cooperative prevention efforts such as HELCOM Response (HELCOM, nd.) and the Bonn Agreement (Bonn Agreement, 2012).

Nevertheless accidents still occur regularly and the need to address and re-assess the related underlying issues remains if future incidents are going to be avoided or reduced. Even small scale accidents in very sensitive environments can have profound environmental consequences (e.g. MV. Pallas). Climate change predictions are likely to exacerbate the causes of foundering: storm surge, changing wind/wave climates, extreme weather events. Furthermore there is a danger of complacency in the absence of a recent 'major' accident and whilst much can be inferred from the accident statistics, such data can belie all manner of near misses.

In light of the issues highlighted in the report, several recommendations are made. These include support for a more cohesive approach towards shipping safety through encouragement of ratification of IMO and environmental conventions; balancing port and flag State responsibilities; globalised, standardization of reporting mechanisms associated with the collection of shipping accident data; transparency and access to this information; encouragement of data sharing and of best practice concerned with safety procedures within the industry; research and collaborative work to keep older sea going vessels classed with IACS class societies. These recommendations are particularly pertinent in light of the continued growth of the worlds' shipping fleet, as the economic crisis influences the number of ageing ships transporting high risk products and with the likely growth of vessels trading and operating in the sensitive Arctic region.

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## 1.0 Introduction

Maritime safety is increasingly significant in a growing, global industry where major accidents have wide reaching impacts. Whilst large shipping accidents do still occur on the scale of the Prestige and the Erika, they are fortunately quite rare. The overall industry picture is one of continual improvement with Lloyds List Casualty Survey noting an 18% decrease in the number of accidents and the International Union of Marine Insurers recording a continuing downward trend both in tonnage and the percentage of the world fleet lost since 1980 (over the past 30 years). However it is important to keep the pressure focused on this trend for improvement and clearly understand the factors which are most significant in contributing to losses of lives at sea. Despite the noted improvements, shipping accidents still occur globally on a regular basis and can often be linked to a certain set of criteria such as certain geographical locations (highlighted by the 'Incidents Map' – *Figure 3*). Whilst general improvements are apparent, a minority of flag States and port States are still operating outside of the legislative requirements resulting in sub-standard shipping slipping through the net and compromising human life and the marine environment.

The steady growth in seaborne trade has meant an increase in global shipping movements and tonnage. Vessel size has increased the need to benefit from economies of scale, whilst manning levels on ships has tended to be reduced with the introduction of labour saving and assistive technologies on board. At the same time mariners are under pressure to meet deadlines imposed by shipping companies and to comply with a raft of legislation pertaining to safety, security and the protection of the marine environment. The associated administrative burden is expected to be delivered without any additional manning on board the vessels to account for the additional hours required to complete the tasks in order to comply with company and industry regulations. All these factors impose additional stresses and can impact on the safe passage of a vessel (Butt, 2012).

Organisations such as the Marine Accident Investigation Bureau (MAIB) UK and the European Maritime Safety Agency (EMSA) Europe and others, work to identify the causes of these accidents and to share information with the industry so that they can learn from the experiences and recommendations made as a result. Data quality and quantity associated with reporting shipping accidents and detentions is the responsibility of the many organisations and flag States involved, and the member State in whose territorial waters the accident/ detention occurred. This becomes more of an issue when several organisations or member States are involved who may not be collecting the same data or using the same criteria or methods for recording the information.

The International Maritime Organisation (IMO) provides support to member and States to encourage them to ratify their Conventions, although more needs to be done in this area. The IMO process is demonstrably effective, but notably slow,

which has a bearing on safety response legislation following major accidents, as seen by the time line (*Figure 1*).

Flag State performance continues to play an important role in the quality and safety of sea-going vessels around the world. Several organisations publish guidelines on flag State performance. These include bodies such as the International Chamber of Shipping (ICS), the Maritime International Secretariat Services (MARISEC) and the International Transport Workers' Federation (ITF). These guidelines provide indicators to enable performance measurements in a number of key areas for example the enforcement of the international maritime treaties, maritime security, seafarers' welfare and movement of ships between flags (MARISEC, 2006). Yearly performance tables are produced using these indicators to raise awareness of the best and worst performing flag States. The following two sections describe the role of flag States addressing the terminology and definitions surrounding open registries. What becomes clear is the complexity of the subject matter and the lack of common reference points.

### 1.1 Purpose of the report

This report was initiated by WWF out of concern for shipping safety at sea and the number of shipping accidents impacting on human life, the environment and the reputation of the industry. The analysis of key shipping accident data over the past 15 years was designed to highlight issues associated with those incidences, and other underlying factors, to flag State performance, and to demonstrate where improvements can be made. To help drive change and further improvements within the industry and put pressure in the areas that could make a difference.

### 1.2 Data sources

Various data sources have been consulted and cross-referenced to provide the evidence required for this report with a focus on the past 15 years, 1997 - 2012. Current data trends have been derived from the Institute of Shipping economics and Logistics (ISL), Fairplay and the MOU data bases. The information regarding shipping incidents has been drawn from several sources including key reports such as the 'Shipping Industry Flag State performance tables', the 'Shipping Statistics Year books' and the 'Annual Review of Maritime Transport' among others. Additionally, expert interviews were conducted with six key organisations associated with shipping safety and accident response (See section 2.2). The interviews provided first hand professional evidence from the industry that support the data findings.

An issue of data reporting inconsistency became apparent during the research with different criteria used to record data from MOUs and from the Shipping Statistic Year Books. This issue is expanded upon in sections 3.8 and 4.1.

Additionally the data used for the report is only as good as the data mechanisms used to collect and report shipping accidents. Although there are continuous strides made towards ensuring data consistency and quality, particularly driven by the IMO, this area still has great room for improvement throughout the industry.

### 1.2.1 MOUs

The lists of vessel detentions were derived from the eight International Memorandums of Understanding, as listed in *Table 2: Port State Control Regimes*. Data provided by the MOUs varies considerably, including the number of years data has been collected for and the requirements for reporting. For example the Paris MOU was the first to be established in 1978 (Paris MOU, 2010). Therefore records of detentions have been kept longer in the regions this MOU covers. However, initially only the flags, the number of inspections with deficiencies, ship type, and number of deficiencies were recorded. It was not until 2009 that many additional headings were required (see *Table 4*). The increase in detailed reporting across the MOUs in more recent years indicates tighter regulations and reporting requirements and the need to improve general ship performance on many levels. The information concerning the datasets held for the MOUs have been found on their relevant websites and databases held there. Whilst work is taking place to document data more consistently across the MOUs, this remains a major task and one that IMO continually supports. Information from the MOUs is presented in section 3.8.

### 1.2.2 Interviews

In order to determine an entirely current picture of the state of play in this field, six semi-structured interviews with experts working in associated shipping safety, and accident response organisations were undertaken. The interviewees remain anonymous and the views expressed were their personal opinions based on extensive experience gained within their organisations and the shipping industry generally. They included the following:

- The Marine Accident Investigation Branch (MAIB)
- Lloyds Register
- A major European shipping insurer
- A naval architect
- A P and I Club, international group
- The International Maritime Organisation (IMO)



### 1.3 Flag States

Whilst the ship owner is ultimately responsible for the safety of his/her ship it is the flag State that sets the standard. Safety standards are not determined at an international level, but minimum safety standards are. Some flag States choose to adopt only the very minimum number of international conventions and it is these States that are attractive to those ship owners whose main concern is to cut costs and who care little for the safety of the seafarers employed on their vessels, the impact their operations have on the marine environment and the poor reputation they bring to an industry that has made great strides in cleaning up its act. They have been labeled 'flags of convenience', a derogatory term that is sometimes mis-used to refer to all open registries. Labeling all open registers as flags of convenience leads to confusion and fails to get to the heart of the matter. It is only through identification of those flag States who, it can be demonstrated, have failed to fulfill their international obligations, that change can take place by actively encouraging them to improve their standards. It is not possible to prevent a flag State from operating a shipping registry, but it is possible to shine a spot light on those who fail to engage in ensuring that ships that take their nationality, operate in a safe way.

#### 1.3.1 What is a Flag of Convenience?

The terms 'open register' and 'flag of convenience' are often used interchangeably, causing confusion, however they are not the same thing. The ITF defined a flag of convenience (FOC) as, '*Where beneficial ownership and control of a vessel is found to lie elsewhere than in the country of the flag the vessel is flying, the vessel is considered as sailing under a flag of convenience*' (ITF, 1974). Shipping registers can be either, national registers, second registers or registers. National registers, sometimes called 'closed' or 'traditional' registers, are operated by flag States for use by their nations ships only. Open registers are open to foreign-owned vessels. Second registers, or 'international' registers as they are often called, were created by traditional shipping nations as a response to the significant losses their national registers suffered as ships were moved out to open registers. Second registers offer more operational freedom and exemption from some taxes. Countries such as Denmark, Norway, France and the UK operate two registers, one National and one International. Flag of convenience is a derogatory label, used by the ITF, given to those flag States against whom the allegation that they care little for safe shipping standards or seafarer welfare is frequently made. The International Maritime Organisation (IMO) does not refer to flags of Convenience nor do they use the terms white, black or grey lists which are used by port State MOUs. The International Transport Workers Federation (ITF) has maintained a running campaign against those registers that they categorise as a FOC. It should be noted that it is often the ITF's definition or classification that is used when identifying a particular flag State (See *Table 1*).

Port State control categorise flag States according to lists. Flag States are entered each year on a 'white list', 'black list' or even a 'grey list' This denotes their status, based on inspection data held by those MOUs and is used as a tool to decide which vessels to inspect. The following countries (*Table 1*) have been assigned the 'Flag of Convenience' status by the International Transport Workers' Federation (ITF) Fair Practice's Committee.

*Table 1: Current Flag of Convenience registries, 2011 (ITF).*

Antigua and Barbuda	Gibraltar (UK)
Bahamas	Honduras
Barbados	Jamaica
Belize	Lebanon
Bermuda (UK)	Liberia
Bolivia	Malta
Burma	Marshall Islands (USA)
Cambodia	Mauritius
Cayman Islands	Moldova
Comoros	Mongolia
Cyprus	Netherlands Antilles
Equatorial Guinea	North Korea
Faroe Islands (FAS)	Panama
French International Ship Register (FIS)	Sao Tome and Príncipe
German International Ship Register (GIS)	St Vincent
Georgia	Vanuatu

Source: ITF, nd.

*Table 1* is based on findings of the ITF and does not correspond with the research findings in this report in relation to poorly performing flag States. However it does highlight some of the issues and differences surrounding the definitions and criteria used to determine whether a State is a flag of convenience (ITF, 2012a).

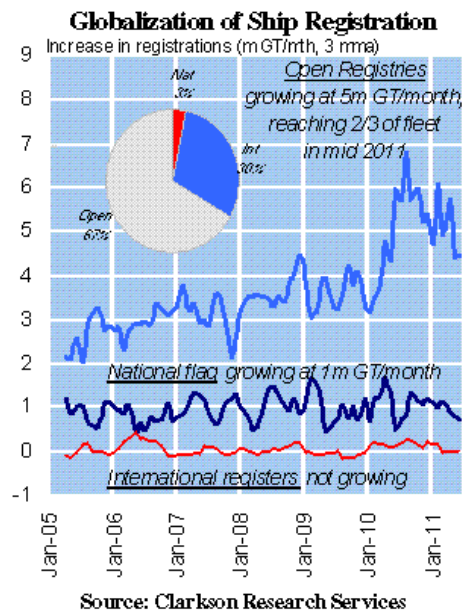
### 1.3.2 Open Registers

The use of open registers has been growing steadily at around 5 million gross tonnes per month; this accounts for 86% of the new tonnage in the fleet (See *Graph 1*). Currently, over two thirds of the world's gross tonnage use open registers (Stopford, 2011).

There have always been fundamental economic factors determining the flag a ship will fly; the aim of maximizing revenue and minimizing costs is at the heart of ship operations (offshoregate, nd.). The FAO identify the benefits of open registers to ship owners as the following: *low or no vessel restrictions; favourable tax environment; low administration and registration fees; no or easy to meet*

*nationality requirements; quick and efficient registration process; flexible manning requirements; lower operational costs of the vessel.*' (FAO, 2012). Clearly having the choice of flag and nationality provides ship operators with a method of controlling the costs of operation. For the flag States the FAO (2012) identifies the economic benefits associated with operating an open register as the following: *'tonnage tax and registration fees, franchise and or royalty fees; and reduced governmental expense due to outsourcing.'*

Graph 1: The growth in open registrations



It is important to note that flag States operating open registers are not all 'bad flags'. For example Panama now has a very good international reputation as a flag State and compared to the number of ships registered under this flag, there are relatively few accidents occurring (see *Graph 8* and *Table 3*). Despite this, all the flags listed on the International Labour Organisation's (ILO) 'Black list' are open registers.

### 1.3.3 Why do Flag States exist at all?

In international law a ship must have a nationality; if it does not have a nationality it does not have any protection in international law. Registration of a ship is the method by which a ship gains nationality. When a State accepts a ship onto its register of ships, the State then takes on the national and international

responsibilities required by a flag State in relation to that ship. Individual States may decide for themselves the conditions of registration.

The United Nations Convention on the Law of the Sea (UNCLOS) 1982, Article 91 states:

*“Nationality of ships*

*1. Every State shall fix the conditions for the grant of its nationality to ships, for the registration of ships in its territory, and for the right to fly its flag. Ships have the nationality of the State whose flag they are entitled to fly. There must exist a genuine link between the State and the ship.”*

There has been a great deal of discussion about what exactly constitutes a genuine link. It is the vagueness of the term ‘genuine link’ that fuelled the arguments of those who oppose the concept of open registers. The arguments still exist but are of a more academic nature now. The practical issue is whether those States that operate open registries meet the very clear obligations that international law places on them. Article 94 of UNCLOS establishes the fundamental principles.

UNCLOS 1982, Article 94 states:

*“Duties of the flag State*

*1. Every State shall effectively exercise its jurisdiction and control in administrative, technical and social matters over ships flying its flag.*

*2. In particular every State shall:*

*(a) maintain a register of ships containing the names and particulars of ships flying its flag*

*(b) assume jurisdiction under its internal law over each ship flying its flag and its master, officers and crew in respect of administrative, technical and social matters concerning the ship.*

*3. Every State shall take such measures for ships flying its flag as are necessary to ensure safety at sea .....*

*4. Such measures shall include those necessary to ensure:*

*(a) that each ship, before registration and thereafter at appropriate intervals, is surveyed by a qualified surveyor of ships ...*

*(b) that each ship is in the charge of a master and officers who*

*possess appropriate qualifications ...*

*(c) that the master, officers and, to the extent appropriate, the crew are fully conversant with and required to observe the applicable international ....*

*5. In taking the measures called for in paragraphs 3 and 4 each State is required to conform to generally accepted international regulations, procedures and practices and to take any steps which may be necessary to secure their observance.*

*6. A State which has clear grounds to believe that proper jurisdiction and control with respect to a ship have not been exercised may report the facts to the flag State. Upon receiving such a report, the flag State shall investigate the matter and, if appropriate, take any action necessary to remedy the situation.*

*7. Each State shall cause an inquiry to be held by or before a suitably qualified person ... into every marine casualty or incident of navigation on the high seas involving a ship flying its flag and causing loss of life or serious injury to nationals of another State or serious damage to ships or installations of another State or to the marine environment.”*

Whilst Article 94 of UNCLOS is clear in detailing the obligations of a flag State the means by which flag States must achieve these obligations is less clear. Article 94(5) establishes the link between municipal and international law. It provides the duty to “*take any steps which may be necessary*” to “*conform to generally accepted international regulations*”.

The “*generally accepted international regulations*” are those concerning safety of life at sea, standards of training of seafarers, prevention of pollution, prevention of collisions, and the provision and maintenance of communications by radio.

Flag States evidence their compliance with these international regulations by carrying out surveys and issuing certificates to ships on their registry. Flag States have the responsibility in international law for carrying out these functions, but in practice may sub-contract the administrative and technical functions to other organisations such as classification societies. In sub-contracting the administrative and technical functions they do not sub-contract the obligation of enforcement, they retain this responsibility. Article 217 of UNCLOS is clear that the enforcement of international regulations is the responsibility of the flag State:

*“Article 217*

*Enforcement by flag States*

*1. States shall ensure compliance by vessels flying their flag or of their*

*registry with applicable international rules and standards, established through the competent international organization or general diplomatic conference.... Flag States shall provide for the effective enforcement of such rules, standards, laws and regulations, irrespective of where a violation occurs.”*

It is the approach that some flag States take in discharging their duty of enforcement that attracts the less than scrupulous ship owner and has been a subject of contention for many years.

#### 1.3.4 What are the registration requirements and formalities?

It is very difficult to provide a concise overview of the registration requirements and formalities as they vary from State to State. What is clear is that some States require a minimum level of information and registration can be affected in as little as one day, and some States have a more robust system requiring a much greater degree of information and carry out a series of cross checks on that information including carrying out a survey of the ship.

There is no legal obligation for port States to carry out inspections on foreign flagged vessels entering their waters. States may choose to inspect visiting vessels for a variety of reasons. The scope of operations of a body such as the US Coast Guard is wide and it is driven wholly by domestic US law. Similarly those States who are members of the European Union may find that their practices in this area are driven both by internal policy and externally by European directives; these are often in response to accidents or incidents, for example, the sinking of the MV. Erika in December 1999 was the catalyst for many changes at European level. Aside from these internal drivers States may opt to cooperate with each other regionally. Memorandums of Understanding may be signed and a concerted effort of inspections, according to agreed criteria, is carried out by the member States.

The response of the international community to those flag States who fail to ensure that ships on their registry meet the minimum of standards was to put in place a system whereby foreign flagged vessels were inspected in ports they visited; this is referred to as port State control (PSC). It goes without saying that if all flag States met their international obligations PSC would not be necessary. Whilst PSC has proved highly effective in identifying and to some degree eliminating sub-standard shipping it should never be seen as alternative to ensuring flag States meet their obligations.

The right of a port State to carry out inspection on a foreign flagged vessel can be found in Article 218 of UNCLOS III, it states:

*“Article 218*

## *Enforcement by port States*

*1. When a vessel is voluntarily within a port or at an off-shore terminal of a State, that State may undertake investigations and, where the evidence so warrants, institute proceedings in respect of any discharge from that vessel outside the internal waters, territorial sea or exclusive economic zone of that State in violation of applicable international rules and standards established through the competent international organization or general diplomatic conference.*

*2. No proceedings pursuant to paragraph 1 shall be instituted in respect of a discharge violation in the internal waters, territorial sea or exclusive economic zone of another State unless requested by that State, the flag State, or a State damaged or threatened by the discharge violation, ....*

*3. When a vessel is voluntarily within a port or at an off-shore terminal of a State, that State shall, as far as practicable, comply with requests from any State for investigation of a discharge violation ....*

*4. The records of the investigation carried out by a port State pursuant to this article shall be transmitted upon request to the flag State or to the coastal State ...* Reference to “*applicable international rules and standards established through the competent international organization or general diplomatic conference*” is accepted as referring to the key International Maritime Organisation (IMO) instruments such as;

International Convention on Load Lines 1966 (LL 66),

International Convention on Tonnage Measurement of Ships 1969 (TONNAGE 69),

International Convention for the Safety of Life at Sea 1974 (SOLAS 74),

International Convention for the Prevention of Pollution from Ships, as modified by the Protocol of 1978 relating thereto (MARPOL 73/78) and

International Convention on Standards of Training, Certification and Watch keeping for Seafarers 1978 (STCW 78)

International Labour Organisations (ILO) Convention 147, Merchant Shipping (Minimum Standards) Convention 1976.

ILO's Maritime Labour Convention 2006 (ratified August 2012, in force August 2013).

In order to maintain a consistency across port States, IMO resolutions have been adopted and the IMO introduced guidelines on how port State inspections should be carried out.

#### 1.4 Port State Control Inspections

Inspections may be undertaken for a number of reasons:

- i.* On the initiative of the port State authorities,
- ii.* At the request of a third party, or
- iii.* As result of information received by a member of the ship's crew, a professional body or trade union.

The port State control officer (PSCO) on boarding a ship will inspect the ships' certificates and documents. If the certificates are valid and the documents satisfactory, and the general impression of the ship meets the PSCO's expectations, the inspection will concentrate on any reported or observed deficiencies. If the initial inspection reveals deficiencies and the PSCO has clear grounds to believe that the ship, its equipment or crew do not meet acceptable standards, then a more detailed inspection will take place.

In theory, but perhaps not always in practice, all deficiencies must be rectified prior to the ship departing the port. However, if the ship is either unsafe to proceed to sea or the deficiencies on the ship are so serious that they will have to be rectified before the ship sails, the ship will be detained, irrespective of the time the ship is scheduled to stay in port. It should be noted that PSC cannot compel a ship to affect repairs in a particular port, but it can issue a formal prohibition of a ship continuing an operation due to established deficiencies which, individually or together, would render the continued operation hazardous. The flag State will be notified in writing of the outcome of the inspection and includes a report of inspection.

##### 1.4.1 Regional Port State Control Agreements

The coordination of port State control activities by groups of port States working under a Memorandum Of Understanding (MOU) has enabled a more unified approach to inspection. The maritime authorities of the member States can avoid, or target, ships which have been inspected by fellow members in proceeding months. There are 10 port State control regimes (see *Table 2*), eight of which are MOUs, one of which is an Agreement (The Acuerdo de Vina del Mar Agreement, Latin America) and The US Coast Guard, which operates their own regime as a stand-alone Authority but do cooperate with other maritime authorities.



Table 2: Port State Control Regimes<sup>1</sup>.

<b>MOU</b>	<b>Covering</b>	<b>Date Effective</b>
US coastguard port State control	The USA	1975
Paris	European coastal States and the North Atlantic basin from North America to Europe	1978
Acuerdo de Viña del Mar Agreement	Latin America	1992
Tokyo	Asia and the Pacific	1994
Caribbean	Caribbean	1996
Mediterranean	Mediterranean	1997
Indian Ocean	Indian Ocean	1999
Abuja	West and Central Africa	1999
Black Sea	The Black Sea region	2000
Riyadh	Arab States of the Gulf	2004

Source: Original

#### 1.4.2 Ship selection criteria

The selection criteria for inspections, whilst following similar principles, differs from MOU to MOU; each however sets a minimum percentage of vessels that member authorities will inspect. Along with the practical steps of detaining sub-standard ships MOU's collect and collate data on ships. This data is shared between member States and made publically available. This enables organisations such as classification societies, ship owner associations and the International Transport Workers Federation to coordinate their activities

The data collected is crucial to the MOU's work in classifying ships and their flags; this enables them to prioritise and target those ships that are registered with flag States that are known to have a poor record of inspection and enforcement of their own ships, a much more efficient use of PSC resources. The Paris MOU was the first to publish three lists of flag States performance (See Appendix B).

- i. The "White List" indicating the quality flags;
- ii. The "Grey List" for flags with an average PSC score; and
- iii. The "Black List" for flags with a consistent poor safety record

The 'White, Grey and Black List' presents the full spectrum, from quality flags to flags with a poor performance that are considered high or very high risk. It is

<sup>1</sup> See Appendix A for table of MOU member countries

based on the total number of inspections and detentions over a 3-year rolling period for flags with at least 30 inspections in the period. The Tokyo MOU later adopted the same methodology as the Paris MOU for the assessment of performance of flags. It is a standard formula for statistical calculations in which certain values are fixed in accordance with the agreement of the Port State Control Committee of the MOU (Paris MOU, 2012).

There is no list identifying those States actively involved in port State control. The member States of the various MOUs are clearly visible in their activities, membership is public and annual reports are published. Individual State activity on the scale of the US, who are a not member of an MOU, can be clearly identified. However, the level of engagement by States who are not members of an MOU is harder to identify, as is the criteria by which they select vessels for inspection. It should not be concluded that PSC is universally carried out across the globe.

### 1.5 Hiding Corporate Identity

Ensuring effective implementation and enforcement of international maritime conventions and the compliance of owners and ships, is a major challenge for flag States. Despite this many flag States do not require disclosure of beneficial ownership as a condition for registering ships and some actively advertise secrecy as a benefit of registering ships to their flag (Gianni, 2008).

In 2003, the Maritime Transport Committee of the OECD scrutinised ship registration provisions of various ship registers. The report was designed to assess the possibilities available to beneficial owners, who for one reason or another might wish to remain anonymous. The Report of the UN Secretary General's Consultative Group on Flag State Implementation (2004) highlights the key points from the OECD Report as follows. *'It is very easy, and comparatively inexpensive, to establish a complex web of corporate entities to provide very effective cover to the identities of beneficial owners who do not want to be known'* (Gianni, 2008). The mechanisms to invoke anonymity are legally available in many jurisdictions and can provide an international business corporation that can conduct business nearly anywhere in the world. For the reasons identified, this report does **not** look at shipping companies or organisations.

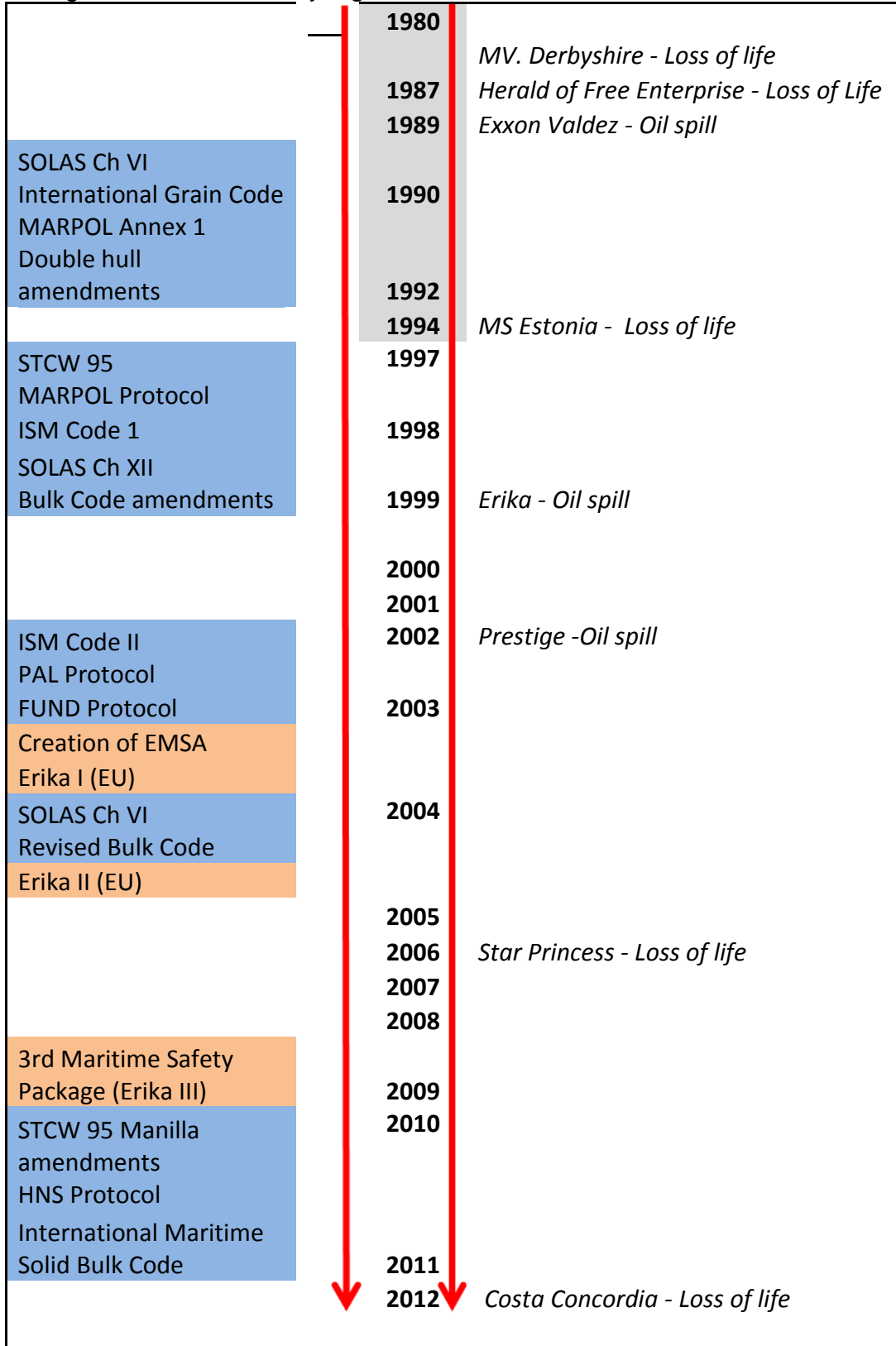
### 1.6 Shipping accidents as drivers of maritime legislation

It has long been recognized that one of the key measures of improving safety at sea is to develop, implement and enforce international regulations. History has demonstrated that large-scale shipping accidents serve as key drivers of change, which is often manifested in new or amended safety regulation (Charlebois, 2012).

The timeline in *Figure 1* highlights the drivers for change through the introduction of new or updated legislation attributed to major incidents or a series of incidents focusing on the past 15 years. For example, the Safety of Life at Sea (SOLAS) Convention traces its origins to the loss of the Titanic (1912) with significant updates in more recent years, such as the introduction of the ISM Code (Chapter IX of SOLAS) after the lessons learnt from the loss of the Herald of Free Enterprise in 1987. Similarly changes have taken place to regulations governing the operation of dry bulk carriers and tankers, including *inter alia* the amended Bulk Code, amendments to MARPOL Annex I, and the introduction of the US legislation such as the Oil Pollution Act 1990 (OPA '90). These were triggered by the large number of dry bulk carrier losses in the 1980s, most notably the Derbyshire in 1980, and the grounding of the Exxon Valdez oil tanker in 1989.

This retrospective amendment of legislation continues; the loss of the MV. Erika in 1999 saw changes to the operation of tankers and new European Regulations. The serious fire on the cruise ship the Star Princess in 2006 brought changes to fire regulations. It remains to be seen what affect the cruise ship the Costa Concordia (2012) will have after such a serious loss of life. Other contributing factors to improved vessel safety and reduction in shipping accidents should also be considered such as the introduction of the International Safety Management (ISM) code (adopted 1994), the increasing role of port State control with regard to vessel inspections and detentions and the increasing role of corporate social responsibility (CSR) for shipping companies.

Figure 1: The 15 year time line and key shipping accidents and subsequent changes in maritime safety legislation.



## 2.0 Current trends and data presentation

The following graphs and tables summarise factual information held in the public domain from the past 15 years, which provide information that can help in assessing the factors which are more likely to contribute to shipping accidents. As with any statistics it is important to use these tables and graphs with care and take into consideration other underlying issues at play, including the supporting evidence provided by the interviews. The graphs have been grouped accordingly:

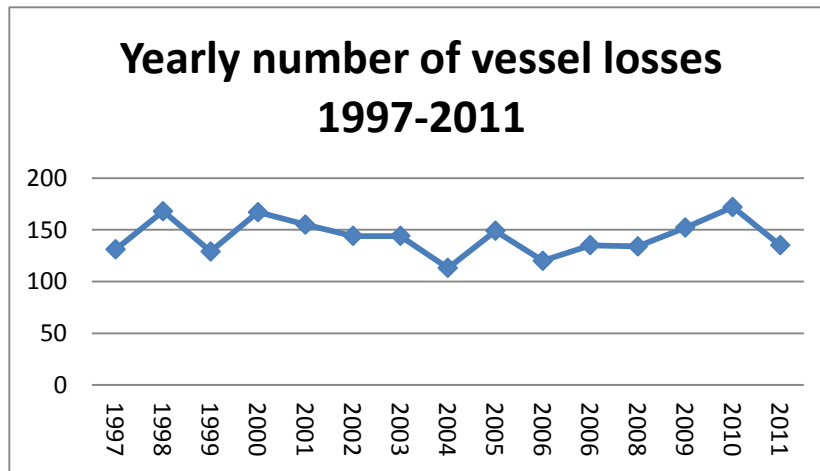
- Growth of the world fleet
- Losses by incident type
- Losses by geographical area
- Losses by average age of vessel
- Losses by vessel type
- Losses by registration
- Losses as a percentage of registered fleet
- Information from the MOUs

Losses, unless otherwise stated, in this research refer sea going propelled merchant ships *'not less than 100gt which as a result of being a marine casualty [have] ceased to exist, are irrecoverable, or have subsequently been broken up'* (World casualty statistics, 2011).

### 2.1 Growth of the world fleet

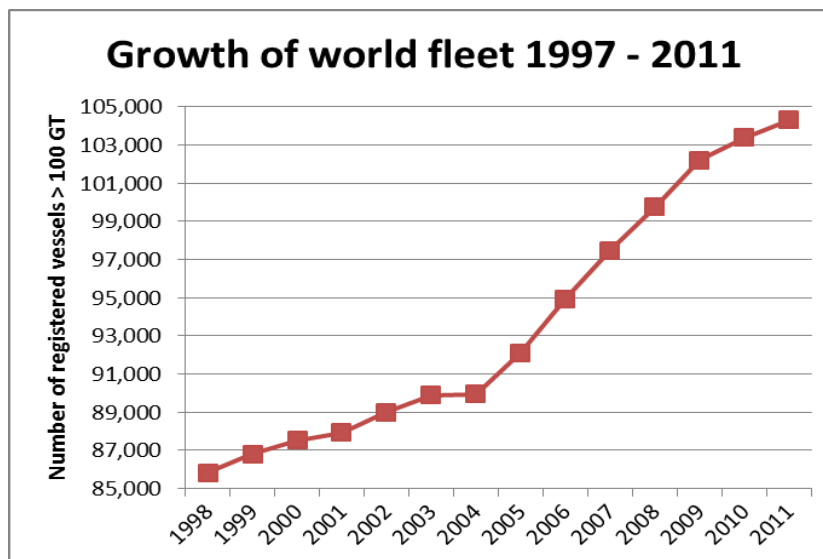
The total number of vessel losses in *Graph 2* shows a decrease in numbers for 2011 following a peak the previous year. These figures need to be considered in conjunction with the steady increase of the world's merchant fleet (over 100gt) which has seen a rise of an additional 15,846 vessels over the past decade, representing a growth of 18.1%, (see *Graph 3*). This demonstrates an overall decline in the number of vessels lost (World casualty Statistics 1997 - 2011). Despite this encouraging statistic it is clear that the number of global vessel losses on an annual basis is still consistently far too high, indicating a requirement to understand and take action against the root causes of such accidents.

Graph 2: Yearly number of vessel losses (> 100gt) 1997 – 2011



Source: Original

Graph 3: Growth of the world's merchant fleet



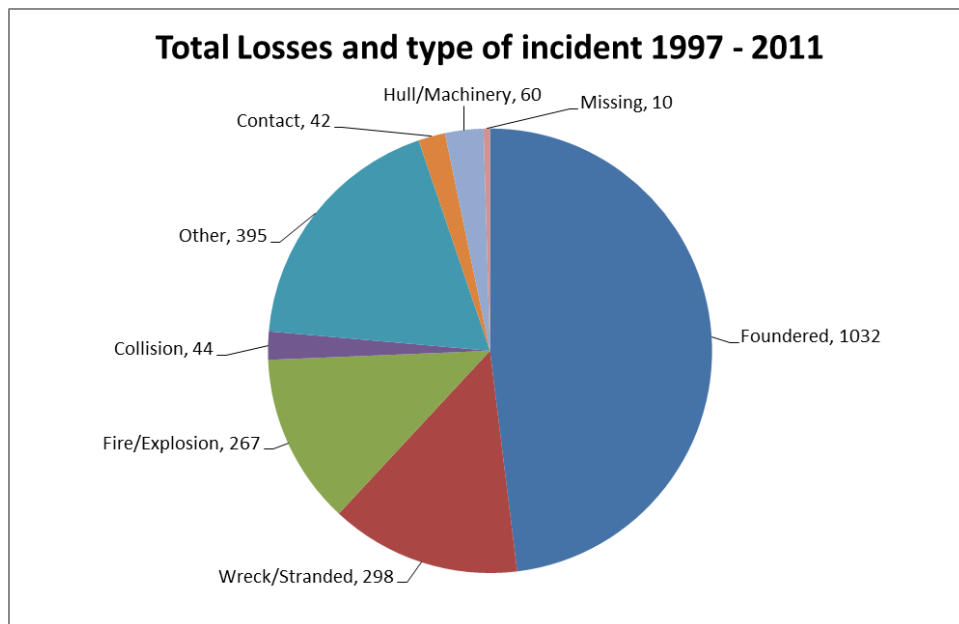
Source: Original

Other contributing factors to improved vessel safety and reduction in shipping accidents should also be considered, such as the introduction of the International Safety Management (ISM) code (adopted 1994), the increasing role of port State control with regard to vessel inspections and detentions and the importance of corporate social responsibility (CSR) within most shipping companies. Although this data shows a generally improving trend in shipping accidents, there are still significant numbers of incidences which can be attributed to factors affecting the vessel itself, such as its age and type, through to the vessel's geographical area of operation, as discussed below.

## 2.2 Total losses by incident type

The data in *Graph 4* shows that the most common incident type consistently occurring is foundering. This accounts for approximately 50% of all the annual ship losses. Foundering is defined by ISL (2010) as, ‘*Sinking due to rough weather, leaks, breaking in two etc, but not due to other categories such as collision [and so on]*’. Foundering incidences are clearly associated with the geographical area they occur in and the extreme weather conditions often experienced in such locations, as discussed in section 3.3. These incidences also occur in areas such as the North Sea and the Black Sea where there are high volumes of shipping and many coastal trading routes associated with short sea shipping. The second major cause of loss by incident type is associated with wrecked or stranded vessels, which is defined as ‘*Striking the sea bottom, shore or underwater wrecks. Also termed “Grounding”*’ (ISL, 2010). However this attributes to less than half of those that are foundered. Project Horizon, a research project looking at the effects of sleepiness on the cognitive performance of maritime watch keepers, stated that marine insurance statistics have shown that human error is a major contributing factor in about 60% of shipping accidents, with other research suggesting that this figure significantly increases in the case of collisions and groundings (Project Horizon, 2012).

*Graph 4*: Total losses and incident type



Source: Original

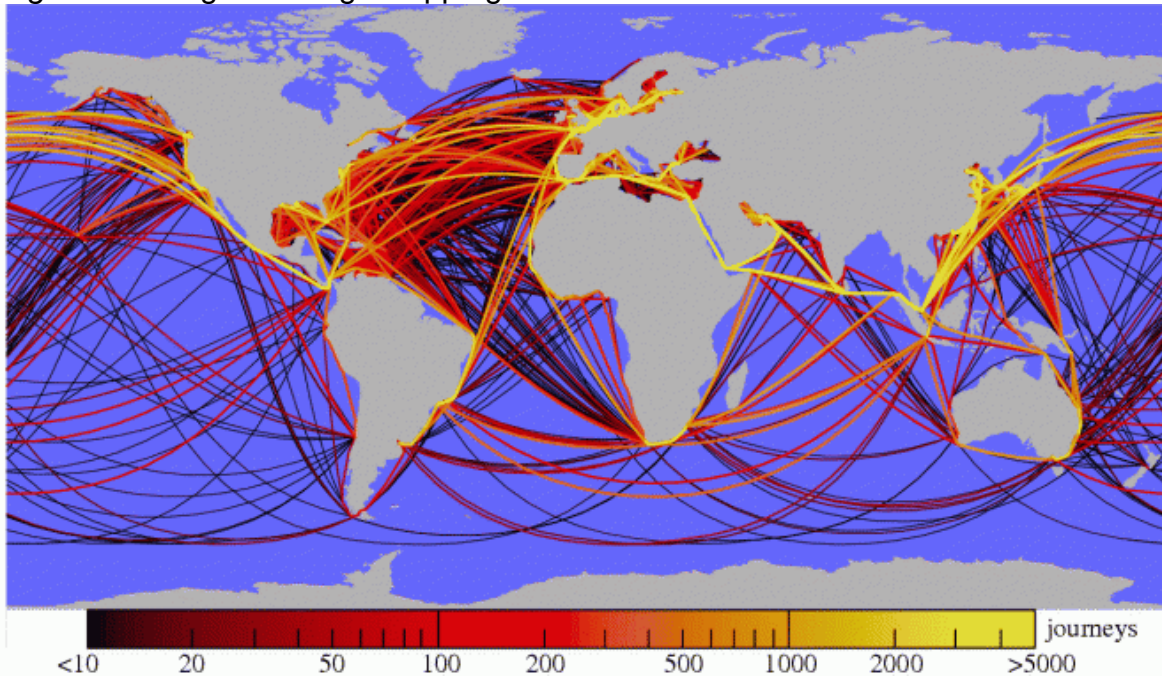


### 2.3 Losses by geographical area

The losses by geographical area shown in *Graph 4* only cover a 12 year period from 1999 to 2011, as these were the only statistics available from the World Casualty Statistics (1999 - 2011). The geographical areas that are most prevalent (in order) are the South China Seas and East Indies, Japan and Korea and the East Mediterranean and Black Sea. The losses in the Far Eastern region could be significant if a relationship is made with the data for number of vessels which have foundered. Meteorological conditions in specific areas have a significant bearing on the number of incidences occurring. Tropical storms, tsunamis and typhoons are prevalent in the Asia Pacific region where extreme and changeable weather and sea states are common (Cornish and Ives,1997; Craig, 2006). Additionally whilst bulk carriers, tankers and container vessels commonly travel through this area, one of the most predominant types of vessel trading here is the general cargo ship. These ships are well suited to trade in the island and archipelagic States of the region, as they can engage in the 'tramp' trade where they have no specific route or schedule, carrying the smaller quantities of cargo that are required. However these vessels also tend to have an older age profile, generally above 20 years (World Casualty Statistics 2000-2011) and as such tend to be flagged with open registries as many national registers impose restrictions on the age of vessel they will register. There is also a possibility that these vessels may cut corners to save money, which could mean taking risks and sailing in potentially dangerous weather conditions, in sub-standard vessels, with sub-standard crews. The combination of these factors could be of considerable significance to vessels lost to foundering. For example the ITF (2012b) highlights the frequency of serious accidents in the Black Sea region, suggesting that the Black Sea trade is characterized by *'The use of aged, smaller vessels, working well beyond their economic life and moving low value goods, [and this is] reflected in serious accidents ....'* (ITF, 2012b).

Figure two shows the complex network of global cargo ship movements between ports during 2007. The researchers (Kaaluzza *et. al.* 2012) used the itineraries of 16,363 ships over 10,000 GT to build a picture of activity over one year. The colour scale shows the number of journeys along each route.

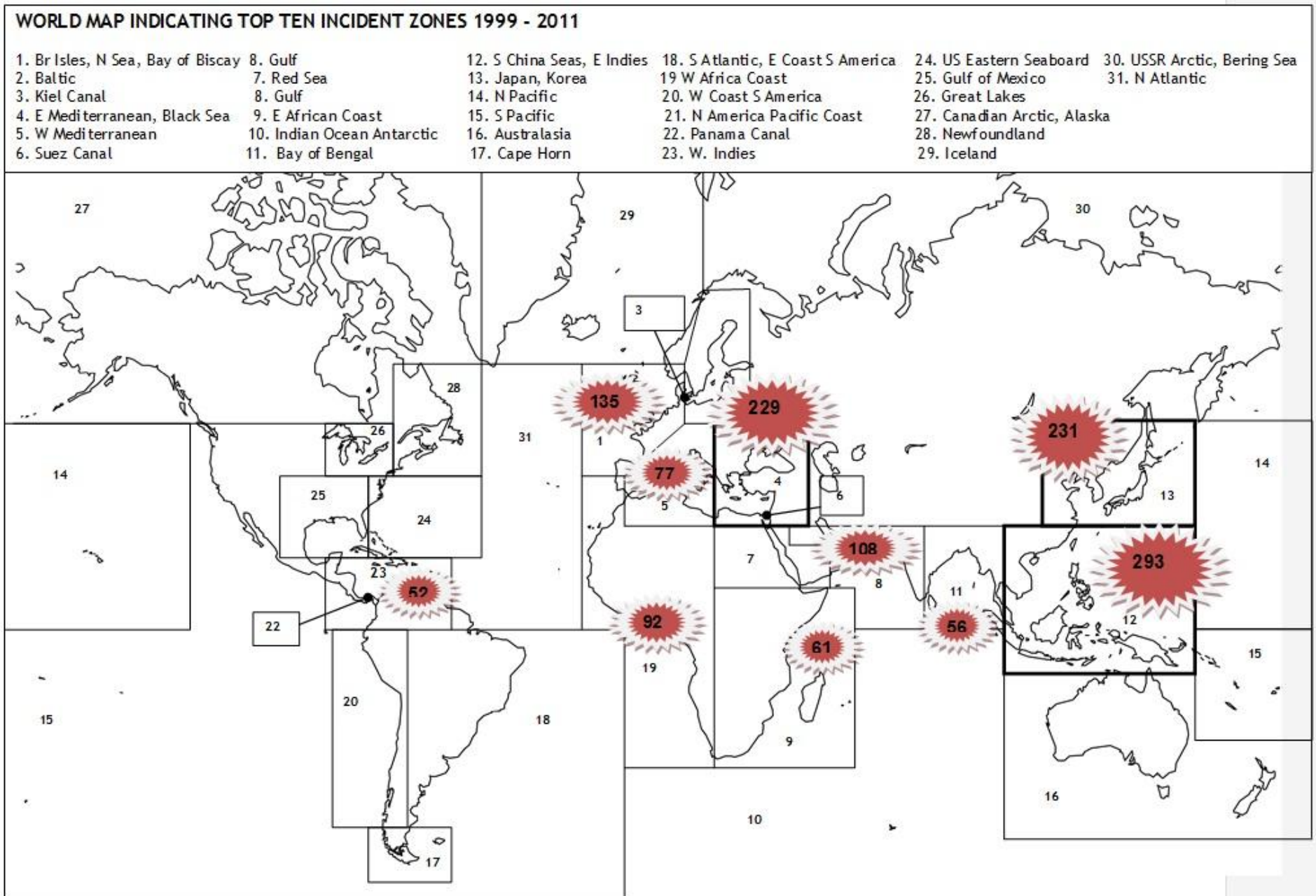
Figure 2: The global cargo shipping movements for 2007



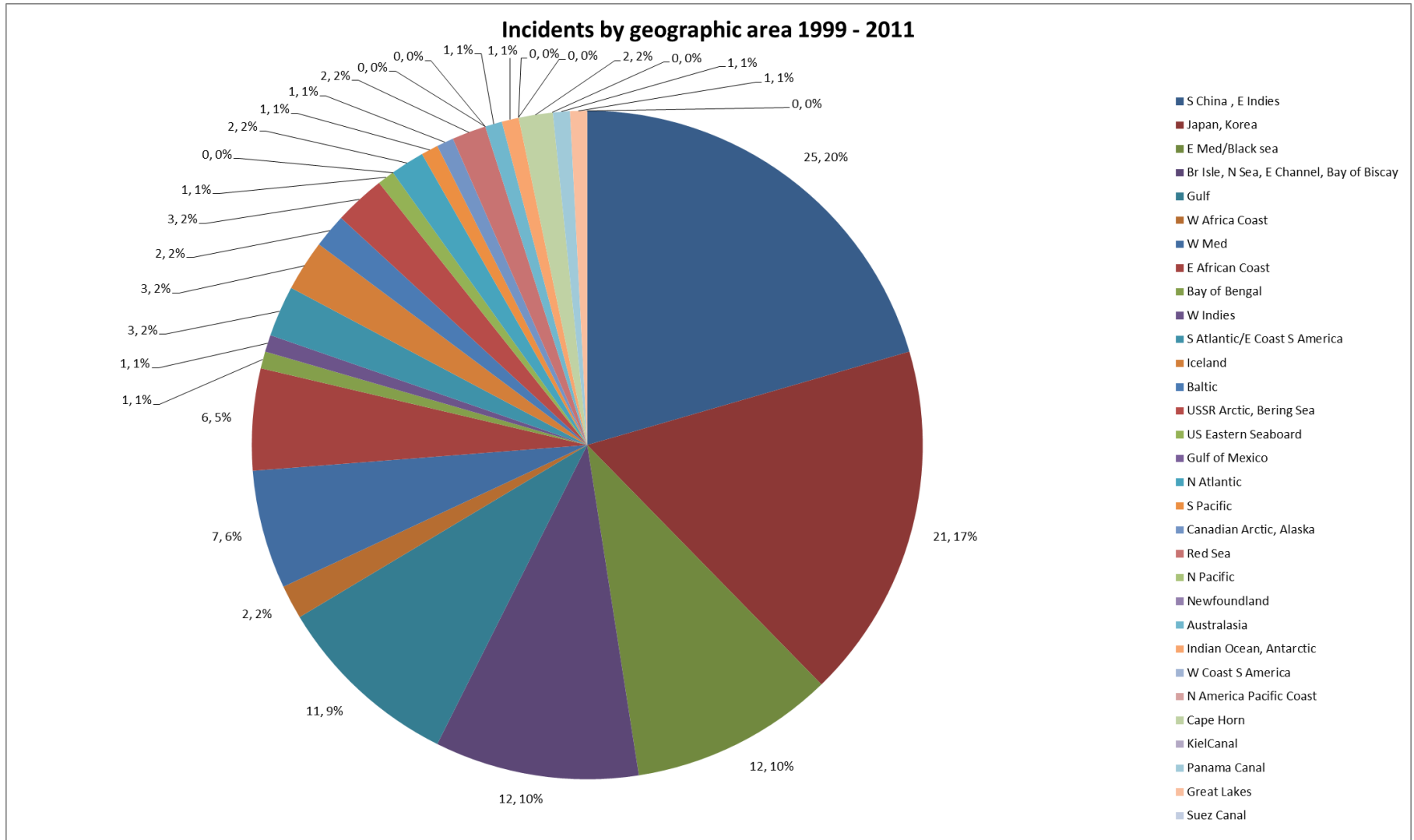
Source: Kaaluzza *et. al.*, 2010

When *Figure 2* is compared with *Figure three*, the world map indicating the top ten incident zones between 1999 and 2011, it is clear that many of the areas where shipping traffic is heaviest marries up. Many of the highlighted regions are also on the financial radar for higher insurance premiums. The maps provide a clear indicator of potential problem areas and should be a focus of international attention for increased safety measures and enforcement of regulations and high standards.

Figure 3: World map indicating top ten incident zones 1999-2011



Graph 5: Losses by geographical area

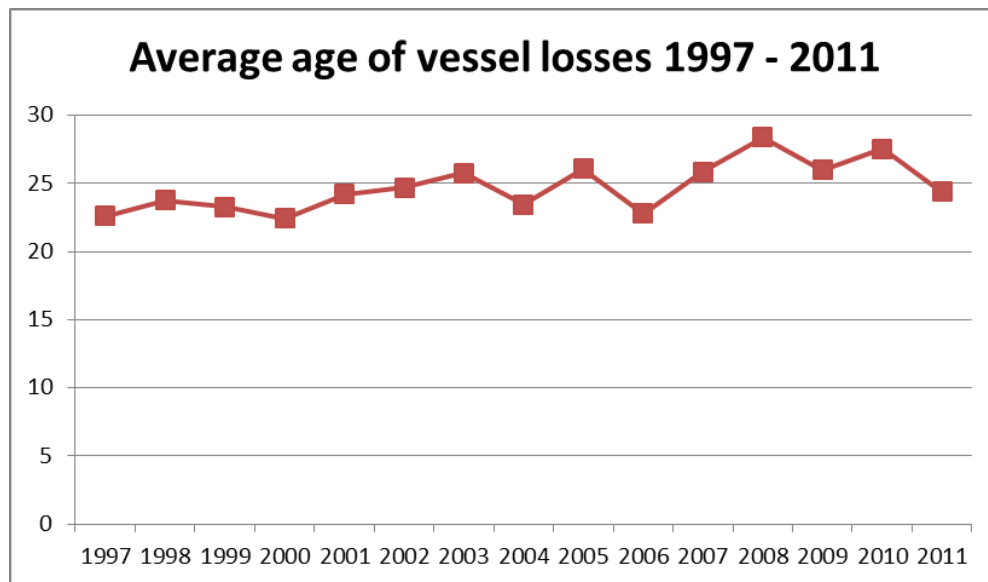


Source: Original

## 2.4 Losses by average age of vessel

*Graph 6* shows that the average age of vessels lost between 1997 and 2011 are all above 20 years with a small but steady increase over the last 15 years. The age of vessels has been discussed in relation to geographical area of operation, but is also a consideration to some IACs members who will not class sea-going vessels over 20 years old.

*Graph 6:* Losses by average age of vessel

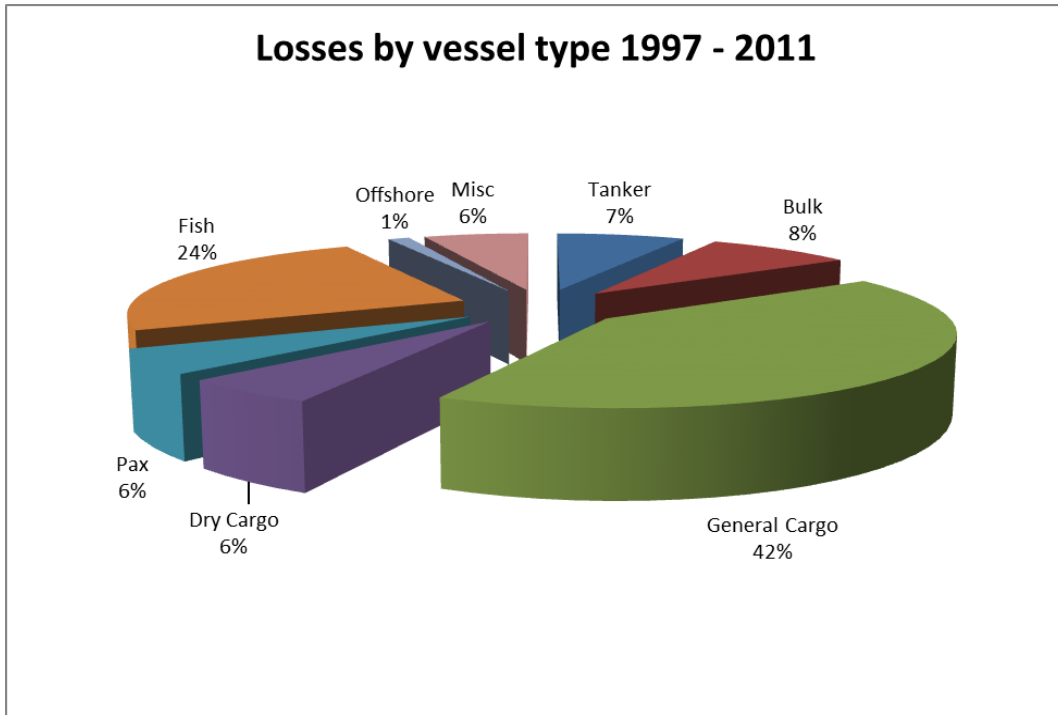


Source: Original

## 2.5 Losses by vessel type

*Graph 7* shows that general cargo vessels account for nearly 50% of all vessel types lost at sea over the research timeframe. These types of vessels are often operating short sea shipping routes, particularly in the Far East which involve many port calls, navigating in congested coastal areas with the risk of difficult hydrographic uncertainties, such as submerged reefs and rocks. By their design these vessels can carry a multitude of cargos and are therefore more predisposed to trading in this way, as discussed in Section 3.3.

Graph 7: Losses by vessel type

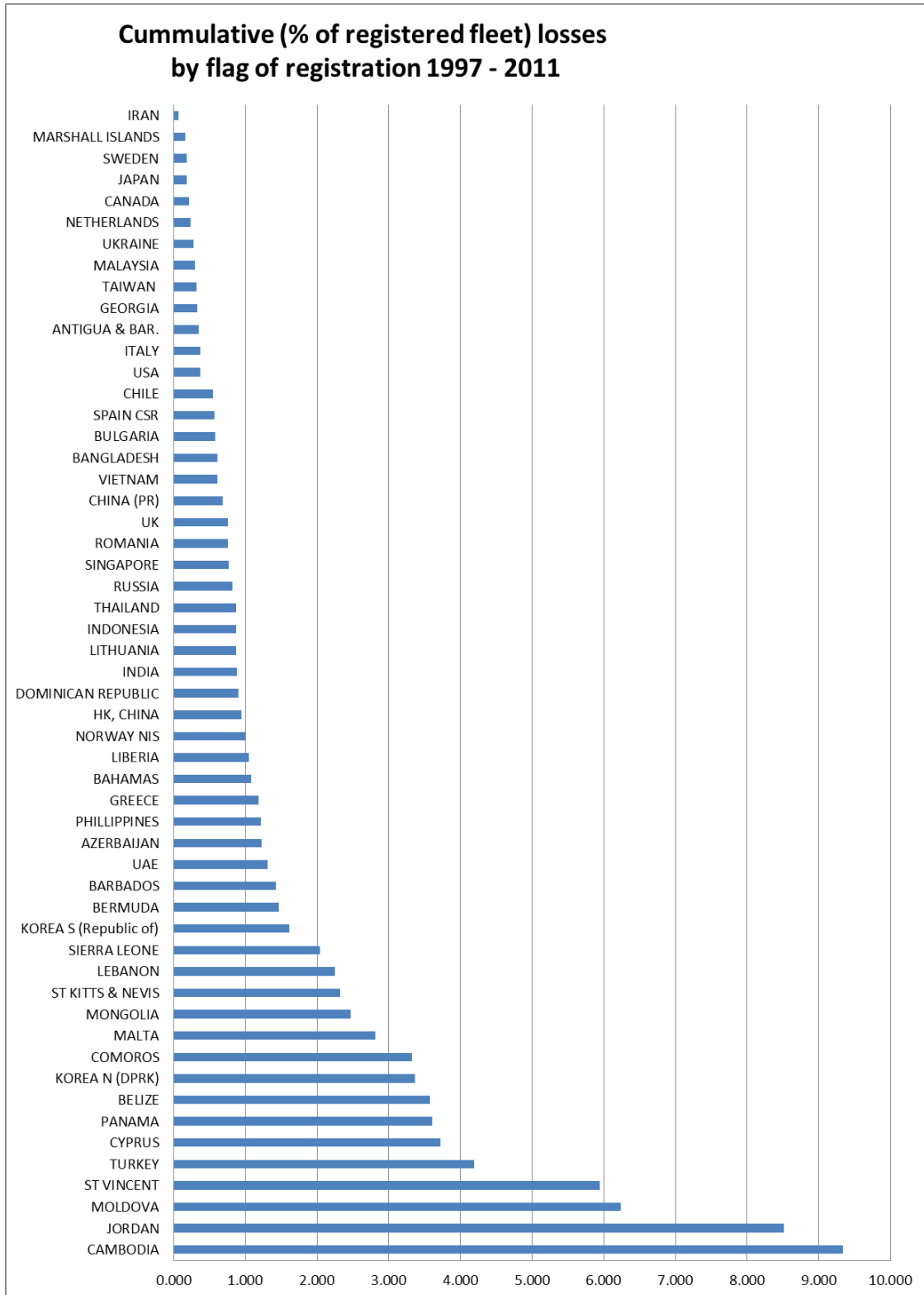


Source: Original

## 2.6 Losses by registration

When considering cumulative losses by registration (*Graph 8*), the number of registered vessels in the fleet must also be examined for a clearer view of actual numbers. For example, although Panama appears to have the seventh highest cumulative losses by flag registration, it also has the highest number of registered ships in a fleet which has been steadily growing over the past 15 years. When looking at flags such as Cambodia where the fleet size is relatively small (591 in 2011) it is clear that they have suffered significant cumulative losses to their flag. This is a recurrent theme which also applies, in particular, to Jordan and Moldova where the registered fleet size is relatively small in relation to the number of vessel losses incurred.

Graph 8: Cumulative losses as a percentage of registered fleet



Source: Original

## 2.7 Losses as a percentage of registered fleet

In total the percentage loss of the registered fleet may appear small but is of serious consequence when considering the implied potential loss of life, impacts to the environment and finances of the ship owner (*Table 3*).

*Table 3:* Total of world's registered fleet as recorded losses of >10,000gt in 1997 and 2011.

1997	Registered Fleet	As % of world fleet	vessels lost	As % of flag fleet	2011	Registered Fleet	As % of world fleet	vessels lost	As % of flag fleet
PANAMA	6188	7.24	8	0.129	PANAMA	8127	7.792	22	0.271
USA	5260	6.15	11	3.230	INDONESIA	6332	6.071	5	0.079
RUSSIA	4814	5.63	1	0.021	JAPAN	5619	5.387	10	0.178
CYPRUS	1650	1.93	6	0.364	CHINA, PR	4148	3.977	3	0.072
GREECE	1641	1.92	2	0.122	LIBERIA	3030	2.905	1	0.033
MALTA	1378	1.61	2	0.145	KOREA, SOUTH	2916	2.796	3	0.103
ST VINCENT	1343	1.57	7	0.521	MALTA	1815	1.740	5	0.275
BAHAMAS	1221	1.43	3	0.246	VIETNAM	1525	1.462	2	0.131
TURKEY	1146	1.34	7	0.611	BAHAMAS	1409	1.351	1	0.071
INDIA	941	1.10	3	0.319	CYPRUS	1022	0.980	1	0.098
THAILAND	576	0.67	5	0.868	CAMBODIA	591	0.567	7	1.184
ANTIGUA & BAR.	516	0.60	4	0.775	BELIZE	446	0.428	2	0.448
HK CHINA	375	0.44	1	0.267	JORDAN	23	0.022	1	4.348
<b>World total fleet</b>	<b>85,494</b>				<b>World total fleet</b>	<b>104,305</b>			

Source: Original

For example, this means that in 2011 Panama had 8,127 vessels in its registered fleet, which equated to 7.79% of the total world fleet. In this year they lost 22 vessels, which equates to 0.271 of their fleet which is a relatively small number when compared to flags such as Jordan. In the same year Jordan had 23 registered vessels in their fleet. They lost 1 in 2011 representing an overall loss of 4.348% of their registered fleet, clearly a much higher percentage.



## 2.8 Information from the MOUs

It is the IMO's policy to encourage the establishment of regional port State control organizations and agreements on port State control (IMO, 2012), as discussed in section 1.3.1. The following graphs look at a number of statistics collated from the MOUs. These primarily focus on the Paris MOU as this has the most comprehensive data set, having been in operation the longest, since 1978. However, it should be noted that even this MOU has only the bare minimum of data collected over the total time period studied (15 years). Data collection for the Paris MOU became much more thorough from around 2009 and for this reason much of the detention information reported is from this period.

The Tokyo MOU also has a more comprehensive reporting system, although it was not initiated until 1994. Until recently none of the data collected for the various MOUs matched up, with criteria reported on varying broadly. Additionally the information collected from the World Casualty lists are not using consistent criteria or terminology with the MOUs, which makes it difficult to cross reference like for like between the two data sets.

*Table 4* demonstrates the range of data that the MOUs have collected over the past 15 years and highlights the disparity in regional approaches to detention monitoring. For example, the Abuja MOU website database has a list of which classification societies had ships detained, but unlike the Paris and Tokyo MOU they are not linked to specific ships or flags, so there is no way of telling if there is a link between which ships are classified under which society and their performance. This is the same for vessel type. Additionally some MOUs such as the Caribbean MOU was open for signatories in 1996 but it appears from their website that data was not available to the public until 2009. The IMO interviewee mentioned that this is an area they are working on with port State regimes to rectify. It is recognised that the data must be reported on in a standardised and consistent way in order for it to be meaningful and to allow for cross referencing and verification. Therefore the following graphs provide snapshots of certain statistics only and are supported by published literature and the interview data.

Table 4: Data available from MOUs from 1997 - 2012

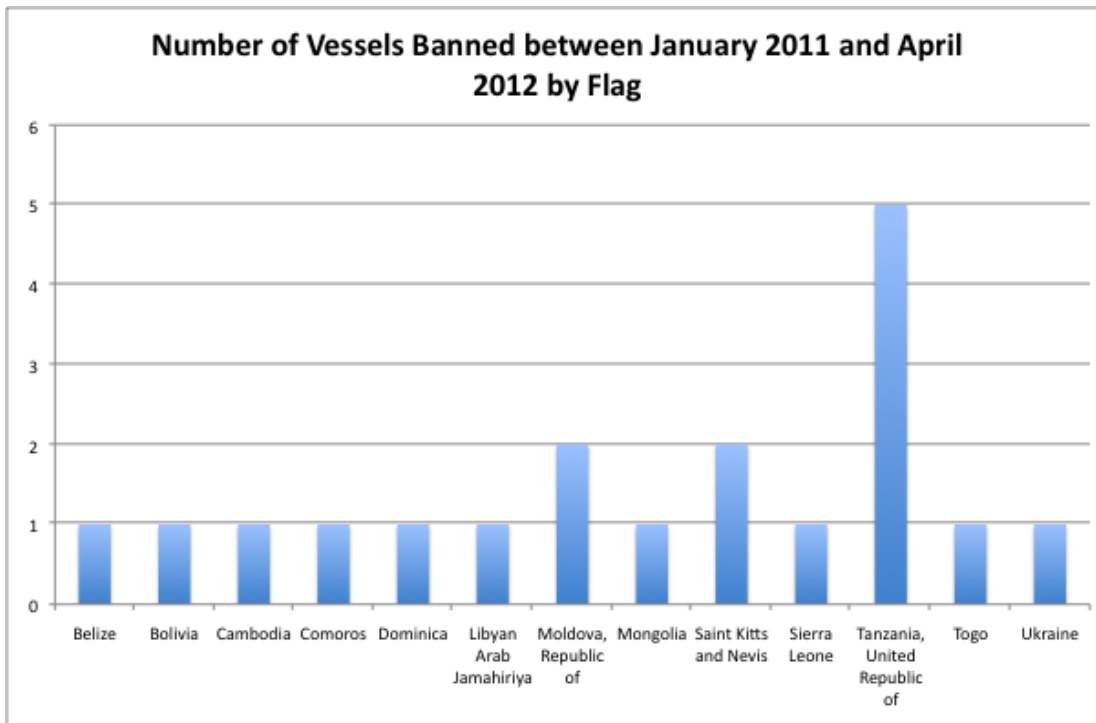
Name of MOU	Year MOU Signed	Data Available from	Ship Flag	Year Build	Gross Tonnage	Class Society	Year of Detention	Reasons for being detained	Ship Type	Place of Inspection
Paris	1978	Limited data from 1997. Full details from 2009	Since 1997	Since 2008	Since 2008	Since 2008	Since 1997	Since 2009	Since 1997	Since 2009
Tokyo	1994	Since 1999	Since 1999	Since 1999	Since 1999	Since 1999	Since 1999	Since 1999	Since 1999	Since 1999
Mediterranean	1997	Since 2005	Since 2005	Since 2005	Since 2005	Since 2005	Since 2005	Since 2005	Since 2005	Since 2005
Riyadh	2004	Limited data available between 2007-2009	No	No	No	No	2007- 2009	No	No	2007-2009
Abuja	1999	Limited data for 2008, 2010, 2011 & no data for 2009	2008, 2010, 2011	No	No	Limited, to number per class not linked to a flag	2008 2010 2011	No	Limited, to number per type not linked to a flag	No
Indian Ocean	1999	Limited since 2002 further data available from 2005	Since 2002	Since 2002	Since 2000	Since 2002	Since 2002	No	Since 2002	Since 2002
Caribbean	1996	Since 2009	No	No	Since 2009	Since 2009	Since 2009	No	Since 2009	Since 2009
Black Sea	2000	Since 2002	Since 2002	Since 2002	Since 2002	Yes but limited information	Since 2002	Since 2002	Since 2002	Since 2002

Source: Original

Due to the limited amount of consistent data available for the MOUs, all the graphs below use information collected from the Paris MOU.

*Graph 9A* indicates the number of flags banned from the Paris MOU between January 2011 and April 2012. Of the vessels banned, 14 were for multiple detentions, 3 failed to call the indicated repair yard and 2 jumped detention.

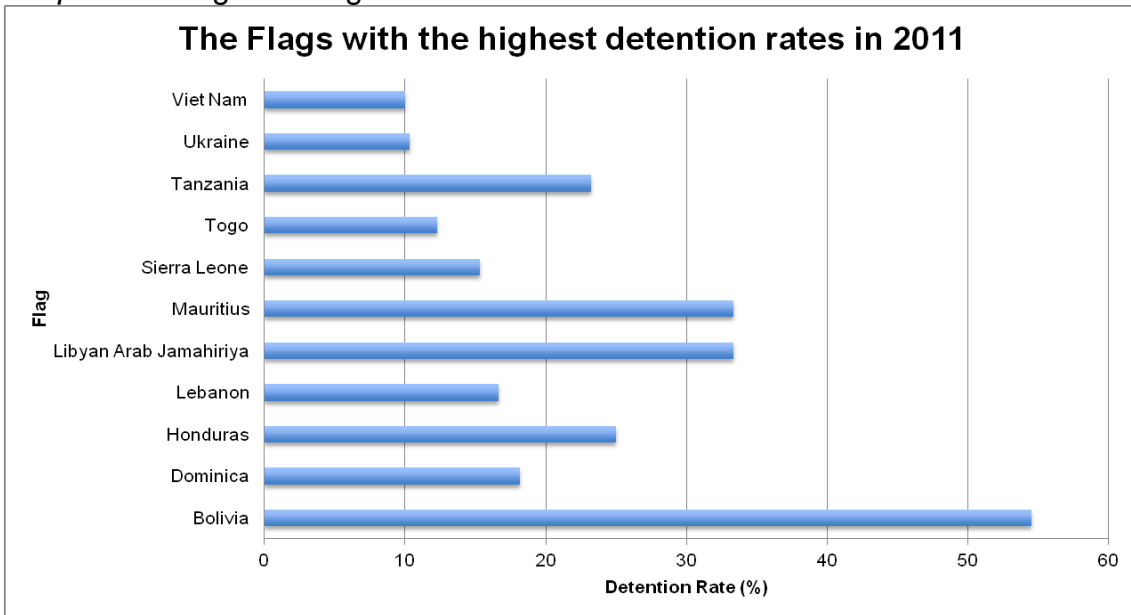
*Graph 9A:* Number of vessels banned from the Paris MOU, Jan 2011 to April 2012



Source: Original

*Graph 9B* below shows the flags which had over a 10% detention rate compared with the number of vessels inspected from the Paris MOU region. In 2011 the age of the vessels was recorded so the detention rate has been compared with this (*Graph 9C*), however for the other years identified this was not possible. As *Graphs 9B, D, and E* show over this three year period, the following flags appear year on year as having a detention rate greater than 10%: Albania, Libyan Arab Jamahiriya and Sierra Leone.

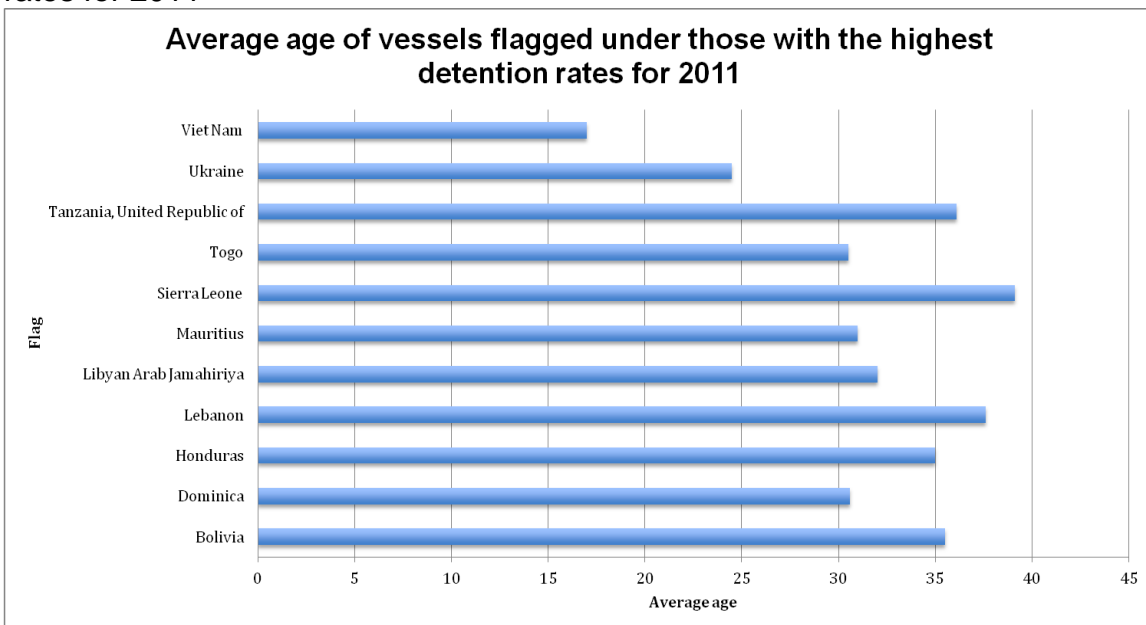
**Graph 9B: Flags with highest detention rates 2011**



Source: Original

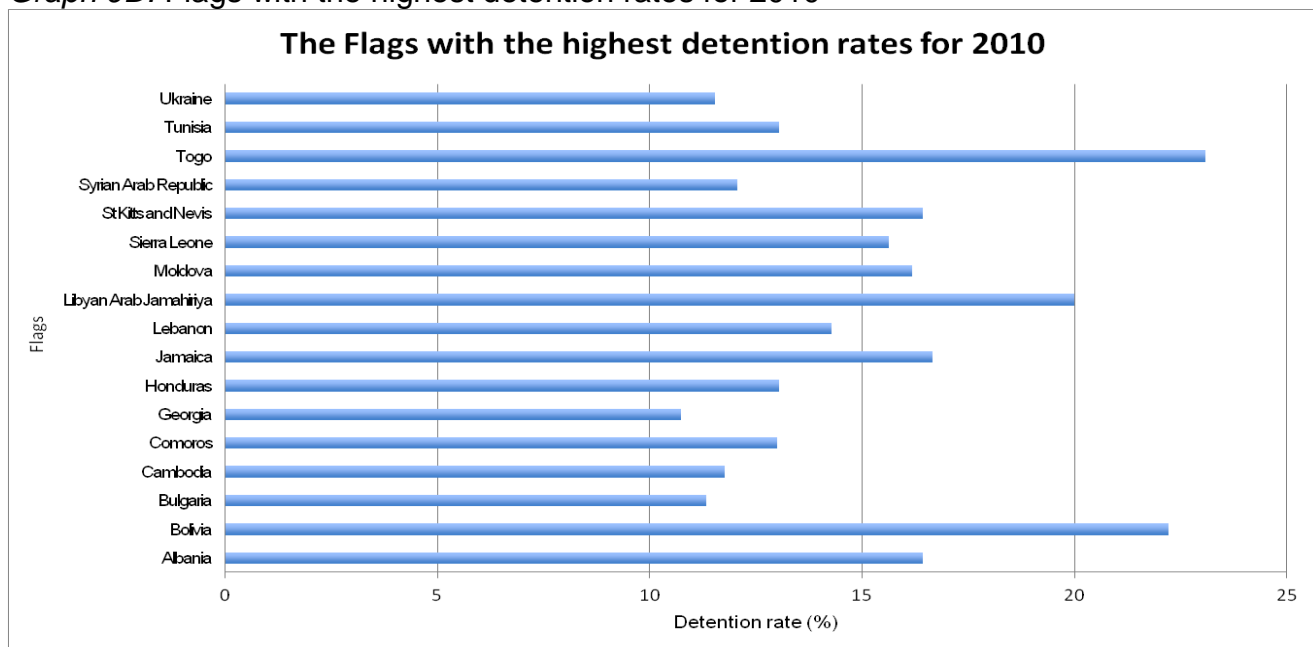
Graph 9B therefore shows, for example, that 54% of vessels flagged in Bolivia were detained by the Paris MOU in 2011, statistically making it the worst performing flag for that year.

**Graph 9C: Average age of vessels flagged under those with the highest detention rates for 2011**



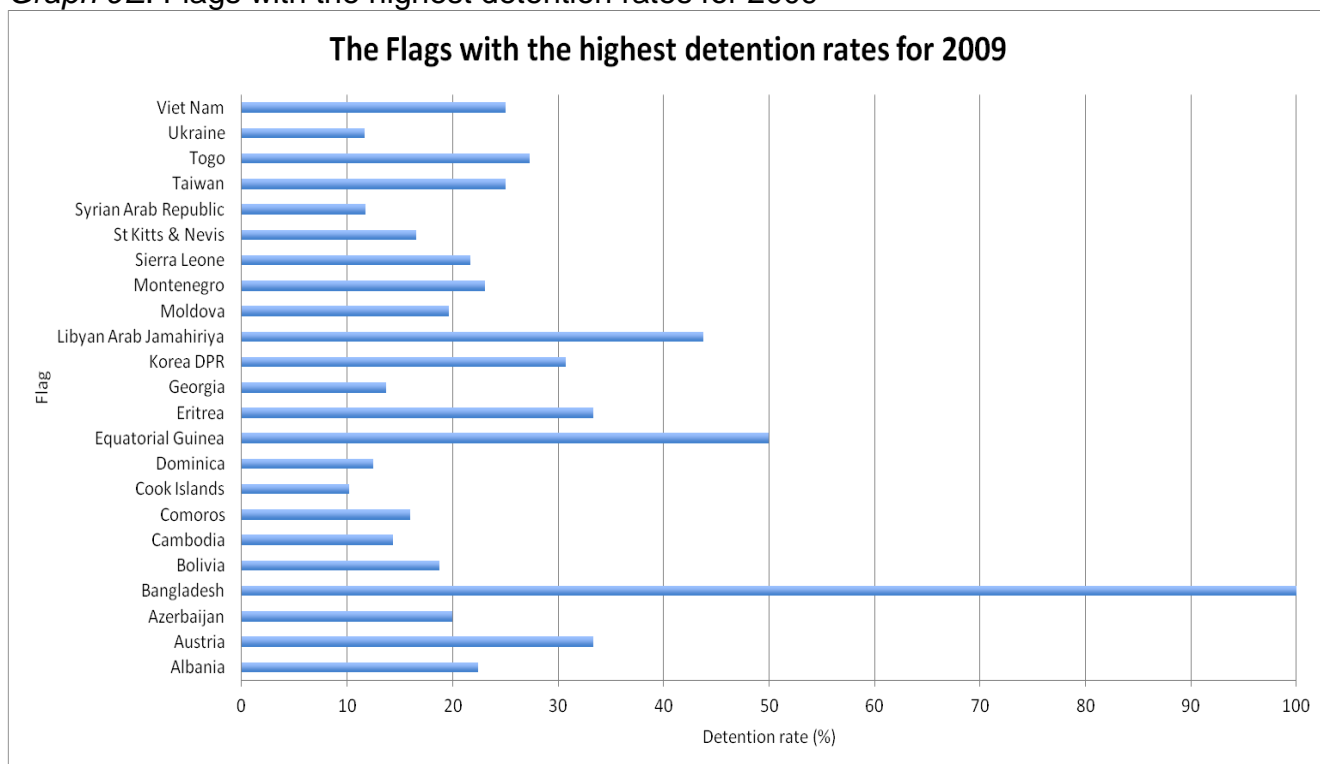
Source: Original

Graph 9D: Flags with the highest detention rates for 2010



Source: Original

Graph 9E: Flags with the highest detention rates for 2009

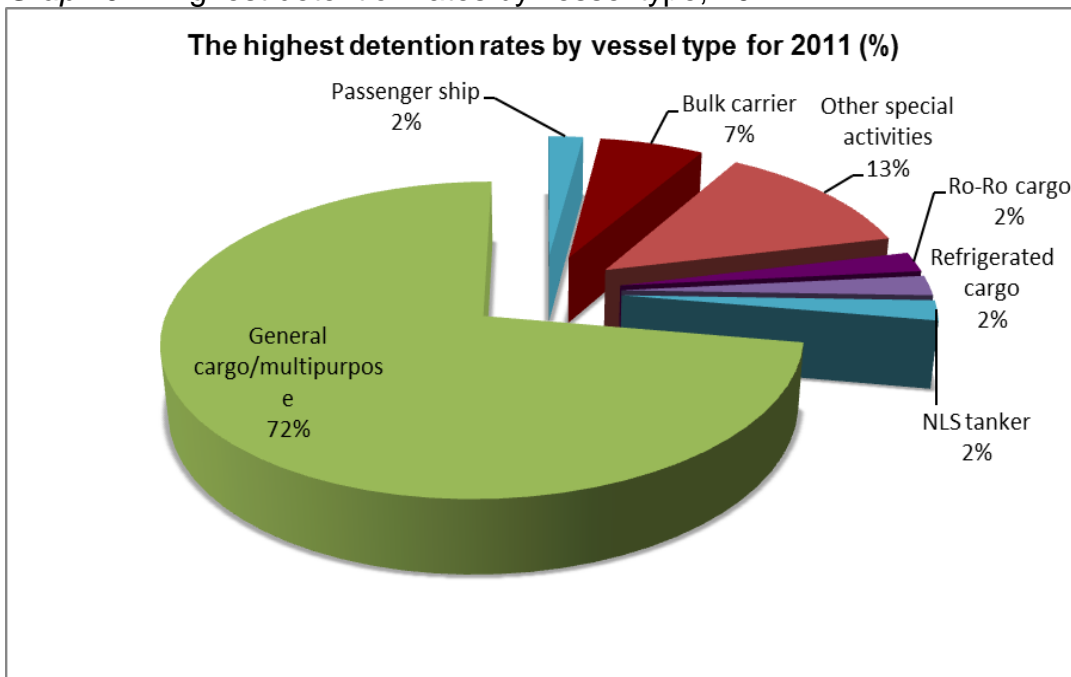


Source: Original

From the data available 2009 – 2011, the type of vessel detained can be noted per flag, with the most commonly detained vessels being general cargo vessels. Additionally these usually involve older vessels (as seen in *Graph 9C*) and are therefore more likely to have greater numbers of deficiencies leading to higher detention rates. This is demonstrated in the graphs below *9F*, *G* and *H*.

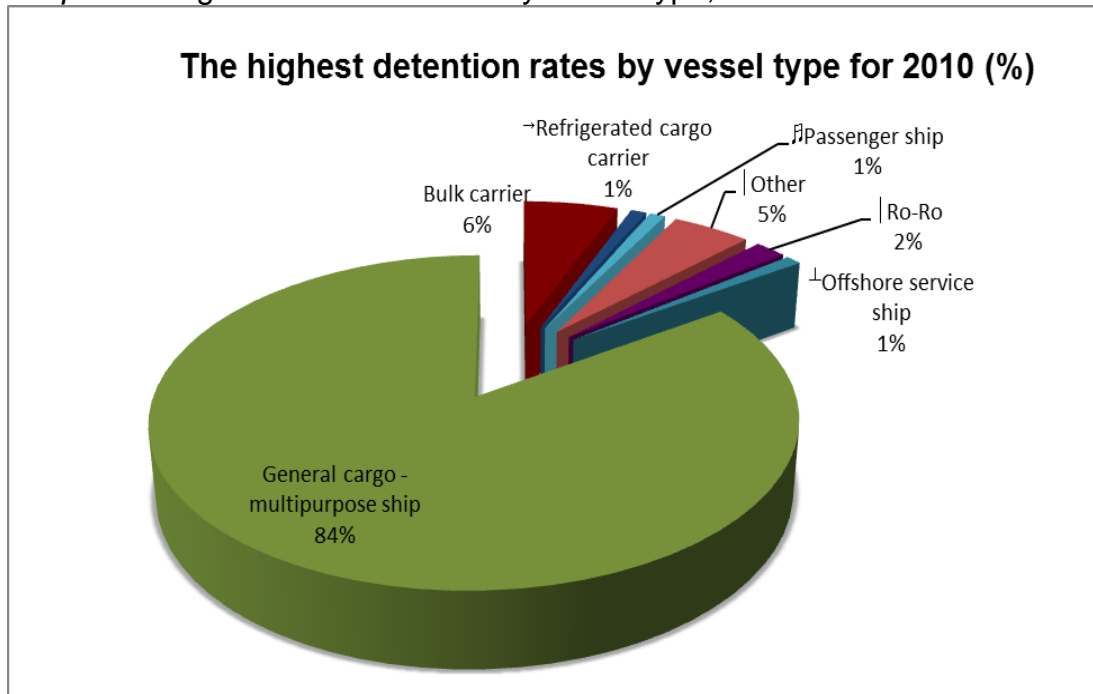
General cargo/ multi-purpose vessel type refers to ships with more than one function, for example one that carries oil and containers (*Graph 9F*). The vessel type known as ‘special activities’ is likely to relate to ships such as fishery vessels or tugs, although this is unclear.

*Graph 9F*: Highest detention rates by vessel type, 2011



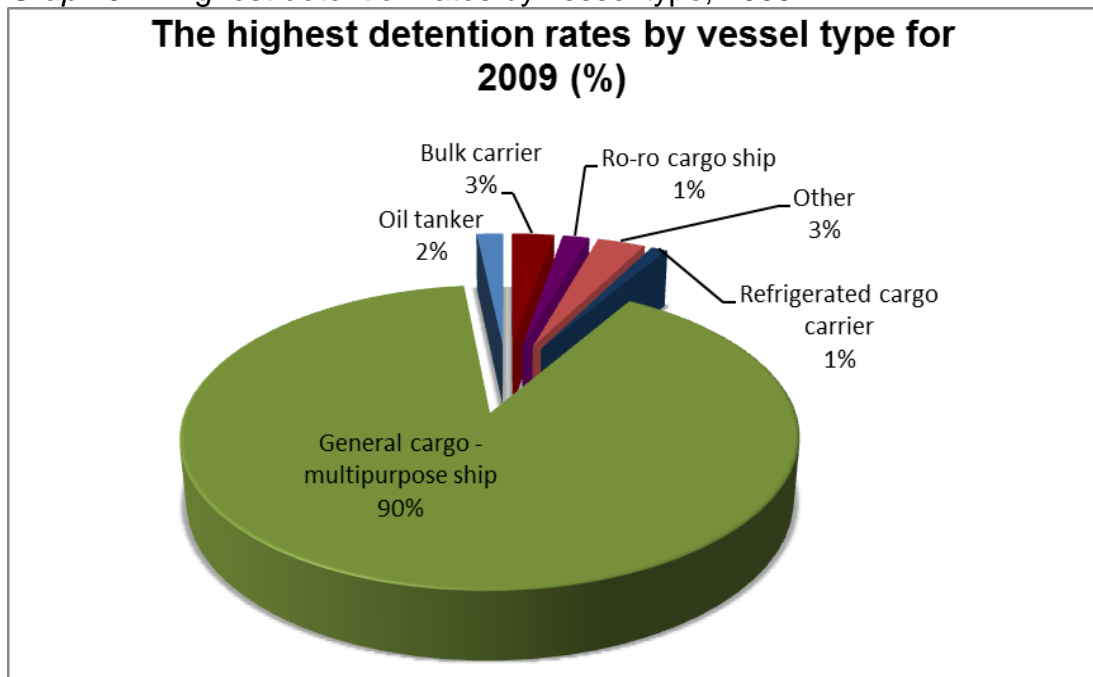
Source: Original

Graph 9G: Highest detention rates by vessel type, 2010



Source: Original

Graph 9H: Highest detention rates by vessel type, 2009



Source: Original

## 2.0 Discussion and key messages from the data

This section presents a discussion based on the key messages from the data findings and looks at them in relation to the relevant legal instruments and the current debate in this field.

### 3.1 Key messages

The shipping industry is inherently global and performs around the clock in many different time zones. The world fleet is steadily growing and operates in an increasingly intense, economically driven environment where cost savings are a fundamental part of business. These and other data findings presented in this report show a complex picture of factors that are strongly linked to shipping accidents.

Despite the historical data which demonstrates overall improvements in the number of shipping accidents, there is still a need to make progress with tackling the associated underlying causes and to reduce incidences further. This is particularly pertinent during a time of economic downturn when there might be a temptation for owners and operators to cut corners but also as the global fleet size is predicted to increase significantly over a number of decades. This implies there will be more ships operating in high risk areas such as those identified on the 'Top Ten Incident Zones' map (*Figure 3*) and in areas where potential new shipping routes may be established, such as the Arctic, and resource rich areas such as the West coast of Canada. It is important that proactive consideration of these potential high risk areas is taken to avert the risk of shipping accidents in the future in these highly sensitive and bio-diverse areas.

This report shows that there is the greatest probability of a shipping accident occurring when all of the following factors act together.

- Key hotspot locations (S.E. Asia (particularly the Coral Triangle area), the E. Med/ Black Sea, N,Sea/ British Isles)
- Age of Vessels (over 10 years)
- A minority of poorly performing flag States
- Vessel type (General Cargo 42%/ fisheries 24%)

Some flag States are still not behaving responsibly. This can be evidenced by certain flags experiencing higher than normal incidences (*Graph 8*) and registering older vessels. Examples in the report include St. Kitts and Nevis and Moldova, among others. However, this point raises questions. Are these flag States being remiss in their duty of safety at sea or is it because they register older vessels which are statistically involved in a higher number of incidences? (See *Table 1* for the current list of Flags of Convenience, Appendix A for PARIS MOU Black, grey and white list, 2011, and Appendix C for the ICS flag performance list).



General cargo vessels account for 42% of all vessel types lost at sea over the research timeframe (*Graph 6*). These types of vessels are often operating short sea shipping routes, associated with tramp trading, particularly in the South East Asian region which involve many port calls, navigating in congested coastal areas with the risk of hydrographic uncertainties such as submerged reefs and rocks. They often involve older vessels of 10 years and above which can limit their registration to less reputable flags States in order to continue trading. This can establish a cycle of potentially a lowering of standards and cutting safety corners. The South East Asia region, where the majority of these incidences are occurring, is often referred to as the Coral Triangle as it is an area particularly rich in biodiversity and therefore especially vulnerable to the potential of shipping accidents (*Figure 3*).

The report highlights that fishing vessels are also involved in a high number of shipping incidences, amounting to 24% of the total world's fleet for this vessel type. This number could be potentially higher given that accidents involving fishing vessels are often under reported.

Nearly 50% of all global shipping accidents fall into the foundered category, which is strongly linked to location and the type and age of vessels operating there. This is also strongly associated with human factors, particularly related to sleep deprivation and shift work, which can lead to errors of judgment when handling a ship.

There are many other complexities that contribute to safety at sea and shipping accidents, including the following:

Some IACS members will not class sea-going vessels over 20 years old thus effectively pushing older and potentially more vulnerable vessels to poorer standard class societies. The report highlights that there are still a minority of significantly badly performing flags which negatively impact on the reputation of the shipping industry. There is a need for the industry to promote best performance in flags, particularly the ones that have significantly 'cleaned up their act' in the last 15 years or so. Long term this provides more business and improves reputation of a flag.

There is a need to encourage countries to ratify and implement IMO Conventions and regulations as well as international regulations such as UNCLOS (which the US have not yet ratified), the Convention of Biological Diversity (CBD) and others that govern marine environmental protection and behaviour/operations whilst at sea, and monitor shipping performance. It is important that this information is made publicly available so that business decisions can be made in an informed way and operated on a level playing field. The fact that some conventions and regulations have not entered into force for decades or that certain countries have never ratified means a base line has not been established in terms of global regulation. While some countries continue to improve in this regard, others continue to get worse.

There is a need to standardise recorded data, particularly between the MOUs and to use the same metrics for undertaking this. Genuinely global standardised regimes do not yet exist in this context which can cause confusion, misinterpretation of data and potentially poorly performing flags to slip through the net. This becomes more problematic set against a growing world fleet and congested shipping hotspot areas which increase the probability of accidents. Future focus on this area is a key recommendation.

### 3.2 Weaknesses in the existing legal instruments: Should the genuine link concept be tightened?

The issue of nationality of a ship is frequently cited as an area open to misuse, where the concept of a genuine link between the ship and the State to which is flagged can at times be tenuous. The conditions governing genuine link between ship owner and registration were initially laid down in the Convention on the High Seas in the 1950s, and took account of ship ownership and registration models in place at that time. When it was incorporated into the United Nations Convention of the Law of the Sea (UNCLOS III) little was changed, even though discussion had moved on from conditions of registration to that of sub-standard ships in general. UNCLOS III addressed sub-standard shipping by providing more detailed provision with regard to effective jurisdiction for flag States and coastal and port States. The lack of change within UNCLOS III, with regard to genuine link, may reflect the fact that this issue had been taken up by the United Nations Conference on Trade and Development (UNCTAD), which had been looking at registrations of ships since the 1970's. After the ratification of UNCLOS III in 1982, the United Nations Convention on Conditions for Registration of Ships (the Registration Convention) was concluded by UNCTAD; however it had limited success. Furthermore, it is often ignored by the industry in discussions relating to genuine link, where efforts have concentrated on improving effective jurisdiction and control, particularly that of the port State.

It is suggested that the timing may be appropriate to re-visit the issue of who can offer nationality to merchant shipping as this has implications with regard to jurisdiction and control of these ships. This would seek to prevent the very existence of some open registries. Alternatively greater focus could be directed to whether flag States are exercising effective jurisdiction and control over ships that fly their flags. This would accept that any State may operate a ships registry but that they must be more effective in exercising jurisdiction and control over ships and their owners to whom they grant nationality. The International Transport Worker's Federation are clear in their assertions that, *'there should be a "genuine link" between the real owner of the vessel and the flag the vessel flies.'* They state that *'there is no "genuine link" in the case of 'Flags of Convenience' registries* (ITF, 2012).

### 3.2.1 Should effective enforcement by flag States be strengthened?

Those flag States, identified by the various Port State Control Agreements, as consistently being deficient in meeting their obligations in international law to “*effectively exercise its jurisdiction and control in administrative, technical and social matters over ships flying its flag*” should be targeted to ensure they clean up their act. If they are not already members of Port State Control Agreements, for example an MOU, they could be encouraged to participate in their regional agreement and take advantage of the technical support facilitated by the IMO.

The role of the flag State in carrying out investigations has been strengthened by the IMO. A knowledge based approach to the rule making process could use, for instance, casualty and Port State control data. A great deal can be learnt from casualty investigation. A mandatory framework has been developed by the IMO, which provides a clear way of carrying out an investigation. This Code promotes cooperation amongst States carrying out joint investigations leading to greater transparency. By having a standard process for casualty analysis and by making the information available to all States, meaningful insight into the causes of accidents and any lessons learnt from the data can be used to prevent reoccurrences.

The IMO clearly recognize that flag State performance is ultimately down to monitoring the work of the people who act on their behalf,

*‘because they are the ones entering whether a ship has been well surveyed, things which are wrong, that deficiencies have been rectified, that the right people are on board, that everything is in order.’*

They explain that they have seen changes in the way some flag States choose to operate,

*‘Some of those [flag States] have also decided to scale down to ensure the critical number of ships they can manage’.*

### 3.2.2 Enforcement by Port State Control

The success of PSC in identifying and publicising flag States who fail to meet their international obligations should be recognized, and where necessary further encouraged and strengthened. The strength of Port State Control is the coordinated approach taken regionally. Greater cooperation between MOU’s internationally should be encouraged particularly in the areas highlighted as hotspots of sub-standard shipping.

Greater cooperation between flag and port States is an area the IMO is exerting considerable effort to further encourage and support. Cooperation through the IMO FSI sub-committee provides a forum to rectify the causes of deficiencies and improve the safety of vessels. This should be supported.

The use of incentive schemes, such as the United States 'Qualship 21' should also be encouraged because they inspect the level of compliance with international standard. Schemes such as this and the 'lists' operated by some port State control MOU may also have an impact on flag State compliance, it may be considered bad for business if ships flying your flag are "black" listed and targeted for inspection in areas their owners wish to trade.

#### **4.0 Recommendations**

Based on the research findings several recommendations can be made to help strengthen various aspects of shipping safety standards. The recommendations focus on several areas of the shipping industry which contribute towards vessel and seafarer safety and reflect the complexity of finding a one stop solution to decreasing shipping accidents. Whilst the recommendations address the issues raised in the report, they also highlight areas where future research would be instrumental in providing greater knowledge that could potentially instigate long term safety improvements within the shipping industry.

The continual growth of the industry, yearly recorded accidents and the potential for a large scale disasters occurring, reinforces the need for continual support for an integrated, global, legislative response to increase vessel safety standards. This is slowly being achieved through the IMO and highlights the importance of ratification by flag States of its conventions.

Increased enforcement of global legislation through the port and flag States would produce more cohesive and effective results for shipping safety. Whilst this is recognised as an inherently complex area, it is important that focus remains on those ports and flag States that are not complying with international regulations.

Monitoring work conducted by some of the MOUs fails to encompass several key elements of information such as age of vessel and location of incident for example. Despite the IMOs continual efforts in this regard, the data collected is often inconsistent for different years and there appears to be a lack of collaboration across all the MOUs to standardise the approach taken to data collection and monitoring, resulting in a lack of data quality. There needs to be a common base-line which could be achieved by the development of a global standardised framework for data collection and reporting. Investment into research in this area is highly recommended.

Support and encouragement should be given for greater cooperation between the various MOUs, particularly in the geographical hotspots where incidences most occur. This would help to coordinate efforts on detaining sub-standard shipping and help to ensure that deficiencies are rectified as soon as possible

Currently there is a lack of collaborative exchange of data between the port State regimes. Sharing data of shipping accidents and the recommendations made on the strength of them can be a positive outcome of the incident. It is therefore crucial that information is made easily accessible, publically available and at no cost, in order to promote transparency and the sharing of best practice.

This report has shown that vessels over 20 years of age often start a geographical move East (to the Black Sea area and then the Far East) when they are no longer able to register with better known registries. This is particularly the case with general cargo vessels which can be adaptable with their trade and route. The age of the vessel means that maintenance is more important than ever but often works against the ship as it is no longer able to register with a registry holding a good reputation. These registries generally impose more stringent and greater safety standards such as on-board management systems. Keeping a ship with a good registry will help achieve better safety standards overall and therefore this is an important issue that needs to be looked at in collaboration with those registries that could have a positive impact on maritime safety.

Finally, this report has touched on the human elements involved with shipping accidents which include the competency of crews, their employment conditions, and their training; Organisational, national and safety cultures and even human fallibilities like fatigue and situation awareness. This is a vast area and there has been much research surrounding these issues in the past. A future recommendation would be to tie the existing research in this field to this current study.

The recommendations can be summarised by the following points:

- Encourage a more global and cohesive approach towards shipping safety through support for the IMO in its pragmatic approach to encouraging flag States to ratify its conventions.
- Advocacy to improve poorer performing flag State standards through increased enforcement to produce a more effective and joined up approach.
- Standardised data collection and reporting mechanisms across the MOUs.
- Investment in research and design to develop a global frame work for a standardised reporting system to enable commonality of data collection, monitoring and reporting of shipping accidents and detentions at various levels. This would help to achieve common, global metrics with the use of

clear, simple language which could be adapted to various levels of reporting.

- Transparency and availability of data for all with no charges applied for its use.
- Data sharing of best practice and lessons learnt from shipping accidents
- Work with well-known shipping registries to understand the move East that occurs with older vessels. Review the options to keep older vessels in well-known registries so that they can be better maintained particularly at this crucial stage in their life cycle.
- Support the IMO in its encouragement of greater cooperation between MOU's particularly in the areas highlighted as hotspots of sub-standard shipping.
- Consider research of the human elements associated to shipping accidents in relation to the work in this report.

## **5.0 Conclusions**

Shipping is a highly complex, global industry that provides trade networks across the world contributing to economic progress. As shipping delivers 90% of all world trade (IMO, 2011), it follows that this is an industry in growth, and one that is inherently complex. As the report identifies, these issues also apply to all aspects of shipping safety and many criteria have been highlighted in regard to shipping accidents. As technology advances and greater awareness of the attributing factors of shipping accidents are raised, it is essential to insist on better safety standards, both regarding the vessel itself, its crew and operators and on strict enforcement of procedures and regulations designed to minimise accidents.

The recommendations set out in this report provide logical solutions in response to the research findings. In some cases they demonstrate the first steps to a solution and in others they highlight where resources could best be justified.

Although it is logical to consider the global areas where the most incidents occur, the issues raised by this report should also be considered in highly sensitive areas where potential new trade routes may open up, such as the Arctic and Western Canada, particularly in light of climate change predictions and the economic environment where new areas to obtain natural resources are continuously being sought and exploited.

Despite decreases in shipping accidents over the last 15 years relative to the increase in the worlds' fleet, poor flag State performance still has a consistent impact. Black lists kept by the ITF, the ICS and some of the MOUs can influence insurers and class societies against the worst offenders, but these lists themselves are not always looking at the bigger picture. In regard to the number of ships

registered to a flag, those with a high percentage of cumulative losses should be targeted to clean up their act. Ultimately this will be of benefit to the offending flag State itself, both in economic terms and to their reputation, and to the shipping industry in general.

As highlighted in the report, whilst not a compulsory role, port States can make a major contribution to vessel safety standards. As such the onus is on them to help enforce high shipping standards and not turn a blind eye to sub-standards. However economics can make it difficult for some port States to make the right decisions in this regard and the reality maybe counter-productive to shipping safety, particularly in some small island States.

Therefore the findings demonstrate that shipping accidents, whilst still related to poor flag State performance, cannot be reviewed in isolation. Consideration must be given in relation to other significant contributing factors identified in the report and the recommendations made on the strength of them.

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Appendix A  
MOU member countries

<b>MOU/ Agreement</b>	<b>Member countries include:</b>
<i>Acuerdo de Viña del Mar</i> Agreement. (The Latin American Agreement on Port State Control of Vessels)	Argentina, Bolivia, Brazil, Colombia, Chile, Cuba, Ecuador, Honduras, Mexico, Panama, Peru, Uruguay and Venezuela
Abuja MOU (West and Central Africa MoU)	Angola, Benin, Cameroon, Cape Verde, Congo, Cote d' Ivoire, Gabon, Ghana, Guinea, Equatorial Guinea, Liberia, Mauritania, Namibia, Nigeria, Senegal, Sierra Leone, South Africa, São Tomé and Príncipe, Democratic Republic of Congo, Guinea Bissau, The Gambia, and Togo
Black Sea MOU	Bulgaria, Georgia, Romania, Russian Federation, Turkey and Ukraine
Caribbean MOU	Antigua & Barbuda, Belize, Barbados, Dominica, Grenada, Guyana, Jamaica, the Netherlands Antilles, Suriname and Trinidad and Tobago
Indian Ocean MOU	Australia, Bangladesh, Djibouti, Eritrea, France(La Reunion Island), India, Iran, Kenya, Maldives, Mauritius, Mozambique, Myanmar, Oman, Seychelles, South Africa, Sri Lanka, Sudan, Tanzania and Yemen.
Mediterranean MOU	Algeria, Cyprus, Egypt, Israel, Jordan, Lebanon, Malta, Morocco, Tunisia and Turkey.
Paris MOU NIR <sup>2</sup>	Belgium, Bulgaria, Canada, Croatia, Cyprus, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Latvia, Lithuania, Malta, Netherlands, Norway, Poland, Portugal, Romania, Russian Federation, Slovenia, Spain, Sweden, United Kingdom
Riyadh MoU	Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and UAEv
Tokyo MOU	Australia, Canada, Chile, China, Fiji, Hong Kong(China), Indonesia, Japan, Republic of Korea, Malaysia, New Zealand, Papua New Guinea, The Philippines, The Russian Federation, Singapore, Thailand, Vanuatu and Vietnam.

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<sup>2</sup> The Paris MoU New Inspection Regime is a recently-implemented system (effective from 1 January 2011) used to evaluate a vessel's risk profile, and thereby determine the frequency of inspections, (Memorandum of Understanding on Port State Control in the Asia-Pacific Region", as amended 20 November 2008. Available from: [www.tokyo-mou.org](http://www.tokyo-mou.org)).

## Appendix B: The Paris MOU Black, Grey and White List

Valid 1st July 2011

<b>Black, Grey and White lists Flag</b>	Inspections 2008-2010	Detentions 2008-2010	Black to Grey Limit	Grey to white limit	Excess factor
<b>Black List 2008 - 2010</b>					
Korea, Democratic People's Rep.	45	17	6	Very High Risk High Risk	7.31
Libyan Arab Jamahiriya	47	14	7		5.09
Togo	150	37	16		5.02
Sierra Leone	570	114	50		4.44
Montenegro	34	10	5		4.43
Albania	222	44	22	High risk	3.86
Moldova, Republic of	461	77	42		3.31
Cambodia	863	135	73		3.22
St Kitts and Nevis	488	76	44		2.99
Comoros	644	98	56		Medium Risk to High Risk
Georgia	776	106	67	2.57	
Bolivia	40	8	6	2.24	
Lebanon	72	12	9	2.04	
Syrian Arab Republic	246	33	24	2.02	
Tanzania United Rep.	65	10	8	Medium risk	1.62
Ukraine	471	50	43		1.47
St Vincent and the Grenadines	1,957	168	156		1.19
Azerbaijan	69	9	9		1.07

<b>Valid 1st July 2011 Flag</b>	Inspections 2008-2010	Detentions 2008-2010	Black to Grey Limit	Grey to White Limit	Excess Factor
<b>Grey list 2008-2010</b>					
Egypt	112	12	13	3	0.92
Cook Islands	150	15	16	5	0.90
Viet Nam	37	5	6	0	0.89
Dominica	167	16	18	6	0.86
Algeria	98	10	12	2	0.84
Slovakia	234	21	23	9	0.83
Honduras	65	7	8	1	0.82
Tunisia	57	6	8	0	0.77
Jamaica	48	5	7	0	0.74
Mongolia	43	4	6	0	0.65
Tuvalu	36	3	6	0	0.58
Morocco	153	11	16	5	0.53
Saudi Arabia	62	3	8	1	0.32
Bulgaria	230	13	23	9	0.27
Belize	660	40	57	35	0.23
Curacao	599	35	53	31	0.18
Malaysia	74	2	9	1	0.11
Switzerland	94	3	11	2	0.11
Faroe Islands	157	6	17	5	0.07
Vanuatu	177	7	18	6	0.06
Latvia	144	5	16	5	0.04
Iran, Islamic Republic of	146	5	16	5	0.03
Thailand	128	4	14	4	0.03
United States of America	128	4	14	4	0.03

<b>Valid 1st July 2011 Flag</b>	Inspections 2008-2010	Detentions 2008-2010	Black to Grey Limit	Grey to White Limit	Excess Factor
<b>White list 2008-2010</b>					
Kazakhstan	30	0	5	0	0.00
Qatar	30	0	5	0	0.00
Philippines	231	8	23	9	-0.24
Panama	8,385	476	626	548	-0.30
Korea, Republic of	201	6	21	8	-0.35
India	138	3	15	4	-0.41
Japan	89	1	11	2	-0.44
Turkey	2,294	108	181	140	-0.50
Lithuania	227	6	23	9	-0.57
Spain	278	8	27	12	-0.59
Russian Federation	1,965	80	157	118	-0.70
Barbados	527	15	47	27	-0.87
Cayman Islands, UK	286	6	28	12	-0.93

Antigua and Barbuda	5,235	195	397	336	-0.94
Luxembourg	196	3	20	7	-0.96
Malta	5,569	200	422	358	-0.99
Poland	202	3	21	8	-1.00
Portugal	542	13	48	28	-1.05
Croatia	178	2	19	6	-1.10
Liberia	4,461	132	341	284	-1.20
Cyprus	2,694	76	211	166	-1.20
Estonia	104	0	12	2	-1.25
Gibraltar, UK	1,301	29	107	75	-1.33
Belgium	231	2	23	9	-1.41
Norway	2,323	51	183	142	-1.42
Marshall Islands	2,260	49	179	138	-1.42
Ireland	182	1	19	7	-1.43
Bahamas	3,628	75	280	228	-1.51
Singapore	1,375	24	112	80	-1.52
Hong Kong, China	1,422	22	116	83	-1.61
Greece	1,475	22	120	87	-1.63
Italy	1,487	22	121	87	-1.64
Man, Isle of, UK	883	11	75	49	-1.65
China	250	1	25	10	-1.68
Finland	624	6	55	33	-1.71
Denmark	1,385	17	113	81	-1.73
France	355	2	33	16	-1.73
Netherlands	3,860	54	297	244	-1.75
United Kingdom	2,007	25	160	121	-1.76
Sweden	984	9	83	55	-1.80
Germany	1,388	14	113	81	-1.81
Bermuda, UK	270	0	26	12	-1.91

## Appendix C: ICS Flag State Performance List

BLANK SPACES SUGGEST POSITIVE PERFORMANCE INDICATORS	PORT STATE CONTROL						RATIFICATION OF CONVENTIONS						A739	AGE	REPORTS	IMO		
	PARIS MOU WHITE LIST	PARIS MOU BLACK LIST	TOKYO MOU WHITE LIST	TOKYO MOU BLACK LIST	USCG QUALSHIP 21	USCG TARGET LIST (SAFETY)	SOLAS 74 (AND 88 PROTOCOL)	MARPOL INCLUDING ANNEXES I - II	MARPOL ANNEXES III - VI	LL 66 (AND 88 PROTOCOL)	STCW 78	ILO 147/MLC	CLC/FUND 92	RECOGNIZED ORGANIZATIONS	LOW AGE (SHIP NUMBERS)	STCW 95 'WHITE LIST'	COMPLETED FULL ILO REPORTS	IMO MEETINGS ATTENDANCE
ALBANIA	•	•	•		•		•		•					N/S	•	•		•
ALGERIA	•		•		•				•									
ANTIGUA & BARBUDA					•	•												
ARGENTINA	•		•		•				•			•		N/S	•			
AUSTRALIA	•		•		•													
BAHAMAS					•				•									
BAHRAIN	•		•		•		•		•			•		N/S				•
BANGLADESH	•		•	•	•							•	•		•			•
BARBADOS			•		•													•
BELGIUM			•		•	•												
BELIZE	•		•	•	•	•								•				
BERMUDA *					•													
BOLIVIA	•	•	•		•	•	•		•	•		•	•		•	•		•
BRAZIL	•		•		•					•			•					
BULGARIA	•		•		•										•			
CAMBODIA	•	•	•	•	•				•			•		•				•
CANADA	•		•												•			
CAYMAN ISLANDS *																		
CHILE	•		•		•							•	•					
CHINA					•							•	•					
COLOMBIA	•		•		•		•		•	•		•	•					•
COSTA RICA	•		•		•		•	•	•	•		•	•	N/S	•	•		•
COTE D'IVOIRE	•		•		•		•		•			•	•	N/S	•			•
CROATIA			•		•	•												•
CUBA	•		•						•			•	•					
CYPRUS					•													
DEM. PEOPLE'S REP. KOREA	•	•	•	•	•				•			•	•					
DEM. REP. OF THE CONGO	•		•		•		•	•	•	•		•	•	N/S	•	•	•	•
DENMARK																		
DOMINICA	•		•		•	•			•									•
EGYPT	•		•		•				•				•					
ESTONIA			•		•													
FAROE ISLANDS	•		•		•				•			•		N/S				•
FINLAND			•		•										•			
FRANCE																		
GEORGIA	•	•	•	•	•				•	•		•		•	•			•
GERMANY																		
GHANA	•		•		•		•		•					N/S	•			
GIBRALTAR *			•		•	•												
GREECE																		
HONDURAS	•		•		•	•			•			•	•	•	•			•
HONG KONG (CHINA)												•						
ICELAND	•		•		•				•					N/S	•			•
INDIA			•		•	•			•									
INDONESIA	•		•	•	•		•		•	•		•	•					
IRAN	•		•		•							•						
IRELAND			•		•													•
ISLE OF MAN *																		
ISRAEL	•		•		•	•			•	•								•
ITALY			•		•	•												
JAMAICA	•		•		•							•						
JAPAN																		
JORDAN	•		•		•				•			•						•
KENYA	•		•		•		•		•			•		N/S				•

N/S – No data submitted to IMO - can be regarded as negative indicator

\* – UK dependent territories - entries for ratification of conventions, STCW 'white list' and IMO meetings attendance as UK

BLANK SPACES  
SUGGEST POSITIVE  
PERFORMANCE  
INDICATORS

	PORT STATE CONTROL						RATIFICATION OF CONVENTIONS						A739	AGE	REPORTS		IMO	
	PARIS MOU WHITE LIST	PARIS MOU BLACK LIST	TOKYO MOU WHITE LIST	TOKYO MOU BLACK LIST	USCG QUALSHIP 21	USCG TARGET LIST (SAFETY)	SOLAS 74 (AND 88 PROTOCOL)	MARPOL INCLUDING ANNEXES I - II	MARPOL ANNEXES III - VI	LL 66 (AND 88 PROTOCOL)	STCW 78	ILO 147/MLC	CLC/FUND 92	RECOGNIZED ORGANIZATIONS	LOW AGE (SHIP NUMBERS)	STCW 95 'WHITE LIST'	COMPLETED FULL ILO REPORTS	IMO MEETINGS ATTENDANCE
KUWAIT	•				•		•				•	•						•
LATVIA	•		•		•										•			
LEBANON	•	•	•		•		•	•							•			•
LIBERIA																		
LIBYAN ARAB JAMAHIRIYA	•	•	•		•			•				•	•					
LITHUANIA			•		•	•												•
LUXEMBOURG			•		•													
MALAYSIA	•		•		•		•					•						
MALTA			•		•	•												
MARSHALL ISLANDS																		
MAURITIUS	•		•		•			•				•						•
MEXICO	•		•		•	•		•				•						
MONGOLIA	•		•	•	•						•	•	•		•			•
MOROCCO	•		•		•		•		•			•						
MYANMAR	•		•		•		•	•	•			•	•	N/S	•			•
NETHERLANDS					•													
NEW ZEALAND	•		•		•			•				•						
NIGERIA	•		•		•		•	•	•			•			•			
NORWAY																		
PAKISTAN	•		•		•			•				•	•					•
PANAMA					•								•					
PAPUA NEW GUINEA	•		•	•	•		•		•			•						•
PHILIPPINES					•			•	•			•			•			
POLAND			•		•										•			
PORTUGAL			•		•										•			
REPUBLIC OF KOREA					•							•						
ROMANIA	•		•		•							•						
RUSSIAN FEDERATION																		
ST. KITTS & NEVIS	•	•	•	•	•	•						•			•	•		•
ST. VINCENT & GRENADINES	•	•	•		•	•												
SAO TOME & PRINCIPE	•		•		•		•	•	•			•	•	N/S	•	•		•
SAUDI ARABIA	•		•		•		•		•			•	•					
SIERRA LEONE	•	•	•	•	•	•						•		•	•	•		•
SINGAPORE					•													
SOUTH AFRICA	•		•		•		•	•	•			•						
SPAIN			•		•													
SRI LANKA	•		•		•		•	•	•			•						•
SWEDEN															•			
SWITZERLAND	•		•				•	•	•			•						
SYRIAN ARAB REPUBLIC	•	•	•		•			•	•			•						
THAILAND	•		•	•			•	•	•			•						
TONGA	•		•		•			•	•			•		N/S	•			•
TRINIDAD & TOBAGO	•		•		•		•	•	•									•
TUNISIA	•		•		•			•	•			•						•
TURKEY			•	•	•	•		•	•			•						
TUVALU	•		•	•	•							•						
UKRAINE	•	•	•		•				•			•			•			
UNITED KINGDOM																		
UNITED STATES OF AMERICA	•				N/A	N/A		•				•						
URUGUAY	•		•		•			•	•			•		N/S	•			•
VANUATU	•											•						
VENEZUELA	•		•		•	•		•				•			•			
VIET NAM	•		•	•	•			•				•						•

N/S - No data submitted to IMO - can be regarded as negative indicator  
N/A - Data not applicable - US not eligible for Qualship 21 or USCG target listing