BSU

Bundesstelle für Seeunfalluntersuchung
Federal Bureau of Maritime Casualty Investigation

(Source: R. Frank, NNN)

2019 Annual Report

June 2020

Foreword

Dear Reader,

I am writing these words to you from my home office. The Corona virus has Germany firmly in its grip, public life is paralysed, work is dealt with at home. Fortunately, this has been possible at the Federal Bureau of Maritime Casualty Investigation (BSU) for years. Appropriate technical facilities and electronic workflows, i.e. processing and forwarding files, are in place. And so, both this annual report and the accident reports can be produced at home in a small private room or in the office – there is meaningful work for all our staff even in the home office. However, this should not become a permanent state of affairs, especially since ships need to be visited again. I sincerely hope that you, our valued readers, have remained healthy and not been affected by recent events.

On to the subject at hand. No, the cover picture is not a photomontage, nor is it a still, as one might assume at first glance. When it comes to capturing an accident in detail there are times when the photographer simply picks exactly the right moment. This photograph then finds its way to the BSU. You may not be keen on the at times excessive use of the mobile phone to capture anything and everything in a photograph at every single minute of the day. However, to the BSU the information gained in this manner is worth more than its weight in gold. More and more witnesses are sending us pictures or the investigators stumble across them by chance when researching on the internet. It is often the case that the items of information then flow into the investigative work, literally making the causes of an accident 'visible' and thus easier to understand – you will see various examples in this annual report.

The year had a lot to offer in other respects, too. We were able to close the GLORY AMSTERDAM case. This accident attracted a lot of attention and therefore the BSU held a press conference, which for the second time was extremely well attended. On the international stage the BSU is involved in an extensive joint investigation into the MSC ZOE case with the Netherlands and Panama. Internally there have been some changes in staffing. Of course, there were also accidents again this year – some of which sadly had dramatic and fatal consequences. I will be discussing some of them in this report.

And that brings me back to the start. Health is our most valuable asset – whether on land or at sea. Stay safe!

Warmest regards,

Ulf Kaspera

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The Federal Bureau of Maritime Casualty Investigation (BSU) is a federal higher authority subordinated to the Ministry of Transport and Digital Infrastructure (BMVI). Its offices are in Hamburg and it currently has 13 staff members employed on a full- and part-time basis. It is one of the smallest federal higher authorities, has a single-stage administrative structure and operates under the supervisory control of Department WS 22 of the BMVI.

The BSU's offices in the Federal Maritime and Hydrographic Agency (BSH) building in Hamburg. The piers are visible in the foreground. In the background are the so-called 'Dancing Towers' to the right and the Astraturm to the left. (Source: Fotolia)

Marine casualty investigation

1.1 Principles

Both national and international legislation define the work of a marine casualty investigation authority as 'safety investigation'. This clearly demonstrates that a marine casualty investigation is not intended to clarify issues of fault or liability but is solely for the purpose of improving maritime safety. A marine casualty investigation aims to deliver a comprehensive account and analysis of the course of events leading up to and during an accident to prevent future accidents. It should consider any direct and indirect causes, facilitating factors, as well as the overall circumstances including possible rescue operations and safety systems. Due to legislation, the BSU is guided by a no blame approach within the framework of a safety partnership.

The German Maritime Safety Investigation Law (SUG) constitutes the primary legal framework for the work of the BSU. The SUG transposes international rules and regulations, such as the International Maritime Organization's (IMO) Casualty Investigation Code (Resolution MSC.255(84)) and the EU's Directive 2009/18/EC, into the German judicial system. Other provisions that apply under German law include Regulation (EU) No 1286/2011 and the IMO's Resolution A.1075(28), which harmonise the methodology and implementation of the investigation of accidents internationally.

According to the above, the BSU is responsible for investigating incidents and marine casualties involving any category of seagoing ship from any flag

- within German territorial waters;
- during traffic movements on the German navigable maritime waterways as well as to, from and in ports connected to them;
- outside territorial waters but within the German Exclusive Economic Zone (EEZ) only in the event of very serious casualties, provided that the special rights assigned to Germany there are affected.

Outside the areas above the BSU only investigates marine casualties on or involving seagoing ships flying the German flag or if the Federal Republic of Germany has a substantial interest in the investigation of a marine casualty abroad (if German nationals are killed or seriously injured, for example).

The SUG also addresses those cases in which the BSU does not take action. The BSU is not responsible for marine casualties involving only

- ships of war, troop ships and other ships owned or operated by Germany's federal or state governments and used only on government non-commercial service;
- ships not propelled by mechanical means, wooden ships of primitive build, pleasure yachts and pleasure craft not engaged in trade, unless they have prescribed manning and carry more than 12 passengers;
- fishing vessels with a length of less than 15 m, and
- fixed offshore drilling units.

This has practical relevance in the pleasure boating sector, in particular. The SUG does not cover privately used recreational craft (unlike those used commercially), meaning the BSU's legal mandate does not extend to investigating accidents involving recreational craft. This applies regardless of damage. It is only possible for the BSU to investigate such accidents in (rare) exceptions and then only when they occur in Germany's territorial waters and concern pleasure craft built, suitable and used for maritime navigation. Open rowing or sailing boats and personal watercraft, etc. do not belong to this category.

The SUG distinguishes between four categories of marine casualty: incident, less serious marine casualty (LSMC), serious marine casualty (SMC) and very serious marine casualty (VSMC). Moreover, in the case of the VSMC, it requires that the BSU always conduct an investigation.[1]

1.2 The investigation procedure

After an accident notification is received, the BSU's director (or the deputy director in his absence) decides on the initiation of an investigation and usually assigns the subsequent processing of the accident to a team of two people. The BSU is free from instructions in this decision and in all other aspects of the investigation. The BSU has extensive rights and powers of intervention when investigating the course of events leading up to and during an accident, including in respect of access to the scene of the accident, preservation and analysis of evidence, questioning witnesses and the engagement of experts. These rights are not limited to entities/individuals directly involved in the accident (the ship, her crew and possibly pilots), but can also be exercised in respect of third parties (e.g. shipowners, shipyards or classification societies) or authorities (e.g. the Federal Waterways and Shipping Administration or the Ship Safety Division (BG Verkehr)).

[1] On the subject of marine casualties, see in particular the explanatory notes in Section 6.1 (Statistics).

An important cornerstone of the work of the BSU is cooperation with the members of European and non-European investigative bodies. Based on European and international principles, the BSU conducts investigations in international cooperation. These can be limited to merely supporting the other investigative body or may extend to a full joint investigation and joint final report. One recent example of this is the loss of cargo of the MSC ZOE on the German-Dutch border at the beginning of 2019. The BSU has worked on this very closely with its Dutch counterpart, the *Onderzoeksraad voor Veiligheid* [Dutch Safety Board] and the Panamanian investigating authority (Panama Maritime Authority – PMA). See following pages for more on this case.

1.3 Investigation reports and safety recommendations

The investigation report is the product of a safety investigation and made available to the public. An investigation finishes with the publication of the report. The BSU's investigation reports follow a certain pattern, which is provided by Directive 2009/18/EC. In addition to the required indication of the purpose of the safety investigation, notably, the prevention of future accidents and malfunctions, but not the determination of blame, liability or claims, each report contains

- a summary of the accident;
- factual information, including but not limited to ship and voyage particulars;
- a detailed account of the course of the accident and investigation;
- an analysis of the investigation;
- ensuing conclusions, and
- usually safety recommendations.

The publication of interim investigation reports is also required if it is not possible to prepare a final report within one year of the date of an accident. Cases not investigated further after the BSU has conducted a preliminary investigation are usually closed with an internal report. Interim reports relating to ongoing investigations are only produced for SMCs or VSMCs.

Safety recommendations constitute the key element and conclusion of an investigation report. A safety recommendation points to an identified gap in safety and aims to help the addressee avoid or at least reduce the impact of future situations similar to those that led to an accident in the case investigated. A safety investigation by the BSU focuses not only on events on board, but also looks at organisation ashore or the safety system where appropriate. In short, any factors that may have facilitated the accident are investigated and evaluated. Consequently, in addition to the crew, addressees of safety recommendations can include pilots, shipowners, shipyards, manufacturers of equipment, the Maritime Administration, the legislator or other bodies. Safety recommendations can also be directed at several addressees but their wording should be sufficiently specific. Addressees should be able to clearly discern what is being recommended to them. Accordingly, recommendations of a general nature should be avoided.

One or more safety recommendation(s) is (are) not issued for every investigation report.

This can be for a variety of reasons, e.g. that no specific deficiencies were apparent or the speculative addressees had already closed a gap in safety identified by the BSU through their own action while the investigation was ongoing. The BSU published a total of 12 investigation reports (including interim) in 2019 and issued 27 safety recommendations in four reports.

Safety recommendation addressees in 2019 included (number of recommendations in square brackets):

- owners [11]
- BMVI [9]
- Ship Safety Division (BG Verkehr) [2]
- BSH [1]
- Directorate-General for Waterways and Shipping [1]
- German Central Command for Maritime Emergencies (CCME) [3]

The 27 safety recommendations issued included 15 concerning the grounding of the GLORY AMSTERDAM. In this particular case we are pleased to note that the competent authorities referred to and the BMVI responded promptly and quickly closed the gaps in safety found.

The BSU may also issue an early alert in the form of preliminary safety recommendations before the publication of an investigation report. This is to prevent accidents if it has been found that a safety risk exists for which notification must be provided as quickly as possible, i.e. before publication of the final report. A preliminary safety recommendation concerning the collision between the ASTROSPRINTER and traditional sailing vessel № 5 ELBE was published in 2019. It is strongly recommended that so-called one-compartment status be ensured on traditional ships carrying more than 12 passengers and, if necessary, that bulkheads be installed to mitigate the risk of foundering in the event of leakage.

1.4 Summary investigation report, lessons learned and other activities

In addition to the generally known activities mentioned above, there were also some changes in 2019:

- the summary investigation report was reintroduced;
- the IMO's mandatory rules for the publication of lessons learned introduced last year have been implemented;
- other activities, such as assisting other countries, are gaining in importance.

Let us begin with the **summary (or 'simplified') investigation report**. The European Union provided this option in 2009 for cases in which incidents or LSMCs are investigated but do not result in the publication of safety recommendations. They should enable the investigating body to compile 'simplified' reports not subject to the strict procedural rules. The statutory period of 30 days for parties involved to submit comments is dispensed with, for example. This rule was incorporated into the SUG in 2011 when the EU requirement was transposed. Legally, these still constitute official investigation reports. The BSU produced a number of summary investigation reports up until 2015 but then discontinued this practice. Since it saves time and effort, which in turn is beneficial to other investigations, it was resumed last year. The legal provision that an investigation into a SMC or VSMC may not be concluded with a summary investigation report is certainly open to criticism.

The consequences of an accident are not always the crucial factor for any resulting knowledge that contributes to the prevention of an accident. The legislator should give the investigating authority more leeway in this regard. A summary investigation report was first issued in the form of a report on the CAPE LEONIDAS's engine failure and subsequent emergency anchoring manoeuvre in November. More will follow.

Let us move on to the second point, **lessons learned**. As outlined in the last annual report, in June 2018 the IMO laid the foundation for the investigating country to publish the general lessons learned from an accident. The aim is to go beyond the rather narrow group of safety recommendation addressees and make other potentially affected parties aware of existing risks. Only cases from which general findings can be made are suitable for this. The BSU has adopted this approach and published lessons learned in a total of five cases, which can be accessed in a new section on its website.

I would like to close the first section with a brief insight into the BSU's **other investigative activities**, which – although the general public does not usually notice them – are a true devourer of time and resources. The BSU's investigators carry out extensive preliminary investigations in many cases where it is finally concluded that a main investigation would be inappropriate for lack of new findings that might improve ship safety. These preliminary investigations are archived internally and not accessible to the general public for legal reasons. Further, the BSU is increasingly involved in the investigative work of other countries, without being explicitly mentioned in a final report. The BSU often assists in questioning witnesses, gathering information or even inspecting vessels. Accordingly, when an investigating country concludes its investigation with a report, the BSU will – at least if there is public or professional interest in so doing – also translate and publish such reports going forward.

Main investigations

This section deals with several accidents that occurred in 2019 and are currently the subject of main investigations. In principle, investigations should be completed after one year. Unfortunately, this is not possible in many cases. The reasons for this are as varied as the actual accidents. However, the rule is that the length of the investigation rises with the degree of complexity of the events surrounding the accident and number of parties involved. The BSU obviously makes every effort to analyse accidents quickly and publish the final report within one year.

2.1 Loss of containers on the MSC ZOE

The year immediately started with a 'bang'. The Panama-flagged MSC ZOE, at 395 m in length one of the biggest container ships in the world, lost a large number of containers in the North Sea in a storm on the evening of New Year's Day and early hours of the next morning.

Figure above: The MSC ZOE sailing for Bremerhaven. The damage is clearly visible. (Source: CCME)

Sailing from Sines in Portugal to Bremerhaven, the ship started to roll heavily in near hurricane-force gusts and wave heights of up to 6.5 m for an extended period of time, during which several hundred containers were torn overboard and plunged into the sea.

Most of the containers burst open when they struck the water and their contents were washed into the sea or sank there and then. The majority was washed up on the beach in the Netherlands and a smaller part on the German North Sea island of Borkum, causing considerable pollution there.

Figure above left: Containers floating in the North Sea (Source: CCME)

Figure above right: Beach at Ameland in the Netherlands after the accident (Source: DSB)

The MSC ZOE sailed into Bremerhaven that same night. Investigators from the BSU were on board soon after together with their Dutch and Panamanian colleagues and carried out an initial assessment. The damage was considerable. Entire stacks had been torn from their anchorage, toppled over, slipped or wedged into one another. Many more containers could have gone overboard.

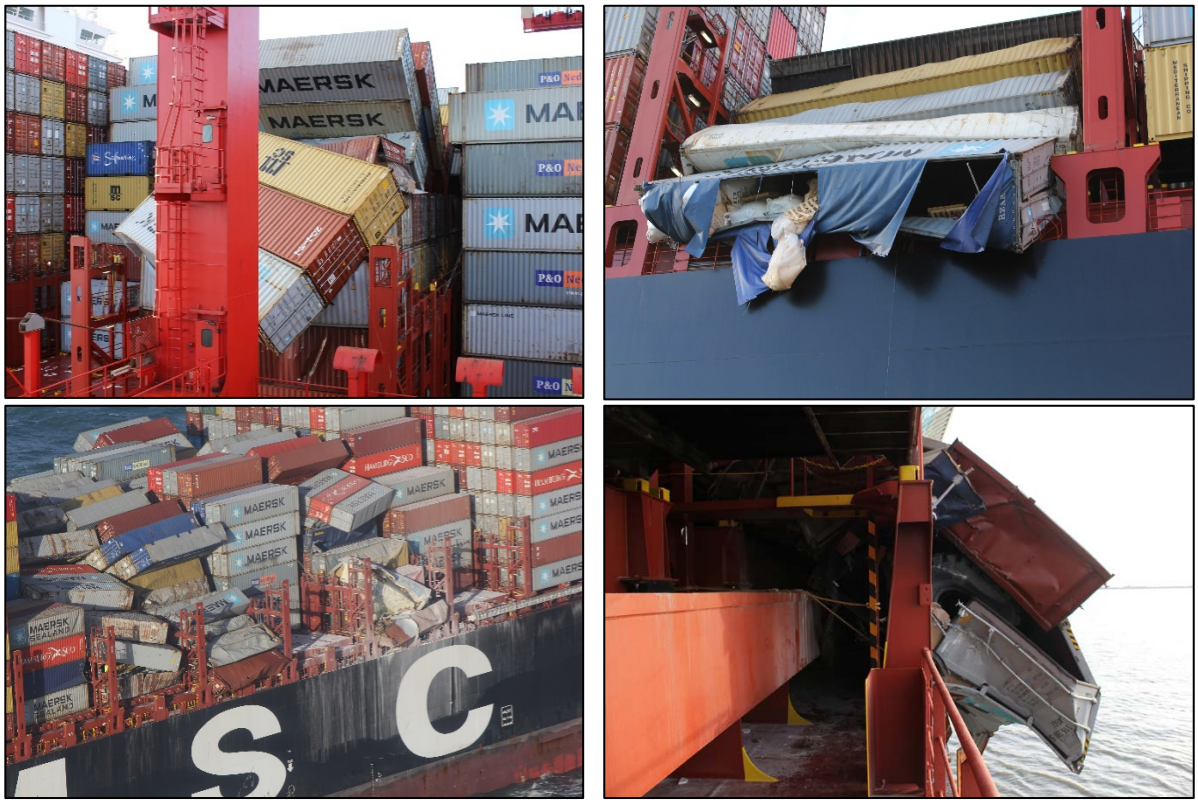


Figure above: Damage on board the MSC ZOE (Source: CCME and BSU)

The three investigating authorities decided to conduct a joint investigation. The flag State of Panama led the investigation in accordance with international regulations.

The salvage operation began after only a short period of time. It was possible to locate and subsequently salvage most of the containers on both the German and the Dutch sides. 45 containers went overboard on the German side and the salvage operation was declared

finished at the end of November. The salvage was still ongoing in the Netherlands, where nearly 300 containers fell into the sea, when this report was compiled.

2.2 Fire on the YANTIAN EXPRESS

Figure above: The YANTIAN EXPRESS (Source: Hasenpusch)

Another drama was unfolding in the middle of the Atlantic at almost the same time. The YANTIAN EXPRESS, a container ship of 320 m in length with 22 crew members on board, was sailing from Colombo in Sri Lanka to Halifax in Canada when a fire in the containers was discovered in the forward section of the ship during the night of 2-3 January 2019. The fire spread rapidly and the crew struggled in vain for more than 24 hours to contain it before being forced to discontinue active firefighting due to exhaustion and a lack of options. Despite the fact that the ship was more than 1,000 nm from the nearest coast, rescue workers were at the scene as early as the following evening and began to fight the fire from a distance using water cannons. However, by that time fire had taken hold on much of the ship's fore section and spread to a large number of containers on and below deck. Accordingly, containing it from a distance was virtually impossible. Added to this was a strong wind which repeatedly fanned and whipped up the fire, posing a risk of flying sparks and heat generation setting other containers on fire. For that reason the master constantly steered the ship with the wind blowing from astern to prevent the fire from spreading forward toward the superstructure.

Figures above left and right: Fire on board (Source: SMIT Salvage (left) and Hapag-Lloyd (right))

This resulted in a random voyage across the ocean weaving from side to side for several days. However, the situation had become so dangerous in the meantime that the crew abandoned the ship and found refuge on one of the rescue ships. An emergency crew did not go back on board until three days later. By that time more rescue teams had arrived, active firefighting on board was resumed and the ship was taken in tow. Thanks to the continuous extinguishing

measures from a distance and the firefighting on board, it was finally possible to bring the fire under control after 25 days and set course for the Bahamas. The ship arrived in Freeport on 30 January 2019 and was allowed to enter port a few days later, where the BSU was already waiting for her.

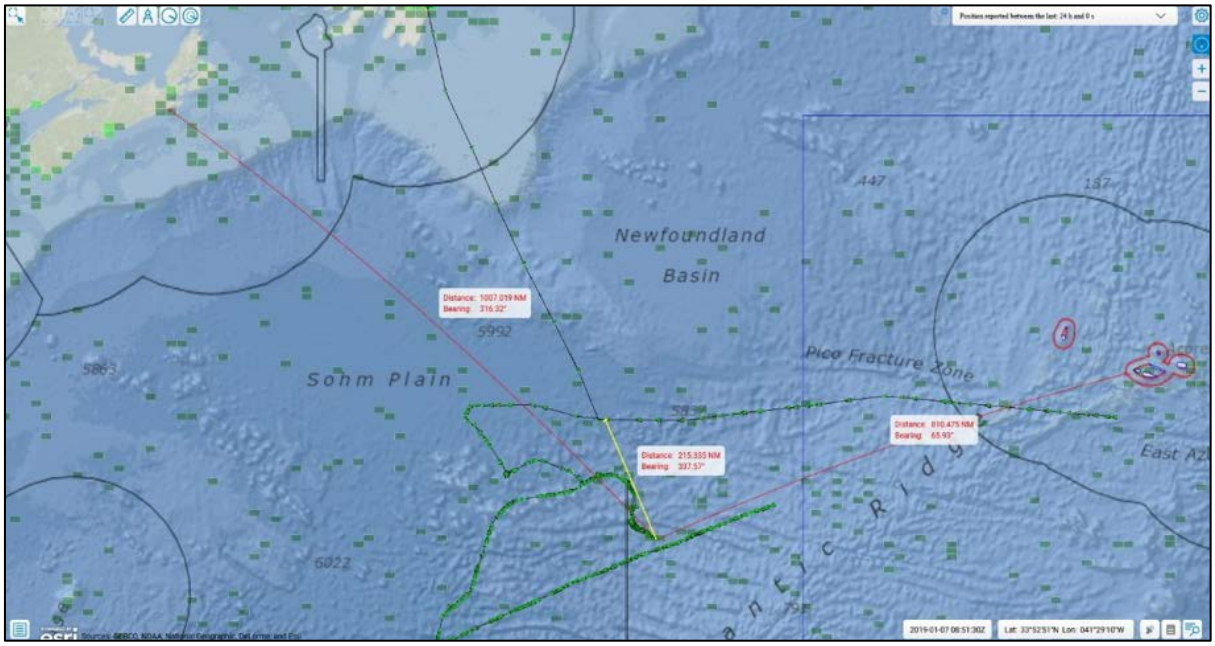


Figure above: The YANTIAN EXPRESS's random voyage (Source: European Maritime Safety Agency – EMSA)

A BSU investigator was already on scene in the roadstead off Freeport to obtain an immediate picture of the damage and its consequences. Together with other experts, the damage was assessed, samples were taken and information was gathered. A second local survey followed in Freeport a few weeks later.

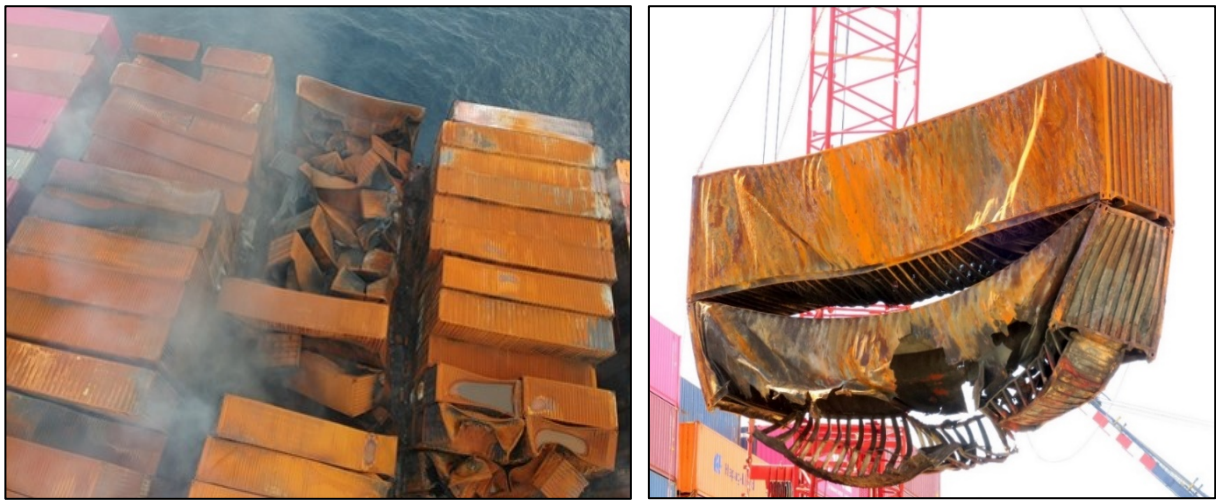


Figure above left: Heavy damage to the ship and cargo (Source: SMIT Salvage); above right: Clearance works in Freeport (Source: BSU)

The investigation of this case has been completed and the report published. The accident was probably caused by the self-ignition of pyrochar in the container incorrectly declared as coconut pellets.

2.3 Grounding of the BORE BANK

Less spectacular and hardly noticed by the general public but equally important was an accident that happened in the Baltic Sea just off the port entrance to Rostock-Warnemünde.

Figure above: The BORE BANK (Source: owner)

The Finnish-flagged ro-ro ship BORE BANK was sailing from Kotka in Finland to Rostock on 17 January 2019. The pilot found that the ship was no longer under command when they started to sail into the port in the early hours of the morning. Switching to manual steering proved unsuccessful, too. Only the use of the tiller brought the steering gear back under control. However, the ship was already so close to the breakwater by then that countersteering was no longer possible. The previous emergency manoeuvre was therefore continued and the ship sailed onto soft ground in a controlled manner so as not to hit the breakwater. The ship was towed free shortly afterwards and able to enter Rostock.

Figure above: The scene of the accident (circled in red) just off the Rostock-Warnemünde port entrance (Source: WSP)

The BSU would not normally have investigated such an accident, which in itself was harmless in terms of course and consequences, had there not been rudder failures on repeated occasions more recently in German waters in the North Sea and Baltic Sea. Moreover, it is not always the case that the consequences are as harmless as those described here. After all,

ecologically sensitive areas are also crossed. A common feature of many accidents[2] and incidents of this kind is that a cause cannot be determined – neither by the BSU nor by other technicians who examine the steering gear afterwards. This is due to the lack of traceability of system malfunctions, as the steering gear – unlike the main engine, for example – does not store any data of relevance. This means that the cause remains hidden if no mechanical fault is visible.[3]

The BSU has therefore used this accident as an opportunity to recall a safety recommendation issued in 2016 in connection with the grounding of the CSCL INDIAN OCEAN that international efforts be made to supplement steering gear with internal error logging.

2.4 Collision between the ASTROSPRINTER and schooner № 5 ELBE

The accident which probably attracted the greatest media attention (alongside the one involving the MSC ZOE) happened in the summer – the best time of the year for traditional shipping.

Figures above left and right: The ships involved – pilot schooner No 5 ELBE (Source: Stiftung Hamburg Maritim) and ASTROSPRINTER (Source: owner)

On 8 June, the newly overhauled 136-year-old German pilot schooner No 5 ELBE was sailing on a passenger cruise on the River Elbe. She had 43 people (15 crew members and 28 paying passengers) on board. Since the weather was good and a strong wind prevailed, they could proceed under sail. At about 1400, a collision occurred in the fairway with the ASTROSPRINTER, a container ship flying the flag of Cyprus.

[2] About 60 per cent.
[3] The collision between the DANICA VIOLET and FGS BERLIN, which was also caused by an unclarified rudder failure, is another good example of this (see cover picture).

Figure above: The moment of the collision – the № 5 ELBE is pushed to the side (Source: Daniel Beneke, Stader Tageblatt)

The № 5 ELBE was struck in the forward section of the hull. The shrouds of the foremast cushioned most of the impact but the mast broke in the process. The running and standing rigging landed on deck and the pilot schooner was holed. There were eight casualties on board. Coincidentally, boats from the Stade Voluntary Fire Brigade and the German Life Saving Association (DLRG) were nearby. They were just finishing another emergency response when they observed the collision and immediately went to assist. Using her own engine and towed by a DLRG boat, the schooner was able to save herself in the mouth of the River Schwinge and put her passengers and crew members ashore there, despite the water ingress. However, she foundered directly at the pier.

The above figure shows the damaged № 5 ELBE as seen from the deck of the ASTROSPRINTER shortly after the collision. Boats from the fire service and the DLRG hurrying to assist are visible in the background (Source: ASTROSPRINTER's crew)

In the opinion of the fire service, everyone involved had an extremely lucky escape. Firstly, nobody went overboard during the collision. If you look at the above photograph, this in itself is almost miraculous. Secondly, the № 5 ELBE would probably have either broken up or been pushed under water had she been struck more amidships. In both cases it is highly likely that 43 people, among them several children, would have gone overboard and drifted in the River Elbe fairway, most of them without lifejackets – a horrible thought.

The BSU started its investigation into the accident immediately at the scene. There were a large number of witnesses to interview, making the investigation very complex and time-consuming. The private photographs and video recordings of the passengers mentioned in the foreword were especially beneficial. Seldom has an accident been so well documented by photographic material.

Figure above: The foundered № 5 ELBE (Source: DLRG)

A specialist company from Portugal raised the ship a few days later and she is being repaired in a Danish shipyard. She is to be put back into operation.

The BSU published a preliminary safety recommendation in this case for the below reasons. The pilot schooner № 5 ELBE was originally built with a continuous hull, which is not divided by bulkheads. There is no collision bulkhead. The hull has not been fitted with watertight bulkheads – not even in the course of extensive and substantial conversions and renovations. Accordingly, it was unavoidable that damage would result in the flooding of the entire hull and inevitable foundering. Moreover, there will not always be other ships in the immediate vicinity that can initiate a rescue operation without delay. The BSU has therefore advised the competent authorities to adapt the legal situation so that traditional ships carrying more than 12 passengers are subdivided by watertight bulkheads. The operator was advised to act accordingly and install watertight bulkheads during the forthcoming repairs.

2.5 Fire in the engine room of the KELLY

Even though its consequences were very dramatic, the next accident also attracted hardly any attention. A fire in the engine room of the KELLY cost the life of one Ukrainian crew member. Moreover, two other crew members were found seriously injured and flown to a hospital in Hamburg.

Figure above: The KELLY (Source: owner)

The KELLY, a cargo ship flying the flag of Malta, was sailing from Rotterdam to Kaliningrad when a major fire broke out in the separator room as she was passing Otterndorf just before entering the Kiel Canal. Three crew members were cleaning pipes belonging to the thermal system when a small explosion with subsequent fire occurred. One person with serious injuries managed to escape into the open. His two colleagues were left unconscious. Crew members went to assist and tried to reach the two injured men. They managed to pull the first person into the open but in the case of the second it turned out to be extremely difficult because of the increasing smoke and cramped conditions. As more people rushed to help, the third person was also reached but unfortunately his death was confirmed at the scene. In the meantime the CCME had set the emergency measures in motion and the casualties were flown to various hospitals.

By that time the crew had managed to fully extinguish the fire by discharging CO_2. The ship's engine was no longer operational and she anchored. The damaged ship was towed to Brunsbüttel. The BSU started the investigation and surveyed the ship immediately after the accident. The investigators found a picture of devastation. It is always horrifying to see the violence with which a fire can rage and the consequences of this, as illustrated by the following photographs.

Figures left and above: Consequences of the fire in the engine room and adjacent spaces – the heavy destruction is clear to see (Source: BSU)

It is a miracle that two crew members managed to escape this inferno alive.

2.6 Line accident on the THEMSESTERN

The THEMSESTERN was moored with four lines in the southern chamber of the lock at Kiel-Holtenau on 30 November 2019. As the lock gate was opening a tug set off first to sail out of the lock into the Kiel Canal. Shortly before the THEMSESTERN began to cast off, her head line parted without warning level with the hawse, rapidly rebounded back to the pier and struck the linesmen's recreation cabin, which was located in the immediate vicinity. Some of the windows facing the southern lock chamber and the glazing at the front of the building were destroyed and a person standing in the doorway suffered injuries to his leg.

Figure above: The THEMSESTERN (Source: Hasenpusch)

Figure to the right: Similar ship made fast in the lock with the linesmen's cabin on the left-hand side (Source: WSP)

Figures above and below left: Damage caused by the rebounding line (Source: WSP)
Figure below right: Linesmen's cabin provisionally sealed (Source: WSP)

Two other linesmen inside the building were also injured, fortunately only very slightly, by flying splinters of glass. The three people were discharged after being admitted into hospital briefly for outpatient treatment. This case was also referred for investigation by the BSU after a brief consultation.

2.7 Personnel accident on the MARFAAM

The last accident to be discussed here is a personnel accident. It befell a canal helmsman who intended to transfer from a pilot boat to the multipurpose ship MARFAAM at Rüsterbergen. The Netherlands-flagged ship transited the Kiel Canal during her voyage from Ventspils in Latvia to Ghent in Belgium and took a pilot and a canal helmsman on board in accordance with regulations.

Figure above: The MARFAAM in the Kiel Canal lock at Brunsbüttel (Source: WSP)

The transfer of pilot and canal helmsman was to take place in Rüsterbergen as planned. It was still dark, raining and a wind of 4.5 Bft prevailed. The pilot boat approached and the canal helmsman was the first to step onto the ladder and climb up. However, he lost his footing while attempting to board the MARFAAM, slipped and then fell back onto the deck of the pilot boat, which was still underneath him.

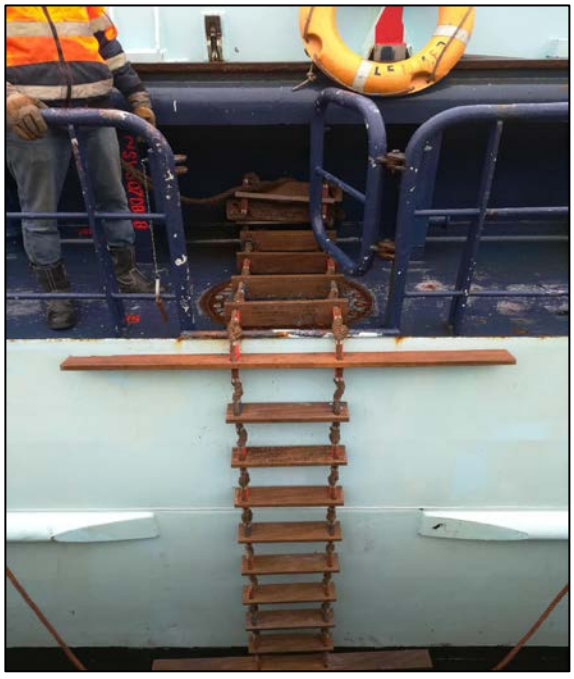


Figure above: Pilot boat RÜSTERBERGEN in operation at Rüsterbergen (Source: Hasenpusch)

Figure left: Access to the MAARFAM by pilot ladder lowered on the day of the accident (source: WSP)

The canal helmsman fell about 4 m and suffered severe injuries in the process, especially to his head. The transfer was stopped immediately and the pilot boat headed for the pier so that medical care could be given to the casualty without undue delay.

The BSU decided to investigate because similar accidents and near misses involving pilots were brought to its notice during the preliminary investigation.

Not every accident that was investigated in 2019 has been presented above. A comprehensive summary goes beyond the scope of this report. A complete and up-to-date list of current main investigations can be found on the BSU's website.[4]

[4] www.bsu-bund.de.

Organisation of the BSU

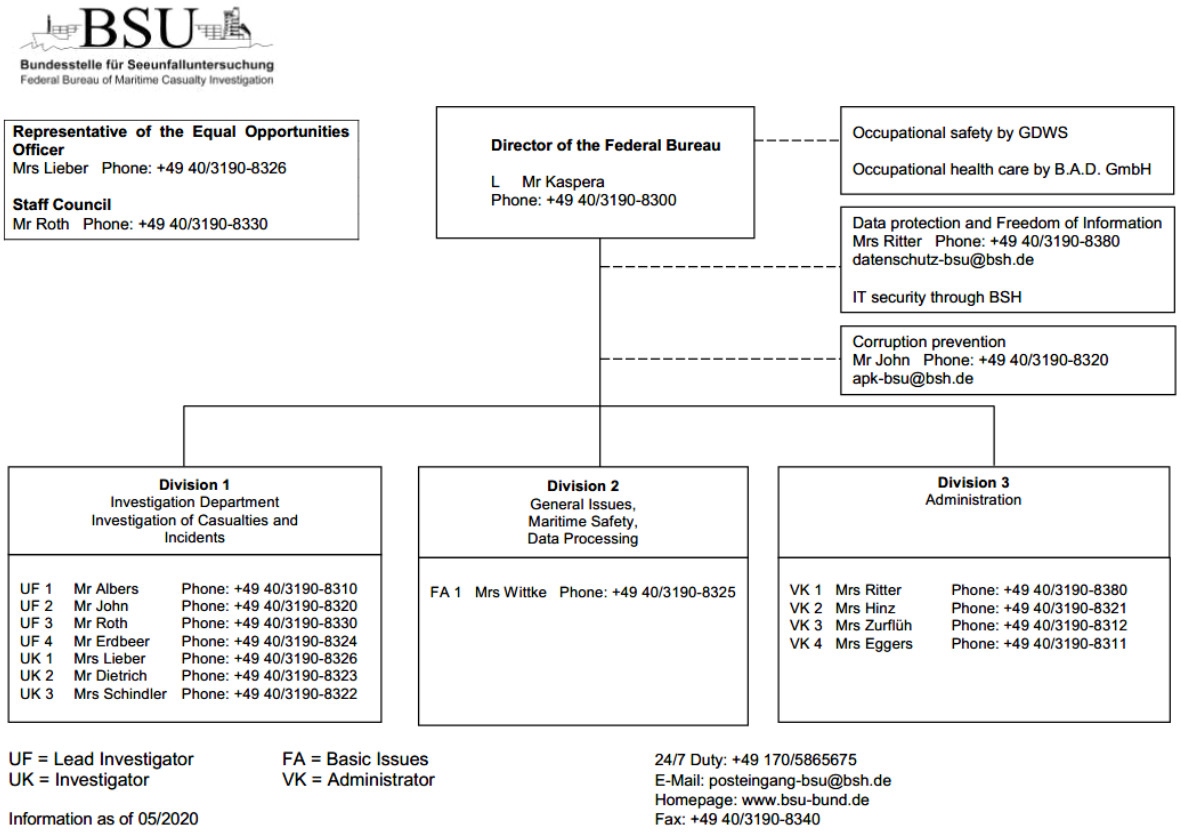
The BSU is managed by a director. He decides autonomously on whether a safety investigation should be initiated, or not. The director represents the BSU nationally and internationally and is also responsible for strategic planning and control, as well as for public relations.

The BSU is split into three divisions. Despite the low headcount, the staff of the BSU have an extremely varied range of qualifications, which include shipbuilding, navigation, law, marine engineering, social sciences and administration. In addition to the huge commitment with which staff members perform their duties, this diversity symbolises the work of the BSU and permits investigations based on comprehensive technical expertise.

3.1 The divisions

The BSU is organised in the following divisions:

- Division 1 – marine casualty investigation
- Division 2 – technical support for marine casualty investigation
- Division 3 – administration



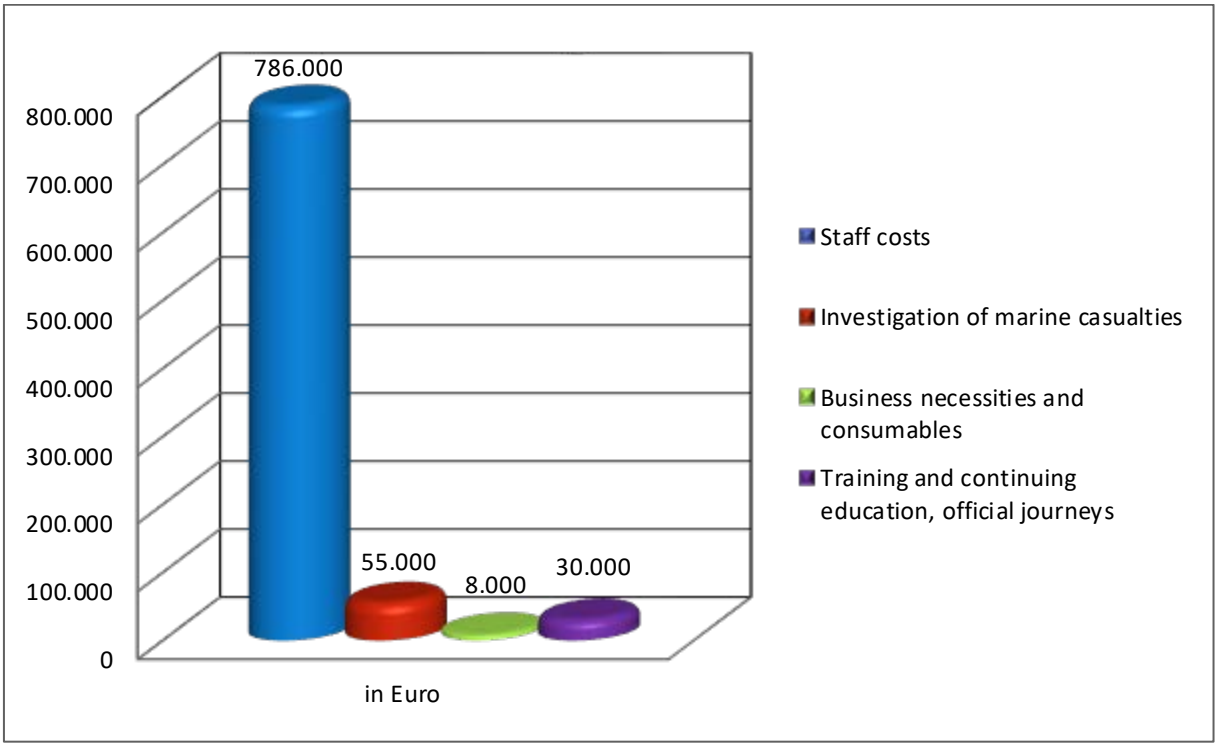
Division 1 – marine casualty investigation
Division 1 has been fully staffed by seven people again since May 2019. This means that in addition to major accidents, it has been possible to investigate accidents that while smaller in scale certainly impact safety.

Division 2 – technical support for marine casualty investigation
Much of the work of Division 2 was devoted to the European Marine Casualty Information Platform (EMCIP). The preparatory work needed to use only the EMCIP for analysis going forward instead of the national database required enormous organisational effort and is now well under way. The second priority is the work with voyage data recorders (VDRs).

Division 3 – administration
Division 3 continued to deal with the general administrative issues in 2019. One priority here was the preparatory work needed for the introduction of the e-file.

3.2 The budget

The BSU was allocated EUR 1,261,000 for the 2019 financial year. Expenditure once more centred on personnel costs, amounting to some EUR 786,000. EUR 55,000 was needed to cover expenses incurred in the course of marine casualty investigations. Travel and training cost EUR 30,000, while material administrative expenses amounted to EUR 8,000.



3.3 Events and training

Staff members of the BSU attended training as students or lecturers again in 2019. They also took part in a wide variety of official meetings within the portfolio of the BMVI, as well as – in some cases contributing to – national and international presentations and events.

Public relations

4.1 Publications

The work of the BSU is not the cause of much 'media hype' as a rule – not to mention the interest of the public at large. Even if there is no or only material damage, media interest (albeit normally local) increases when an accident happens on the doorstep, as it were. As a rule, unusual fatal accidents involving merchant shipping also receive special attention, while purely occupational accidents tend not to be of relevance to the press. Finally, provided they are actually investigated, dramatic accidents involving recreational craft are addressed and commented on in trade publications, in particular. Once an accident involves a ferry or ship carrying passengers or even a cruise liner, in which the lives of many people were at risk, media interest rises enormously, as can be seen from the foundering of the COSTA CONCORDIA in 2012 or the collision between the ASTROSPRINTER and № 5 ELBE this year, for example. Given the increased sensitivity to environmental issues throughout the population, the same applies to accidents on the German coast which result in marine pollution or in which there is a heightened risk of extensive pollution. The response to the accident involving the GLORY AMSTERDAM in the autumn of 2017 or the MSC ZOE's loss of cargo at the turn of the year demonstrate this clearly.

From the perspective of the BSU, heightened interest is welcome given that the aim of an investigation is to make the findings for improving safety gained from it, which are reflected in the concluding safety recommendations, known to the widest possible audience. The benefits of an investigation arise not only from revealing gaps or deficiencies in safety simply to those directly concerned, but rather to every individual and agency interested in ship safety. Apart from reviewing the case in question, it is chiefly about preventing similar accidents and the related shortcomings in the future – in emergency management, for example. The conclusions of the BSU and above all the safety recommendations associated with them may and should be discussed as widely as possible, which is why we cooperate with the media to get our concerns and recommendations across to interested parties.

Both Article 14 of Directive 2009/18/EC and Article 28 SUG stipulate that investigation reports and safety recommendations must be published. Actual publication is achieved through posting on the BSU's website, which is referred to in press releases. There is also a broad group of interested parties to whom reports are sent regularly or on request. The BSU provides a newsletter for this purpose, which people can subscribe to on the website[5]. In addition, accident report summaries are publicised in German and English in the notices to mariners. Related articles also appear regularly in the THB (Täglicher Hafenbericht), a journal that is widely read in the shipping industry and thus reaches an audience potentially interested in marine casualty reports.

However, in view of existing legal regulations, the BSU can only provide general information on an accident, such as on the course of the accident or damage caused, until an investigation has been concluded with a report. Admittedly unsatisfactory vis-à-vis the members of the public concerned, this situation stems from the nature of marine casualty investigations. Since it concerns an investigation that must ignore questions of fault and liability, and where all parties involved must be given the opportunity to comment before its conclusion, detailed information on the cause of an accident or the factors facilitating it cannot be published beforehand.

[5] https://www.bsu-bund.de/EN/News/Newsletter/Newsletter_node.html.

4.2 The GLORY AMSTERDAM press conference

In certain selected cases, the BSU tries to raise public interest and foster dialogue about safety recommendations. This usually concerns cases in which heightened interest among the general public and media is already evident. The BSU has decided to organise press conferences in which a broader overview can be provided, beyond the investigation report, and specific questions can be answered. This approach was taken for the first time in 2017 in connection with the case of the fishing vessel CONDOR and then revisited in 2019 in the GLORY AMSTERDAM case.

The response was encouragingly high this time, too. A number of radio and TV stations quickly registered. Newspapers from northern Germany were also represented. The sequence of events at such a press conference, which requires some quite detailed preparation, is shown in the collection of photographs below.

Figures above left clockwise: Setting up the technical equipment, presentation of the case, interviews, Q&A session (Source: BSU)

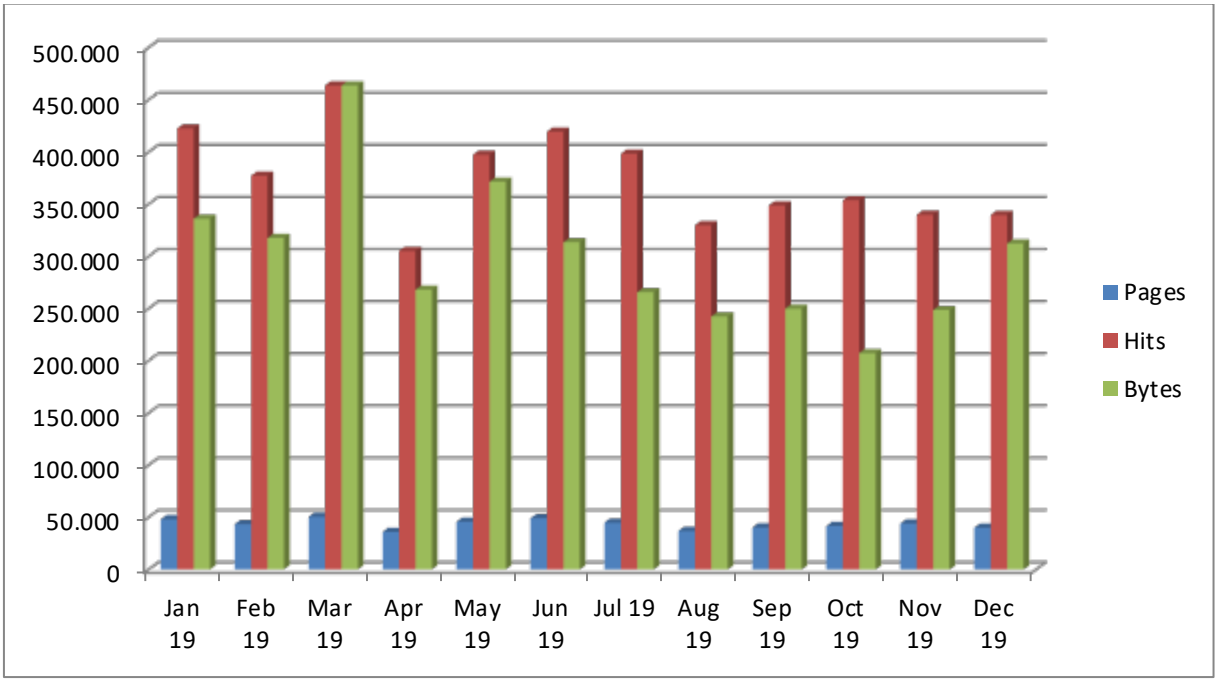
Various reports were broadcast on the radio and television news on the same day. Admittedly, the BSU did not make it onto any of the news programmes aired during prime-time. However, reports were broadcast on the main regional news. The newspapers in northern Germany followed suit on the next day with statements from the relevant ministries regarding the measures recommended by the BSU. The goal was thus achieved. After all, it is not a matter of giving the BSU media attention but rather of making the BSU's recommendations known to a broad group of addressees and stimulating a conversation. Whether the media always casts a spotlight on the findings of importance to the BSU is then something that remains to be seen.

Figure above: The BSU presents the GLORY AMSTERDAM investigation report. From left: Ulf Kaspera, Ferenc John, Dirk Dietrich (Source: BSU)

4.3 The BSU's website

Among other things, the website provides information on the activities and structure of the BSU, the historical development of marine casualty investigation, as well as the legal framework. Visitors can also subscribe to the BSU's newsletter there. Of even greater interest will certainly be that every accident report and safety recommendation published since the BSU was founded can be viewed on the website. This information is usually fully or for the most part accessible to people with disabilities and can be downloaded in German and English in Portable Document Format (PDF).

As mentioned above, public interest in the accident reports of the BSU varies greatly. This is evident from the webpages opened and corresponding downloads. The below graph shows the number of pages and hits, as well as the volume of bytes downloaded per hit.



Month	Jan 19	Feb 19	Mar 19	Apr 19	May 19	Jun 19	Jul 19	Aug 19	Sep 19	Oct 19	Nov 19	Dec 19	total
Pages	48.133	43.523	50.663	35.943	45.760	49.056	44.891	37.056	40.314	41.664	44.079	40.037	521.119
Hits	422.625	377.286	463.855	305.313	397.329	419.364	398.424	329.833	348.843	353.742	340.011	339.631	4.496.256
Bytes	64,91	61,33	89,55	51,74	71,73	60,54	51,31	46,8	48,26	40,03	47,99	60,31	694,5

By and large, the picture is relatively stable when it comes to accessing information online on the BSU's website. However, the summary and specifically the bytes downloaded also show the interest generated by the GLORY AMSTERDAM report. The report was published in early March 2019 – the month in which by far the most content was downloaded.

4.4 Lectures, training, miscellaneous

The numerous events that staff of the BSU attend as experts, where they contribute to a lively exchange of experience with lectures and their specialist knowledge, should not go unmentioned in this section. In addition to the conferences discussed in the 'International' section, the BSU's experts are also called upon to give presentations or to contribute their expertise in panel discussions at national events on ship safety. These include such diverse events as the German Council on Jurisdiction in Traffic, the Maritime Safety Committee, as well as training courses at the Waterway Police Academy or at the pilot associations, at which the excellent cooperation between everyone involved is intensified. Although many of these events are not open to the general public, they do have an impact on it through the decisions and recommendations made there. Staff members of the BSU gave 16 different lectures in 2019, six of them on an international stage.

The BSU's expertise is also called for internally. For example, one of the BSU's experts participates in the working group on occupational safety of the Federal Waterways and Shipping Administration. The aim here is to improve safety requirements for work on public authority ships, floating equipment or in ports.

International

Maritime shipping has always been and remains a predominantly international business. The same applies to marine casualty investigation. Although each flag and coastal State generally has its own investigating authority, international interdependence not only makes cooperation necessary and beneficial, it is also an international requirement. For example, investigations concerning different countries (e.g. flag State on the one hand and coastal State on the other) involve close cooperation between the respective authorities. This can range from simply assisting in data collection to a joint investigation.

Influenced by this international character, a working relationship marked by the spirit of mutual cooperation has developed with the other states, which reaches beyond accident investigation and is also practiced in joint fora, workshops, working groups and committees at the IMO's offices in London, UK. More than just exchanging experience or harmonising investigative activities, the aim is also to develop proposals for new safety regulations, the need for which arises from the accidents investigated, which are then discussed at the IMO.

First and foremost, the BSU should mention the Marine Accident Investigators' International Forum (MAIIF) and its European regional forum the European Marine Accident Investigators' International Forum (EMAIIF). Close contact is also maintained with the Lisbon-based EMSA.

The BSU sends its experts to the respective bodies and committees to contribute the experience gained in Germany.

5.1 IMO – III

An expert from the BSU was part of the German delegation to the III (Implementation of IMO Instruments) Sub-Committee at the IMO in London again in 2019 (in the Casualty Analysis Working Group). The working group's main interest is processing (or evaluating) lessons learned and determining whether general information can be drawn from them that would influence international law-making.

5.2 EMAIIF and MAIIF

The marine casualty investigation authorities once more assembled and shared information on the latest developments and findings in 2019.

(Source: MAIIF)

The **EMAIIF's** 15th meeting of European authorities was held in May 2019 in Ljubljana, Slovenia. Representatives of 18 European countries, as well as guests from European institutions, e.g. EMSA, as well as from Canada, the United States, Marshall Islands, Antigua & Barbuda and for the first time China attended.

Priority topics this time included line accidents, i.e. any accident that might occur when a ship casts off or makes fast or when lines part for various reasons. The rebounding ends have tremendous force and can cause considerable damage. They often also lead to serious injuries or fatalities. A second priority was – given recent events – the topic of container losses. The DSB from the Netherlands and the BSU were able to present some of the latest news from the MSC ZOE investigation. They were accompanied by Ms Jannsen MSc from the Hamburg University of Technology, an invited guest who provided in-depth scientific information on the topic. The last priority was evidence collection, a perennial topic.

DIGIFEMA, the Italian investigating authority, hosted the annual international forum of marine casualty investigation authorities, **MAIIF**, this year. Representatives of 31 Member States met in Naples, as well as guests from international organisations such as the IMO and the Sailors' Society. Oman was welcomed as a new MAIIF member.

(Source: MAIIF)

In-depth Q&A sessions were added to this year's MAIIF meeting, resulting in a slight decrease in the number of lectures and presentations. Streamlining of this nature is to be welcomed, as important topics regularly require more time than the so-called 'Session', which comprises two hours and three lectures. It leaves more room for discussion.

Figure above: In addition to lively technical debate there was a little time for culture (Source: MAIIF)

The two main topics at this year's meeting were

- the mental health of seafarers, on which the deputy CEO of the Sailors' Society, Ms Sandra Welch, gave an excellent opening lecture. She used examples and statistics to illustrate the health risks associated with long periods of service at sea, especially in terms of mental health. More seafarers suffer from depression than the average number of working people. What is alarming is that far fewer than average would seek professional help. This was followed by an in-depth round table;
- international orientation and cooperation, in which the direction of the MAIIF's activities was defined and how interaction with the IMO can be improved going forward. This was also followed by a long and quite contentious round of discussions.

Of course, other topics were also addressed, such as sharing information on ongoing investigations – which has now taken place for the second time – and the session on life-saving appliances, the failure of which we are sadly repeatedly seeing.

5.3 EMSA and PCF

Figure above: The offices of EMSA in Lisbon, Portugal (Source: sea-alarm.org)

EMSA continued to be extremely active in 2019. There were workshops and working groups on ship safety, firefighting on ro-ro passenger ships, the EMCIP database, accident investigation for beginners and for the first time also for advanced practitioners, which were attended by experts from the BSU. The **EMCIP** is of particular importance to the BSU. Most of the technical shortcomings have been eliminated. The database proves very beneficial in its day-to-day application, as it is able to present facts and causes comprehensively and they can be better analysed at a later stage. It is now a user-friendly tool that provides an excellent means of analysis due to the numerous input and evaluation methods. Accordingly, the BSU has decided not to maintain or upgrade the outdated national database going forward but rather to work only with the EMCIP.

The annual **PCF/9** (Permanent Cooperation Framework) meeting of EU Member States plus Norway and Switzerland was also held at EMSA. While the MAIIF and EMAIIF fora discussed above focus on practical work and sharing experience, the PCF is more concerned with the legal framework and procedures within the EU. The ninth three-day meeting of this kind took place in July. Here, too, two topics that will have a direct influence on the future work of the BSU have been chosen as examples:

- the EU Commission plans to comprehensively revise the European legal basis for marine casualty investigation and has asked investigating authorities for assistance and input in advance. All the authorities have actively participated – first in discussions and later in a virtual working group. A common document was agreed upon in December and made available to the EU Commission;

- in addition, the EU Commission and EMSA are intending to periodically review the quality of completed investigation reports and presented a procedure and comprehensive quality guidelines in draft form for this purpose. This was the most hotly disputed topic at the meeting. Almost every Member State objected – not to quality reviews as such, as they are already in place through the IMO. In particular, objections were raised against the proposed procedure and very detailed, in places contradictory regulations on the use of language, which in principle would be capable of affecting not only quality but also substance. No agreement could be reached. It will be interesting to see how the issue evolves.

Statistics

6.1 General information and explanatory notes

This statistics section first requires a number of explanations.

Article 1a SUG defines the term 'marine casualty' as being any event that has at least one of the following consequences:

- the death or serious injury of a person caused by or in connection with the operation of a ship;
- the disappearance of a person on board a ship caused by or in connection with the operation of a ship;
- the loss, presumed loss or abandonment of a ship;
- substantial material damage to a ship;
- the grounding or constructive total loss of a ship or the involvement of a ship in a collision;
- substantial material damage caused by or in connection with the operation of a ship;
- environmental pollution resulting from damage to one or more ships caused by or in connection with the operation of one or more ships,

and any event caused by or in connection with the operation of a ship that poses a risk to a ship or a person or the consequences of which could cause serious damage to a ship, an offshore structure or the environment (incident, Article 1b SUG).

Depending on the consequences, German law states that the generic term 'marine casualty' must be divided further into:

VSMC:
Fatality, constructive total loss of a ship or an accident with substantial environmental pollution.

SMC:
Marine casualty according to the above criteria, which cannot be classified as a VSMC but which additionally involves

- the failure of the main engine;
- substantial damage to the accommodation spaces;
- serious damage to the ship's structure;
- a leak in the underwater shell plating with which the ship becomes unseaworthy;
- pollution, regardless of the volume of pollutants released, and/or
- an accident that necessitates towing or shore-based assistance.

LSMC:
Any marine casualty according to the above definition not classified as a VSMC, SMC or incident.

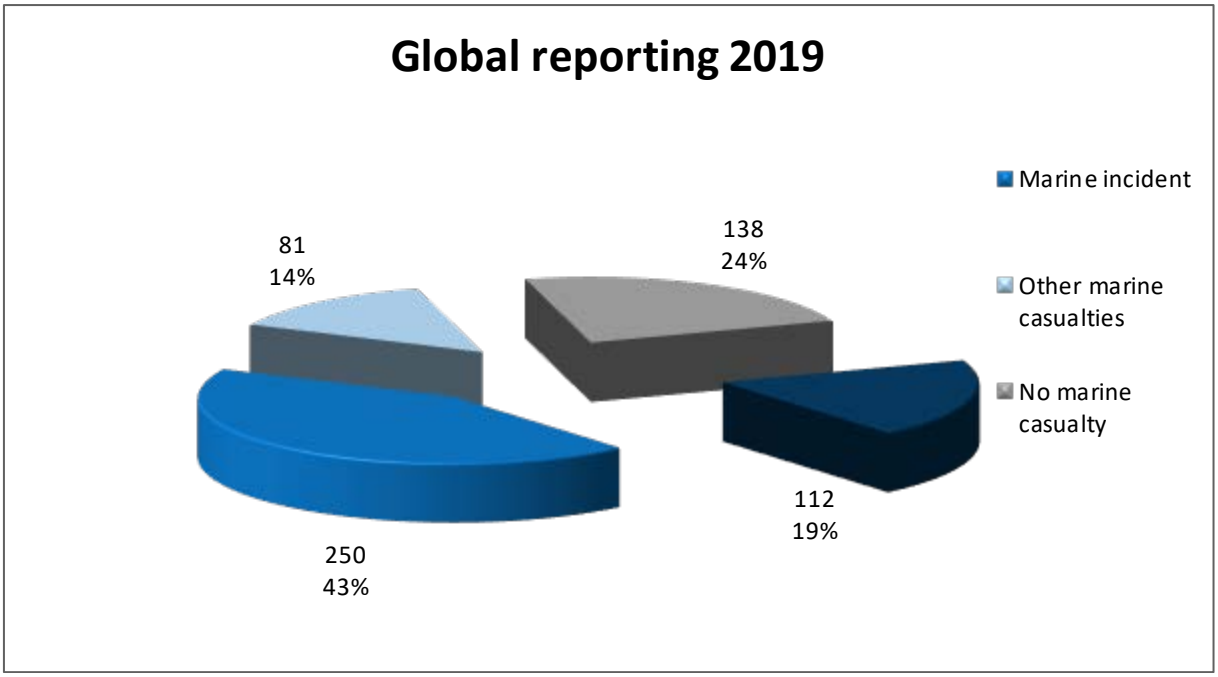
Incident (as defined above). This also includes minor accidents which have not caused significant damage and therefore cannot be classified as a LSMC, but which did endanger a ship, her crew or the surrounding area (environment/traffic).

With regard to 'incident', there is a discrepancy between German law, on the one hand, and the internationally applicable regulations of the IMO and EU, on the other. Although the definition of 'incident' is similar in the international regulations, the wording is not identical. Moreover, an 'incident' is not the same as a marine casualty according to international rules, while the SUG deems it a sub-category of a marine casualty. However, this has no practical significance.

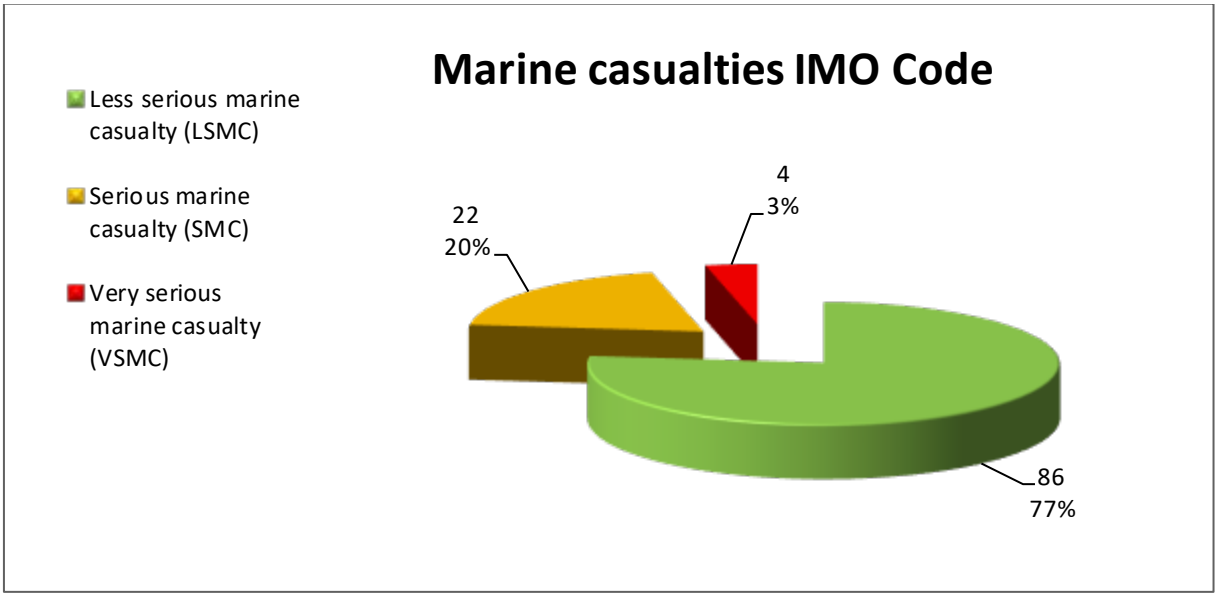
Although **other casualties (OCs)** are marine casualties, they do not fall within the scope of mandatory international or national regulations, specifically Article 1(3) SUG cases. They primarily concern accidents that only involve non-commercial recreational craft, small fishing boats, as well as naval or other state-owned vessels. OCs are thus quasi marine casualties beyond the basic competence of the BSU.

The **non-casualty (NC)** category encompasses any other report that does not concern a marine casualty, e.g. accidents involving vessels for inland navigation or passengers on ferries or cruise ships and crew members in general falling ill.

The **total number of notifications** remained almost the same as compared with the preceding year (577 in 2018 compared to 581 in 2019). However, there was a change in the individual categories.

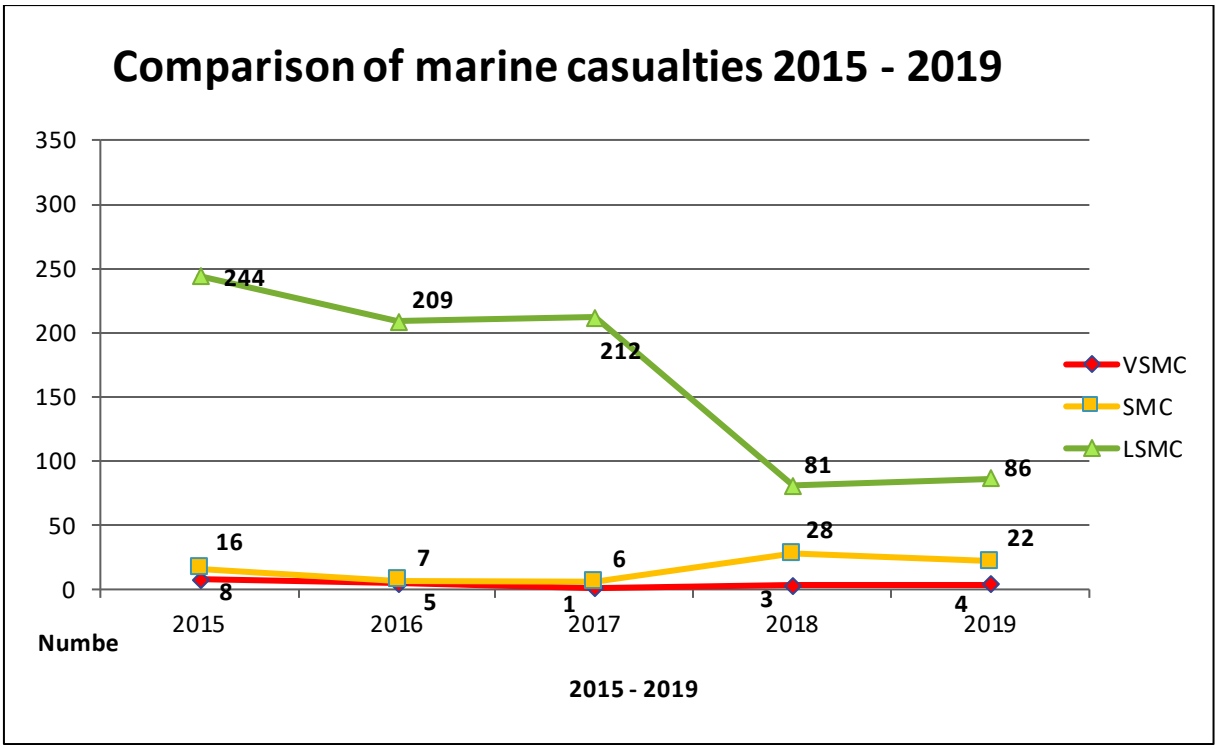


While 472 (or 82% of all) notifications concerned an incident or accident in 2018, this figure was only 433 (76%) in the following year. This is because notifications outside the BSU's sphere of responsibility have increased and the number of incidents has decreased. The number of marine casualties remained the same (112 in each case).



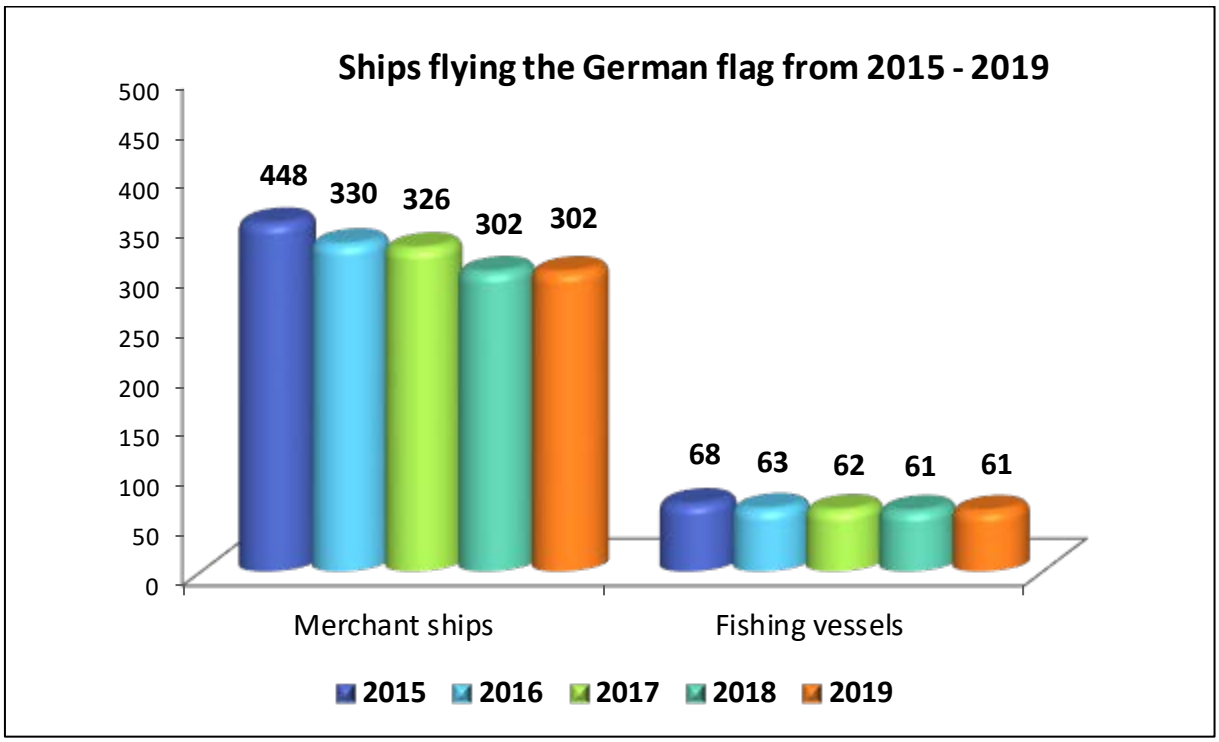
There were no major changes compared to the previous year within the area of marine casualties, either. The figures only diverge marginally. At any rate, it is not possible to deduce trends from this.

The following table summarises the trend over the past five years. Since the amended classification rules are applied purely according to international rules only for the second time, comparability with earlier years is difficult to establish.



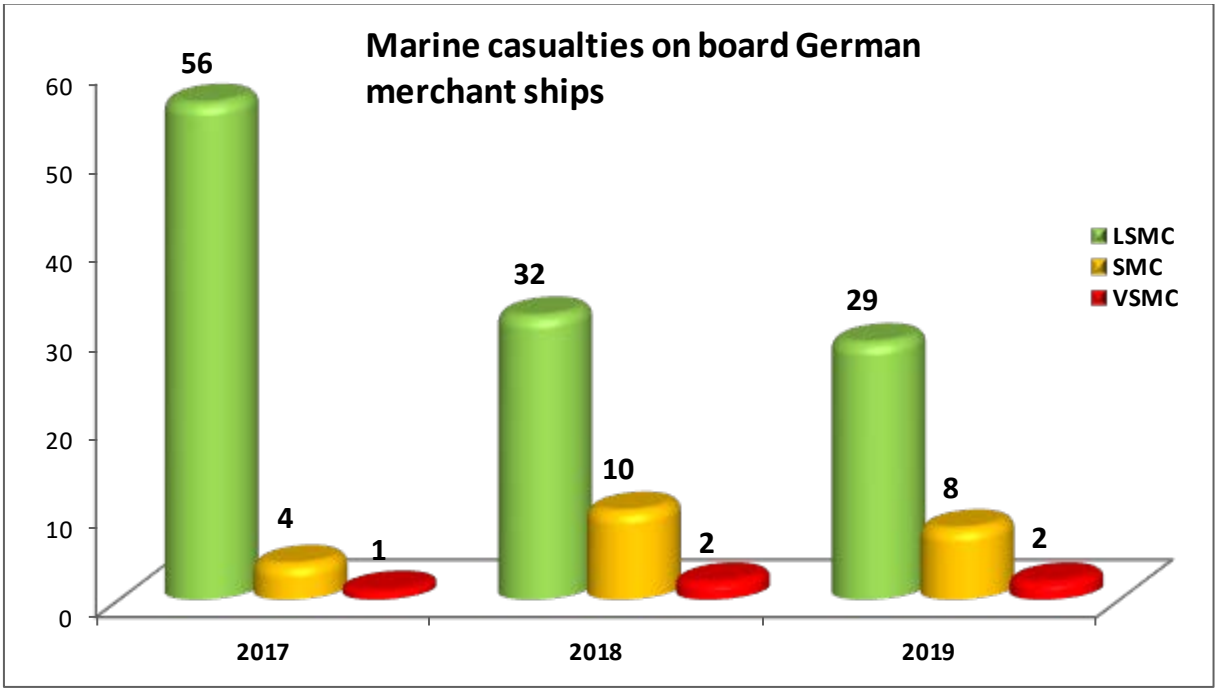
6.2 Ships flying the German flag[6]

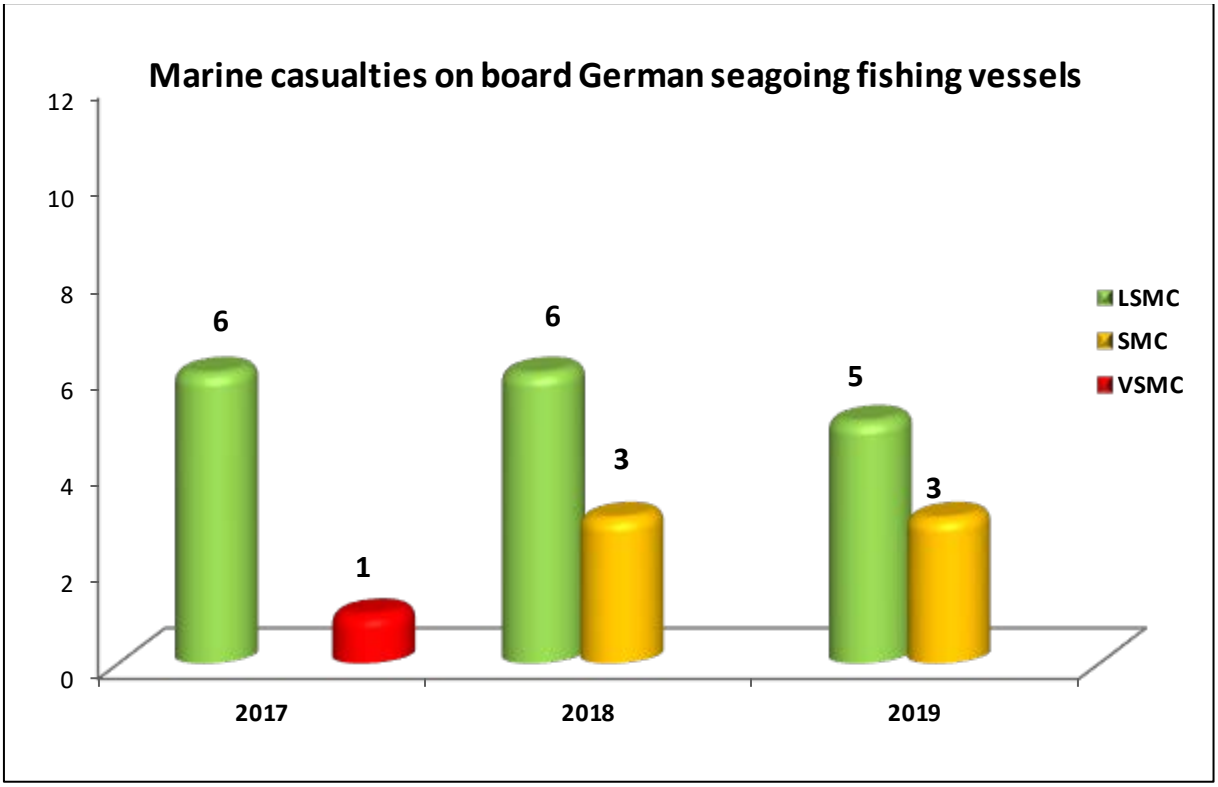
Remaining stable at 302, the number of merchant ships registered under the German flag did not decline for the first time in a long time in 2019. The contraction of Germany's merchant fleet is experiencing an interruption for the time being, at least. However, it remains to be seen whether this is a tentative step toward a reversal in the trend.



Due to the different method of classifying accidents described in the previous report, this year it is once more possible to compare the figures directly with those of the previous year. The figures show that overall fewer marine casualties occurred on merchant ships and fishing vessels flying the German flag in 2019 than in the previous year. The difference is small, however.

[6] Source: BSH.



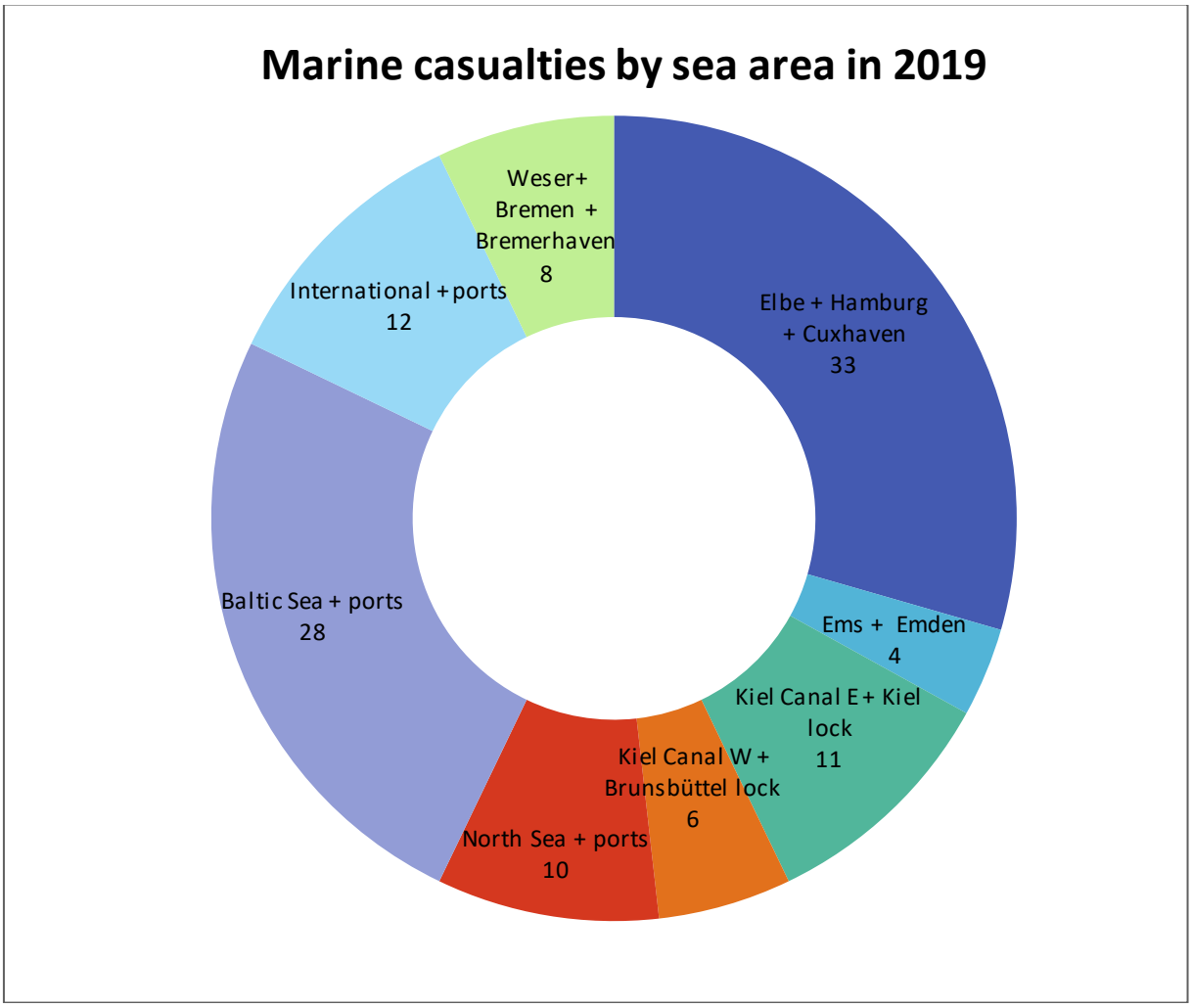


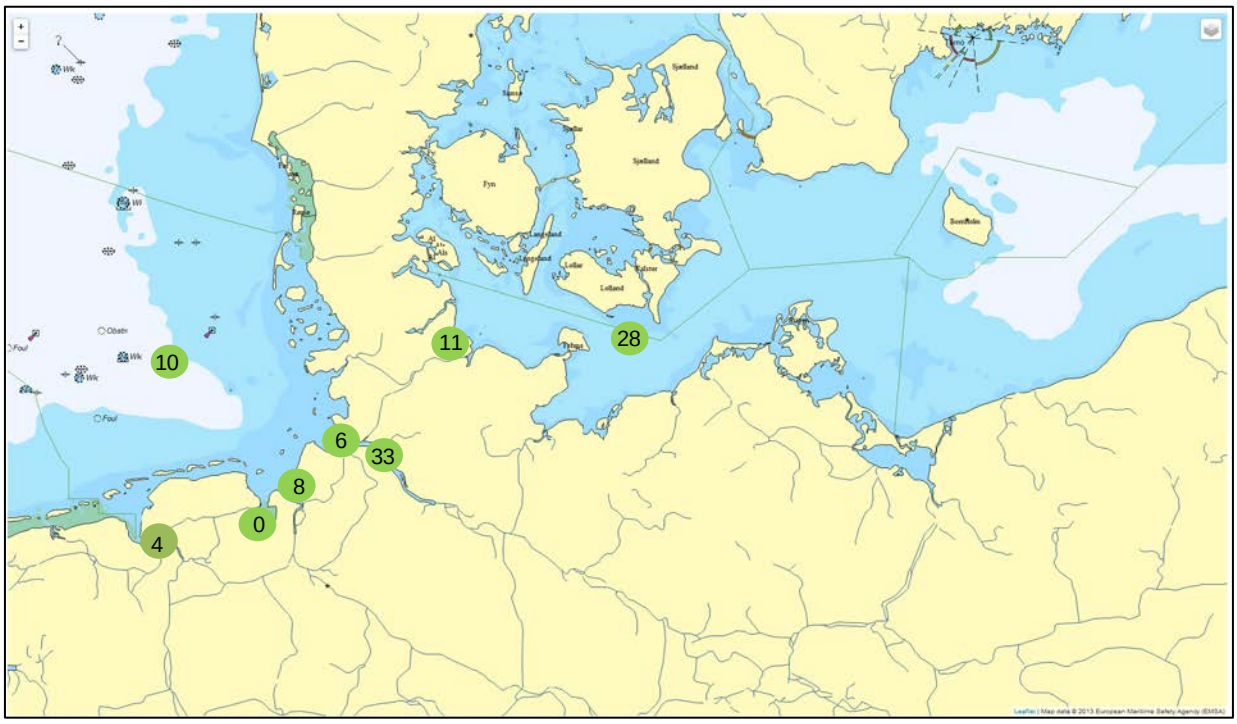
That the number of deaths and injuries in merchant shipping has remained at the same low level year-on-year is extremely encouraging. This and the downward trend over the years, as shown in the below table, may well be due to increased safety awareness on board ships and in shipping companies.

	2015	2016	2017	2018	2019
Fatalities	7	5	4	2	2
Injured	56	60	51	31	36

6.3 Distribution of marine casualties by sea area

The distribution of accidents (LSMC and above) within German sea areas has remained virtually unchanged. Areas with the highest volume of traffic (Elbe from Cuxhaven to Hamburg and the locks on the Kiel Canal) are also the sea areas with the highest accident figures in 2019, as reflected by the second presentation on the chart, in particular. On the other hand, the figures are declining in the North Sea and its surrounding ports (Jade and Wilhelmshaven, in particular).



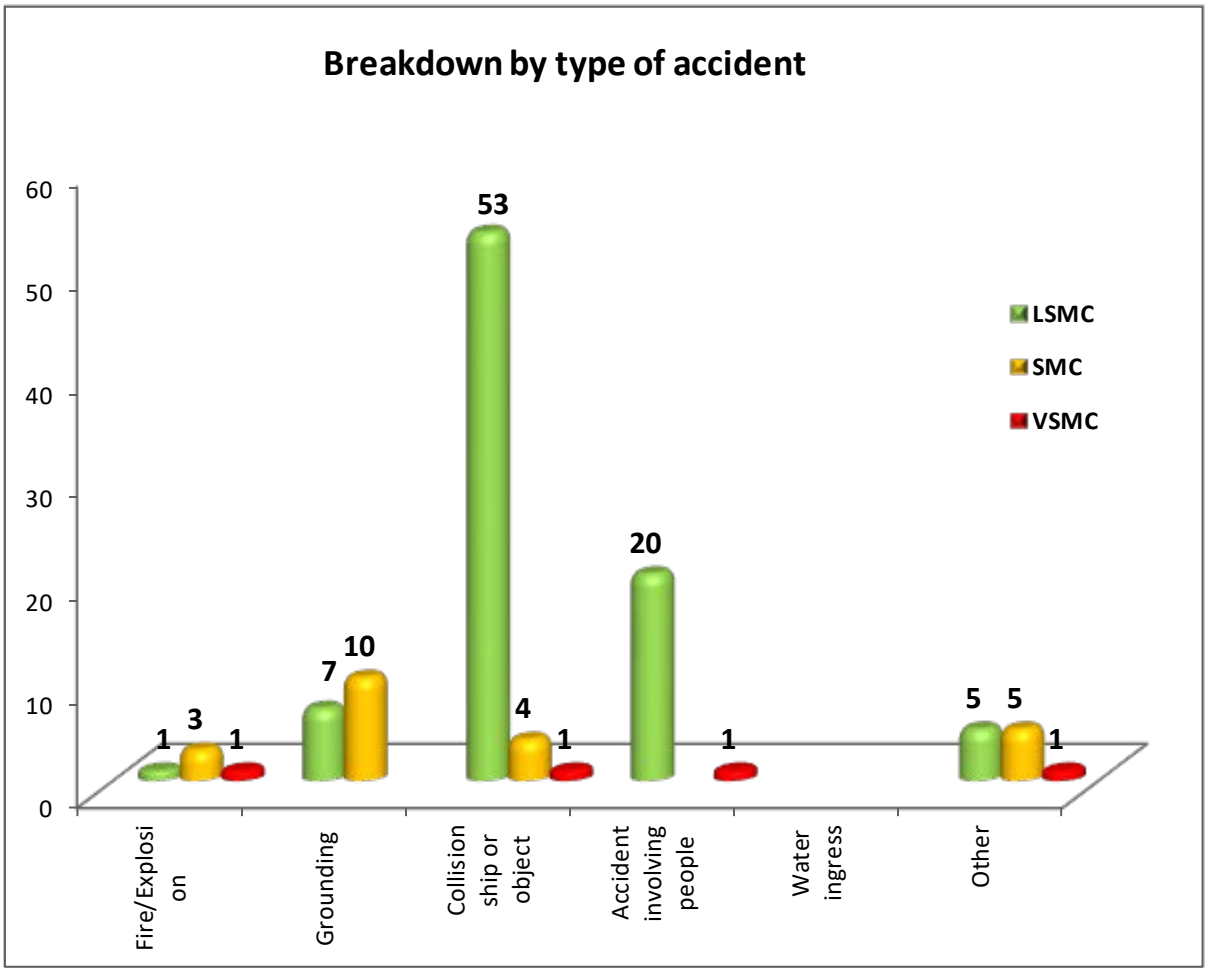


There has been little change in the distribution of the scene of accidents over the past three years. However, their share is subject to strong fluctuations, as shown in the table below. A real trend cannot be discerned here. This may be revealed in the coming years. The share is shown as a percentage in the interest of comparability.

	Weser HB BHV	Elbe CUX HH	Ems EMD	Jade WHV	Kiel Canal East	Kiel Canal West	North Sea ports	Baltic Sea ports	Int. German flag
2019	**7.1**	**29.5**	**3.6**	**0**	**9.8**	**5.4**	**8.9**	**25**	**10.7**
2018	**13.4**	**23.2**	**1.8**	**3.6**	**4.5**	**7.1**	**15.2**	**24.1**	**8.9**
2017	**13.2**	**24.2**	**1.4**	**1.8**	**10.5**	**17.4**	**21.4**	**17.8**	**2.7**

6.4 Distribution of marine casualties by kind of accident and type of ship

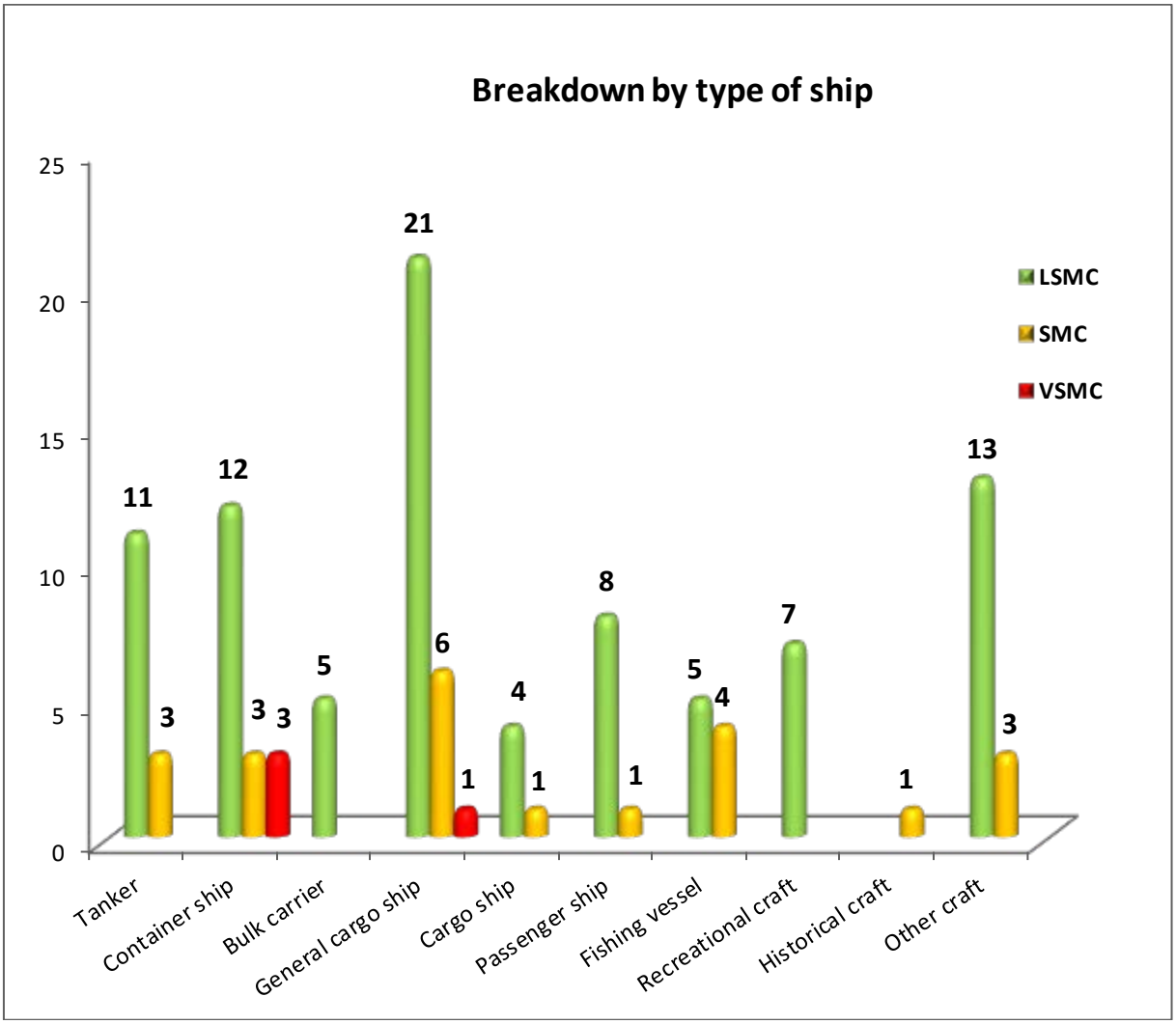
The distribution of accidents by kind of accident did not differ significantly from 2018. Collision, personnel injury and ground contact have always led the statistics.



The kinds of accident, too, have been examined this year to see how they have evolved over recent years. The following table aims to provide information (figures not absolute but rather expressed as a percentage):

	2015	2016	2017	2018	2019
Fire and/or explosion	3.6	2.7	1.4	1.8	4.5
Ground contact	9.0	13.6	16.0	13.4	15.2
Collision	56.7	54.8	63.0	56.3	51.8
Accident involving people	13.4	9.1	7.3	13.4	18.7
Water ingress	1.5	1.8	1.8	1.8	0
Other	16.0	18.1	10.5	13.4	9.8

As can be expected, collisions have been the predominant cause of an accident for years, although they have been declining for the past three years. Occupational accidents and ship fires also declined in 2017 and 2018. This went in the opposite direction again in 2019. Water ingress is almost non-existent. It is also important to mention that incidents are not listed here because they do not constitute shipping casualties internationally. The frequent engine or rudder failures without ensuing consequences are therefore not shown in these lists.



General cargo carriers have been leading the way for years, as can be seen in the following table. As above, the share of vessel types is shown as a percentage in the interest of comparability. 'Other' includes seagoing ships covered by the SUG that have yet to be mentioned, such as tugs, pilot boats, offshore supply vessels or others.

	2015	2016	2017	2018	2019
Tanker	12.3	4.1	7.8	6.3	12.5
Container	18.3	22.6	20.1	16.1	16.1
Bulk cargo	4.9	3.6	7.8	7.1	4.5
General cargo	28.3	27.1	29.2	22.3	25.0
Ro-ro cargo	4.9	2.7	7.8	3.6	4.5
Passenger	6.0	11.3	3.2	10.7	8.0
Fishing	6.0	5.9	3.7	8.9	8.0
Recreational craft (g)	2.6	5.9	6.4	5.3	6.3
Traditional	2.2	3.2	3.2	0	0.1
Other	14.6	13.6	11.0	19.6	14.3

Apart from a few outliers, the figures have been very stable over the years.

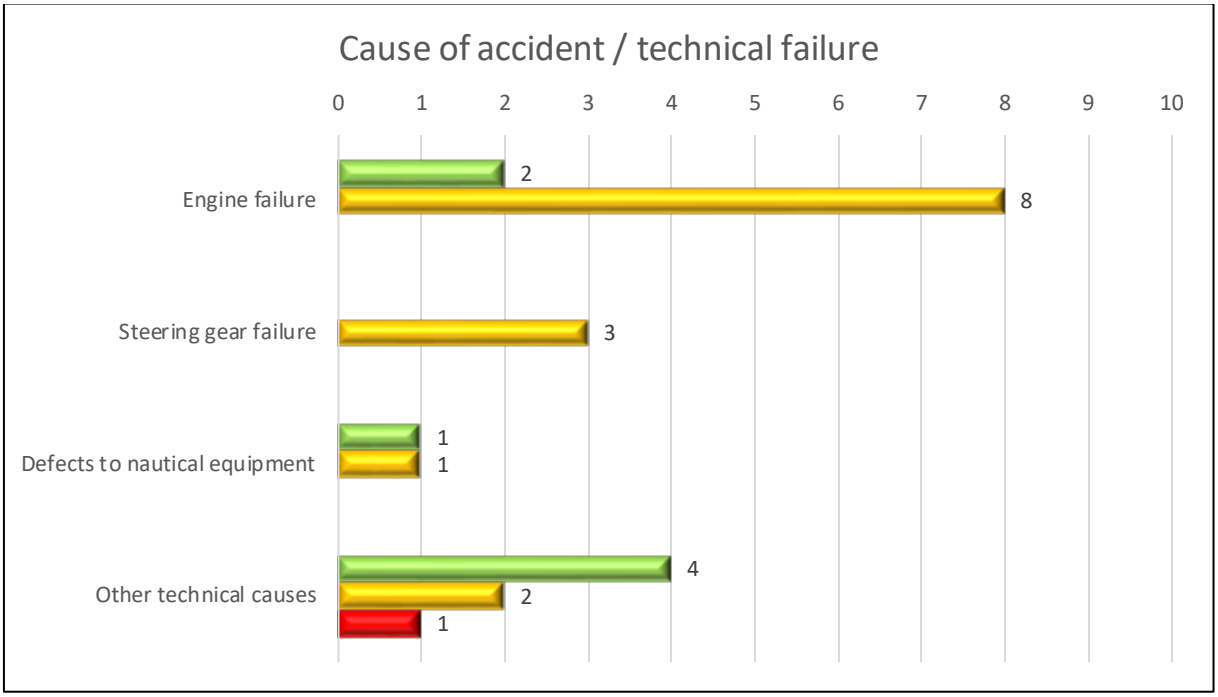
6.5 Accident causes

We now move on to accident causes. The BSU does not only classify every accident according to LSMC, SMC or VSMC, but also according to accident cause. The following matrix is used for this purpose:

Human causes
Incorrect assessment of the situation
Inadequate communication
Incorrect or no coordination with other party involved in the accident
Inadequate navigation
Right-of-way error
Misjudgement of pilot/VTS
Influence of alcohol
Heavy weather
Restricted visibility
Lack of occupational safety
Inappropriate speed
Fatigue
Other human causes

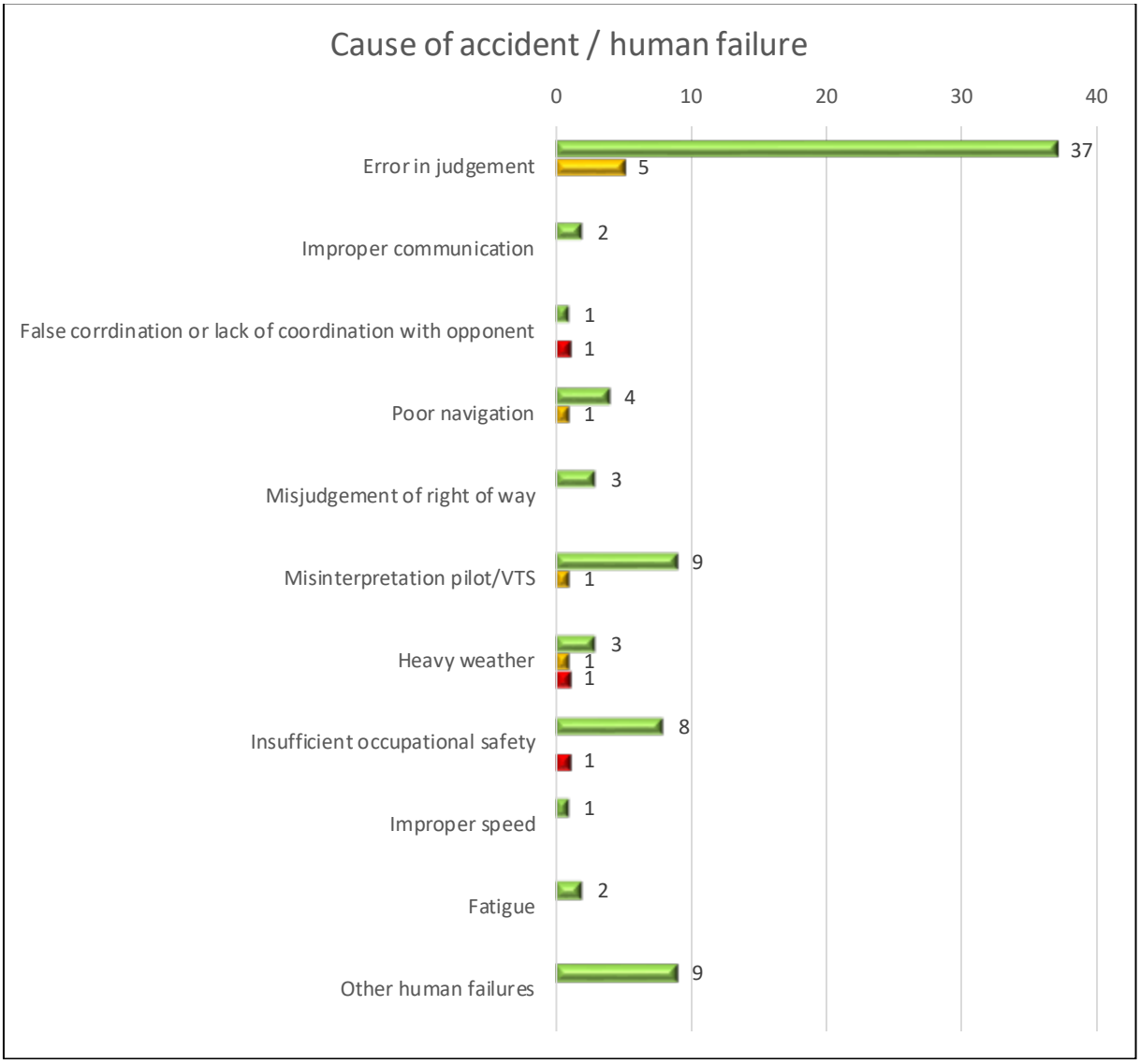
Technical causes
Engine damage
Rudder damage
Equipment damage
Faulty navigational equipment
Overall condition of ship insufficient
Other technical causes

The accident causes may then be referred to as follows[7]:



Engine damage – a perennial phenomenon – is the most common technical cause. Moreover, engine damage is often classified as SMC. It is usually unnoticed and harmless, however. One example here is an engine failure causes a ship to run aground in silt, a tug pulls the ship back into the fairway and after repairs her voyage continues. Although this sounds harmless, its formal classification by law is SMC.

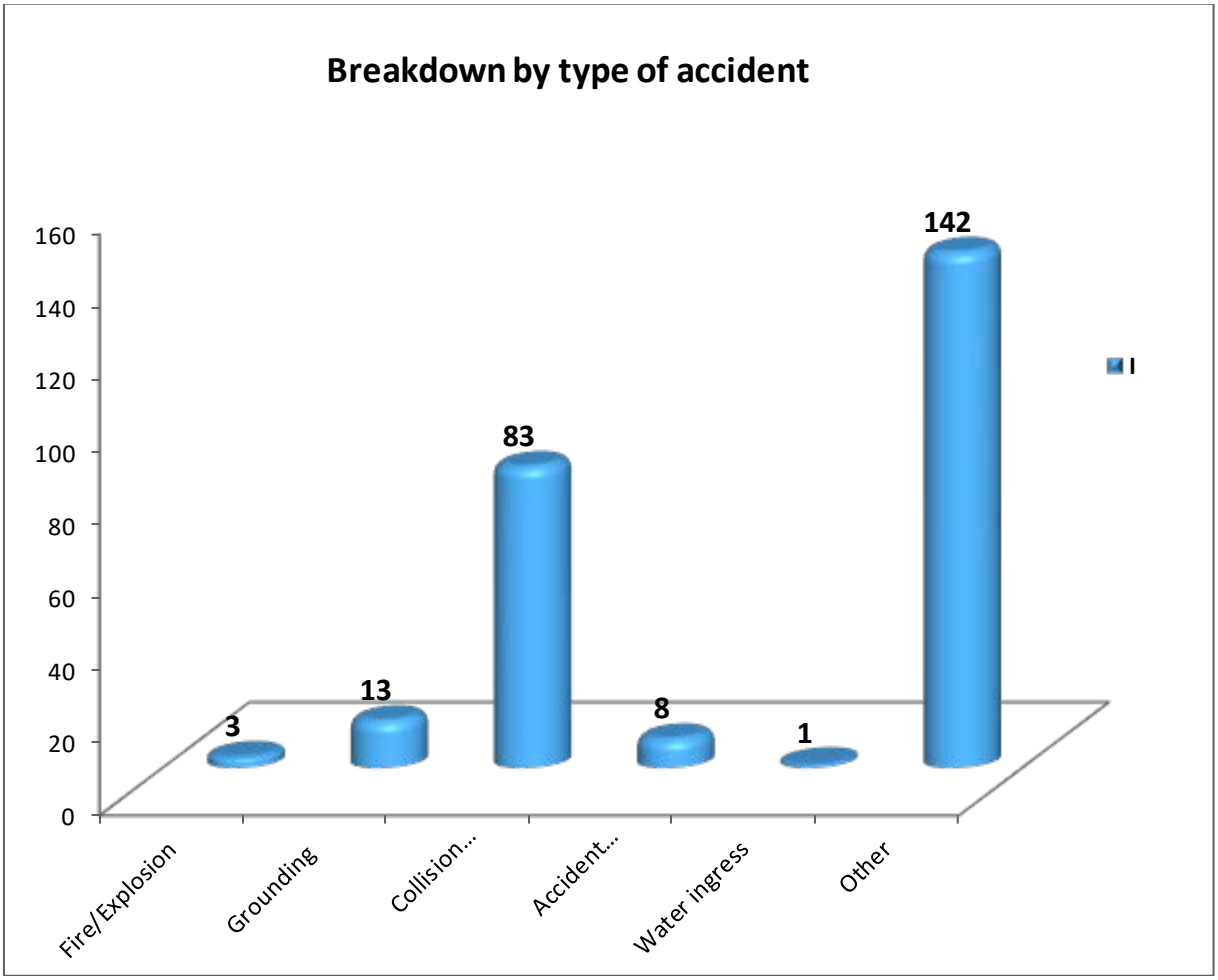
[7] No reference means number = 0; the colour scheme is based on the one previously used (green = LSMC, yellow = SMC and red = VSMC).



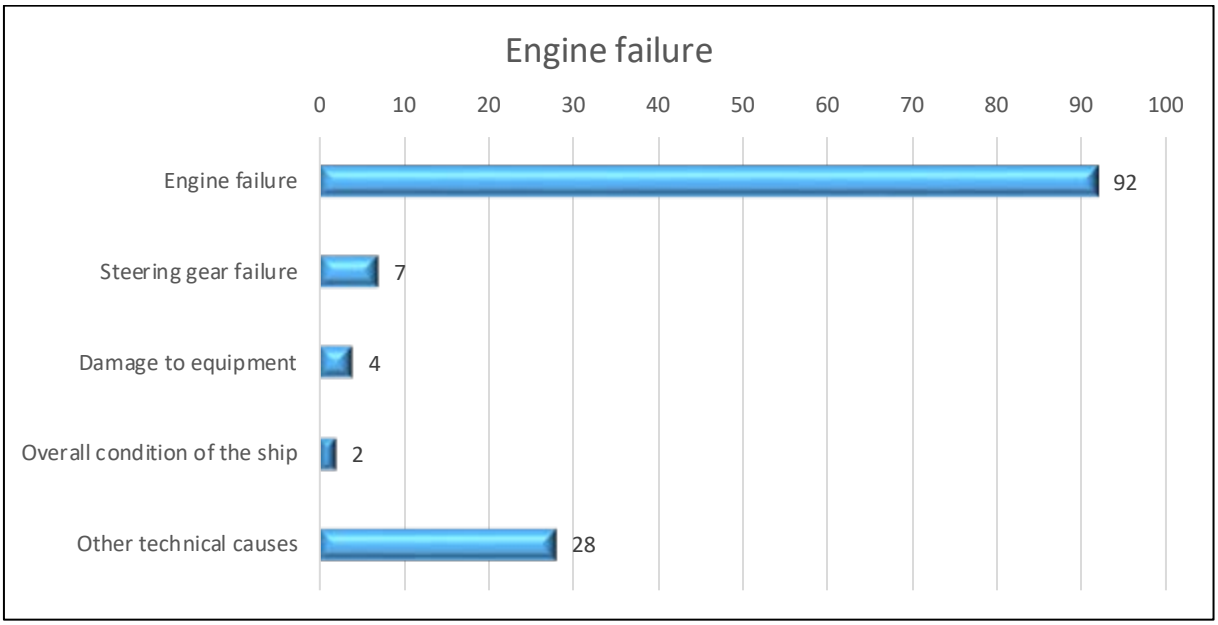
'Incorrect assessment of the situation' is the most common human cause. This can be navigational errors or underestimating winds or disturbances, for example. The key point here is that in the case of accidents, i.e. those with serious consequences, it is the human causes that predominate. On the other hand, technical causes are most common in the case of incidents, as can be seen below. This is probably due to the fact that in the case of a technical error humans can take countermeasures to prevent damage, which is usually no longer possible in the case of a human error.

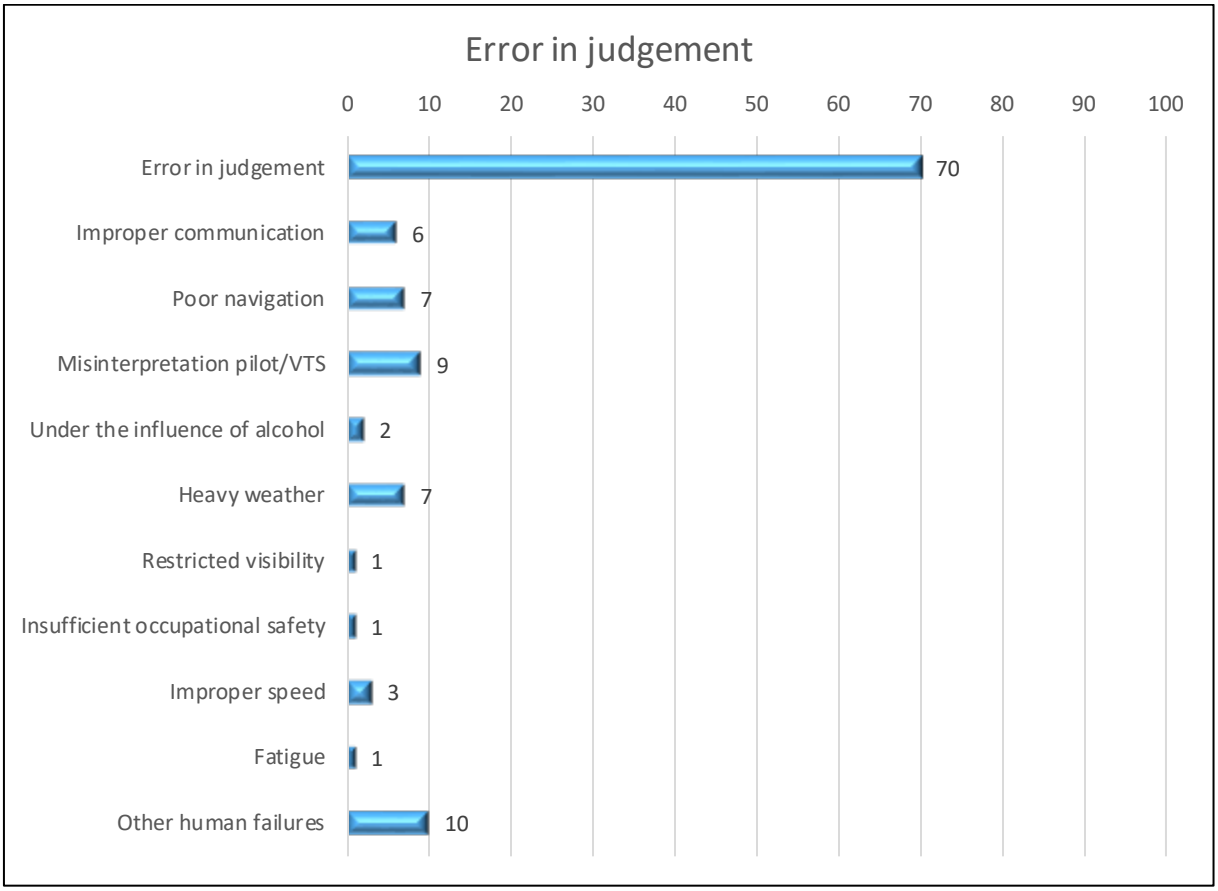
6.6 Incidents

Since most notifications concern an incident in terms of number and percentage distribution – at 250 incidents, it was almost 45% in 2019 – this annual report will also look at those in greater detail. Although it is inherent in incidents that their consequences are not serious, they too pose a threat to safety at sea.

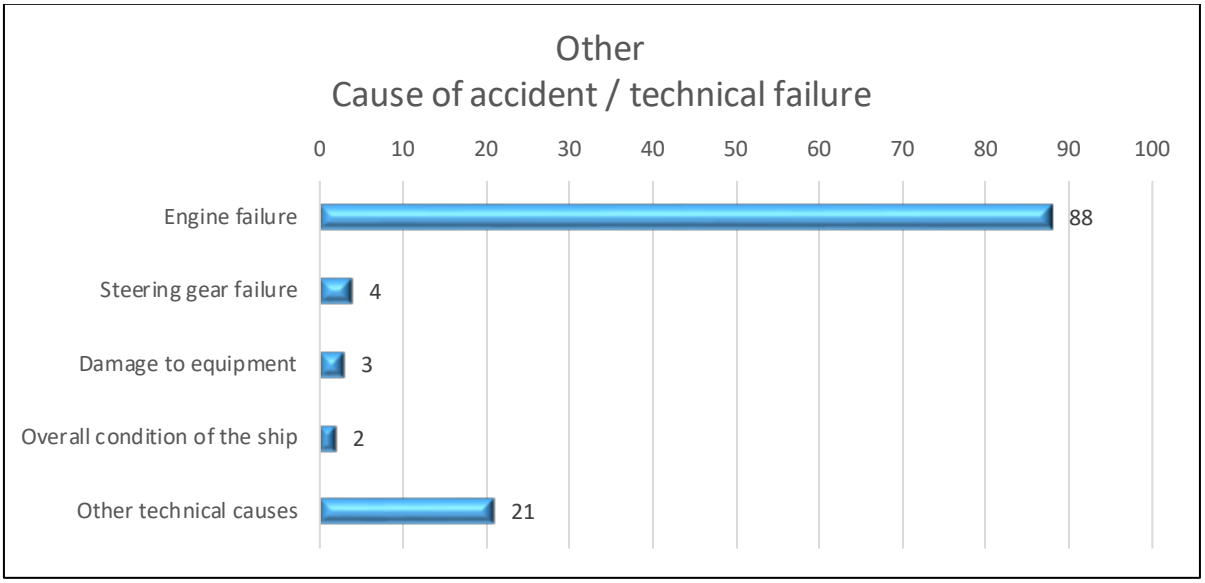


As with accidents, the BSU distinguishes between technical errors and human errors in the causes of an incident. They can be summarised as follows:

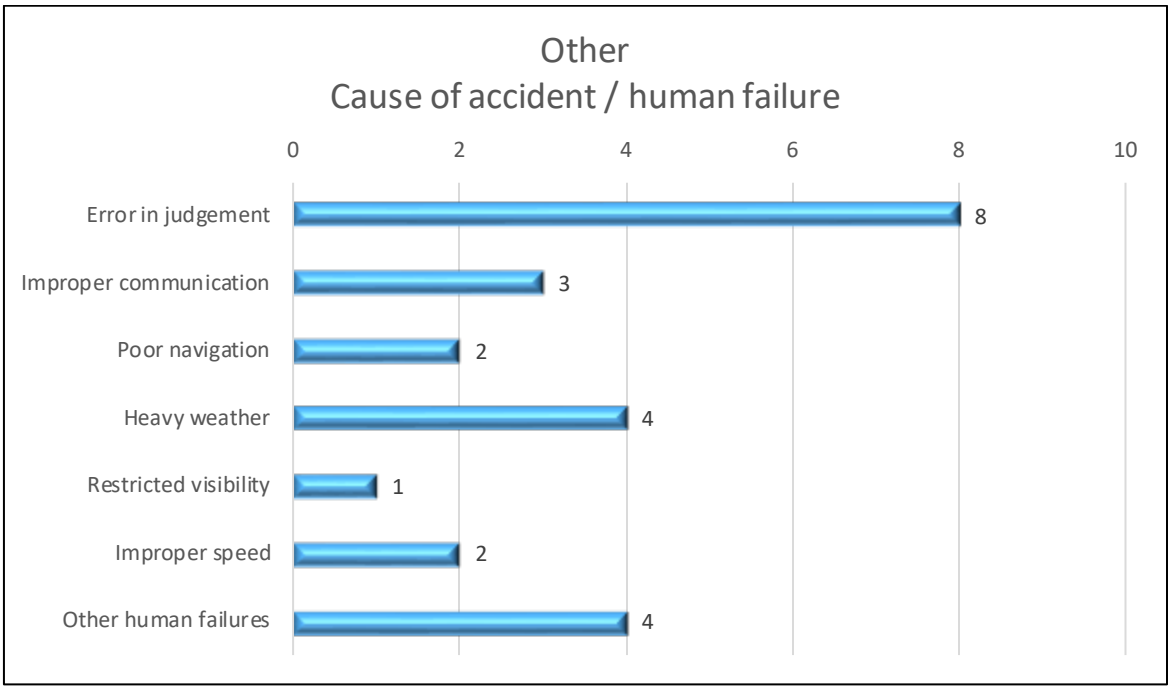




When incidents are broken down by kind of accident, one thing stands out in the above accidents: **'Others'** are the most common and collision (or contact) is only in second place. Ground contact also makes it onto the list, although this usually concerns briefly running aground on silt and then refloating immediately. Nevertheless, it is worth looking at 'Others' in more detail.

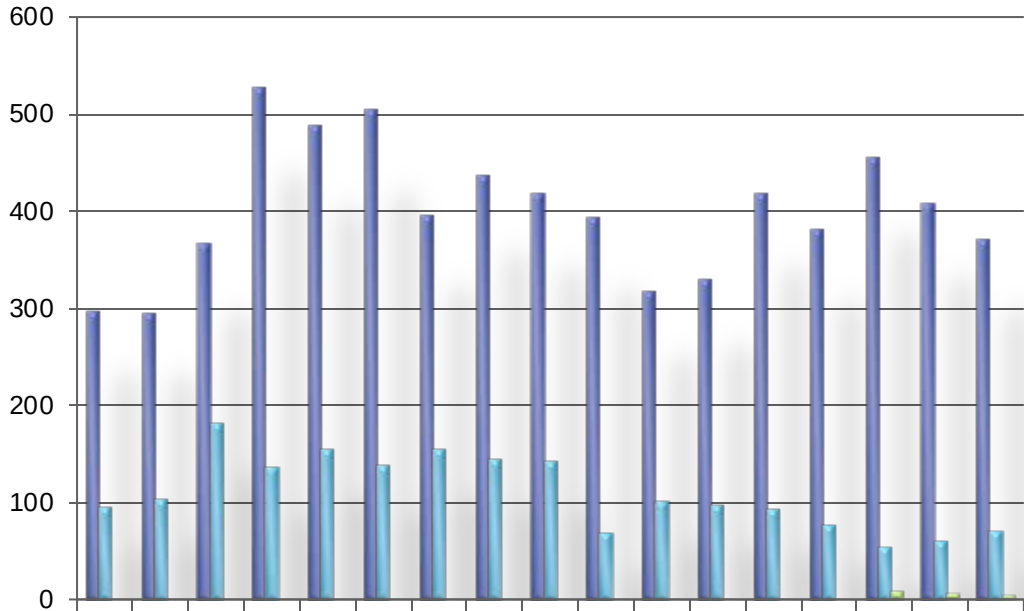


By far the most incidents have technical causes. Engine damage and blackouts or misfires have led the way for years. It can usually be quickly repaired while the ship is anchored in a roadstead and the voyage then continues.



6.7 Accident notifications to the BSU and recreational boating

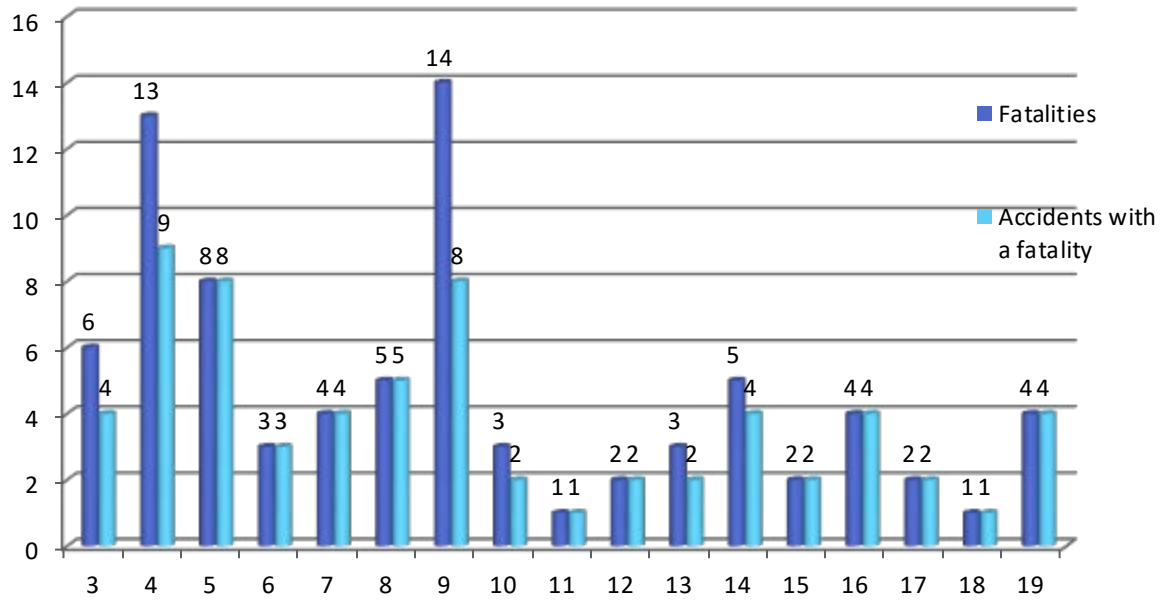
A total of 443 accident notifications (i.e. notifications from merchant shipping or recreational boating concerning a marine casualty, incident or so-called other accident) to the BSU means that 2019 is a 'good' year. This is nearly 30 notifications fewer than in 2018 and as much as 73 fewer than in 2017. The annual average of all accident notifications since 2003 stands at 521 per year and the average figure over the past decade is 493. In addition to accident notifications in general, notifications concerning recreational craft have also been declining for years. Unfortunately, this trend was not confirmed in 2019. On the contrary, the figures relating to recreational craft increased slightly by 9, a share of 15.6% (as compared to 12.8% last year).



	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Commercial craft	297	295	367	526	487	504	396	436	417	392	316	329	418	380	455	407	370
Recreational craft	95	103	181	136	155	138	155	144	141	68	101	97	92	76	53	60	69
Historical craft															8	5	4

The figures correspond to the number of fatalities due to accidents in recreational boating. Four people lost their lives in these accidents. The reasons are varied and often unexplainable, e.g. in the case of single-handed sailors. However, what many such accidents have in common is that the casualties were not wearing a lifejacket when they happened. In any case, the number of fatalities in recreational boating is higher than in merchant shipping for the first time since 2009.

Fatalities in pleasure boating sector from 2003 to 2018



6.8 Investigation reports published and lessons learned

It is appropriate to close the statistics section and thus also this annual report with the summaries of the published investigation reports (including interim) and now also the lessons learned.

The BSU published 12 investigation reports in 2019. They include four interim reports *(in italics)* and a summary report.

No	Published on	Report no	Kind of accident
1	18/02/2019	168/16	Fatal person-overboard accident involving a crew member of the fishing vessel PESORSA CUATRO 150 nm west of Ireland on 17 May 2016
2	*18/02/2019*	*52/18*	*Allision between the container ship AKACIA and a lock gate on the Kiel Canal in Kiel-Holtenau on 19 February 2018*
3	06/03/2019	408/17	Grounding of the bulk carrier MV GLORY AMSTERDAM on 29 October 2017 about 1.6 nm north of the North Sea island of Langeoog
4	10/04/2019	118/18	Allision between the VOS STONE and a wind turbine on 10 April 2018 in the Baltic Sea
5	02/05/2019	258/18	Capsize of survey boat GEO PROFILER in the Wadden Sea off Büsum on 17 July 2018
6	*05/07/2019*	*241/18*	*Grounding of the motor tanker PAZIFIK off Indonesia on 9 July 2018*

7	20/09/2019	71/17	Collision between the FV JAN MARIA and a fishing boat in the Mauritanian EEZ on 21 March 2017
8	*22/10/2019*	*405/18*	*Destruction of the main engine's turbocharger with subsequent fire in the engine room of the BALTIC BREEZE in the North Sea on 14 October 2018*
9	06/11/2019	20/17	Failure of the main engine with subsequent emergency anchor manoeuvre on the bulk carrier MV CAPE LEONIDAS on 17 January 2017 in the area of Kolmar on the River Elbe
10	29/11/2019	496/15	Fire in the cargo hold of the multipurpose ship VENTURA off the canal locks at Kiel-Holtenau on 18 December 2015
11	*12/12/2019*	*3/19*	*Containers lost overboard on the MSC ZOE in the Terschelling-German Bight traffic separation scheme on 1 and 2 January 2019*
12	18/12/2019	52/18	Allision between the container ship AKACIA and a lock gate on the Kiel Canal in Kiel-Holtenau on 19 February 2018

The BSU also published five lessons learned:

Ser no	**Date**	**Kind of accident**	**Description of accident**
01	29/07/2019	VSMC	Occupational accident; person-overboard and death
02	18/09/2019	SMC	Grounding after failure of emergency towing attempts
03	27/09/2019	VSMC	Collision between fishing vessel and fishing boat
04	02/10/2019	LSMC	Allision with wind turbine
05	05/12/2019	Incident	Emergency anchor manoeuvre after engine failure