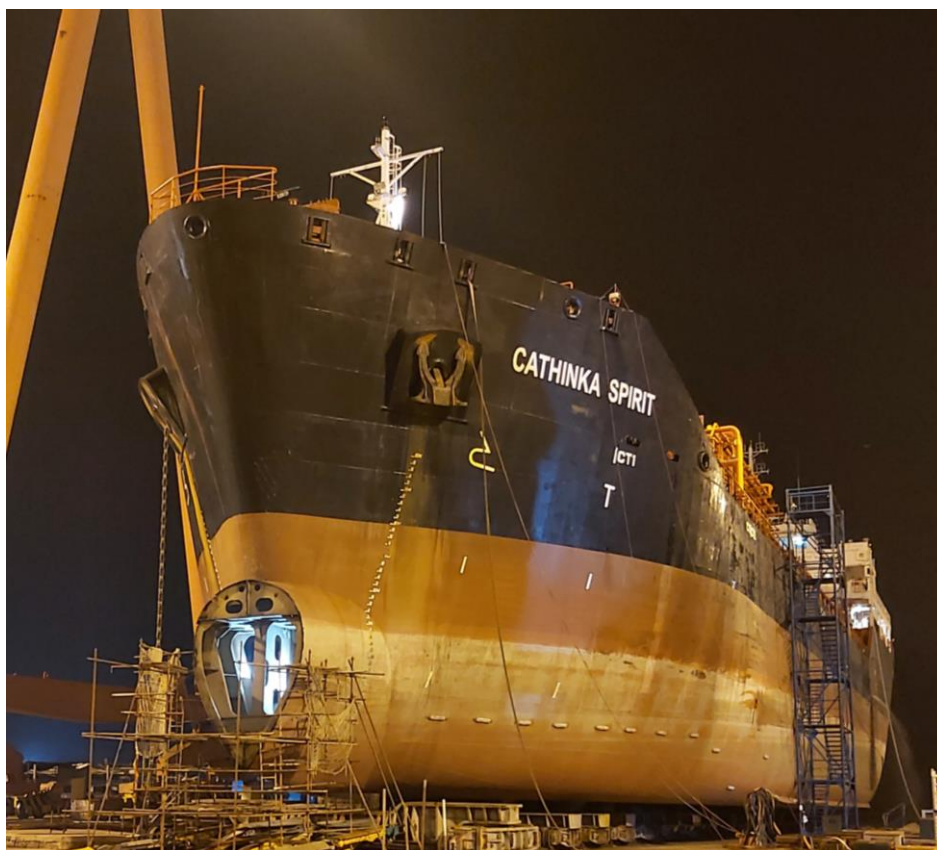




**The Bahamas
Maritime Authority**

THE COMMONWEALTH OF THE BAHAMAS

Cathinka Spirit v Zhe Ling Yu Yun 60007



**Report on the collision between the LPG/chemical tanker
Cathinka Spirit and the fish transportation vessel Zhe Ling
Yu Yun 60007 on 24 December 2019**

The Bahamas conducts marine safety or other investigations on ships flying the flag of the Commonwealth of the Bahamas in accordance with the obligations set forth in International Conventions to which The Bahamas is a Party. In accordance with the IMO Casualty Investigation Code, mandated by the International Convention for the Safety of Life at Sea (SOLAS) Regulation XI-1/6, investigations have the objective of preventing marine casualties and marine incidents in the future and do not seek to apportion blame or determine liability.

It should be noted that the Bahamas Merchant Shipping Act, Para 170 (2) requires officers of a ship involved in an accident to answer an Inspector's questions fully and truly. If the contents of a report were subsequently submitted as evidence in court proceedings relating to an accident this could offend the principle that a person cannot be required to give evidence against themselves. The Bahamas Maritime Authority makes this report available to any interested individuals, organizations, agencies or States on the strict understanding that it will not be used as evidence in any legal proceedings anywhere in the world. You must re-use it accurately and not in a misleading context. Any material used must contain the title of the source publication and where we have identified any third-party copyright material you will need to obtain permission from the copyright holders concerned.

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1 GLOSSARY

AB	Able-bodied seafarer
AIS	Automatic identification system
ARPA	Automatic radar plotting aid
BMA	The Bahamas Maritime Authority
Cable	Unit of distance: 0.1 NM / 185.2m
COLREGS	International Regulations for Preventing Collisions at Sea 1972 (as amended)
CPA	Closest point of approach
ECDIS	Electronic chart display and information system
ISM	International Safety Management
LPG	Liquid petroleum gas
m	meters
mm	millimetres
MSA	Maritime Safety Administration (People's Republic of China)
NM	Nautical miles (1852m)
OOW	Officer of the Watch
TCPA	Time until closest point of approach
UTC	Universal Time Co-ordinated
VDR	Voyage Data Recorder
VRM	Variable range marker

All times noted in the report are given as local time (UTC +9).

2 SUMMARY

At 23:49 on 24 December 2019, the Bahamas flagged LPG/chemical tanker Cathinka Spirit collided with the Chinese flagged fish transportation vessel Zhe Ling Yu Yun 60007. The collision occurred in the Yellow Sea, approximately 130NM from land.

Cathinka Spirit sustained minor damage to its bulbous bow, but Zhe Ling Yu Yun 60007 sank approximately one hour after the collision. All 17 crew were rescued by Cathinka Spirit and Hai Xing 215, a fishing vessel which was in the vicinity at the time of the incident.

The collision occurred in open water and in relatively low traffic density. Having been on a steady bearing and closing range, Cathinka Spirit and Zhe Ling Yu Yun 60007 turned towards each other, at about the same time, when less than half a mile apart.

As the give way vessel, Zhe Ling Yu Yun 60007, did not take action to avoid collision in good time. As the stand on vessel, Cathinka Spirit did not take appropriate action once the collision could not be avoided by the action of Zhe Ling Yu Yun 60007 alone.

Several hours of navigation through dense fishing fleets may have normalised the Cathinka Spirit's Officer of the Watch (OOV) to non-compliance with the minimum closest point of approach limits documented in the vessel's safety management system and Master's standing orders and increased his threshold for acceptable collision risk.

Whilst the collision occurred in relatively open water, Cathinka Spirit's Master or OOV did not consider amending the voyage plan or reducing speed when heavy traffic was experienced earlier in the watch, indicating that risk perception remains low despite the high frequency of similar incidents in the area, many leading to loss of life.

3 DETAILS OF VESSELS INVOLVED

Cathinka Spirit

Cathinka Spirit is an LPG/chemical tanker which has been registered under the flag of The Commonwealth of The Bahamas since 2018. The vessel is beneficially owned by the Teekay Corporation. Technical and safety management is performed by OSM Tanker Management Pte Ltd.



Figure 1: Cathinka Spirit (source: vesselfinder.com)

At the time of the incident, the vessel complied with all statutory and international requirements and certification. The Company's safety management system had been audited by DNV GL. The vessel has the following principal particulars:

Call sign	C6YA4
IMO number	9370654
MMSI number	311021900
Built	Taizhou, China, 2008
Length overall	109.39 metres
Breadth	20.99 metres
Depth moulded	11.3 metres
Propulsion power	2500 kW
Gross registered tonnage	8331
Class Notation (DNV GL)	✱100 A5 Chemical tanker Type 2 Liquefied gas tanker Type-2G BWM ERS ESP IW MC AUT Inert RI

Cathinka Spirit's crew

The Cathinka Spirit had a crew of 17, including the Master and three deck officers. The bridge was manned using standard four hour watches with an AB designated to each watch. At the time of the collision, the Third Officer was on watch with a duty AB as lookout.

	Master	Third Officer	Duty AB
Qualification	Master STCW II/2	OOW STCW II/2	Deck Rating STCW II/4
Certification Authority	Latvia	Russia	China
Nationality	Latvian	Russian	Chinese
Time in rank	13 years	17 months	3 years
Time onboard	2 months	2 days	3 months

It was verified that all the crew met the statutory hours of rest requirements at the time of the collision¹.

Shortly after the collision, the Master ordered alcohol breathalyser testing of Cathinka Spirit's bridge team, the remainder of the crew were breathalysed within two hours. All tests returned negative results.

Zhe Ling Yu Yun 60007

Zhe Ling Yu Yun 60007 (Zhe Ling Yu hereafter) was a Chinese flagged fish transportation vessel with a crew of 17. It was used to land fish from fishing vessels, which could then remain at sea. There are limited details of the vessel and crew certification available.



Figure 2: Zhe Ling Yu Yun 60007 (source: MSA)

¹ The Third Officer joined the vessel two days prior to the collision where he had two nights in a hotel

MMSI number	421356778
Built	China, 2006
Length overall	43.1 metres
Breadth	7.6 metres
Depth	4 metres
Propulsion power	400 kW
Gross tonnage	359

At the time of the collision, the Master was alone on the bridge.

After the collision, the Cathinka Spirit's Master ordered alcohol breathalyser testing of the 12 crew recovered to Cathinka Spirit. One test produced a positive result but, due to incomplete record-keeping, it is unclear if this was relevant to the circumstances of the collision.

Environmental Conditions

The collision occurred at 23:49 on 24 December 2019, in approximate position 33°54'N 123°26'E. This was during the hours of darkness and several hours before moonrise. The visibility was good, with a moderate breeze from the north.

Regulations

International Regulations for Preventing Collisions at Sea (COLREGS) Rules 2, 5, 6, 8, 15, 16, 17 and 34 of the COLREGS are particularly relevant.

4 NARRATIVE

Zhe Ling Yu departed its home port of Wenling, China, on the night of 20 December 2019, bound for fishing grounds in the Yellow Sea to load directly from fishing vessels. On the evening of 24 December 2019, Zhe Ling Yu departed the fishing grounds carrying 12,000 crates of fish products for discharge at Shidao Port, Shangdong Province.

Cathinka Spirit was on passage from Yeosu, South Korea, to Qingdao, China, loaded with a cargo of 2,900 tonnes of ethylene.

On 23 December 2019, whilst alongside at Yeosu, a new Third Officer joined the vessel. He was provided with a brief handover from the outgoing Third Officer, bridge equipment familiarisation from the Second Officer and he signed the Master's standing orders prior to sailing. Cathinka Spirit departed Yeosu at around 00:25 on 24 December 2019.

The Third Officer kept watch by himself during the 08:00-12:00 watch, which passed without remark. For the 20:00-24:00 watch, the Third Officer was joined by a duty AB as lookout. Due to the density of fishing vessel traffic, the Master was also on the bridge from approximately 20:30- 23:00.

Having cleared the dense fishing fleets at around 23:00, Cathinka Spirit's lookout identified Zhe Ling Yu at approximately 23:19 and reported it as a "fishing vessel²". The OOW acquired it as an ARPA target on the X-band radar two minutes later. The Master of the Zhe Ling Yu reports he sighted the Cathinka Spirit at around 23:30.

² The bridge team reported the Zhe Ling Yu was displaying the navigation lights of a power driven vessel but both were under the impression it was a fishing vessel until after the collision.

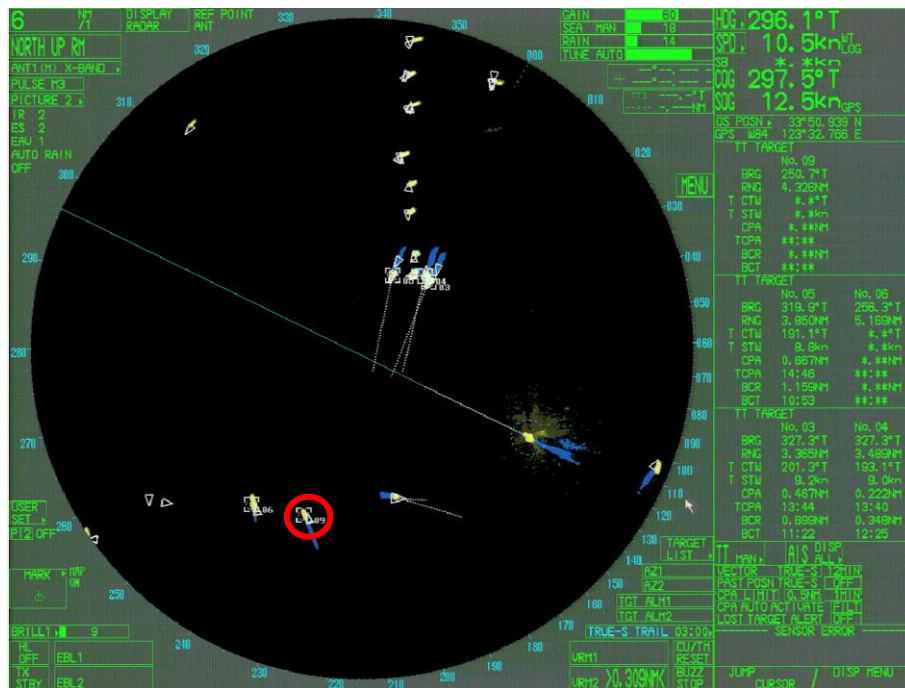


Figure 3: Cathinka Spirit X-band radar, 23:21. Zhe Ling Yu (target 09) is circled in red.

Approximately three minutes before CPA, Cathinka Spirit attempted to attract the attention of Zhe Ling Yu using an Aldis lamp but the two vessels, on a steady bearing and closing range, maintained their course and speed until they were less than 0.5NM apart.

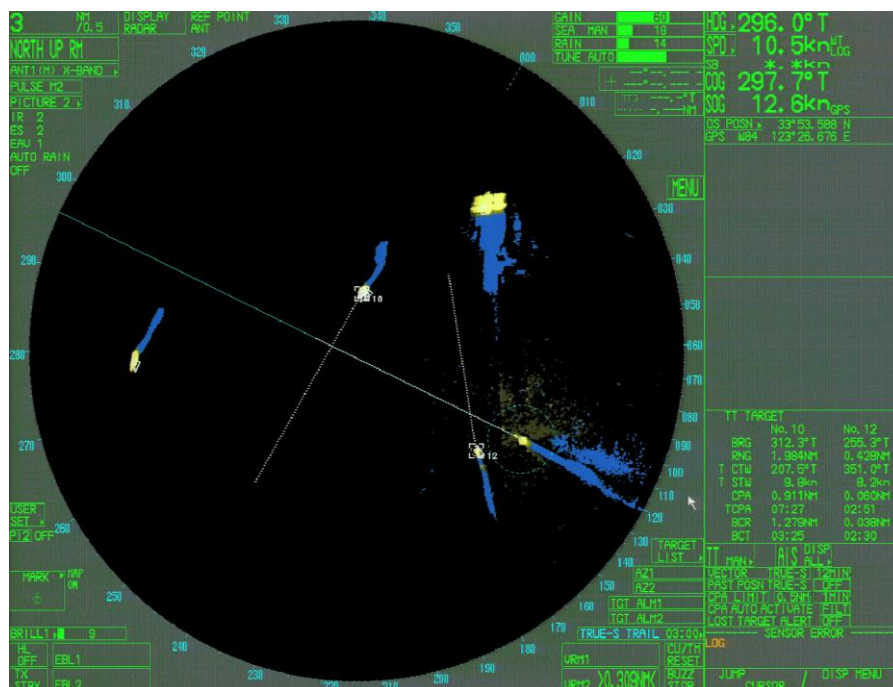


Figure 4: Cathinka Spirit X-band radar, 23:48. Zhe Ling Yu (target 12).

Note: VRM is set to 0.309NM

At this point, Cathinka Spirit's OOW took control of manual steering and altered course to port using 15° port helm. At about the same time, Zhe Ling Yu made a bold

alteration of course to starboard³. Neither vessel used sound signals prior to their alteration but Cathinka Spirit sounded two short blasts when it became apparent that Zhe Ling Yu was also taking action.

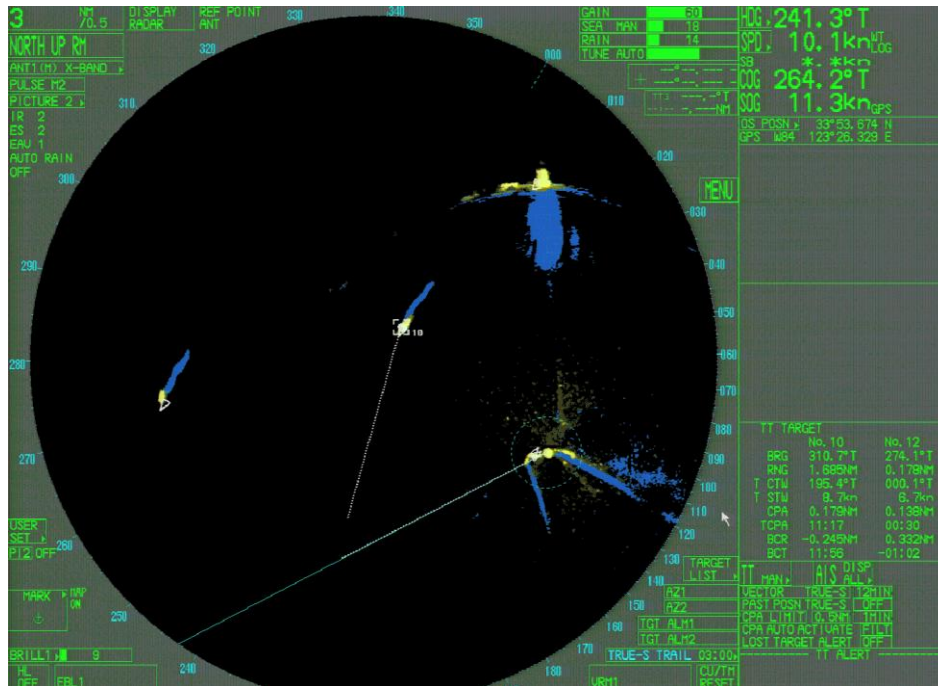


Figure 5: Cathinka Spirit X-band radar, moments before impact

The vessels collided with a closing speed of approximately 15 knots, Cathinka Spirit's bow impacting Zhe Ling Yu on the port side, just forward of midships with a 45° angle of blow.

Having heard the sound signal and felt the impact, Cathinka Spirit's Master and Chief Officer arrived on the bridge within 30 seconds of the collision. The engines were stopped, deck lights illuminated and an announcement made on the public address. Cathinka Spirit's Master directed the crew to prepare lifesaving equipment, boarding arrangements and launch the rescue boat to help recover the crew of the Zhe Ling Yu who had launched, and were in the process of boarding a liferaft.

Twelve of the Zhe Ling Yu's crew, who had boarded the liferaft, were recovered by the Cathinka Spirit. The remaining five crew could not launch the vessel's second liferaft and were recovered by Hai Xing 215, a fishing vessel.

Zhe Ling Yu sank approximately an hour after the collision. Cathinka Spirit sustained minor damage to its bulbous bow and, after waiting for instructions from the vessel's managers and China MSA, resumed passage to Qingdao.

³ Cathinka Spirit's lookout reported the change of aspect as red and green light visible, then red light visible, shortly before impact.

5 ANALYSIS

Both vessels were aware of the presence of the other and that risk of collision existed. It is not clear why, as the give way vessel, the Master of Zhe Ling Yu did not take avoiding action in ample time.

Closest point of approach limits

Cathinka Spirit's OOW had "*no feeling of risk*" about the developing situation and felt he did not need to call the Master despite the closest point of approach (CPA) being zero. He remained "*comfortable*" until three minutes before the anticipated collision but did not call the Master and did not take action for another two minutes.

OSM established limits for minimum CPA and time until closest point of approach (TCPA) as part of its safety management system. These limits were reinforced in the Master's standing orders (enhanced with a specific limit for fishing vessels).

Situation	Vessels \leq 100,000 DWT		Vessels \geq 100,001 DWT		Actions by OOW
	Minimum CPA	Minimum TCPA	Minimum CPA	Minimum TCPA	
Open Sea	2.0 nm	15 minutes	2.0 nm	15 minutes	Inform Master
Coastal Waters	1.0 nm	15 minutes	1.5 nm	15 minutes	Inform Master
Restricted Waters	0.5 nm	15 minutes	1.0 nm	15 minutes	Inform Master
Overtaking Situations	0.5 nm	15 minutes	1.0 nm	15 minutes	Inform Master

Figure 6: Extract from OSM's safety management system

AVOIDING COLLISION

The OOW must always strictly comply with the COLREGS.

The OOW shall keep, as a minimum, the following safe CPA:

- In open sea, 2 miles for ocean going vessels.
- In straits, 1 mile for ocean going vessels.
- 0.5 miles for fishing vessels.
- All above, considering good visibility. In case of reduced visibility the CPA shall be increased.

Figure 7: Extract from Master's Standing Orders

These limits were not reflected in the alarm settings on the X-band radar or demonstrated by the actions taken by the OOW.

During the watch on which the collision occurred, Cathinka Spirit spent nearly two hours navigating through dense traffic with the Master on the bridge. At times there were over 100 AIS targets registered on the radar's 3-mile scale, a mixture of moving and stationary targets.

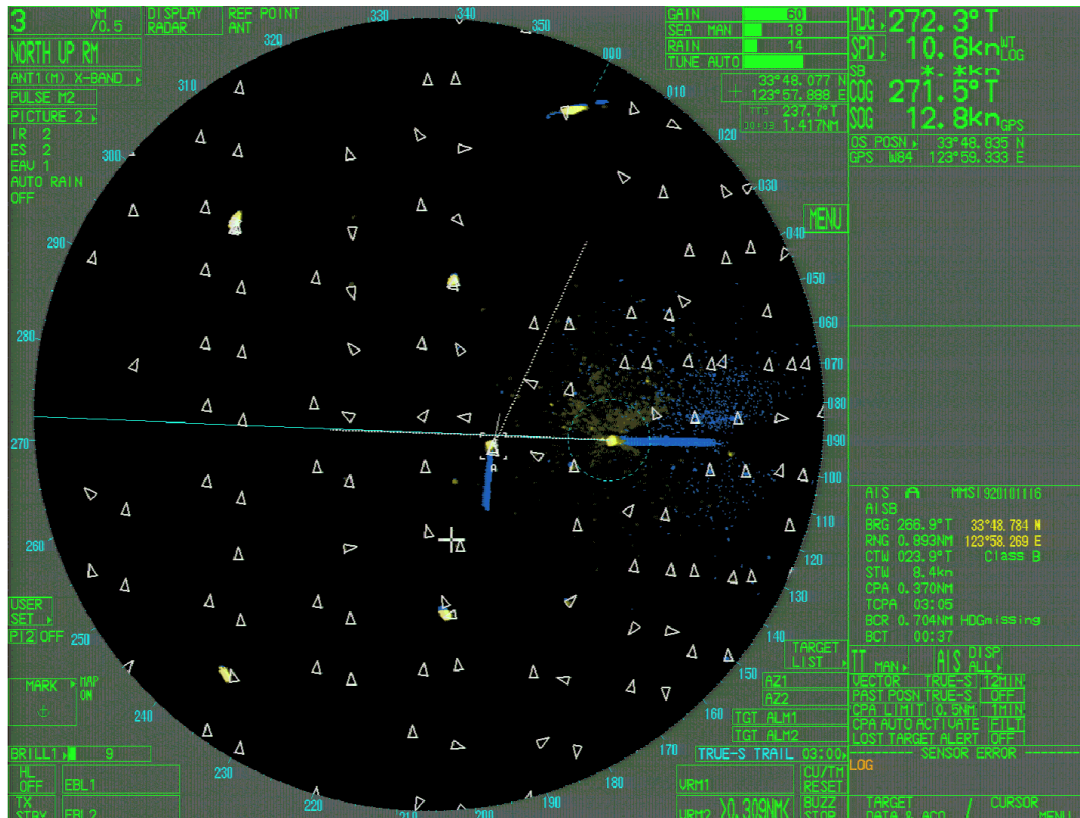


Figure 8: Cathinka Spirit radar, 21:33

During this period, there were four violations of the “ocean going vessels” 1.0NM CPA limit and 61 violations of the 0.5NM “fishing vessel” CPA limit. The vessel’s speed was not adjusted at any time.

Close quarters navigation through these fishing fleets with the Master on the bridge may have normalised the Cathinka Spirit’s OOW to non-compliance with the minimum CPA limits documented in the SMS and MSO and increased his threshold for acceptable collision risk.

The bridge team’s incorrect identification of Zhe Ling Yu as a “fishing vessel” may have also skewed their mental model of the developing situation, and the risk of collision.

Action to avoid collision

Zhe Ling Yu did not take avoiding action in ample time.

Cathinka Spirit’s OOW took action to avoid collision only when he felt that Zhe Ling Yu was not going to take any action at all. His alteration of course towards the give way vessel was contrary to COLREGS Rule 17, which was re-stated in the Master’s Standing Orders:

Special attention should be paid to the following points:

- In general, early and positive action should always be taken when avoiding collisions and, once action has been taken, the OOW should always check to make sure that the action taken is having the desired effect.
- In a crossing situation, a vessel shall, if the circumstances of the case admit, not alter course to port for a vessel on her own port side.
- **VHF radio should not be used for collision avoidance purposes.** Valuable time can be wasted attempting to make contact since positive identification may be difficult and, once contact has been made, misunderstandings may arise.
- **Engine is always at disposal of the OOW, in case of necessity.**
- **Attempts to avoid collision by communicating using AIS equipment should be avoided.** Accident investigations have shown that such attempts waste time, distract the attention of the OOW and often fail to establish effective communication.

Figure 9: Extract from Master's Standing Orders

The OOW stated⁴ that there were a significant number of drift nets spotted to starboard when he became aware that he needed to take action to avoid collision. Regardless of the consequences of passing through such nets, there were no navigational constraints that prevented Cathinka Spirit from reducing speed or altering course to starboard in ample time.

Sound Signals

Whilst Cathinka Spirit attempted to attract the attention of Zhe Ling Yu with an Aldis lamp, no use was made of suitable sound signals until five seconds before the collision when Cathinka Spirit sounded two short blasts. Whilst the signal made was correct, it was too late to be of any benefit as both vessels had executed their manoeuvre by this time. Cathinka Spirit's alteration to port would not have been anticipated by Zhe Ling Yu.

Watchkeeper experience

The collision occurred during Cathinka Spirit's OOW first night watch since joining the vessel. Whilst new to Cathinka Spirit, his previous voyage had been on a sister ship, fitted with the same navigational equipment and sailing in the same region. He had also sailed with the same Master. He demonstrated he was familiar with the function of all equipment.

Navigational Audits

The vessel's SMS includes provision for the completion of "bridge navigational audits". Audits are conducted by the Master against a standardised six page checklist. Whilst the checklist includes sections that cover competency of deck officers and compliance with COLREGS and procedures, there is no verification process such as review of VDR data or external assessment of the function of the bridge team.

⁴ This was corroborated by the lookout

Previous Casualties

There have been multiple similar incidents in the region, many leading to loss of life. A study, conducted by Huatai Insurance Agency and Consultant Service Ltd and published by Gard⁵, identified that there were 268 incidents involving fishing vessels in Chinese waters, resulting in 562 deaths in the period 2006 - 2011.

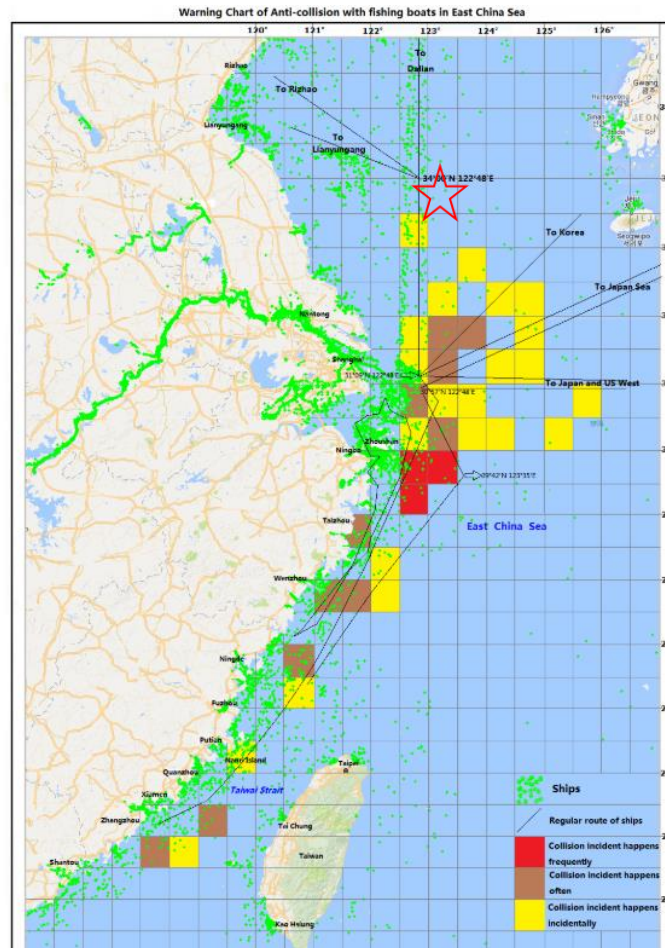


Figure 8: Collision density. Location of the collision marked “★”

Several similar incidents have been investigated and reported under the IMO Casualty Investigation Code:

- September 2018 - Polar Spirit v Zhe Xiang Yu 41020 (Bahamas)
- March 2018 - APL Southampton v Zhe Ling Yu 52035 (Singapore)
- May 2016 - Catalina v Lu Rong Yu 58398 (Malta)
- March 2011 - Cosco Hong Kong v Zhe Ling Yu Yung 135 (UK)
- Feb 2011 - Xin Zhang Zhou v Liao Wa Yu 75060 (China)

Amongst other root causes, common navigational issues in these cases are a failure to adjust passage plans to avoid areas of high density fishing traffic, failure to reduce speed in high density traffic areas and action to avoid collision being inappropriate, taken too late, with too small a margin for error or a combination of the three.

⁵ Protection and Indemnity Club

6 CONCLUSIONS

The collision occurred in relatively open waters during Cathinka Spirit's OOW's first night watch since joining the vessel.

Cathinka Spirit's Master had been providing navigation assistance whilst the vessel passed through dense fishing traffic and had left the bridge approximately 45 minutes prior to the collision.

The Master's guidance on minimum passing distance was definitive but was not followed when the Master was on the bridge in the hours prior to the collision. No alarms were set on the radar for CPA/TCPA.

Significant time spent navigating through dense fishing fleets and passing close to vessels with the Master present may have given the impression that rule violation was the norm and increased the OOW's threshold for acceptable collision risk.

Misidentification of Zhe Ling Yu as a fishing vessel may have skewed the Cathinka Spirit's mental model of the developing situation.

As the give way vessel, Zhe Ling Yu did not, so far as possible, take early and substantial action to keep well clear of the Cathinka Spirit.

As the stand on vessel, Cathinka Spirit's OOW did not take appropriate action to avoid a collision once the collision could not be avoided by the action of Zhe Ling Yu alone.

Neither vessel made any manoeuvring sound signal prior to altering course, which may have alerted the other to the action being taken.

The evacuation of Zhe Ling Yu and subsequent rescue of crew members by Cathinka Spirit and Hai Xing 215 was completed quickly and effectively.

7 LESSONS TO BE LEARNED

- Bridge resources - watchkeepers should be aware of the function of all available tools to assess the risk of collision and support decision making.
- Action to avoid collision – needs to be early, substantial and in line with COLREGS. Use of the appropriate sound signal helps clarify the action being taken. Visually monitoring the effectiveness of action taken is vital.
- Normalisation of deviance – junior officers will take cues from the actions of senior officers – if prescribed limits such as minimum CPA are not applied consistently, that deviation can become normalised.

8 RECOMMENDATIONS

OSM Tanker Management Pte Ltd. is recommended to consider the use of external navigation audits to test the effectiveness and application of navigational procedures.