



Australian Government

Australian Maritime Safety Authority

Annual overview for marine incidents - 2021

State of the fleet

Foreign flagged, regulated
Australian and domestic
commercial vessel

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Overview

Purpose of this report

This report provides an analysis of marine incidents reported in the 2021 calendar year with trends from 2017-2021 for foreign-flagged vessels and RAVs and trends from 2019-2021 for DCVs¹.

It aims to inform key stakeholders in maritime and across other sectors, from government and other organisations with an interest in AMSA's reporting on marine incidents and their consequences in the commercial maritime sector².

Marine incident data alone does not provide enough evidence for the in-depth analysis required for the identification of safety issues – this requires a more holistic analysis of other safety data including inspections and investigations data with further supporting research. AMSA does this in the development of the [National Compliance Plan](#), where targeted activities for the 2022-2023 financial year are set out. This report is not intended as a complete overview and/or comprehensive technical analysis.

A list of acronyms and definitions as well as extra information on the classification used in marine incidents is at **Appendix 1**.

Marine incident and safety concern reporting

Information on marine incident reporting is available on the AMSA website³.

Apart from marine incident reports AMSA also receives reports relating to marine safety concerns and these are processed and recorded in the same way as marine incidents. Unlike marine incidents which are reported by the master or owner/operator of a vessel, anyone who observes an incident that may endanger, or if not corrected could endanger, the safety of a commercial vessel or persons on board the vessel can report a marine safety concern to AMSA.

¹ AMSA has received marine incident reports for vessels operating under the *Navigation Act 2012* since its commencement in 2013. Marine incident reports for DCVs operating under the *Marine Safety (Domestic Commercial Vessel) National Law Act 2012* (the National Law) have only been required to be reported to AMSA since July 2018.

² AMSA also publishes monthly updates of very serious and serious incidents for DCVs

<https://www.amsa.gov.au/vessels-operators/incident-reporting/2022-monthly-domestic-commercial-vessel-incident-reports>

and monthly safety lessons briefs based on marine investigation reports which are intended to target owners, operators and crew

<https://www.amsa.gov.au/marine-incident-reporting/annual-and-monthly-incident-publications/monthly-safety-lessons-domestic>

<https://www.amsa.gov.au/marine-incident-reporting-0>

Marine incident reporting

Reported marine incidents

In 2021, AMSA received 4683 marine incident reports and 320 marine safety concerns in relation to foreign-flagged vessels, RAVs and DCVs.

Marine incident reporting has increased over previous years. All combined, there was a 9.1% increase in 2021 over reports received in 2020. Notably DCVs reported 24.7% more incidents in 2021 (945) than the previous year (758).

It is generally recognised that the maritime industry suffers from widespread underreporting of marine incidents. This presents a challenge for safety regulators such as AMSA as incident reporting is an important safety improvement strategy and provides an opportunity for everyone to help develop a better picture of risks affecting our industry and in turn contribute to broader safety improvements. Marine incident data is a critical input for regulatory reviews. Comprehensive marine incident data enables well targeted reforms and avoids unintended consequences. The generally increasing trend in marine incident reporting may signify an improvement in reporting culture.

Figure 1 shows the total marine incidents reported by commercial vessels operating within Australia's maritime jurisdiction, or in preparation to enter Australia's maritime jurisdiction,⁴ between 2017 and 2021.

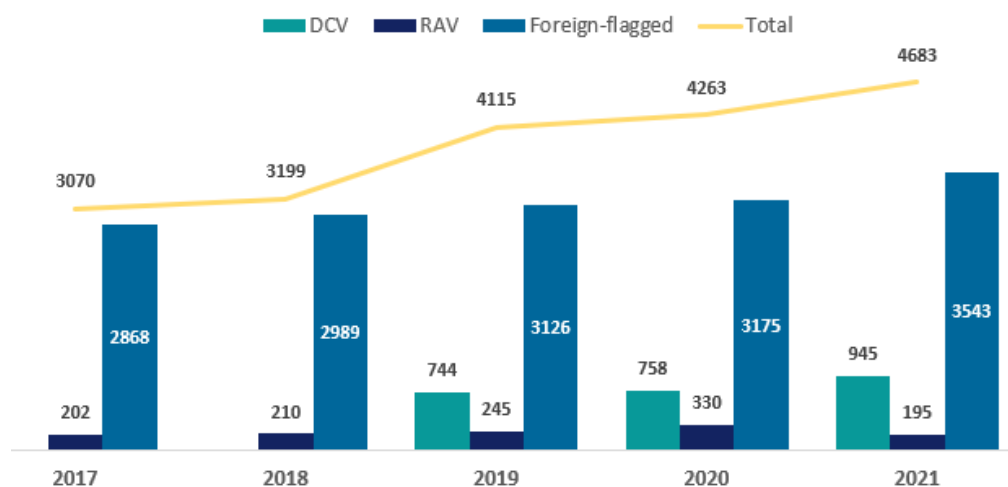


Figure 1: Reported marine incidents, all vessels, by year (2017-2021)^{5 6}

⁴ Whilst foreign-flagged vessels are required to report marine incidents to AMSA when they occur within Australian waters, AMSA often receives reports from foreign flagged vessels in all stages of their journey to or from Australian ports. Unless otherwise noted, incidents reported by foreign flagged vessels are not limited to Australian waters.

⁵ DCV incident reporting to AMSA commenced in July 2018.

⁶ RAV incidents between 2019 and 2021 may have been reported in separate annual incident summaries for DCVs and for RAVs and foreign-flagged vessels. Incident data for Australian commercial vessels for 2021 is reported against the certification status as either a RAV or a DCV at the time of the incident.

Marine incidents are classified by AMSA into three severity levels:

- very serious
- serious, and
- less serious⁷

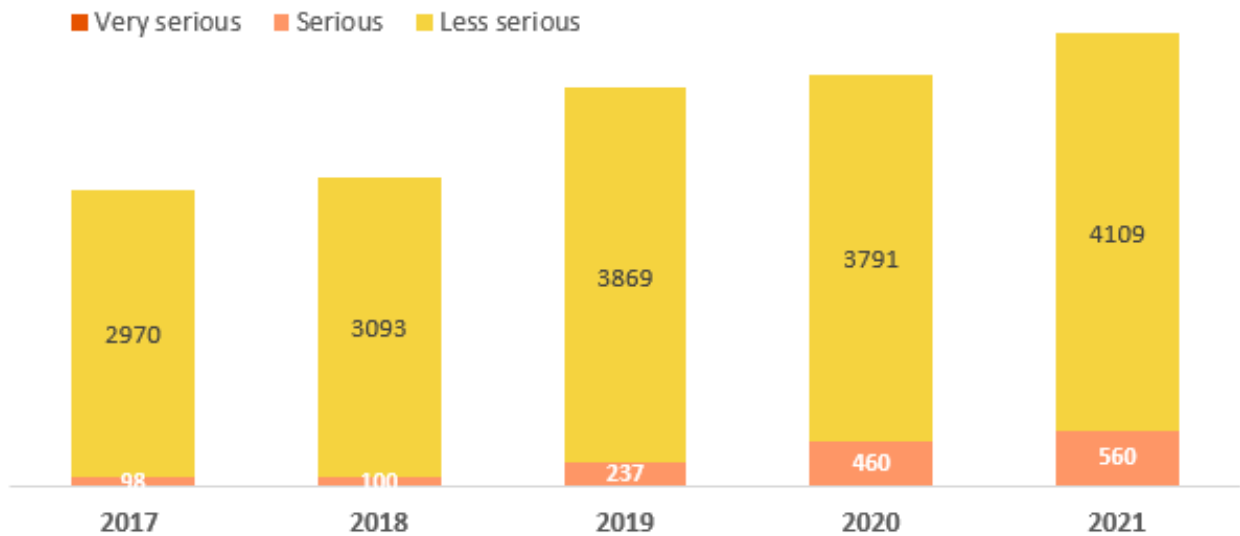


Figure 2: Marine incident severity, all vessels, by year (2017-2021)⁸

In 2021, 0.3% of total reported incidents were *very serious* (14), 12.0% were *serious* (560) and 87.7% were *less serious* (4109) (Figure 2). Figure 3 shows the difference in the numbers of each severity across the three vessel groups.

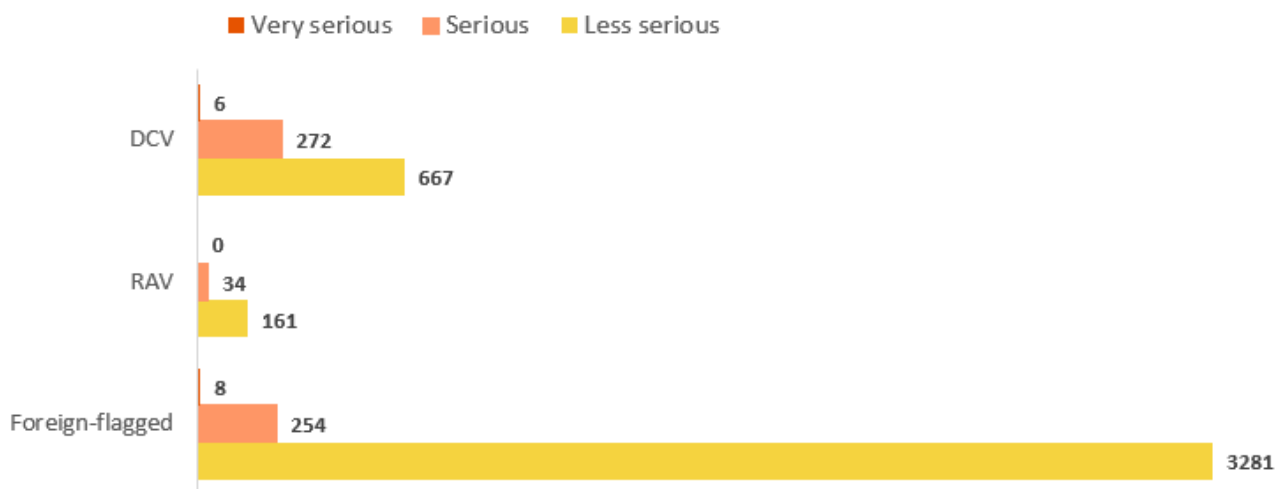


Figure 3: Number of incidents by severity for each vessel group (2021)

⁷ Marine incident severity definitions are set out in Appendix 1.

⁸ Totals for 2017-18 include RAV and foreign flagged vessels only.

Marine incident reporting trends

Domestic commercial vessels

In 2021 there were approximately 31,000 active DCVs operating across four vessel classes⁹ (passenger; non-passenger; fishing and hire & drive vessels). This includes approximately 7000 human powered (such as kayaks) or sail vessels which are primarily hire and drive and under 7.5m in length.

In 2021, the proportion of less serious incidents was 70.6% of all reported incidents. This is consistent with the results reported in 2020 (70.3%).

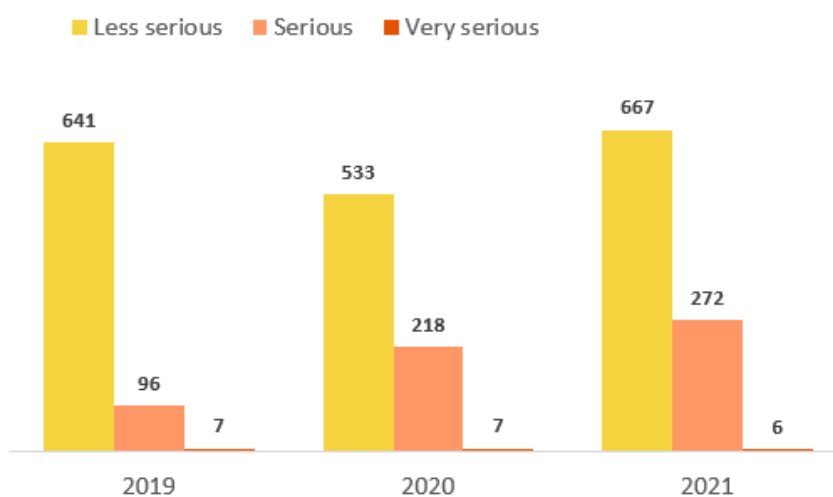


Figure 4: DCV incidents by severity (2019 - 2021)

Considering DCV incidents by class, Figure 5 shows reported marine incidents from 2019 to 2021. Incident reports received from passenger and non-passenger vessels increased whilst the number of reports received from fishing and hire & drive vessels remained largely steady.

⁹ Glossary including description of vessel use classes for DCVs are set out in Appendix 1.

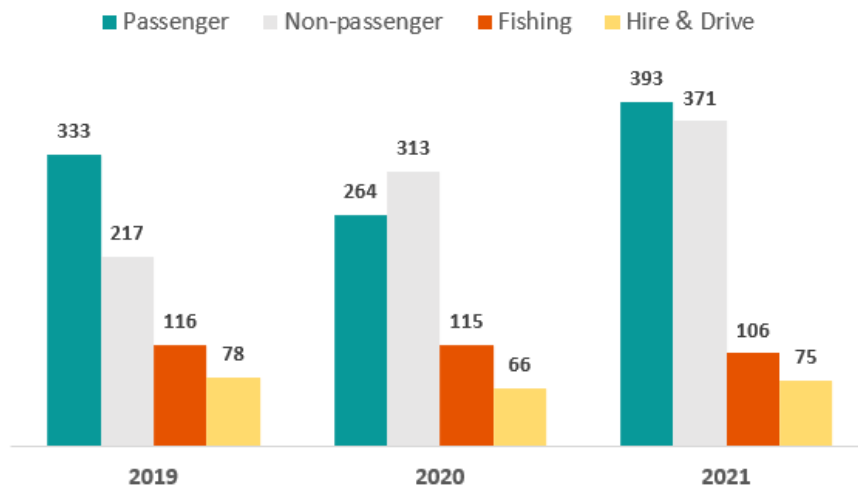


Figure 5: Reported DCV marine incidents by vessel class (2019-2021)

The data suggests that the operators of passenger vessels continue to have a better reporting culture than those of all other classes of vessels. This is evident when comparing the proportion of the fleet to the proportion of incidents reported by vessel class (Figure 6). Passenger vessels account for 41.6% of incident reports, while only representing 9.5% of the DCV fleet. In contrast, the proportion of incident reports in relation to the fleet class size is much lower for the other classes of vessels. Fishing vessels comprise 30% of the DCV fleet but accounted for 11.2% of reported incidents.

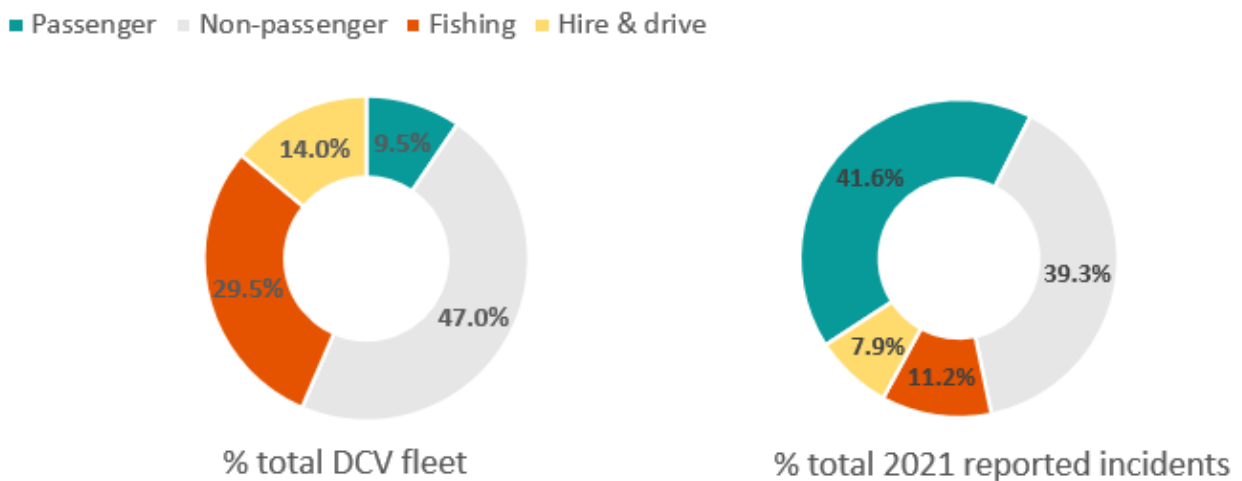


Figure 6: Comparison of proportions, DCV fleet and marine incidents by vessel class (2021)

Differences in reporting culture across vessel classes is further evident when comparing the severity of reported incidents. Fishing vessels continue to report a much higher proportion of *very serious* and *serious* incidents than the other classes (Figure 7). This indicates that incidents on fishing vessels tend not to be reported if they are less serious.

Compared to 2020, in 2021 the proportion of *very serious* and *serious* incidents increased slightly in non-passenger (+1.5%) and passenger (+2.2%) vessel classes and decreased slightly in hire & drive (-3.4%) and fishing (-3.5%) vessels.

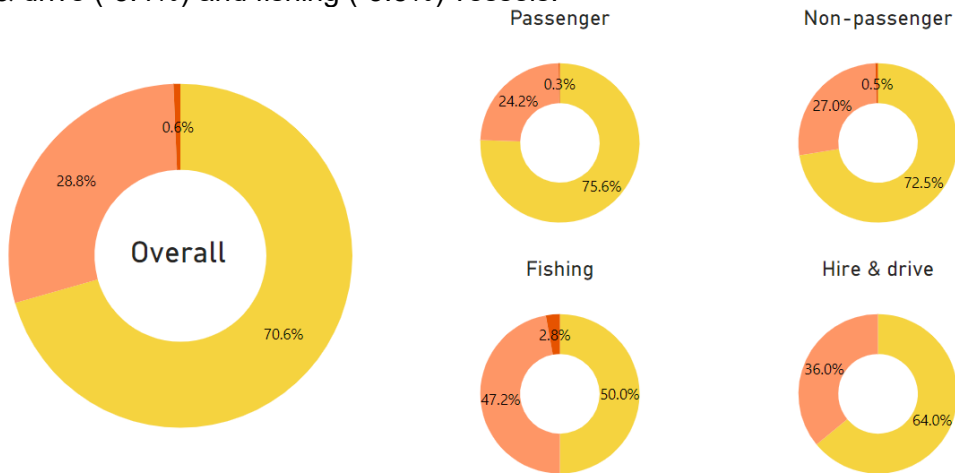


Figure 7: DCV incidents by vessel class and severity (2021), total and broken down by vessel class

The data also suggests that operators of larger vessels report proportionally more incidents. Reviewing incident reports by vessel length, Figure 8 shows that there was a relatively lower proportion of reports from vessels under 7.5m in length, which form the majority of the DCV fleet. AMSA recognises that there are issues to be addressed to foster a positive reporting culture among operators of smaller vessels, and we will continue to work with smaller vessel operators to improve reporting culture.

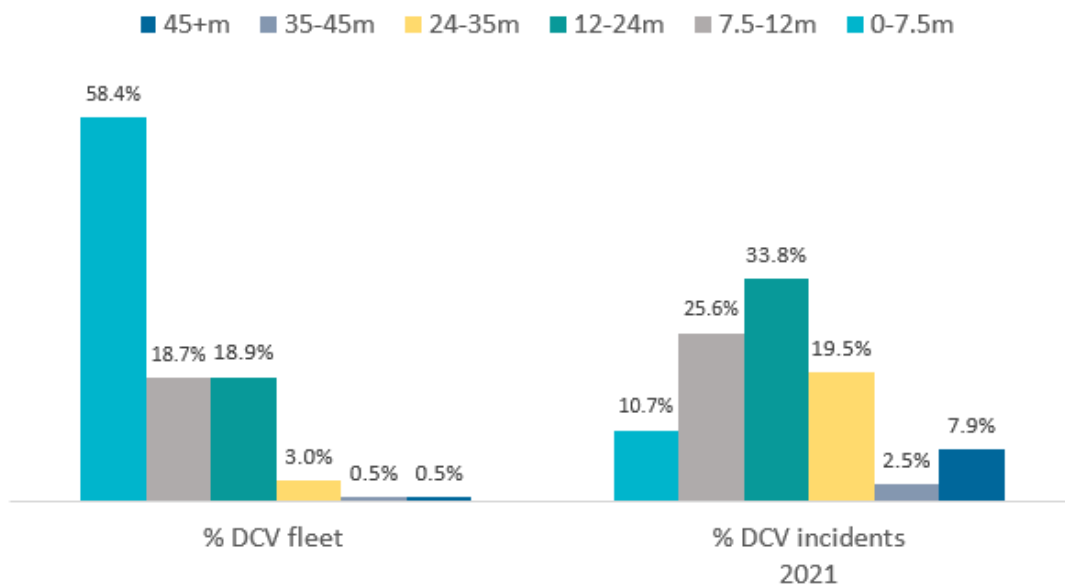


Figure 8: Proportion of DCV marine incidents reported by vessel length compared to fleet demographics (2021)

Foreign-flagged and regulated Australian vessels

A total of 195 marine incidents were reported by 58 individual RAVs in 2021. The low number of incident reports compared to foreign-flagged vessels means that RAV data lacks the statistical power to support meaningful trend analysis; hence we have not included further analysis of RAVs.

The 3543 marine incidents reported to AMSA by foreign-flagged vessels in 2021 were reported by 2131 individual vessels.

Consistent with port arrivals data¹⁰ most incident reports were received from bulk carriers (Figure 9). This ship type was over-represented in incident reporting compared to vessel arrivals. It is worth noting that it is not uncommon for bulk carriers to submit multiple reports of minor equipment and/or machinery defects or failures at the same time and such reports would often be captured as a less serious incident.

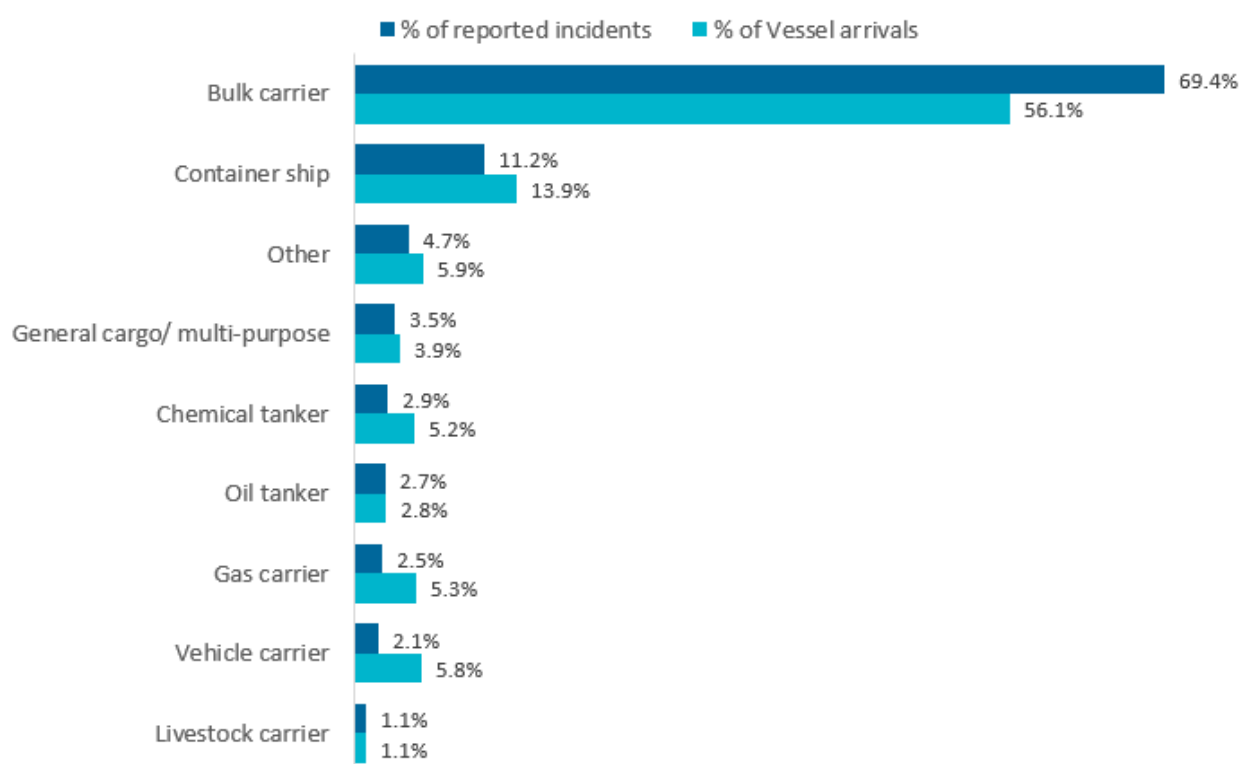


Figure 9: Proportion of foreign-flagged vessel incidents by ship type with vessel arrivals¹¹ (2021)

Whereas very serious and serious incidents represent 12.3% of all marine incidents reported to AMSA in 2021, this proportion for foreign-flagged vessels is 7.4%. Figure 10 shows that the proportion of very serious and serious incidents reported by foreign-flagged vessels in 2021 varies by type of ship.

Bulk carriers reported the majority of very serious and serious incidents. However, as a proportion of the total reporting by bulk carriers, very serious and serious incidents were only 5.9% of their

¹⁰ [Port State control – 2021 Annual Report](#)

¹¹ [Port State control – 2021 Annual Report](#)

total. Likewise, the proportion of very serious and serious incidents reported by vehicle carriers (6.8%) was lower than the average for all foreign-flagged vessels. The 'other'¹² ship types and livestock carriers reported the highest proportions (15.7% and 18.4% respectively) of very serious and serious incidents in 2021.

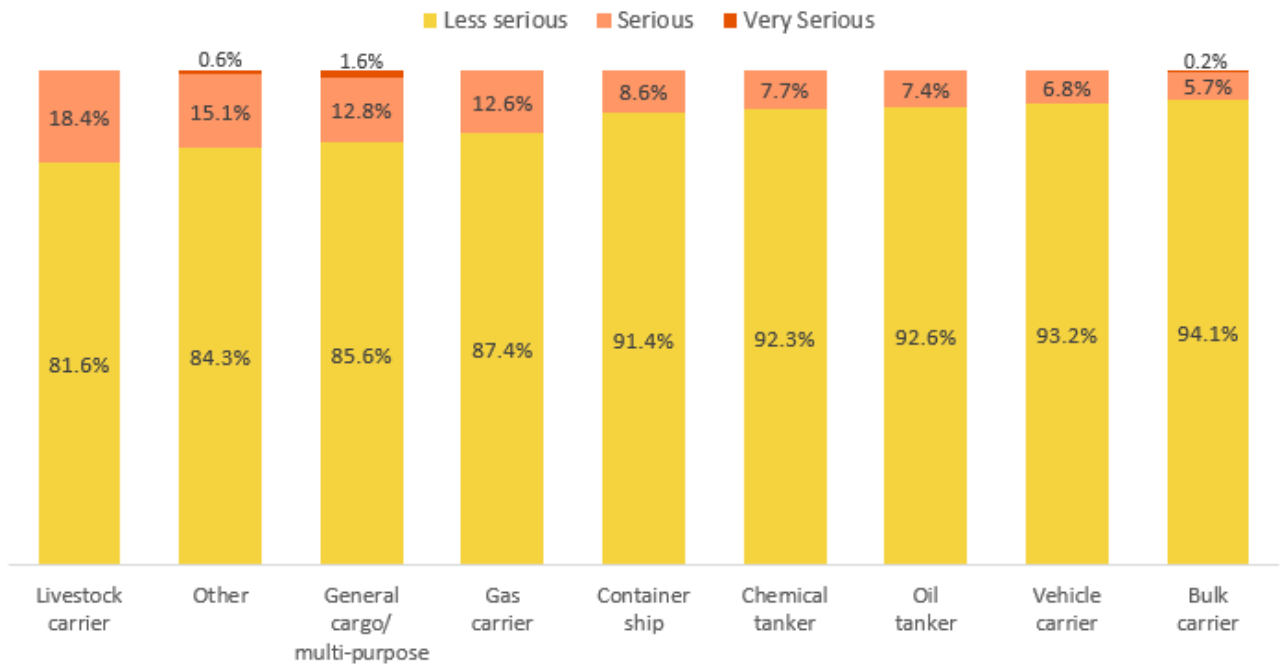


Figure 10: Foreign-flagged incidents by ship type and incident severity proportion (2021)

¹² 'Other' ship types include tug boats, wood-chip carrier, special purpose ship, heavy load carriers, ro-ro cargo ships and NLS, oil/chemical and oil/NLS tankers.

Classification of marine incident and follow-up investigation reports

AMSA classifies all reported marine incidents into one or more 'occurrence type' categories to consistently describe what happened. This helps us understand patterns of what has taken place and identify potential areas for further investigation.

This 'occurrence type' classification provides a description of what happened¹³.

AMSA reviews all marine incident reports it receives and responds according to the principles outlined in the [AMSA Compliance Strategy 2018 – 2022](#). After conducting preliminary inquiries, a decision is made on whether to conduct an investigation. Some considerations for commencing an investigation include: the existence and extent of fatalities/serious injuries and/or structural damage; the anticipated safety value of an investigation; the likelihood of safety action arising from the investigation; and the relevance to an identified and targeted safety campaign. In this regard, investigation reports are also analysed and used by AMSA as a source of safety data.

Hence, in addition to classifying the types of incidents based on what happened, AMSA also reviews investigation reports for DCV incidents to identify *how* and *why* the incident occurred. Marine incidents are a result of many factors and underlying safety issues that often are not directly linked to the incident – such as organisational issues. To ensure we capture these underlying safety factors, AMSA has developed a marine safety framework¹⁴ to classify investigation findings based on research and marine incident data.

¹³ Marine incident classifications and definitions are set out in Appendix 1.

¹⁴ Details of the Safety Framework are in Appendix 1 (Figure 1 and Table A6)

Marine incidents by occurrence type – analyses and findings

Figure 11 shows a breakdown of the 4683 marine incidents reported in 2021 by occurrence type¹⁵.

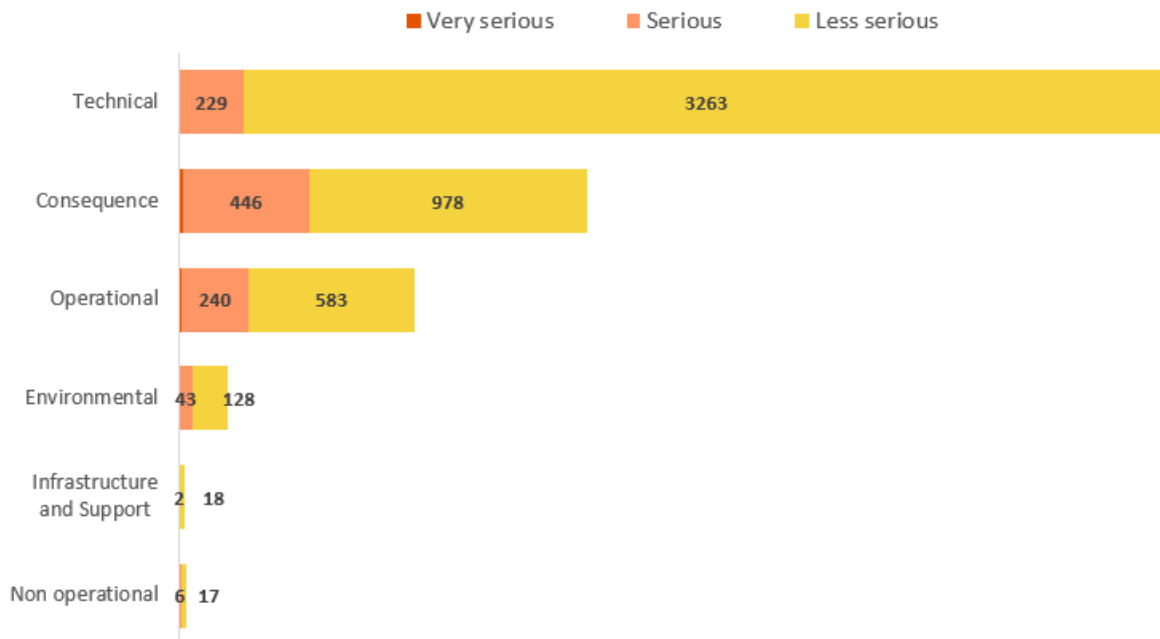


Figure 11: Number of incidents by occurrence type and severity (2021)

Figure 12 shows the proportion of incidents for each occurrence type classification, for foreign-flagged ships and domestic commercial vessels. While 87.3% of incidents reported from foreign-flagged ships are classified as *Technical*, 85.8% of incidents reported from DCVs are classified as *Operational*. This is an indication that foreign-flagged ships tend to report *Technical* incidents even when they do not result in *Consequences*; whereas DCVs are less likely to report incidents that do not result in *Consequences*.

¹⁵ Multiple occurrence type classifications can be applied to one incident.

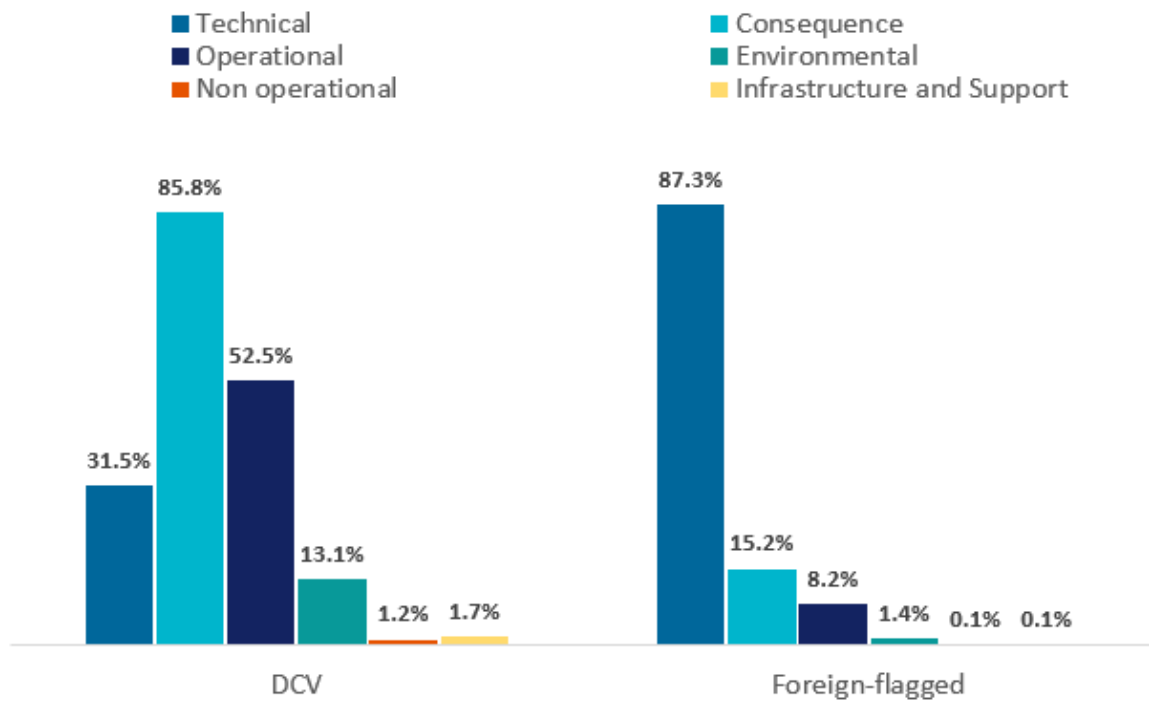


Figure 12: Percentage of incidents in each certification group which were classified with at least one occurrence type from each of the 6 primary occurrence types (2021)

The next sections of this report will focus on *Consequence*, *Technical* and *Operational* occurrence-types and their sub-types. *Environmental*, *Infrastructure* and *Non-operational* will not be discussed individually due to the limited amount of data associated with these categories.

Consequences to people

Domestic Commercial Vessels

Fatalities

Between 2017 and 2021, there were 19 operational-related fatalities on DCVs (17 crew and 2 passengers) associated with 14 marine incidents¹⁶. While 3 fatalities occurred in 2021, overall, the number of fatalities has continued to trend downward since 2017 (Figure 13).

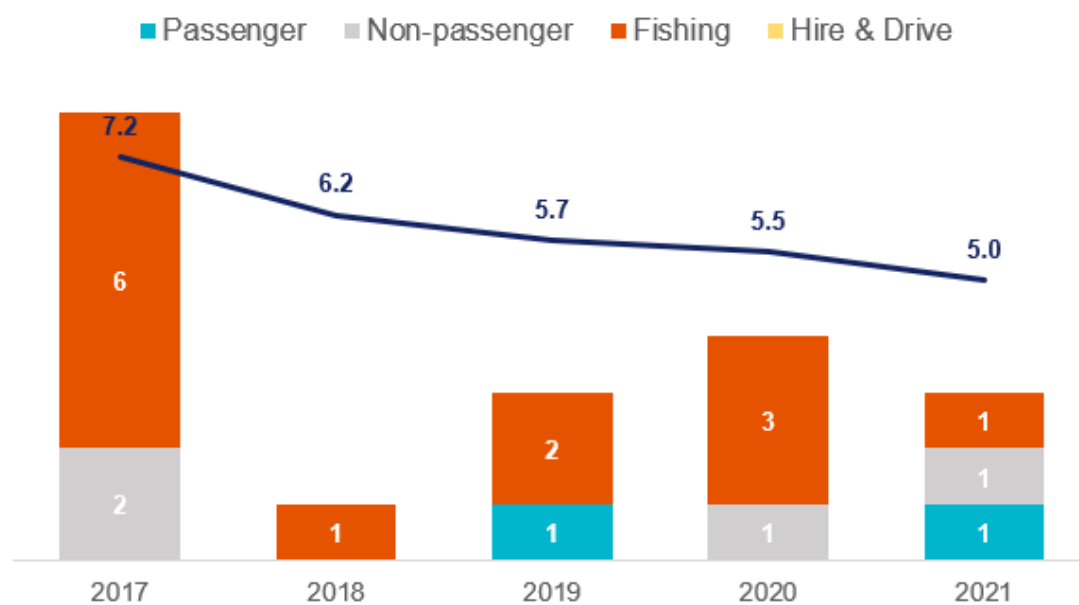


Figure 13: DCV fatalities by year and vessel class, 2017-2021, with average (since 2013)

Most of the fatalities between 2017 and 2021 (52.6%) occurred in Queensland. 9 of the 10 fatality incidents in Queensland in this period involved Fishing vessels (Table 1). The largest proportion by state of fishing vessels in the DCV fleet (41%) are based in Queensland.

State	Vessel class	Crew					Passenger	
		2017	2018	2019	2020	2021	2019	2021
NSW								
	Passenger						1	
	Non passenger	1				1		
NT								
	Non passenger	1						
	Fishing		1		1			

¹⁶ AMSA also receives reports of deaths which occur onboard DCVs which are assessed as non-operational. Fatality classification definitions are set out in Appendix 1.

QLD							
Non passenger				1			
Fishing	6		2	1			
TAS							
Fishing				1	1		
WA							
Passenger							1

Table 1 DCV fatalities by year, state and vessel class, 2017-2021

Fishing vessels remain overrepresented in DCV fatality statistics, accounting for 13 (68.4%) fatalities in the period.

In 2021 there were three fatalities associated with DCV vessel operations.

Class	Incident
Passenger	Passenger on an anchored recreational vessel was fatally injured when a DCV collided with the recreational vessel.
Non passenger (Barge)	Crew member was fatally injured when they were struck by the mast of a sunken vessel that was being retrieved with a crane and snapped off
Fishing	Crew member was washed overboard; the body of the crew member was not found.

In 2021, the fatality rate (the number of fatalities per 100,000 crew employed on DCVs) was 4.5. This remains lower than the five-year average annual fatality rate of 5.5 per 100,000 crew (Table 2).

However, as also noted by SafeWork Australia, fatality rates are sensitive to the number of people employed in the industry and this may be particularly evident in smaller industries that employ fewer employees (such as in the DCV fleet), where small variation in the number of fatalities produces an apparent larger variation in the fatality rate. Compared to the estimated 66,000 crew engaged in the DCV fleet, agriculture/forestry and fishing fatality rates are calculated from nearly five times the number of workers (approximately 351,100) and there are ten times the number of workers in transport/postal and warehousing (approximately 628,200)¹⁷. Therefore, the actual number of fatalities needs to be considered when interpreting the fatality rates for this data.

¹⁷ Number of workers in agriculture, forestry & fishing and transport, postal & warehousing industries calculated from the number of fatalities and fatality rates per 100,000 workers in [Safe Work Australia Work-related, traumatic injuries fatalities 2020 Report](#).

Year of incident	Number of operational-related crew fatalities on DCV fatalities	Domestic commercial vessels fatality Rate per 100,000 crew ¹⁸	Agriculture, forestry and fishing fatality Rate per 100,000	Transport, postal and warehousing Fatality rate per 100,000
2017	8	12.1	16.5	8.6
2018	1	1.5	11.2	5.9
2019	2	3.0	9.4	9.0
2020	4	6.1	13.1	7.8
2021	3	4.5	*	*
Five-year average (2017-2021)	3.6	5.5	12.9 (2016-2020)	7.7 (2016-2020)

Table 2: Fatality rate per 100,000 crew employed on DCVs compared to similar industries
*Data not yet available at time of publication of this report.

Since AMSA took service delivery in mid-2018, the average fatality rate per 100,000 crew on domestic commercial vessels is 3.8 (2018-2021).

¹⁸ Based on a calculated approximation of 66,000 crew engaged on domestic commercial vessels

Injuries

In 2021 there was an increase in the total number of incidents involving injuries on DCVs to 179, from 148 in 2019 and 131 in 2020. It is important to note that due to the overall increase in incident reporting, the 2021 figures still represent a 1.0% decrease in the frequency of incidents resulting in injuries from nearly 1 in 5 incidents in 2019, to 1 in every 5.3 reports in 2021.

DCV reports of injuries to passengers increased to 65 in 2021 after a low of 52 in 2020. Notably, the proportion of incident reports including injuries to DCV passengers in 2021 (7.6%) was lower than in 2019 where they accounted for 8.7% of total incidents.

Consequence	2019		2020		2021	
	Total	% DCV incidents	Total	% DCV incidents	Total	% DCV incidents
Injury to crew	84	11.3%	78	10.3%	108	11.4%
Injury to passengers	65	8.7%	52	6.9%	72	7.6%
Injury (all)	148	19.9%	131	17.3%	179	18.9%

Table 3. Incidents that reported an injury to a crew member of passenger, total and as a proportion of all incidents, DCV (2019-2021)¹⁹

In 2021, DCVs reported a total of 39 serious injuries compared to 42 in 2020. (Figure 14). There was a decrease in the proportion of serious injuries from 50.6% in 2020 to 35.8% in 2021. This suggests that operators of DCVs are notifying AMSA of a greater number of incidents that result in less-serious outcomes, which indicates success from AMSA's activities promoting the importance of reporting²⁰.

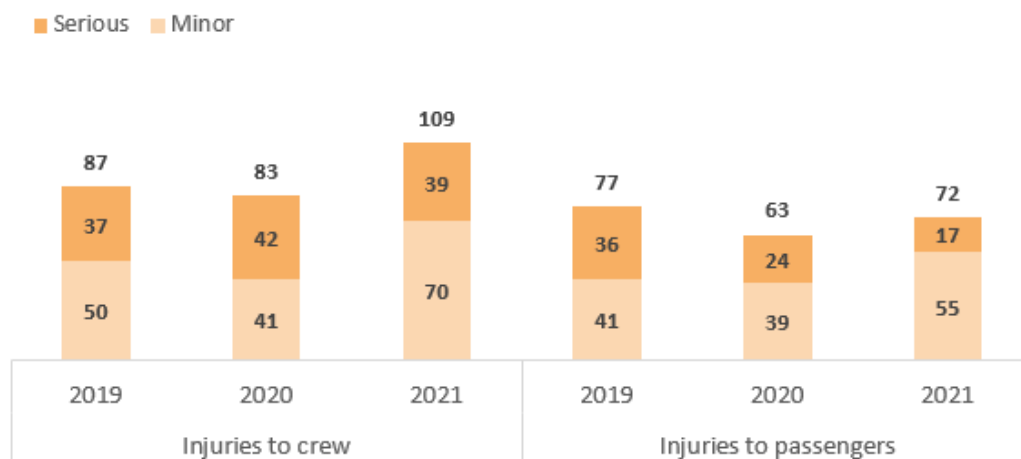


Figure 14: Number crew and passenger injuries by injury classification, DCV (2019-2021)

¹⁹ Incidents may report injuries to crew and passengers. In both 2019 and 2020 AMSA received one report of an injury to a stevedore in relation to the operation of a DCV.

²⁰ [Why is reporting important](#)

This is further supported by DCV reporting of injuries to passengers which increased in real terms after a low of 63 in 2020 to 72 in 2021. Importantly however, the proportion of serious injuries to passengers on DCVs decreased steadily from 2019 when reporting commenced (46.8% serious) to 38.1% serious in 2020, and in 2021 only 23.6% of reported injuries to passengers were classified as serious.

Figure 15 shows the most frequently occurring circumstances in which a crew injury was reported on DCVs with incident severity²¹. The largest categories are consistent between very serious and serious incidents and less serious incidents that result in an injury. These are:

- operational and technical access which involves the movement of people around the vessel and the condition of access equipment including ladders and stairs
- injuries resulting from incidents where a loss of vessel control was reported
- injury where water conditions and weather affected the operation of the vessel
- handling of cargo and stores, and
- maintenance operations

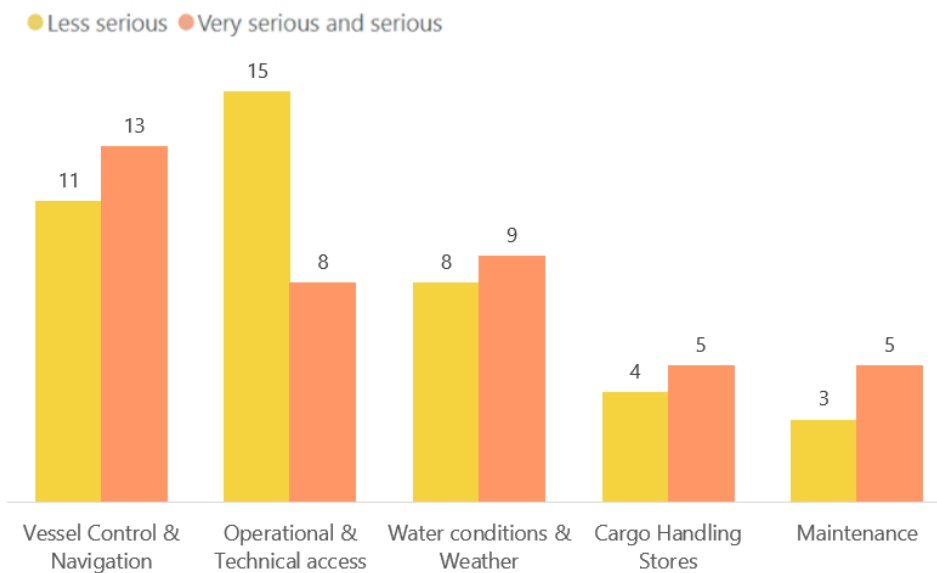


Figure 15: Circumstances of crew injury by incident severity, DCV (2021)

²¹ All incidents reporting serious operational injuries to crew or passengers are classified as serious.

Persons overboard

In 2021 73 of the 80 incident reports involved persons overboard from DCVs. This is consistent with contextual expectations given that the DCV fleet comprises smaller vessels, the majority <7.5m, where the risk of falling overboard is correspondingly greater.

The 73 persons overboard incidents on DCVs in 2021 represented a 65.9% increase over the 43 incidents reported in 2020. Of the 2021 incidents, 11 were reports of passengers deliberately jumping overboard. The remaining 84.4% (62) persons overboard incidents were reports of persons unintentionally entering the water.

Figure 16 shows the distribution of persons overboard incidents on DCVs by vessel class and whether the person was wearing a lifejacket when they entered the water. Inclusive of deliberate persons overboard, passenger vessels reported 46.6% of persons overboard incidents, and passenger vessels reported the majority (32 out of 51) where the person overboard was not wearing a lifejacket, or their lifejacket status was unknown. This is consistent with the context of vessels carrying passengers in groups and situations where it is less likely or practical for the passengers to be wearing lifejackets while on board.

Only 30.1% (22) of incidents reported that the person overboard was wearing a lifejacket when they entered the water, and the majority of these (14) were non-passenger vessels.

There was one person overboard incident which resulted in a fatality on a DCV fishing vessel. The incident report noted that this person was not wearing a lifejacket.

AMSA will continue to work with industry to promote the importance lifejacket wear on DCVs.

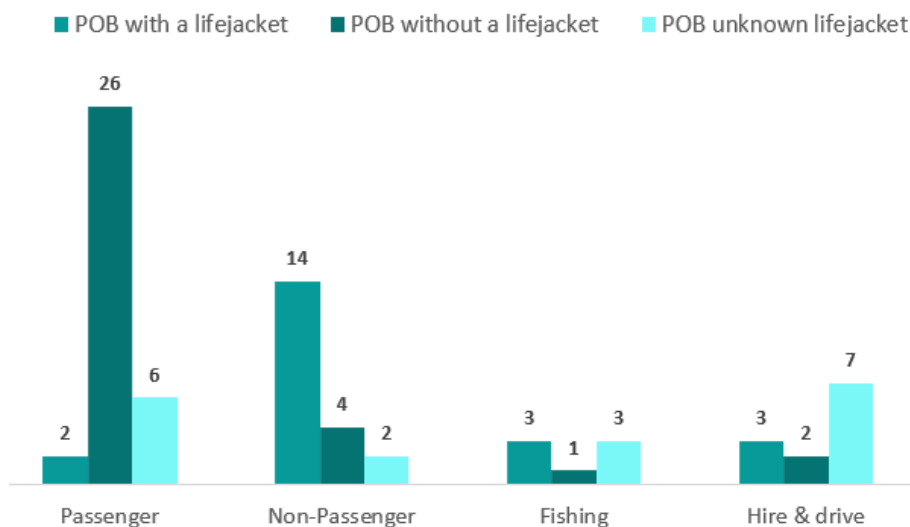


Figure 16: Person overboard (POB), by vessel class and lifejacket status, DCVs (2021)

RAVs and Foreign Flagged Vessels

Fatalities

In 2021 three operational related fatalities occurred on foreign flagged vessels. Of the fatal incidents one was classified as an operational fatality occurring during a crew transfer between vessels; the deceased crew member was wearing a lifejacket at the time of the incident. The two remaining fatal incidents involved crew members who went missing from the vessel and are presumed dead²².

There were no RAV or foreign-flagged vessel reports of operational-related **passenger** fatalities in 2021.

Detailed reporting on **RAV and foreign-flagged vessel crew fatalities** is contained in the [2021 Maritime Labour Convention, 2006 \(MLC\) Annual Report](#) .

Injuries

A total of 200 injuries for crew and passengers were reported from RAVs (41) and foreign flagged (159) vessels. Of these, 77 were categorised as serious injuries. In 2021, the proportion of serious injuries to crew increased by 20.8 % from 2020 (Figure 17).

Consequence	2019		2020		2021	
	Total	% incidents	Total	% incidents	Total	% incidents
RAV						
Injury to crew	36	14.7%	60	18.1%	38	19.5%
Injury to passengers	2	0.8%	1	0.3%	3	1.5%
Foreign flagged						
Injury to crew	177	5.7%	126	4.0%	158	4.5%
Injury to passengers	102	3.3%	24	0.8%	1	0.0%

Table 4. Incidents that reported an injury to a crew member or passenger, total and as a proportion of all incidents, RAV and foreign flagged (2019-2021)

²² 2021 MLC Annual report contains a detailed breakdown of seafarer fatalities on RAV and foreign flagged vessels since 2017 including person overboard incidents

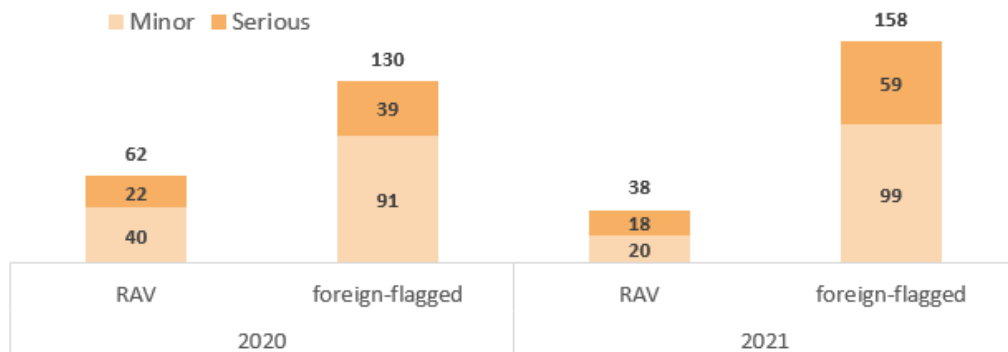


Figure 17: Number of crew and injuries by injury classification, RAV and foreign flagged (2020-2021)

Figure 18 shows the incident circumstances in which injuries occurred by crew on RAV and foreign flagged vessels in 2021. Operational and technical access was frequently associated with injuries. Injuries related to the actions of a person performing maintenance was also frequently represented in RAV and foreign flagged vessel incidents. This is a concerning trend and, as noted in the [2021 MLC Annual Report](#) and [National Compliance Plan 2022-23](#), this is consistent with an increased number of MLC complaints and PSC statistics related to breaches of health and safety protection and accident prevention. As identified in the National Compliance Plan AMSA will continue to pay particular attention to MLC compliance on board vessels.

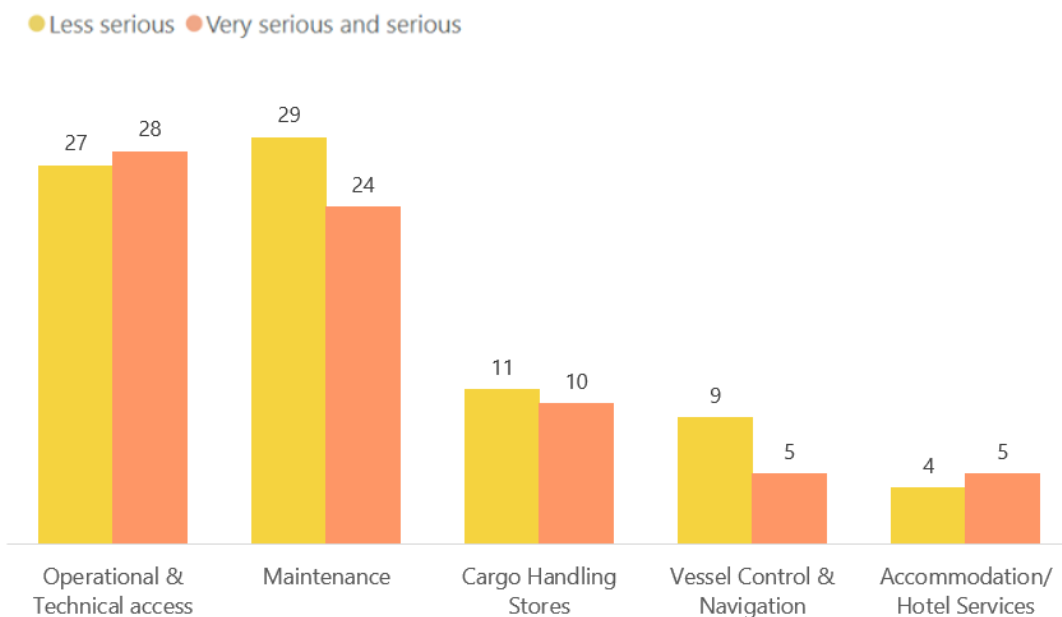


Figure 18: Circumstances of crew injury by incident severity, RAV and foreign-flagged vessels (2021)

Persons overboard

7 persons overboard incidents were reported by foreign flagged vessels in 2021 and as indicated above, 3 of these were fatal incidents.

In response to safety issues identified from foreign-flagged incidents, AMSA has issued information and guidance on safe vessel access, including Marine Notices on pilot transfer arrangements²³ and pilot ladders²⁴ and a Maritime Safety Awareness Bulletin on safe vessel access²⁵. AMSA has also issued a Marine Notice and a Maritime Safety Awareness Bulletin drawing attention to the importance of planned maintenance²⁶.

Consequences to vessels

In 2021, 743 incidents resulted in a vessel consequence; 561 involved a DCV, 152 a foreign-flagged vessel and the remaining 30 involved a RAV (Figure 19). This represented a 22% increase in DCV incidents reporting consequence which is commensurate with the 24.7% increase in overall incident reporting by DCVs. Foreign-flagged and RAV incidents involving consequences remained steady between 2020 and 2021.

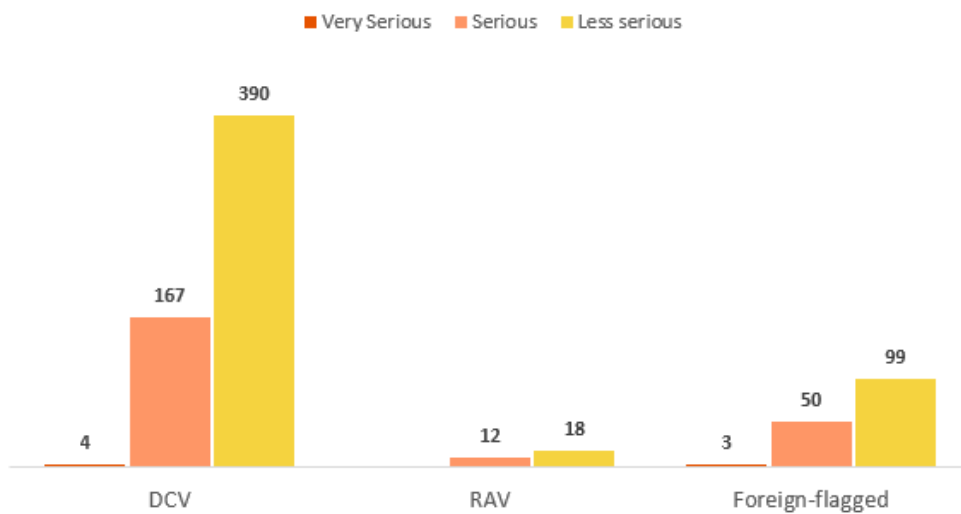


Figure 19: Number of vessel Consequence incidents, by vessel certification group and severity (2021)

²³ <https://www.amsa.gov.au/about/regulations-and-standards/032022-pilot-transfer-arrangements>

²⁴ <https://www.amsa.gov.au/about/regulations-and-standards/marine-notice-062021-fatal-accidents-falling-pilot-ladders-ships>

²⁵ <https://www.amsa.gov.au/news-community/newsletters/maritime-safety-awareness-bulletin-issue-10-safe-vessel-access>

²⁶ <https://www.amsa.gov.au/about/regulations-and-standards/102022-planned-maintenance-ships>

Domestic Commercial Vessels

The three most frequently occurring consequences on DCVs were collision, grounding and contact (with something other than a vessel) (Figure 20). Figure 21 shows the trends in these types of incidents between 2019 and 2021.

Incidents involving collision, grounding and/or contact accounted for 60.8% (104) of the serious and very serious (171) incident consequences for DCVs in 2021. This is consistent with previous reporting. In 2021 these types of incidents were high frequency very serious and serious incidents for passenger, non-passenger and hire & drive vessels, while flooding was the fourth most frequent consequence

Figure 19 shows the 10 most frequently occurring consequences by vessel class for DCVs in 2021.

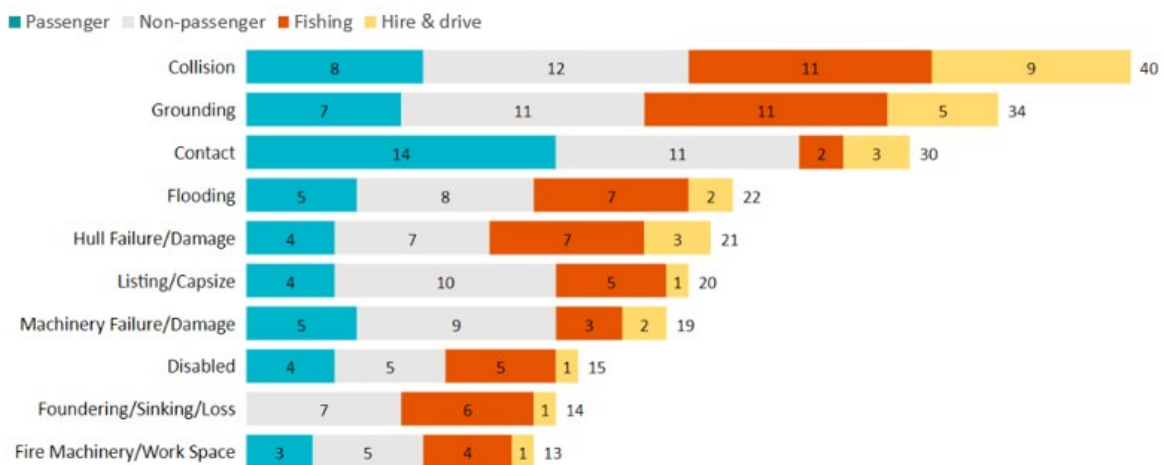


Figure 20: Top 10 vessel consequences for serious and very serious incidents by vessel class. DCV (2021)

Figure 21 shows that reports of collision incidents increased in all vessel types between 2020 and 2021 while reports of groundings have increased steadily in non-passenger vessels.

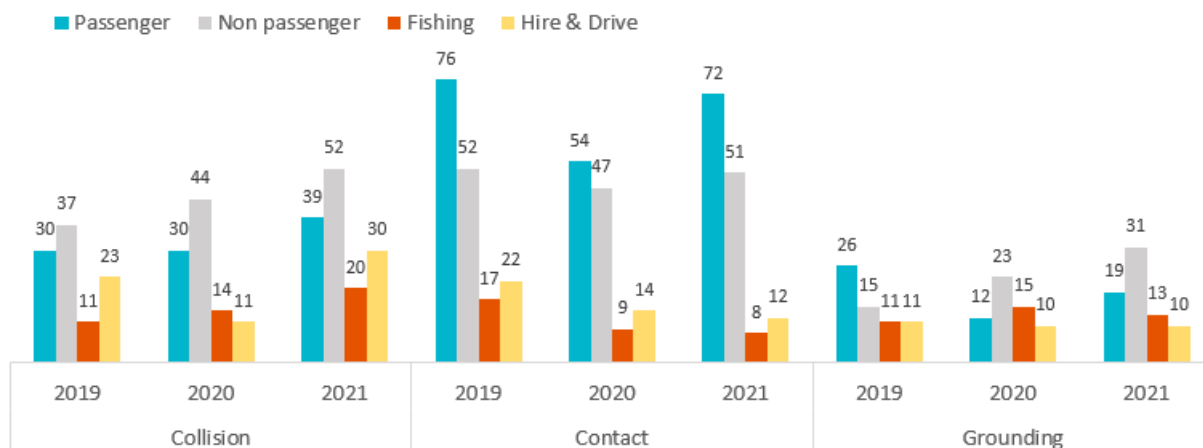


Figure 21: Collision, grounding and contact incidents by vessel class. DCV (2019-2021)

Regulated Australian and Foreign-Flagged Vessels

The most frequently occurring consequences for RAVs in 2021 were incidents involving Contact (20.0%), Fire (14.3%) and Collision with another vessel (14.3%). Figure 22 shows the three most frequently occurring vessel consequences for foreign-flagged vessels were Vessel Disabled (18.1%), Fire (13.1%) and incidents involving a “blackout” (Total Power Failure 13.1%)²⁷.

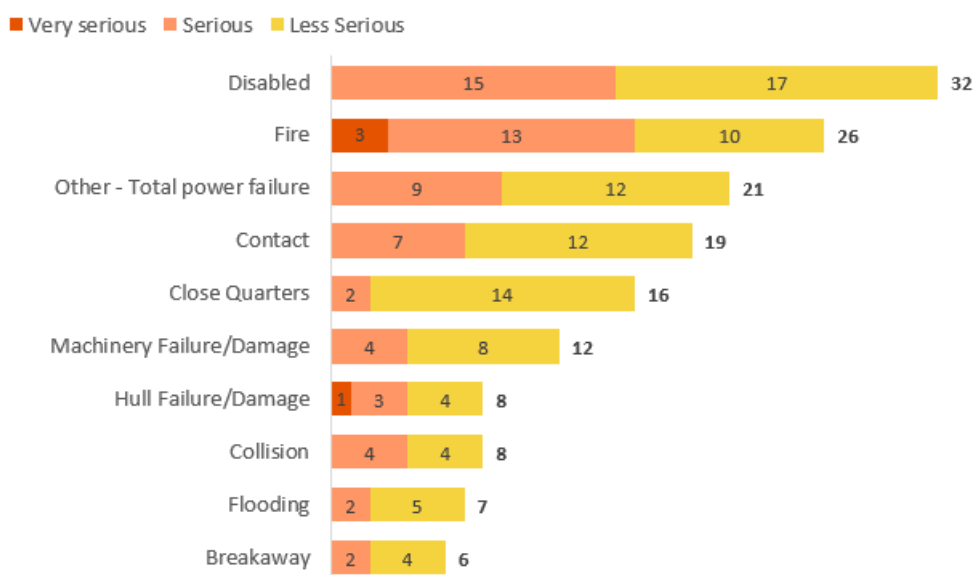


Figure 22: Top 10 vessel consequences for serious and very serious incidents, RAV and foreign-flagged vessels (2021)

²⁷ Vessel Disabled incidents reflect incidents where a vessel was unable to make way due to loss of propulsion machinery or because of a protracted total loss of ship’s power. Total power failure incidents reflect occurrences where vessels experienced a blackout either for a short period of time before power or emergency power was restored, or for an extended period, however due to circumstances the vessel was not ‘disabled’ (e.g. was at anchor, alongside).

The high frequency of vessels being disabled or losing ship's power and the number of fire incidents (Figure 21) occurring in RAVs and foreign-flagged vessels have both informed the [National Compliance Plan](#).

In relation to the high frequency of vessels becoming disabled or experiencing total power failures, and in conjunction with PSC reporting on deficiencies related to maintenance, AMSA has recently published a [Safety Awareness Bulletin](#) regarding the importance of planned maintenance, which has been identified as a contributing factor to incidents resulting in total power failure and/or a disabled vessel. AMSA has also published a [Marine Notice](#) on the same issue, highlighting AMSA's current focus on planned maintenance during port State control inspections.

Also appearing in the top five for both foreign-flagged vessels and RAVs were Fire²⁸ incidents, with 13.1% of foreign-flagged vessel incidents and 14.3% of RAV incidents reporting a Fire as an incident consequence.

Figure 23 shows the increase in Fire incidents in foreign-flagged vessels in the period 2017 – 2021. Most of these incidents were classified as either very serious or serious. In addition, RAVs reported 2 serious and 3 less serious fire incidents in 2021. This increasing trend in Fire incidents in vessels in Australian waters led to the inclusion of Fire Safety as a focus risk area in the [National Compliance Plan](#). The issue of fire safety has also been identified internationally, with the 2023 Tokyo Ocean MoU Concentrated Inspection Campaign topic being fire safety.

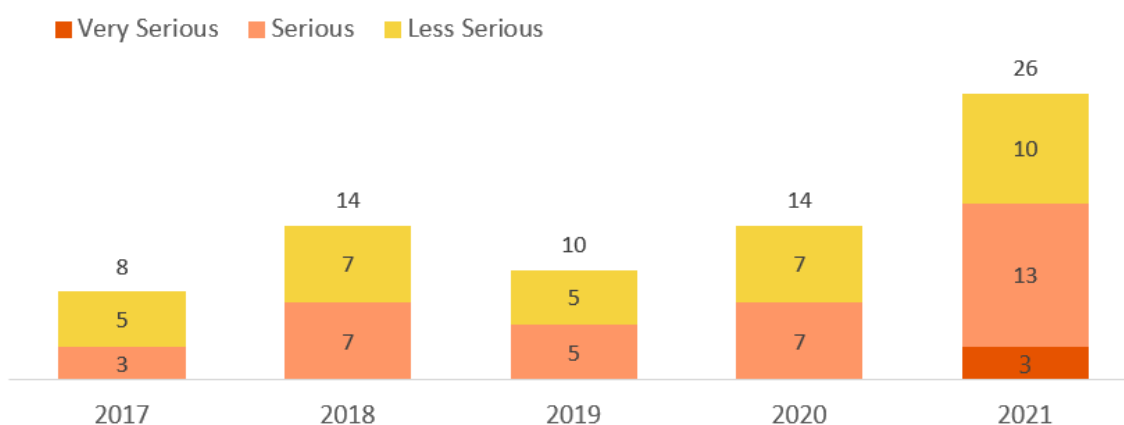


Figure 23: RAV and foreign-flagged vessel fire incidents by incident severity (2017-2021)

Reports of Contact or Collision on foreign-flagged vessels decreased to 12 and 3 respectively in 2021, representing a 65.7% decrease on the 35 Contact incidents and 76.9% decrease on the 13 Collision incidents reported by foreign-flagged vessels in 2019.

RAV contact incidents followed the same trends. Figure 24 shows the trends in Contact and Collision incidents for each vessel group over time.

²⁸ Fire incidents include Fire in Machinery/Work spaces, Accommodation spaces, Cargo Spaces and Cargo fires and Other spaces onboard as well as reports of smoke.

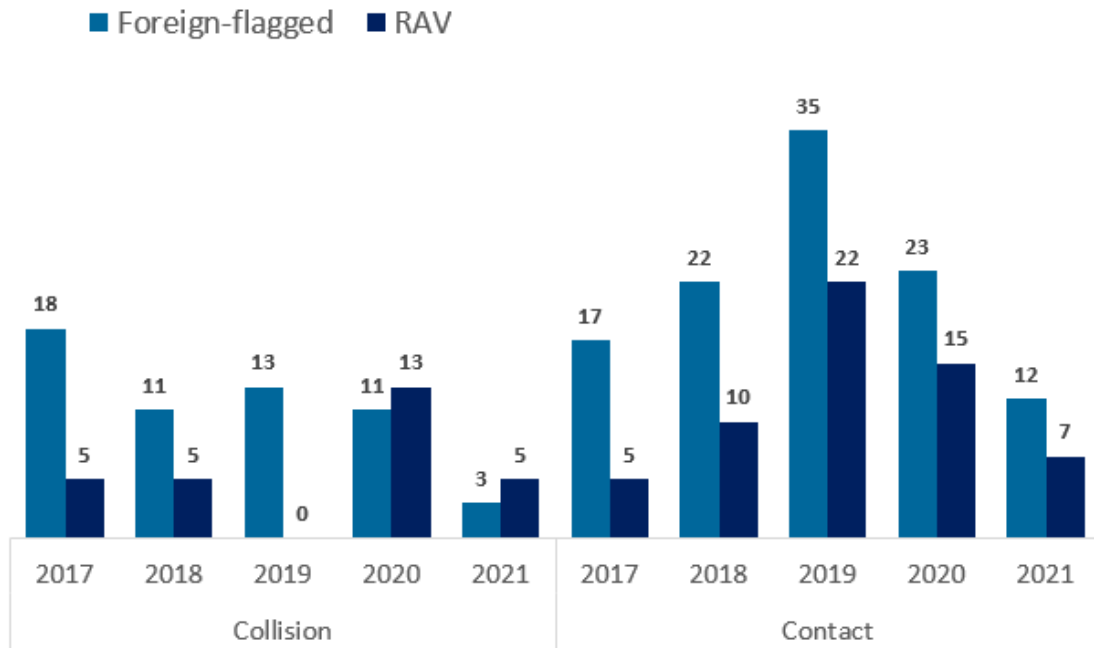


Figure 24: RAV and Foreign-flagged collision and contact incidents (2017 - 2021)

Technical

In 2021 74.6% (3492) of incidents included report of a failure or defect to a technical or engineering system or equipment onboard.

The most frequently occurring category of technical failure in 2021 across all vessel groups were power propulsion and steering (21.0%), followed by navigational monitoring equipment (17.4%) and vessel systems (16.0%) (Figure 25).

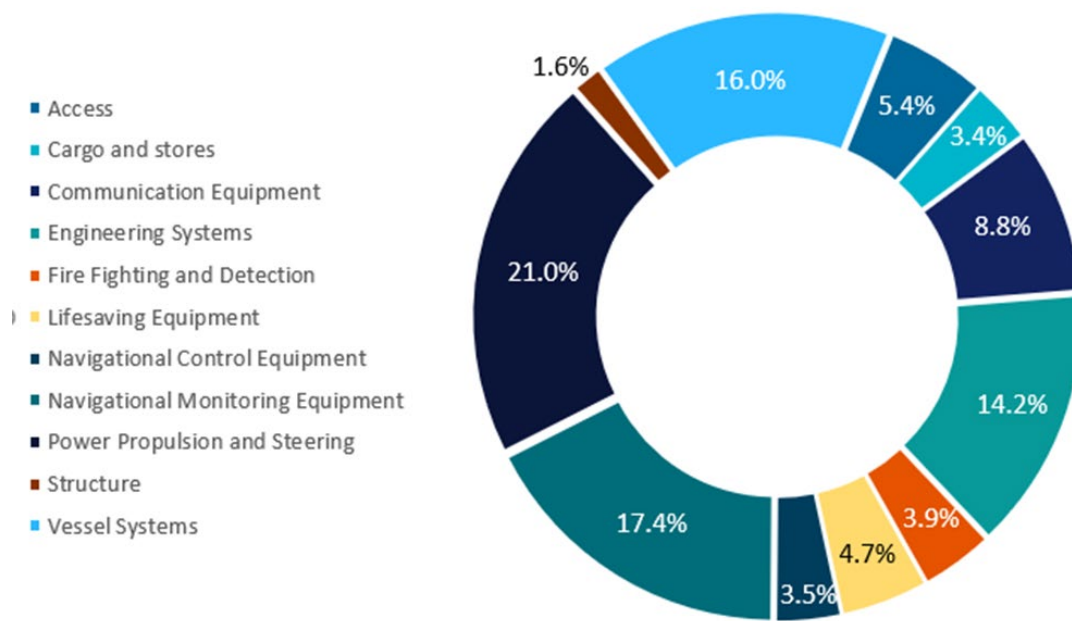


Figure 25: Incidents by Technical sub-category all vessels (2021)

Domestic commercial vessels

In 31.0% of DCV marine incidents in 2021 a failure or fault of a Technical system or piece of equipment was reported. 28.3% (77) of all serious incidents involving DCVs in 2021 included a Technical element.

Figure 26 show the top 5 most frequently occurring Technical incident types by severity. Consistent with the other vessel groups, incidents involving power, propulsion and steering issues occurred most frequently.

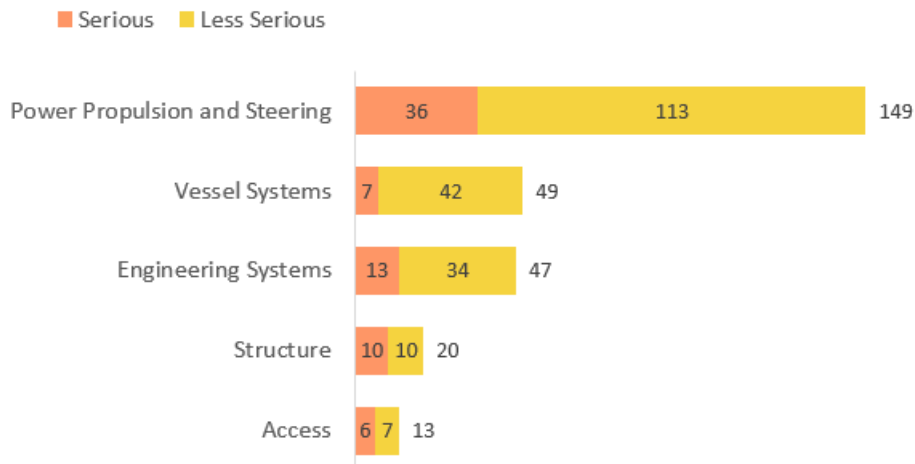


Figure 26: Top 5 Technical sub-categories with severity, DCV (2021)

Evaluation of the severity of power propulsion and steering incidents between 2020²⁹ and 2021 reveals only a minor increase in serious incidents from 20.6% in 2020, to 24.2% in 2021.

Figure 27 highlights the 53.6% increase in incidents involving power, propulsion and steering failures in 2021 was inconsistent with reporting trends of the other most frequently occurring Technical sub types which remained steady. Notably, the increase in this type of incident is much higher than the 24.7% increase in total incident reports from DCVs in 2021.

²⁹ [Domestic commercial vessel annual incident report 2020](#)

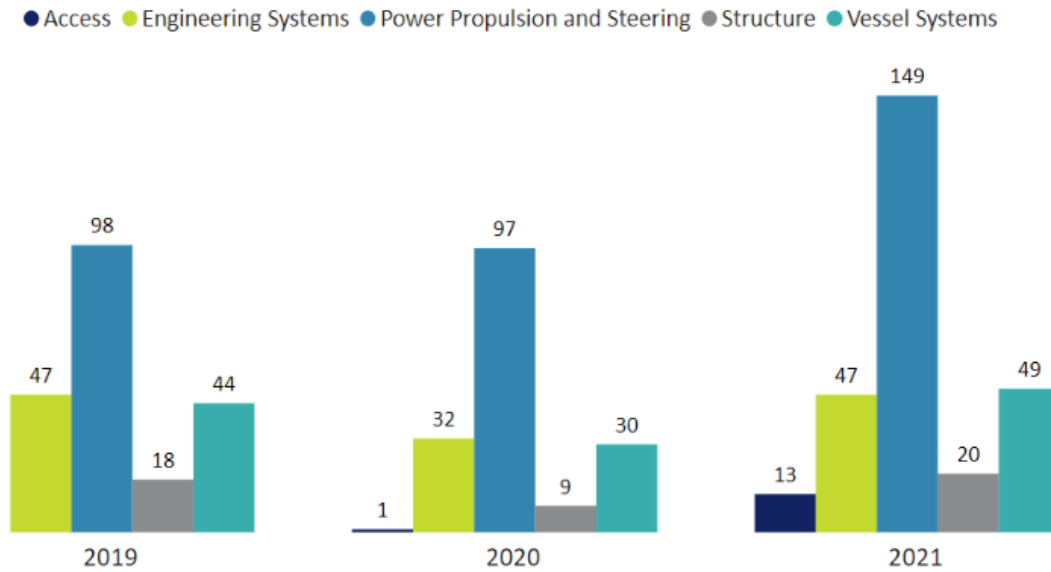


Figure 27: Number of incidents in Top 5 Technical sub-categories, DCV (2019-2021)

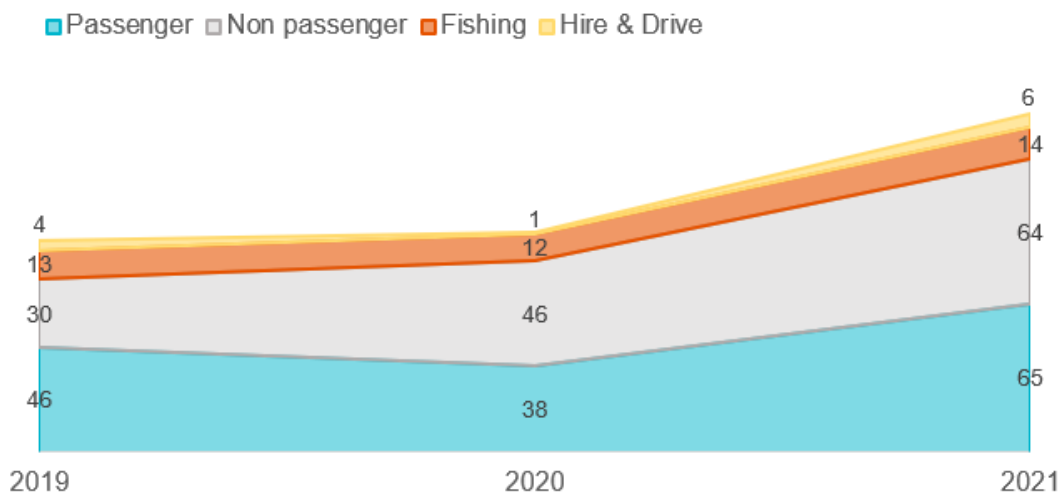


Figure 28: Number of Technical: Power, propulsion and steering incidents, by DCV vessel class (2019-2021)

Figure 28 shows that there have been increases in reporting from all vessel classes, however the additional reporting in 2021 was shared between passenger and non-passenger vessels. The overall increase in this type of reported incident, across vessel class types and with incident severity remaining steady suggests a shift within industry to consider more events such as mechanical breakdowns, loss of steering and propulsion as an incident worthy of reporting to AMSA, rather than part of the ordinary course of running a commercial vessel operation. Future positive indicators of this sort of cultural shift would be continued growth in reported marine

incident numbers, and an increase in the proportion of less serious technical incidents, and less serious incidents overall.

Regulated Australian and Foreign Flagged Vessels

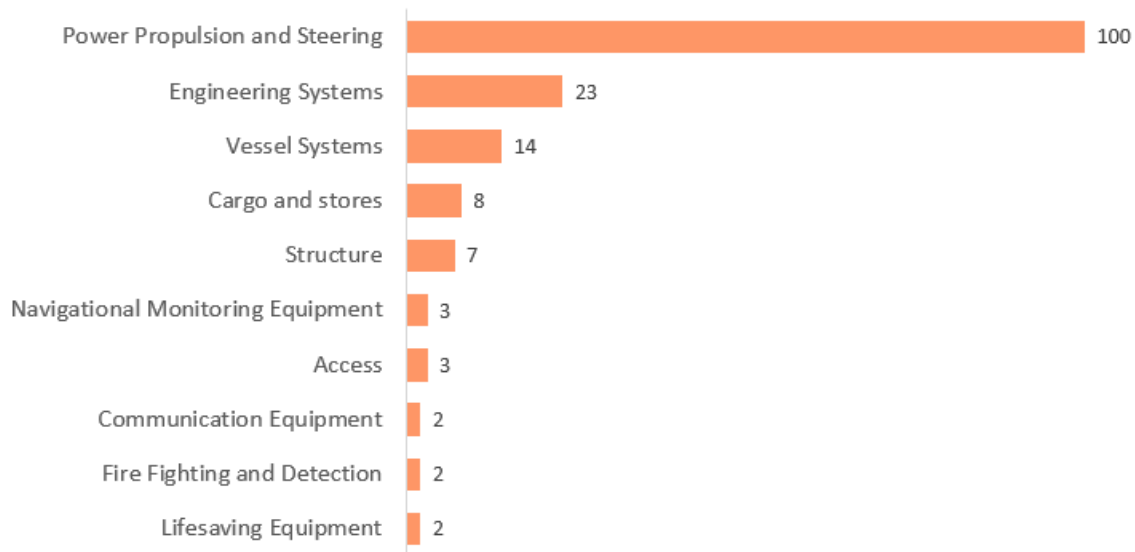


Figure 29: Serious incident distribution by Technical sub-category RAV and Foreign flagged vessels (2021)

Figure 29 shows that of the 152 serious incidents reported by RAVs and foreign-flagged vessels in 2021 involving a Technical failure, 65.8% (100) reported failures or issues related to power propulsion and steering, followed by engineering systems which was significantly less frequent, occurring 15.1% of the time (23 incidents). This was followed by ship systems at 9.2% (14); Technical failures/faults related to cargo and stores 5.3% (8) rounded out the top 85% of these incidents.

Further analysis of Technical incidents involving power propulsion and steering (Figure 30) shows that incidents involving main engine and gearing failures comprise 48% (72) of the 152 serious Technical incidents in 2021.

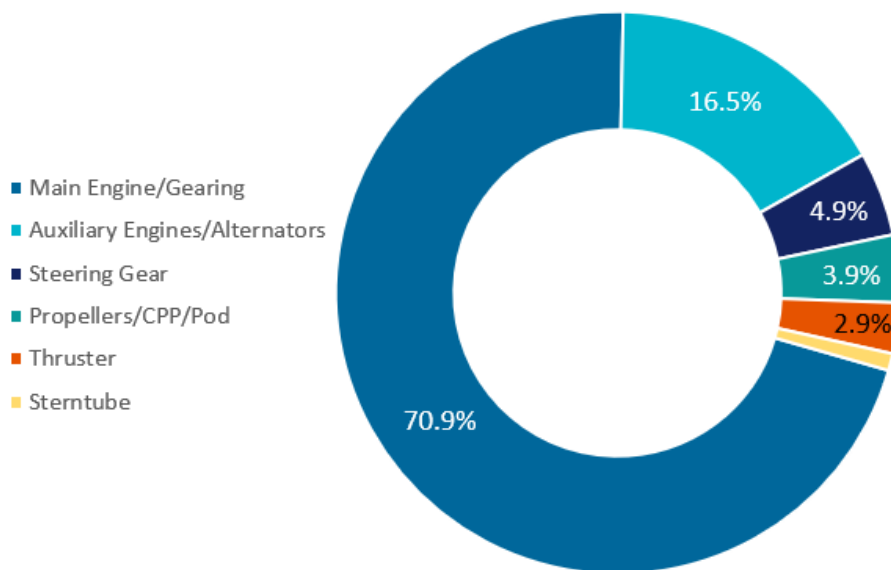


Figure 30: Detailed breakdown of power, propulsion and steering serious incident occurrence, RAV and Foreign flagged vessels (2021)

It is relevant to note that 88.6% of all incidents involving Technical occurrences in 2021 were reported by foreign-flagged vessels. This is higher than their share of overall incident reports (75.6%) received by AMSA in 2021. Figure 31 shows the top 10 most frequently reported Technical incident by equipment sub type for foreign-flagged vessels in 2021.

Most of these reports are less serious and are related to notification of equipment failures, defects or stoppages that may not necessarily stop the safe operation of the vessel in the short term, but they do reflect the issues that vessels visiting Australia are experiencing on-board. Patterns in non-critical events are important considerations in the formulation of the National Compliance Plan and targeting of AMSA campaigns including safety bulletins.

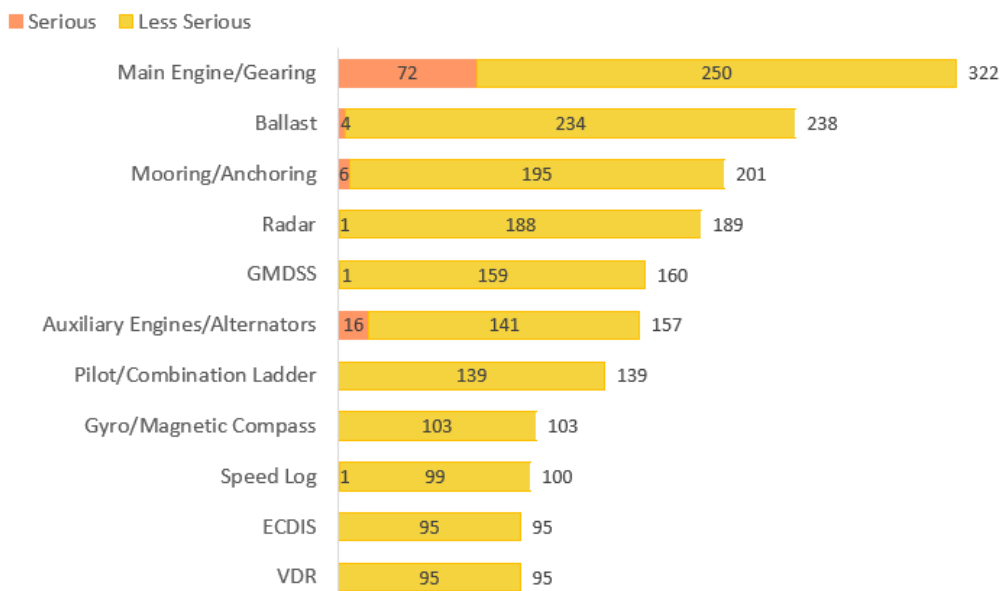


Figure 31: Top 10 equipment types reported in foreign flagged vessel incident reports, (2021)

Operational

Operational type incidents are related to shortfalls in the operation of the vessel related to an erroneous action by the crew.

In 2021, 830 (17.7%) of reported incidents included an operational related element. The most frequently occurring operational incident type was related to the control and navigation of the vessel, which was a factor in 52.1% of all the operational related incidents. This is followed by operational access (15.4%) cargo handling/stores (11.6%) and maintenance (9.7%). (Figure 32)

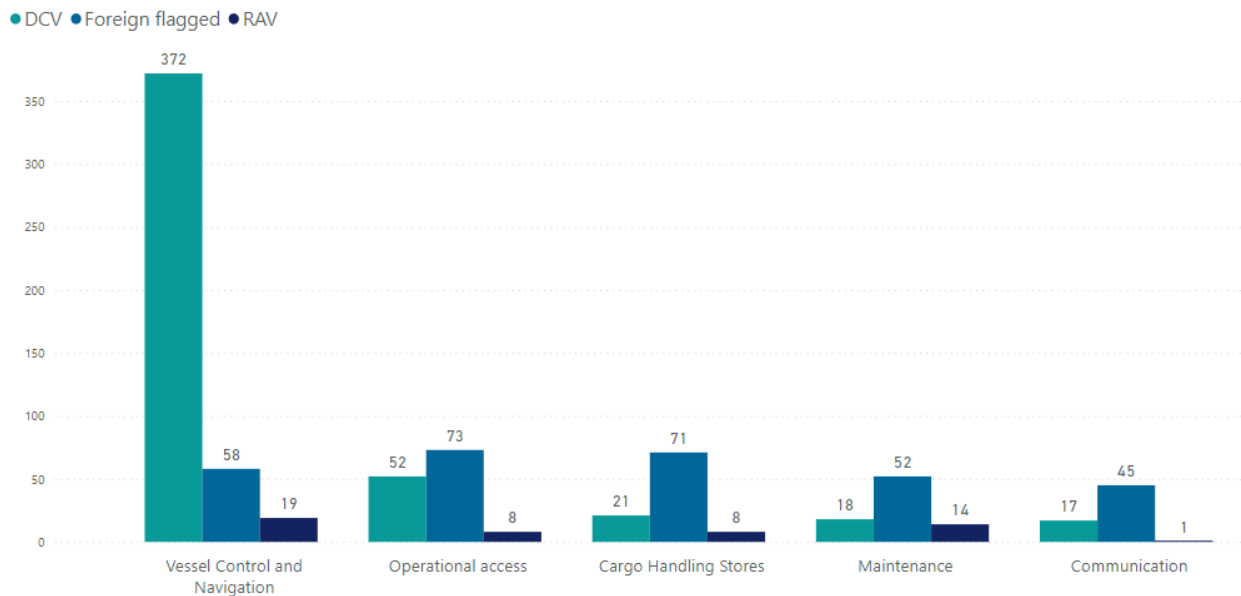


Figure 32: Top 5 Operational type incidents, distributed by sub-category with vessel group (2021)

Domestic Commercial Vessels

DCVs reported the majority (58.8%) of incidents that involved an operational event.

37.8% of all very serious and serious incidents reported by DCVs in 2021 reported shortfalls in vessel control and navigation. The distribution of severity of these incidents as a whole and by vessel class in is largely consistent below with the breakdown of all 2021 incidents by vessel class in Figure 7.

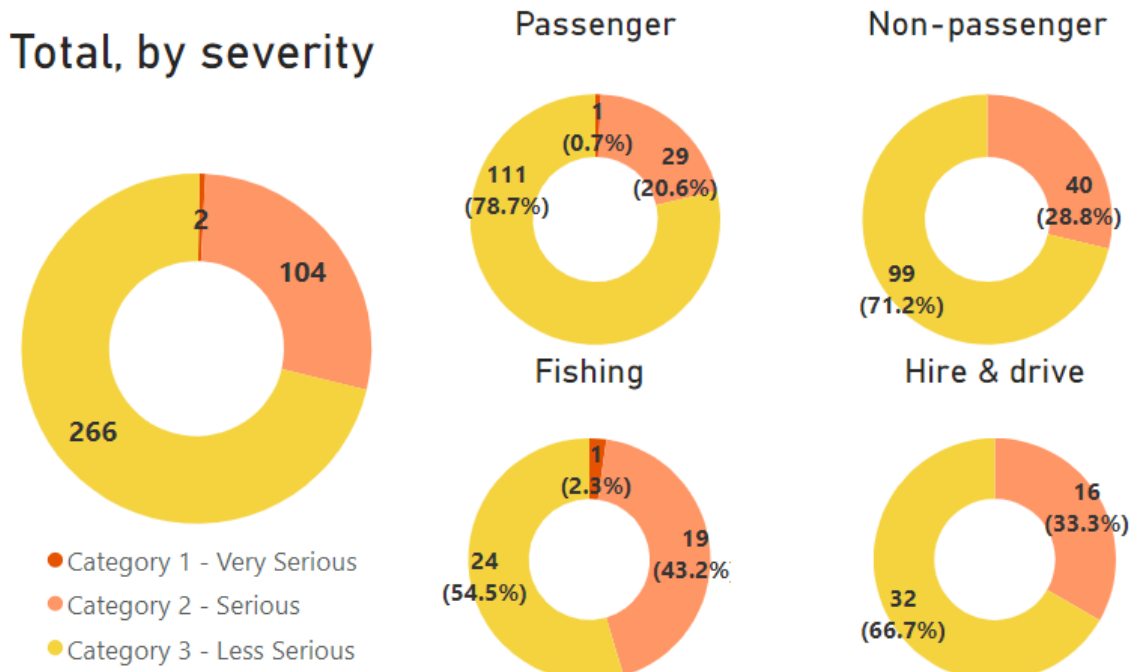


Figure 33. DCV Vessel control and navigation incidents. Total by severity and distributed amongst vessel class (2021)

Also notable is that the patterns of incident distribution by vessel class between 2019 and 2021 as shown in in Figure 34 are consistent with the overall incident distribution for 2021 in Figure 7 and, importantly, has remained relatively consistent since 2019. This indicates that issues around vessel control and navigation during an incident is occurring across the DCV fleet and is not concentrated within a particular use category.

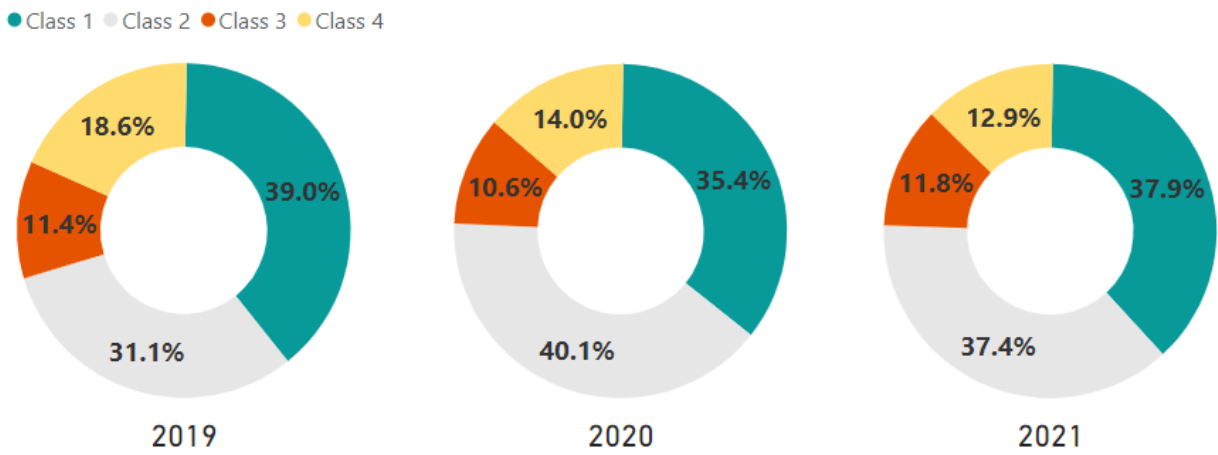


Figure 34. DCV Vessel control and navigation incidents. Distribution amongst vessel class (2019-2021)

Foreign-flagged and regulated Australian vessels

Vessel control and navigation was the most frequently occurring Operational type event reported in RAV incidents in 2021 at 36.5% (19) followed by maintenance 23% (12).

Operational events were present in 31.3% (82) of all serious and very serious incidents on foreign-flagged vessels in 2021. Figure 35 shows the breakdown of serious and very serious incidents reported by foreign-flagged vessels.

As indicated, AMSA has issued several guidance and education material focusing on planned maintenance and will continue to focus heavily on maintenance during PSC inspections.

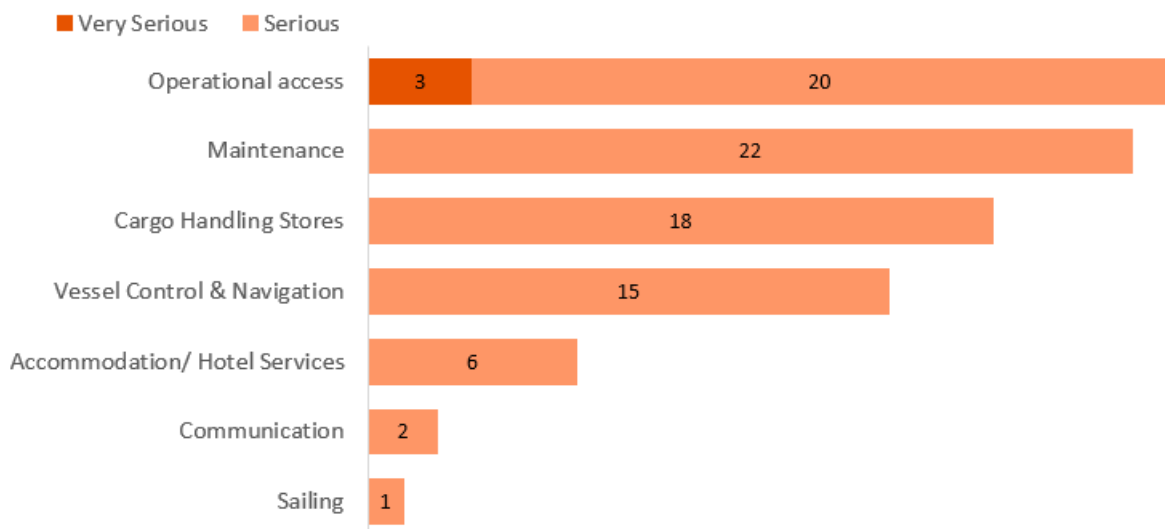


Figure 35: Foreign flagged vessels Operational type event-breakdown for serious and very serious incidents (2021)

Safety framework coding analysis and findings Domestic Commercial Vessels

This section of the report presents the findings of the analysis of safety factors identified from the coding of completed DCV investigation reports using AMSA’s Safety Framework. The results of this analysis provide an understanding of risks and identifies if, and where, greater compliance focus needs to be applied.

This analysis also provides the risk basis for AMSA’s [National Compliance Plan](#) and helps to target our compliance focus.

From the 945 DCV marine incidents reported in 2021, 51 incidents included an investigation report coded using the safety framework. This is 7 less than the 58 incident investigation reports coded in 2020³⁰, bringing the total of incident investigation reports coded for 2020 and 2021 using this framework to 109.

The majority of *Consequences* from the 109 investigations coded were crew injury (23.6%); contacts (14.1%); collision (12.3%); and passenger injury (11.3%) (Figure 37).

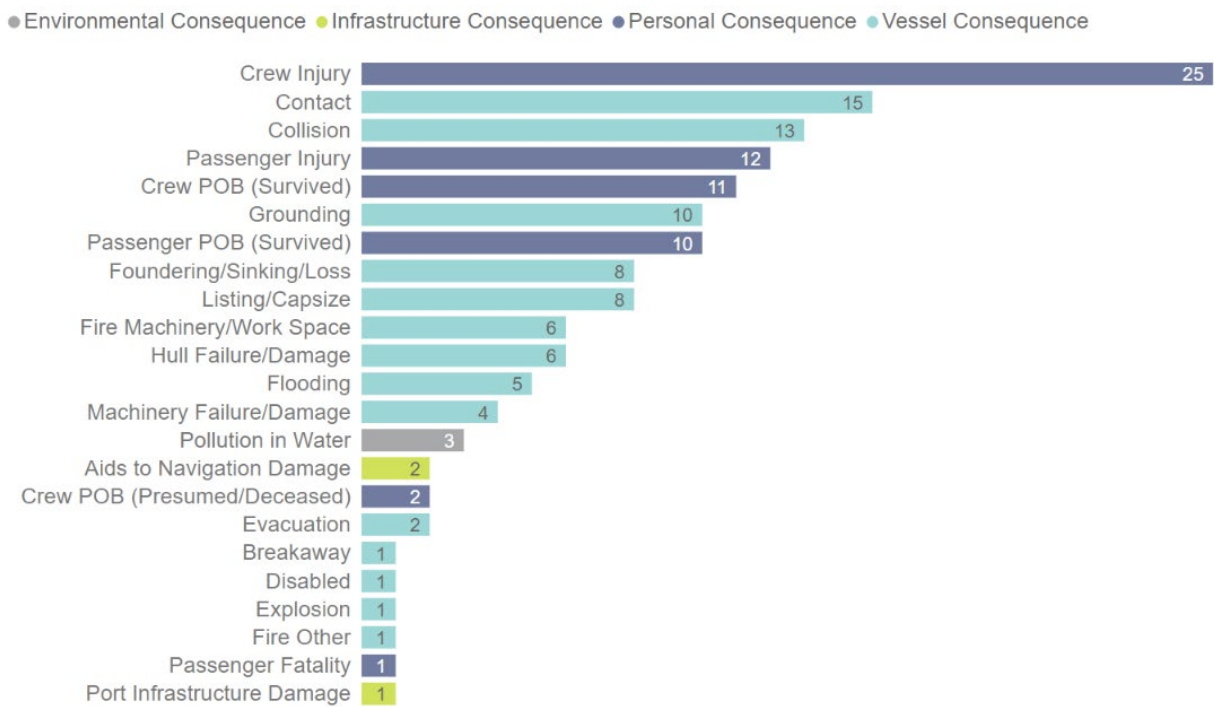


Figure 37: Consequence category from the 109 coded investigation reports (2020-2021)

A total of 525 safety factors were identified from the 109 investigation reports analysed.

Aspects related to *people* (27.6%), and *internal organisational* issues (27.2 %) continue to form the majority of safety factors. While their proportions remain largely unchanged from 2020 to

³⁰ Note that subsequent to the publication of the 2020 annual report, a further 6 investigations into incidents which occurred in 2020 were coded using the safety framework.

2021, *onboard condition* decreased by 5% while *technical/equipment* increased by 3% such that the remaining 4 safety factors are now evenly represented. (Figure 38)

● 2020 ● 2021

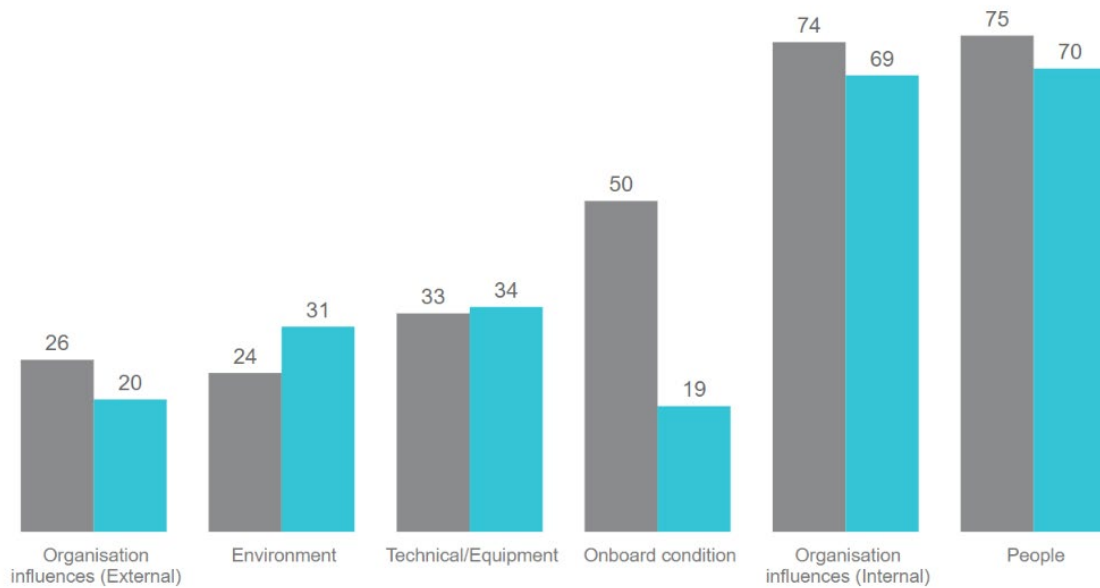


Figure 38: Categorisation of primary safety factors identified from investigation reports (2020 - 2021).

The analyses presented in the next sections will focus on the two primary safety factors of concern, *people* and *organisational influences (internal)*.

People

Overall, *people* actions was the most common primary safety factor identified from the 51 investigation reports analysed in 2021. *People* actions refer to observable behaviours such as decisions, actions and/or inaction by the crew that increased risk.

Of the 70 *people* actions identified in 2021, 40.0% were Deck operation actions, followed by Navigation actions (37.1%) and Maintenance actions (12.9%) (Figure 39). This represents a shift in the type of *People* actions identified in 2020 reporting where Navigation actions comprised most *People* actions at 45.3% (34) over Deck operation actions 29.3% (22).

Deck operation actions related to using equipment (35.7%), monitoring/checking/documenting (25.0%), and communicating and coordinating (21.4%).

Assessing and planning issues included no passage planning, incorrect assessment of the safety risk when taking certain actions or course, and making inappropriate plans to rectify the situation. Problems with monitoring/checking/documenting include poor monitoring of the status of the voyage, poor lookout and lack of monitoring of environmental conditions.

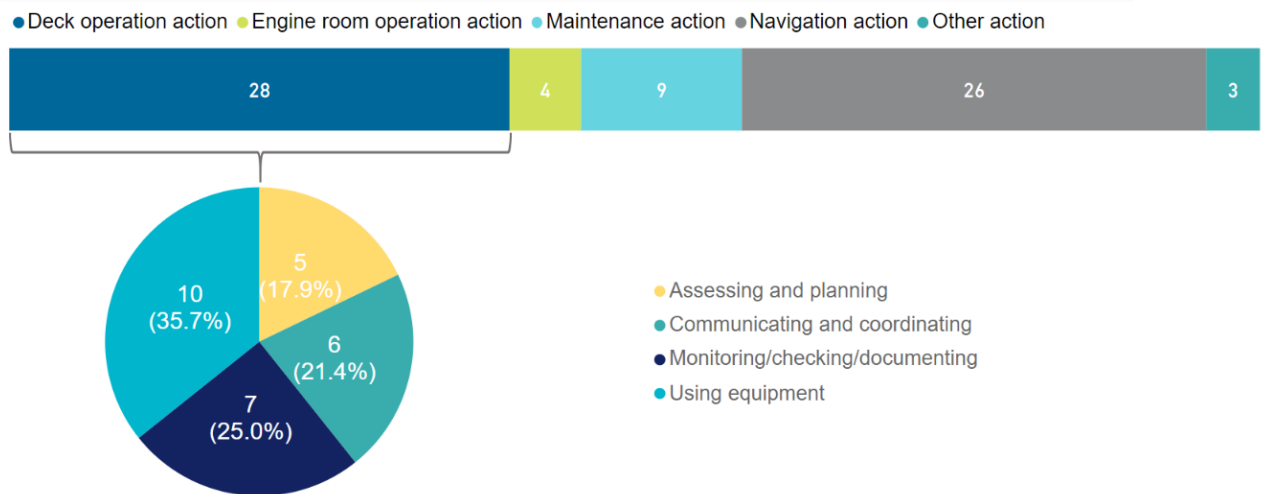


Figure 39: Breakdown of People categories with a focus on deck operation action (2021)

Internal organisational influences

Internal organisational influences accounted for just over a quarter of all safety factors identified in investigation reports analysed in 2021. This is consistent with the result in 2020, suggesting that a significant portion of the risks to safety of vessels and crews reside at the organisational level.

In 2021 safety management processes continues as the largest percentage of internal organisational issues, forming 65.2% of the total internal organisational issues. Investigation reports in 2021 identified shortfalls associated with the processes an organisation uses to establish, maintain, and otherwise ensure the effectiveness of its risk controls as factors affecting onboard safety. Safety procedures (42.2%) and risk assessments (40.0%) continue to represent the majority of safety management processes issues (Figure 40).

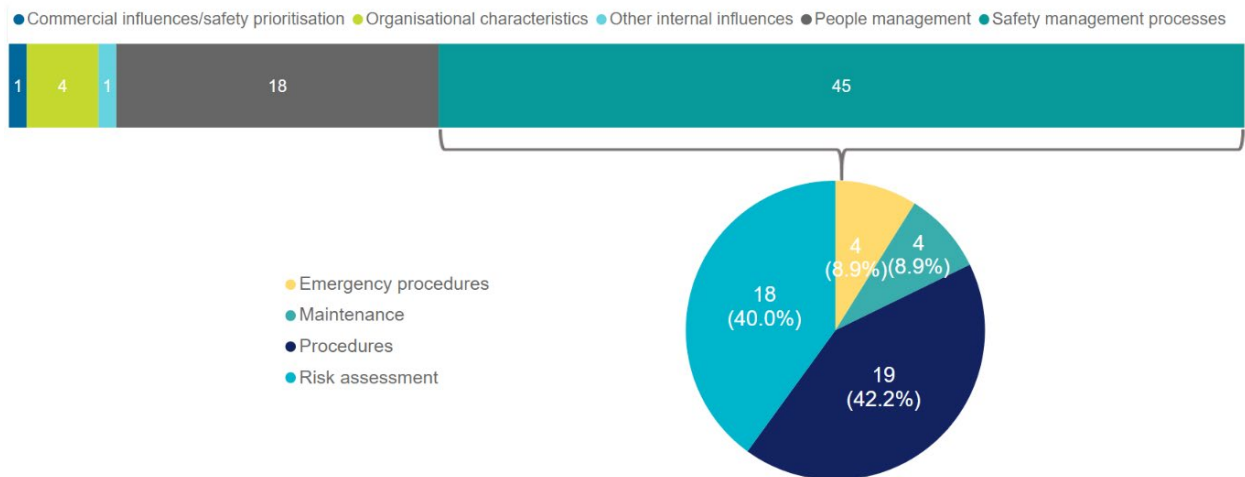


Figure 40: Internal organisational influences, 2021

Poor, lack of or ineffective risk assessments continue to be major areas of concern in DCV fleet incidents and operations.

Noting that proper risk assessment is foundational for an effective safety management system (SMS), AMSA will conduct a safety compliance campaign which will include education and focused inspections on risk assessment.³¹

³¹ [Focus areas of 2022-23 \(amsa.gov.au\)](https://www.amsa.gov.au/focus-areas-of-2022-23)

Conclusion

This annual incident report has sought to consolidate and consider marine incident reports across the spectrum of domestic and international commercial operations. It presents a snapshot, for the vessels that regularly operate in or visit Australian waters.

Bringing this reporting together will further assist AMSA to develop a more complete picture of the maritime industry to identify emerging trends in safety, identify further areas for research and recommend safety compliance actions.

This report continues to highlight the importance of effective and timely marine incident reporting. In 2021 it was encouraging to see the increased incident reporting from the DCV sector, but this uptake has not been consistent across all types of vessels and operations. AMSA continues to work in partnership with industry stakeholders on the challenge of fostering an active reporting culture within the domestic maritime industry to improve reporting culture and subsequent safety outcomes for the DCV fleet.

Whilst incident reports provide a good measure of the nature and frequency of marine incidents in terms of what happened, we also need to identify the underlying safety issues that lead to dangerous occurrences. We need to know not just what went wrong, but why it went wrong, how it went wrong and more relevantly how we can prevent recurrence. Through use of a safety framework to better understand what drives human behaviour and performance at sea we support our risk-based approach in the identification of focus areas of primary concern. By doing so we can prioritise our compliance approach and design tailored compliance initiatives to ensure we allocate our resources in the most cost-effective way, relative to the outcomes we aim to achieve.

The information in this report, in conjunction with the [Port State Control Annual report](#) and [Maritime Labour Convention annual report](#) formed the basis of the [2022-2023 National Compliance Plan](#).

Focus areas in the National Compliance Plan which have been informed by incident data include the following:

- Safety Management Systems (Risk Assessment): AMSA will conduct a safety compliance campaign which will include education and focused inspections on risk assessment, targeting Class 2 (non-passenger vessel) operations in port limits, including towage and vessel transfer operations.
- Safety Management Systems (onboard familiarisation): AMSA will develop and conduct an education campaign focusing on the obligations of vessel owners to ensure that all personnel are qualified and properly inducted and trained in the operation of the vessel before assuming duties.
- Fire Safety: AMSA will develop and publish a maritime safety bulletin in 2022/23 on fire safety with a focus on adapting fire prevention and firefighting practices to the cargo being carried on-board.

AMSA also leverages information from marine accident reports and incident data to publish a range of safety information such as Safety Alerts and Marine Notices.

AMSA will continue to work with our stakeholders in the delivery of education and safety campaigns as identified in the 2022-23 National Compliance Plan.

Appendix 1 – Glossary & Classification Descriptions

Vessel certification types in this report

Marine incidents are defined by relevant Australian laws and include different types of incidents. Generally, a marine incident includes any occurrence that has affected, or is likely to affect, the safety of persons or vessels.

Both the *Marine Safety (Domestic Commercial Vessel) National Law Act 2012* (the National Law) and *Navigation Act 2012* (the Navigation Act) contain a requirement for masters and / or owners and operators of commercial vessels to report marine incidents to AMSA and all are subject to the same marine incident classification process.³² Despite this, it is still appropriate to consider the analysis of incident data for DCVs separately from the data for RAVs and foreign-flagged vessels as the nature of these vessels and their operations are, for the most part, vastly different. For Australian commercial vessel incidents, the incident is grouped with the certification type of the vessel at the time of the incident.

The three vessel certification groupings used across this report are:

- Domestic commercial vessel (DCV)
- Regulated Australian vessel (RAV)
- Foreign-flagged vessel

Domestic Commercial Vessels – vessel use category³³

DCVs are categorised by vessel use as per Table A1. The vessel use category at the time of the incident is recorded.

Vessel use category	Term used in this report
Class 1 passenger vessels (more than 12 passengers)	Passenger vessels
Class 2 non-pasenger vessel (includes vessels carrying less than 12 passengers)	Non-passenger vessels
Class 3 fishing vessel	Fishing vessels
Class 4 hire and drive vessel used by the hirer only for recreational purposes	Hire and drive vessels

Table A1: DCV vessel use categories and terminology in 2021 report

³² Safety Framework Coding is presently only developed for the review of investigation reports into DCVs.

³³ National Standard for Commercial Vessels (NSCV) Part B General Requirements

Foreign-flagged and regulated Australian vessel ship types

Foreign-flagged vessels are categorised into 9 groups representing the vessels which most frequently visit Australian ports.

Foreign-flagged ship types

Bulk carrier	General cargo/ multi-purpose
Chemical tanker	Livestock carrier
Container ship	Oil tanker
Gas carrier	Vehicle carrier
Other	

The composition of the RAVs fleet differs greatly from the foreign-flagged fleet trading in Australia. The ship types for RAVs in this report has been modified slightly from the above.

RAV ship types

Bulk carrier	Other – Ro-Ro cargo ship
Gas carrier	Other – Ro-Ro passenger ship
General cargo/ multi-purpose	Other – Special purpose ship
Oil tanker	Other – Tugboat
Vehicle carrier	Other

Classification of marine incidents

AMSA categorises all marine incidents into a severity level. AMSA then uses an ‘occurrence type’ classifications to describe ‘*what happened*’ in a marine incident.

Additionally, AMSA codifies incident investigation reports using a safety framework³⁴. Differing from occurrence type, safety framework coding provides an indication of ‘*what contributed to the incident*’. These classifications are described in further detail below.

Marine incident severity

Marine incidents are classified by AMSA into one of three severity levels which include the following:

Incident severity	Descriptor
Very serious	Very serious marine incidents include loss of vessel, loss of life (fatalities) due to the operation of the vessel and serious pollution events.
Serious	Marine incidents classified as serious include serious injuries, fire, explosion, collision, grounding, contact, heavy weather damage, critical equipment failure (e.g. main engines, steering gear), severe structural damage, loss of stability, pollution, and breakdown necessitating towage or shore assistance.
Less serious	Less serious marine incidents include incidents resulting in minor injuries, main engine stoppage for maintenance, minor contact or collisions, minor oil spills, and near misses.

³⁴ Safety Framework Coding is presently only developed for the review of investigation reports into DCVs.

Table A2: Marine incident severity classifications in 2021 report

Occurrence type classification

AMSA classifies each reported incident into one or more categories to consistently describe *what happened*. Classifying incidents in this way helps to understand patterns of what has taken place and identify potential areas for safety improvement.

The classification includes six primary (Level 1) categories (Table A3). Under each of the six primary categories are secondary (Level 2) and more specific (Level 3) subcategories.

Category (Level 1)	
Consequence	to the vessel, people, the environment, infrastructure
Technical	failure / missing / defective vessel equipment, structure or system
Operational	operational shortfall usually associated with the action or inaction of a person that affected the outcome
Infrastructure and Support	failure or issues with vessel traffic services, navigational aids and other infrastructure support that directly affected vessel operations
Non-operational	other factors that are not directly related to the operation of the vessel
Environment	external influences (weather, dangerous species) that have a direct impact on the people and/or vessel and crew passenger safety

Table A3: Primary (Level 1) occurrence type framework categories and associated definitions

Classification of injuries

AMSA reports on injuries to persons where the injury was sustained in connection with or because of the operation of a vessel. Injuries are classified as either serious or minor (Table A5).

Serious injury	An injury that requires emergency treatment, in most cases leading to an emergency medevac from the vessel and/or hospitalisation, or Where a crew member is assessed as being unfit for duties because of the injury.
Minor injury	Injured party may require first aid treatment on the vessel and/or crew members remain fit for duty and can continue working in their normal duties on the vessel.

Table A4: Classification of injuries

Classification of marine incident investigations

Safety framework

The safety framework is used for coding investigation reports within AMSA (Figure A1). It maps decisions and actions at six levels (people, onboard conditions, environment, technical/equipment, and internal and external organisational influences). Description of the six levels is contained in Table A6.

The safety framework shows that safety factors³⁵ and risk controls (controls in place to manage safety risks) may be present across all levels of the system. When there is a breakdown across these levels, the marine incident is the final event, which sits at the bottom of the safety framework (Figure A1).

The identification of safety factors is important as it provides an indication of what contributed to the incident and allows for more targeted safety interventions to be developed.

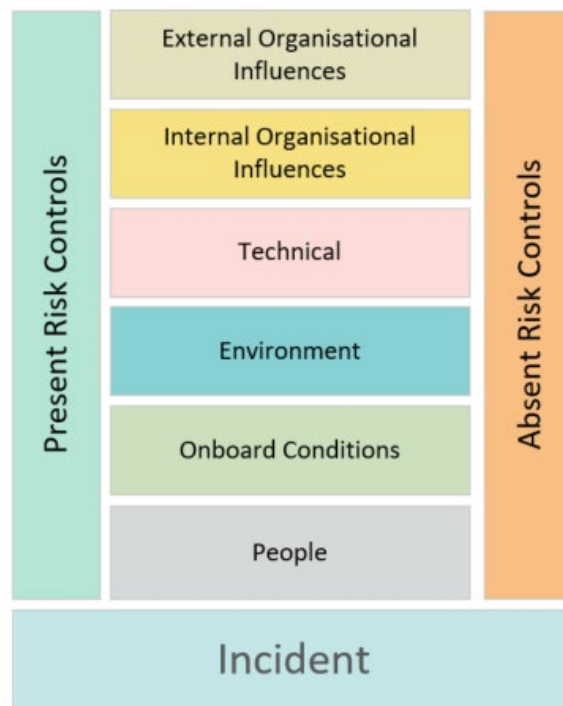


Figure A1: Safety framework used to analyse investigation reports

³⁵ Safety factor is defined as an event or condition that increases risk.

Primary Safety Factor	Description
Organisational Influences - External	<p>Organisational influences (external) include any decisions, actions and events or risk controls that may impact the safety of vessel operations which are performed by or implemented by organisations other than the vessel owner/operator.</p> <p>Includes regulatory influences, class societies, port authorities, vessel traffic services, manufacturers and design of maritime systems on vessels.</p>
Organisational Influences – Internal	<p>Organisational influences (internal) include any decisions, actions and events or risk controls performed by or implemented by the owner/ operator related to the vessel, crew or cargo.</p> <p>This includes safety management system processes (risk assessment, maintenance, emergency procedures), organisational characteristics (skills of management personnel, internal communication), commercial influences/safety prioritisation and people management (crewing, supervision, training).</p>
Environment	<p>The environment includes surroundings and/or physical environment in which vessels operate that may have influenced decisions, actions, inaction or events.</p> <p>This includes the workplace (light, noise temperature, ship motion, etc); the physical environment and weather conditions (such as visibility, wind, sea/swell)</p>
Technical/Equipment	<p>Technical/equipment include any equipment or systems onboard that may have influenced decisions, actions, inaction or events.</p> <p>It includes any failures in the structural integrity, electrical, mechanical and warning detection systems.</p>
Onboard Conditions	<p>Onboard conditions include any conditions onboard the vessel that may have influenced decisions, actions, inaction or events.</p> <p>These include personal factors (fatigue, drug/alcohol, health conditions, physical limitations, stress/anxiety); Knowledge, skills and experience; task demands (workload, pressure, distractions) and the social conditions.</p>
People	Crew decisions, action and/or inaction that increased risk.

Table A5: Primary Safety Factors and associated definition

