REPUBLIC OF THE MARSHALL ISLANDS

Maritime Administrator

ANNUAL REPORT ON MARINE SAFETY INVESTIGATIONS

2021

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TABLE OF CONTENTS

LIST OF ABBREVIATIONS AND ACRONYMS

Administrator	Republic of the Marshall Islands Maritime Administrator
BWMC	Ballast Water Management Convention
Casualty Investigation Code	Code of the International Standards and Recommended Practices for a Safety Investigation into a Marine Casualty or Marine Incident
COLREGs	Convention on the International Regulations for Preventing Collisions at Sea
COVID-19	Coronavirus Disease
CTL	Constructive Total Loss
FSS Code	International Code for Fire Safety Systems
GT	Gross Ton
IMO	International Maritime Organization
LSA	Lifesaving Appliance
MARPOL	International Convention for the Prevention of Pollution from Ships
MI-107	Republic of the Marshall Islands Maritime Act
MI-108	Republic of the Marshall Islands Maritime Regulations
MI-260	Republic of the Marshall Islands Rules for Marine Investigations
MOU	Mobile Offshore Unit
MSA	Marine Safety Advisory
MSC	Maritime Safety Committee (IMO)
OSV	Offshore Support Vessel
PPE	Personal Protective Equipment
RMI	Republic of the Marshall Islands
RO/RO	Roll-on/Roll-off
SOLAS	International Convention for the Safety of Life at Sea

Message from the Republic of the Marshall Islands Maritime Administrator

Hans Molver
Deputy Commissioner of Maritime Affairs

The impacts of the COVID-19 pandemic continued throughout 2021. Nevertheless, the Administrator continued to leverage the extensive network of worldwide offices to ensure timely and thorough investigation of all very serious marine casualties, marine casualties, marine incidents, and occurrences. The Administrator maintains detailed data for all reports made across the entire RMI fleet. This report is being published to provide and share this information with owners, managers, and crews with the goal of increasing marine safety, and protection of human life at sea and the environment.

During 2021, the Administrator investigated 700 very serious marine casualties, marine casualties, marine incidents, and occurrences. While there was a slight reduction in the total number of reports compared to 2020, there was also a reduction in the overall severity of the incidents. This is a direct reflection of the dedication to safety by the owners, managers, and crews of RMI-registered vessels. The Administrator also acknowledges the extraordinary dedication exhibited by the seafarers serving on board RMI-registered vessels. Their continued vigilance and dedication, despite the many challenges posed by the COVID-19 pandemic, is highly commended.

Principles of Marine Safety Investigations

Marine safety investigations are conducted in accordance with the MI-107, MI-108 (Chapter 6), MI-260, and the Casualty Investigation Code.

Under the Casualty Investigation Code, marine safety investigations are conducted to determine the causal factors of the casualty, with the objective of preventing similar casualties or incidents in the future, and to make safety recommendations, as necessary. Marine safety investigations do not seek to apportion blame or determine liability.

All reports to the Administrator are classified in accordance with the following:[1]

1. **Very serious marine casualties** are those involving loss of life, total loss of the ship, or significant environmental damage.

2. **Marine casualties** are events, or a sequence of events, directly in connection with the operation of the vessel, that have resulted in serious injury, loss or material damage to the vessel, grounding or disabling of the vessel, collision or allision, and severe damage to marine infrastructure or to the environment.

3. **Marine incidents** are events, or a sequence of events, other than a marine casualty, which have occurred directly in connection with the operation of the vessel, that endangered, or if not corrected, would endanger the safety of the vessel, its occupants, or the environment.

4. **Occurrences** are other conditions and events which are not marine casualties or marine incidents but require investigation by the Administrator.

Additionally, all reports are assigned a primary incident type based on information obtained during the marine safety investigation. The primary incident type details the nature of the incident which resulted in the very serious marine casualty, marine casualty, marine incident, or occurrence.

Accurate and timely reporting[2] by Masters, owners, and operators in accordance with the Administrator's reporting requirements are vital to ensure an appropriate response and necessary support can be provided in order to identify safety critical factors and lessons learned. Further, the analysis conducted by the Administrator is used to identify trends which can then be shared with Masters, owners, and operators to improve safety.

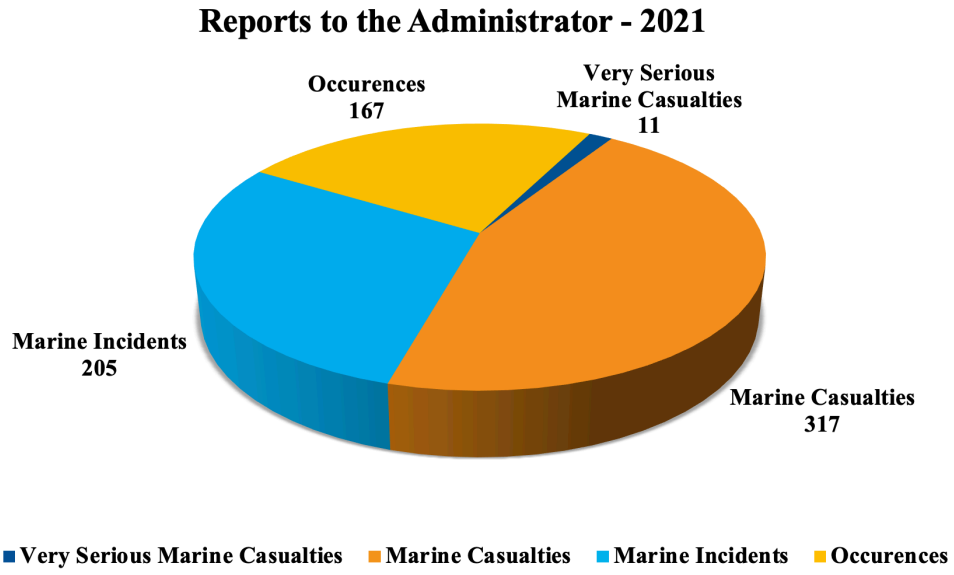
This report excludes data pertaining to the investigation of reports of misconduct and other intentional acts by RMI-documented seafarers.

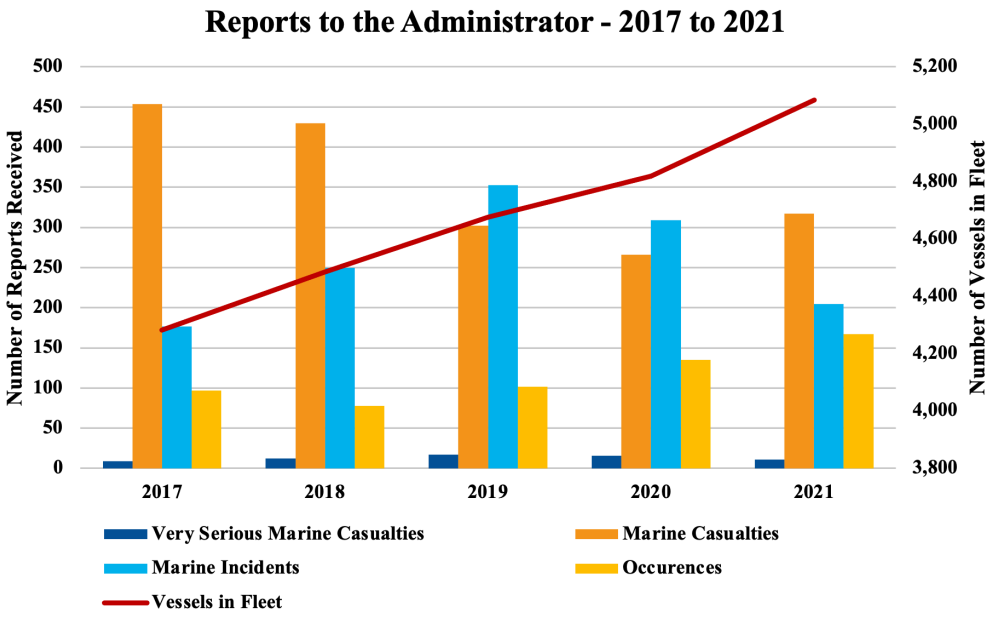
1 For complete definitions, refer to MI-108 §6.35.

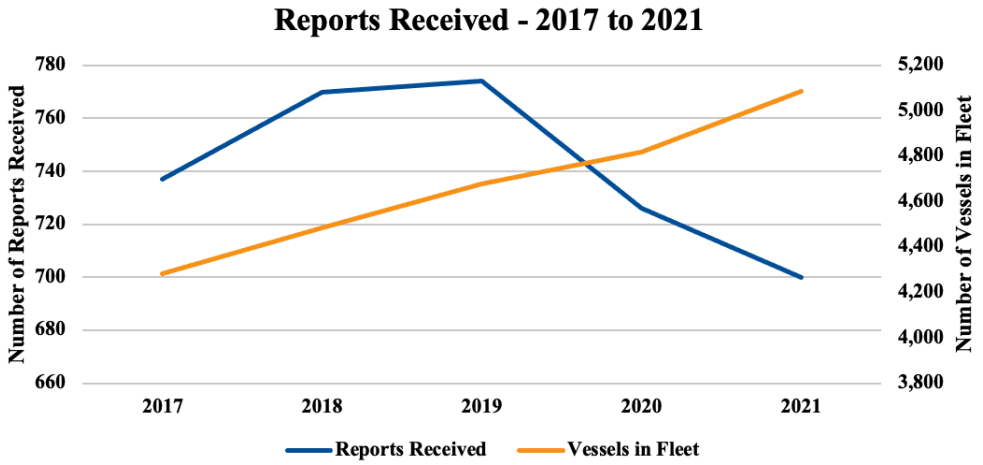
2 For additional information, see RMI Marine Guideline 6-36-2.

Section 1: 2021 Year in Review

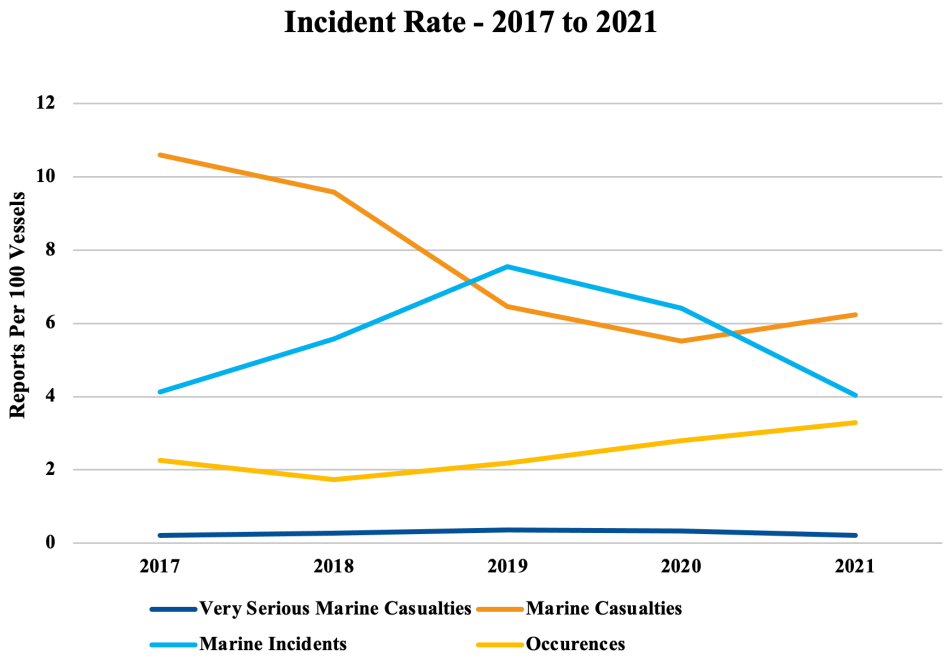
During 2021, there were 700 very serious marine casualties, marine casualties, marine incidents, and occurrences reported to the Administrator, 26 less than reported during 2020.







Since 2019, the data shows a consistent decline in the number of reports received, which is a strong indication that the commitment to safety and protection of the marine environment by Masters, crewmembers, owners, and operators remains high.

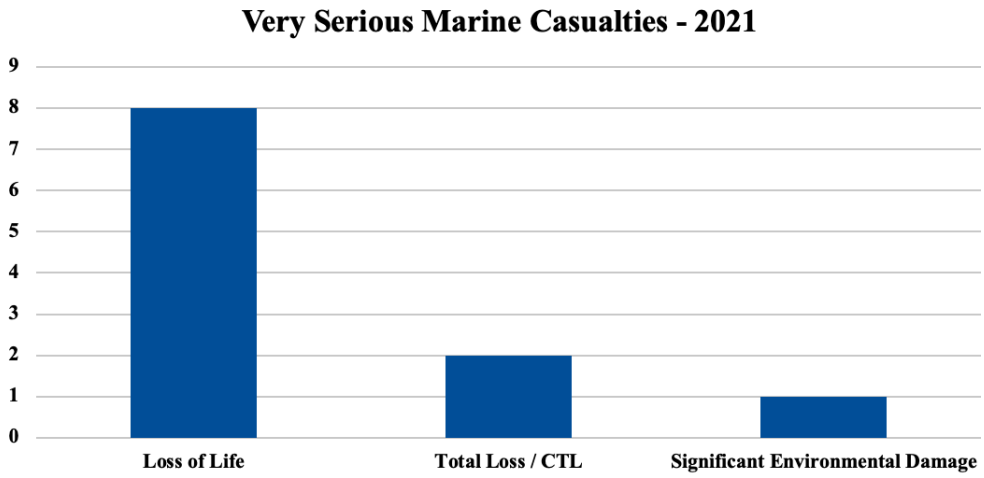


While the overall reduction in the number of reports received is positive, there has been an increase in the number of occurrences. This increase can be attributed to the Administrator's decision in 2020 to classify natural deaths of RMI seafarers as occurrences rather than as marine incidents.

Section 2: Reports by Incident Classification – 2021

Very Serious Marine Casualties

During 2021, 11 very serious marine casualties were reported to the Administrator, compared to 16 in 2020. Eight of these resulted in a cumulative loss of nine lives,[3] two resulted in the loss of vessels and seafarers missing at sea,[4] and one resulted in significant environmental damage.[5] Additional data pertaining to very serious marine casualties is in Appendix 1.



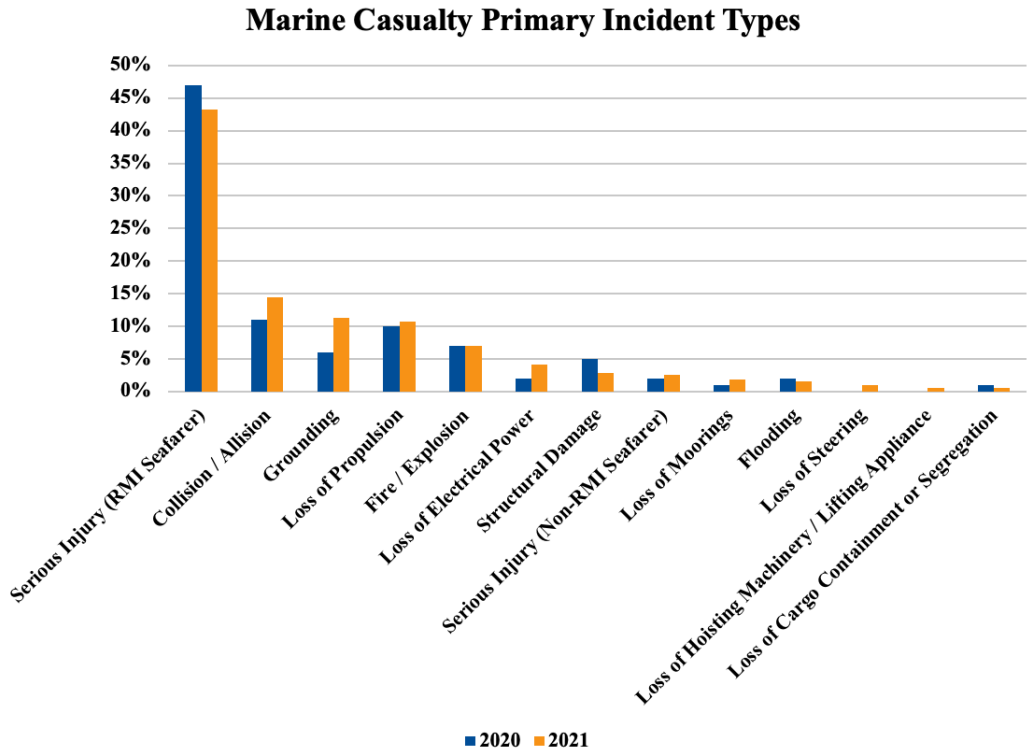
3 Six RMI-documented seafarers, one superintendent, and two stevedores.

4 A collision resulted in the loss of a non-RMI-registered RO/RO and three of its seafarers missing at sea. Another collision resulted in the loss of a non-RMI-registered fishing vessel and two of its fishermen missing at sea.

5 Significant environmental damage is determined by the coastal State for marine casualties occurring in their territorial seas.

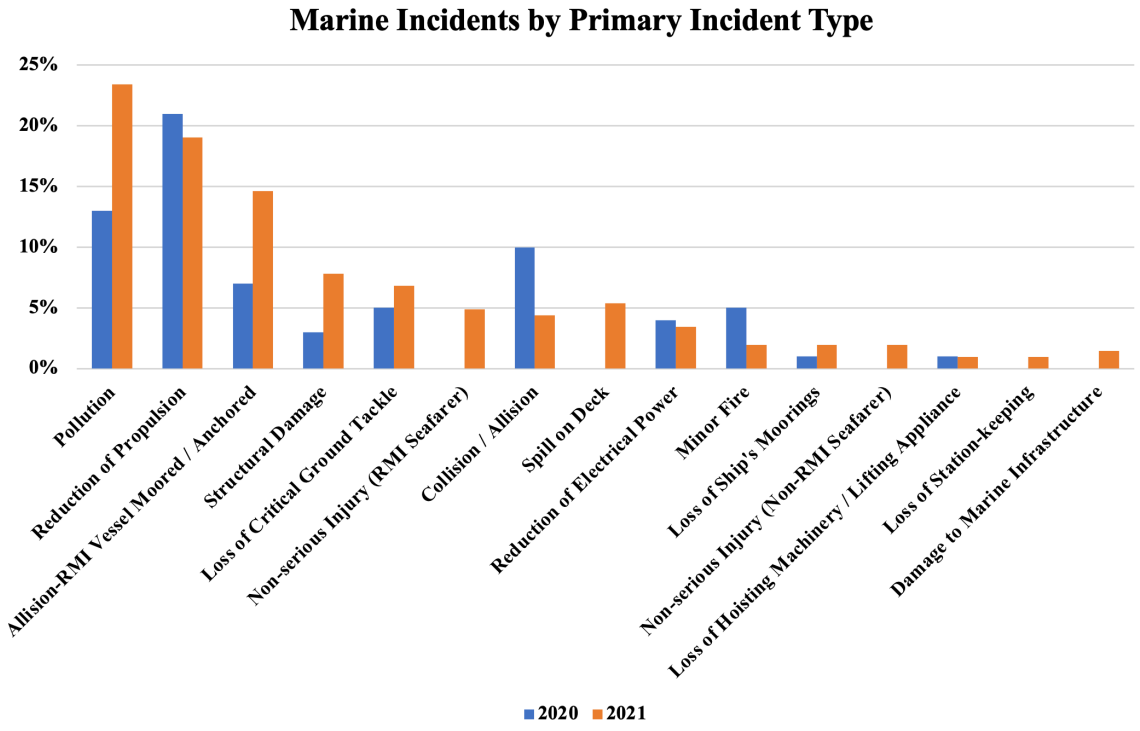
Marine Casualties

There were 317 marine casualties reported to the Administrator during 2021. These have been classified by the primary incident type and are shown on the below chart as a percentage of the total marine casualties reported during 2021. Additional details pertaining to marine casualties, marine incidents, and occurrences reported during the previous years can be found in Appendix 2.



Marine Incidents

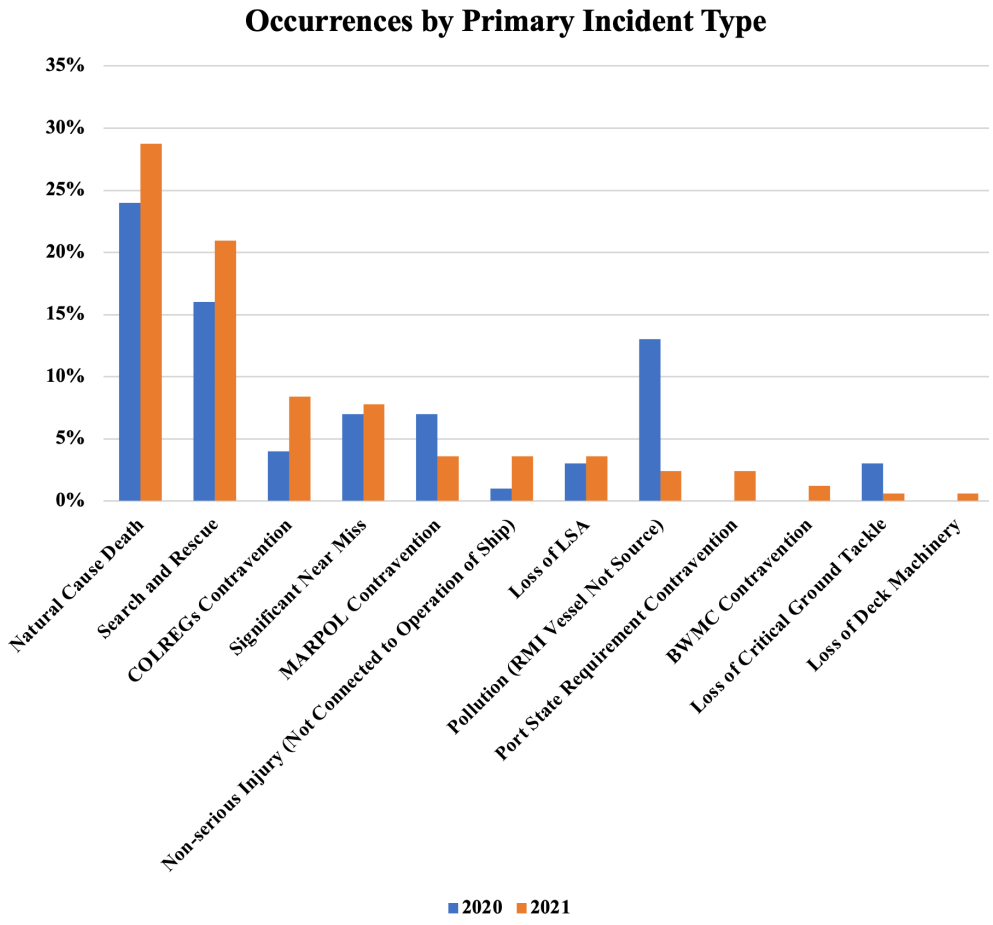
There were a total of 205 marine incidents reported to the Administrator during 2021. These have been classified by the primary incident type and are shown on the below chart as a percentage of the total marine incidents reported during 2021.[6]



6 Incident types which accounted for less than 1% of the reported marine incidents are excluded. Values are rounded to the nearest whole percent.

Occurrences

There were 167 occurrences reported to the Administrator during 2021. These have been classified by the primary incident type and are shown on the below chart as a percentage of the total occurrences reported during 2021. These include primary incident types which would normally be classified as marine casualties or marine incidents but have been classified as occurrences due to their specific nature and circumstances.



Section 3: Highlighted Topics

Serious Injury

Over the past five years, serious injuries have consistently featured as the most common type of incident reported to the Administrator. The maritime working environment is dynamic and exposure to hazardous situations can occur on a regular basis. That is why owners, operators, managers, and seafarers have developed procedures and invested in training to mitigate the many risks presented. However, serious injuries continue to be reported and despite a reduction in 2021, the number of serious injuries recorded remains too high.

To decrease the occurrence of serious injuries on board, it is imperative for owners, operators, managers, and seafarers to encourage reporting. Specifically, there are five areas in which to focus up and down the chain of command if serious injuries are to be reduced:

Training – Provide training that is realistic, specific, and task oriented.

Awareness – Disseminate information discussing prevention based on actual accounts of events. This should reinforce the risks posed which, in turn, should increase awareness and reduce complacency.

Procedures – Risk assessments, toolbox talks, and documented methods of work cannot be used as the sole resource to reliably reduce serious injury. These tools must be used in conjunction with the four other key areas.

Behavior – Individuals learn at different rates and understand instructions in different forms (behavior versus cognitive learning). Understanding the individual is vital to determining how a seafarer takes in, interprets, retains, and retrieves information and instruction.

Holistic – Removing mitigating factors, such as mental and physical stressors which impact negatively on the wellbeing of seafarers, will reduce the number of serious injuries. Encouraging reporting and sharing lessons learned, assessing routine activities to reduce complacency, and adhering to safe working practices will improve safety and quality of life on board.

Collisions

Collisions involving RMI-registered vessels have consistently been the second most frequent incident type reported to the Administrator, accounting for 10-15% of all marine casualties reported over the past five years. Although many of the collisions that were reported resulted in minor damage, they have also been one of the leading causes of very serious marine casualties. Collisions occurring over the past five years have resulted in the loss of a Japan-registered 11,500 GT RO/RO, five non-RMI-registered fishing vessels, and a discharge that the coastal State determined caused severe harm to the marine environment. In terms of human life, 12 crewmembers have died or are missing at sea due to these collisions over the past five years.

All the collisions that resulted in very serious marine casualties occurred in coastal waters or on the high seas, not in restricted waterways. Additionally, most occurred at night in good visibility.

The top ten causal factors for the collisions reported to the Administrator are found in Appendix 2 of this report. The most common of these were related to ineffective navigational watch on both of the vessels that were involved in the collision. Examples of ineffective navigational watch on board RMI-registered vessels have included not maintaining an effective lookout, not making a timely assessment of the risk of collision, not taking positive action in sufficient time to avoid collision, prioritizing other watch keeping tasks over collision avoidance, and ineffective coordination between the members of the vessel's bridge team.

Owners and operators of RMI-registered vessels are encouraged to review and consider if there are opportunities to improve the effectiveness of how they currently monitor and assess navigational watch on board their vessels. For example, remote navigation audits might be considered as a way of periodically observing how navigation watch standers perform their duties when the Master or ship's superintendent is not on the Bridge. The findings of such audits can then be used to identify actions that can be taken to improve the effectiveness of the navigation watch on board the ships in their fleet.

Container Fires

While accounting for less than 10% of all fires reported to the Administrator during 2021, those originating within loaded containers present a significant risk to ships and crews. Fires occurring in containers loaded on board containerships pose several unique hazards, including: the ability for an incipient fire in a container to go undetected by the ship's crew or the fixed fire detection system until the container is compromised; access to a container for investigation and fire extinguishment can be very difficult (if not impossible) while the container is stowed; and the close proximity of other containers can promote rapid fire growth.

Many of the container fires occurring on board RMI-registered vessels have been attributed to either undeclared or mis-declared dangerous goods. Additionally, several have been attributed to improper or inadequate securing of cargo in the container. These causal factors are largely outside the direct control of owners, operators, and crew; however, actions can be taken to reduce the impacts of a container fire. Container fires reported to the Administrator have shown that early detection of a fire and prompt fire extinguishment by the crew were critical factors in preventing extension to other nearby containers and, ultimately, damage to the ship's structure. These incidents have also highlighted the importance of conducting fire drills. Conducting frequent and realistic fire drills help crewmembers to be better prepared to respond to a potential incident in a safe and efficient manner.

Recognizing the risk posed by container fires, several IMO member States (including the RMI) submitted proposals relating to the evaluation of the adequacy of current fire detection, protection, and extinguishment arrangements on containerships. A new output related to fire prevention on containerships was established during the 103rd session of the IMO MSC. Specifically, the MSC agreed that "the output was to amend regulations in SOLAS chapter II-2 and the FSS Code to enhance provisions for early fire detection and effective control of fires in containerized cargoes stowed on and under deck of containerships."

Section 4: MSAs Issued by the Administrator

During 2021, the following MSAs were issued in response to incidents reported to the Administrator:[7]

MSA NO.	SUBJECT
04-21	Loss of Propulsion in High-Density Traffic Areas in China
06-21	Safe Navigation in Fishing Areas – Ningbo-Zhoushan, China
08-21	Enclosed Space Entry Incidents Involving Shore Personnel
10-21	Overhead Monorail Provision Crane Failure
14-21	Loss of Moorings During Lay-up
17-21	Use of Radar

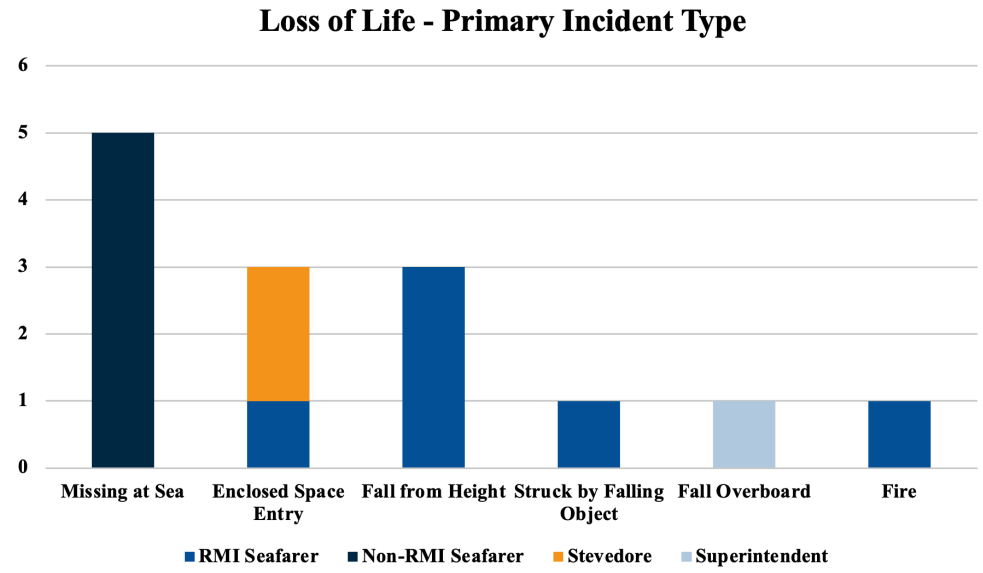
Section 5: Looking Forward

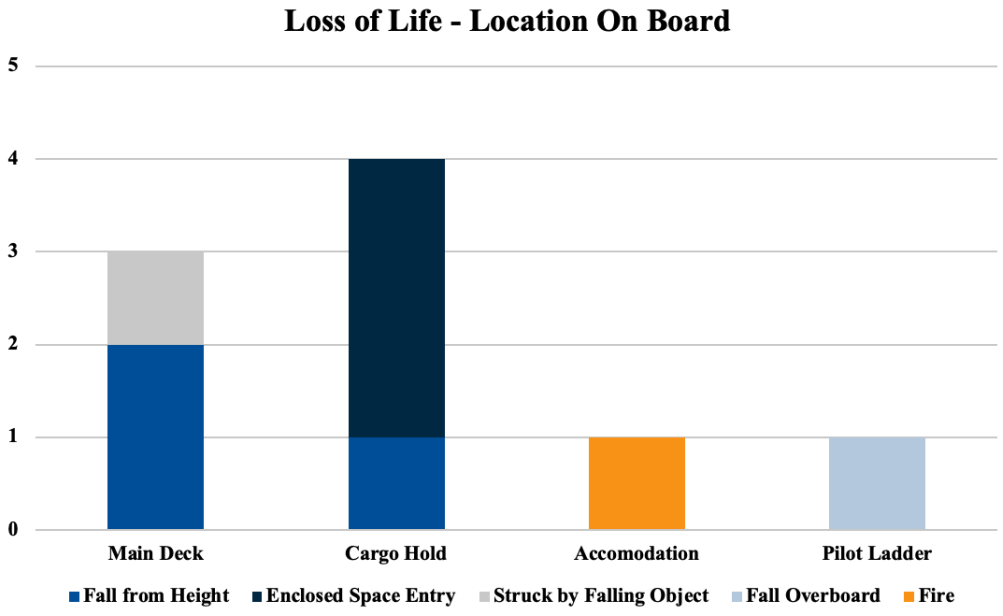
The previous two years saw the maritime sector adapt and overcome the many challenges presented by a global pandemic; this was also true in the conduct of marine safety investigations. While upholding international obligations, the Administrator maintained its capability to investigate every very serious marine casualty, marine casualty, marine incident, and occurrence to identify lessons learned to improve safety across the fleet. As evidenced in the data provided in this report, the reduction in the number of reports is testament to the recognition that maritime safety is not solely the responsibility of seafarers, but the responsibility of every stakeholder. The Administrator will continue its commitment to investigate, identify improvements, and disseminate information for the benefit of the RMI fleet and its crew and the protection of the marine environment.

7 MSAs are valid for one year from publication. The MSA Index can be found here.

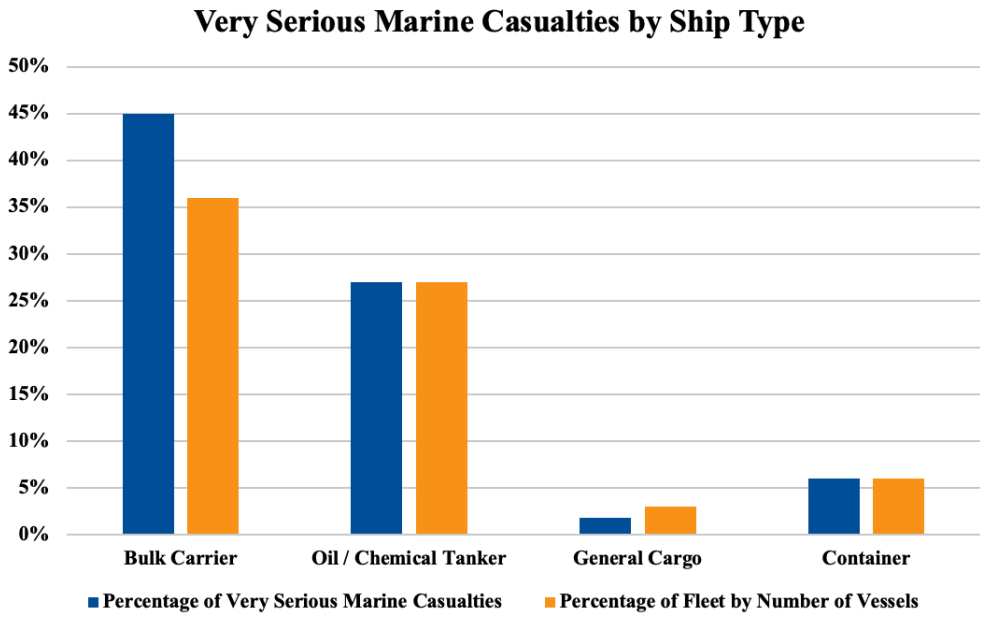
Appendix 1: Very Serious Marine Casualties

During 2021, very serious marine casualties involving RMI-registered ships resulted in nine fatalities and five individuals missing at sea.[8]





8 Three seafarers missing at sea following a collision with a non-RMI-registered RO/RO and two fishermen missing following a collision with a non-RMI-registered fishing vessel.

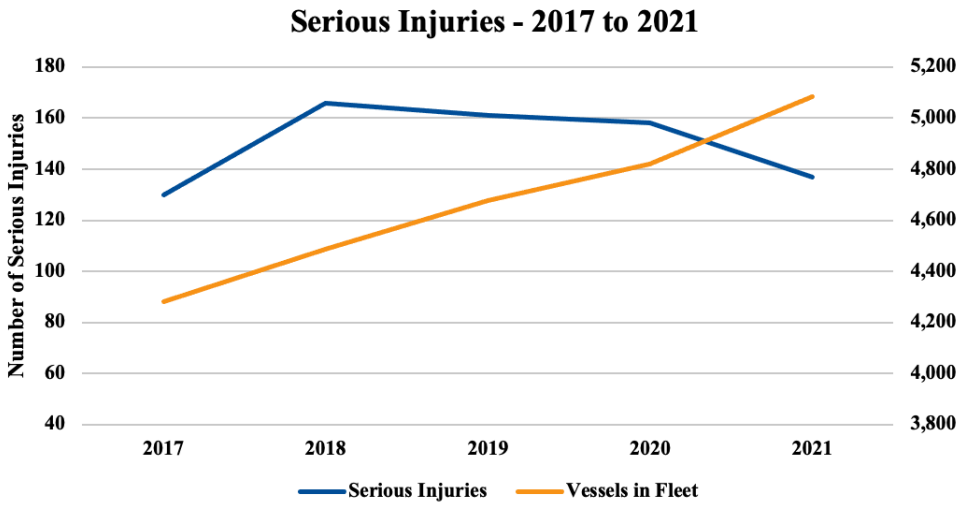

Very Serious Marine Casualties by Ship Type
50%
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
Bulk Carrier
Oil / Chemical Tanker
General Cargo
Container
Percentage of Very Serious Marine Casualties
Percentage of Fleet by Number of Vessels

Appendix 2: Marine Casualties, Marine Incidents, and Occurrences

The following information includes data obtained during 2021 for marine casualties, marine incidents, and occurrences.

Serious Injuries

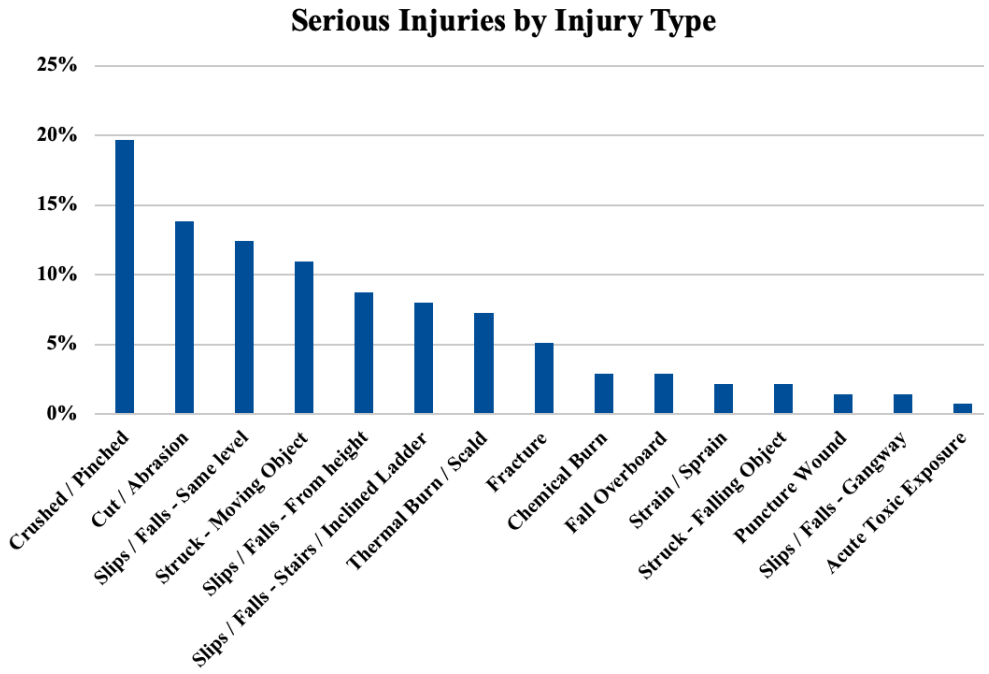
Serious injuries (those resulting in incapacitation for 72 hours or more) continue to be the leading marine casualty primary incident type reported to the Administrator during 2021. However, it is noted that the total number of serious injuries reported continued to decline while the fleet size has continued to grow.

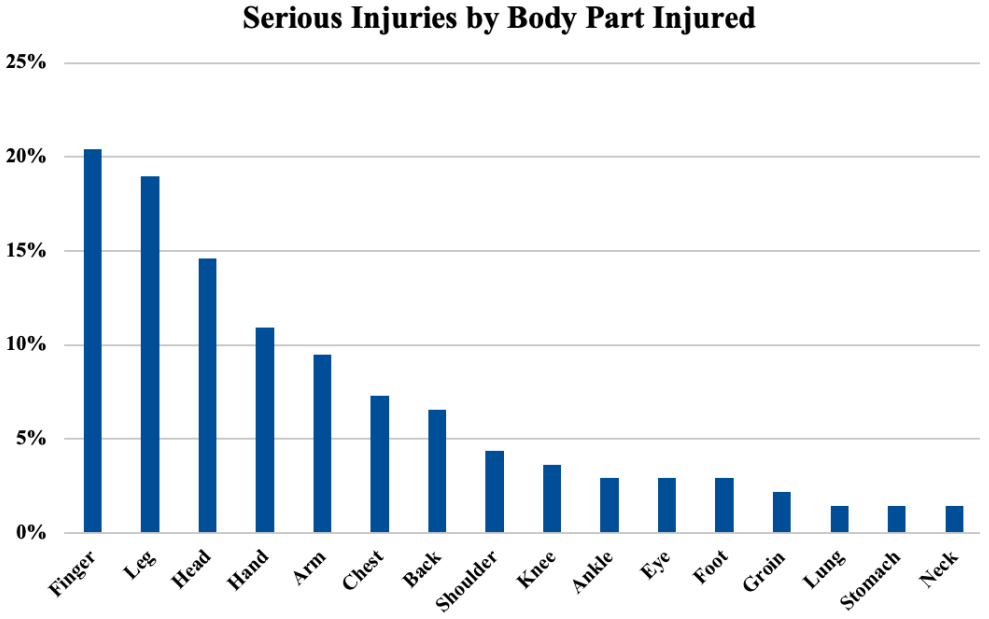


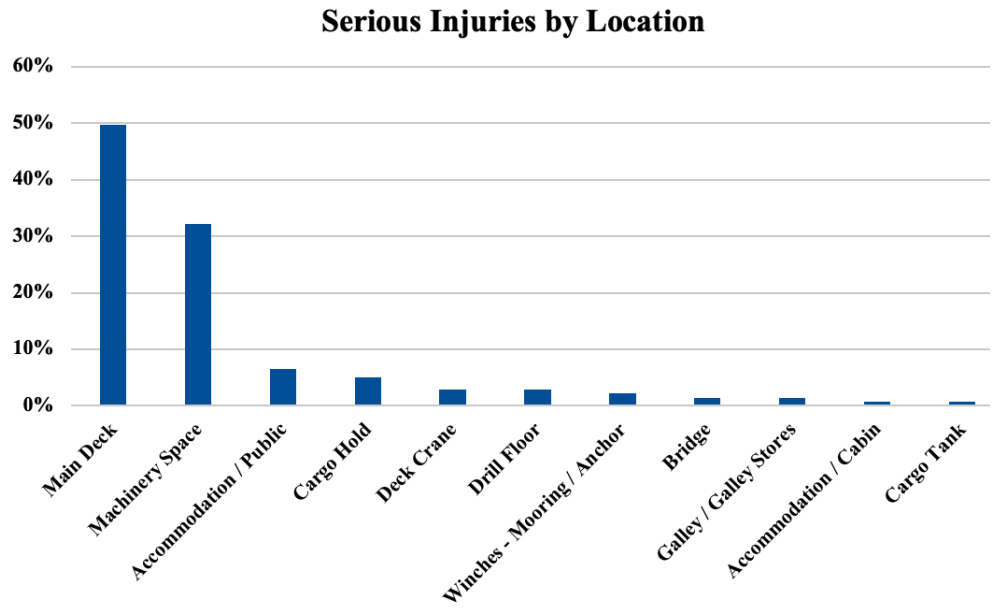
Top Ten Causal Factors of Serious Injuries – 2021

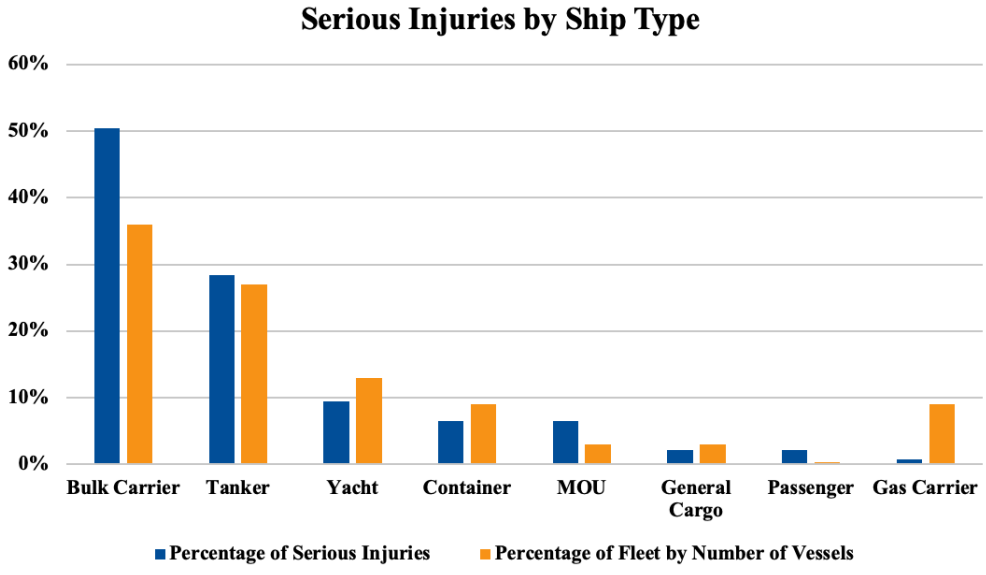
CAUSAL FACTOR	PERCENTAGE OF INCIDENTS[9]
Improper position for the task	50%
Inadequate identification and/or evaluation of loss exposures	42%
Inadequate work planning	38%
Failure to follow rules or regulations	20%
Routine, monotony, or demand for uneventful vigilance	16%
Improper lifting, handling, or storage	15%
Failure to secure	12%
Adverse sea conditions	10%
Inadequate leadership and/or supervision	10%
Failure to use PPE properly	9%

9 Multiple causal factors can be associated with the same incident.


Serious Injuries by Injury Type
25%
20%
15%
10%
5%
0%
Crushed / Pinched
Cut / Abrasion
Slips / Falls - Same level
Struck - Moving Object
Slips / Falls - From height
Slips / Falls - Stairs / Inclined Ladder
Thermal Burn / Scald
Fracture
Chemical Burn
Fall Overboard
Strain / Sprain
Struck - Falling Object
Puncture Wound
Slips / Falls - Gangway
Acute Toxic Exposure

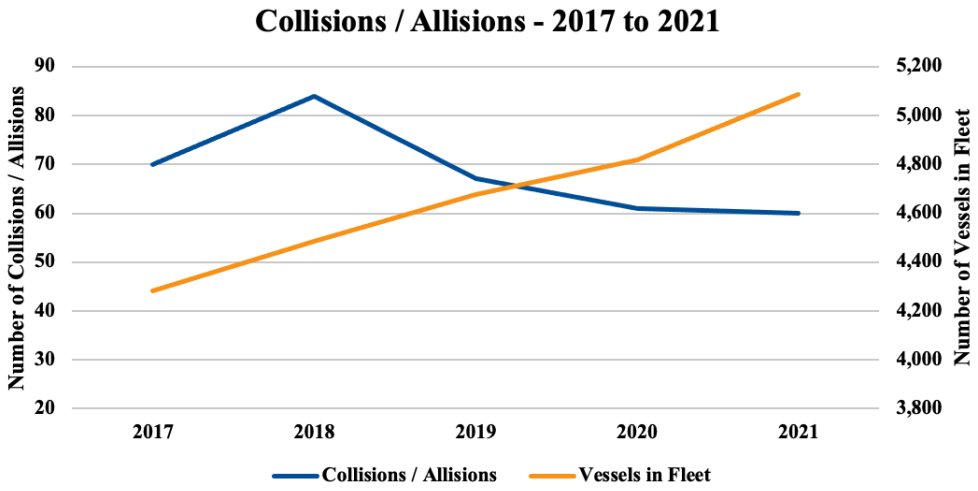

Serious Injuries by Body Part Injured
25%
20%
15%
10%
5%
0%
Finger
Leg
Head
Hand
Arm
Chest
Back
Shoulder
Knee
Ankle
Eye
Foot
Groin
Lung
Stomach
Neck


Serious Injuries by Location
60%
50%
40%
30%
20%
10%
0%
Main Deck
Machinery Space
Accommodation / Public
Cargo Hold
Deck Crane
Drill Floor
Winches - Mooring / Anchor
Bridge
Galley / Galley Stores
Accommodation / Cabin
Cargo Tank


Serious Injuries by Ship Type
60%
50%
40%
30%
20%
10%
0%
Bulk Carrier
Tanker
Yacht
Container
MOU
General Cargo
Passenger
Gas Carrier
Percentage of Serious Injuries
Percentage of Fleet by Number of Vessels

Collisions and Allisions

During 2021, 60 collisions and allisions[10] were reported; 31 of these incidents occurred with a pilot on board. The percentage of collisions and allisions that have occurred with a pilot on board has remained almost the same over the past five years.

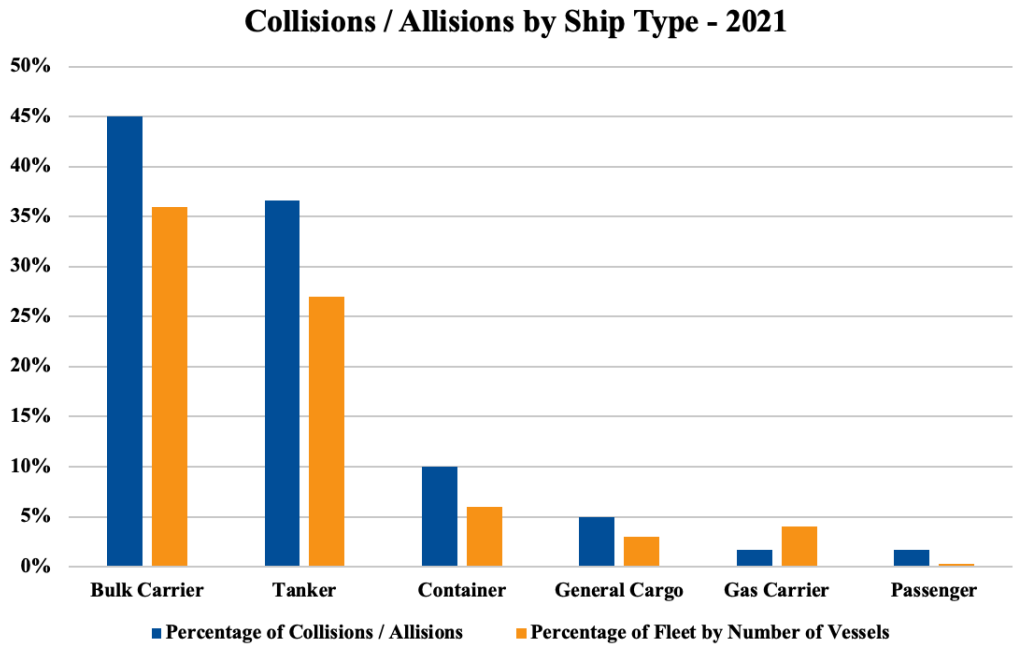


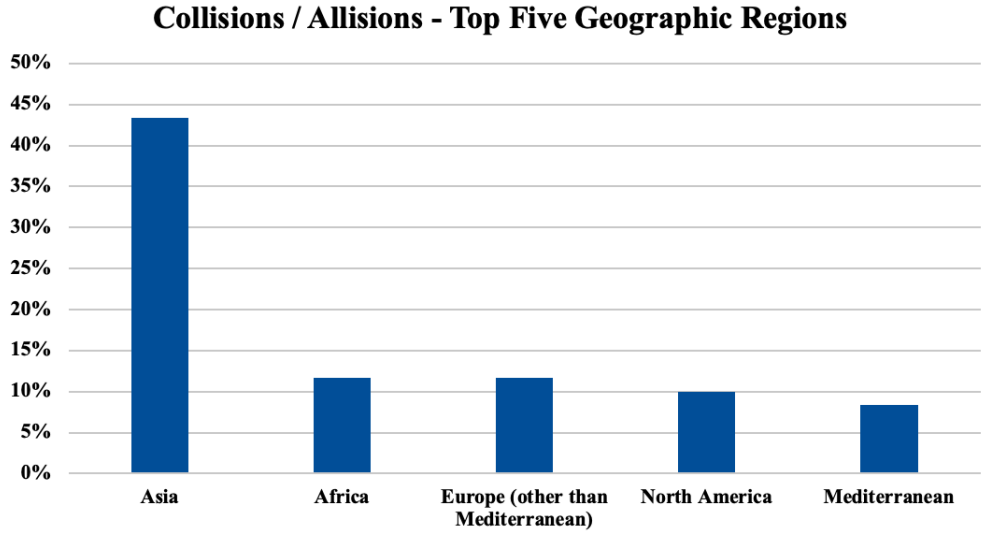
Top Ten Causal Factors of Collisions / Allisions – 2021

CAUSAL FACTOR	PERCENTAGE OF INCIDENTS[11]
Incorrect navigation or ship handling	83%
Inadequate work planning or programming	52%
Inadequate identification and evaluation of loss exposures	47%
Failure to follow rules and regulations	17%
Inadequate or incorrect performance feedback	15%
Congestion or restricted action	10%
Failure to warn	8%
Adverse weather conditions	7%
Adverse sea conditions	7%
Port and berthing facilities	5%

10 These do not include allisions where the RMI-registered vessel was anchored or moored.

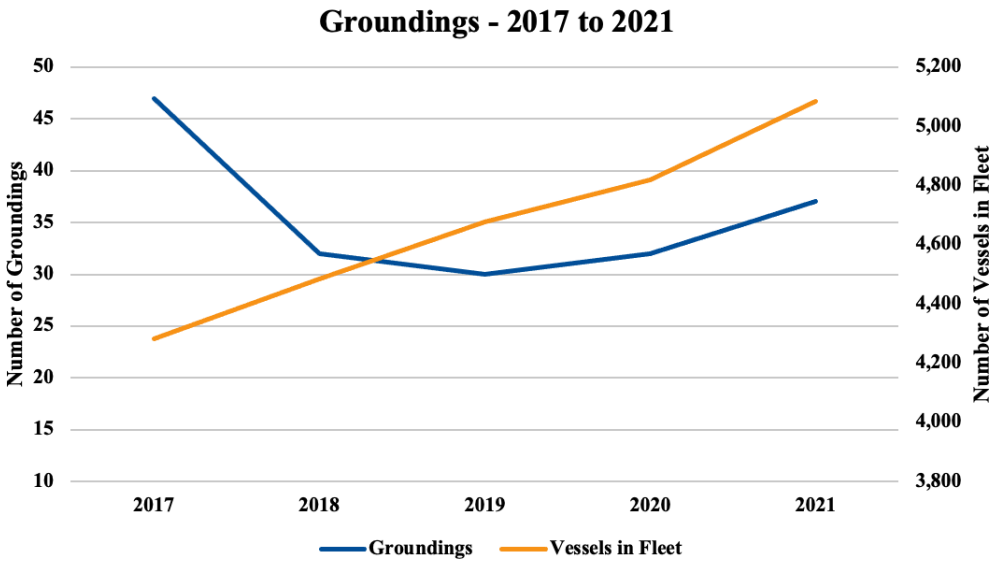
11 Multiple causal factors can be associated with the same incident.


Collisions / Allisions by Ship Type - 2021
50%
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
Bulk Carrier
Tanker
Container
General Cargo
Gas Carrier
Passenger
Percentage of Collisions / Allisions
Percentage of Fleet by Number of Vessels


Collisions / Allisions - Top Five Geographic Regions
50%
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
Asia
Africa
Europe (other than Mediterranean)
North America
Mediterranean

Groundings

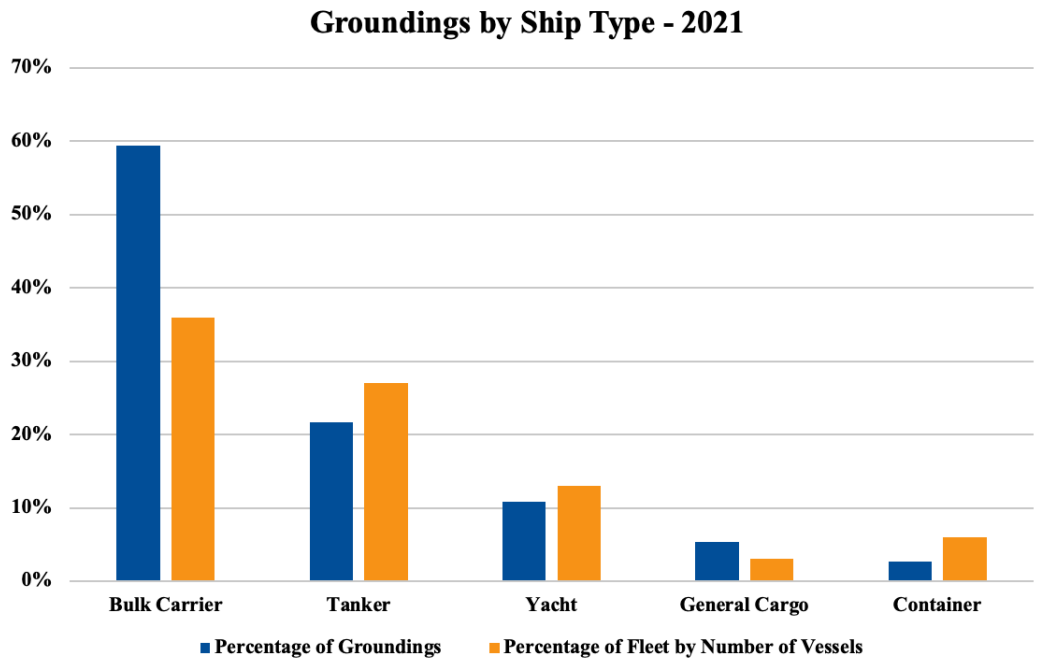
A total of 37 groundings were reported to the Administrator during 2021, with 12 of these occurring with a pilot on board. Two groundings resulted in flooding of the ship and another three resulted in structural damage which rendered the ships unseaworthy.

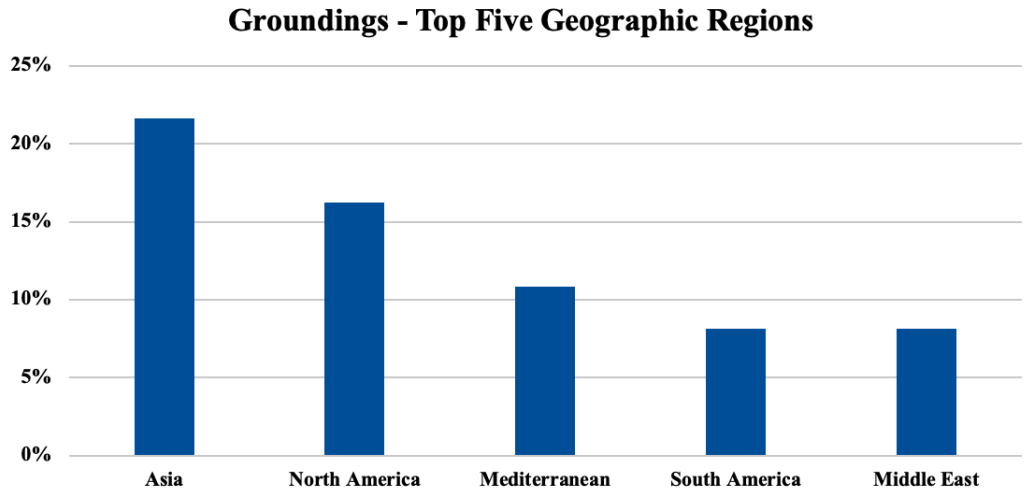


Top Ten Causal Factors of Groundings – 2021

CAUSAL FACTOR	PERCENTAGE OF INCIDENTS[12]
Incorrect navigation or ship handling	49%
Inadequate identification and evaluation of loss exposures	38%
Inadequate work planning or programming	30%
Outdated charts, publications, and other documentation	16%
Adverse weather conditions	14%
Inadequate or incorrect performance feedback	11%
Port and berthing facilities	11%
Adverse sea conditions	8%
Environmental conditions	5%
Confusing / conflicting directions / demands	3%

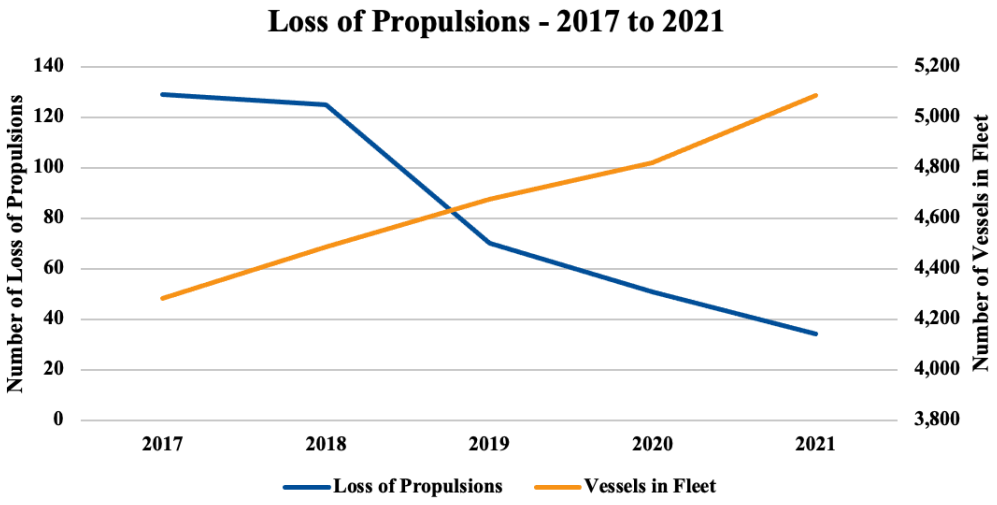
12 Multiple causal factors can be associated with the same incident.


Groundings by Ship Type - 2021
70%
60%
50%
40%
30%
20%
10%
0%
Bulk Carrier
Tanker
Yacht
General Cargo
Container
Percentage of Groundings
Percentage of Fleet by Number of Vessels


Groundings - Top Five Geographic Regions
25%
20%
15%
10%
5%
0%
Asia
North America
Mediterranean
South America
Middle East

Loss of Propulsions

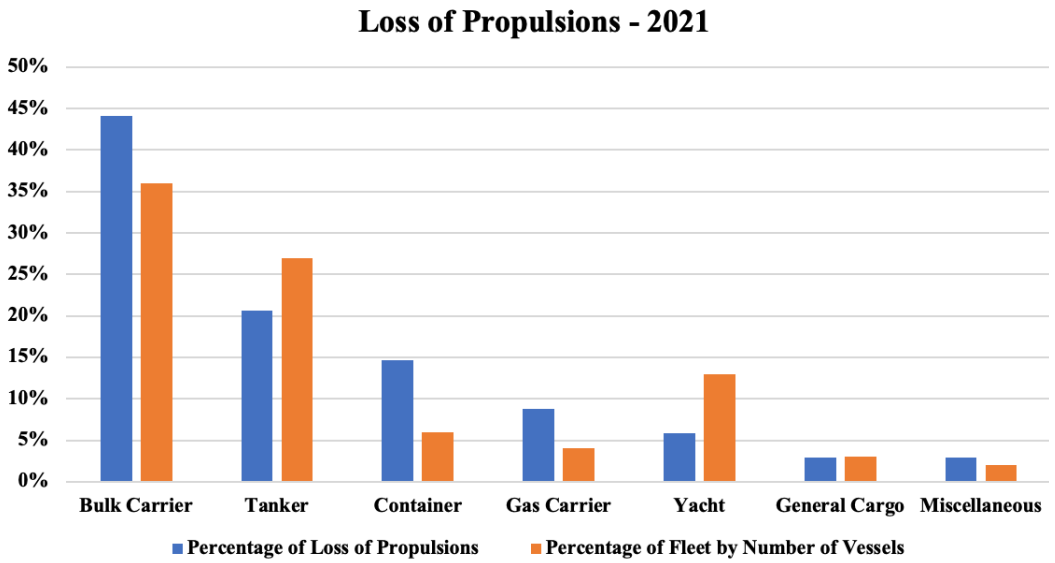
The Administrator received 34 reports of loss of propulsion during 2021, with 16 occurring in coastal seas or port approaches with a pilot on board. The remaining 18 of the loss of propulsions occurred on the high seas. Additionally, nine of the 34 loss of propulsion incidents required towing of the vessel to a repair facility.

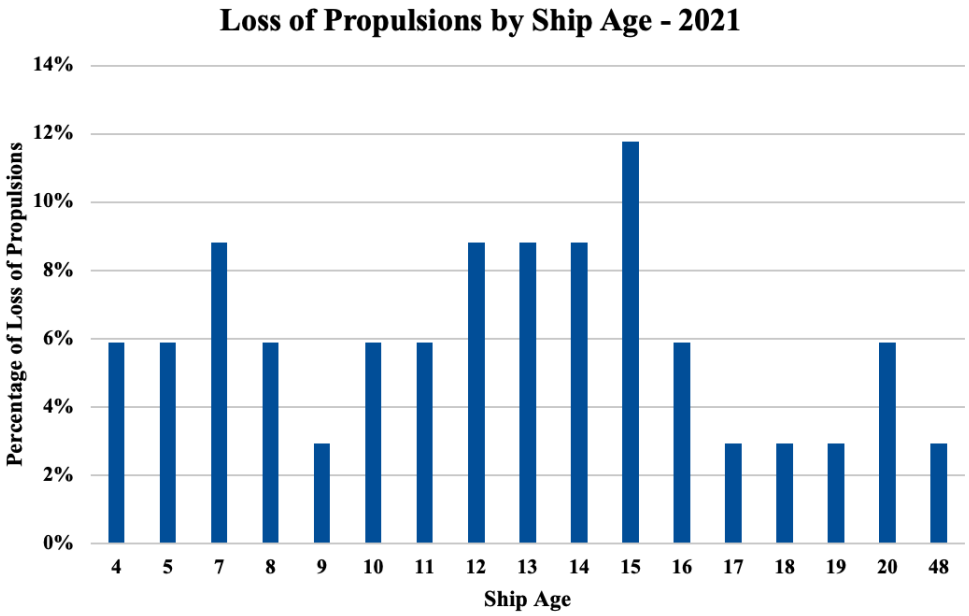


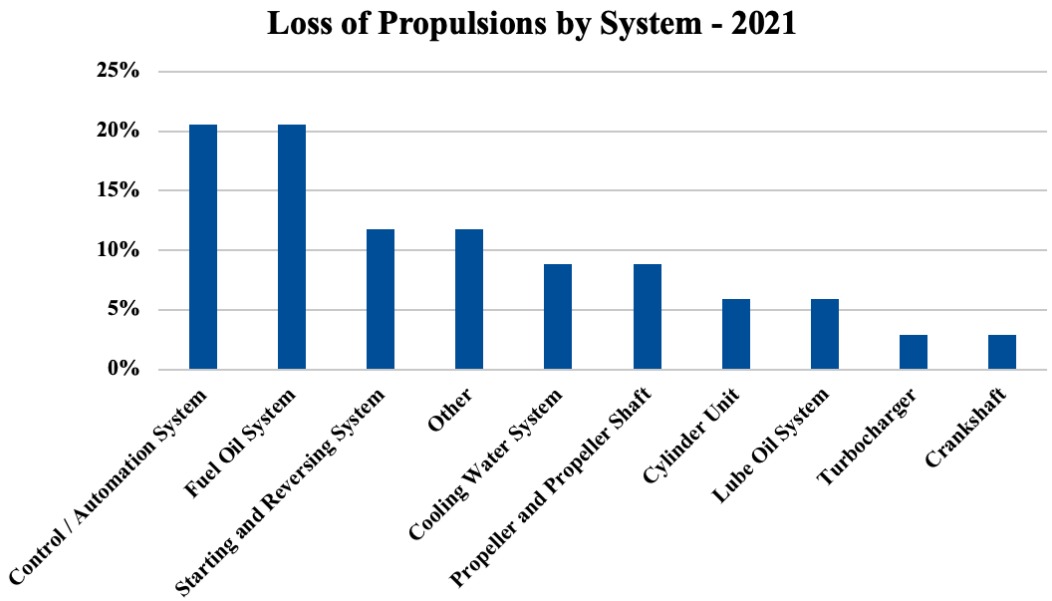
Top Ten Causal Factors of Loss of Propulsions – 2021

CAUSAL FACTOR	PERCENTAGE OF INCIDENTS[13]
Defective equipment, machinery, or tools	55%
Inadequate inspection and/or monitoring	21%
Failure to follow repair / maintenance instructions	18%
Inadequate identification and evaluation of loss exposures	15%
Inadequate maintenance	15%
Inadequate work planning or programming	12%
Inadequate assessment of needs and risks	9%
Using defective equipment or machinery	9%
Failure to follow rules and regulations	6%
Failure to warn	6%

13 Multiple causal factors can be associated with the same incident.

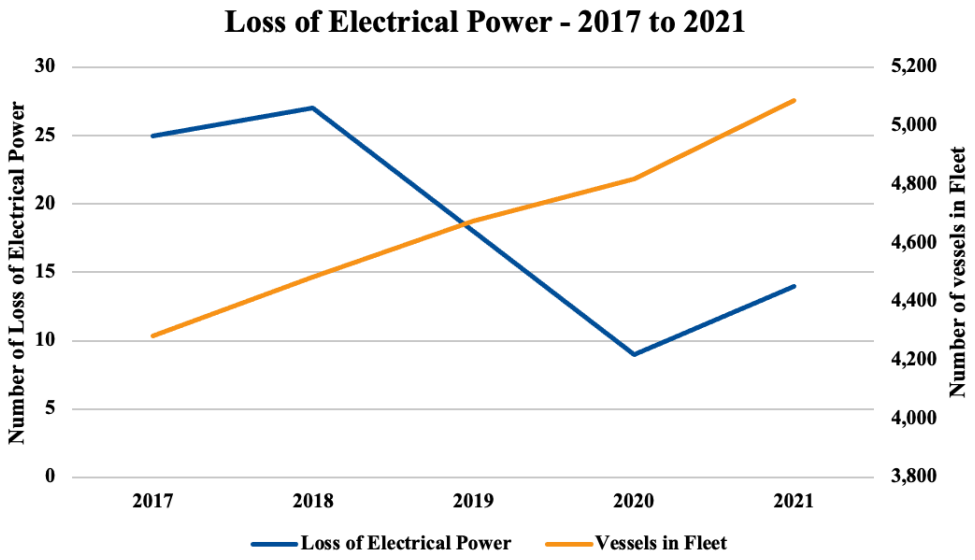

Loss of Propulsions - 2021
50%
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
Bulk Carrier
Tanker
Container
Gas Carrier
Yacht
General Cargo
Miscellaneous
Percentage of Loss of Propulsions
Percentage of Fleet by Number of Vessels


Loss of Propulsions by Ship Age - 2021
14%
12%
10%
8%
6%
4%
2%
0%
Percentage of Loss of Propulsions
4
5
7
8
9
10
11
12
13
14
15
16
17
18
19
20
48
Ship Age



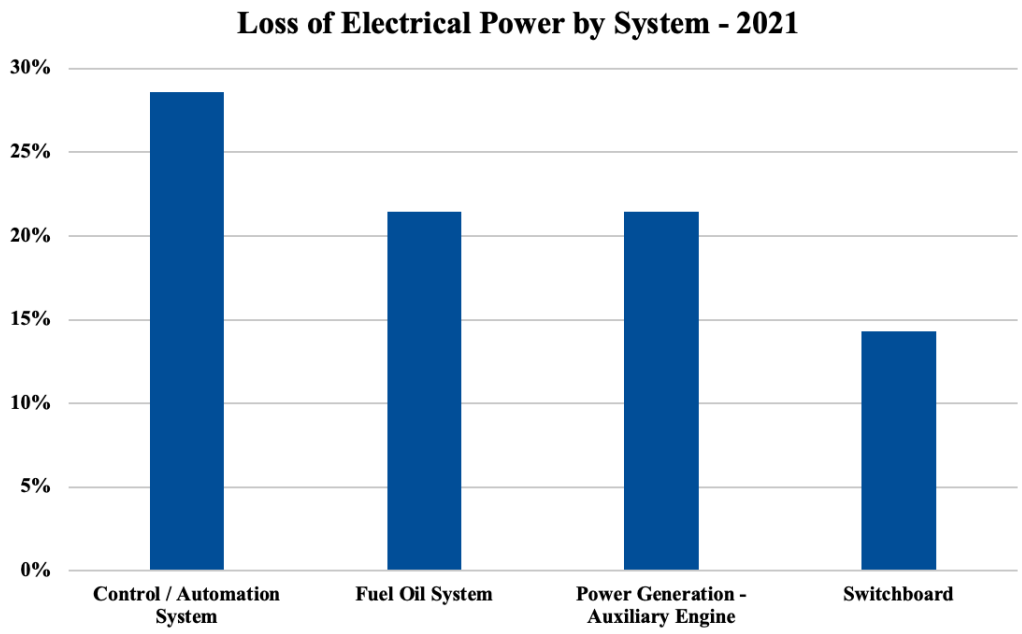
Loss of Electrical Power

The Administrator received 14 reports of loss of electrical power during 2021, with four occurring while a pilot was on board. Eight of the loss of electrical power incidents occurred on the high seas, four occurred in coastal waters or port approaches, and two occurred on MOUs while on station.

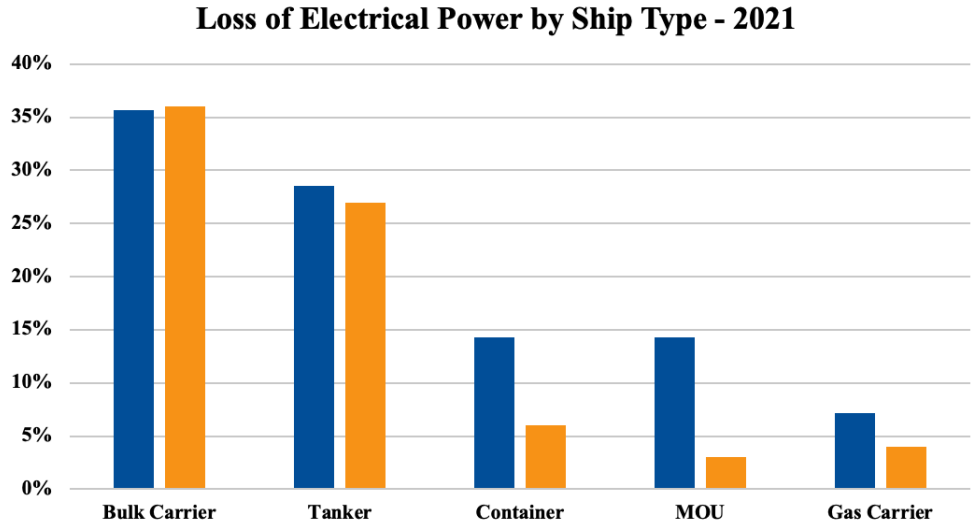


Top Ten Causal Factors of Losses of Electrical Power – 2021

CAUSAL FACTOR	PERCENTAGE OF INCIDENTS[14]
Defective equipment, machinery, or tools	29%
Inadequate identification and evaluation of loss exposures	29%
Inadequate work planning or programming	29%
Inadequate inspection and/or monitoring	21%
Bunkers and/or lube oils	14%
Incorrect use of equipment or machinery	7%
Excessive wear and tear	7%
Failure to follow rules and regulations	7%
Inadequate or incorrect performance feedback	7%
Failure to warn	7%

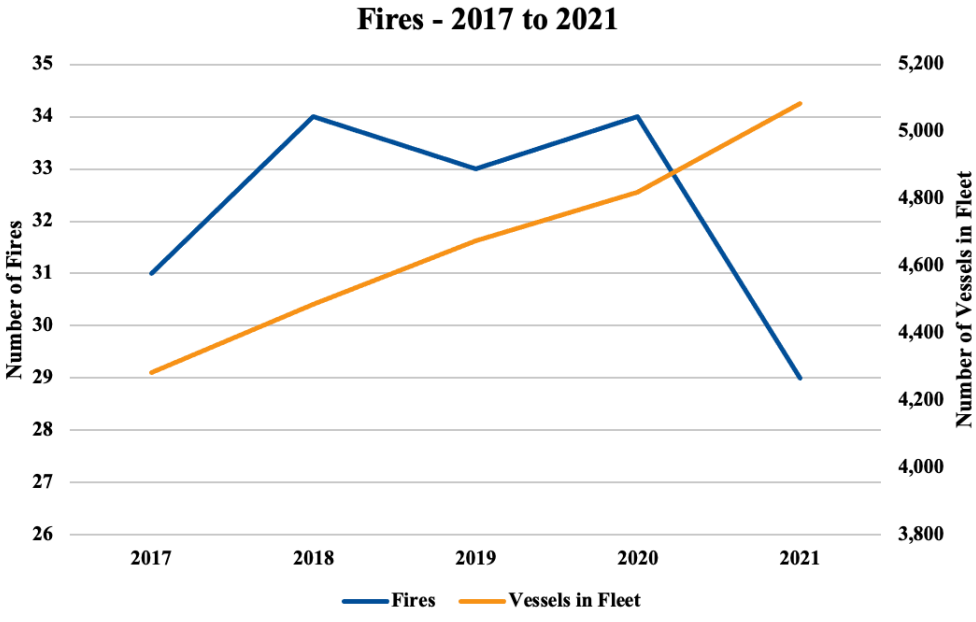


14 Multiple causal factors can be associated with the same incident.



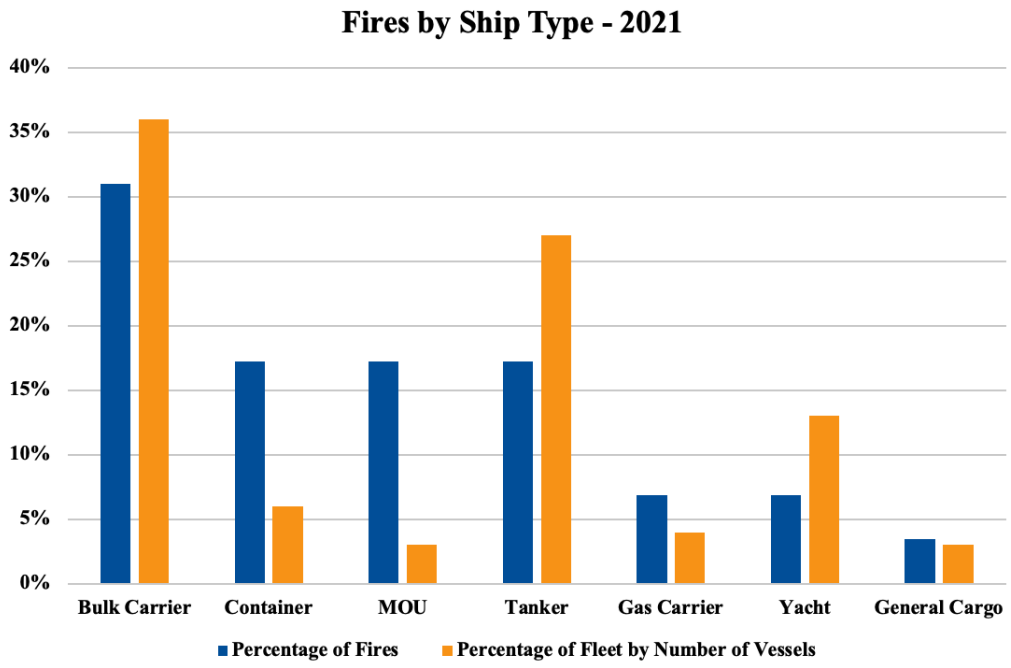
Fires

During 2021, the Administrator received 29 reports of fires occurring aboard RMI-registered vessels.

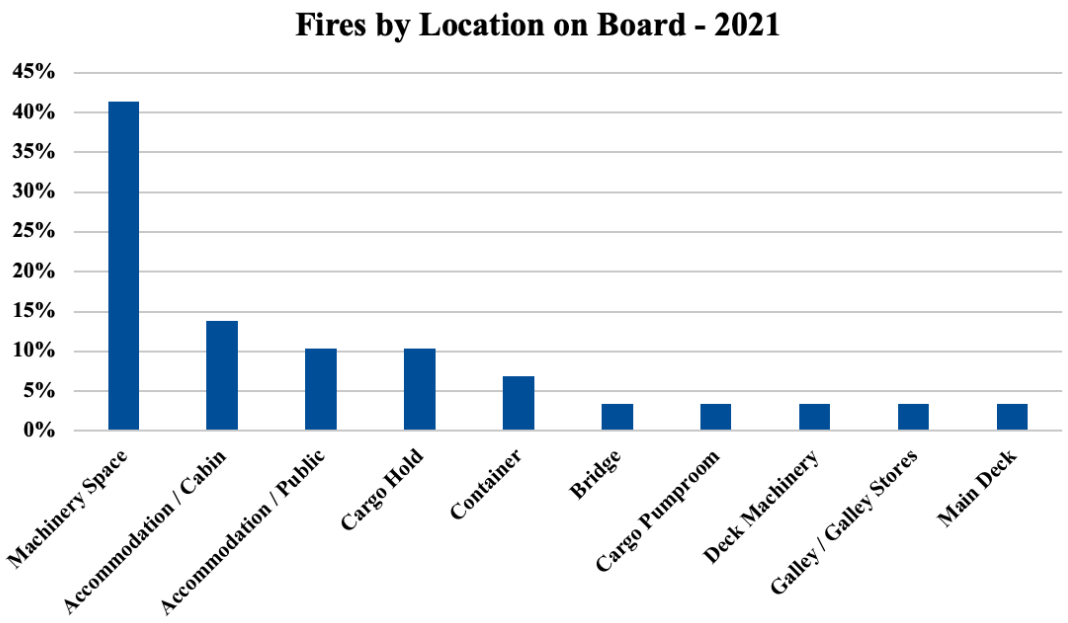


Top Ten Causal Factors of Fires – 2021

CAUSAL FACTOR	PERCENTAGE OF INCIDENTS[15]
Defective equipment, machinery, or tools	48%
Fire and explosion hazards	24%
Inadequate inspection and/or monitoring	17%
Inadequate identification and evaluation of loss exposures (including mis-declared or un-declared cargo)	10%
Inadequate guards or barriers	7%
Routine, monotony, demand for uneventful vigilance	7%
Improper lifting, handling, or storage	7%
Poor housekeeping	7%
Inadequate maintenance	7%
Failure to follow rules and regulations	3%

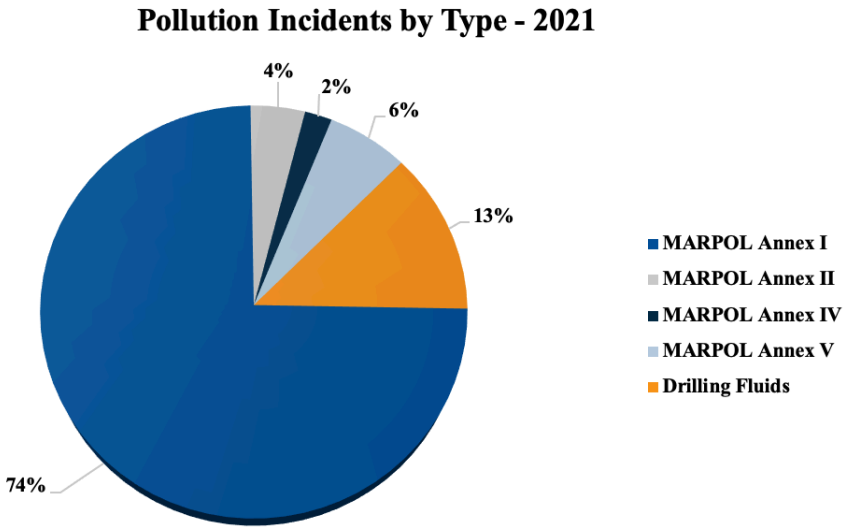


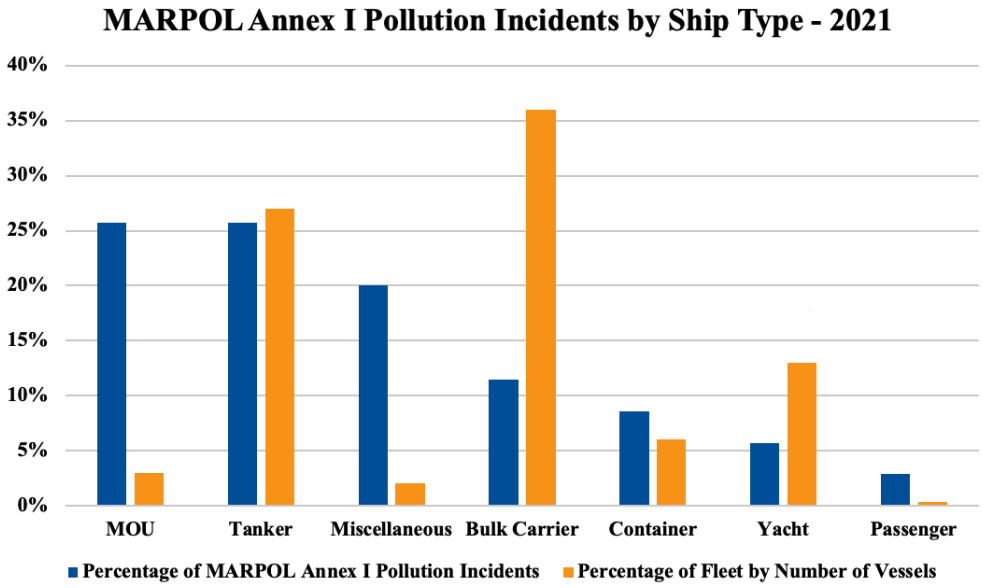
15 Multiple causal factors can be associated with the same incident.



Pollution

The Administrator received 47 reports of pollution during 2021, with four occurring while a pilot was on board. Additionally, the Administrator was notified of 11 spills occurring on deck with no discharge overboard.





Top Ten Causal Factors of Pollution Incidents – 2021

CAUSAL FACTOR	PERCENTAGE OF INCIDENTS[16]
Defective equipment, machinery, or tools	48%
Inadequate work planning or programming	24%
Failure to secure	10%
Inadequate identification and evaluation of loss exposures	17%
Failure to follow rules and regulations	7%
Incorrect use of equipment or machinery	7%
Adverse sea conditions	7%
Adverse weather conditions	7%
Inadequate leadership and/or supervision	7%
Inadequate guards or barriers	3%

16 Multiple causal factors can be associated with the same incident.

Top Ten Causal Factors of Spills on Deck – 2021

CAUSAL FACTOR	PERCENTAGE OF INCIDENTS[17]
Defective equipment, machinery, or tools	46%
Failure to follow rules and regulations	27%
Inadequate inspection and/or monitoring	27%
Inadequate identification and evaluation of loss exposures	18%
Inadequate work planning or programming	18%
Inadequate leadership and/or supervision	18%
Inadequate guards or barriers	18%
Inadequate maintenance	18%
Giving inadequate policy, procedure, practices, or guidelines	9%
Failure to secure	9%

17 Multiple causal factors can be associated with the same incident.

Appendix 3: Most Common Marine Casualties by Ship Type

This table lists, by ship type, the three most common incident types for all reports made to the Administrator in 2021.

Ship Type	First	Second	Third
Bulk Carrier	Serious Injury	Collision / Allision	Grounding
Tanker	Serious Injury	Collision / Allision	Pollution
Container	Serious Injury	Collision / Allision	Fire
OSV	Flooding	Loss of Steering	Loss of Critical Ground Tackle
Gas Carrier	Loss of Propulsion	Fire	Loss of Electrical Power
General Cargo	Collision / Allision	Serious Injury	Grounding
MOU	Pollution	Serious Injury	Fire
Miscellaneous	Pollution	Loss of Propulsion	N/A
Passenger	Serious Injury	Collision / Allision	Pollution
Yacht	Serious Injury	Grounding	Loss of Propulsion