

The background is a dark blue gradient with abstract, glowing particle trails in shades of yellow, green, and blue. These trails form a large, stylized letter 'L' on the left side of the page. The overall aesthetic is futuristic and technological.

THE FUTURE OF MARITIME SAFETY REPORT 2023

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FOREWORD

STAYING STEADFAST ON SAFETY AMIDST TRANSFORMATION



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As shipping stands on the precipice of great digital and green transformation it has an

opportunity, and responsibility, to proactively understand and address safety concerns when introducing new fuels and technology onboard. As data in this report shows, all too often we see the same safety incidents repeated time and again, year after year. While the rapid changes ahead pose challenges, it also affords us a great opportunity: let's not simply try to maintain our current levels of safety, but improve them.

The IMO's theme for World Maritime 2024 underscores this need and lays out an imperative for the shipping industry: "Navigating the Future: Safety first". An essential tool to achieve this is by analysing and learning from the trends revealed in the oceans of data we all have access to. It is the core driver for this report. We can and should utilise safety data to reflect on known risks, and improve practices to avoid

similar pitfalls going forward, from greater protections and training for lithium-ion battery fire risks, to ensuring new technology on board is designed with the seafarer in mind.

It can be all too easy to become safety-complacent when there are so many other pressing operational decisions to make. Especially when you consider that vessel losses for vessels over 100 gross tonnage (GT) are at the lowest level recorded in years, falling by 65% in the last decade. However, despite this eye-catchingly positive trend, the number of marine casualties and incidents reported each year remains stubbornly consistent. The number of distress signals registered over Inmarsat RescueNET services has also remained steady, averaging 810 per year over a four-year period.

The maritime domain is a hazardous environment and shipping operations will always carry a degree of residual risk. But are we, as an industry, doing enough to protect the lives of our seafarers and the vessels they operate, often for months on end, away from loved ones and the everyday conveniences many of us take for granted? I believe more can be done and the bedrock is exploiting the sea of data at our fingertips.



As someone with 30+ years of experience in collating maritime data, I know there is a goldmine of information sitting in servers around the world. As an industry, we are reaping the benefits of digitalisation. It is an incredible enabler that, when applied judiciously, can improve operations and strengthen the bottom line. But we are not sharing and harnessing data at an industry level. I fear that one reason for this is that many have simply become inured to marine casualties and incidents, and have developed a tolerance to repeatable but preventable errors that ultimately cost or irrevocably change lives.

This status quo is unacceptable, and we need to radically change the way we utilise data to optimise safety. We must work collectively to identify how best to gather, analyse, classify, anonymise, and share safety-related data between shipping companies and insurers, classification societies, Flag States and international bodies.

As well as operating in information silos, we have, as an industry, perhaps also been guilty of using data to look backwards, focusing on trend analysis but without the will to extrapolate the findings into quantifiable lessons, which can then be addressed, through new technology, practices, and mindsets, to become lessons learned. We must use data proactively to analyse the root cause of marine casualties and incidents, be they technical, climatic, or human element-based, so we can better predict and manage risk.

Often the default outcome of a marine accident investigation is to assert the need for more or better training. Of course, frequently this is a contributing factor, but training is expensive,

time-consuming and regularly has to be squeezed into already busy routines. It also points the finger of blame at our seafarers, placing too much onus on human error. Such an approach does little to prevent similar events from reoccurring time after time, as it fails to address underlying safety-culture failings.

Central to shipping's transition towards greener operations was the international agreement to set ambitious greenhouse gas emissions targets. Perhaps it's time for the industry to adopt equivalent maritime safety targets to galvanise stakeholders and expedite cultural change. There are some excellent examples of best practices at company and even national level, but there needs to be a better mechanism to share them.

We have the data but need to find ways to harmonise its collation and employment to tackle safety deficiencies head-on. Let's change the narrative from a culture of commercial and personal secrecy, out of fear of competition and punitive measures, to one of transparency and acceptance of safety-related change. In this way, we can better protect seafarers, vessels and the environment, and ensure that safety keeps pace with the other aspects of a sustainable just transition which are steering shipping towards a new dawn.

This report brings together statistics, industry insights, personal opinions of maritime professionals and extensive research. I would like to extend my sincere thanks to all those who contributed to its production, including the data analysts, roundtable participants, commentators, and authors. I hope you enjoy reading the Future of Maritime Safety Report 2023.



EXECUTIVE SUMMARY

Headline 2022 statistics at a glance:

- **853 GMDSS distress calls registered on Inmarsat networks, up from 794 in 2021**
- **Tankers (0.95%), container ships (0.82%) and bulk carriers (0.74%) sent the most GMDSS distress calls (by rate)**
- **Passenger (0.12%) and other merchant vessels (0.14%) sent the fewest GMDSS distress calls (by rate)**
- **12-year-old vessels (all types) responsible for sending the most GMDSS distress calls**

The Future of Safety Report 2023 has been compiled by analysing GMDSS distress data received by Inmarsat Maritime in 2022, and comparing it to equivalent 2021 datasets, to identify annual variations. The output of three thematic roundtable meetings, which considered technology, regulation and the human element respectively, has added insight, opinion and nuance to the raw data.

A downward trend in total vessel losses is cause for optimism and is testament to the work being done at international, regional, national and company levels. However, this is not the full picture of safety in shipping. Inmarsat GMDSS distress call data shows that consistently high levels of safety incidents continue to occur year-on-year.

There has not been an expected dip in distress calls following the end of the COVID-19 pandemic, with figures rising further in 2022. This suggests a possible ripple out effect, with the impact on crew training and wellbeing, and vessel operation, inspections and maintenance not back to pre-pandemic levels.

It could also indicate less focus and investment on safety as the shipping industry traverses the economic and operational impact created by ratcheting geopolitical tensions globally, including the outbreak of high-intensity conflict in Europe and the continued volatility of global energy markets and the supply chain.

The same type of accidents and incidents are reported year on year. Machinery breakdown and failure, collision, fire and explosion, grounding, mis-declared cargo, cargo shift and liquefaction etc, are consistently at the top of the list, but lessons identified through lengthy accident investigations often point to human error and seldom appear to be learnt. Further, emphasis on human error can overlook fundamental flaws in safety culture. This points to systemic failure to implement mechanisms and solutions to manage known risks.

The continued high incidence of distress calls from fishing vessels and mega-ships of all types, the human cost associated with the loss of over-laden passenger ferries, the fire risk posed by lithium-ion batteries alongside the proliferation of misdeclared cargo, and an ageing fleet of Floating Production Storage and Offloading (FPSO) vessels, all demonstrate the need for concerted action.

Too often safety initiatives are conceived, delivered and reviewed in silos, which has resulted in a proliferation of divergent safety policies, strategies and practices. Effective policy development and implementation is based on understanding the nature of the task, establishing a baseline of facts and key assumptions, and developing a clear, unifying aim that all subsequent decisions are geared towards achieving. However, at present, the shipping industry lacks common datasets which means it has proven difficult to establish the ground truth.

Reluctance to share data for fear of losing competitive advantage also remains endemic in the shipping industry, and has led to the haphazard collection, analysis and utilisation of information that otherwise could be used to drive the safety agenda forwards.

Through access to unparalleled amounts of data, shipping has the capability to understand the root causes of marine casualties and incidents, and the opportunity to subsequently address them. However, it must find the collective will to do so. Operations at sea throw up a unique set of challenges and the task facing the industry is how to better manage risk; a logical place to start is to reduce the frequency of preventable safety incidents.

Cooperation and collaboration, built on solid data and the collective desire to manage risk to the lowest practicable level, can improve maritime safety standards and reduce the human, environmental and financial costs of marine casualties.

KEY TAKEAWAYS

- Declines in total losses do not provide a full safety picture for shipping: GMDSS distress signals remain consistently high at 810 per year (over a four-year average).
- Current risk levels need not be accepted. Safety data and reports can be used to proactively tackle the root causes of repeated and well-known safety issues to reduce incidence rates, rather than just to monitor trends and improve incident response.
- Maritime safety can improve if current haphazard data collection is formalised.
- Anonymising incident and casualty data can overcome prevailing unwillingness to share data, due to commercial sensitivities. This will lead to more accurate trend analysis and the development of proactive interventions such as targeted policies and guidelines.
- Consensus is required on a list of standard data points shipping wishes to monitor including, maritime casualties and incidents, injuries or deaths at sea, and near misses.
- The nexus between regulation, human element and technology needs to be front and centre to proactively address safety challenges as shipping transitions to alternative fuels, adopts decarbonisation technologies, and continues to digitalise.
- Seafarer wellbeing is a core component of safety and must remain high on the post-pandemic agenda and as shipping faces its green transition.
- Shipping should more broadly adopt a risk management approach to achieve goal-based safety standards to better accommodate rapid technological and operational transformation.

INTRODUCTION

Shipping has been impacted by recent major black swan events, including a global pandemic and the outbreak of high-intensity conflict in Europe. It has also had to contend with ratcheting geopolitical tensions and continuing global energy and supply chain disruption, yet, despite these challenges, total vessel losses across the industry have continued to fall.

The Allianz Global Corporate and Speciality (AGCS) Safety and Shipping Review 2023¹ reports that losses have fallen from 200+ vessels per year in the 1990s to 38 in 2022 (54 in 2021). In the past decade alone, losses have fallen by 65% for vessels over 100 gross tonnage (GT) and this macro-trend suggests the industry's focus on regulation, ship design and technology, and gradual adoption of risk management practices are coalescing to advance the cause of maritime safety.

That said, an increase in Global Maritime Distress and Safety System (GMDSS) incident data collated by Inmarsat Maritime, from 794 in 2021 to 853 in 2022 reveals a different narrative, where safety incidents are steadily on the rise, despite vessel losses decreasing year on year. This was echoed by Lloyd's List Intelligence, which estimated that casualty reports totalled 700 in the third quarter of 2022, the highest number of incidents per quarter since 2008. The AGCS report also noted that ship casualties increased slightly in 2022 to 3,032, with recurring issues such as machinery damage (accounting for almost half of the incidents,

up from a third in 2021), vessel collision, fire and explosion, and wrecked/stranded (grounded) as the major causes. Such safety issues are well-known in the maritime industry and require a proactive approach if they are to be effectively tackled.

While COVID-19 risk has markedly reduced and the world is once again open for business, its ramifications are still being felt across shipping. The restricted access to seafarer training during the height of the pandemic may have contributed to the current shortage of trained personnel. It also affected the ability of Flag States to carry out thorough due diligence of seafarers intending to renew their Certificates of Competency, which may have resulted in some continuing to apply outdated practices on board.

Perhaps of equal concern, the curtailment of Port State Control inspections appears to have affected vessel safety and seafarer employment practices, as deficiencies that would ordinarily have been identified - and rectified - were not, and this may have contributed to the increase in detention rates, and marine casualties and incidents, seen during 2022. To compound this, many vessels missed scheduled maintenance slots due to drydock closures and are continuing to trade whilst backlogs are cleared or while the price of raw materials remain high, and owners and operators are relying on crew to resolve issues as they arise.

The long-term impact of the pandemic on seafarer welfare, in particular mental health and morale, are yet unknown but could

continue to be detrimental to safety in the years ahead. Resuming crew changes has helped reduce the insidious impact of fatigue, but other issues continue to affect ship safety and the ability of seafarers to carry out their duties. The demand for rapid turnaround in ports, the sheer size of modern vessels, and the ongoing challenge of minimal crewing arrangements are notable examples.

Given the technological and green transformations on the horizon, and the requirement to retrain seafarers on complex new systems and procedures, there is a pressing need to maintain a happy, healthy and resilient workforce. This is also of the utmost importance if shipping is to reverse the increasing age profile of seafarers and overcome its recruitment and retention challenges (exacerbated by the conflict in Ukraine, as together Ukraine and Russia supply 14.5% of the world's seafarers).

In this third edition of the Future of Maritime Safety report, analysis of Inmarsat RescueNET and network of SafetyNET GMDSS services data provides insights into maritime industry safety trends. Focusing on data gathered in 2022 and 2021, the report also offers some broader comparisons with trends found in previous editions. Industry experts also share their views on potential underlying causes of these data-led trends and what it means for maritime safety. Understanding patterns can help us to take proactive steps to prevent, and perhaps even predict, such incidents going forward and help guide the maritime industry to a safer future.

¹ [Safety and Shipping Review 2023 \(allianz.com\)](https://allianz.com/safety-and-shipping-review-2023)

DISTRESS CALLS BY VESSEL SECTOR AND TYPE

For the purpose of this report, Inmarsat research categorised vessels into 15 types across three broad sectors²:

VESSEL SECTOR	MERCHANT	OFFSHORE AND HIGH-END FISHING	LARGE YACHT AND PASSENGER
VESSEL TYPE	Tanker Bulk Carrier Container Gas Carrier Other Dry Cargo Other Merchant Other Non-Cargo Pure Car Carrier Reefer	Offshore Rig and platform Fishing	Passenger Ro-Ro Yacht

TABLE 1: Vessel sectors and types categories defined in the 2022 dataset³

Note: 28.6% of the 853 GMDSS distress signals in 2022, and 32% of the 794 recorded in 2021, were missing data about vessel sectors and types - these calls were excluded from the analysis.

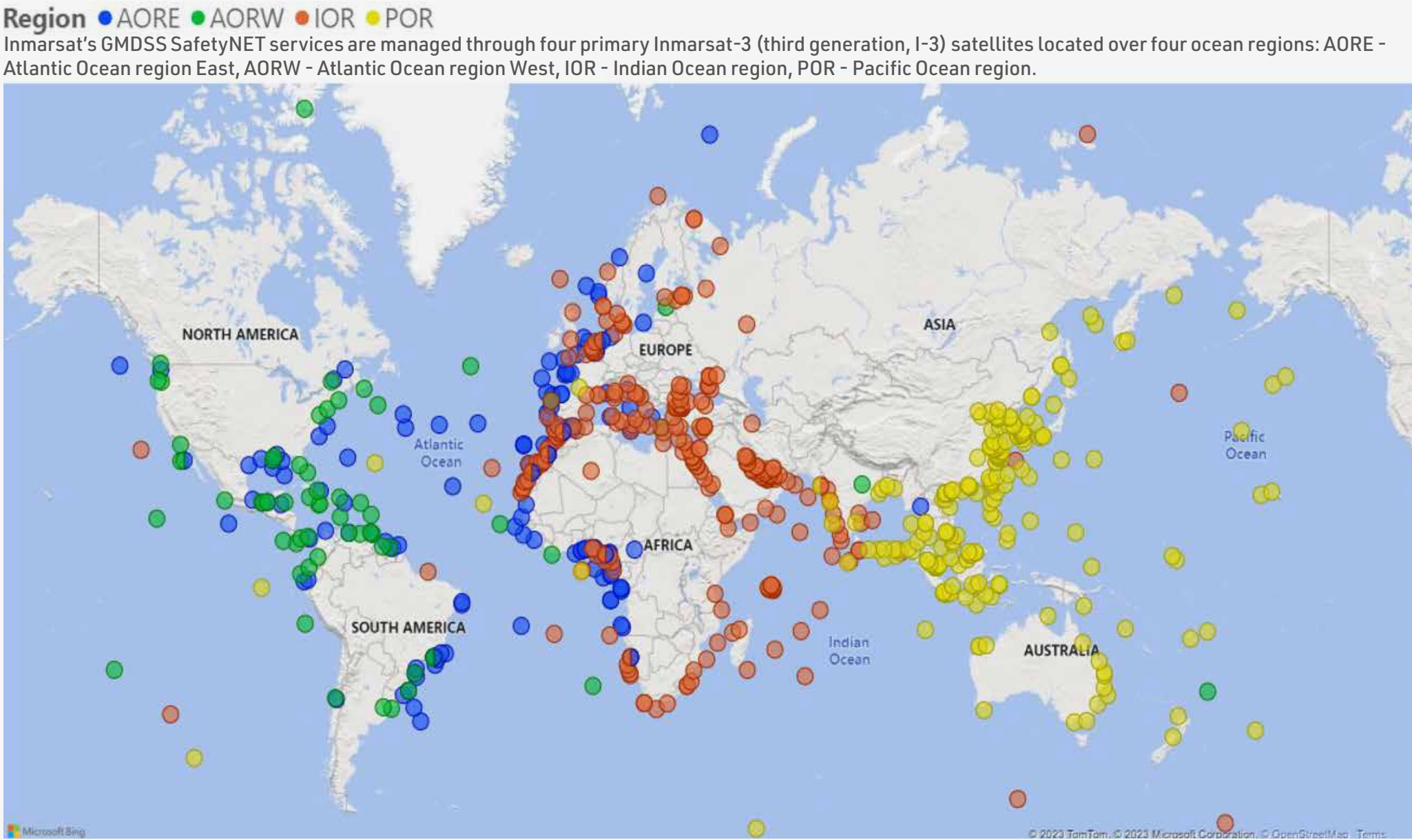
OVERVIEW OF DISTRESS CALLS BY VESSEL SECTOR AND TYPE

According to UNCTAD’s Review of Maritime Transport 2022⁴, the total fleet of seagoing merchant vessels amounted to 102,899 ships of 100 gross tons and above, equivalent to 2,199,107 thousand dwt of capacity. This marked a 2.95% increase over the course of 2021, the second lowest rate of growth since 2005. For context, over the same period, supported by the global demand for gas, the fleet of liquified-gas carriers grew by 8.15%.

The total number of distress calls across the three vessel sectors, merchant; offshore and high-end fishing; and large yacht and passenger, increased by 7% between 2021 and 2022, from 794 to 853. Of the 15 vessel types identified, tankers, bulk carriers and offshore vessels transmitted the highest number of distress calls, with tankers at the top of the list for the fifth successive year.

The pattern of GMDSS satellite distress calls [see Map 1] received from all vessel types during 2022 reflects the international nature of the shipping industry. It also highlights how congested trading routes run close to ecologically sensitive coastlines and illustrates the impact of geographical choke points.

2 The Future of Maritime Safety Report 2022 identified 12 vessel types rather than the 15 listed in Table 1 and was informed by different analytical models. To enable accurate comparisons between 2021 and 2022 datasets, this report reconsiders 2021 data against the models and vessel categorisation used to assess 2022 data. As a result, readers will note some discrepancies between the analysis of 2021 data presented in this report and that offered last year.
3 “Ro-Ro”, “Gas Carrier”, “Other Non-Cargo”, “Pure Car Carrier”, “Reefer”, and “Rigs & Platforms” were excluded from the analysis due to the relatively small number of total registered vessels - cumulatively they account for less than 5% of the total registered fleet. However, they are included in graphs 1 and 2 for reference.
4 Review of Maritime Transport 2022 | UNCTAD



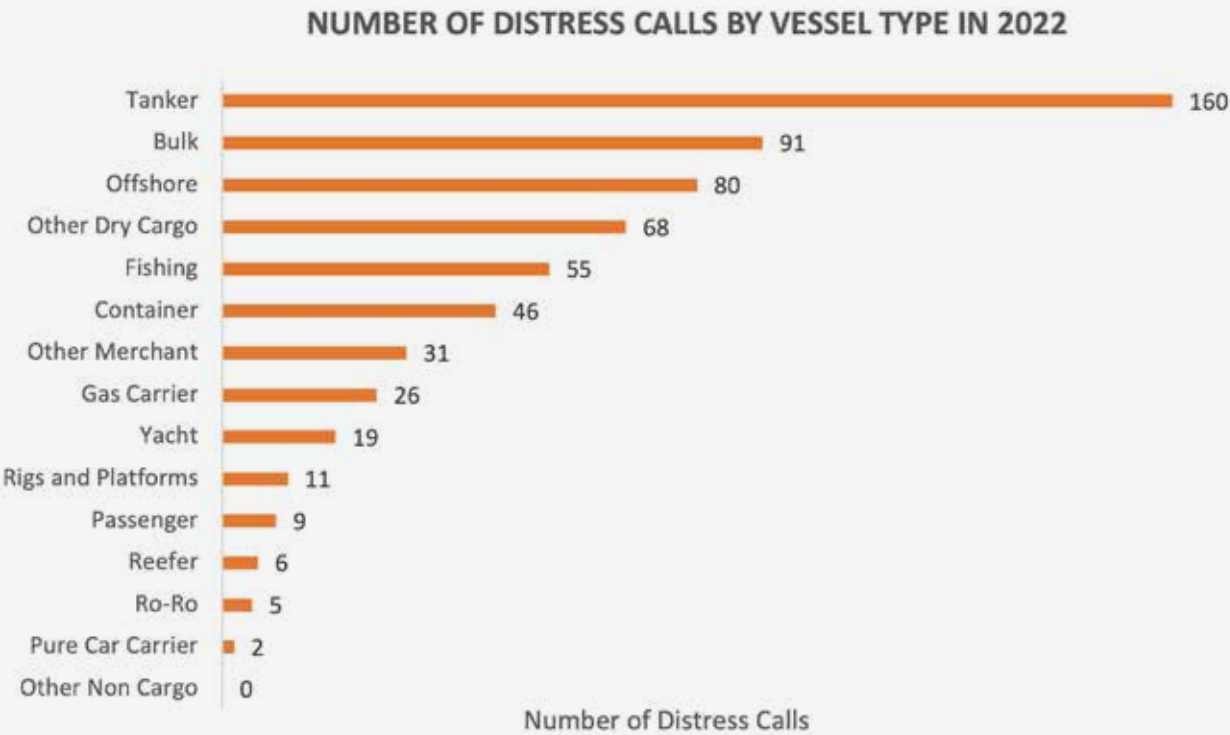
MAP 1: Distress calls point map, by GMDSS region, 2022

According to Lloyd’s List Intelligence⁵ data, machinery damage or failure was the most common cause of casualty in 2022. Such incidents have been steadily increasing over the past decade - up from 40% of all casualties reported during the first nine months of 2015 to 57% over the same period in 2022 - occurring worldwide and affecting all vessel types. The pandemic is thought to have played a significant role in the rise of technical problems and a corresponding increase in incidence rate, as fewer inspections and internal audits, delays in sourcing spare parts, unavailability of drydocks for scheduled maintenance and technicians not being able to service on board equipment, have cumulatively impacted vessel quality. Soberingly, the accompanying analysis also suggested that the shipping industry’s shift to lower emissions, including slow steaming and new fuels, could further increase the chance of machinery damage and failure in the future.

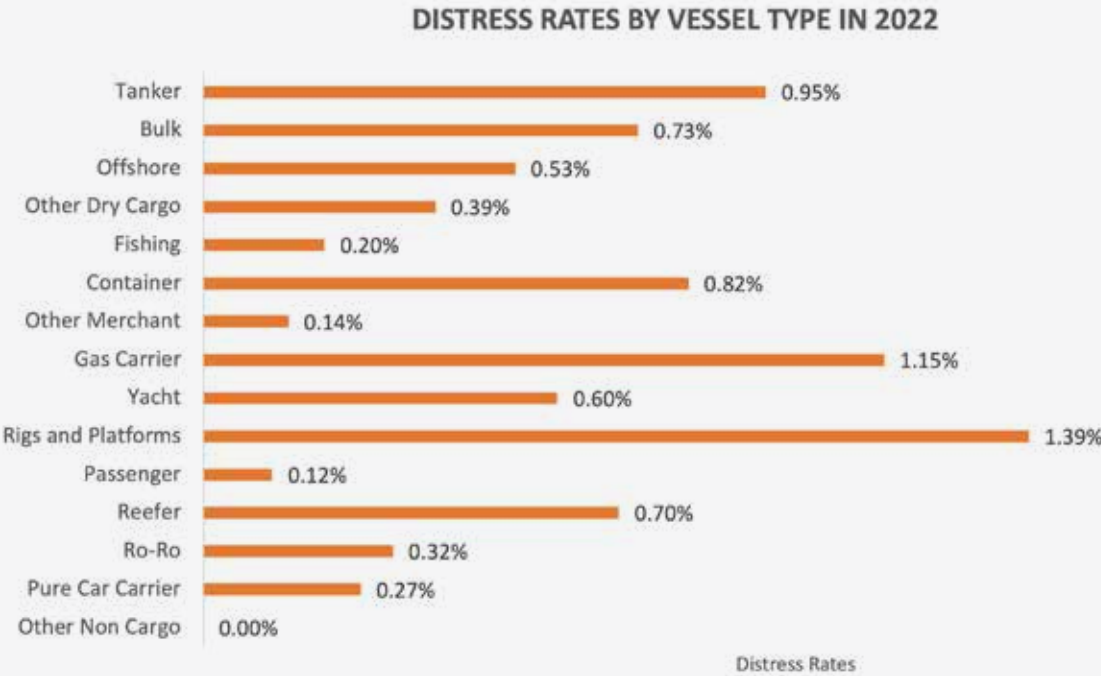
Of course, the future is yet unwritten, but as noted in a Lloyd’s List Intelligence White Paper sponsored by DNV⁶, the trend between 2012-2022 is not a positive one. And while some class societies, Flag States, and insurers may continue to report improvements, the general uptick in such incidents is clearly evident - 704 ships reported machinery trouble in 2012 against 1,497 such reports in 2022. As recommended in the whitepaper, understanding the reasons behind the increase in machinery damage or failure incidents should be an early target for investigation.

As with any sign of potential underlying safety issues, the industry should not ignore possible contributing human factors. Fatigue and low morale, exacerbated by the crew change crisis and the ripple out effect from the pandemic, will likely have played a significant role in the rise in overall vessel incidents during 2022.

Ongoing concerns regarding overwork within the industry, are only likely to be amplified as the shortfall in well-trained crew continues to bite. In July 2021, the Seafarer Workforce Report⁷ published by



GRAPH 1: GMDSS distress calls (count) by vessel type 2022



GRAPH 2: GMDSS distress calls (rate) by vessel type 2022

BIMCO and the International Chamber of Shipping warned that the industry had to significantly increase training and recruitment levels to avoid a serious shortage of around 90,000 STCW certified officers by 2026. While the crewing situation is already serious, it will soon become acute as companies compete for the tiny pool of crew who are able to safely handle and operate vessels transporting, and/or powered by alternative (and higher risk) green fuels.

More broadly, the human factor is often blamed for safety incidents in the maritime industry, but there is a need to look more deeply at underlying factors. Ksenia Zakariyya, Yara Clean Ammonia, HSEQ Manager asked rhetorically during the Inmarsat Proactive Safety Roundtable - Human Element Focus, held in Oslo in June 2023: “Over 70% of all incidents reported are based on human factors. What is causing the human error statistic to be so high in the maritime industry? We need to route it back to the cause.”

In response, Captain Jaquelyn Burton, Head of Creative Design, Kongsberg Maritime, said: “Companies often blame seafarers because they have trained them to undertake certain tasks. However, the reality is that ISO human centric standards are not being applied in our industry, and I think that is the root cause of many incidents pinned on human error. We don’t look outside to the other industries that are applying ISO standards because, as an industry, we don’t think we can learn anything from them.”

A similar discussion took place at the Inmarsat Proactive Safety Roundtable - Regulatory Focus, held in February 2023 in London, but participants noted an opportunity to affect lasting change. As Nimia Willems, IMO Technical Officer to the International Association of Classification Societies, said during the discussion, “We are in a transition period. New technology, new fuels, digitalisation, and Maritime Autonomous Surface Ships (MASS). There is momentum now because everything is changing.”

5 [Maritime Casualty Incidents | Lloyd's List Intelligence \(lloydslistintelligence.com\)](#)
6 [Maritime Safety Trends 2012-2022: Advancing a culture of safety in a changing industry landscape DNV](#)
7 [New BIMCO/ICS Seafarer Workforce Report warns of serious potential officer shortage](#)

THE VOICE OF SEAFARERS

Seafarers from container ship manager and owner Seaspan Corporation provided their insights into what could be done to improve safety in the industry, and what maritime leaders should consider. Overall, access to regular and high quality training and the need for frequent safety drills was a resounding message from the seven seafarers interviewed, noting it would ensure competency levels were maintained and onboard risks reduced. Fundamental safety considerations cropped up multiple times, including the need for appropriate PPE, proper rest hours and manageable shift patterns. Some also noted more crew members on board ships would ensure safety.

Many demonstrated a broad acceptance and faith in the promise of new technologies, including greater automation and artificial intelligence (AI). Bachala Shankar Rao, 4th engineer, said: "Embracing advanced technology (automation) will reduce human error [and] remote monitoring system[s] to track the vessel conditions." Focusing on AI, Pankaj Manglani, 2nd officer, said, "It has its own pros and cons. AI technology helps in saving time and multitasking, but it lacks creativity and improvisation."

Often, the seafarer recommendations boiled down to a need for leaders to focus on the basics, including regular reviews and updates to safety protocols. Pankaj Manglani pointed out that

leaders must also "strictly follow" regulatory compliance (codes and conventions) to ensure safety, implement and execute risk assessments, ensure good health and hygiene onboard, promote and practise a strong safety reporting culture, as well as promote teamwork and "be aware of and eliminate non-conformities".

Bachala Shanker Rao added that leaders should work to build and maintain a strong safety culture to reduce incidents at sea: "Create an environment where safety is a top priority and everyone is responsible for making the workplace safe, encouraging a culture of open communication," he said. Implementing or maintaining such procedures will not only improve safety and reduce incidents, Jaith Peethambaran, 4th engineer, pointed out that a good safety culture and track record is something seafarers consider when looking for job opportunities. "When a shipping company insists on following safety procedures on ships, it not only builds a reputation for itself among its crew but also in the entire shipping industry" they said. "A shipping company giving safety the first priority will be more preferred by crew members and job seekers. A person having a smooth and safe sailing on a ship will prefer the same company for his/her next contract, which in turn would benefit the company as the same staff, which already knows the ship and company policies, will be retained."



DISTRESS CALLS BY VESSEL TYPE

TANKERS

According to Statista, in 2022, the global oil tanker fleet had a combined capacity of around 629 million tons deadweight, and in terms of tonnage, accounted for around 29% of global seaborne trade⁸. The Baltic and International Maritime Council (BIMCO) suggested that the crude fleet was expected to grow further by 5.4% in 2022 and the product tanker fleet to grow by 1.0%⁹, in part driven by new trade patterns resulting from the conflict in Ukraine.

Given the nature of cargo carried and the possible consequences of a marine casualty or incident, tankers are subject to additional requirements in terms of fire safety and structural elements, for example, double hulls have been mandatory for tankers above 5,000 DWT since 1993. Tankers are also reputed to operate against rigorous safety procedures, be crewed by highly trained seafarers, and comply with, or exceed, international standards. However, tankers were once again responsible for sending more GMDSS signals than any other type of vessel during 2022 (the fifth successive year), with 160 recorded incidents, and the highest rate of calls for all vessel types, at 0.95% of the fleet of tankers equipped with Inmarsat C.

Inmarsat GMDSS data indicates that tanker distress incidents have risen steadily over the past five years from 80 distress calls in 2018, through 134 in 2021 to its highest peak so far in 2022. Whilst the gradual increase could potentially be linked to the overall increase in the global fleet during the same period, it seems likely that other factors are at play. It could be that the strong safety culture and reporting mechanisms in this sector are creating the false impression that tankers are prone to significantly higher rates of distress incidents than other vessel types.

Captain Samrat Biswas, Senior Manager (QHSE), Anglo Ardmere Ship Management, agreed with this possible cause, noting that

crews on tankers are “safety conscious and urged to report events on board” due to oil majors and industry partners frequently inspecting vessel conditions, maintenance and operations records as well as crew competencies. This is done to stay in line with stringent oil, chemical and gas industry requirements for minimum standards and KPIs to ensure the safe transport of cargo and prevent spills.

He explained that there has also been a rise in third party inspections by oil majors and even smaller firms that have developed their own vetting criteria and inspections, which can happen up to three times a year on a vessel. Captain Biswas said: “Inspectors look into a variety of aspects and the major being the safety aspect and reporting of incidents, injuries and near misses, as these are required by the industry to analyse and provide preventive measures/improvements to procedures.”

He also posited that variations in oil prices and global energy markets, which drove up demand for shipments, combined with uncertainties in the global economy, “could have led to decreased investments in vessel upkeep and safety measures”, in turn leading to more incidents and distress alerts as a result.

During 2021-2022, tanker incidents generally occurred in close proximity to coastlines, for example in the East Pacific coast of Peru, Gulf of Guinea, Gulf of Oman, and the South China Sea, or chokepoints, such as the Strait of Hormuz and the Strait of Singapore. In addition to machinery breakdown, extreme weather, and human errors that make up the bulk of safety incidents, Captain Biswas pointed out that “escalated [political] tensions, piracy, kidnapping or conflicts in vital maritime zones” may have led to the high levels of reporting and raising of distress alerts in the tanker sector. As an example of the former, the Liberian-flagged oil tanker Pacific Zircon was struck by an explosive-laden drone 150 miles off the coast of Oman, in November 2022, which was attributed to rising tensions between Iran and Israel¹⁰.

The International Chamber of Commerce’s (ICC)-International Maritime Bureau (IMB) 2022 annual report¹¹ indicated that incidents of piracy and armed robbery against ships fell from 132 in 2021 to 115 in 2022, with 64% of them occurring in just five locations (Singapore Strait, Bangladesh, Ghana, Indonesia and Peru). That said, such incidents are likely to be the root cause of a number of distress signals originating from tankers, as 24% of reported cases (28 incidents) involved either chemical/product or crude oil tankers, the second highest number of incidents (by vessel type) after bulk carriers.

Bucking the global trend, the Regional Cooperation Agreement on Combating Piracy and Armed Robbery against Ships in Asia (ReCAAP) noted a 2% increase in the total number of incidents in 2022 over those reported in 2021. It also recorded 84 incidents of piracy and armed robbery against ships in Asia in 2022¹², compared to 70 recorded by IMB. This likely highlights the ongoing challenge of compiling accurate baseline data.

Reassuringly, “petro-piracy” attacks on vessels involved in oil and gas transportation, such as tankers, bulk carriers and tugs off the coast of Nigeria, continue to abate. Overall, incidents in the Gulf of Guinea fell from 35 in 2021 to 19 in 2022. While the region remains dangerous, it appears that sustained and collaborative maritime security and law enforcement operations, conducted by regional and international players, allied with new national legislation and prosecutorial powers, are prevailing.

The embargo on Russian oil alluded to earlier has created unforeseen problems. A thriving shadow tanker fleet, estimated by AGCS¹³ at anywhere between 300 to 600+ vessels (roughly a fifth of the overall global crude oil tanker fleet) is transporting and selling its oil. These vessels are likely to be older ships and potentially being operated to lower maintenance standards. AGCS indicated that there were at least eight groundings, collisions

⁸ Global seaborne trade – oil tanker capacity 2022 | Statista

⁹ RECORDED WEBINAR: Longer routes and higher rates as EU bans Russian oil and products (bimco.org)

¹⁰ Tanker hit off Oman, says Israeli-controlled shipping firm | Reuters

¹¹ 2022 Annual IMB Piracy and Armed Robbery Report.pdf (icc-ccs.org)

¹² ReCAAP ISC Annual Report 2022.pdf

¹³ Safety and Shipping Review 2023 (allianz.com)

or near misses involving tankers carrying sanctioned oil products in 2022 – the same number as in the previous three years together.

FISHING VESSELS

The maritime fishing sector is a major supplier of food, responsible for almost 17% of the global population's protein intake, according to the European Maritime Safety Report 2022¹⁴. Per the International Maritime Organization (IMO), there are around 4.6 million fishing vessels¹⁵ (of all sizes) in operation around the world to service this demand.

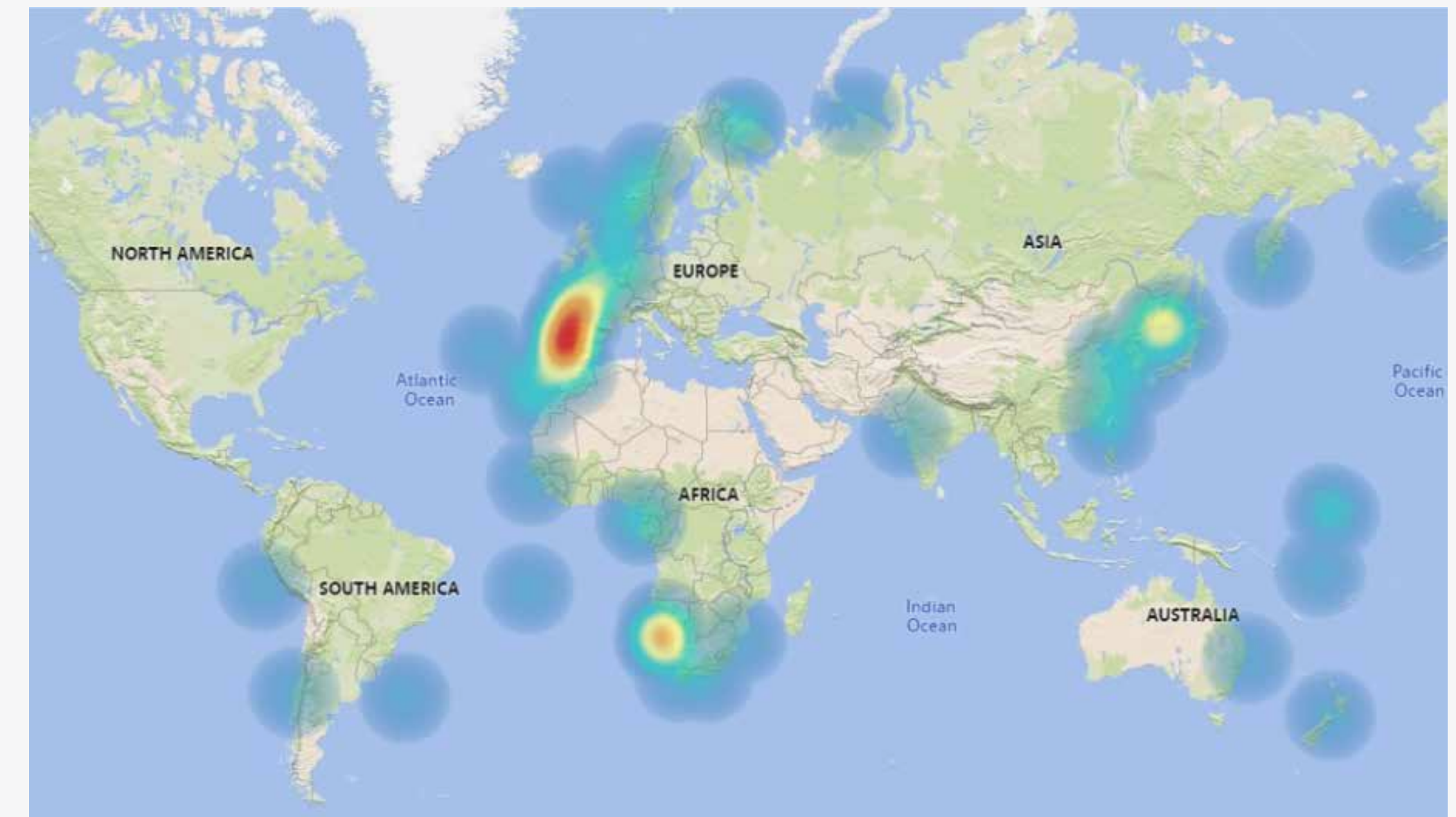
During 2022, fishing vessels were responsible for the fifth highest number of GMDSS calls with a total of 55 incidents, a 21.45% increase over the 39 incidents recorded during 2021 and an increase of call rates from 0.14% to 0.20% in 2022. Although it may not have resulted in a GMDSS signal being received by Inmarsat, the single act of maritime piracy reported by ReCAAP during 2022 involved a fishing vessel in the South China Sea.

Analysis showed a distinct cluster of GMDSS distress calls along the sea banks of Portugal, Morocco and Western Sahara, with incidents occurring year-round. This reinforces the supposition that vessel incidents are unlikely to be confined to specific periods of extreme weather and are in all probability the consequence of ongoing safety concerns within the industry, as reported in the Inmarsat Future of Safety Report 2021.

Morocco continues to belie its comparatively small flag status – it does not fall in the top ten either by vessel numbers or by tonnage – by accounting for the third highest number of distress calls (by count) and the second highest (by rate) during 2022. This is likely due to the number of fishing vessels on Moroccan registry, which in part helps to explain the concentration of incidents along the country's coast and in neighbouring fishing grounds.

However, it is important to remember that this analysis is based solely on Inmarsat SafetyNET services data derived, in the most part, from large commercial fishing vessels. It does not account for distress calls from the vast bulk of the global fishing fleet, which operates in Sea Areas A1 and A2 and therefore uses VHF, mobile telephones etc. to signal distress. Fishing continues to be one of the most dangerous professions globally, with thousands of fishers estimated to lose their lives every year, and safety incidents remain significantly underreported, masking the true extent of the problem.

During the Inmarsat Proactive Safety Roundtable – Regulatory Focus, in February 2023 in London, Heike Deggim, Director of Maritime Safety Division at the IMO, confirmed the issue was endemic throughout the shipping industry and not just restricted to fishing, she said: "Mandatory reporting requirements is not the problem. We regularly issue documents listing what reporting is required and what has not been done, but it has no effect whatsoever." Explaining the impact of the lack of data, she explained that



MAP 2: Heatmap of fishing vessel distress incidents for 2021 & 2022

¹⁴ Publications - EMSAFE Report - EMSA - European Maritime Safety Agency (europa.eu)

¹⁵ Enhancing fishing vessel safety to save lives (imo.org)

“There is often no data underlying proposals for regulations, the proposals depend on what is important to the member states. If we had a more systematic approach, with statistics showing how accidents occur, we could work in a much more targeted way.”

Notwithstanding this, the continued high incidence of distress calls from fishing vessels requires concerted action. Even without reliable data, the international community is aware of the stakes. The IMO is currently reviewing the STCW-F Convention (Standards of Training, Certification and Watchkeeping for Fishing Vessel Personnel), which deals with the training and qualifications of fishermen. These revisions, in tandem with promoting the ratification of the 2012 Cape Town Agreement (CTA),¹⁶ offer the potential to improve the safety of fishing vessels. When in force, the CTA is expected to enhance safety standards on over 64,000 fishing vessels, contribute to legal and sustainable fishing and prevent marine plastic pollution from abandoned fishing nets and other equipment.

BULK CARRIERS

Responsible for 91 GMDSS calls, bulk carriers were ranked second highest in the list of calls received by vessel type in 2022, after tankers, and third highest by rate of calls (0.73%) after tankers and container ships. This echoed the incident spike recorded in 2021 when 82 incidents were recorded, at a rate of 0.66% compared to an average of 46 calls between 2018 and 2020. While the overall global fleet number of bulk carriers increased by 3.61% between 2021 and 2022 (per the UNCTAD Review of Maritime Transport 2022¹⁷), this uplift does not correspond with the abrupt rise of incident numbers.

As outlined in INTERCARGO's Bulk Carrier Casualty Report 2023¹⁸, between 2013 and 2022, 26 bulk carriers of over 10,000 dwt were reported lost, resulting in the tragic loss of 104 seafarers. Grounding remains the greatest cause of ship losses, accounting for 12 bulk carriers lost. Available reports suggest various

causes for these casualties, including machinery and equipment failures, human element, navigation, and adverse weather.

Cargo shift and liquefaction remain the greatest contributor to loss of life on board bulk carriers, and four of the five bulk carrier casualties caused by cargo liquefaction during the 10-year period covered by the INTERCARGO report were loaded with nickel ore. To reduce risk, amendments 06-21 of the International Maritime Solid Bulk Cargoes (IMSBC) Code, developed to provide more accurate cargo information, enter into force on 1 December 2023. The amendments include the term 'dynamic separation', in addition to liquefaction, which is expected to safeguard against moisture related cargo failure that can cause vessel instability.

Incidents involving bulk carriers occur globally but GMDSS data analysis of the period of 2021-2022 suggests a distinct concentration of incidents between the Yellow Sea and East China Sea. This is likely because China, the Republic of Korea, and Singapore are large ship-owning economies that heavily utilise bulk carriers for trade in a region subject to extreme weather.

As already noted in the tanker analysis, bulk carriers suffered more armed robbery against ship incidents (50) than any other vessel type during 2022, and the trading patterns of bulk carriers in East and Southeast Asia seemingly correspond to the increase in security incidents reported by ReCAAP (as previously noted in the tanker section), which may also have led to a spate of GMDSS signals.

The comparatively high count of GMDSS signal incidents during 2022 also suggests that the issue flagged by AGCS in its Safety and Shipping Review of 2022, concerning potential safety issues around stability, firefighting capabilities and securing cargo, arising from repurposing bulk carriers and tankers to transport containers may still be a factor.

OTHER DRY CARGO

According to the UNCTAD Review of Maritime Transport 2022, the general cargo fleet grew by 1.17% between 2021-2022 and the fleet's average age was 27.1 years at the beginning of the year, the highest average age of any vessel type¹⁹. The slow growth was previously attributed to the impact of COVID-19 on vessel commissioning and delivery. While this might still be affecting the newbuild process, it is possible to suggest that older vessels are being retained and operated for longer (or sold on to others) as companies consider the future fuel mix and emerging decarbonisation technologies.

GMDSS recorded 68 calls for other dry cargo vessels during 2022, down from 72 recorded in 2021, but still the fourth highest vessel type (by count). However, by rate of calls, this vessel type ranked sixth (GMDSS signals were received from 0.39% of the fleet).

The following heat map offers compelling evidence of the impact of geopolitics on vessel safety, by illustrating a cluster of GMDSS signals, in and around the Black Sea region, coinciding with Russia's invasion of Ukraine in February 2022. According to IMO figures²⁰, approximately 2000 seafarers were stranded aboard 94 vessels in Ukrainian ports at the outbreak of the conflict.

By the end of 2022 around 40 large commercial vessels remained in Ukrainian ports across the Black Sea and the Sea of Azov. Many of the remaining ships employed local ship keepers to replace repatriated crew (although approximately 330 seafarers elected to remain onboard) and some went into cold lay-up. It is claimed that up to 15 merchant vessels, of all flags, have been damaged or sunk since the outbreak of the conflict²¹, with the tragic death of one seafarer and several others wounded. There were no confirmed reports of commercial vessels being struck by explosive ordnance between April 2022 and July 2023, but the Russian flagged tanker, Sig, was reportedly struck by an uncrewed surface vessel (USV) in the Kerch Strait on 4 August 2023²².

16 By April 2022, 51 States, including Morocco, had signed the Torremolinos Declaration signifying their determination to ratify the 2012 Cape Town Agreement (CTA) to enhance fishing safety by 11 October 2022. By the end of 2022, only one additional country had ratified it, bringing the number of contracting states to 17 (with 1925 fishing vessels of 24 metres in length and over operating on the high seas declared) - the

threshold for member states (22) and vessel tonnage (aggregate 3,600 fishing vessels) has therefore still not been met.

17 [Review of Maritime Transport 2022 | UNCTAD](#)

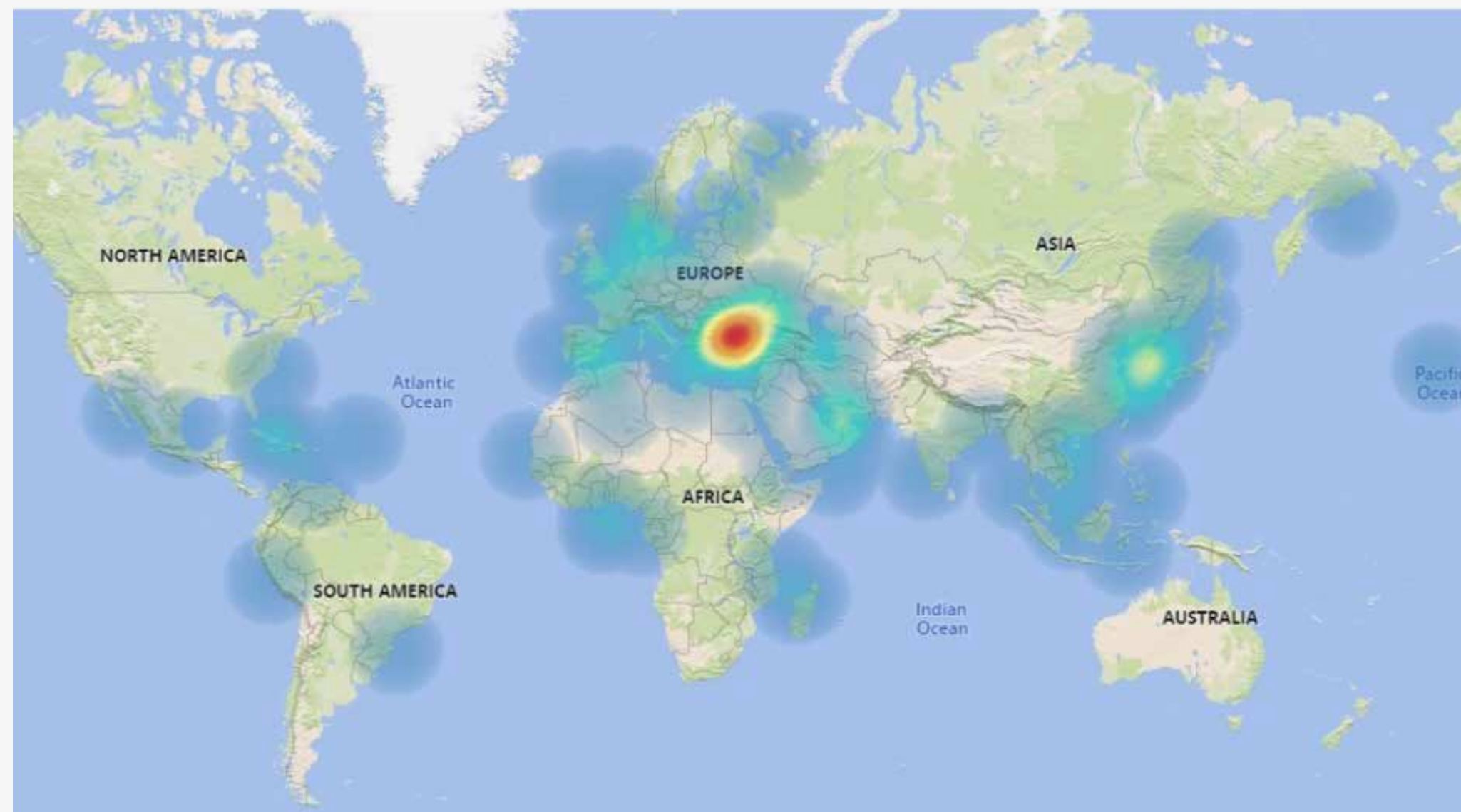
18 [Bulk Carrier Casualty Report 2023 - Intercargo](#)

19 [Review of Maritime Transport 2022 | UNCTAD](#)

20 [Maritime Security and Safety in the Black Sea and Sea of Azov \(imo.org\)](#)

21 [15 Merchant Ships Bombed During the Russia - Ukraine War \(seamanmemories.com\)](#)

22 [Russian chemical tanker hit by Ukraine drones in Kerch Strait | Russia | The Guardian](#)



MAP 3: Heatmap of other dry cargo vessel distress incidents for 2021 and 2022

On 22 July 2022, the Black Sea Grain Initiative, between Russia and Ukraine, made with Turkey and the United Nations (UN) was signed to facilitate the export of foodstuffs and fertiliser to global markets from three Ukrainian ports. Cargo ships were guided to international waters and then sailed through a maritime humanitarian corridor to Istanbul. According to figures compiled by the UN's Joint Coordination Centre (JCC), 16,080,705 metric tons²³ of grain and other foodstuffs were exported between August and December 2022.

On 17 July 2023, Russia refused to further extend the agreement, stating that promises to facilitate shipments of its foodstuffs and fertilisers had not been kept. The withdrawal of the associated safety guarantees means that shipping operations in the northwestern Black Sea are again exposed to the risk of military action.

As noted by John Strawpert, Manager (Environment and Trade) in the Marine Department of the International Chamber of Shipping: "The security situation in the Black Sea has become more complex since the end of the grain corridor, with both sides having said that merchant shipping could be considered a military target. North of 45° 21' remains a no sail zone, and we have not seen traffic transit those waters, though Ukraine has opened a temporary corridor to the three former BSGI ports. The primary risks to ship safety are collateral damage from strikes against ports, free floating mines, and potential interference or action from the combatant states. Outside the no-sail zone traffic continues at pre-war levels, and apart from increased MARSEC levels in some ports requiring

ships to raise their protection levels, we have not seen any serious interruptions to regional trade." However, with the military situation in a continued state of flux, vessel operators and insurers are mindful that maritime traffic could face increasing levels of interference with little to no notice.

OFFSHORE

Using the revised analytical model, offshore vessels accounted for 80 GMDSS calls (by count) during 2022 (with a rate of 0.53%), an increase over the 71 (rate of 0.47%) reported in 2021. These results are in line with the previously identified upward trend observed since 2018.

As one would expect, such incidents are located in close proximity to oil fields, such as off the coast of Rio de Janeiro, in the Gulf of Mexico, the Gulf of Guinea, the Persian Gulf, and the North Sea in particular. Some of these locations are areas of high risk due to piracy and armed robbery against ships, while others are close to high density shipping routes.

Although most offshore exploration and production countries set clear rules for operators, and monitor and enforce compliance, accidents occur with worrying frequency. Offshore Energy compiled a report of some of the major accidents and incidents related to offshore oil and gas during 2022²⁴, including fire, falls, equipment malfunctions and assault. It also provided a timely reminder of the vulnerability of the offshore sector to state aggression, for example the alleged missile strike, in June 2022, on three platforms operated by the Crimea-based Chernomorneftegaz.

²³ [Black Sea Grain Initiative | Data | United Nations](#)

²⁴ [2022 in review: Some of the major incidents related to offshore oil & gas - Offshore Energy \(offshore-energy.biz\)](#)

One notable offshore accident resulted in fatalities and a 20 km oil slick from the estimated 50,000-60,000 barrels of oil it held. In February 2022, an explosion on board the Floating Production Storage and Offloading (FPSO) Trinity Spirit, off Nigeria, triggered a devastating fire which resulted in the deaths of at least three of the crew. First launched 46 years ago, it was reconfigured for storage 25 years ago and was unflagged and unclassified.

According to data compiled by Bloomberg, in February 2022, there were 30+ FPSOs in operation that were originally constructed before 1977²⁵ and during the same month Lloyd's List estimated that the average age of FPSOs in operation was 27.3 years²⁶. Across the global fleet, 55 FPSOs will reach the end of their design life in the next five years, and a further five have already been refitted to extend their lives. In August 2021, the American Bureau of Shipping (ABS), which classes 60% of the global operating fleet of FPSOs, brought together experts to consider the safety challenges associated with the ageing fleet²⁷. The expert group is working with other industry stakeholders to develop solutions, including risk management methodologies, to assist with the evaluation and potential acceptance of life extension of such vessels, or a decision to decommission them should life extension not be viable.

There are also still a few floating storage and offloading units (FSOs) and FPSOs that have been left at sea without maintenance or observation, and some are already causing concern. Probably

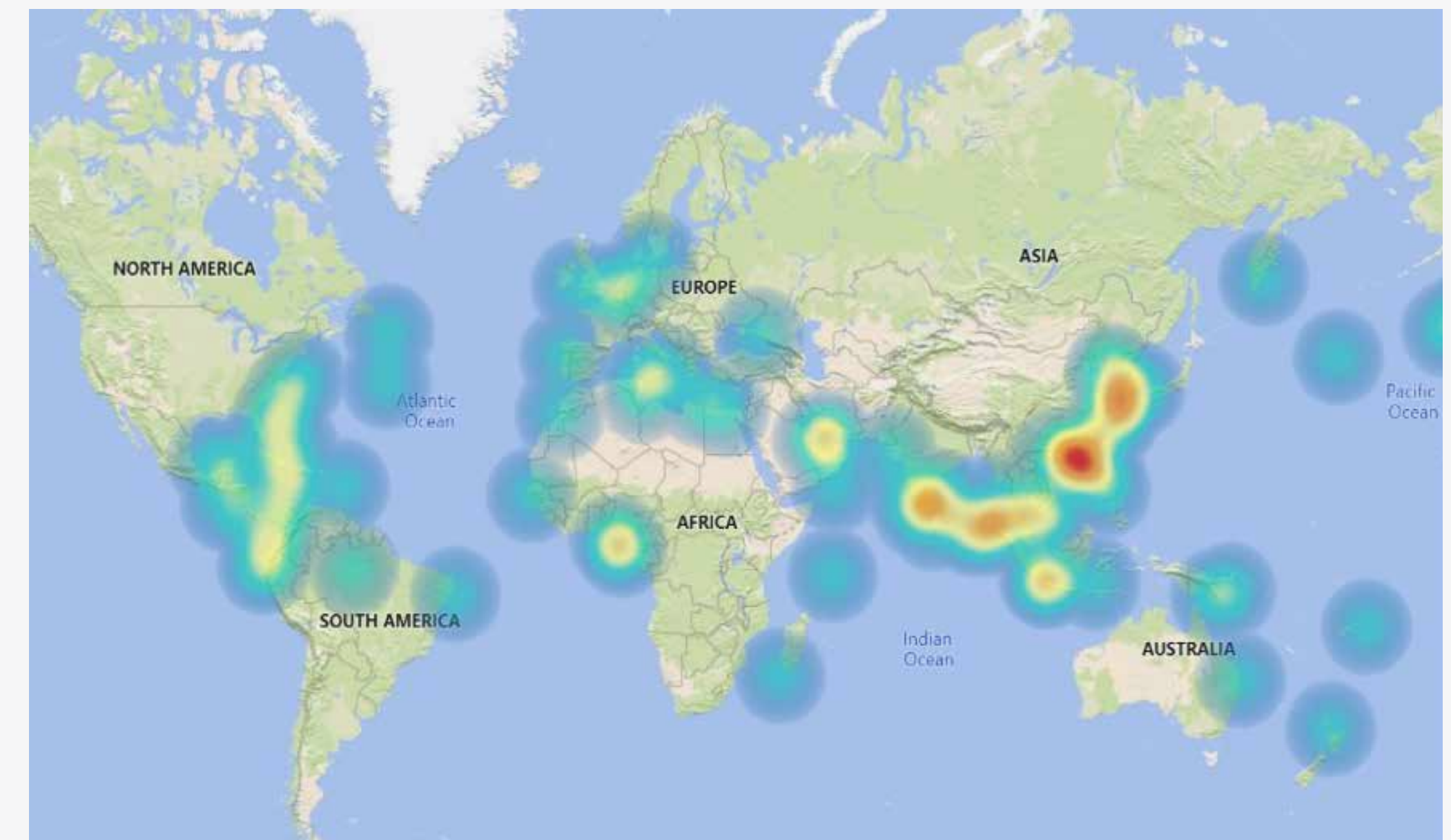
the most notorious, The Safer, built in 1976, it held over a million barrels of crude oil despite safety issues. In July 2023, a replacement storage tanker, the MT Yemen, was procured, averting a long-feared environmental and humanitarian disaster.

CONTAINER SHIPS

At the end of November 2022, the global merchant fleet, according to Statista, consisted of 5,589 container ships²⁸. Seemingly at odds with the continuing growth of the sector (see page 22), container ships only accounted for 46 distress calls received by Inmarsat in 2022. This is largely consistent with the 42 distress calls recorded in 2021, although it indicates a discernible upward trend since 2018 (29 calls).

The location of distress calls was also consistent between 2021 and 2022, with the majority appearing to be from vessels along the eastern seaboard of the United States of America, the Yellow and South China Seas, and the Bay of Bengal. Fortunately, for international trade, there was no repeat of a container ship blocking the Suez Canal (the Ever Green did so for six days in March 2021) although the tanker Affinity V briefly blocked it on 31 August 2022.

Despite the comparatively low number (count) of distress calls during 2021 and 2022, the picture changes dramatically when rate of calls is considered. During 2021, Inmarsat received GMDSS signals from 0.75% of the container fleet, which increased to



MAP 4: Heatmap of container ship distress incidents for 2021 and 2022

²⁵ [Trinity Spirit FPSO Blast Off Nigeria's Coast Leaves Oil-Spill Stretching Miles - Bloomberg](#)

²⁶ [Why the Trinity Spirit FPSO explosion was not a safety anomaly: Lloyd's List \(informa.com\)](#)

²⁷ [ABS Brings Together Leading Industry Players to Tackle Safety Challenge of Aging FPSO Fleet - American Bureau of Shipping \(cision.com\)](#)

²⁸ [Global number of containers ships 2022 | Statista](#)

0.82% in 2022. For context, the rate of distress calls was the second highest, after tankers, during the sample period.

Responsibility for container safety is shared across the supply chain, and liner carriers have long struggled to address recurring safety issues arising from misdeclared cargo. This is particularly relevant in the case of hazardous and combustible goods, including lithium-ion batteries, which are increasingly transported by container onboard large container ships. In 2020, a US National Cargo Bureau (NCB) survey of 500 containers reported that 69% of the import and 38% of the export containers held dangerous goods²⁹. Of the import containers, 44% had problems with cargo packing, 39% had improper placarding and 8% had misdeclared cargo. Unfortunately, little has changed since. As an overarching regulatory and enforcement solution remains out of reach, shipping companies and jurisdictions mandate their own requirements, and the global rate of container inspections remains low.

Misdeclaration of cargo continues to be an important factor in many container fires which, according to AGCS³⁰, is one of the biggest causes of general average claims on container vessels. For example, a major cargo fire reportedly claimed the Marshall Islands flagged TSS Pearl, in the Red Sea, off Saudi Arabia, on 13 October 2022, nine days after its crew abandoned ship³¹. The Jeddah Marine Rescue Coordination Centre picked up all 25 crew safely, so the incident was not picked up widely in the mainstream press.

In addition, proper packing, stowage and securing of containers, and reporting correct weight, (verified gross mass) remain key safety concerns. In July 2022, a Rotterdam District Court ruled that ship managers, ship owners and charterers must

honour a clause that prevents seafarers from being assigned dangerous lashing work where professional dock workers are available³². Time will tell whether this sets a wider precedent.

Another perennial challenge is the loss of containers overboard, due to bad weather, poor stowage, and even the size of the ship (see the Tonnage section for more information). In its Containers Lost at Sea Report 2023, the World Shipping Council (WSC)³³ reported 661 containers were lost overboard during 2022 - including around 90 containers when container stacks collapsed on board the Dyros, a Liberian-registered vessel, in March 2022.

The WSC figure compares favourably to the estimated average 1,566 containers lost at sea over a fifteen-year period (2008-2022) and the spike of losses reported in 2020 and 2021 (an average of 3,100 containers per year). The loss of 661 containers represents less than one thousandth of 1% (0.00048%) of the 250 million containers shipped during 2022, however, many container losses go unreported and undocumented because there is no obligation for lost cargo to be declared unless it is of a hazardous nature and likely to pose an immediate threat to the environment.

The issue of non-reporting, under-reporting or delayed reporting of safety incidents is not unique to the container ship sector. As attendees at the Inmarsat Proactive Safety Roundtable - Human Element Focus held in June 2023 in Oslo pointed out, IMO Member States are technically required to collate and upload information to the Global Integrated Shipping Information System (GISIS), but are not consistently doing so due to the lack of legal or commercial consequences. Joanna Sawh, Head of Commercial for Maersk Training said, "Any accident, incident and undesired activity is closely linked to commercial operations, employability of the vessel and company reputation, which

creates a reluctance to share this information in the market." However, she, like others around the table, suggested such information could be anonymised to avoid commercial impact.

Almost all containers that go overboard sink – eventually – but they can remain afloat for months, depending on the container type and its cargo. While the risk of collision is miniscule, at least on the high seas, the impact on smaller vessels, including yachts and fishing trawlers, would likely be catastrophic. Proposals for the mandatory reporting of lost containers would both improve accountability and navigational safety.

YACHTS

19 vessel distress incidents were recorded for yachts in 2022 (equating to a rate of 0.60%), up from 13 (rate of 0.41%) in 2021. In June 2022, Yachting.com³⁴ reported that human factors cause up to 78% of all incidents, rather than technical failures or sudden weather change. Human factors included over reliance on GPS and map plotters, alcohol consumption and associated lack of judgement, inexperience, and poor appreciation of dynamic risk, for example when manoeuvring in port at low speeds.

In April 2022, Boat International³⁵ reported that there were 1,024 superyachts in build or on order, an increase of 24.7% over the year before (821). Just 11 months earlier it had reported that collisions caused 38% of boat and yacht insurance claims and the rise in GMDSS signals (by count and rate) may suggest that congestion be an increasing factor affecting safety in this sector and that safety incidents will continue to rise in relation to the increasing number of yachts sharing finite space off the busiest coastal resorts.

²⁹ [Container inspections reveal misdeclared cargo, poor stowage - FreightWaves](#)

³⁰ [Hull and cargo risks continue to rise | AGCS \(allianz.com\)](#)

³¹ [Blaze-hit TSS Pearl sinks in Red Sea after crew abandon ship - The Loadstar](#)

³² [Victory for seafarers' safety as Dutch court sides with unions on container lashing | ITF Seafarers](#)

³³ [Container Lost at Sea 2023 \(squarespace.com\)](#)

³⁴ [Accidents at sea and what do sailors underestimate \(yachting.com\)](#)

³⁵ [Global order book: Over 1,000 superyacht projects on order in 2022 \(boatinternational.com\)](#)

PASSENGER SHIPS

Passenger ships continue to send a low number of distress calls with only nine incidents recorded during 2022 (rate of 0.14%) and 11 during 2021 (rate of 0.12%). In part, this likely reflects the stringent international safety standards in place and also the short, fixed voyage patterns of the majority of passenger services.

However, the low incidence rate should not obscure the fact that safety incidents involving passenger vessels often result in multiple human casualties. This is particularly true in remote regions where ferry services, for example, are less likely to comply with basic safety standards, such as maximum passenger numbers, or have sufficient equipment or trained seafarers to respond effectively to an emergency on board. In such locales, increased compliance activity and enforcement remain the most likely mechanisms of success.

The maritime fraternity was given a sombre reminder of the impact of safety incidents on board passenger vessels in February and May 2022. In the former incident, the Euroferry Olympia caught fire off Corfu and was abandoned. Of the estimated 292 people on board, 11 remained unaccounted for two days after the vessel was abandoned³⁶. In the latter, at least seven people were killed and more than a hundred were forced to jump over the side after the Mercraft 2, a ferry carrying 124 passengers and 10 crew, caught fire in the Philippines³⁷. Freak weather conditions can also end in tragedy, for example one passenger was killed and four injured when the cruise ship Viking Polaris was struck by a rogue wave in December 2022, whilst enroute to Antarctica³⁸.

CAR AND GAS CARRIERS

Gas Carriers and Car Carriers were excluded from statistical analysis of GMDSS signal data, but given their profile it would have been remiss not to include them in the 2023 report.

In early 2022, a gas control equipment malfunction occurred on the liquified hydrogen tanker, Suiso Frontier, while the ship was berthed in Australia. Fortunately, the resulting gas flame did not result in a fire or explosion, but it did briefly propagate onto the vessel's deck. The incident was investigated by the Australian Transport Safety Bureau (ATSB), and its report highlighted the importance of ensuring automated shipboard operating systems are equipped with safety controls and reiterated the importance of stringent manufacturer quality controls to ensure correct system components are specified and fitted to equipment³⁹.

It is also worth noting that in the near future, gas carriers will play a vital role in transporting (and likely using) alternative fuels. Risk management will be a key consideration as associated new technologies are rolled out. Similarly, car carriers will face increasing levels of risk as vehicles, running on ever more advanced batteries and green fuels, are introduced ahead of the impending bans on fossil-fueled vehicles.

Inmarsat GMDSS data shows just two vessel distress calls from car carriers in 2022. However, with the market expected to grow over the next decade, many in shipping, particularly container ship and carrier carrier owners and operators, are concerned about the risk of shipping lithium-ion batteries and electric vehicles (EVs)⁴⁰. Insurers, including AGCS, have gone as far as saying that battery-related fires are shipping's most expensive cause of loss; it is believed to have been a key factor in the loss of the Felicity Ace in March 2022. Fortunately, all 22 members of the crew were rescued but the local marine environment and the nearly 4,000 luxury cars embarked were not so lucky.

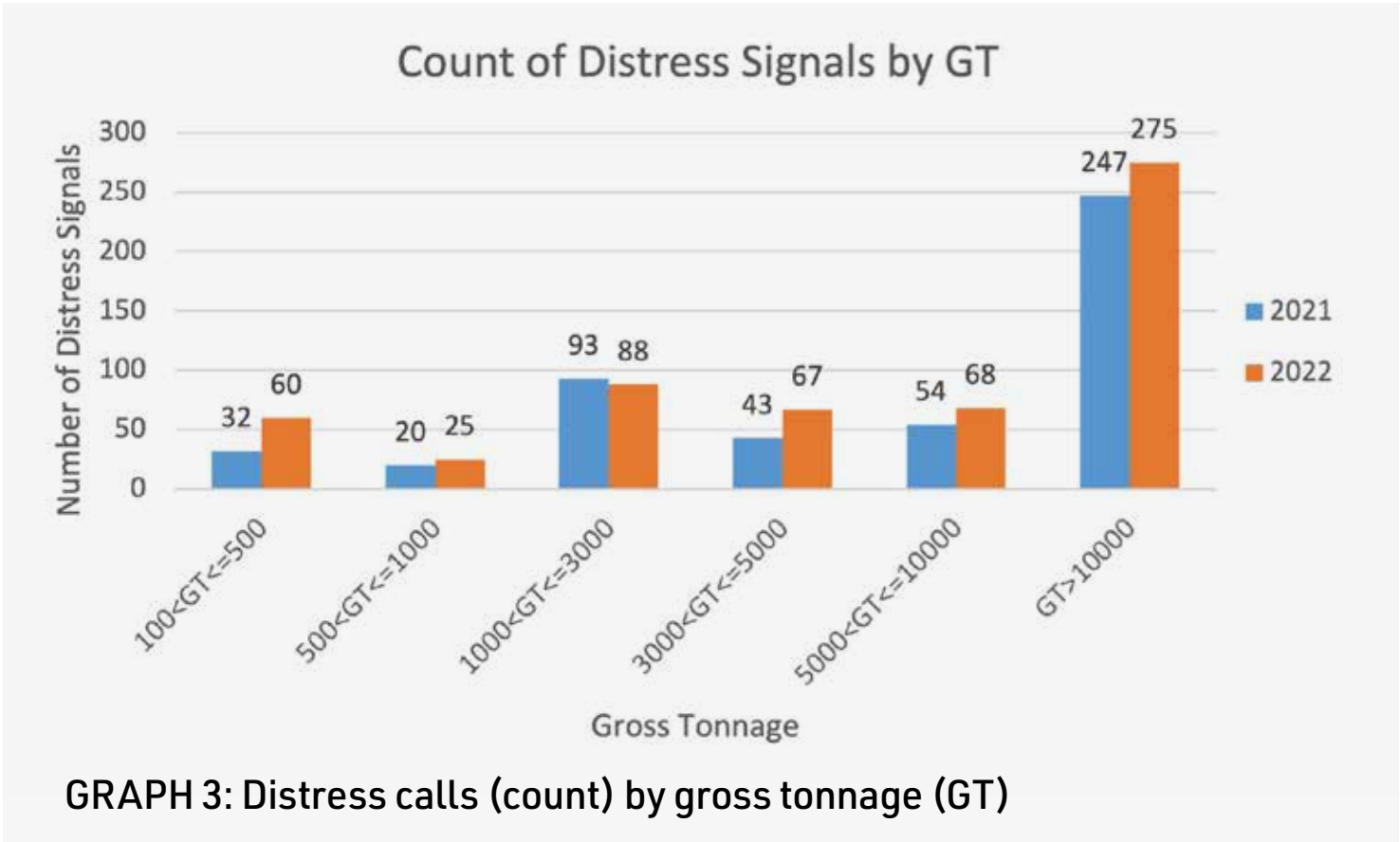
The specific dangers of such fires, including their ferocity and burn-time, risk of thermal runaway and the toxicity of gases released by burning batteries were discussed during Seatrade Maritime Salvage & Wreck conference 2022. Add the risk of free surface

effect, when dealing with a fire on car decks, and the general unpreparedness of crews to tackle such fires and it's clear that the industry has serious safety concerns to resolve. Per a Lloyd's List article⁴¹ published in June 2022, some safety specialists are even suggesting that a new class of car carrier may be required.

However, much in the way that misdeclared cargo has to be considered as an inter-industry challenge, supply chain stakeholders need to collaborate to ensure procedures for handling batteries are adhered to throughout their service life. This is important as initial concerns, which focussed primarily on production through to delivery at the port of disembarkation, have expanded and the risk has led some car carriers to refuse to transport second-hand battery-powered EVs.

DISTRESS CALLS BY GROSS TONNAGE

Over the two-year analysed period, the highest number of distress calls (by count) originated from vessels over 10,000GT, with 275 in 2022 and 247 in 2021.



36 [Ferry fire: Search for 12 missing off Corfu continues - BBC News](#)

37 [\(UPDATE\) Tragedy at sea as passenger boat catches fire in Quezon \(mb.com.ph\)](#)

38 [Rogue Wave Strikes Cruise Ship, Killing One and Injuring 4 Others - The New York Times \(nytimes.com\)](#)

39 [Gas control equipment malfunction on board the gas tanker Suiso Frontier at Western Port, Hastings, Victoria on 25 January 2022 | ATSB](#)

40 [Safety concerns mount over lithium-ion battery cargo fires \(seatrade-maritime.com\)](#)

41 [New vessel type could be needed to carry electric vehicles: Lloyd's List \(informa.com\)](#)

Note: In 2022, 269 of the 853 distress calls (31.5%) in 2022 and 304 of the 794 calls (38.3%) in 2021 did not include information on gross tonnage.

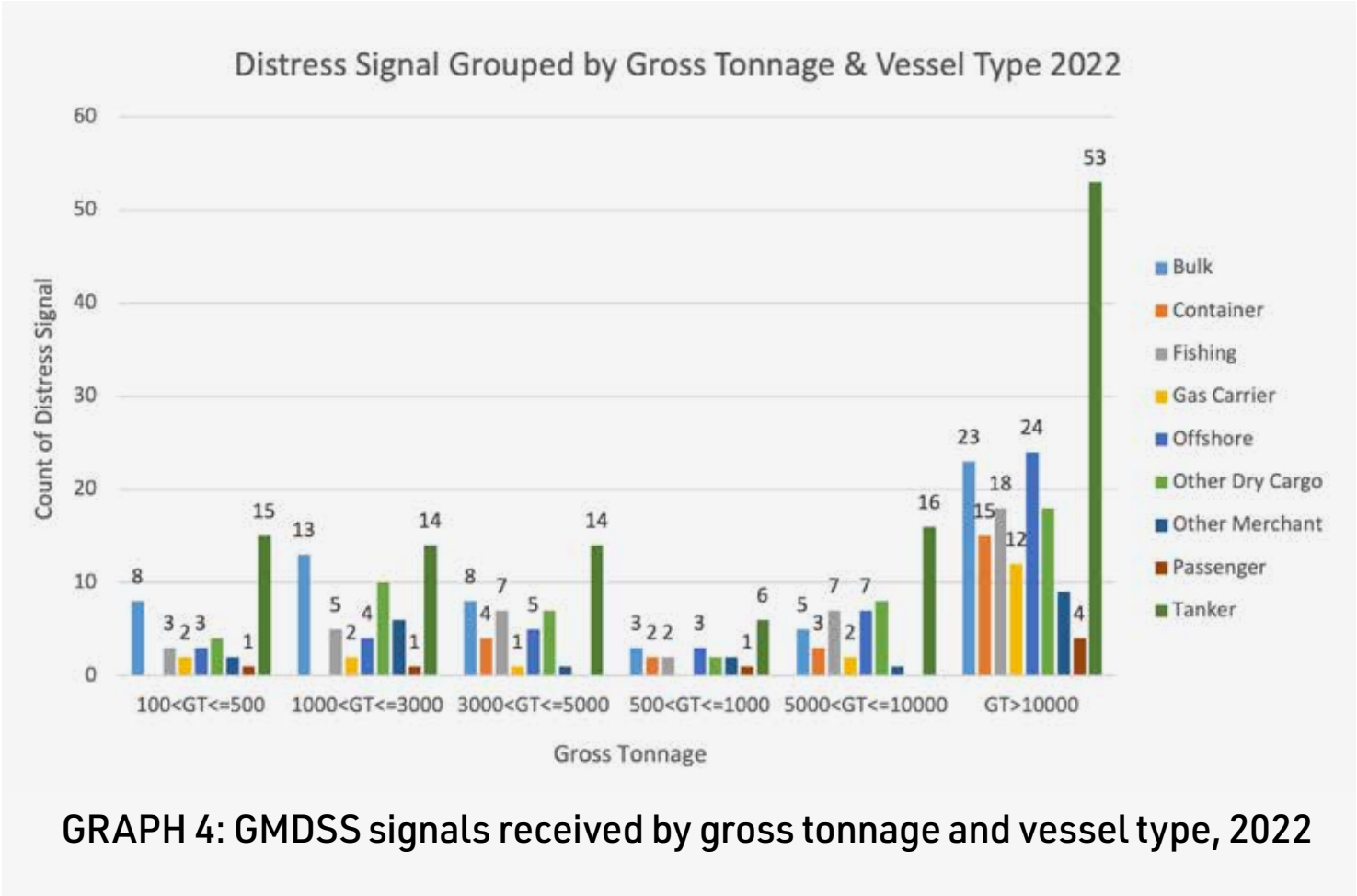
The positive correlation between increase in size and higher distress calls may have several plausible reasons, including vessel complexity, relative age of vessel (smaller, older vessels being operated for longer and therefore avoiding new-vessel teething issues, see 'Year of Build' analysis) and the fact that larger vessels are likely to operate in higher sea states and more severe climatic conditions, that would require smaller vessels to seek refuge.

However, when the rate of distress calls (the number of calls received / number of vessels in each GT band) was analysed, the discrepancy between the four heaviest weight categories was far less stark. While there was generally still a positive correlation between size and a rising rate of distress signals, the variation of call rates between vessels between 3000GT and over 10,000GT bands was much smaller than the count graph might suggest. For example, during 2022 Inmarsat recorded a rate of 0.93% for the 5,000-10,000 GT band, as opposed to 0.98% for vessels over 10,000GT.

Consistent with earlier findings, however, and despite the additional safety requirements, tankers were responsible for markedly more distress calls (by count) across every GT band than any other vessel type in 2022.

Also of note was the number of calls from container ships over 10,000GT compared to smaller vessels of the same type. This would seem to add credence to the concerns expressed by some about the ever-increasing size of container ships and, in particular, their ability to operate safely in adverse weather (for example, parametric rolling caused large-scale box losses in 2020 and 2021). There are also concerns about the frequency of mega-ship groundings, with the Ever Forward, in March 2022, being a high-profile example. In its 2020

annual report⁴² the UK Marine Accident Investigation Branch (MAIB) went as far as to raise large container ship safety as an issue for the shipping industry.



GRAPH 4: GMDSS signals received by gross tonnage and vessel type, 2022

Additionally, while the design of such vessels has changed to comply with the forward visibility line requirement in SOLAS V/22, and their beam has gradually expanded, cargo securing procedures are still essentially manual and are increasingly arduous due to the height of the stacks. The tightly spaced stacks, while important for stability and profit-margin, also make fire harder to detect, control and extinguish, further increasing the risk. In August 2022, the container ship Zim Charleston was forced to return to port shortly after departure after a fire broke out on board. It was fortunate to escape significant damage but fire-damaged containers had to be discharged.

Groundings or collisions, in which size and vessel manoeuvrability may be contributing factors, can block strategic choke points or damage the marine environment. Large vessels are therefore also of concern to salvors as they require specialist salvage equipment and

port infrastructure, which complicates and therefore slows the response and increases costs.

An expert risk article published by Allianz Commercial in May 2022 (as an extract from the Safety & Shipping Review 2022) noted: "A number of recurring themes have emerged in major incidents in recent years, many of which are a consequence of the increased size of vessels," says Justus Heinrich, Global Product Leader Marine Hull at AGCS. "As vessels have grown larger, values at risk have increased, while the environmental bar has been raised. However, regulation, safety management systems and salvage capabilities appear to have not always kept pace."⁴³

It may be that we are nearing the limits of ship size, from both insurance risk and operational risk perspectives, but the relative pros and cons of up-sizing are likely to continue to be discussed by shipowners and operators in the years ahead.

DISTRESS CALLS BY YEAR OF BUILD

According to the UNCTAD Review of Maritime Transport 2022⁴⁴, the global fleet has aged by 7% since 2011, and at the beginning of 2022, the average vessel age was 21.9 years. In 2022, the average age of a bulk carrier was 11.1 years (bulk carriers have been the youngest vessel type since 2013), compared to 13.7 years for container ships, 19.7 for oil tankers, and 27.1 for general cargo vessels.

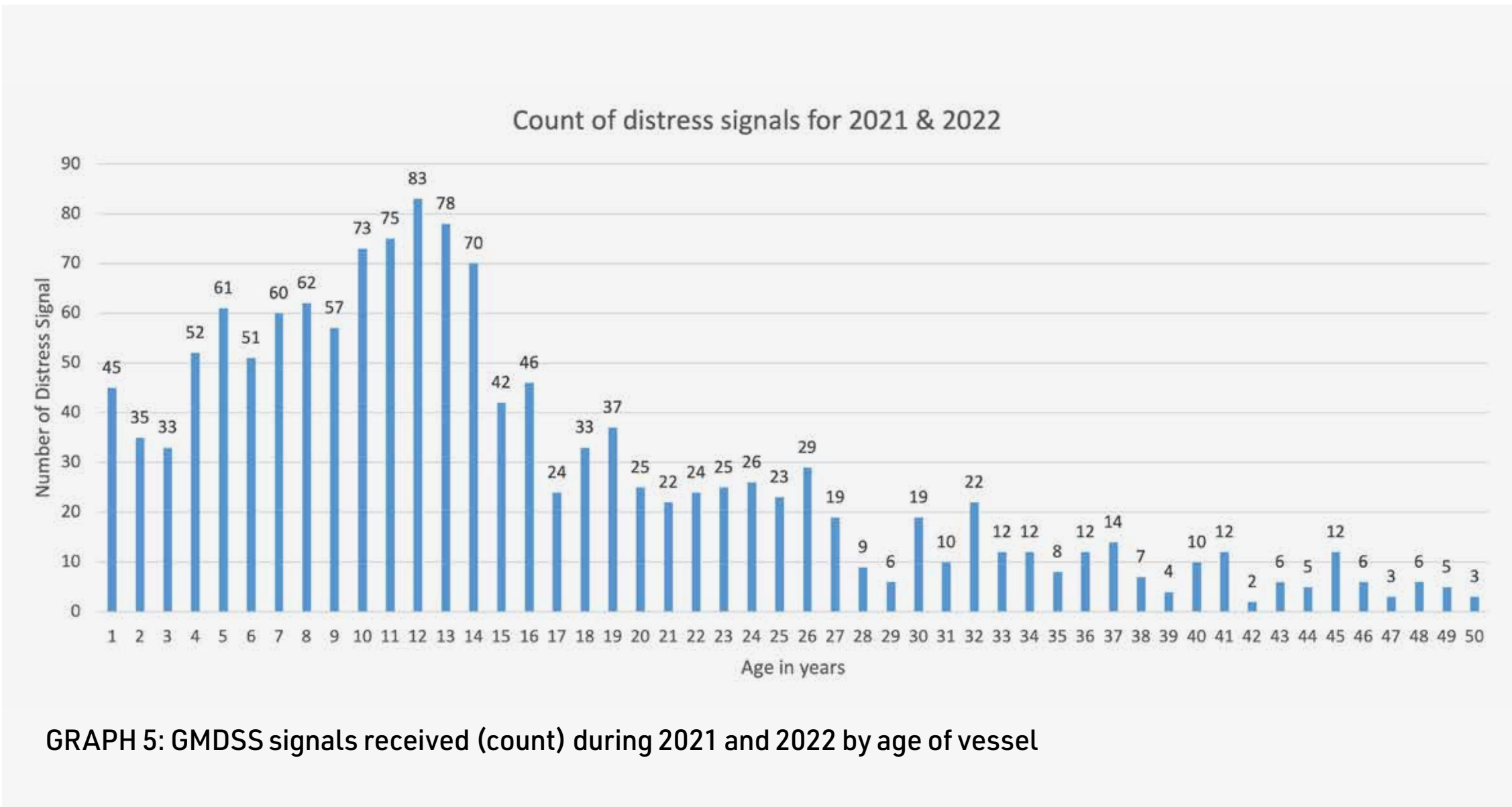
The ageing of the global fleet is a complex web of interconnected issues. Driven by the continuing uncertainty about future fuel and carbon prices, increasingly stringent regulations and rapid technological developments, shipowners and operators may be delaying investment and operating vessels for longer – with some investing in mid-life upgrades as a way of achieving better return on investment (ROI). These commercial decisions are also affected by other macro-factors, such as ongoing economic instability and the price of raw materials.

⁴² MAIB Annual Report 2020 (publishing.service.gov.uk)

⁴³ The problems with bigger ships | AGCS (allianz.com)

⁴⁴ Review of Maritime Transport 2022 | UNCTAD

However, age does not necessarily correlate with more safety incidents, as reflected in the following graph⁴⁵:



Note: In 2022, 38% (322) of distress calls received by Inmarsat did not include age-related data. In 2021 347 (44%) of distress calls did not include age-related data.

The age distribution in the early age ranges may be skewed to some extent by the number of vessels built over the past 14 years to replace older vessels as they are phased out of service. However, the high rate of calls for vessels between the ages of four and nine years is noticeable, as is the spike of calls received from vessels aged between 10 and 14 years, followed by comparatively lower call numbers from 15 years onwards. This pattern is consistent across all vessel types considered in

this report. Other dry cargo vessels were responsible for a higher number of calls after the age of 25 years than other vessel types, which may indicate that they typically have longer service lives.

Although it is impossible to conclude with any certainty, contributing factors to the high number of distress calls from vessels built over the past five years could include the closure of drydocks, reduced levels of Port State Control activity and fragmented seafarer training opportunities caused by COVID-19.

Given that the average lifespan of a ship is 25-30 years, somewhat surprisingly the data recorded over the two-year sample period suggests that crews are less likely to report incidents during the last 15 years of a vessel's service life. While wear and tear is inevitable, and mechanical breakdowns become more likely as the strain of operations takes its toll on engineering tolerances, analysis of GMDSS data, seems to disprove the idea that older vessels should automatically be regarded as less seaworthy and less reliable.

Afterall, older vessels may be expertly maintained and well operated, while younger vessels may experience teething issues or be poorly operated, particularly if they have new systems or technology onboard that crew are less familiar with. This very issue was discussed during the Inmarsat Proactive Safety Roundtable - Technology Focus, held in Hamburg in September 2022. Captain Rajiv Kapoor, General Manager QHSE of Anglo-Eastern (Germany) said, "When we put something new on ships, we often don't get buy-in from the crew because the technology is supposed to reduce their labour, but in many instances, it just becomes another burden. The technology needs to be foolproof and it should make life easier on board. Unfortunately, this is not happening at the pace it should, and we persist on developing new technologies without first fixing the existing ones."

It is possible to suggest that while market uncertainty about the most viable blend of decarbonisation tools persists, owners and operators may decide to operate older vessels in the short-term, rather than retiring them. Owners are increasingly factoring Environmental, Social, and Governance (ESG) principles into their decisions, but it may be possible to improve green credentials and satisfy stringent regulatory requirements through mid-life upgrades and making better operating decisions, such as speed and routing. This in itself is greener thinking as it obviates the carbon-intensive process of newbuild replacements.

⁴⁵ Vessels of 50 years and over have been omitted as the number of distress signals received was comparatively small against the rest of the dataset.

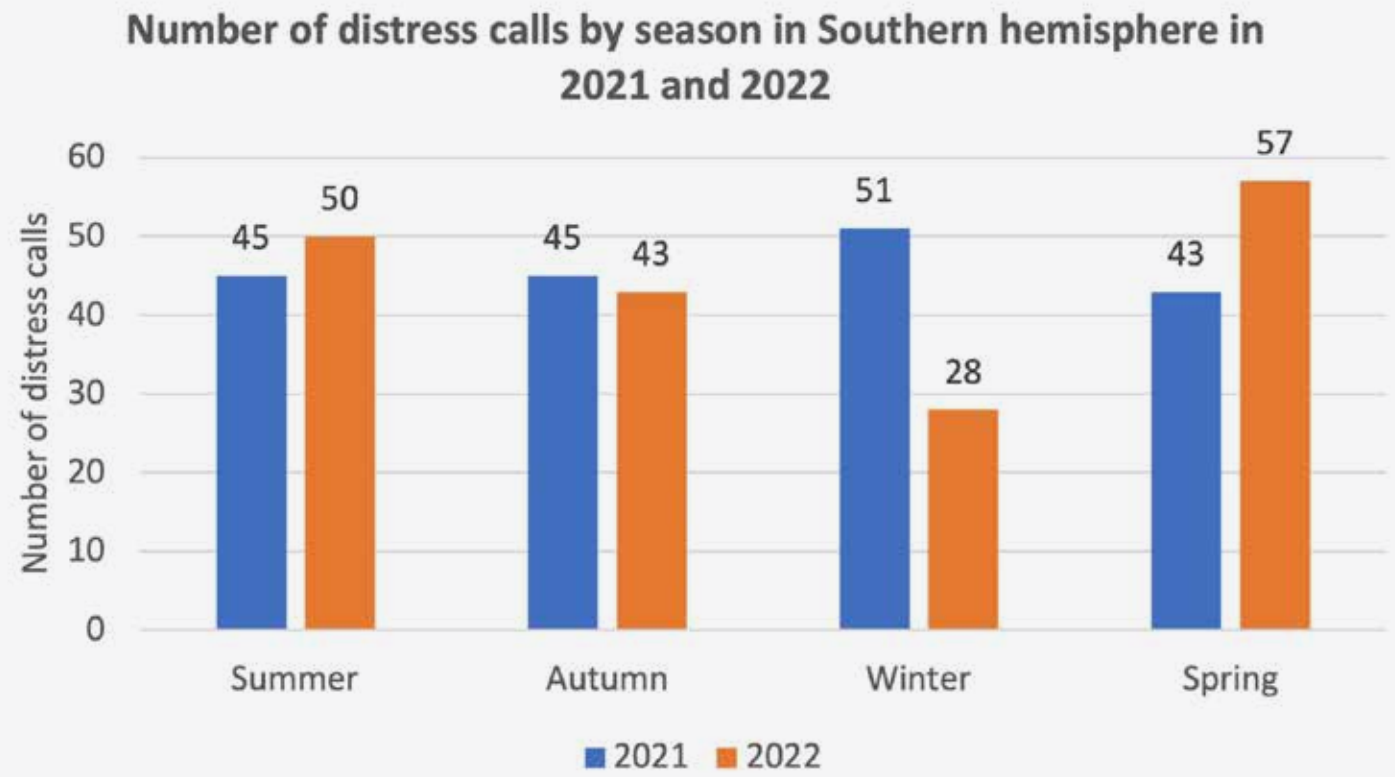
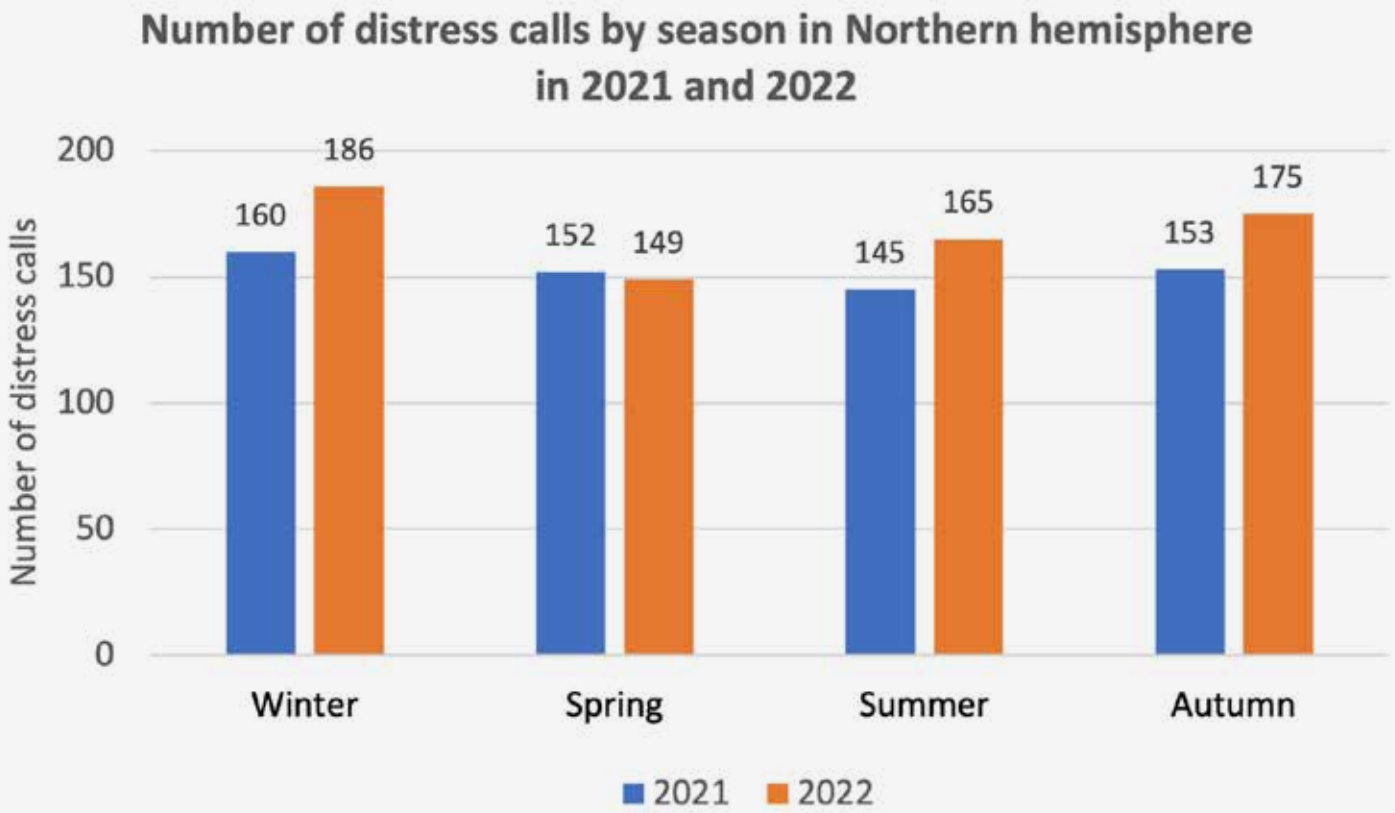
DISTRESS CALLS BY SEASONAL WEATHER PATTERNS

The National Oceanic and Atmospheric Administration’s (NOAA) Annual 2022 Tropical Cyclones Report⁴⁶, reported 88 named storms across the globe in 2022 - six less than 2021, but near the 1991-2020 average. 17 reached major tropical cyclone strength (≥ 111 mph) - below the 30-year average and two reached Saffir-Simpson hurricane wind scale category 5 (≥ 157 mph), the least since 2008, and four less than 2021. The annual global accumulated cyclone energy (ACE), an integrated metric of the strength, frequency, and duration of tropical storms, was the lowest since 2010.

The northern hemisphere registered more distress calls than the southern in both 2021 and 2022, reflecting the predominant east-west flow of global trade. Distress calls per season/per hemisphere were surprisingly consistent throughout the year with minimal variation between seasons, except a discernible spike during the northern hemisphere winter months. The relatively consistent seasonal results may reflect increased distress calls from yachts in the summer balancing out calls from merchant vessels throughout the rest of the year.

Note: 30 records with invalid longitude and/or latitude values were excluded from the analysis and the Arctic Ocean Region was excluded for having only 2 distress signals between 2021 and 2022.

The one significant variation between the two years occurred during the third quarter of 2022. During this period, the tally of distress calls from vessels operating south of the equator fell to 28, from 51 recorded during



GRAPHS 6&7: Seasonal gmdss distress calls by hemisphere in 2021 & 2022

the same three months in 2021, perhaps reflecting the findings of NOAA’s annual report of fewer major storms.

Such statistics can be misleading though. In April 2022, tropical storm Megi/Agaton (maximum sustained winds of 45mph) was still strong enough to reportedly sink two vessels in two days, with the fate of the crew of one of them, the coaster Celsa-2, still unknown⁴⁷. In July 2022, tropical cyclone Chaba (a Category 1 with maximum sustained winds of 85mph) reportedly sank the Fu Jing 001 an offshore construction ship in the South China Sea with the loss of 12 crew killed and 14 reported missing⁴⁸. In the Atlantic Ocean Region, incidents spiked at 78 in the third quarter of 2022, coinciding with the hurricane season affecting the Gulf of Mexico and Caribbean Sea. Thus, despite 2022 being regarded as a relatively benign one, in terms of tropical cyclones, the causal link between weather and the number of distress calls is evident.

As noted by recent scientific analysis, sea surface temperatures are increasing at an accelerated rate and could lead to more extreme weather and disrupt traditional weather patterns, posing a concern for vessel safety and the safety of established trade routes.⁴⁹

While vessels may receive sufficient weather warning, in some instances securing a vessel is not enough. Avoidance remains a safer option than batten-down, and route-planning, a dynamic process throughout a voyage, is critical. Technology, such as route optimisation software considers vessel’s performance characteristics, analyses ephemeral data and then computes optimal route alternatives for the Master. Such technology has proven invaluable, but there are cases where seafarers are still conflicted by having to make operational decisions that are also influenced by commercial pressures.

⁴⁶ [Annual 2022 Tropical Cyclones Report | National Centers for Environmental Information \(NCEI\) \(noaa.gov\)](#)
⁴⁷ [Marine accident round-up : 12th April 2022 | Insurance Marine News](#)

⁴⁸ [12 bodies found around Chinese ship sunken by Typhoon Chaba - The Washington Post](#)
⁴⁹ [Past and future ocean warming | Nature Reviews Earth & Environment](#)

DISTRESS CALLS BY FLAG STATE

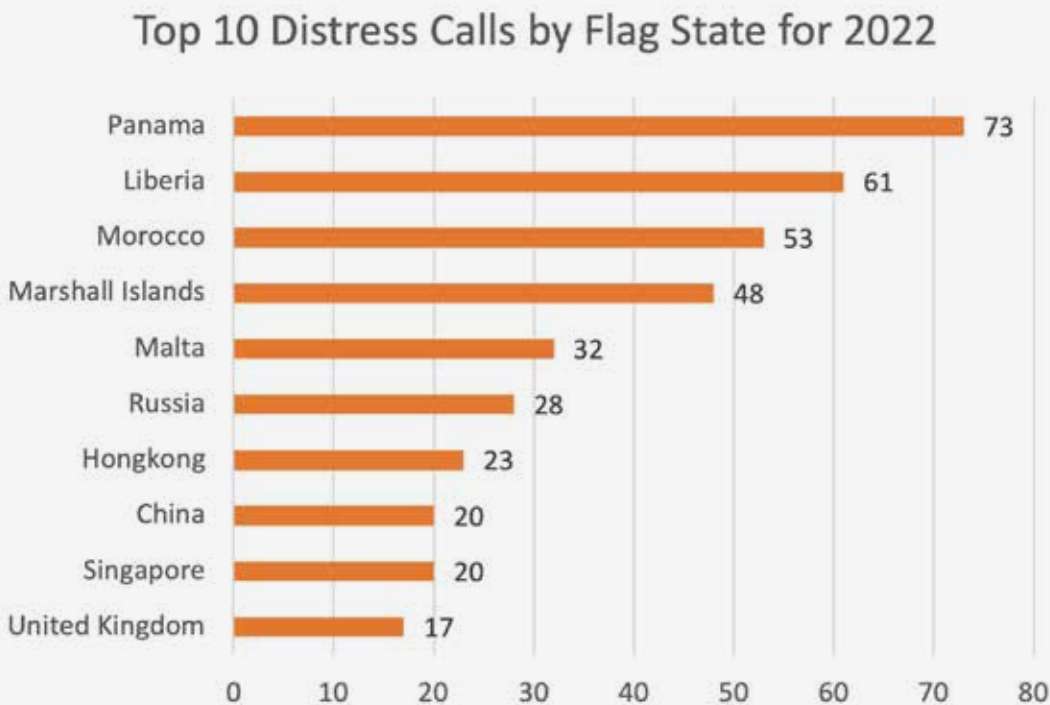
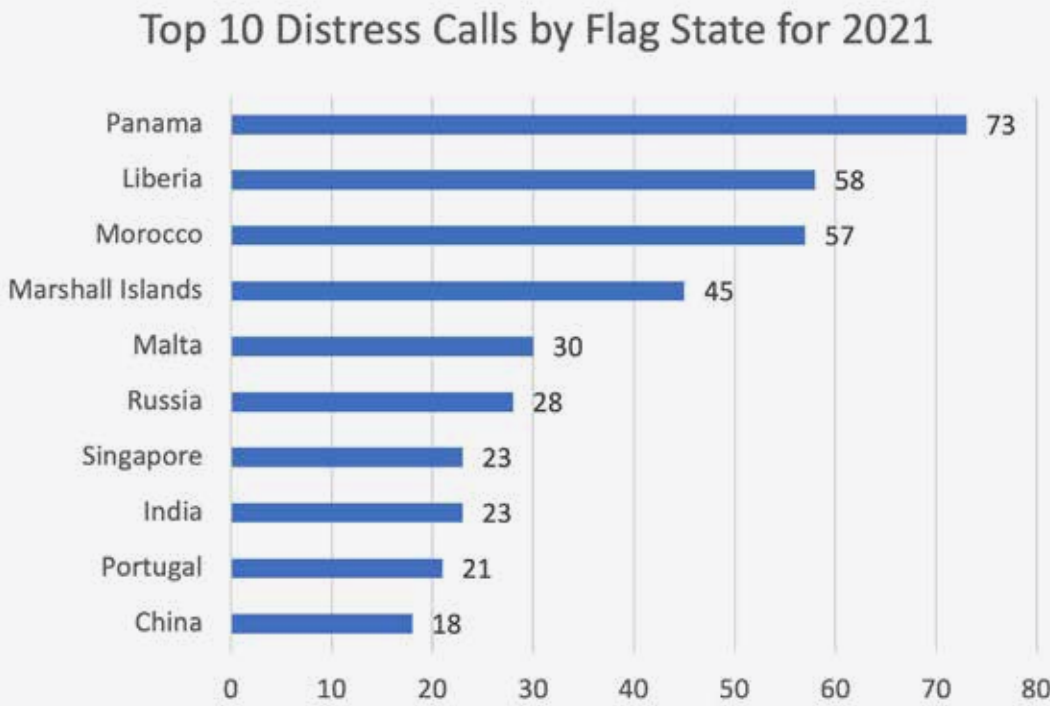
Of the 18 flags analysed (57 flag States were removed as their ships sent ten or less distress calls), Panama and Liberia accounted for the highest number of distress signals during 2022, at 73 and 61 respectively.

Note: Of the 853 distress calls received in 2022, 15.8% (135) were missing flag State information. In 2021 12.7% (101) of the 794 distress calls did not include it.

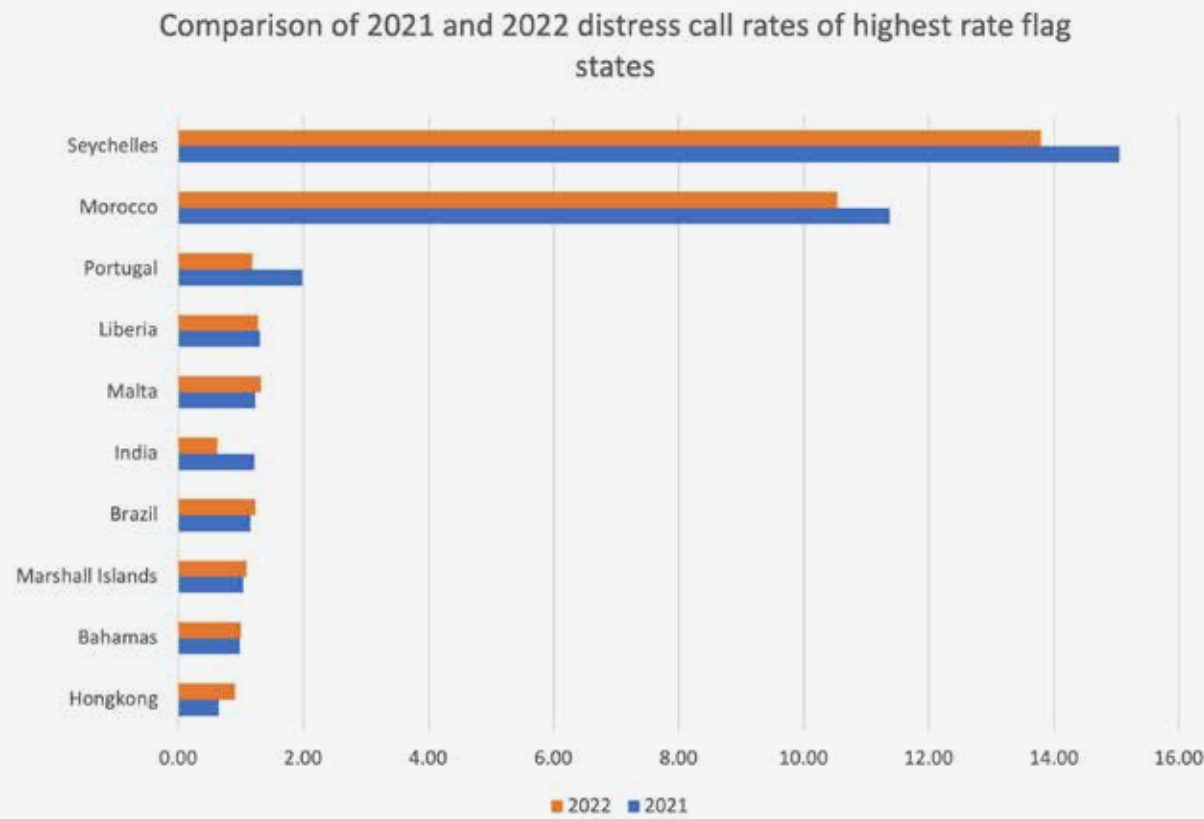
The high numbers of distress calls emanating from vessels flagged to Panama, Liberia and Marshall Island can be attributed to the size of their active vessel fleets. For example, 9,596 (around 16% of the global shipping fleet) were sailing under the flag of Panama in April 2022, and 4,295 vessels and 4,313 vessels sailed under the flags of Liberia and the Marshall Islands respectively (in August 2023 S&P Global confirmed that Liberia had overtaken Panama as the largest flag, by tonnage, although Panama’s registry still ranks first by vessel numbers). The situation for Morocco, a flag registry comprising a large proportion of fishing vessels, is different. Morocco is not a signatory to the CTA, and the consistently high incidence of distress calls suggests a need for regulatory intervention to improve fishing vessel safety in the region.

Analysis of distress rates (the number of distress calls per flag divided by the number of vessels on the flag State’s registry) produced markedly different rankings to merely analysing the number of calls (count). In 2022, 13.79% of vessels flagged to the Seychelles and 10.54% of vessels flagged to Morocco recorded distress calls. While these rates are actually both lower those recorded in 2021, they are significantly higher than Malta, the next flag State, with a rate of 1.33%.

The Seychelles registry does not appear on the International Chamber of Shipping (ICS) Shipping Industry Flag State Performance Table 2022/2023⁵⁰, as its ships did not appear in the

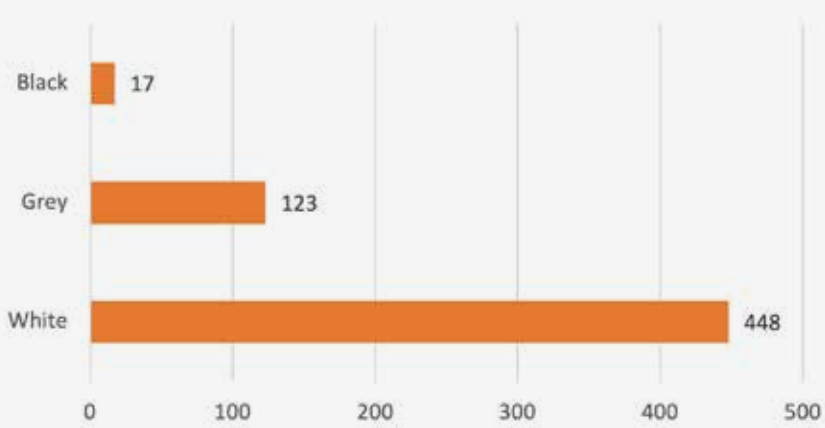


GRAPH 8: Top 10 distress call counts by flag states in 2021 and 2022

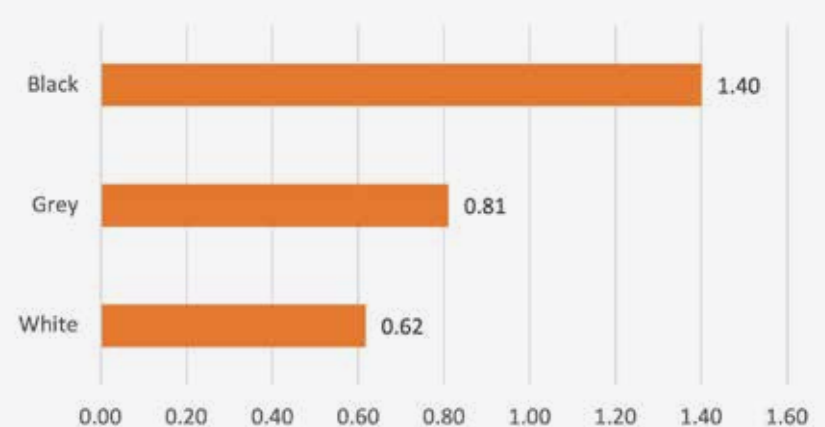


GRAPHS 9: Top 10 distress call rates by flag states in 2021 and 2022

Total Number of calls per Flag Classification 2022



Rate of distress calls per Flag Classification for 2022



GRAPHS 10 & 11: Distress call counts and rates by flag classification 2022

50 <https://www.ics-shipping.org/publication/shipping-industry-flag-state-performance-2022-2023/>

Paris or Tokyo MOU lists. Morocco was listed as demonstrating potentially negative performance (although individual indicators should be considered within the context of the table).

Flag State classification, based on the number of deficiencies resulting in ship detention by Port State Control authorities, assigns flags to one of three lists: "White"; "Grey"; and "Black". 68 of the 75 recognised Flag States appear on the lists. Most calls in 2022 originated from vessels on the "White" list, although this is not surprising as the majority of flags are on this list. Analysing the rate of incidents offers more useful performance insights and illustrates the much higher rate of distress calls for "Black" list Flag States. While this could have been anticipated, the stark results demonstrate the importance of bringing such flags up to international safety standards, through whatever capacity building and enforcement levers are available to improve compliance.

Ship Detentions

The Paris MoU on Port State Control Annual Report 2022⁵¹ noted that while shipping had returned to a degree of normality after the turbulence of COVID-19, its impact was still being felt, for example the number of ships earmarked for inspection in the ports of Paris MoU members. It also noted the possible relationship between the pandemic and average detention rates.

In terms of headline figures, the report stated that Port State Control Officers (PSCOs) conducted 17,289 inspections in 2022, 9,340 recorded deficiencies, and 723 vessels were detained (up from 534 in 2019). After years of steady decline in detention percentages, the abrupt reversal, first recorded in 2021 when detentions rose from 2.98% in 2019 to 3.49%, was repeated when it increased to 4.18% in 2022, the highest in 10 years. While PSCOs issued 10 Refusal of Access Orders (bans), a significant decrease compared to the 25 bans in 2019, the overall number of detainable deficiencies increased

from 3,015 in 2019 to 4,873 in 2022. The increased detention rates were reflected in the MoU's performance lists of Flag States.

The top three detention rates in terms of vessel types were: livestock carriers (7.9%); general cargo/multipurpose ships (6.8%) and tugs (6.5%). Across all types, the five most frequently recorded deficiencies in 2022 were: International Safety Management Code (ISM); fire doors/openings in fire resisting divisions; Seafarers' Employment Agreement; cleanliness of engine room; and auxiliary engine - an almost identical list to that reported in 2021 with only the latter two swapping positions.

Although the performance level of Recognized Organizations (ROs), acting on behalf of Flag States, was found to be similar to that reported in 2021, there were concerns that some recognising Flag States are not effectively overseeing their ROs. As noted in the EMSAFE Report 2022⁵², this has resulted in instances where ROs have underperformed in the role of carrying out statutory survey and certification, resulting in lower safety standards.

As a result of such results, the importance of Port State Control (PSC) is again coming to the fore as officers seek to uphold standards and address ships that pose a threat to safe, environmentally-friendly shipping, and safe working and living conditions on board. Conscious of the increasing detention rate, the Chairman and Secretary-General of the Paris MoU jointly declared the intention, in the Introduction of the 2022 report, to take further steps to help eliminate substandard shipping, including strengthening cooperation with other MoU regimes globally.

One manifestation of this decision was the Paris and Tokyo MoU joint Concentrated Inspection Campaign (CIC) on STCW, which ran from 1 September to 30 November 2022. The CIC was included in routine PSC inspections, with the objective to confirm that crews were certified as per the STCW requirements and by the Minimum Safe

Manning certificate of each vessel. PCSOs considered conditions necessary for safe vessel operations, including familiarisation of newly joined crew and bridge procedures, for example voyage planning, the watchkeeping schedule and rest periods⁵³.

During the campaign, Tokyo MoU members alone carried out 6,953 inspections (84.97% of which included the CIC inspection) and 1,041 CIC related deficiencies were found on 802 vessels. The least favourable results being recorded against records for hours of rest, which illustrates the ongoing need to reduce seafarer fatigue. 20 of the 5,908 ships subject to a CIC inspection were detained, an outcome which the Tokyo MoU secretariat concluded "indicates a relatively high level of compliance with STCW in general."⁵⁴

DISTRESS CALLS BY SHIPYARD

Driven by a decade of decreasing demand, the global shipyard industry has steadily consolidated capacity since 2014. The Danish Ship Finance's Shipping Market Review⁵⁵ published in November 2022, found that global yard capacity was distributed among 284 active yards. Each yard delivered at least one vessel in 2022, but only 95 received new orders during the year, with yards in China and South Korea the main beneficiaries.

The review found that average yard utilisation outside the group of 95 first-tier yards approached 40% in 2022, and the majority of yards not building container ships or LNG carriers (which comprised 56% of the orderbook) had employment for less than six months. Even within the 95 first-tier yards a significant imbalance is evident. In the container segment, more than 850 vessels have been ordered since the beginning of 2021, but only 49 yards are engaged in building them. Similarly, while the LNG orderbook grew beyond 40% of the fleet, in 2022, contracting activity was divided between only seven yards, of which the four largest secured 80% of the ordered

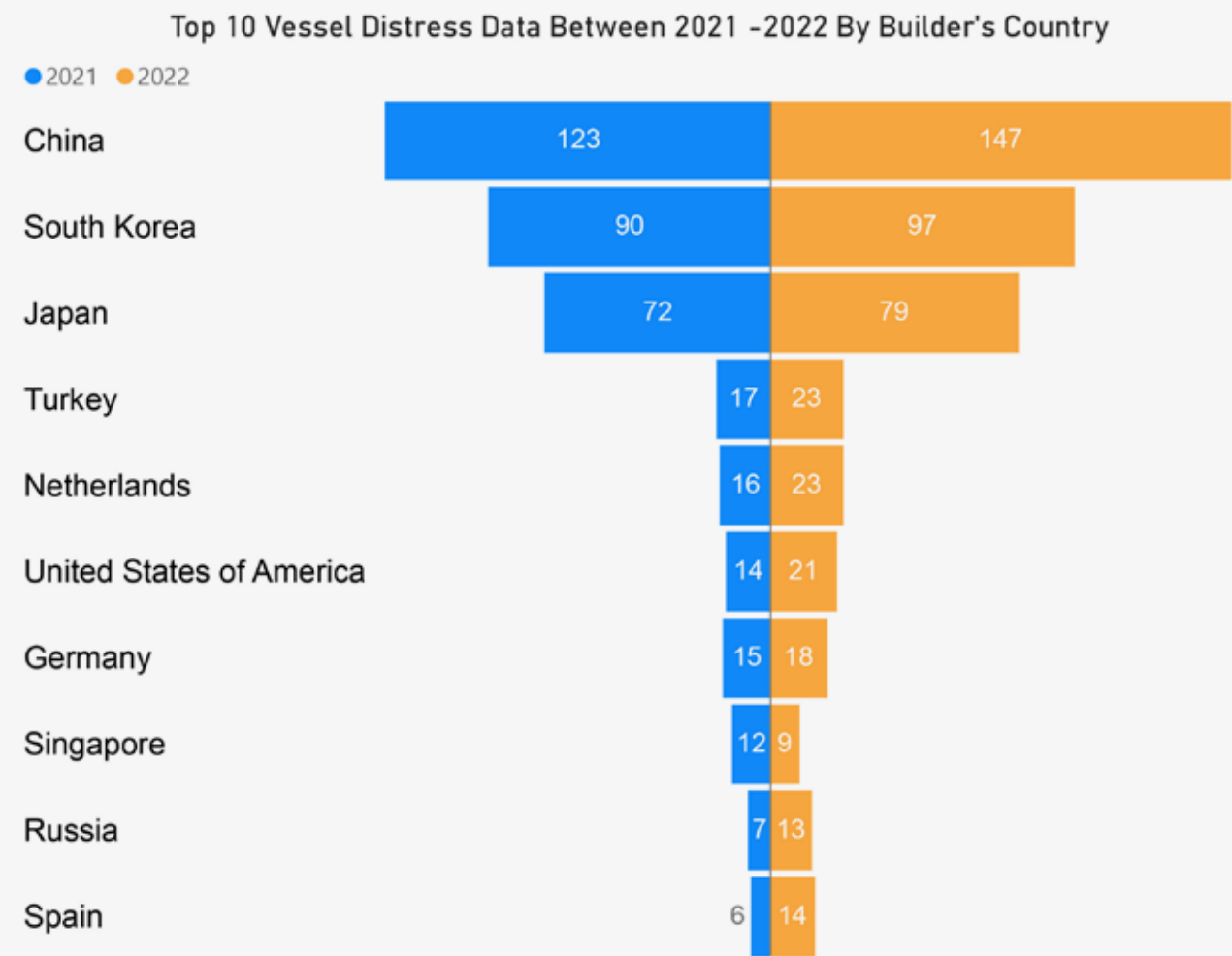
⁵¹ 2022 Paris MoU Annual Report "Port State Control; 40 years of harmonisation" | Paris MoU

⁵² Publications - EMSAFE Report - EMSA - European Maritime Safety Agency (europa.eu)

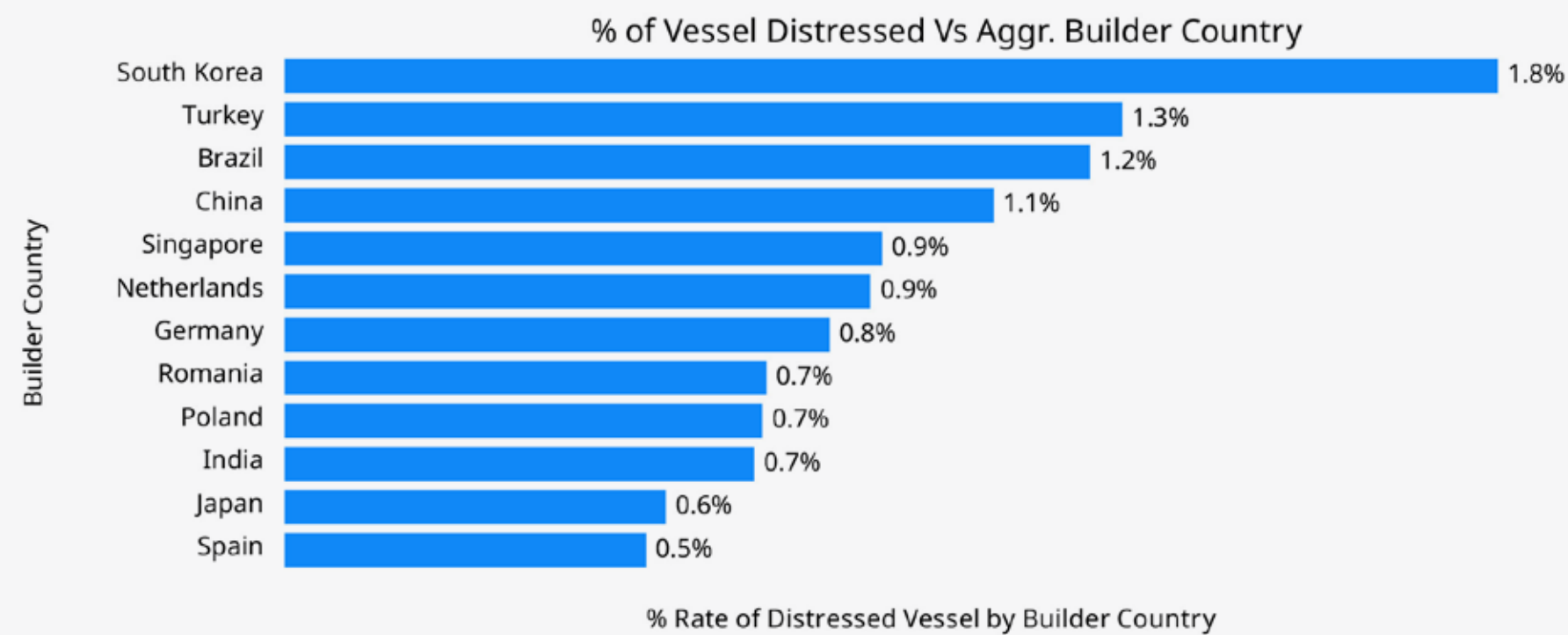
⁵³ Checklist for upcoming PSC Concentrated Inspection Campaign on STCW now available (dnv.com)

⁵⁴ TOKYO MOU SECRETARIAT (tokyo-mou.org)

⁵⁵ Shipping Market Review - November 2022 (shipfinance.dk)



GRAPH 12: Vessel distress data for 2021/2022 by shipbuilding nation



GRAPH 13: Vessel distress data for 2021/2022 as an aggregate of vessels constructed

tonnage. The picture is further complicated as not all first-tier yards are equipped to cope with decarbonisation; 15 yards attracted 66% of orders for vessels powered by alternative fuels in 2022.

Therefore, unsurprisingly, the list of shipyards responsible for vessel construction issuing the highest number of distress calls continues to correspond with those building the most vessels. To this end, Chinese, South Korean, and Japanese builders topped the rankings of distress calls by shipyard in 2022. That said, distress calls from vessels constructed in nine of the top ten ship building nations increased between 2021 and 2022, with only Singapore bucking the trend with a 25% reduction in calls, although this may be a result of fewer new vessels being built there.

Note: 61% of the 1647 GMDSS signals received during 2021 and 2022 included the shipyard's name and country.

Although vessels constructed in Chinese shipyards recorded the highest number of distress calls, analysing the rate of calls (number of calls / vessels constructed per country) significantly affects the rankings.

It would, however, be extremely irresponsible to make any causal links between construction at a specific yard in a particular country and the distress call count/rate, as there are many factors that affect vessel safety after its launch and throughout its service life. Each vessel in the global fleet works to different standards based on their class, Flag State and ship manager. Furthermore, factors including complexity of the vessel and systems, routes and region of operations, nature of cargo carried, company processes and procedures, seafarer performance and behaviour, weather conditions, and vessel maintenance all contribute to the number of distress calls and incidents.

Another factor is often overlooked during the shipbuilding process; human-centric design. As Captain Jaquelyn Burton, Head of Creative Design at Kongsberg Maritime, said during the Inmarsat Proactive Safety Roundtable - Human Element Focus, held in June 2023 in Oslo, "You can provide as much training as you like, but if you put the exhaust lines too close to a fuel pump, the crew member is likely to get burned." This succinctly describes the apparent disconnect between the end-user (the seafarer), equipment manufacturers, and shipyards, which focus primarily on compliance and cost metrics rather than user experience.

It was also suggested that the spatial-design process could be improved by shipowners and seafarer representatives becoming more involved in the process, for example, by establishing cross-stakeholder feedback loops to capture and share information about specific ship types. Peter Swift, attending the roundtable in his capacity of chairman of the International Seafarers Welfare

Association, The Sailors’ Society, suggested that even the simple questions, such as, “If you were to redesign your ship, what changes would you make?” could have a real impact. He stressed that seafarers need to be more empowered to impact decisions that affect vessel safety - even if this might sometimes contradict commercial imperatives.

Seafarer Yrhen Bernard Sabanal Balinis also noted how ship design affects crew cohesion: “The decrease in recreational space combined with internet access can create a cabin-only approach, which decreases opportunities for social interaction and increases the risk of isolation”, he said. Given the renewed focus on seafarer welfare, the industry would do well to listen and implement changes based on seafarer concerns.

DISTRESS CALLS BY CLASS SOCIETY

As with the information on vessel shipyards, it is difficult to determine any causal link between classification societies and the number of distress calls, as numerous factors impact the safe operation of a ship. However, ships registered with ABS, BV, DNV, RINA and ClassNK all experienced higher call counts in 2022 compared to 2021.

During 2022, vessels classed by the American Bureau of Shipping (ABS) made the highest number of GMDSS calls (87), and the overall top five ranking is similar to 2021, with only ClassNK and LR swapping places (ClassNK moved up one place). It is worth remembering that class societies often specialise in particular sectors. Analysis of GMDSS data noted that 72% of ABS’ distress calls came from tankers, which is consistent with tankers sending the most distress signals during 2022.

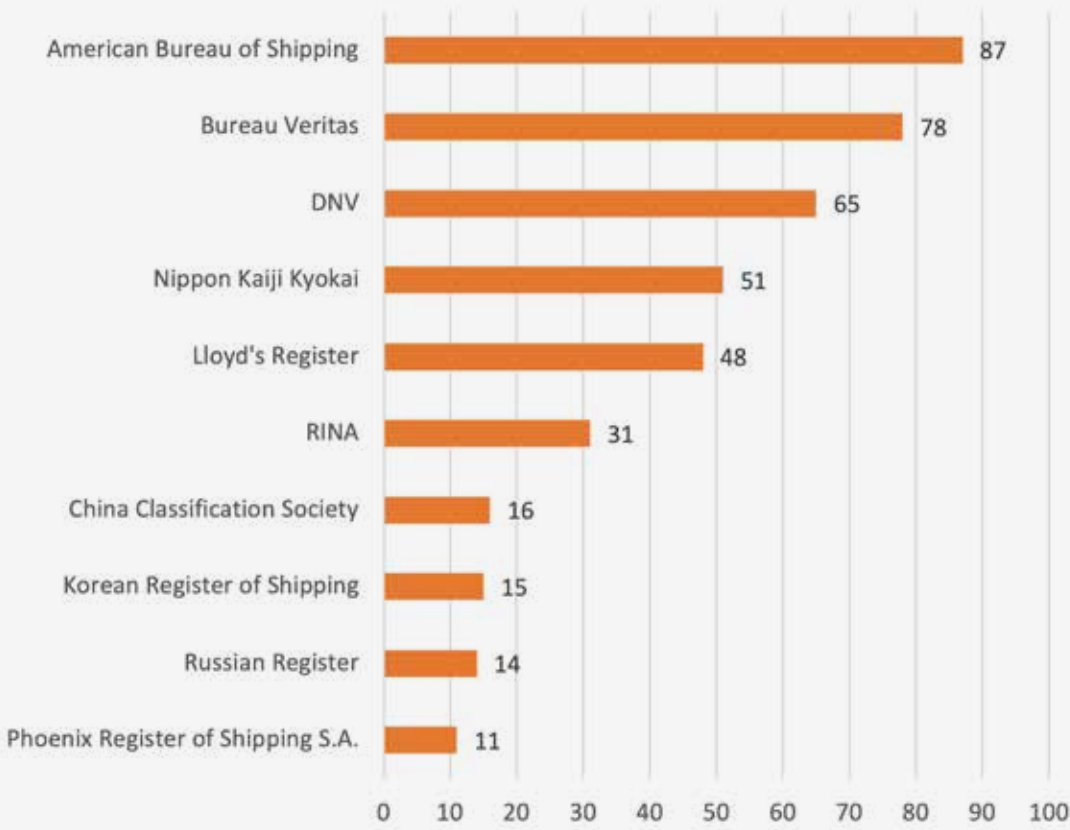
Note: 47% of the GMDSS distress calls received by Inmarsat during 2022 did not include class information, against 49% in 2021. Prior to the analysis, 15 classification societies were removed from the remaining data, as vessels made less than 10 distress calls.

These largest classification societies amassed the highest number of GMDSS calls due to the size of the fleets they class. Using rate analysis, the classification society ranking changes significantly.

The most notable change being that Phoenix Register (PHRS) moved from tenth by count to first; 2.37% of PHRS vessels sent distress signals (11 calls from 465 registered vessels), an 86% increase in the rate of calls over 2021.

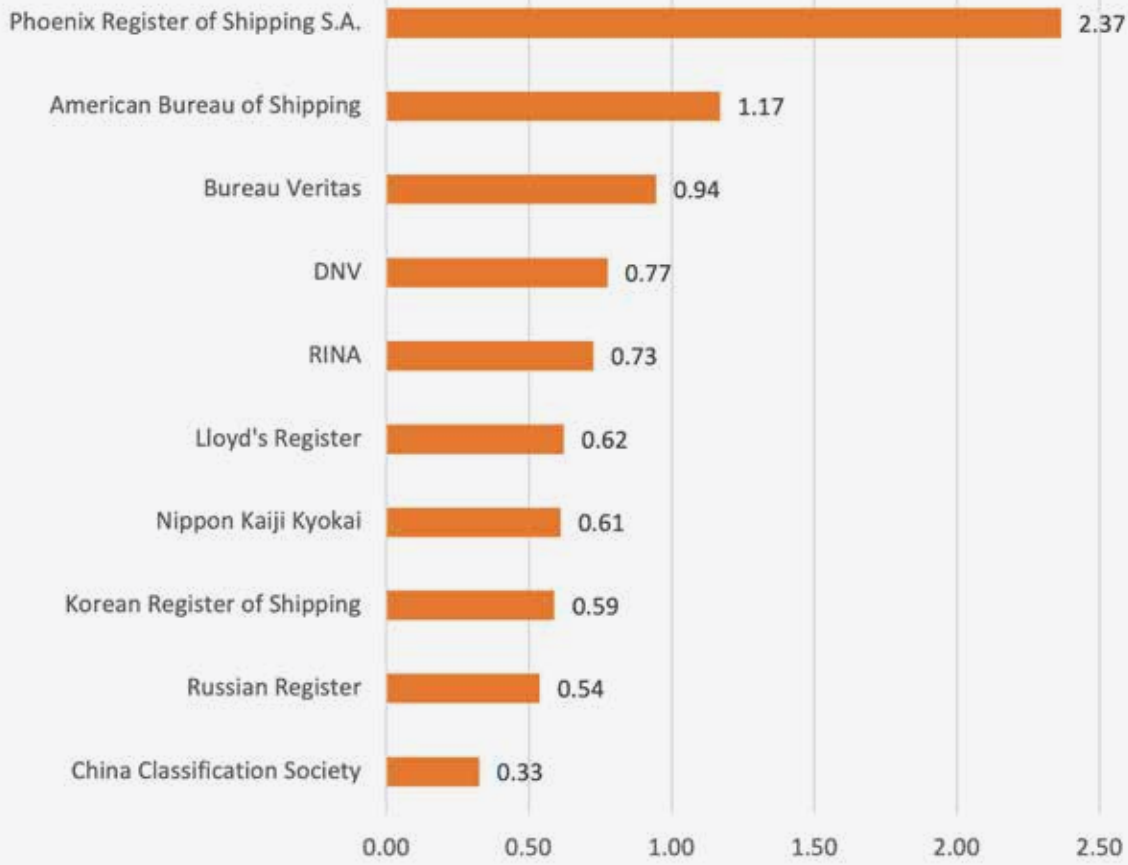
Meanwhile, 55% of calls came from “other dry cargo” vessels and, referring back to vessel type analysis, such vessels were shown to have a comparatively small rate of distress calls, so the increase may indicate an ageing fleet or other performance factors and warrant further investigation.

Number of Distress calls by Classification Society for 2022



GRAPH 14: Number (count) of vessel distress calls by class society for 2022

Rate of Distress Calls by Classification Society for 2022



GRAPH 15: Rate of vessel distress calls by class society for 2022

CONCLUSION

This report looks to the future of maritime safety, but before the industry advances, it would do well to first address existing deficiencies. While significant progress has been made, serious challenges persist, including:

- Inadequate top-down safety culture reduces emphasis on safety and encourages poor reporting systems, a reluctance to share information and to learn from recurring incidents.
- Maritime stakeholders currently require different datasets. Data is collected in silos and seldom shared, so industry trends and practices remain opaque.
- Human error remains a leading cause of safety incidents. However, over emphasis on this can obscure organisational safety culture failings. Poor application of human centred design could also be a significant, but perhaps poorly understood, contributing factor.
- Poor living and working conditions, separation from families and unfair employment practices continue to impact seafarer well-being, potentially leading to safety risks.
- Safety being viewed as a check box exercise. There is a risk of a continued lack of attention and investment in safety to proactively address known risks, exacerbated by black swan events including the COVID-19 pandemic, geopolitical tensions and global energy and supply chain disruption.

Tackling these issues requires collaboration between governments, regulatory bodies, industry stakeholders, and seafarer organisations. Rather than defaulting to the traditional call for yet more regulation, shipping would perhaps be better served, in the short-term, by adopting an overarching and unifying safety goal and set of underlying KPIs. This would enable regulatory impact to be objectively assessed, highlight and prioritise improvement areas, and track the effect of consequent safety initiatives over time. Without global targets and KPIs our industry will struggle to progress, and assess, the safety of ship operations and of our people.

Concurrently, stakeholders could strengthen the regulatory framework by focussing on ratification and effective implementation of existing regulations; reviewing “place of refuge” rules to better accommodate ships in distress; increasing the frequency of compliance inspections; and taking more robust enforcement action when mandatory requirements are not met. While agreed regulatory minimum standards serve to keep our global industry safe, shipowners and operators have begun to lead conversations on the use of goal-based standards as new fuels and technologies enter the market. This signals a potential future direction for the industry. As maritime operations rapidly advance, regulatory standards may need to evolve in line with this approach. As with shipping’s international agreement to set ambitious greenhouse gas emissions targets, the industry should consider adopting equivalent maritime safety targets at the IMO to hold all stakeholders to account and push forward meaningful change.

Encouraging a 360° safety culture that values data collection and analysis could help to identify trends and continuously improve safety measures. Such a culture should promote top-down direction and resourcing; trust, accountability and personal responsibility at all organisational levels; and bottom-up incident and near-miss reporting (without the fear of sanctions for making legitimate mistakes). The overriding aim

should be safety, with a core objective to identify and minimise repeated, and therefore often preventable, accidents.

Data can provide valuable insights, but accuracy, timely collection, thorough analysis and reliable delivery is vital. Optimal utilisation requires clearly articulated and consistent datasets, reliable collection mechanisms, quality assurance, privacy protection and, fundamentally, an agreement to use safety data responsibly. Anonymised safety data could be shared with regulators, industry associations, Designated Persons Ashore, ship builders, research institutions etc. to further maritime safety. This would require an agreement as an industry on what data is required to be shared, and to harmonise how it is anonymised, gathered and analysed to ensure it can be meaningfully used. One solution could be to develop a digital platform, under the auspices of a suitable international body, to facilitate the process of sharing deaths, accidents, incidents and near-miss reports, and best practices, to drive the evolution of safety measures. Essentially, shipping should utilise the data to look for trends and root causes of common safety issues that can then be proactively addressed to improve the safety of the industry.

Shipping recognises the potential of automation and autonomous technologies. Maritime autonomous surface ships (MASS), collision avoidance systems, advanced navigation aids, real-time monitoring of vessel/equipment performance, and others can improve safety and efficiency. Embracing technology, while addressing attendant cyber security risks, is key. If shipping can strike the right balance between human oversight and control on the one hand and machine precision and reliability on the other, it can reap the benefits of enhanced safety management, dynamic risk assessment, and evidence-based decision-making.

MASS has brought the need for systemic change into sharp relief and offers an unprecedented opportunity to press the reset button and put safety front and centre. Now is the time to put the regulatory framework on a more data-driven footing. But analysing the related

data requires the computational power of artificial intelligence and machine learning. With suitable programming, these tools could also identify patterns and trends, develop predictive models to identify risk and anticipate potential incidents, and prioritise preventive measures.

Data and technology can also augment seafarer training and professional development. Virtual and augmented reality technologies could provide realistic, targeted and immersive training for seafarers in safe and controlled environments. With the risks associated with alternative fuels and the scale of retraining required to handle and use them safely, such an approach could pay dividends and be scheduled so as to not impinge on seafarer rest periods.

It is not possible to eliminate risk from maritime operations, but the future of maritime safety will be driven by a combination of technological advancements, regulatory developments (preferably harmonised), evolving industry practices and a focus on sustainability. Stakeholders should continue to work towards more efficient and environmentally responsible maritime operations, but the overriding goal must be to enhance the safety of shipping’s key constituents, its seafarers.

Safety should be the foundation of decision-making, especially as the industry heads into times of great change. While shipping is rightly focused on cutting its emissions, the IMO’s theme for World Maritime 2024 lays out an imperative for the shipping industry: “Navigating the Future: Safety first”. Safety should also be regarded as a business enabler rather than a cost of doing business, but this requires a change of mindset. As Peter Broadhurst noted during the Inmarsat proactive Safety Roundtable - Regulatory Focus, held in March 2023 in London, “I do believe the maritime industry wants to move forward, I believe that shipping companies and other stakeholders want to improve the safety record. Collectively, we just need a concerted effort to break out of our silos. Efficient data gathering and sharing of safety-related information will propel lasting change that benefits seafarers, the environment and the global supply chain.”

METHODOLOGY: DATA ANALYSIS

Focusing on satellite distress signal data received by Inmarsat Maritime between January and December 2022, and a review of 2021 data, the Future of Maritime Safety report 2023 maps annual incidents, identifies trends, assesses safety issues of concern to the shipping industry and makes assumptions, where possible.

For the purposes of writing this report, the primary count and rate factors of interest were vessel types, vessel Gross Tonnage (GT), year of build, seasonal periods of high incidence and corresponding weather patterns. Additional context was provided through an analysis of Class Societies, Flag States, and manufacturing yards/countries of build.

GATHERING DATA FOR ANALYSIS

Chapter IV of the Safety of Life at Sea (SOLAS) convention established the Global Maritime Distress and Safety System (GMDSS) in 1988. Implemented globally between 1992 and 1997, cargo ships of 300 gross tonnage (GT) and over and all passenger ships on international voyages must be equipped with satellite and radio equipment that conforms to international standards.

Inmarsat receives, processes and archives GMDSS data received from its network data and RescueNET services. Although carriage requirements for such terminals are extensive, it should be noted that vessels operating solely in Sea Areas A1, A2, and A4 are exempt from requiring satellite communications, while those operating in Sea Area A3 can fit either MF/HF or Inmarsat C terminals.

In line with previous reports, the 2023 edition does not therefore purport to assess all marine casualties and incidents recorded during 2022. Rather it focuses solely on shipping safety incidents which resulted in the use of GMDSS Inmarsat Safety services.

To offer a more compelling trend analysis, the 2023 report also expands upon and draws comparisons with, where possible, the analysis presented in the Future of Maritime Safety Report 2022, which analysed incidents reported to Inmarsat during 2021⁵⁶. Where appropriate, it also cites data from the first Future of Maritime Safety Report, published in 2021, which covered 2018 to 2020.

DATA ANALYSIS

After commissioning the report, Inmarsat sent raw GMDSS data to Seafocus International for analysis⁵⁷. The data was divided into seven specific variables, for example, location of the distress call and the age of the vessel. Each variable was analysed in isolation and also, where appropriate, in combination with other variables, for example time-series incident analysis per geographic region. The seven variables identified and analysed were:

- Vessel sector/type⁵⁸- matched against Inmarsat records and publicly available vessel data
- Flag State
- Year of build
- Gross tonnage
- Shipyard/country of build
- Location information (such as ocean region, latitude and longitude)
- Classification Society

The data associated with each variable was analysed to establish incident counts and rates of incident. SeaFocus International defines its analysis as follows: The analysis of counts consists of statistical analysis of total counts (for example the total number of distress calls sent from gas carriers per year). The analysis of counts serves as an overview of the analysed variable and provides a quick summary of total metrics. The rates analysis consists of statistical analysis of rates (for example the number of distress calls sent from gas carriers divided by the total number of operating gas carriers per year). The rates analysis provides more objective metrics for each variable as it accounts for the size of the analysed category.

Due to the limitations of rates analysis, variables with less than 10 records in the dataset were excluded from the analysis to avoid extremely small categories distorting the rates. Seafocus International also excluded "Ro-Ro", "Gas Carrier", "Other Non-Cargo", "Pure Car Carrier", "Reefer", and "Rigs & Platforms" vessels from the main body of the analysis due to the relatively small number of total registered vessels - cumulatively they account for less than 5% of the total registered fleet.

CONTRIBUTORS TO DATA ANALYSIS

In support of future maritime talent, the analysis of Inmarsat RescueNET and network data for the Future of Maritime Safety Report 2023 was undertaken by PhD students working under the auspices of SeaFocus International. They provided insights into trends gleaned from data gathered during 2022 and reevaluated data from 2021, using new analytical models, to allow year-on-year comparative analysis.

⁵⁶ The statistical analysis for the 2023 report was conducted by SeaFocus, the underlying methodology differs from that used to underpin the 2021 (covering 2018-2020) and 2022 (covering 2021) editions of the Future of Maritime Safety Report. As a result, the datasets used to inform the 2023 report differ from previous editions.

⁵⁷ Inmarsat removed duplicate GMDSS calls from the same vessels to present a cleaner dataset as, in some

cases, it received multiple GMDSS alerts per single incident.

⁵⁸ The 2022 report was based on 12 vessel types, whereas Seafocus International identified 15. To ensure accurate comparisons between 2021 and 2022 datasets, the revised vessel types are referred to throughout this report for both years. Readers will therefore note discrepancies between the 2021 data analysis presented in this report and that offered in the 2022 report.

METHODOLOGY: REPORT ANALYSIS

The editorial structure and narrative of the Future of Maritime Safety Report 2023 was compiled by maritime consultancy Intent Communications, drawing on SeaFocus International data analysis shared by Inmarsat Maritime, industry commentary, and in-house research.

In addition to supplying industry context and insights into the findings and trends, Intent Communications also supported Inmarsat in organising three in-person Inmarsat Proactive Safety roundtables. The roundtables invited a cross-section of participants, including international and national regulators, ship owners, ship operators, trade associations, classification societies, and maritime lawyers, to exchange opinions and expert insights into pressing safety issues and how they could be addressed in the future.

The three sessions were held in Hamburg (September 2022), London (February 2023) and Oslo (June 2023) and considered technology, the regulatory environment, and the human element, respectively. The essence of each roundtable, discussion themes and comments have been woven into the text of this report

DISCLAIMER

As described in the methodology section, the report is based on Inmarsat’s internal GMDSS data which is correct to the best of its knowledge. The report also contains certain assumptions based on this data. These assumptions are made in good faith but are statements of opinion only. The report also contains opinions provided by third parties which may not reflect the views of Inmarsat. While the information in this document has been prepared in good faith, no representation, warranty, assurance or undertaking (express or implied) is or will be made, and no responsibility or liability (howsoever arising) is or will be accepted by the Inmarsat group or any of its officers, employees or agents in relation to the adequacy, accuracy, completeness, reasonableness or fitness for purpose of the information in this document. All and any such responsibility and liability is expressly disclaimed and excluded to the maximum extent permitted by applicable law.

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REFERENCES

A

Allianz Commercial (May 2022) Expert risk article Loss drivers in the shipping industry: larger vessels. Retrieved from <https://commercial.allianz.com/news-and-insights/expert-risk-articles/shipping-safety-22-losses.html>

Allianz Commercial (May 2023) Hull and cargo risks continue to rise. Retrieved from <https://commercial.allianz.com/news-and-insights/expert-risk-articles/shipping-safety-23-hull-cargo-risks.html#:~:text=In%202020%2C%20a%20US%20National%20Cargo%20Bureau%20%28NCB%29,dangerous%20goods%20and%2038%25%20of%20the%20export%20ones>

Allianz Global Corporate & Specialty (2023) Safety and Shipping Review 2023. Retrieved from <https://commercial.allianz.com/content/dam/onemarketing/commercial/commercial/reports/AGCS-Safety-Shipping-Review-2023.pdf>

Australian Transport Safety Bureau (Report published 2 February, 2022) Gas control equipment malfunction on board the gas tanker Suiso Frontier at Western Port, Hastings, Victoria on 25 January 2022. Retrieved from https://www.atsb.gov.au/publications/investigation_reports/2022/mair/mo-2022-001

B

BBC News (19 February, 2022) Ferry fire: Search for 12 missing off Corfu continues. Retrieved from <https://www.bbc.co.uk/news/world-europe-60443517>

BIMCO (28 July, 2021) New BIMCO/ICS seafarer workforce report warns of serious potential officer shortage. Retrieved from <https://www.bimco.org/news/priority-news/20210728---bimco-ics-seafarer-workforce-report>

BIMCO (13 September, 2022) Recorded webinar: Longer routes and higher rates as EU bans Russian oil and products. Retrieved from https://www.bimco.org/news/market_analysis/2022/20220912-smoo-tanker

Bloomberg (7 February, 2022) Oil-Ship Blast Off Nigeria's Coast Leaves Slick Stretching Miles. Retrieved from <https://www.bloomberg.com/news/articles/2022-02-07/oil-ship-blast-off-nigeria-s-coast-leaves-slick-stretching-miles?leadSource=uverify%20wall>

Boat International (13 December, 2021) Global order book: Over 1,000 superyacht projects on order in 2022. Retrieved from <https://www.boatinternational.com/boat-pro/global-order-book/how-many-superyachts-on-order-for-2022>

C

Cision.com (12 August, 2021) News ABS Brings Together Leading Industry Players to Tackle Safety Challenge of Aging FPSO Fleet. Retrieved from <https://news.cision.com/american-bureau-of-shipping/r/abs-brings-together-leading-industry-players-to-tackle-safety-challenge-of-aging-fps-fleet,c3430689>

D

Danish Ship Finance (November 2022) Shipping market review. Retrieved from <https://shipfinance.dk/media/2256/shipping-market-review-november-2022.pdf>

DNV (12 August, 2022) Checklist for upcoming PSC Concentrated Inspection Campaign on STCW now available. Retrieved from <https://www.dnv.com/news/checklist-for-upcoming-psc-concentrated-inspection-campaign-on-stcw-now-available-228935>

DNV and Lloyd's List Intelligence (2023) Whitepaper Maritime Safety Trends 2012-2022: Advancing a culture of safety in a changing industry landscape. Retrieved from <https://www.dnv.com/publications/maritime-safety-trends-2012-2022-advancing-a-culture-of-safety-in-a-changing-industry-landscape--242642>

E

European Maritime Safety Agency (17 June, 2022) European Maritime Safety Report (EMSAFE). Retrieved from <https://emsa.europa.eu/publications/item/4735-emsafe-report.html>

F

FreightWaves (6 September, 2019) Container inspections reveal misdeclared cargo, poor stowage. Retrieved from <https://www.freightwaves.com/news/container-inspections-reveal-misdeclared-cargo-poor-stowage>

- I**
ICC International Maritime Bureau (January 2023) Piracy and armed robbery against ships, Report for the period 1 January - 31 December 2022. Retrieved from <https://www.icc-ccs.org/reports/2022%20Annual%20IMB%20Piracy%20and%20Armed%20Robbery%20Report.pdf>
- International Association of Dry Cargo Shipowners (19 May, 2023) Bulk Carrier Casualty Report 2023. Retrieved from <https://www.intercargo.org/bulk-carrier-casualty-report-2023/>
- International Maritime Organization (Media Centre, Hot Topics) Enhancing fishing vessel safety to save lives. Retrieved from <https://www.imo.org/en/MediaCentre/HotTopics/Pages/Fishing.aspx#:~:text=The%20total%20number%20of%20fishing%20vessels%20in%20the,in%20length%20and%20over%20operate%20in%20marine%20waters>
- International Maritime Organization (Media Centre, Hot Topics) Maritime Security and Safety in the Black Sea and Sea of Azov. Retrieved from <https://www.imo.org/en/MediaCentre/HotTopics/Pages/MaritimeSecurityandSafetyintheBlackSeaandSeaofAzov.aspx>
- Insurance Marine News (12 April, 2022) Marine accident round-up : 12th April 2022. Retrieved from <https://insurancemarinenews.com/insurance-marine-news/marine-accident-round-up-12th-april-2022/>
- ITF Seafarers (8 July, 2022) Victory for seafarers' safety as Dutch court sides with unions on container lashing. Retrieved from <https://www.itfseafarers.org/en/news/victory-seafarers-safety-dutch-court-sides-unions-container-lashing#:~:text=The%20ruling%20from%20the%20Rotterdam%20District%20Court%20means,not%20given%20to%20seafarers%20as%20an%20additional%20responsibility>
- International Chamber of Shipping (ICS) Shipping Industry Flag State Performance Table 2022/2023. Retrieved from <https://www.ics-shipping.org/publication/shipping-industry-flag-state-performance-2022-2023/>
- L**
Lloyd's List (11 February, 2022) Why the Trinity Spirit FPSO explosion was not a safety anomaly. Retrieved from <https://lloydslist.maritimeintelligence.informa.com/LL1139817/Why-the-Trinity-Spirit-FPSO-explosion-was-not-a-safety-anomaly>
- Lloyd's List (24 June, 2022) New vessel type could be needed to carry electric vehicles. Retrieved from <https://lloydslist.maritimeintelligence.informa.com/LL1141339/New-vessel-type-could-be-needed-to-carry-electric-vehicles>
- Lloyd's List Intelligence (28 October, 2022) Maritime casualty incidents at highest for 14 years. Retrieved from <https://www.lloydslistintelligence.com/knowledge-hub/data-storytelling/maritime-casualty-incidents>
- M**
Manila Bulletin (23 May, 2022) (UPDATE) Tragedy at sea as passenger boat catches fire in Quezon. Retrieved from <https://mb.com.ph/2022/05/23/tragedy-at-sea-as-passenger-boat-catches-fire-in-quezon/>
- Marine Accident Investigation Branch (9 June, 2021) Marine Accident Recommendations and Statistics 2020. Retrieved from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/992017/MAIBAnnualReport2020.pdf

- N**
National Oceanic and Atmospheric Administration (July 2023) Annual 2022 Tropical Cyclones Report. Retrieved from <https://www.ncei.noaa.gov/access/monitoring/monthly-report/tropical-cyclones/202213>
- Nature, Earth and Environment (Volume 3, November, 2022) Past and future ocean warming. Retrieved from https://www.nature.com/articles/s43017-022-00345-1.epdf?sharing_token=Wj8uKOhfYFbiGgrJF9rRM9RgN0jAjWel9jnR3ZoTv0MVxgNXy27Ls-eSRi_djzdm_KgQvjTzxW1ZmiL9DHCC4nws_BlkddhDLlhk50ycPxANU4DSZWiuZqJCGhFdtOVqedQAFxz8Y_sfM1WifKeb34hB2RIqMir47woXe2b8MHYOT4HEfu1s470xNgDJ0-Uy4XndnMVcLOYh37EjJiPgK-tc53iJA5uFVSaYVdBwsyo%3D&tracking_referrer=www.washingtonpost.com
- O**
Offshore Energy (3 January, 2023) 2022 in review: Some of the major incidents related to offshore oil & gas. Retrieved from [2022 in review: Some of the major incidents related to offshore oil & gas -Offshore Energy \(offshore-energy.biz\)](https://www.offshore-energy.biz/2022-in-review-some-of-the-major-incidents-related-to-offshore-oil-gas/)
- P**
Paris MoU on Port State Control (1 July, 2023) 2022 Paris MoU Annual Report "Port State Control: 40 years of harmonisation". Retrieved from <https://www.parismou.org/2022-paris-mou-annual-report-%E2%80%9Cport-state-control-40-years-harmonisation>
- R**
Regional Cooperation Agreement on Combating Piracy and Armed Robbery against Ships in Asia Piracy and armed robbery against ships in Asia (2022) Annual Report 2022. Retrieved from <https://www.recaap.org/resources/ck/files/reports/annual/ReCAAP%20ISC%20Annual%20Report%202022.pdf>

Reuters (16 November, 2022) Tanker hit off Oman, says Israeli-controlled shipping firm. Retrieved from <https://www.reuters.com/world/middle-east/oil-tanker-struck-exploding-drone-attack-off-oman-ap-2022-11-16/>

S

Seatrade Maritime News (November 9, 2022) Safety concerns mount over lithium-ion battery cargo fires. Retrieved from <https://www.seatrade-maritime.com/casualty/safety-concerns-mount-over-lithium-ion-battery-cargo-fires>

Seaman Memories (2 March, 2023) 15 Merchant Ships Bombed During the Russia – Ukraine War. Retrieved from <https://www.seamanmemories.com/15-merchant-ships-damaged-or-sank-russia-ukraine-war/>

Statista (November 2022) Capacity of oil tankers in seaborne trade from 1980 to 2022 (in million dwt). Retrieved from <https://www.statista.com/statistics/267605/capacity-of-oil-tankers-in-the-world-maritime-trade-since-1980/#:~:text=The%20capacity%20of%20the%20world%20oil%20tanker%20fleet,29%20percent%20of%20global%20seaborne%20trade%20that%20year>

Statista (2022) Number of container ships in the global merchant fleet from 2011 to 2022. Retrieved from <https://www.statista.com/statistics/198227/forecast-for-global-number-of-containerships-from-2011/#:~:text=Over%20the%20past%20decade%2C%20the%20number%20of%20container,reached%20roughly%20two%20billion%20deadweight%20tons%20in%202020>

T

The Guardian (5 August, 2023) Russian chemical tanker hit by Ukraine drones in Kerch Strait. Retrieved from <https://www.theguardian.com/world/2023/aug/05/russian-chemical-tanker-reportedly-hit-by-ukraine-drones-in-kerch-strait>

The Loadstar (13 October, 2022) Blaze-hit TSS Pearl sinks in Red Sea after crew abandon ship. Retrieved from <https://theloadstar.com/blaze-hit-and-abandoned-box-ship-tss-pearl-may-have-sunk-in-red-sea/>

The New York Times (23 May, 2022) Rogue Wave Strikes Cruise Ship, Killing a Passenger and Injuring 4 Others. Retrieved from <https://www.nytimes.com/2022/12/03/world/americas/viking-cruise-ship-rogue-wave.html>

The Washington Post (4 July, 2022) Twelve bodies recovered from Chinese ship sunk by typhoon. Retrieved from <https://www.washingtonpost.com/world/2022/07/04/hong-kong-typhoon-chaba-fujing-rescue/>

Tokyo MoU on Port State Control Secretariat (1 March, 2023) Press Release: Preliminary Results of the CIC on STCW 2022. Retrieved from [https://www.tokyo-mou.org/doc/Preliminary%20Results%20of%20the%20CIC%20on%20STCW%202022%20\(Press%20release\)-f.pdf](https://www.tokyo-mou.org/doc/Preliminary%20Results%20of%20the%20CIC%20on%20STCW%202022%20(Press%20release)-f.pdf)

U

United Nations Conference on Trade and Development (29 November, 2022) Review of Maritime Transport 2022. Retrieved from unctad.org/system/files/official-document/rmt2022_en.pdf

United Nations Black Sea Grain Initiative Joint Coordination Centre (1 September, 2023) Cargo exports by port and month. Retrieved from [Black Sea Grain Initiative | Data | United Nations](https://blackseagrains.org/en/data)

W

World Shipping Council (22 May, 2023) Containers Lost at Sea – 2023 Update. Retrieved from https://static1.squarespace.com/static/5ff6c5336c885a268148bdcc/t/646cf5b50ba5a260052b1b66/1684862389529/Containers_Lost_at_Sea_2023_FINAL.pdf

Y

Yachting.com (10 June, 2022) Why do accidents occur at sea and what do even experienced sailors sometimes underestimate? Retrieved from <https://www.yachting.com/en-gb/news/accidents-at-sea#:~:text=It%E2%80%99s%20not%20technical%20failures%20or%20a%20sudden%20change,factors%20cause%20up%20to%2078%25%20of%20all%20accidents>



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