Australian Government

Australian Transport Safety Bureau

ATSB TRANSPORT SAFETY REPORT
Marine Research and Analysis Report – MR-2011-003
Final

Australian Shipping Occurrence Statistics 2005 to 2010

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Australian shipping occurrence statistics 2005 to 2010

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Abstract

There were a total of 546 marine occurrences reported to the Australian Transport Safety Bureau from 2005 to 2010. There were significant decreases in reported occurrences in 2008 and 2010; however, the number of serious incidents remained fairly constant for the duration of the period. The number of accidents has decreased from eight each year from 2005 to 2007 to three each year from 2008 to 2010, which reflects the decrease in fatal accidents and people missing during the second half of the period. Injuries sustained were mainly to one person in each occurrence; however, there were occasional occurrences where more than one person was injured.

The West Australian and Queensland coasts had the most marine occurrences, followed by New South Wales and Victoria. More than half of occurrences in the Northern Territory occurred at sea, and Tasmania and Victoria had about 75 and 70 percent of occurrences while at berth or within harbours.

The most common time period for marine occurrences was between 8 am and 11 am, however, another slight rise in occurrences is observed between 1am and 7 am.

Most occurrences involved one vessel, however there were 43 occurrences where 2 vessels were involved, and one 3-vessel occurrence between a barge in tow with a tug and an offshore support vessel in 2010. The number of occurrences involving Australian vessels has decreased over the time period, and a slight increase was observed for occurrences involving foreign registered vessels.

The main vessels involved were bulk carriers and cargo vessels, which also had the highest number of injuries recorded, and close to one in four reported occurrences resulting in serious or fatal injuries. Typical injuries sustained were falls from height, being hit from falling or swinging objects, and burns from explosions, flame bursts or hot fuel oil.

The most common type of occurrence involved damage to the ship or equipment followed by serious injury and equipment failure. Equipment failure, fires and explosions were associated with the highest number of fatal and serious injuries. Cargo vessels, bulk carriers and tankers were the most common vessels involved in pollution occurrences, making up 22 out of 25 vessels with this occurrence type. The majority of pollution occurrences involved the venting of gases into the atmosphere, or small amounts of dangerous goods or oil leaking.

THE AUSTRALIAN TRANSPORT SAFETY BUREAU

The Australian Transport Safety Bureau (ATSB) is an independent Commonwealth Government statutory agency. The Bureau is governed by a Commission and is entirely separate from transport regulators, policy makers and service providers. The ATSB's function is to improve safety and public confidence in the aviation, marine and rail modes of transport through excellence in: independent investigation of transport accidents and other safety occurrences; safety data recording, analysis and research; fostering safety awareness, knowledge and action.

The ATSB is responsible for investigating accidents and other transport safety matters involving civil aviation, marine and rail operations in Australia that fall within Commonwealth jurisdiction, as well as participating in overseas investigations involving Australian registered aircraft and ships. A primary concern is the safety of commercial transport, with particular regard to fare-paying passenger operations.

The ATSB performs its functions in accordance with the provisions of the *Transport Safety Investigation Act 2003* and Regulations and, where applicable, relevant international agreements.

MARINE OPERATIONS COVERED BY THIS REPORT

The occurrences documented in this report are confined to those incidents and accidents that are considered to be immediately reportable matters under the Transport Safety Investigation (TSI) Regulations (2003) Part 3 and were reported to the ATSB. This involves Australian ships undertaking trade or commerce (cargo and/or passengers) engaged in international and interstate operations, and foreign trading ships in Australian waters.

This report currently does not cover marine operations involving the following vessels:

(a) trading ships on intrastate voyages

(b) Australian fishing vessels on domestic voyages

(c) fishing fleet support vessels on domestic voyages

(d) inland waterways vessels

(e) pleasure craft

(f) off-shore industry mobile units that are fixed to the seabed

(g) Australian defence ships

(h) exempt foreign ships (foreign defence ships).

TERMINOLOGY USED IN THIS REPORT

Accident: an occurrence involving a vessel where:

- a person dies or suffers serious injury as a result of an occurrence associated with the operation of the vessel; or
- the vessel is destroyed or seriously damaged as a result of an occurrence associated with the operation of the vessel; or
- any property is destroyed or seriously damaged as a result of an occurrence associated with the operation of the vessel (TSI Act, 2003).

Australian Jurisdictional Waters: all of Australia's coastal and territorial waters, economic exclusion zone and search and rescue area. This is defined by the Australian Maritime Safety Authority.

Incident: an occurrence, other than an accident, associated with the operation of a vessel which affects or could affect the safety of operation.

Marine area: an area over an ocean or sea under Australia's maritime jurisdiction.

Occurrence type: An event that occurs during a marine occurrence. Occurrence types describe what happened during the occurrence. Currently, there are 18 discrete marine occurrence types, and there can be multiple events during an occurrence.

Occurrence: accident, serious incident or incident.

Serious Incident: an incident involving circumstances indicating that an accident nearly occurred.

Serious Injury: an injury that requires, or would usually require, admission to hospital within 7 days after the day when the injury is suffered (TSI Regulations, 2003).

Vessel group: groupings of vessel types with similar function.

1 INTRODUCTION

1.1 Background to the report

This is the first of a regular series of statistical reports of marine occurrences reported to the Australian Transport Safety Bureau (ATSB). It has been generated to provide information on occurrences involving Australian flag ship vessels operating as trading ships (cargo and/or passengers) around the world and trading vessels flying foreign flags within Australia's maritime jurisdictions. All occurrences were classified as immediately reportable matters to the ATSB under the Transport Safety Investigations Regulations (2003).

1.2 Data sources

The ATSB's marine occurrence database was used for this report. Due to current reporting requirements under sub-Regulation 3.1 of the Transport Safety Investigation Regulations (2003), generally only larger vessels conducting international trade, transport or offshore support operations are included in this data set. Some fishing vessels and recreational craft are included in the data set due to the interaction of these types of vessels with larger vessels where reporting is required.

The data is analysed without any normalising variable (such as marine shipping movements) as this data was not available. Therefore, as the number of occurrences within any vessel group or marine area will be affected by the amount of activity, direct comparisons between groups/areas need to be made with this fact in mind.

1.3 Disclaimer

All effort has been taken to ensure that this data is correct, however, over time this data may change due to factors such as changing thresholds for definitions and further information coming to light on particular occurrences.

2 EXPLANATORY NOTES

Structure of data in this report

Each chapter of this report is structured according to the particular element being reviewed. The data is shown for occurrences between 1 January 2005 and 31 December 2010.

- Occurrence data in Chapter 3 is a count of the total occurrences and total injuries. This chapter represents the amount of reported incidents, serious incidents and accidents.
- Vessel data in Chapter 4 is based on the total number of vessels in reported occurrences. As there is more than one vessel in some occurrences, there are more vessels than occurrences.
- Occurrence type or event based data in Chapter 5 is based on a count of the number of individual events that have occurred over the period of study, and also the number of events that have been associated with vessels.
  - There is often more than one event during an occurrence, and therefore the number of events is significantly more than the number of occurrences.
  - Counts have also been performed for events affecting different types of vessels. As there are multiple vessels in some occurrences which share a common event, such as a collision, counts performed for these occurrence types will have two vessel events recorded.

Other key points

The highest injury refers to the most serious injury sustained during the occurrence or onboard the vessel depending on the particular report chapter. This does not represent the total number of injuries. Minor injuries are not included as the reporting of minor injuries for non-investigated occurrences is probably inconsistent. The severity of injuries are in the following order: fatal injury, missing, serious injury.

‘Serious injury’ and ‘Fatality’ occurrence types reflect when at least one of these injuries has occurred. Counts of these occurrence types do not necessarily reflect the total number of these injuries.

The ‘Missing assumed lost’ occurrence type can include occurrences where a vessel, person or object from a vessel such as a container is lost at sea. Therefore, this occurrence type does not reflect the number of occurrences where a person was lost overboard.

Further definitions of terminology used in this report can be found in the prefix of this report on page vii.

3 MARINE OCCURRENCES

3.1 Occurrence categories

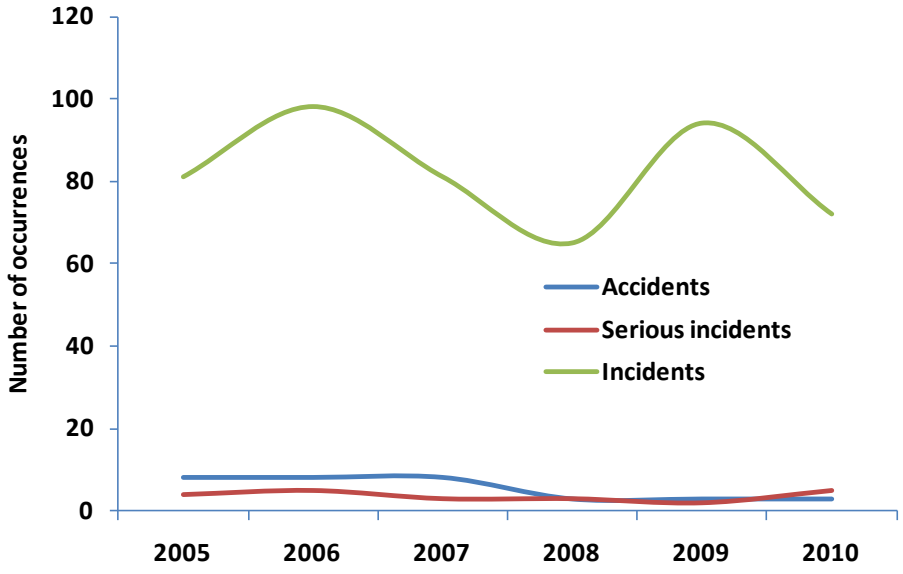
Table 1 shows the number of shipping occurrences from 2005 to 2010 related to Australian vessels or vessels within Australian marine jurisdictions as per reporting requirements under the Transport Safety Investigation Regulations 2003. The total number of occurrences has been oscillatory around an average of about 91 occurrences per year over the 6-year period, with numbers in 2010 being below the 6-year average. This is driven largely by the number of bulk and cargo carrying vessel incidents.

Table 1: Commercial shipping occurrence accidents, incidents 2005 to 2010

Occurrence category	2005	2006	2007	2008	2009	2010	Total
Accidents	8	8	8	3	3	3	**33**
Serious incidents	4	5	3	3	2	5	**22**
Incidents	81	98	81	65	94	72	**491**
Total occurrences	**93**	**111**	**92**	**71**	**99**	**80**	**546**

Over the 6-year period, 33 of the 546 occurrences were accidents and 22 were serious incidents. Figure 1 below shows the number of accidents and serious incidents is relatively low and stable.

Figure 1: Commercial shipping occurrences



There were three accidents and six serious incidents in 2010. The three accidents involved:

- a stevedore who was fatally crushed between containers during cargo operations on board the cargo vessel *Vega Gotland* at Port Botany
- an oiler on board a general cargo ship *Cape Darnley* who was fatally struck on the head by the top of a 200 l drum while attempting to remove the top with an angle grinder
- a crew member of bulk carrier *Polska Walczaca* who fell about 6 m in the ship's cargo hold and sustained fatal injuries.

The five serious incidents involved:

- a fire/explosion in the engine room of bulk carrier *River Embley* at Gladstone Anchorage
- stoppage and drift of a bulk carrier in the Great Barrier Reef
- a collision of bulk carrier *Grand Rodosi* under pilotage with moored fishing vessel *Apollo S* at Port Lincoln, resulting in the bulk carrier being holed and the fishing vessel sinking
- the grounding of the bulk carrier *Shen Neng 1*on Douglas Shoal after departing Gladstone
- the grounding of a 113 m log carrier in the Great North East Channel, Torres Strait (within the Australian Search and Rescue region) after departing Daru, Papua New Guinea.

3.2 Injuries

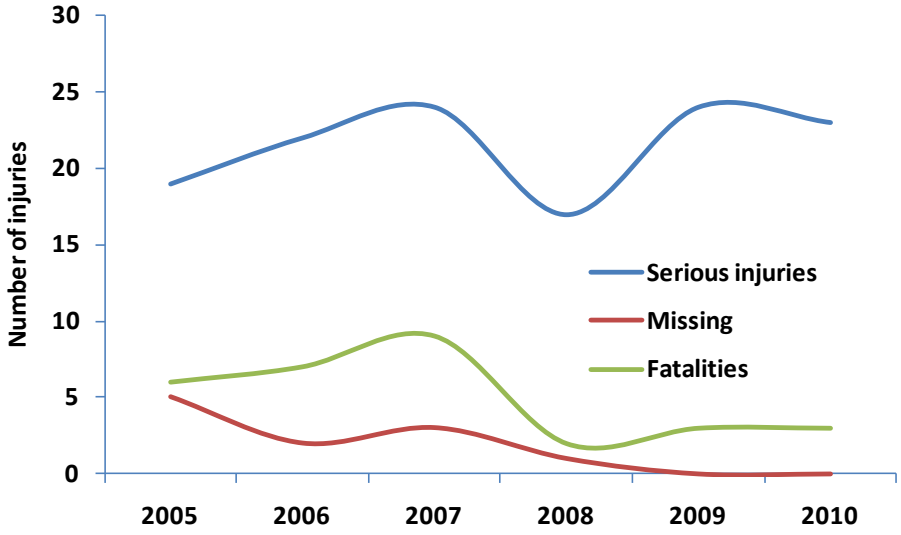
One hundred and forty two occurrences involved serious injuries, fatalities, or people missing overboard. A breakdown of these injuries is listed in Table 2 below. Some occurrences involved multiple injuries, making up a total of 170 people being either seriously injured, fatally injured, or missing.

Table 2: Injuries from reported marine occurrences 2005-2010

Number of people injured	2005	2006	2007	2008	2009	2010	Total
Serious injuries	19	22	24	17	24	23	**129**
Missing	5	2	3	1	0	0	**11**
Fatalities	6	7	9	2	3	3	**30**

Figure 2 shows the number of fatal injuries has reduced in the second half of the analysis period from an average of 7.3 to 2.7 fatal injuries per year. The number of serious injuries is fairly stable, with an average of 21.5 people receiving serious injuries each year. The report of people receiving serious injuries is the second most common event in the ATSB marine database. The number of people reported missing has decreased since 2005 and there have been no reports of people missing overboard in 2009 and 2010. Four of the five people missing in 2005 were from the sinking of *Malu Sara* in Torres Strait.

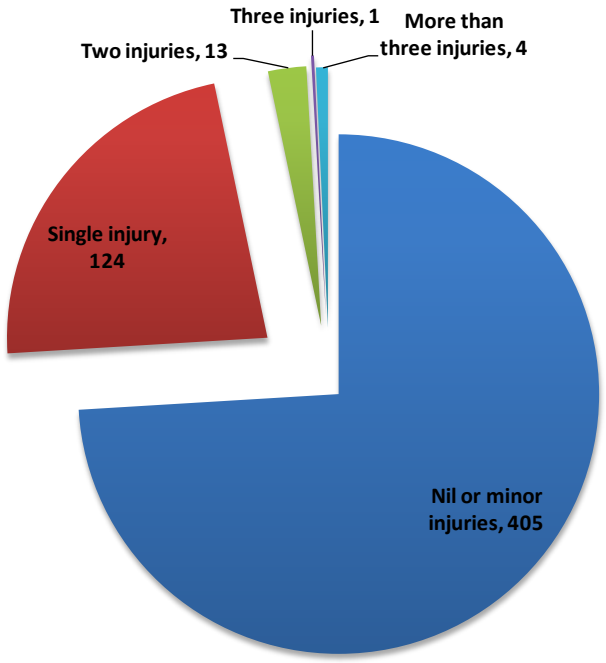
Figure 2: Personal injuries related to commercial shipping occurrences



3.2.1 Multiple injuries

There were several occurrences where more than one person was seriously or fatally injured, as shown below in Figure 3. There were four occurrences where more than three people were injured. The loss of a vessel in Torres Strait was the worst accident in the 6-year period in terms of fatalities, with one confirmed fatality and the remaining four people lost. Other circumstances surrounding multiple injuries were collisions between vessels, rough seas and explosions on board.

Figure 3: Number of serious or fatal injuries in marine occurrences



3.3 Locations of marine occurrences

3.3.1 Marine occurrence regions

Table 3 contains a breakdown of the general marine area of the 546 marine occurrences from 2005 to 2010. A marine area is defined by the most applicable location given the vessels particular operation and location at the time. Most occurrences took place off the Queensland and Western Australian coasts or waterways, followed by New South Wales and Victoria.

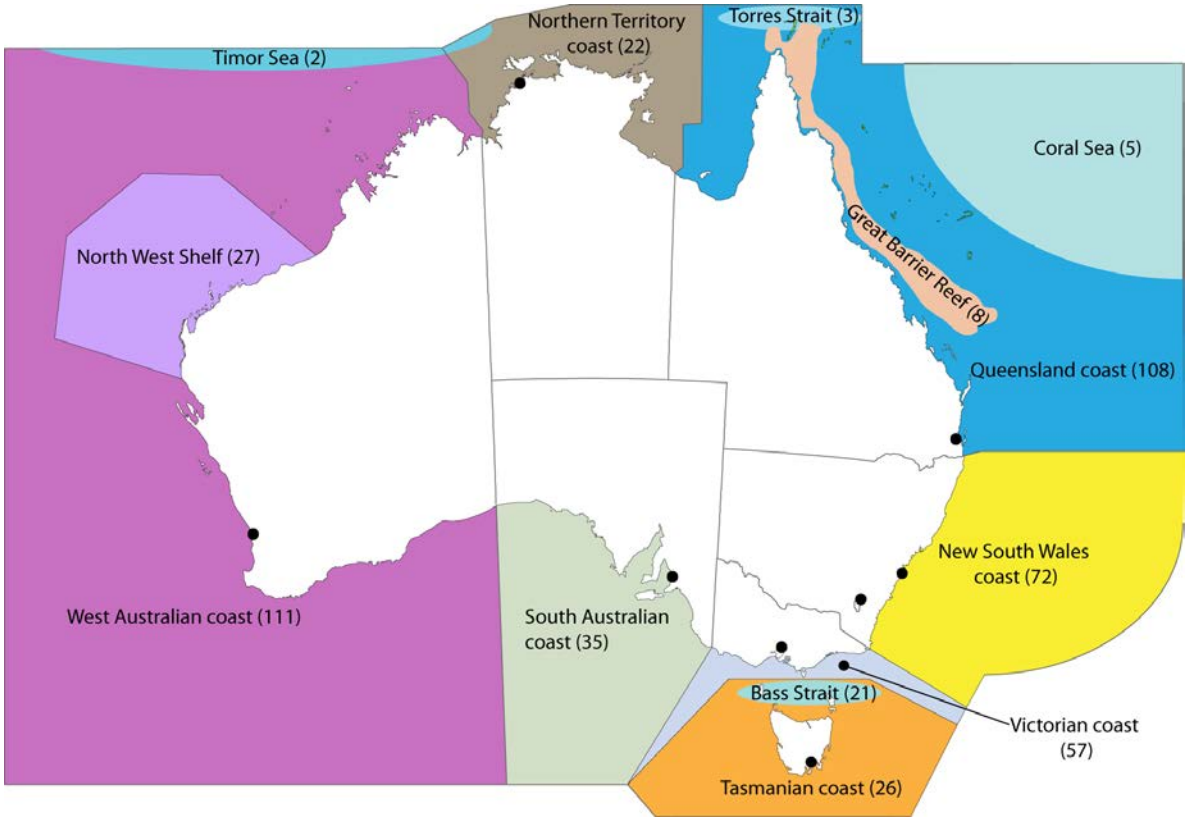
Table 3: Areas of marine occurrences by year 2005 to 2010

Marine area	2005	2006	2007	2008	2009	2010	Total
West Australian coast	27	23	11	14	21	15	**111**
Queensland coast	19	18	20	14	20	17	**108**
NSW coast	16	12	11	8	13	12	**72**
Victorian coast	4	20	13	6	11	3	**57**
South Australian coast	7	6	7	5	5	5	**35**
Overseas	3	8	9	4	6	4	**34**
North West Shelf	0	5	4	3	9	6	**27**
Tasmanian coast	6	6	5	4	1	4	**26**
Northern Territory coast	2	5	1	5	7	2	**22**
Bass Strait	5	3	5	4	1	3	**21**
SAR area[1]	1	1	3	4	2	2	**13**
Great Barrier Reef	1	2	3	0	0	2	**8**
Coral Sea	2	0	0	0	1	2	**5**
Torres Strait	0	0	0	0	2	1	**3**
Timor Sea	0	0	0	0	0	2	**2**
Unknown	0	2	0	0	0	0	**2**

[1] The SAR area refers to Australia's search and rescue area, which includes 52.8 million square kilometres of the Indian, Pacific and Southern Oceans or about one tenth of the earth's surface.

The total number of occurrences off the coast of each state is generally more than indicated in Table 3 due to more specific areas being described within most states' waters. Figure 4 shows the general proximity of marine occurrences by marine area. This map is an approximate representation of the location of these areas and does not necessarily reflect precise state or international boundaries.

Figure 4: Australian marine areas with number of marine occurrences 2005 to 2010



3.3.2 Types of locations of marine occurrences

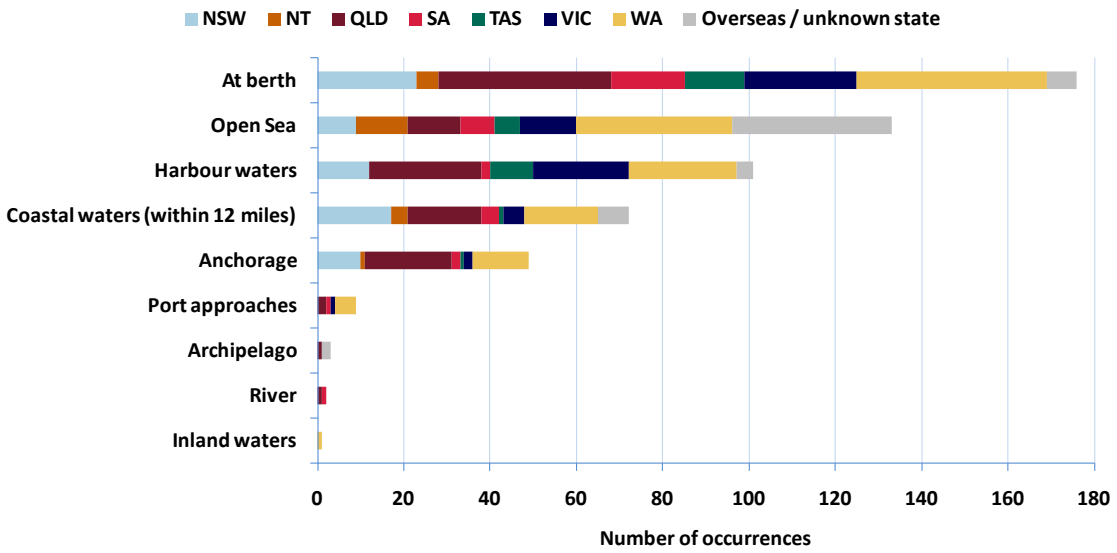
One hundred and sixty nine marine occurrences took place while at berth in Australian waters. The other main types of locations for marine occurrences were harbour waters, open sea or within 12 nautical miles of the coast. The exact numbers are shown by state in Table 4 below, and are depicted in Figure 5 below.

Table 4: Types of locations[2] of marine occurrences 2005-2010

Type of location	NSW	NT	QLD	SA	TAS	VIC	WA	Overseas or unknown state	Total
At berth	23	5	40	17	14	26	44	7	**176**
Open Sea	9	12	12	8	6	13	36	37	**133**
Harbour waters	12	0	26	2	10	22	25	4	**101**
Coastal waters (within 12 miles)	17	4	17	4	1	5	17	7	**72**
Anchorage	10	1	20	2	1	2	13	0	**49**
Port approaches	0	0	2	1	0	1	5	0	**9**
Archipelago	0	0	1	0	0	0	0	2	**3**
River	0	0	1	1	0	0	0	0	**2**
Inland waters	0	0	0	0	0	0	1	0	**1**

More than half of the occurrences off the coast of the Northern Territory occurred while at open sea, while about 54 per cent of all marine occurrences were located at berth or within harbour waters for each state. Tasmania and Victoria had about 75 and 70 per cent respectively of recorded occurrences while at berth or within harbour waters; however, this is likely to be due to the relatively short coast lines of these states. This is shown in Figure 5 below.

Figure 5: Types of locations of marine occurrences 2005-2010 (where known)



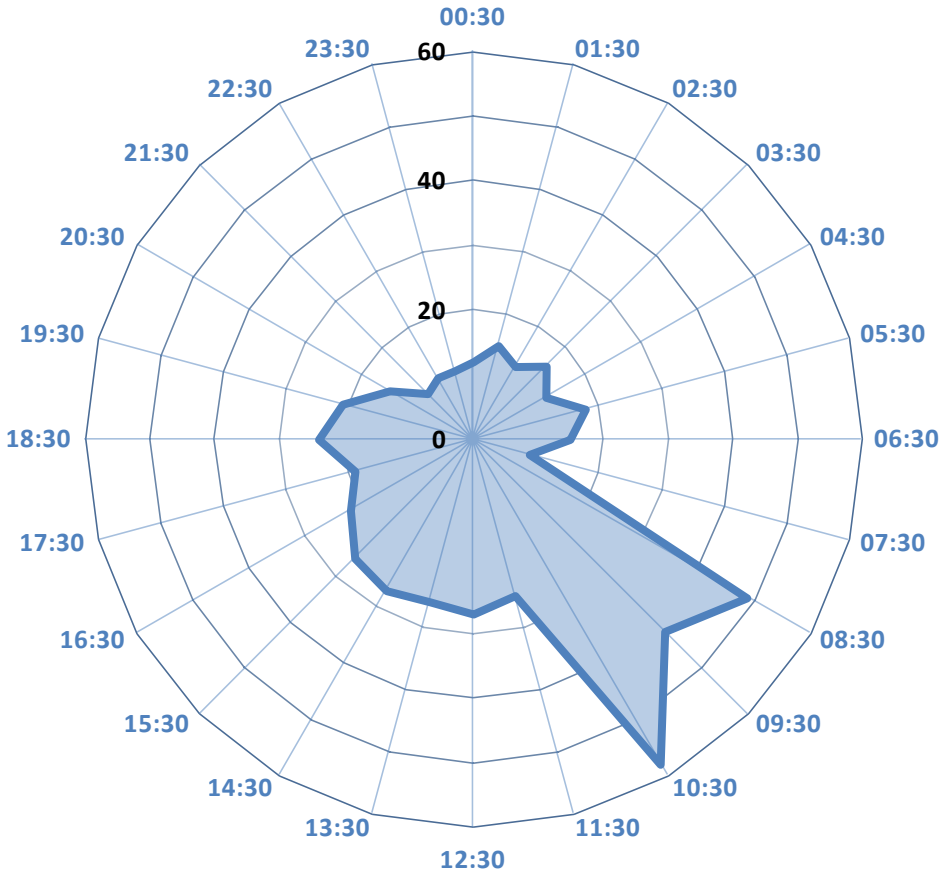
[2] State locations reported in Table 4 and Figure 5 may differ slightly from marine areas shown in Table 3 and Figure 4. This is due to some parts of marine areas being outside state boundaries.

3.4 Time of marine occurrences

Figure 6 shows the approximate time of marine occurrences. The graph uses half past the hour to represent the number of occurrences in the complete hour.

Figure 6 indicates that a large number of occurrences take place between 8am and 11am. After this time the number occurrences are fairly constant during the afternoon and drop off to a low at 9pm. There is another slight rise in occurrences between 1am and 7am.

Figure 6: Hour of day of marine occurrences (where known) 2005-2010



4 VESSELS IN OCCURRENCES

4.1 Number of vessels involved in occurrences

There were 591 vessels involved in the 546 Australian marine occurrences reported to the ATSB. These are shown for each year in Table 5 below.

Table 5: Number of vessels in occurrences 2005 to 2010

Vessels in occurrence	2005	2006	2007	2008	2009	2010	Total vessels	Total occurrences
1	85	103	83	68	91	72	502	502
2	8	8	9	3	8	7	86	43
3	0	0	0	0	0	1	3	1
All vessels	101	119	101	74	107	89	591	546

4.1.1 Multiple vessel occurrences

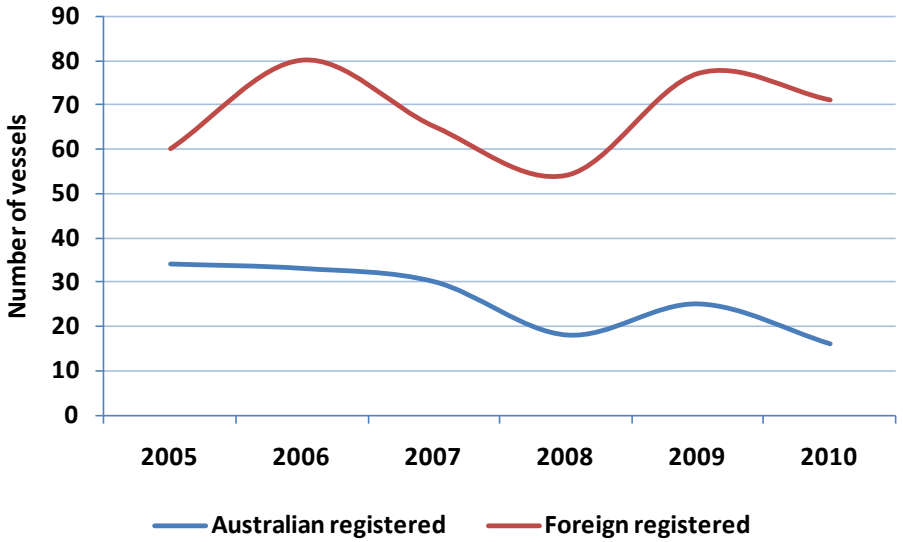
Eighty-six of these vessels were involved in 2-vessel occurrences such as collisions and close quarters events. About one in twelve occurrences had multiple vessels involved. There was one 3-vessel occurrence in 2010, which involved an off-shore support vessel colliding with in an un-manned barge in tow with a tug.

4.2 Vessel Flag States

Between 2005 and 2010, there were 156 commercial Australian registered vessels involved in shipping occurrences reported to the ATSB and 407 vessels registered as a Flag State for another country. The number of occurrences involving Australian Flag State vessels has decreased since 2005, whereas foreign vessels involved in occurrences has increased slightly.

Figure 7 below shows the expected variation in the number of vessels involved in occurrences, as well as the relative decrease in the number of Australian vessels from about 36 per cent in 2005 to about 18 per cent in 2010.

Figure 7: Number of vessels in occurrences by Flag State 2005 to 2010[3]



[3] Figure 7 excludes fishing and recreational vessels.

Table 6 shows the number of accidents, serious incidents and incidents by Australian and Foreign Flag State vessels from 2005 to 2010. The number of accidents has decreased for foreign registered vessels since 2007 and the number of serious incidents has remained fairly stable over this period. Apart from Australia, the main flags flown by vessels involved in Australian marine occurrences were Panamanian, Hong Kong and Bahaman registered vessels from 2005 to 2010. In 2010, the highest number of occurrences recorded was by Australian, Panamanian, Hong Kong, Singaporean, British and Liberian vessels respectively.

Table 6: Number of vessels by occurrence category and Flag State 2005 to 2010[4]

Flag state	Occurrence category	2005	2006	2007	2008	2009	2010	Total
Australian registered	Accident	2	0	0	1	1	0	4
	Serious Incident	1	1	1	0	0	1	4
	Incident	31	32	29	17	24	15	148
Foreign registered	Accident	6	7	8	2	2	3	28
	Serious Incident	3	5	2	3	2	4	19
	Incident	51	68	55	49	73	64	360

4.3 Types of vessels in marine occurrences

Table 7 shows all vessels involved in commercial shipping occurrences by vessel group. The brackets describe the different types of vessels that are grouped into these categories. The *other* category includes vessels such as barges and dredgers, which had low numbers of marine occurrences, or where the vessel was unknown.

Due to the nature of mandatory reportable incidents under Australian legislation, mainly large commercial shipping vessels are involved in occurrences reportable to the ATSB. Some smaller vessels, such as fishing and recreational vessels only appear in the ATSB database due to their interactions with larger vessels. Therefore, data for these vessel groups shown in Table 7 are not indicative of the total number and type of incidents and accidents involving these types of smaller vessels.

[4] Table 6 excludes fishing and recreational vessels.

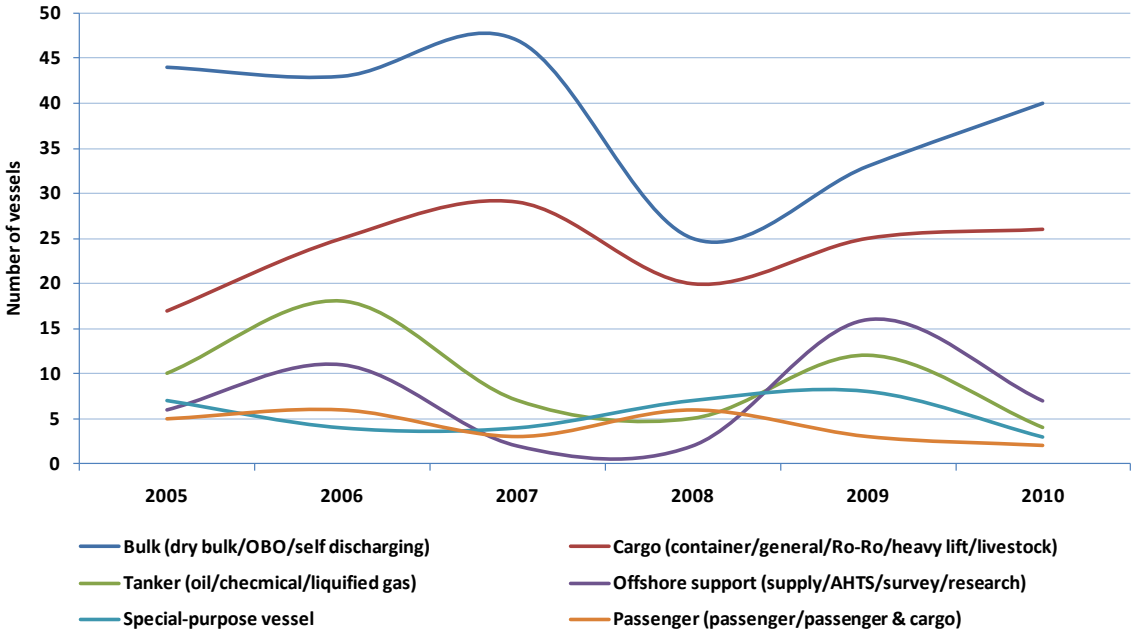
Table 7: Number of vessels from 2005 to 2010 occurrences by vessel grouping

Vessel group	2005	2006	2007	2008	2009	2010	Total
Bulk (dry bulk/OBO/self discharging)	44	43	47	25	33	40	**232**
Cargo (container/general/Ro-Ro/heavy lift/livestock)	17	25	29	20	25	26	**142**
Tanker (oil/chemical/liquefied gas)	10	18	7	5	12	4	**56**
Offshore support (supply/AHTS/survey/research)	6	11	2	2	16	7	**44**
Special-purpose vessel	7	4	4	7	8	3	**33**
Passenger (passenger/passenger & cargo)	5	6	3	6	3	2	**25**
Fishing*	3	3	4	2	3	2	**17**
Tug	1	4	0	5	3	2	**15**
Recreational (motor/sailing/training)*	4	3	2	0	2	0	**11**
Other (includes barges and dredgers)	2	1	3	1	0	2	**9**
Offshore platform (FPSO/FSO/development/production)	1	1	0	1	2	1	**6**
Border Protection/Law Enforcement (navy/customs/police)	1	0	0	0	0	0	**1**
Total	**101**	**119**	**101**	**74**	**107**	**89**	**591**

* Occurrences involving these vessel groups are not reportable to the ATSB unless the occurrence also involved another vessel from another vessel group in the table.

Bulk carriers and cargo vessels made up the vast majority of marine occurrences, and fluctuations in the number of occurrences within these vessel groups has a large effect on the total number of marine occurrences. Figure 8 below shows a decrease for four of the six top vessel groups in 2010, which has resulted in the lower overall occurrence numbers during this period.

Figure 8: Number of vessels involved in occurrences 2005 to 2010 – Top 6 vessel groups by year

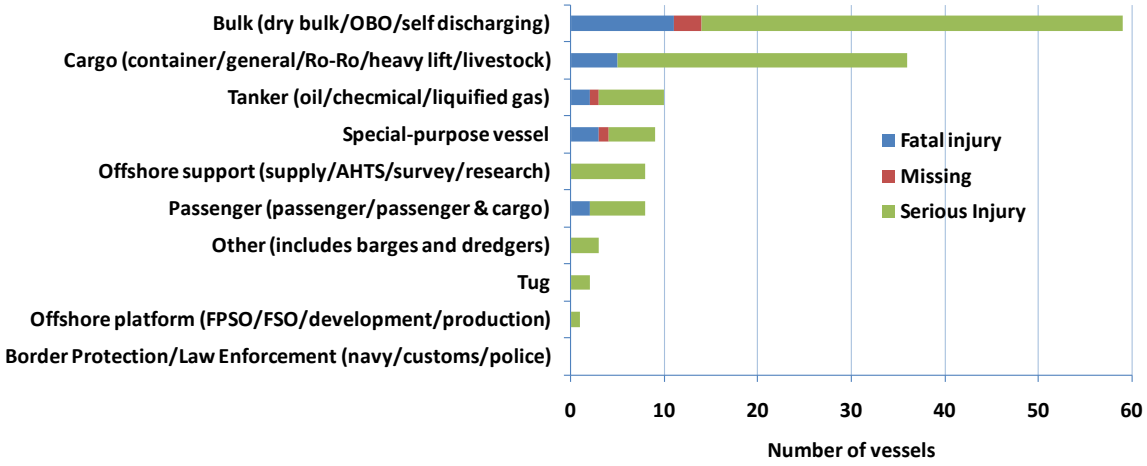


4.4 Types of vessels and injuries

Nearly one in four vessels in reported marine occurrences had serious or fatal injuries, or persons missing presumed lost. Almost three quarters of injuries for the period were on bulk carriers, cargo vessels and tankers, as shown in Figure 9 below. However, this is related to the large numbers of occurrences for these vessels as the rate of vessels being involved in occurrences with serious or fatal injuries or missing persons was close to one in four. Some typical injuries sustained on these vessels involved falls from height, being hit from falling or swinging objects, and burns from explosions, flame bursts or hot fuel oil.

The highest proportion of injuries per occurrence (excluding fishing or recreational) was on special-purpose vessels, with more than 27 per cent of all occurrences involving serious and fatal injuries or missing persons. The typical serious injury for this group was hand injuries such as severed or severely lacerated fingers, related to working with machinery. Other examples include two similar occurrences where a crew member fell overboard and another where a crew member was injured while launching the recovery lifeboat, and the sinking of a vessel in Torres Strait with all on board lost.

Figure 9: Highest injury onboard for vessels in marine occurrences by type of vessel 2005 to 2010



5 OCCURRENCE TYPES

5.1 Occurrence types

The following chapter discusses the different types of categorised events (occurrence types) for the 546 marine occurrences in the ATSB's database that happened between 2005 and 2010. There may be more than one event during an occurrence sequence for each vessel.

There were 885 unique occurrence types associated with Australian marine occurrences between 2005 and 2010. Table 8 shows that damage to the ship or equipment was the most common and was present in 195 occurrences. Serious injury and equipment failure were the next most common events in marine occurrences.

In 2008, there was a significant decrease for most occurrence types; however, there was a relative spike in fires and explosions on board vessels. In 2009 and 2010, there was a relative increase in vessels contacting stationary objects, such as berthed or moored vessels, oil rigs and wharfs.

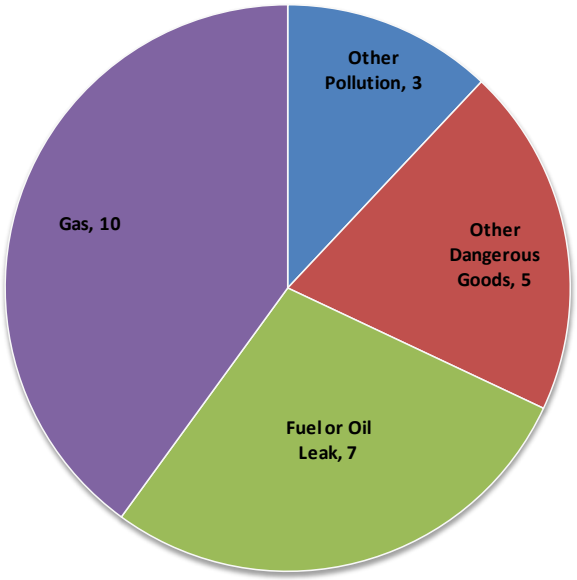
Some types of events included in the *other* occurrence type category are people slipping between the wharf and vessel while berthed, the ship being found to be overloaded and requiring a cargo discharge, and the near grounding of vessels while navigating channels.

Table 8: Occurrence types during marine occurrences 2005 to 2010

Occurrence type	2005	2006	2007	2008	2009	2010	Total
Damage to ship or equipment	32	40	28	21	42	32	**195**
Serious injury	19	20	20	16	23	18	**116**
Equipment failure	14	16	24	20	17	15	**106**
Other	6	12	11	7	22	17	**75**
Fire/explosion	10	13	10	17	9	10	**69**
Machinery failure	8	22	7	2	7	8	**54**
Grounding/stranding	11	10	6	11	4	7	**49**
Contact	6	5	5	7	13	12	**48**
Collision	7	7	7	2	7	3	**33**
Hull failure/failure of watertight openings	4	6	6	2	6	5	**29**
Fatality	6	6	6	2	3	3	**26**
Pollution	0	7	3	2	8	5	**25**
Lifeboat accident	4	3	2	2	4	4	**19**
Close quarters	3	2	2	1	2	2	**12**
Flooding	1	2	4	2	2	0	**11**
Missing assumed lost	2	2	2	1	0	1	**8**
Capsizing/listing	0	1	1	0	2	2	**6**
Foundered	1	0	1	0	1	1	**4**
Total	**134**	**174**	**145**	**115**	**172**	**145**	**885**

Of the 25 pollution occurrences, 10 involved gas, and seven involved fuel or oil leaks. The full range of pollution occurrence types can be seen in Figure 10.

Figure 10: Type of pollution for pollution-related occurrences, 2005 to 2010



5.2 Occurrence types associated with injuries

Table 9 shows that, apart from the fatality and serious injury occurrence types, equipment failure was associated with the largest number of fatal and serious injury occurrences. Fires and explosions were associated with the next highest number of fatal and serious injuries.

Foundering and capsizing/listing were associated with the highest proportion of casualties per occurrence; however, these are relatively infrequent occurrence types. Lifeboat accidents had the next highest rate of associated fatal/missing and serious injuries.

Table 9: Occurrence types and highest injury 2005 to 2010

Occurrence Type	Fatal	Missing	Serious	Minor/nil
Fatality	26	0	0	0
Serious injury[5]	5	1	110	0
Equipment failure	2	0	11	93
Missing assumed lost[6]	1	6	0	1
Collision	1	1	0	31
Fire/explosion	1	0	8	60
Lifeboat accident	1	0	2	16
Hull failure/failure of watertight openings	1	0	0	28
Foundered	1	0	0	3
Other	0	1	3	71
Capsizing/listing	0	1	0	5
Damage to ship or equipment	0	0	5	190
Pollution	0	0	1	24
Machinery failure	0	0	0	54
Grounding/stranding	0	0	0	49
Contact	0	0	0	48
Close quarters	0	0	0	12
Flooding	0	0	0	11

[5] Some serious injury accidents also involved fatal injuries of persons missing overboard. The serious injury occurrence type is used to indicate that serious injuries have been sustained in the occurrence.

[6] Similar notes apply as per serious injury accidents, however, the missing assumed lost occurrence type may include the loss of cargo or vessel without loss of life or injury.

5.3 Occurrence types associated with accidents and serious incidents

Sixteen of the eighteen occurrence types were associated with accidents or serious incidents. Close quarters and contact occurrence types were not associated with any accidents or serious incidents.

Fatality and damage to ship or equipment were the most common of these occurrences, with declines in fatal accidents being shown between 2008 and 2010. There was a slight rise over the average for damage to ship or equipment in 2010 for accidents and serious incidents, although this occurrence type is associated with a significantly larger proportion of incidents. This is shown in Table 10.

Table 10: Occurrence types associated with accidents and serious incidents 2005 to 2010

Occurrence Type	2005	2006	2007	2008	2009	2010	Total
Fatality	6	6	6	2	3	3	**26**
Damage to ship or equipment	4	4	3	3	1	4	**19**
Fire/explosion	0	1	2	1	1	2	**7**
Machinery failure	2	2	0	0	1	2	**7**
Missing assumed lost	2	2	2	1	0	0	**7**
Serious injury	2	2	1	0	2	0	**7**
Grounding/stranding	1	1	0	2	0	2	**6**
Hull failure/failure of watertight openings	0	3	1	0	0	2	**6**
Equipment failure	0	1	1	2	0	1	**5**
Collision	0	1	2	0	0	1	**4**
Flooding	1	1	1	0	0	0	**3**
Foundered	1	0	1	0	0	1	**3**
Pollution	0	1	0	0	0	2	**3**
Other	2	0	0	0	0	0	**2**
Capsizing/listing	0	0	1	0	0	1	**2**
Lifeboat accident	0	0	1	0	0	0	**1**

5.4 Occurrence types associated with incidents

Table 11 below shows the number of occurrence types associated with incidents during the period of study. Damage to ship or equipment, serious injury occurrences and equipment failure make up a significant proportion of all incidents.

Table 11: Occurrence types associated with incidents 2005 to 2010

Occurrence Type	2005	2006	2007	2008	2009	2010	Total
Damage to ship or equipment	28	36	25	18	41	28	**176**
Serious injury	17	18	19	16	21	18	**109**
Equipment failure	14	15	23	18	17	14	**101**
Other	4	12	11	7	22	17	**73**
Fire/explosion	10	12	8	16	8	8	**62**
Contact	6	5	5	7	13	12	**48**
Machinery failure	6	20	7	2	6	6	**47**
Grounding/stranding	10	9	6	9	4	5	**43**
Collision	7	6	5	2	7	2	**29**
Hull failure/failure of watertight openings	4	3	5	2	6	3	**23**
Pollution	0	6	3	2	8	3	**22**
Lifeboat accident	4	3	1	2	4	4	**18**
Close quarters	3	2	2	1	2	2	**12**
Flooding	0	1	3	2	2	0	**8**
Capsizing/listing	0	1	0	0	2	1	**4**
Foundered	0	0	0	0	1	0	**1**
Missing assumed lost	0	0	0	0	0	1	**1**

5.5 Occurrence types associated with vessel groups

Table 12 on page 25 shows the number of occurrence types for each vessel grouping. Where two vessels were involved in one event, such as a collision, the event was counted for each vessel.

Vessel groups are exposed to different marine hazards due to the varying methods and types of operation they involve. For example, cargo and bulk carriers were involved in four of the six occurrences where capsizing and listing was an occurrence type. Tugs were more likely to be involved in occurrences where damage to a ship or equipment occurred, with more than 30 per cent of all tug occurrences having this occurrence type.

Cargo vessels had a significantly higher proportion of *other* occurrence types, with this recorded against 34 vessels. Typical *other* occurrences for cargo vessels were container related, such as containers overboard and container damage in rough weather, and the leaking of dangerous goods and gas from containers.

Cargo vessels, bulk carriers and tankers were the most common vessels involved in pollution occurrences, making up 22 out of 25 vessels with the occurrence type. Cargo vessels and tankers had a pollution event in approximately 1 in 20 and 1 in 18 occurrences respectively, whereas bulk carriers had pollution in only 1 in 60 occurrences. The majority of these occurrences were either pollution from venting gases such as carbon dioxide, ammonia or halon bottles into the atmosphere, or small amounts of oil and dangerous goods leaking out of cargo or the vessel. Two of the serious pollution incidents occurred between 11pm and 1 am in the morning.

Table 12: Vessels with associated occurrence types by vessel group

Occurrence Type	Border Protection	Bulk	Cargo	Fishing	Offshore platform	Offshore support	Other	Passenger	Recreational	Special-purpose vessel	Tanker	Tug	Total
Damage to ship or equipment	0	84	47	7	3	20	2	2	4	6	17	8	**200**
Serious injury	0	48	32	1	1	8	3	6	2	7	7	3	**118**
Equipment failure	0	48	15	0	1	8	3	8	1	12	10	0	**106**
Other	0	22	34	0	1	3	0	4	1	5	8	0	**78**
Fire/explosion	0	21	21	1	1	7	0	3	0	5	10	0	**69**
Collision	0	17	10	12	0	4	2	0	6	2	6	5	**64**
Machinery failure	0	24	15	0	2	3	0	0	0	0	8	2	**54**
Grounding/stranding	0	21	9	0	0	6	0	1	2	4	5	1	**49**
Contact	0	19	12	0	1	10	0	0	0	0	2	5	**49**
Hull failure/failure of watertight openings	0	12	4	3	0	4	1	2	1	1	1	1	**30**
Fatality	0	11	6	1	0	0	0	2	1	3	2	0	**26**
Pollution	0	6	11	1	0	1	1	0	0	0	5	0	**25**
Lifeboat accident	0	12	0	0	0	0	0	1	0	2	4	0	**19**
Close quarters	1	7	3	2	0	0	1	2	0	0	3	0	**19**
Flooding	0	3	0	4	0	2	0	2	0	0	0	0	**11**
Missing assumed lost	0	4	1	0	0	0	0	0	0	2	1	0	**8**
Capsizing/listing	0	2	2	1	0	0	0	0	0	0	0	1	**6**
Foundered	0	0	0	1	0	1	0	0	1	1	0	0	**4**

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