How Ships Avoid Collisions and Groundings



With
Rear Admiral (Retired) Simon Hardern

Global Shipping Numbers

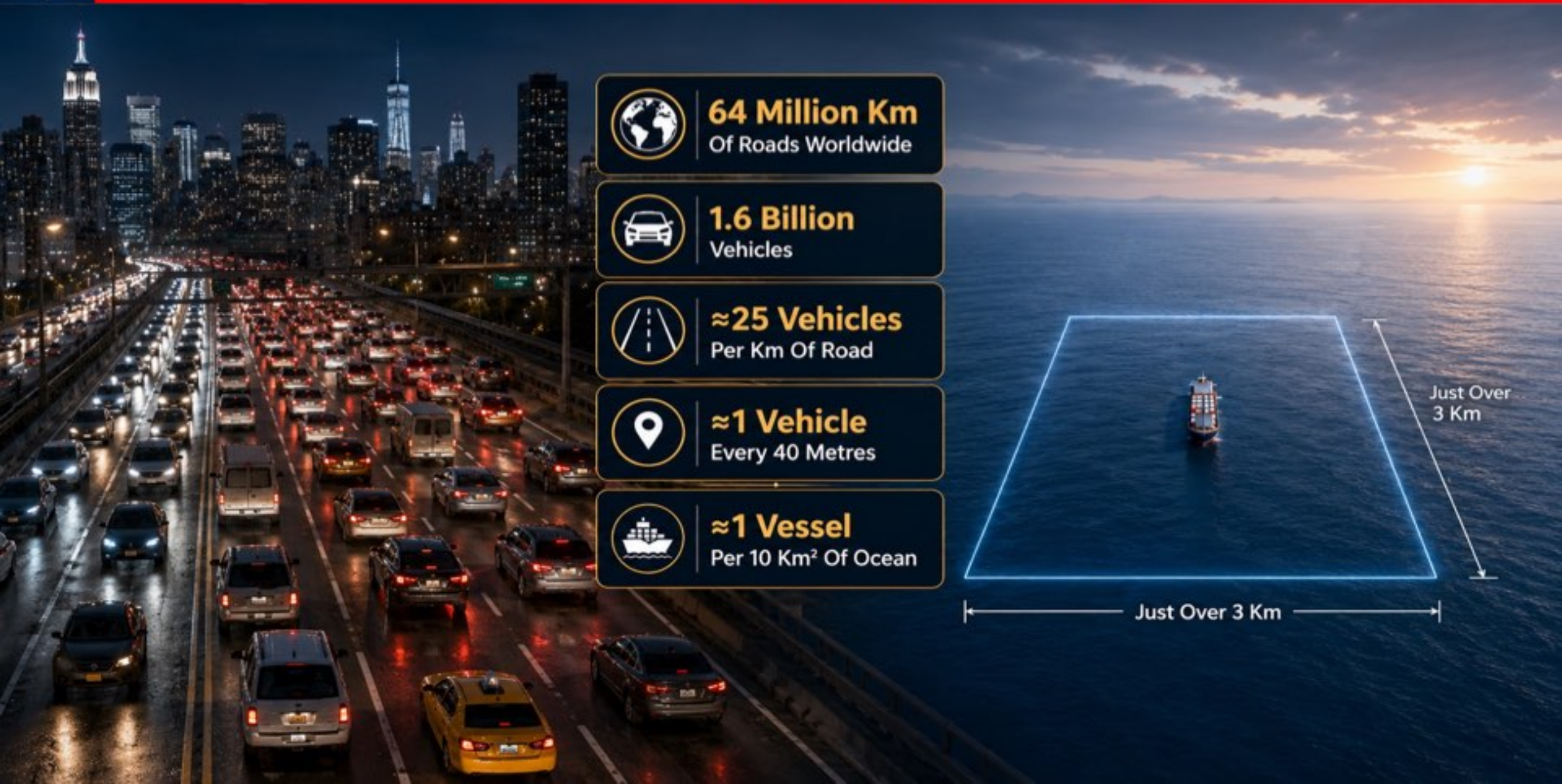


Ship Category	Vessel Numbers
Merchant fleet	~ 119,000
Naval and Government	~ 50,000
Fishing Vessels	~ 4.9 Million
Recreational Craft	~ 30 Million
Approximate total	~ 35 Million

Global Vehicle Densities on Our Roads



Global Shipping Density




... and
Yet
United Kingdom
Dover
Folkestone
Calais
France
Boulogne-sur-Mer

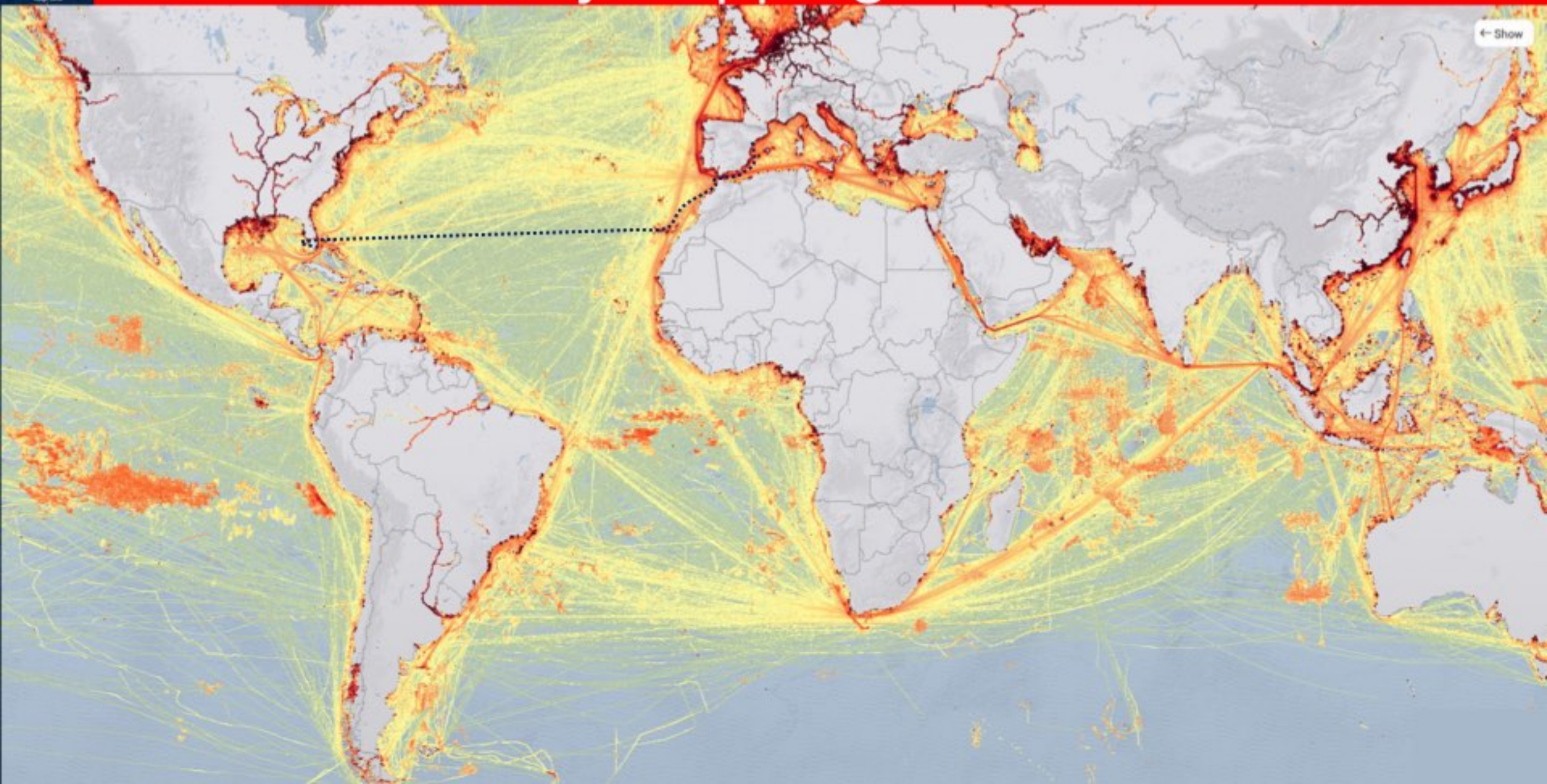
Singapore/Malacca Strait



- At any one time, there are approximately 1,000 vessels within the Port of Singapore's limits

- A ship arrives or departs Singapore every two to three minutes

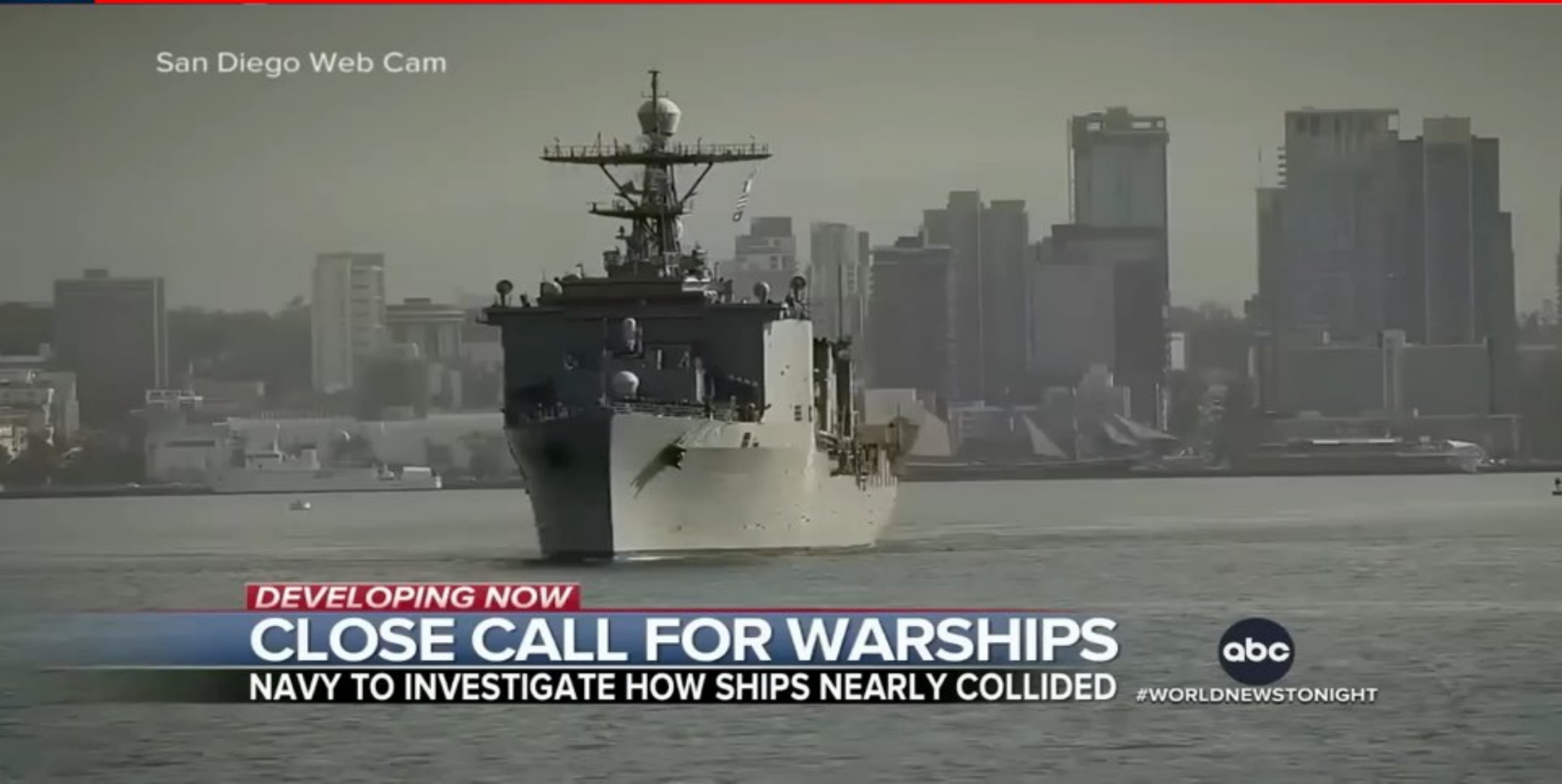
Busy Shipping Lanes



Bridge Teams Need to be on the Ball



Events Like This Happen Everyday

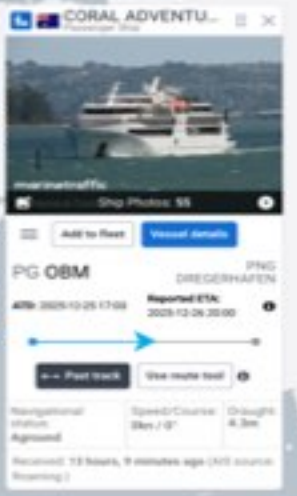


Expedition Ship Grounding



Lack of Attention to Detail

- Coral Adventure voyage planning did not adequately account for survey limitations
- Navigation practices in poorly charted waters were not adequate
- Use of Electronic Navigational Charts versus local knowledge was not appropriate









International Regulations for Preventing Collisions at Sea
(or COLREGs for short)

The internationally accepted rules governing vessel behavior at sea to prevent collisions, ensuring safe navigation and minimising risks to vessels, crew, and the environment

Success depends on good training, education and experience matched to national and international regulations

A 2023 European Maritime Safety Agency Report found that while modern technology has improved safety, it has added to Bridge Staff burden due to information overload

In Simple Terms

- Many of you are car drivers – as such, you understand that cars have lanes, right-of-way rules (the Highway Code) and speed limits!

- Collision Regulations (COLREGs) are essentially that - but with global reach in a medium with no lane markings, no traffic lights and vessels of wildly different sizes, speeds and turning characteristics sharing the same space!

Applicability

Types of Vessel

Rules apply to **all types of vessels** without exception

Waters

Rules apply to vessels on the high seas and all connected waters navigable by seagoing vessels, as well as all vessels on inland waterways

Visibility

Rules also apply in any condition of visibility, with specific rules for low visibility situations











Worth Remembering

- A car travelling at 30mph can stop in under 100 metres. A large vessel at 15 knots may need 3–5 miles and close to 15 minutes to stop - and virtually cannot turn faster than that stopping distance allows. This is the fundamental cognitive challenge that makes collision avoidance at sea so demanding, and why the Rules require action early

- Passengers might reasonably assume a big cruise ship is the 'give-way' vessel – after all, it is the most visible, the most powerful. In fact, a small boat or a fishing vessel will often have right of way over our 110,000-tonne cruise ship

All About Avoiding This



Key Principles

Navigational Rules

Covers things like safe speed, right-of-way situations, overtaking manoeuvres and general navigation

Power Driven and Sailing Vessels

Covers power driven vessels and sailing vessels of all types and sizes

Lights, Shapes and Sound Signals

Specific lights, shapes and sound must be used for safe navigation, signifying a vessel's identity, size and course

Main Responsibilities









A Sharp Bridge Team is Crucial



Firing Shots to Avoid a Collision is not in the Rules



JUNE 16, 2026 | Current News

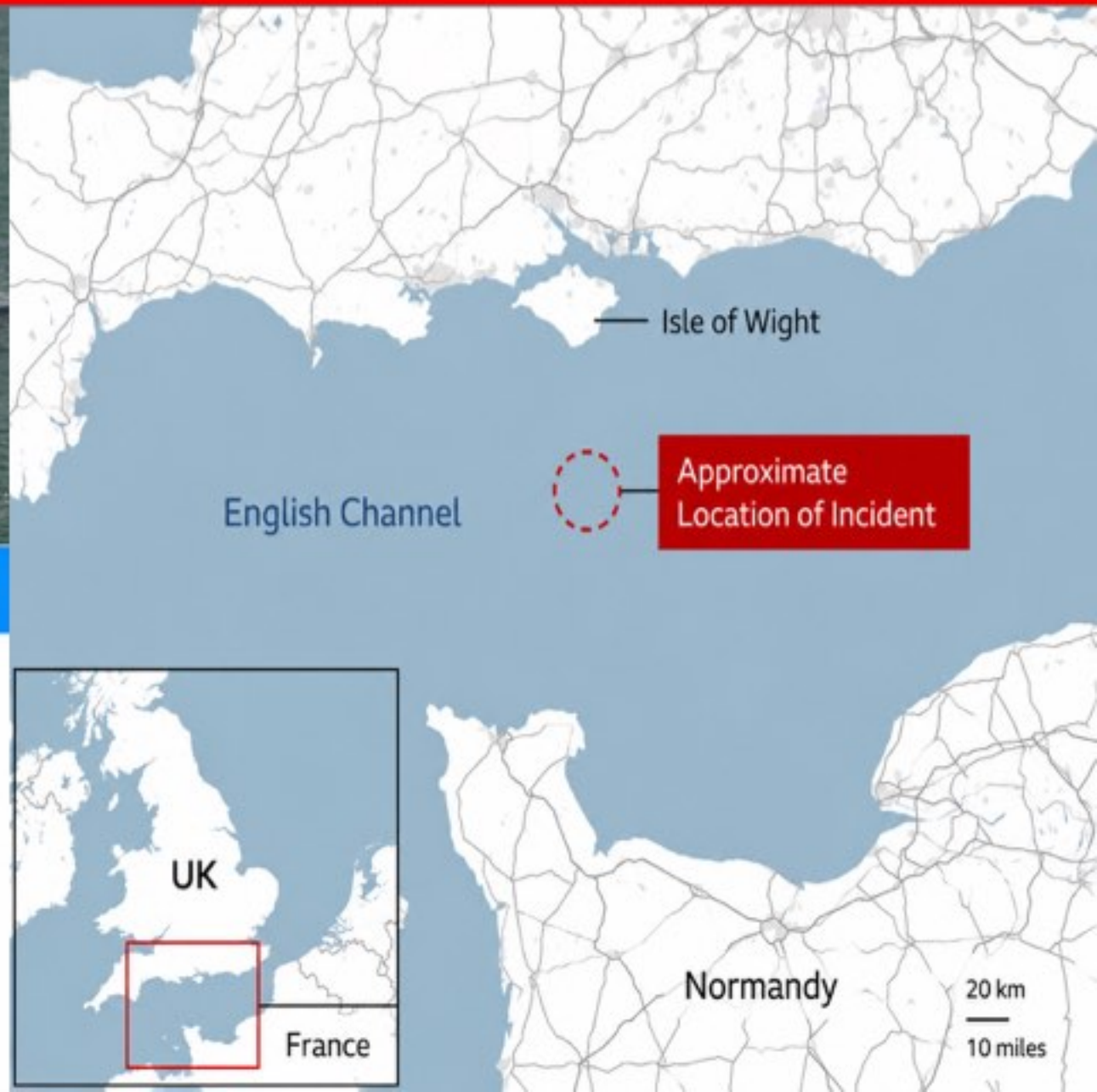
Russian frigate RFS Admiral Grigorovich fires warning shots at a British yacht

A Russian frigate has fired warning shots at a British-flagged civilian yacht in the English Channel, in the most direct military confrontation between Russia and the UK in home waters in recent memory. The incident follows the Royal Navy's seizure of a Russian shadow fleet tanker in the same waters just days earlier.

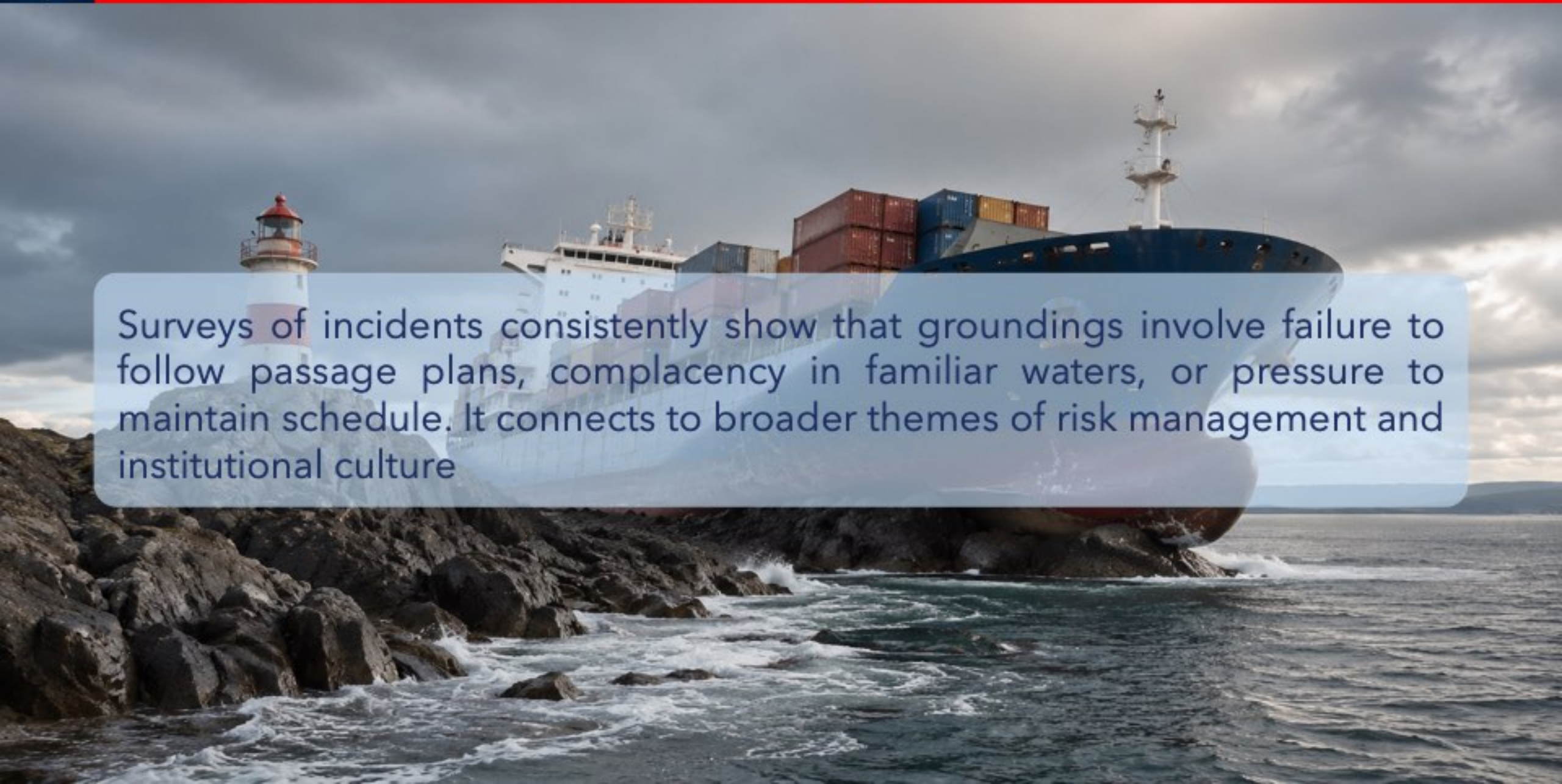
The British yacht reported coming into close proximity with RFS Admiral Grigorovich before warning shots were fired at a distance of approximately 500 yards. The incident is understood to have taken place in the sea between the Isle of Wight and Normandy. No injuries or damage were reported, and a seaboat from HMS Tyne visited the yacht to check on its occupants and gather details.

UPDATE: Deborah Haynes of Sky News reports that the Russian frigate appears to be having difficulty controlling its movements. The warship is thought to have sounded an alert to the yacht to avoid a collision, but it didn't change course, so a couple of warning shots were fired, though not directly at the yacht.

The RN says the OPVs HMS Mersey and HMS Tyne were shadowing the frigate west of Brest at the time of the tanker seizure that took place 25 miles south of the Isle of Wight on Sunday night. They were also close by at the time of the incident involving the yacht today. The ships were monitoring a vessel that has now been a persistent presence in British waters for some weeks. As we have previously reported, she has been escorting shadow fleet vessels but also loitering off the UK coast.



Incidents are Generally Human Failures



Surveys of incidents consistently show that groundings involve failure to follow passage plans, complacency in familiar waters, or pressure to maintain schedule. It connects to broader themes of risk management and institutional culture

Poor Planning



















Poor Focus



Korean Ferry QUEEN JENUVIA II grounded on 19 November 2025 on approach to Mokpo

Initial Korean Coastguard findings found the Bridge Watchkeeper was distracted by his mobile telephone, left the ship on autopilot and missed a planned course alteration and the fact that the Captain was rarely on the Bridge for the approaches to the narrow waters







Consequences of Serious Failure



Captain guilty of North Sea tanker crash death











As a Reminder … The Costa Concordia Incident



Reckless Manoeuvre

Safety compromised by deviating from planned course for a too-close approach to shore

Loss of Situational Awareness

Failure to monitor navigation systems relative to hazards

Ignoring Alarms

Critical warning alarms were disregarded, silenced or dismissed as false or inaccurate

Delayed Evacuation Order

Evacuation order was delayed even after it was clear the situation was critical

Navigational Errors Leading to Disaster

Failure Can Result in Prison

Jury Finds Ferry Officer Guilty on Lesser Count in Fatal Collision



Commodore Goodwill ferry collided with the fishing boat in December 2022 (John K. Thorne photo - CC0 1.0)

PUBLISHED SEP 26, 2025 2:43 PM BY **THE MARITIME EXECUTIVE**

Bridge Watchkeeper jailed on 3 Dec 25 for 18 months for manslaughter of 3 fishermen



Captain Francesco Schettino was found guilty of manslaughter and other charges, receiving a 16-year prison sentence



The Mariner's Safety Toolbox



Global Navigation Satellite Systems

Modern ships rely heavily on satellite navigation - but the systems have vulnerabilities

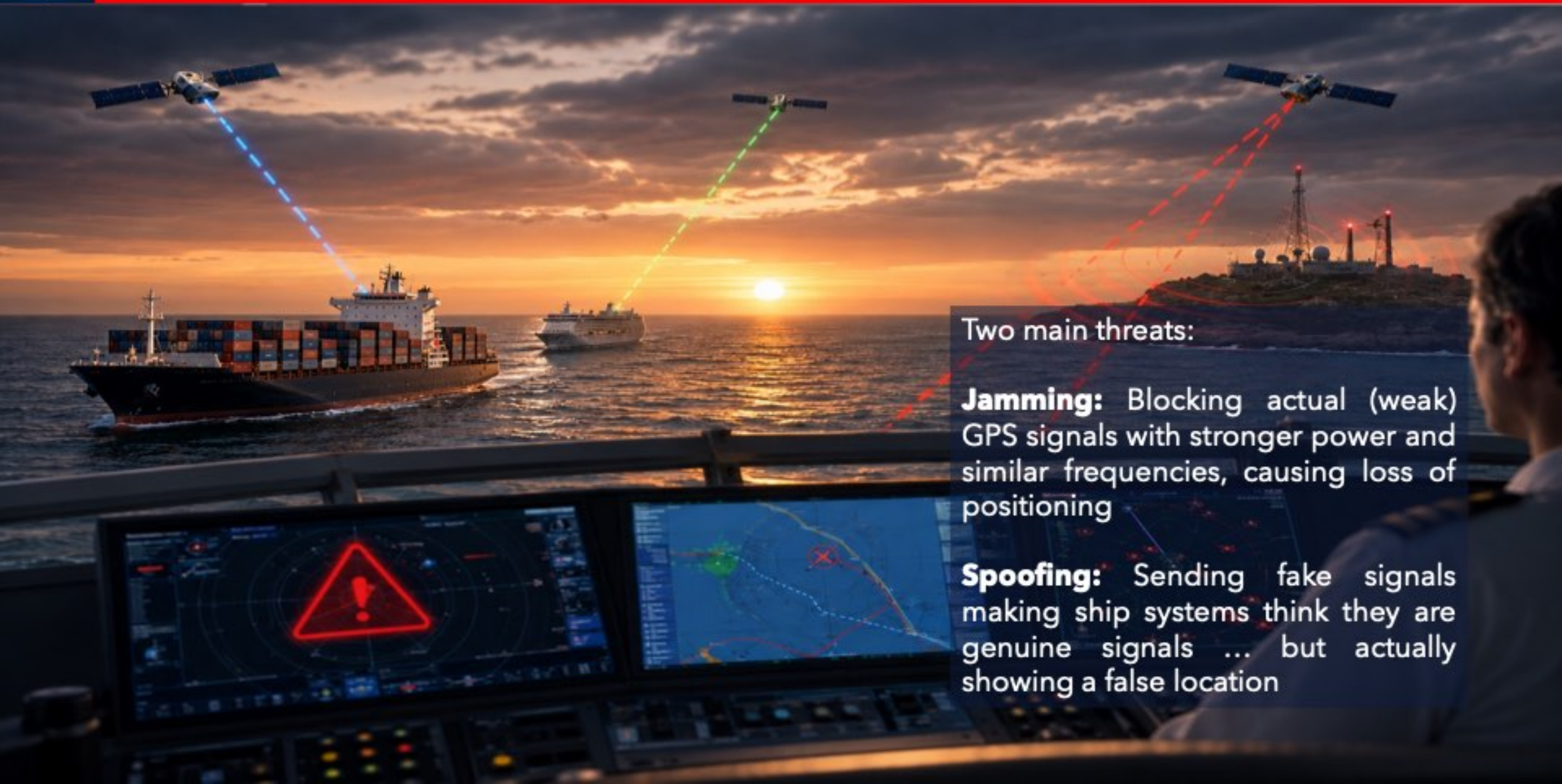
Ships use signals from multiple satellite systems:
GPS (USA), Galileo (Europe), GLONASS (Russia), BeiDou (China)

These signals provide precise position, speed, and timing

Most modern phones use multiple signals for accuracy, but many vessels rely on the original civilian GPS signal (L1 C/A). This signal dates back to the early 1990s. It is weaker and easier to interfere with. Newer, more resilient signals are not always used onboard



The Disruption Problem



Two main threats:

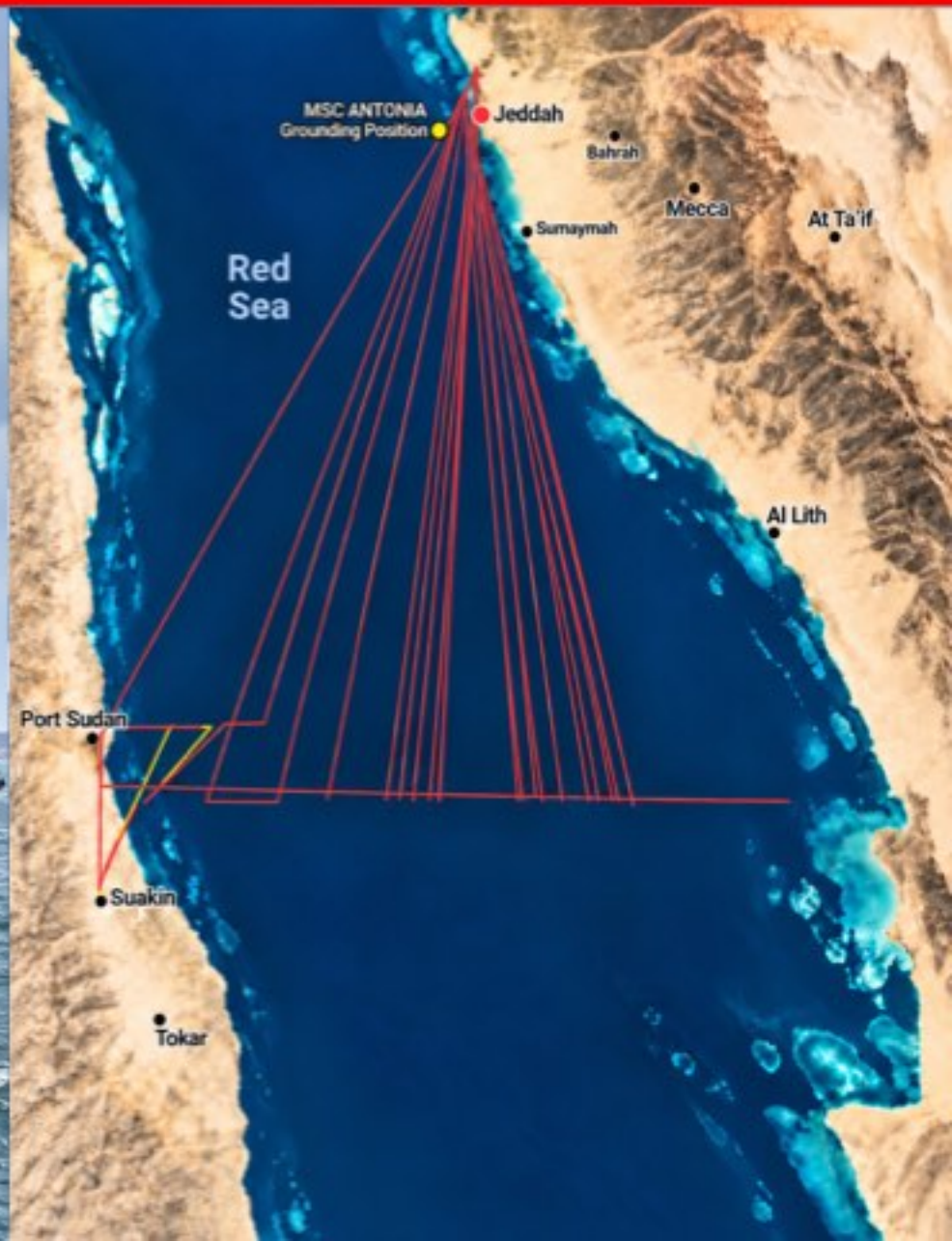
Jamming: Blocking actual (weak) GPS signals with stronger power and similar frequencies, causing loss of positioning

Spoofing: Sending fake signals making ship systems think they are genuine signals … but actually showing a false location

MSC ANTONIA Gounding - Red Sea - 2025



GPS interference fed the bridge a misleading position. The ship's Bridge Team became disorientated and grounded near Jeddah



Why this Disruption Matters for Ship Safety

- Grounding risk rises - ships may appear off course without knowing it
- Collision avoidance degrades
- Search and rescue slows

Crews must fall back on traditional navigation skills



GNSS Outages Spreading in Baltic Sea and Red Sea Regions

Satellite navigation is powerful- but not infallible. At sea, the most important system is still the one on the bridge:

Human Judgement

Vessel Traffic Control - Miami





- All ships reach the Atlantic through Government Cut. In 2025, it handled over 8.5 million cruise passengers - averaging 164,000 weekly and peaking at 75,000 passengers across ten ships in one November day
- Despite this, Miami has no formal vessel traffic control system. All ships share one radio channel - a safety concern flagged in 2023, with a dedicated system now under consideration





Navigational Channel - Miami



Pilotage

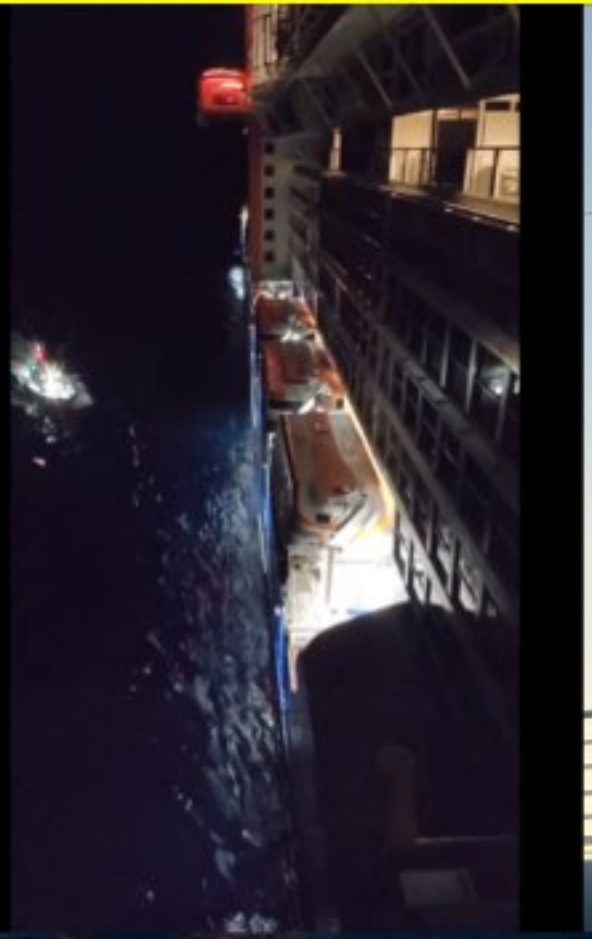
What Is A Pilot

A harbour pilot is a highly trained mariner who boards ships as they approach or leave a port to guide them safely through local waters. They know every channel, depth, tide, current, shoal, turning point and hazard better than anyone else











Pilotage … When it Goes Wrong



Navigation in Narrow Channels

VOYAGES

1 Starboard Side

Keep to the starboard outer limit



2 Priority

Small craft must not impede



3 Crossing

Do not cross if passage is impeded



4 Overtaking

Sound signals and caution



5 Anchoring

Avoid unless necessary



Mariners also Have Lights to Warn of Dangers



England and Wales has 49 rotating white lights, 109 fixed white lights and 58 with coloured sectors

Rule 19



The Canaries has 27 rotating white lights, 10 fixed white lights and 3 with coloured sectors

International Organization for Marine Aids to Navigation Regions



What it Looks Like

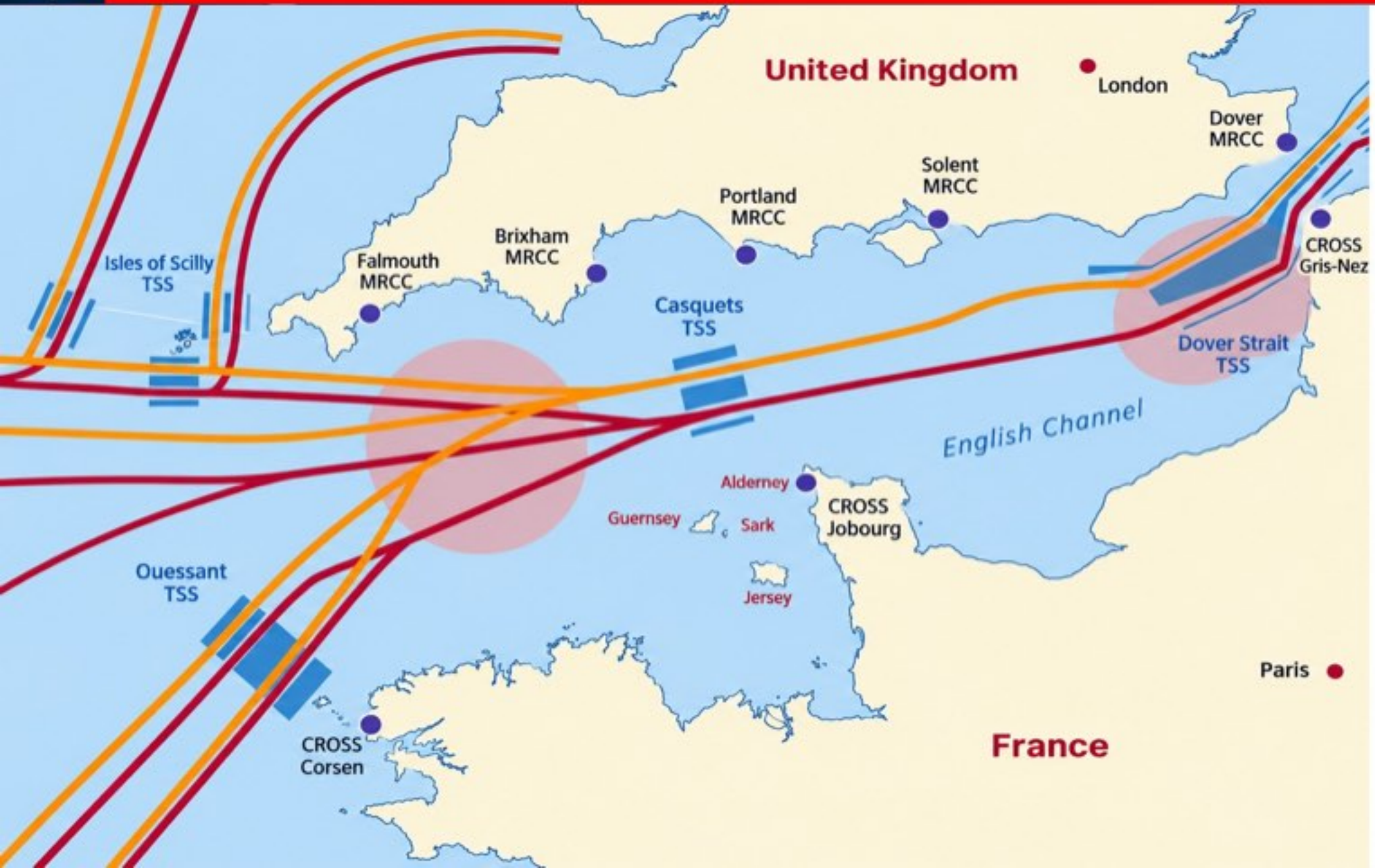


Entrance into Southampton Cruise Port

… and for Region B



Traffic Separation Schemes



TSS: Traffic Separation Scheme (area closed to navigation)

Ships of more than 300 GRT required to declare their passage near TSS

Rising traffic

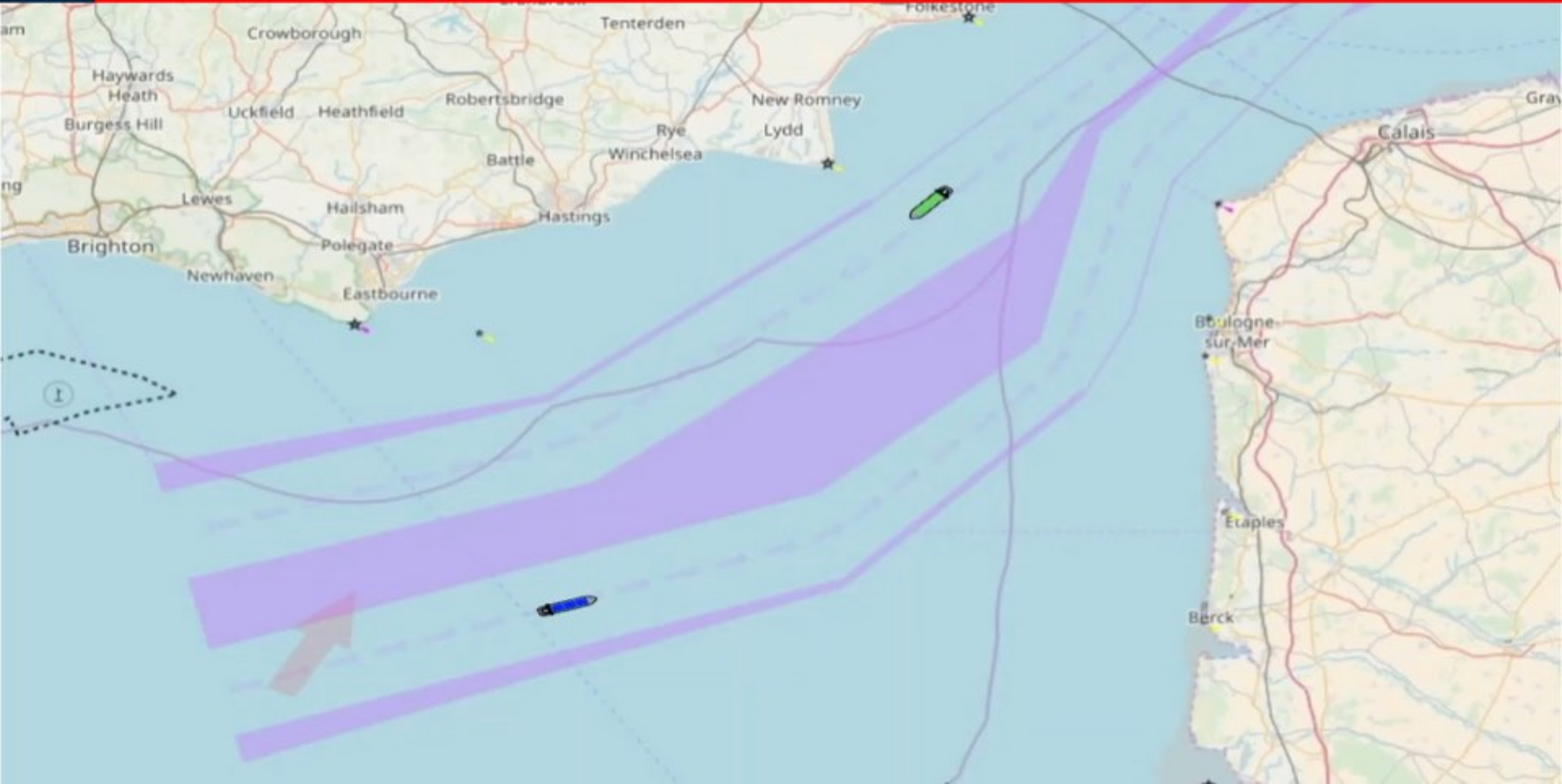
Downward traffic

Danger zone

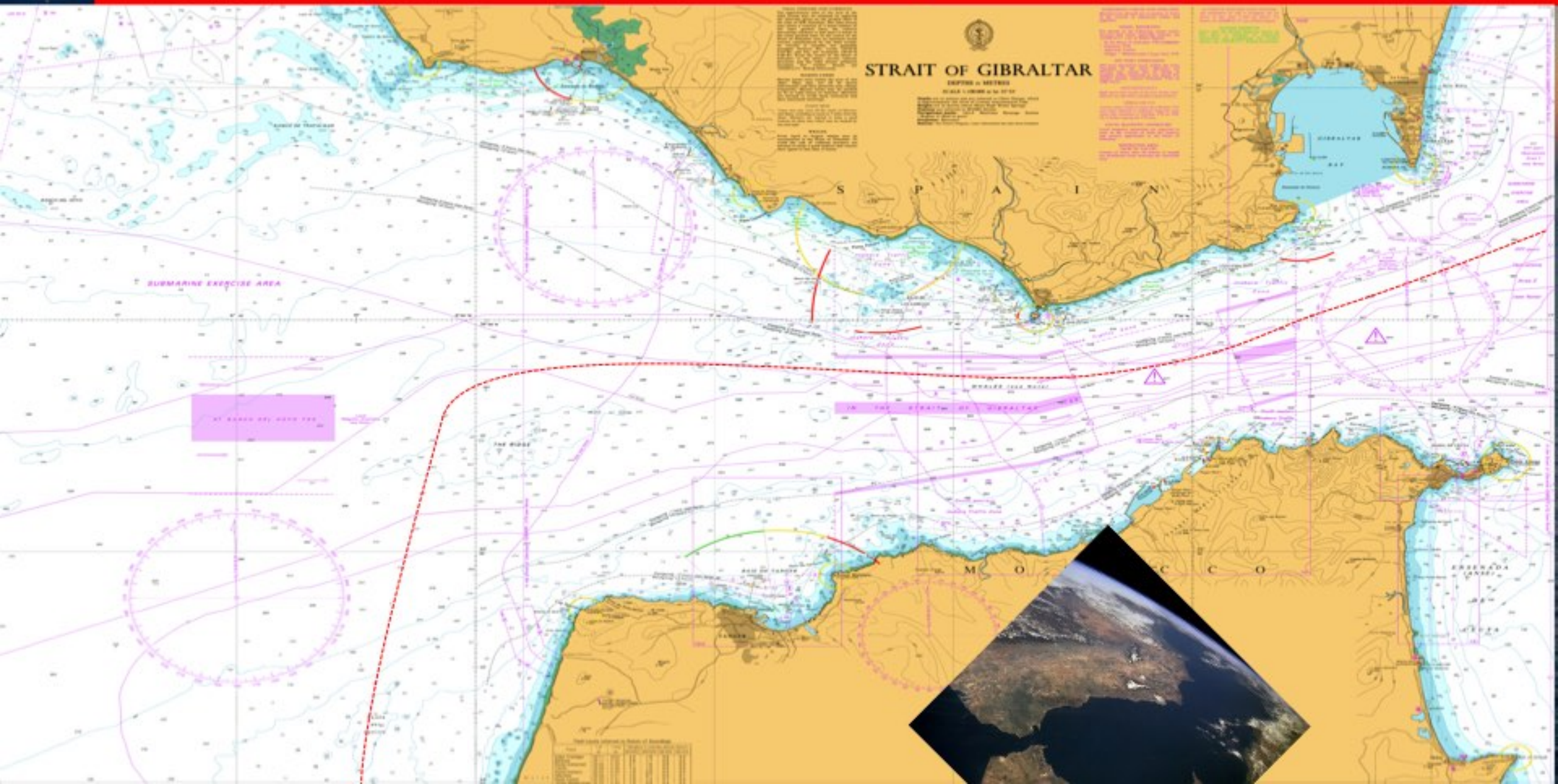
CROSS
Centres Régionaux Opérationnels de Surveillance et de Sauvetage

MRCC
Maritime Rescue Co-ordination Centre

English Channel - Animation



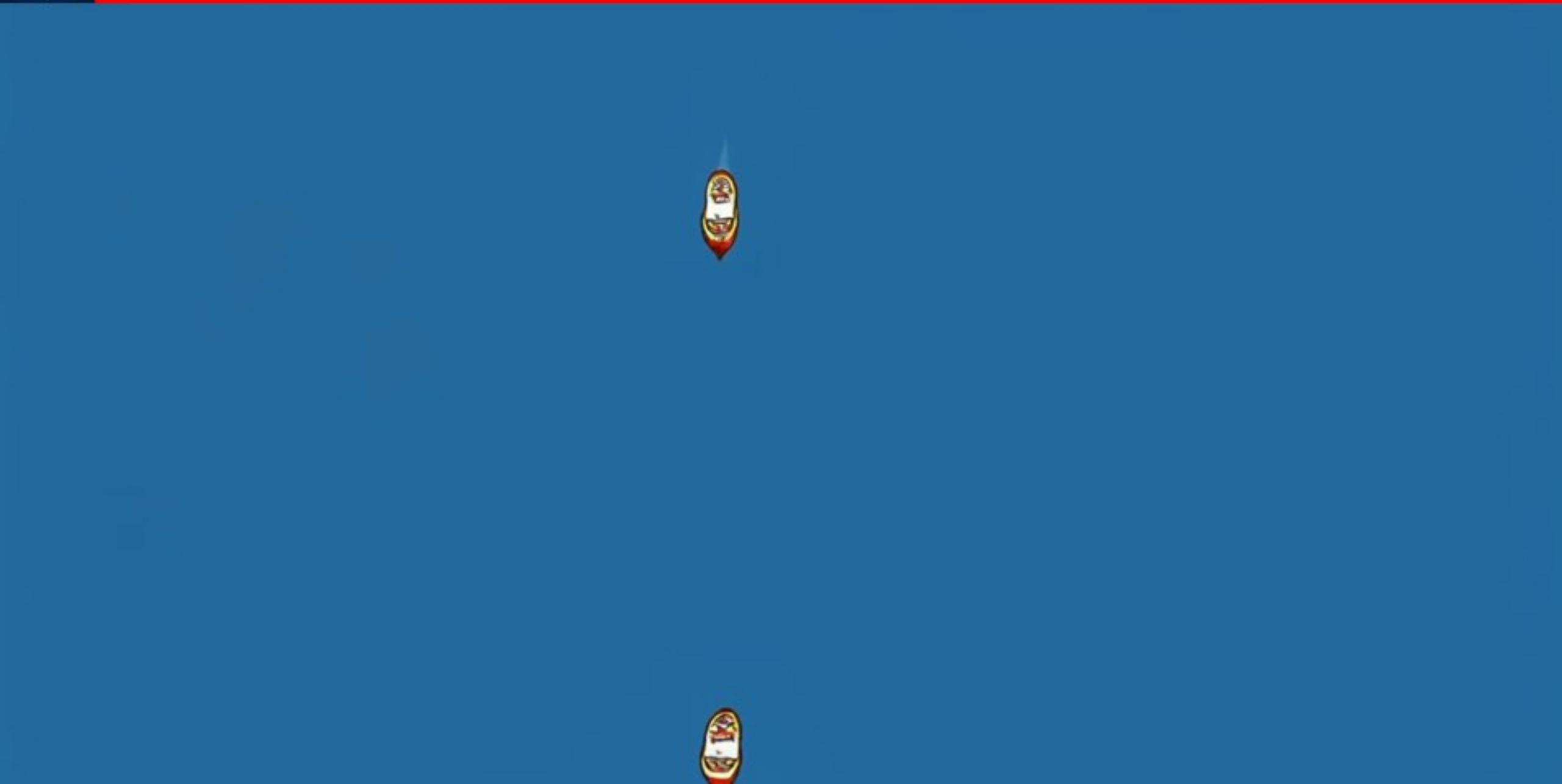
Traffic Separation Scheme – (Strait of) Gibraltar



Head-On Situation



Head-On Situation - Animation

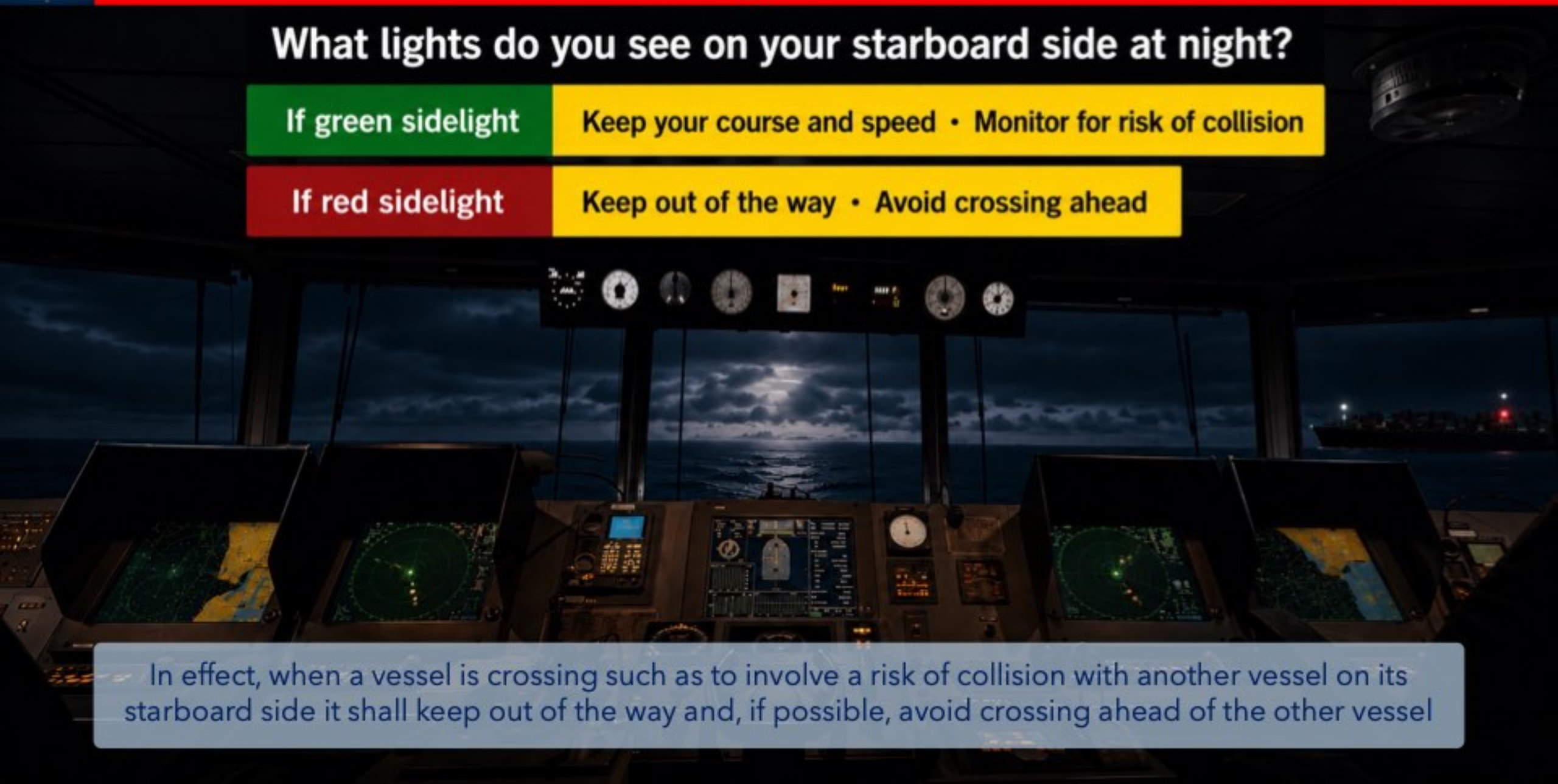




Crossing Situation

What lights do you see on your starboard side at night?

If green sidelight	Keep your course and speed • Monitor for risk of collision
If red sidelight	Keep out of the way • Avoid crossing ahead



In effect, when a vessel is crossing such as to involve a risk of collision with another vessel on its starboard side it shall keep out of the way and, if possible, avoid crossing ahead of the other vessel

Crossing Situation - Animation





Crossing Situation - Getting it Wrong



Bulk carrier Polesie (top) and general cargo ship Verity (bottom), the two vessels involved in a fatal October 2023 collision in the German Bight that investigators later concluded was wholly avoidable. UK MAIB Image

Fatal German Bight Ship Collision Was 'Wholly Avoidable,' MAIB Says

Mike Schuler
Total Views: 0
February 12, 2026

More than two years after the cargo ship *Verity* sank following a collision in the German Bight, the UK's Marine Accident Investigation Branch has released its final report—and its conclusion is stark: the loss of five lives was entirely preventable.

The Isle of Man-registered *Verity* collided with the Bahamas-flagged bulk carrier *Polesie* in the early hours of October 24, 2023, inside a busy traffic separation scheme about 12 nautical miles southwest of Helgoland. The impact sent *Verity* to the bottom of the North Sea within minutes. Two crew members survived. Five did not.

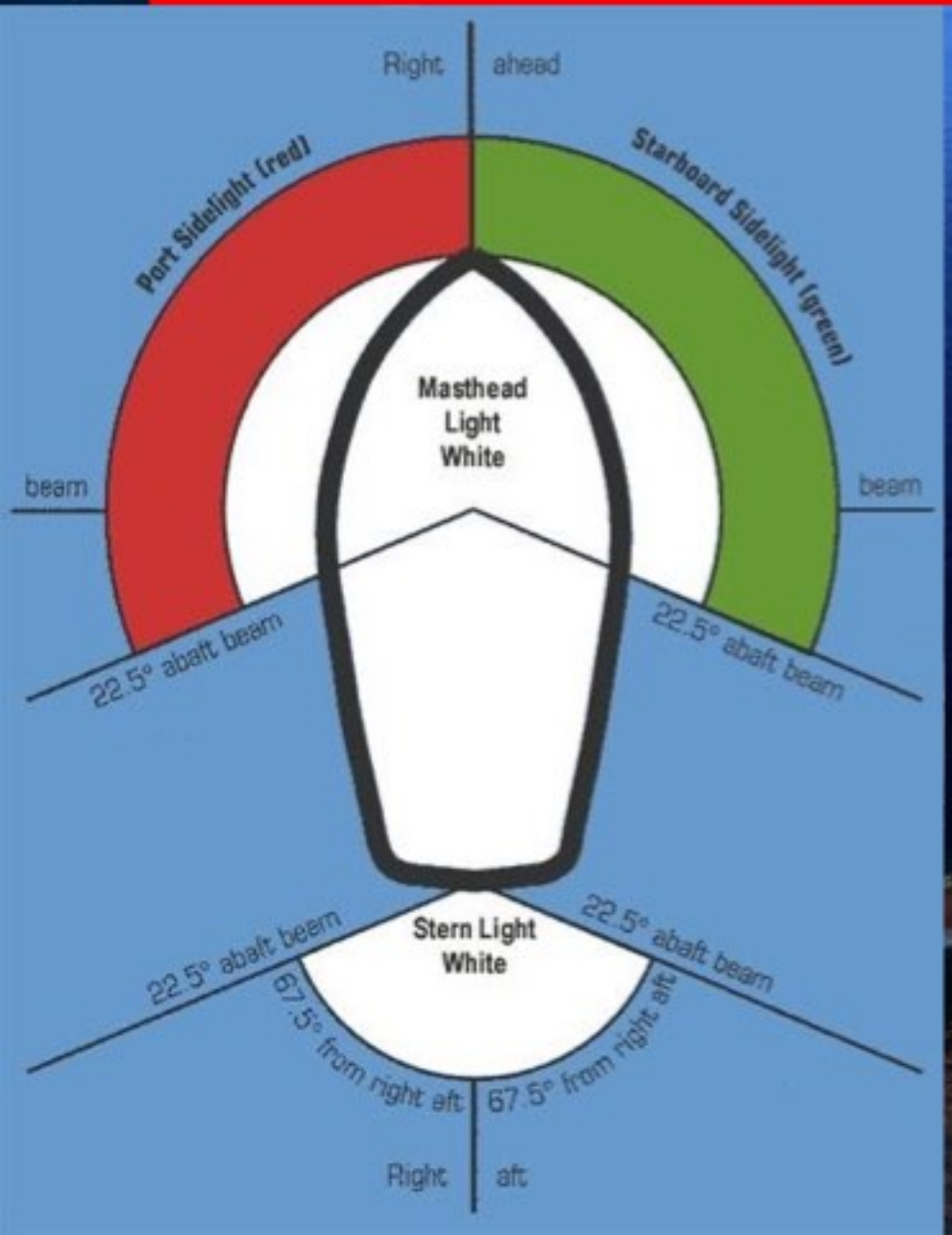
"This accident was wholly avoidable," said MAIB Chief Inspector Andrew Moll. "Neither vessel applied the collision regulations diligently, and both accepted passing at close range when there was no need to do so."

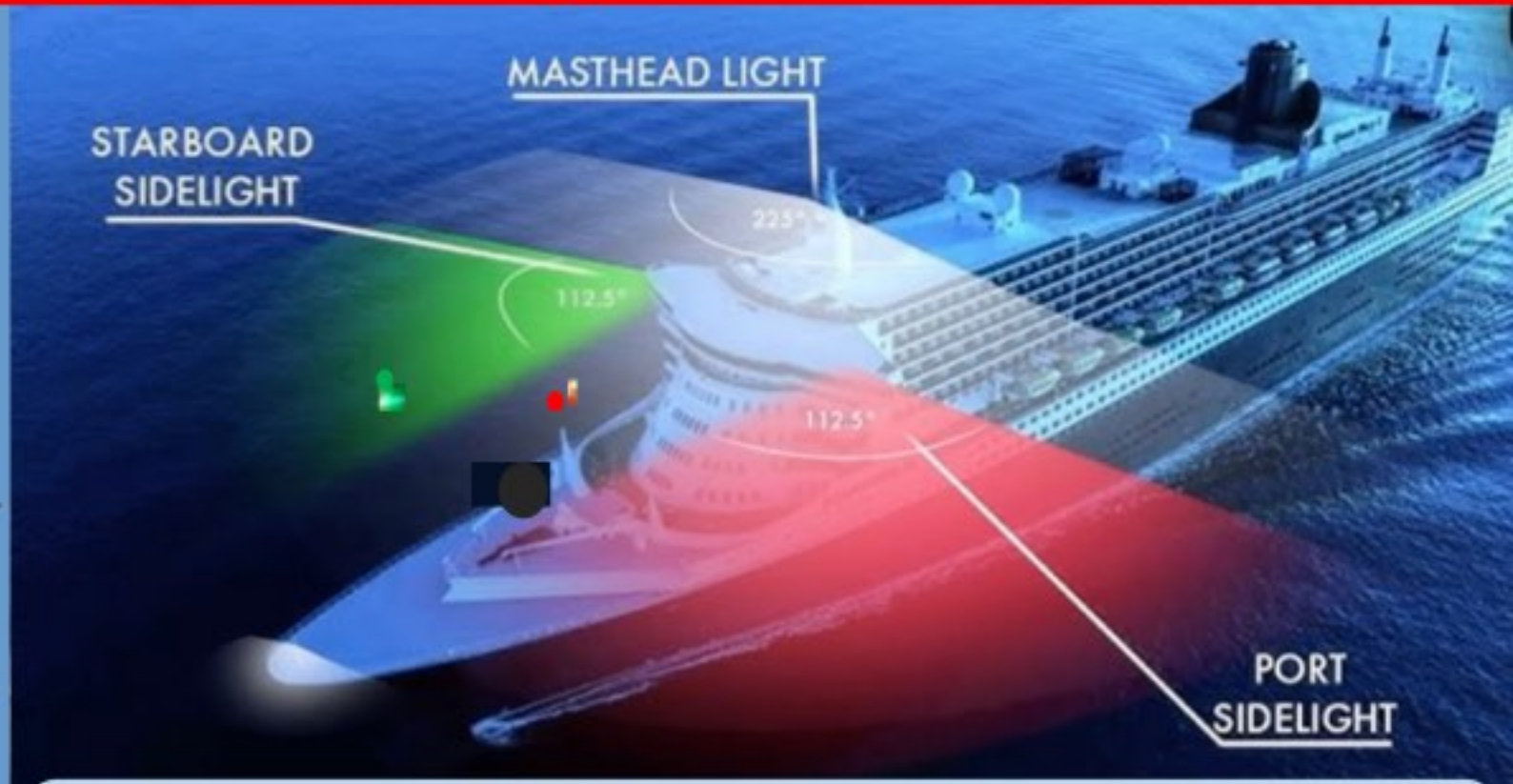
A Failure to Act—Until It Was Too Late

The investigation found that both vessels were on a clear crossing course with ample sea room. Under the International Regulations for Preventing Collisions at Sea, *Verity* was the give-way vessel and required to take early and decisive action to keep clear. It did not.



Navigational Lights





- A ship's lights will depend upon whether she is power driven and her length
- Crucial at night to understand perspective and take avoiding action as necessary
- In the case of Scarlet Lady, because she is over 50 metres in length she will have 2 white masthead lights, a green starboard steaming light, a red port steaming light and a white stern light

Navigation Lights - Scarlet Lady



Lights - Scarlet Lady

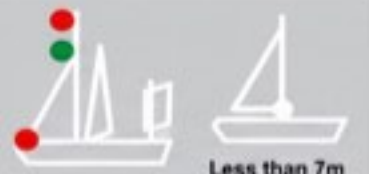
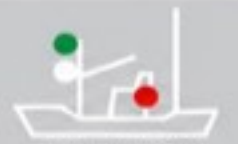
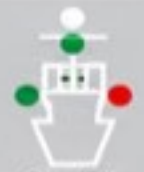
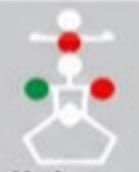
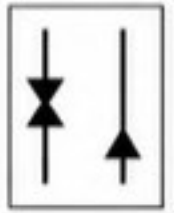
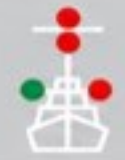


Head-On Situation - Night Animation

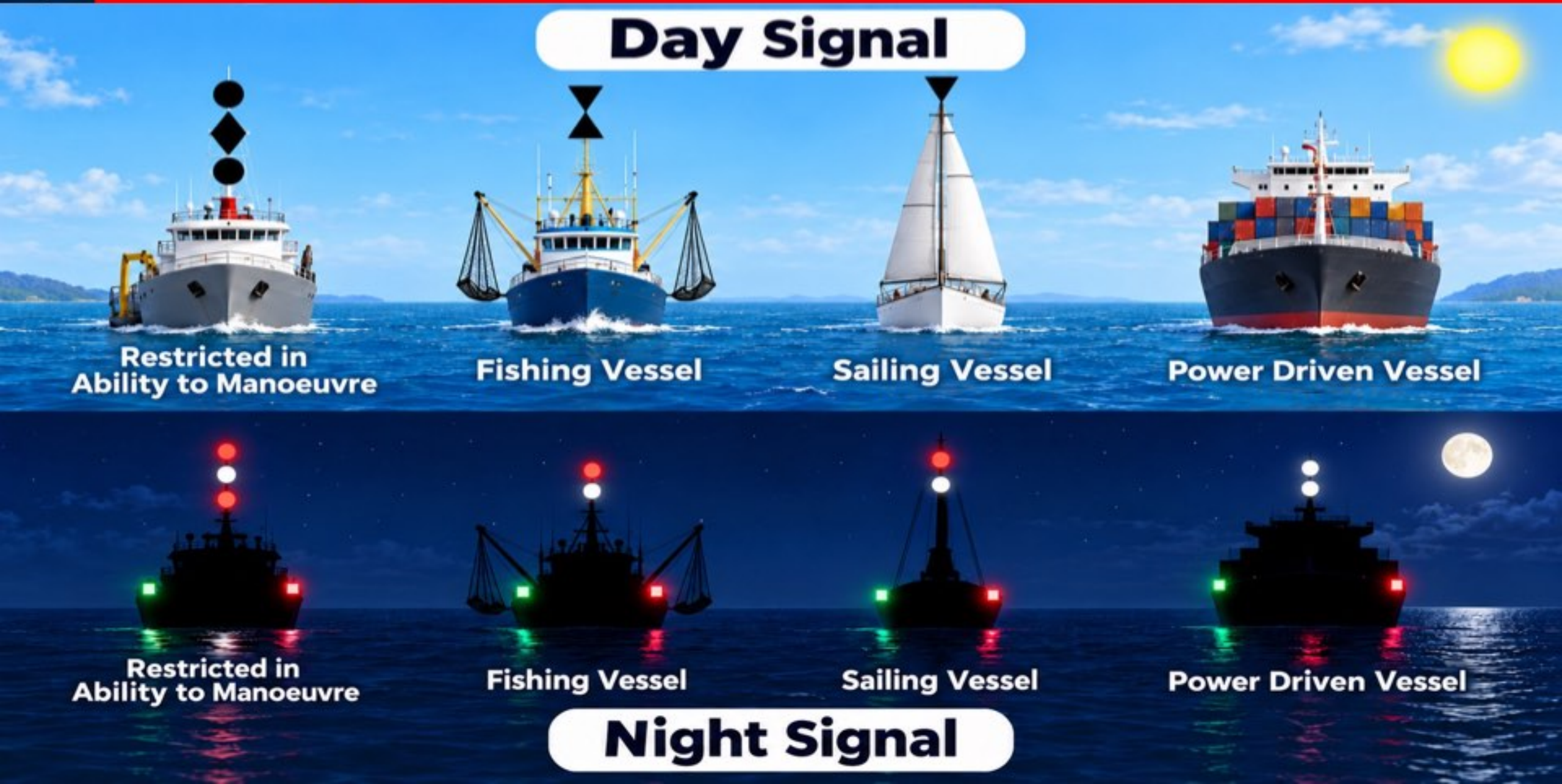


A Light/Shape Sequence for Every Eventuality

VOYAGES

Rule 25 Sailing vessels		If not showing navigation lights, hand held torch shown in time to prevent collision.			If not showing navigation lights, hand held torch shown in time to prevent collision.		
Rule 26 Fishing Vessels Trawling (also see Annex II)							
Rule 26 Fishing Vessels Other than Trawling (also see Annex II)							
Rule 27 Vessels not under command							
Rule 27 Vessels not under comm'd making way through water							
Rule 27 Power-Driven Vessels restricted in ability to manoeuvre							

A Light Sequence for Every Eventuality



… Even for a Submarine





Sound Signals You Might Hear



One Short Blast

I am altering my course to starboard

Two Short Blasts

I am altering my course to port

Three Short Blasts

I am operating astern propulsion

Five Short Blasts

I am unsure of your intentions

In Summary



Universal Regulatory Framework

The International Regulations for Preventing Collisions at Sea provide internationally accepted rules that minimise risks to crews, ships and the environment



The Human Element

Success ultimately relies on the training, education and experience of deck officers



Layered Traffic Management

Safety is reinforced through Vessel Traffic Services (VTS), local pilots and Traffic Separation Schemes (TSS) that organise flow in densely travelled areas



Standardised Communication

Universal systems like IALA buoyage and standardised vessel lights/signals help mariners communicate clearly



Operational Discipline

Strict adherence to 'Right of Way' principles in channels and using proper signals to avoid collisions



Accountability and Consequences

Ignoring maritime safety rules is illegal and can lead to severe consequences

Worth Remembering



All of the rules, equipment and oversight sophistication I have spoken about exists precisely so that you don't have to think about our ship's safety. The rules, the training, the technology and the crew are a layered system of protection

You are benefiting from it right now, without really knowing it (until now)!

The sea doesn't forgive complacency - and that's exactly why the people responsible for Scarlet Lady are so serious about their work

Thank You

VOYAGES

www.voyagerstories.com

