

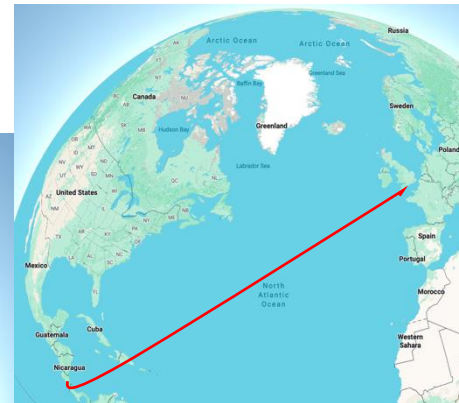
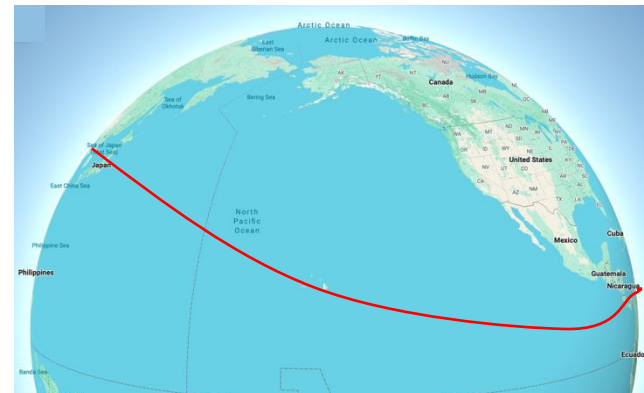


How Ships Avoid Collisions (and Groundings)



Departure Okpo, South Korea

A Big World



A Journey of 14,000 nm
Took 7 Weeks (at 15 kts)



How Ships Avoid Collisions (and Groundings)



with
(Rear Admiral Retired)
Simon Hardern





Global Vehicle Densities on Our Road



64 Million Km
Of Roads Worldwide



1.6 Billion
Vehicles



≈25 Vehicles
Per Km Of Road



≈1 Vehicle
Every 40 Metres

Global Movement
Connected World
↑ ↑ ↑





Global Shipping Numbers



The Oceans cover about 71% of the Earth



Rule 19

Give Way

Receiving Situation
Stand on

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

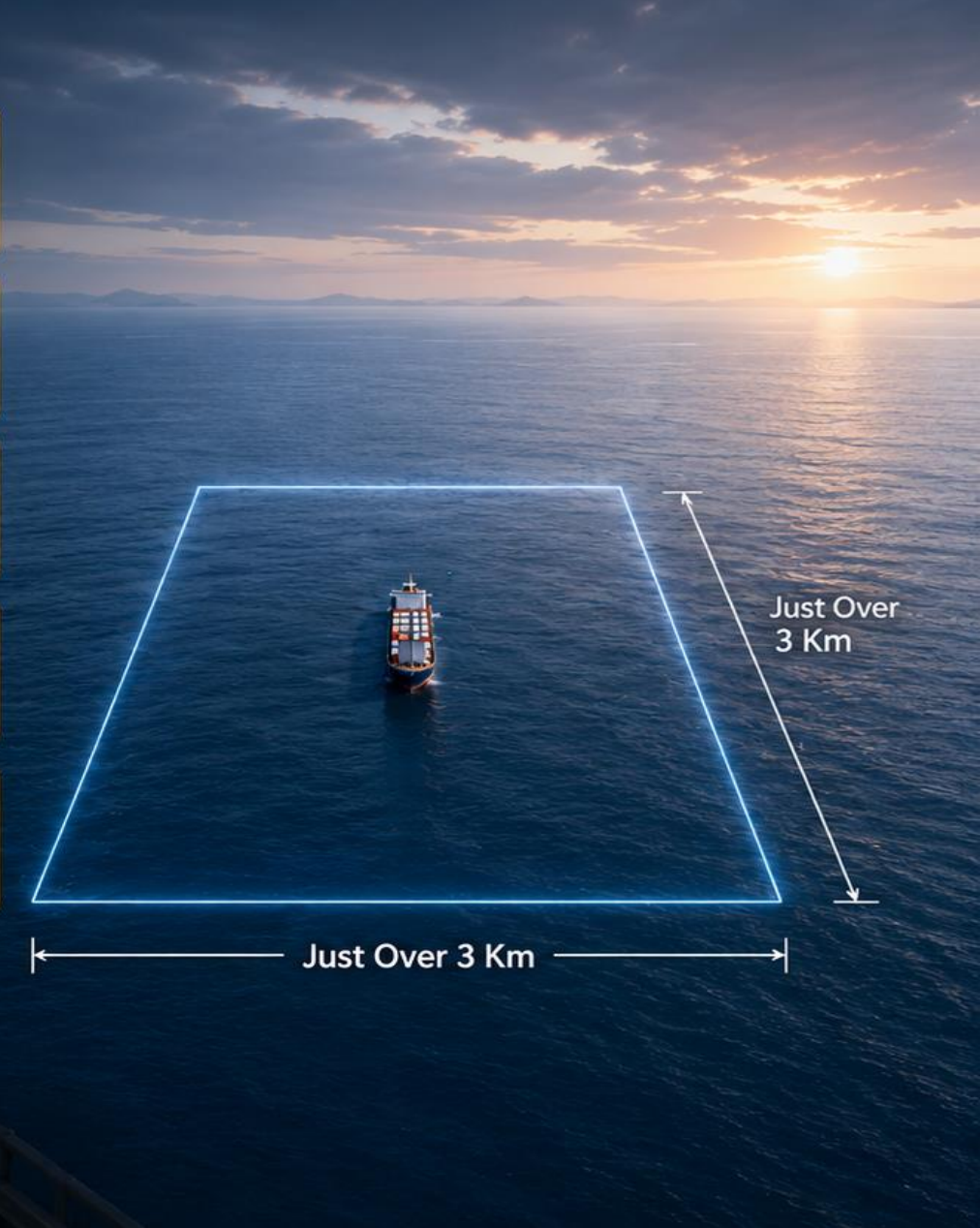




Global Shipping Density



-  **64 Million Km**
Of Roads Worldwide
-  **1.6 Billion**
Vehicles
-  **≈25 Vehicles**
Per Km Of Road
-  **≈1 Vehicle**
Every 40 Metres
-  **≈1 Vessel**
Per 10 Km² Of Ocean



And
Yet



United Kingdom

Dover

Folkestone

Calais



France

Boulogne-sur-Mer





Singapore/Malacca Strait

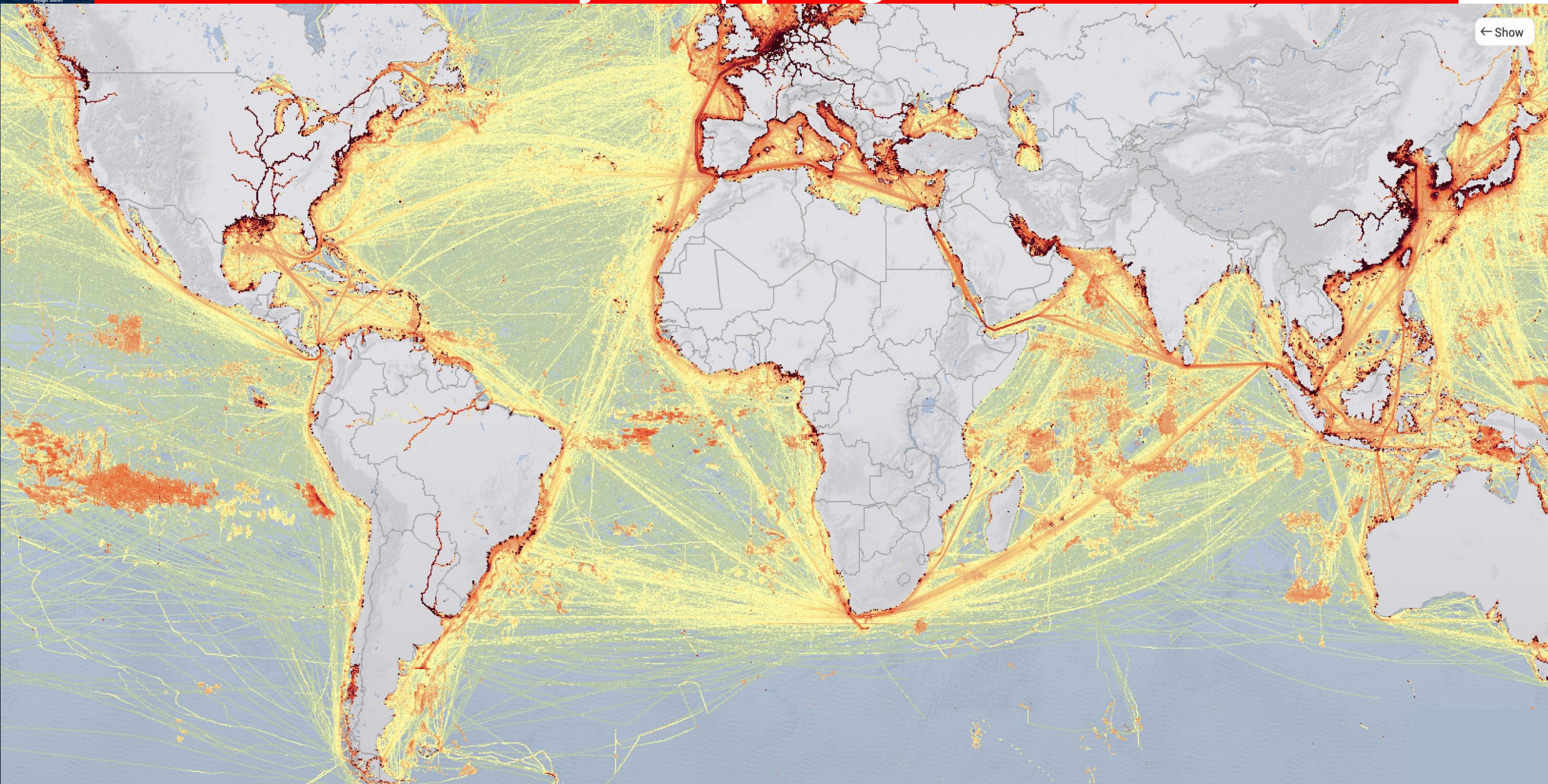


- At any one time, there are approximately 1,000 vessels within the Port of Singapore's limits
- A ship arrives or departs Singapore every two to three minutes





Busy Shipping Lanes





The Picture This Morning



Rule 19
↑
Give Way
→
↓
Receiving Situation
Stand on





San Diego Web Cam



DEVELOPING NOW

CLOSE CALL FOR WARSHIPS

NAVY TO INVESTIGATE HOW SHIPS NEARLY COLLIDED



#WORLDNEWSTONIGHT



Coral Expedition Grounding



Lack of Attention to Detail

- 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

PG OBM
DREGERHAFEN
Reported ETA: 2025-12-26 20:00
ATD: 2025-12-25 17:03

Speed/Course:	0kn / 0°	Draught:	4.3m
---------------	----------	----------	------

Received: 13 hours, 9 minutes ago (AIS source: Roaming)





Guiding All Mariners

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



Rule 19
↓
Give Way
↓
Resolving Situation
Strain on

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 for 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 54,700-tonne cruise ship





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



Over-riding Responsibilities



Maintain a Proper Lookout



Use Radar Effectively



Take Early and Decisive Action



Employ All Available Means





A Sharp Bridge Team is Crucial

**Always on Watch
Vigilant
Night and Day**



Someone is always on watch, always scanning.
It speaks to the professionalism of the crew you are living with aboard the
Silver Nova



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



Lack of Bridge Concentration and 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 wheel over and the fact that the Captain was rarely on the Bridge for the approaches to the narrow waters





Poor Passage Planning





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

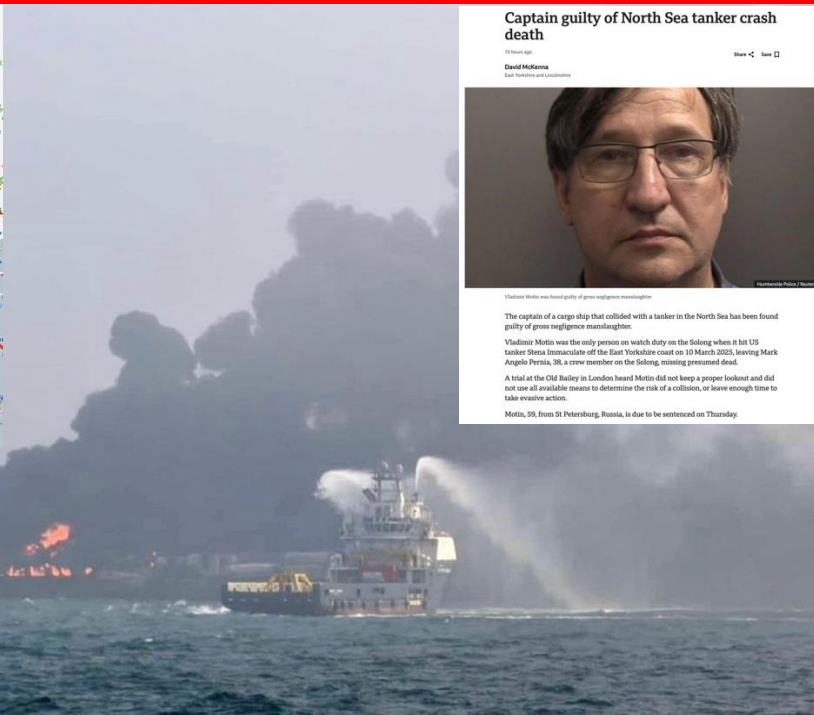
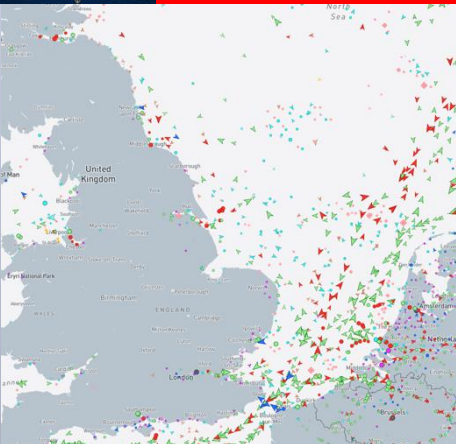
Evacuation order was delayed even after it was clear the situation was critical



Navigational Errors Leading to Disaster



Consequences of Failure



Captain guilty of North Sea tanker crash death

David McKenna
East Yorkshire and Lincolnshire

Vladimir Motin was found guilty of gross negligence manslaughter.

The captain of a cargo ship that collided with a tanker in the North Sea has been found guilty of gross negligence manslaughter.

Vladimir Motin was the only person on watch duty on the Solong when it hit US tanker Stena Immaculate off the East Yorkshire coast on 10 March 2025, leaving Mark Angelo Perria, 38, a crew member on the Solong, missing presumed dead.

A trial at the Old Bailey in London heard Motin did not keep a proper lookout and did not use all available means to determine the risk of a collision, or leave enough time to take evasive action.

Motin, 59, from St Petersburg, Russia, is due to be sentenced on Thursday.

SOLONG Container Ship

Details Track Add Photo Add to fleet

Destination
Rotterdam, Netherlands
ETA: Mar 10, 20:15 (in 6 h)

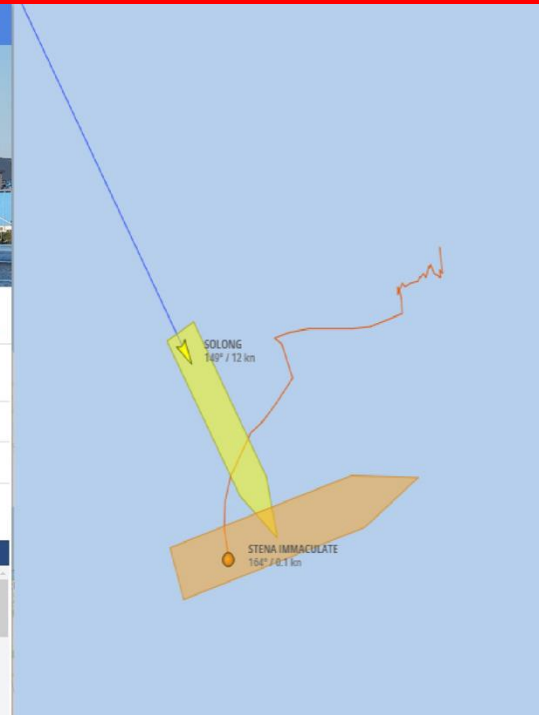
Speed: 0.0 kn Course: 115° Draught: 6.3 m (max 7.3)

Status: Under way Last report: Mar 10, 2025 10:34 UTC

Last Port
Grangemouth, United Kingdom (UK)
ATD: Mar 09, 20:07 UTC (18 h ago)

PORT CALLS

Recent Port Calls	ATA (UTC)
Grangemouth	Mar 8, 22:06
Rotterdam Waalhaven	Mar 7, 04:01
Hull	Mar 5, 12:15
Rotterdam Waalhaven	Mar 4, 04:02



STENA IMMACULATE Chemical/Oil Products Tanker

Details Track Add Photo Add to fleet

Destination
Killingholme, United Kingdom (UK)
ETA: Mar 09, 17:30

Speed: 0.0 kn Course: 76.7° Draught: 9.7 m (max 12.9)

Status: At anchor Last report: Mar 10, 2025 14:29 UTC

Last Port
Agio Theodoroi, Greece
ATD: Feb 27, 02:58 UTC (11 d ago)

PORT CALLS

Recent Port Calls	ATA (UTC)
Agio Theodoroi	Feb 25, 15:41
Corinth Easth Anch.	Feb 21, 12:50
Piraeus Anch.	Feb 15, 18:23
Corinth Easth Anch.	Feb 9, 08:19





Failure Can Result in Prison



Jury Finds Ferry Officer Guilty on Lesser Count in Fatal Collision

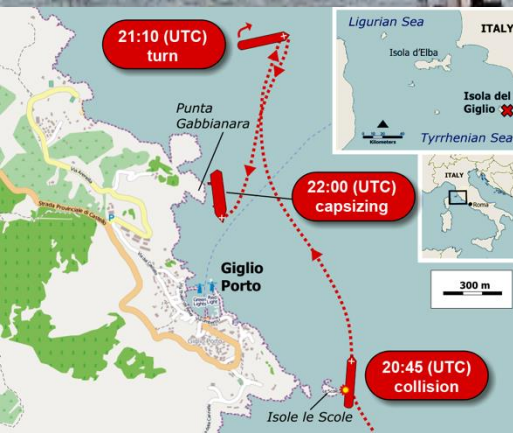
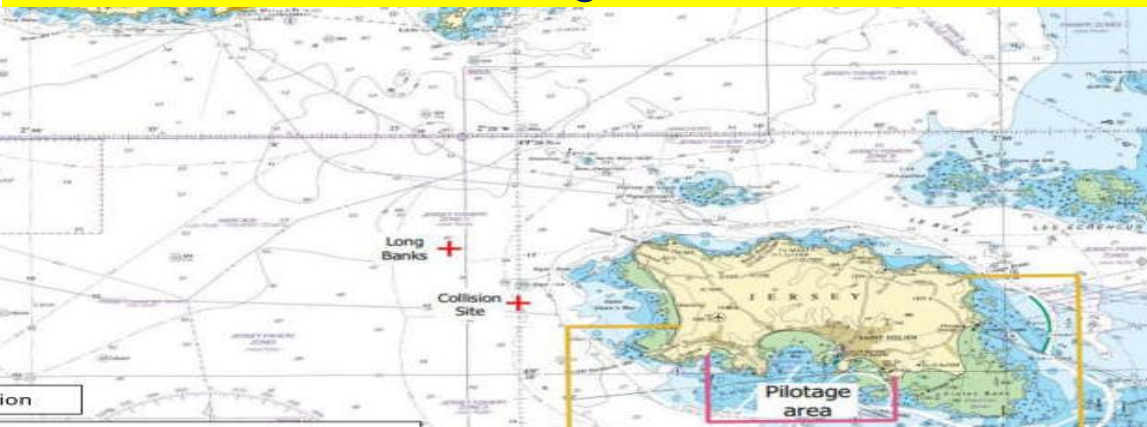
Captain Francesco Schettino was found guilty of manslaughter and other charges, receiving a 16-year prison sentence



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





Bridge Teams Need to be on the Ball



c10.6 bn tons of cargo



c98,000 cargo vessels



cargo vessels



c4,400 cruise/ferries



c4.6 m fishing/ferries



5,250+ ports





The Mariner's Safety Toolbox





Global Navigation Satellite System Disruption



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 Problem



In the Baltic Sea, for example, there has been a sharp rise in (Russian) interference with satellite navigation

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



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 Region

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

Human Judgement





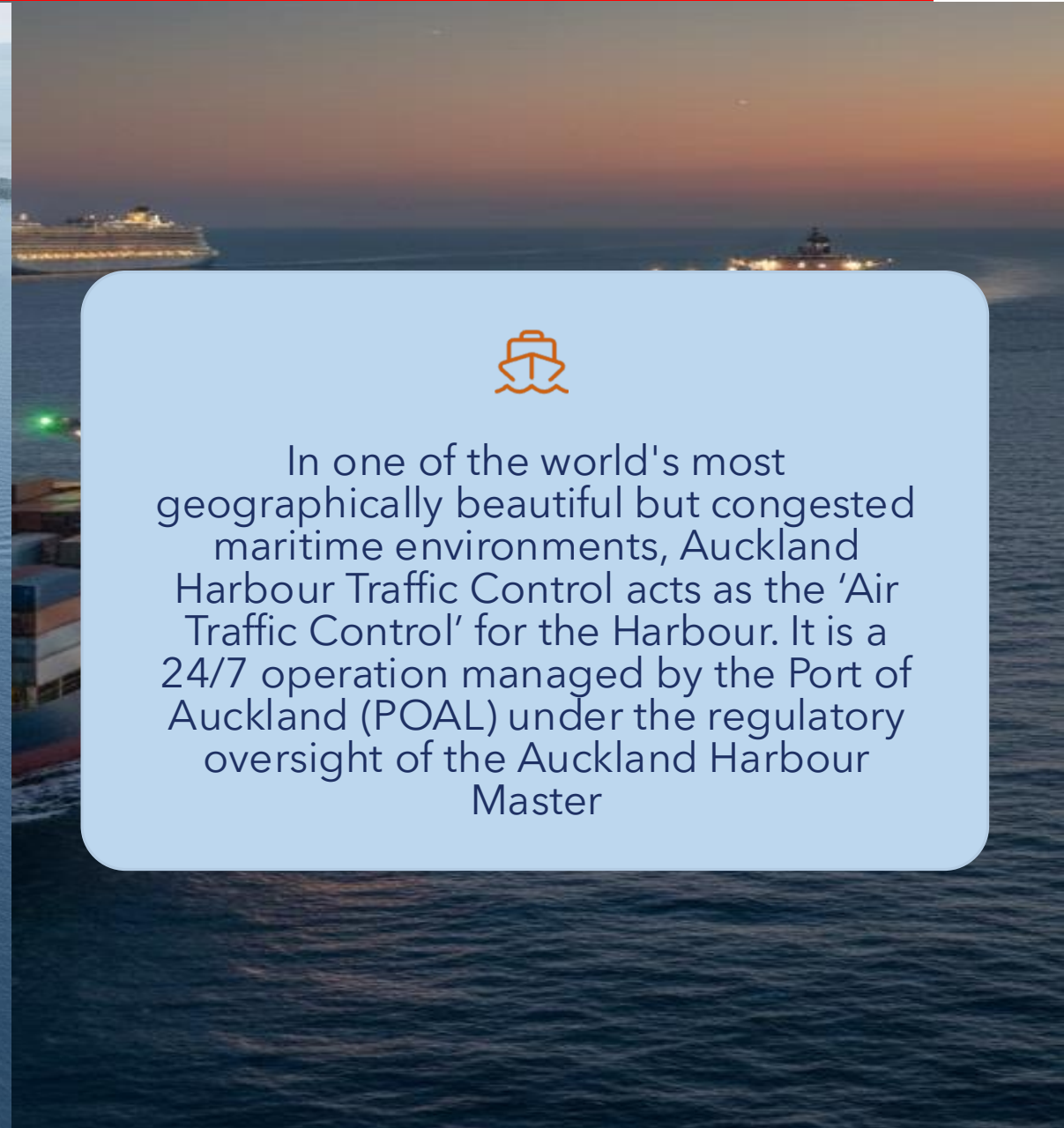
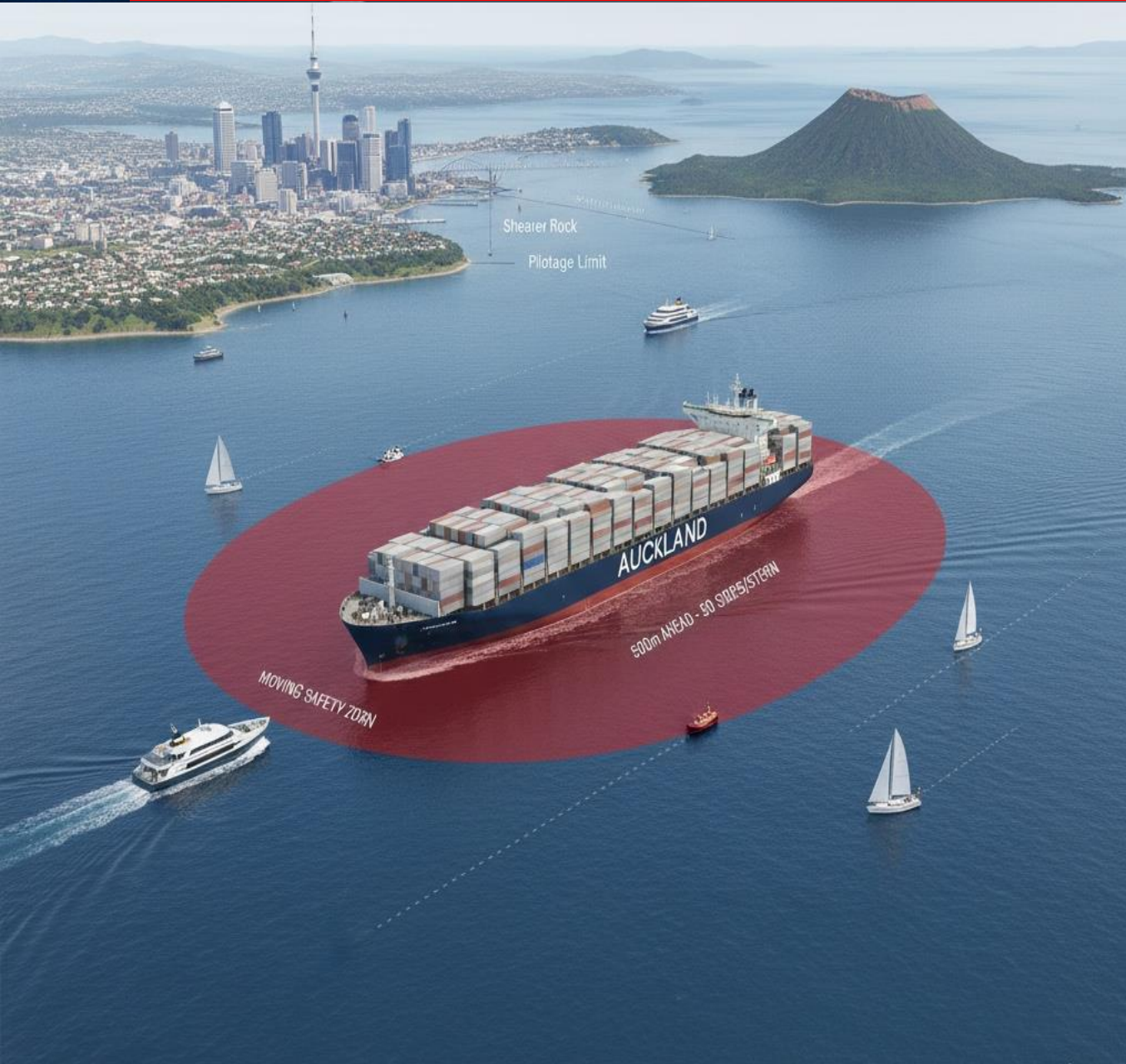
Vessel Traffic Control - Amsterdam



- The Port of Amsterdam Authority (officially Havenbedrijf Amsterdam NV) is the governing body responsible for the safe, swift, and environmentally sustainable management of shipping traffic. It oversees the entire Amsterdam port region, which stands as Europe's fourth largest port
- Operational handling is synchronised via the Central Nautical Management (CNB), representing the municipalities of Amsterdam, Beverwijk, Velsen and Zaanstad



Port Traffic Control - Auckland



In one of the world's most geographically beautiful but congested maritime environments, Auckland Harbour Traffic Control acts as the 'Air Traffic Control' for the Harbour. It is a 24/7 operation managed by the Port of Auckland (POAL) under the regulatory oversight of the Auckland Harbour Master



Navigationa Channel - Amsterdam





Vessel Traffic Control - Miami



- Port Miami sits on Dodge Island in Biscayne Bay, and every ship passes through a single dredged channel - Government Cut - to reach the open Atlantic. In 2025 the port handled over 8.5 million cruise passengers, roughly 164,000 every week, peaking on one November Sunday when ten ships and over 75,000 passengers passed through in a single day
- Despite that intensity, Miami has no formal port traffic control system. Every vessel, from a cruise ship to a weekend motorboat, shares the same radio channel. That gap was officially flagged as a safety risk in 2023, and a dedicated system is now under consideration
- A speeding recreational boat collided with a passenger ferry in Government Cut that same year, killing one person. New speed restrictions followed in 2025 - meaning the channel our ship transited had, until recently, no enforceable speed limit at all



Navigational Channel - Miami





River Plate (Río de la Plata)

SHARED WATERWAY TRAFFIC CONTROL



A Binational Model of Navigation Governance



COMISIÓN ADMINISTRADORA DEL RÍO DE LA PLATA (CARP)

Sets binational rules on the estuary

- Navigation rules
- Dredging channels
- Environmental protection



ARGENTINA

Prefectura Naval Argentina (PNA)

Controls ship traffic day-to-day

- VTS centres
- Port authorities



Buenos Aires



Port Authorities

- Berth & tug management
- Port authorities



Pilotage

- Mandatory pilots
- for most vessels

VESSEL TRAFFIC SERVICES (VTS)

- Manages real-time ship movements
- Enforces international rules



URUGUAY

Prefectura Nacional Naval (PNN)

- VTS for:
- Montevideo approaches
- Outer estuary routes

DREDGED DEEP-WATER CHANNELS

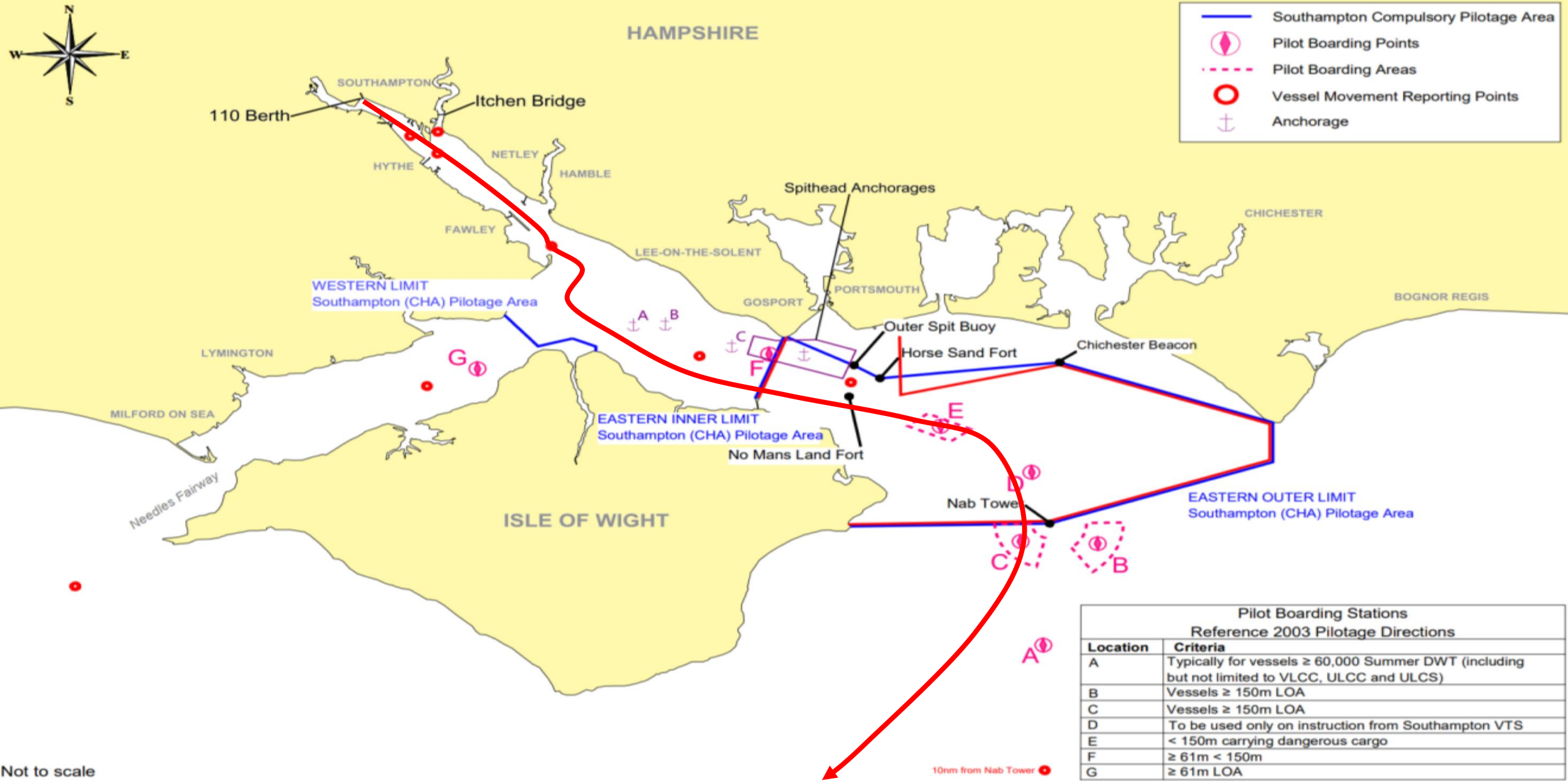


International Rules:

COLREGs | SOLAS | MARPOL
+ River Plate regulations



Port Traffic Control - Southampton



Not to scale



Port Traffic Control - Tampa

- Vessel Traffic Service Tampa, run by the US Coast Guard, manages ship movements in and out of Port Tampa Bay (covering Tampa Bay, its approaches and key shipping channels)
- Acts as the eyes, ears and traffic coordinator for the entire port area



Tampa is tricky due to its long, dredged, winding approach channel, shallow waters either side, tight bends in places and heavy commercial traffic. Cruise ships, tankers and bulk carriers all share the same 'road' - it is less a highway ... more a one-lane country road with very large vehicles

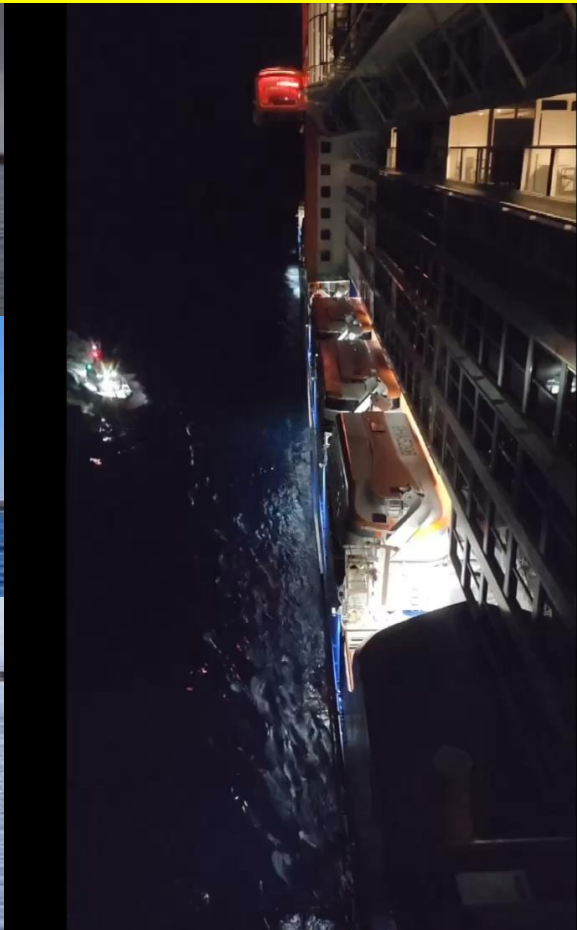


Pilotage



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





Navigation in Narrow Channels



KEEP TO
STARBOARD SIDE



AVOID ANCHORING

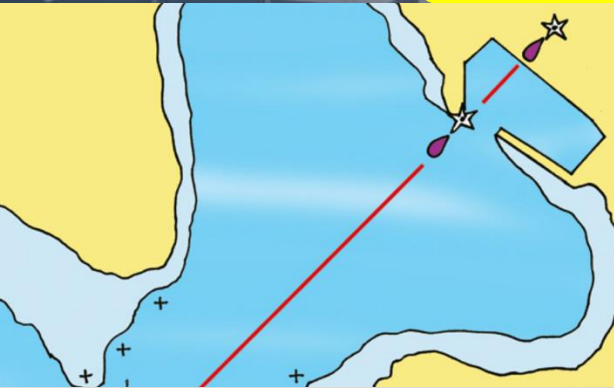




Leading Lines/Lights



Leading lines/lights are a pair of beacons set at different heights and distances on the shore. They create a transit that marks the exact center of a safe channel



Here we are on track because the leading lights are in line



To bring the lower leading light back in to line move to port...



... or in this case you'll need to move to starboard





International Organization for Marine Aids to Navigation Regions



Maritime Buoyage System

- Region A (port is red)
- Region B (port is green)



What it Looks Like



Region A - Ship Coming Into Harbour



Region B - Ship Coming Into Harbour





Traffic Separation Schemes - What Are They?



SEPARATE TRAFFIC LANES

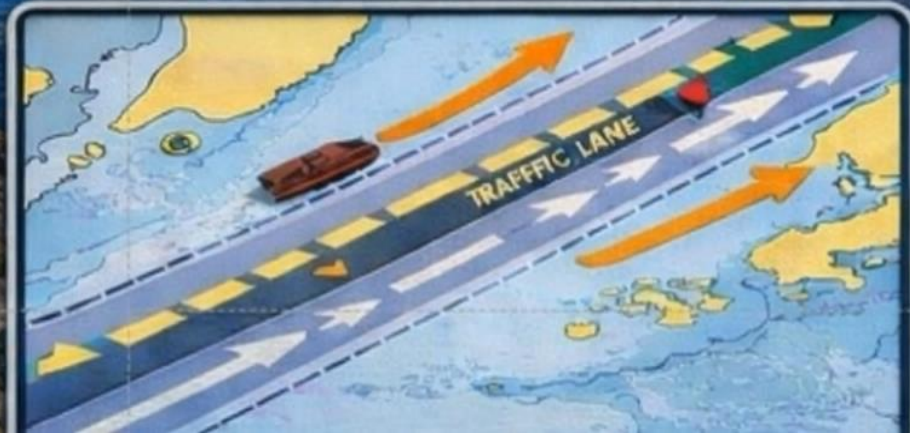
BUFFER ZONE

BUFFER ZONE

SEPARATE TRAFFIC LANES



**NO ANCHORING
IN SEPARATION SCHEMES**

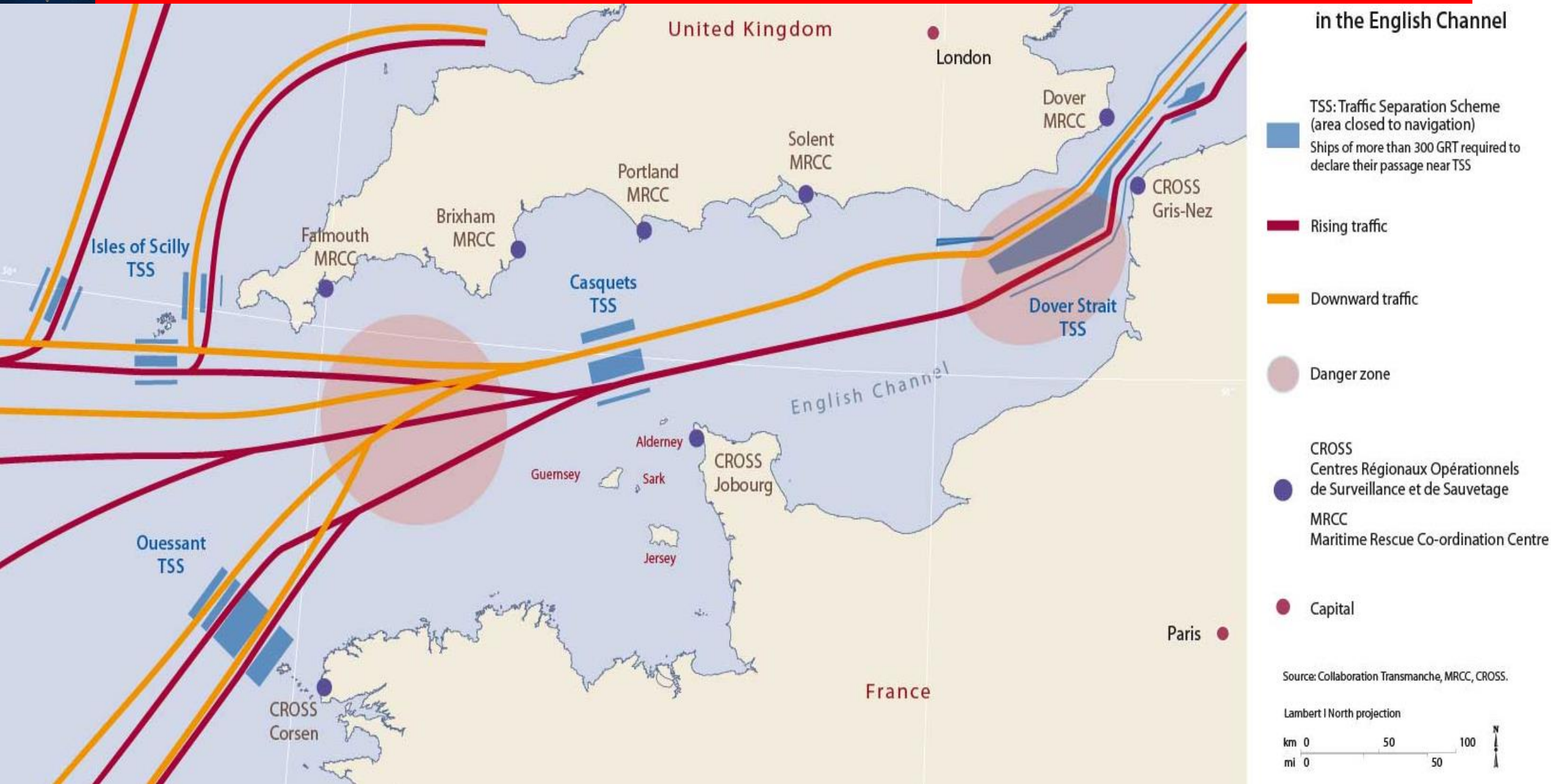


✓ You may cross a buffer zone but only by approaching it at a right angle

- ✓ Vessels follow separate traffic lanes
- ✓ Buffer zone separates lanes of traffic

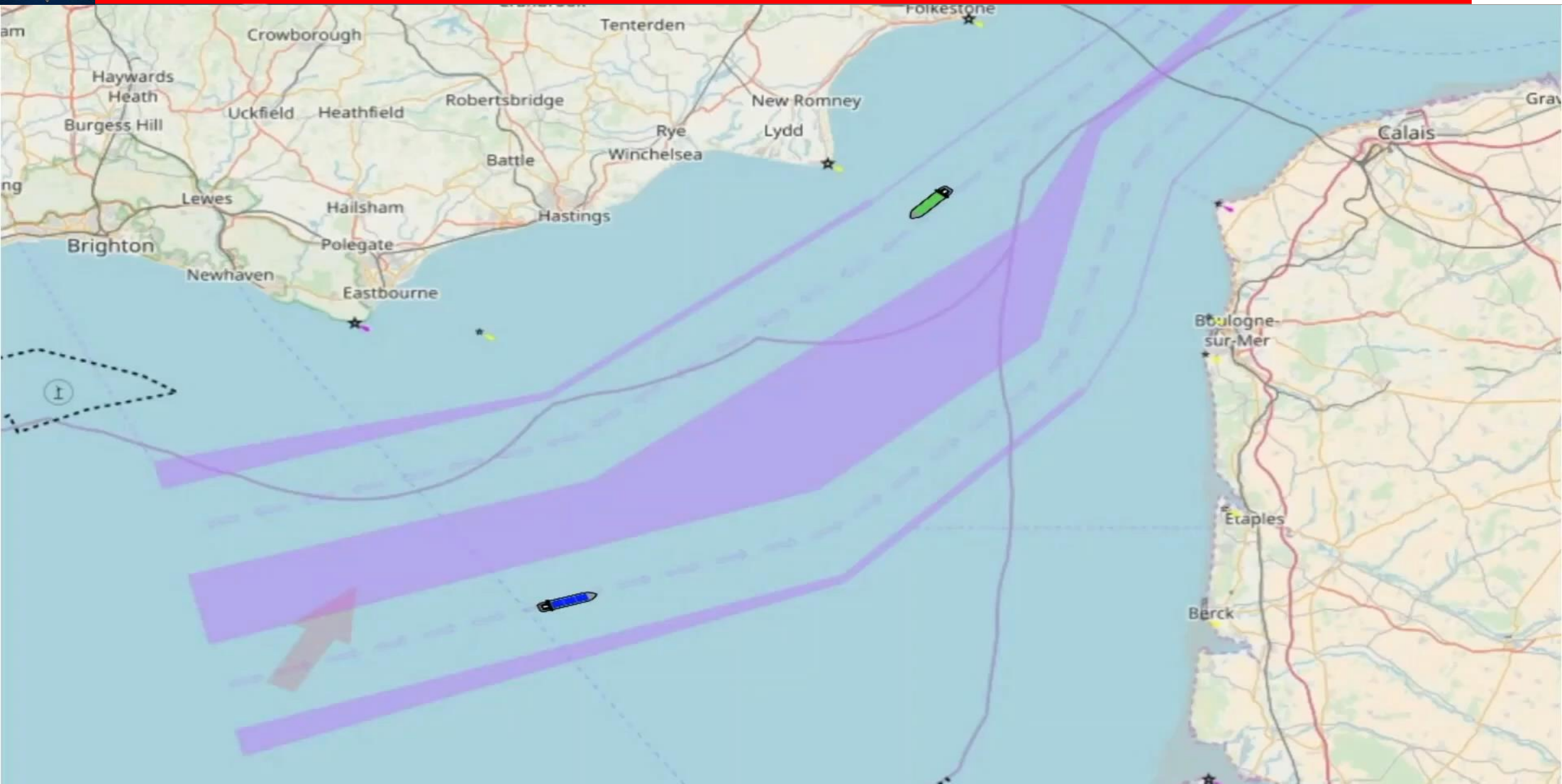


Traffic Separation Schemes - How They Work



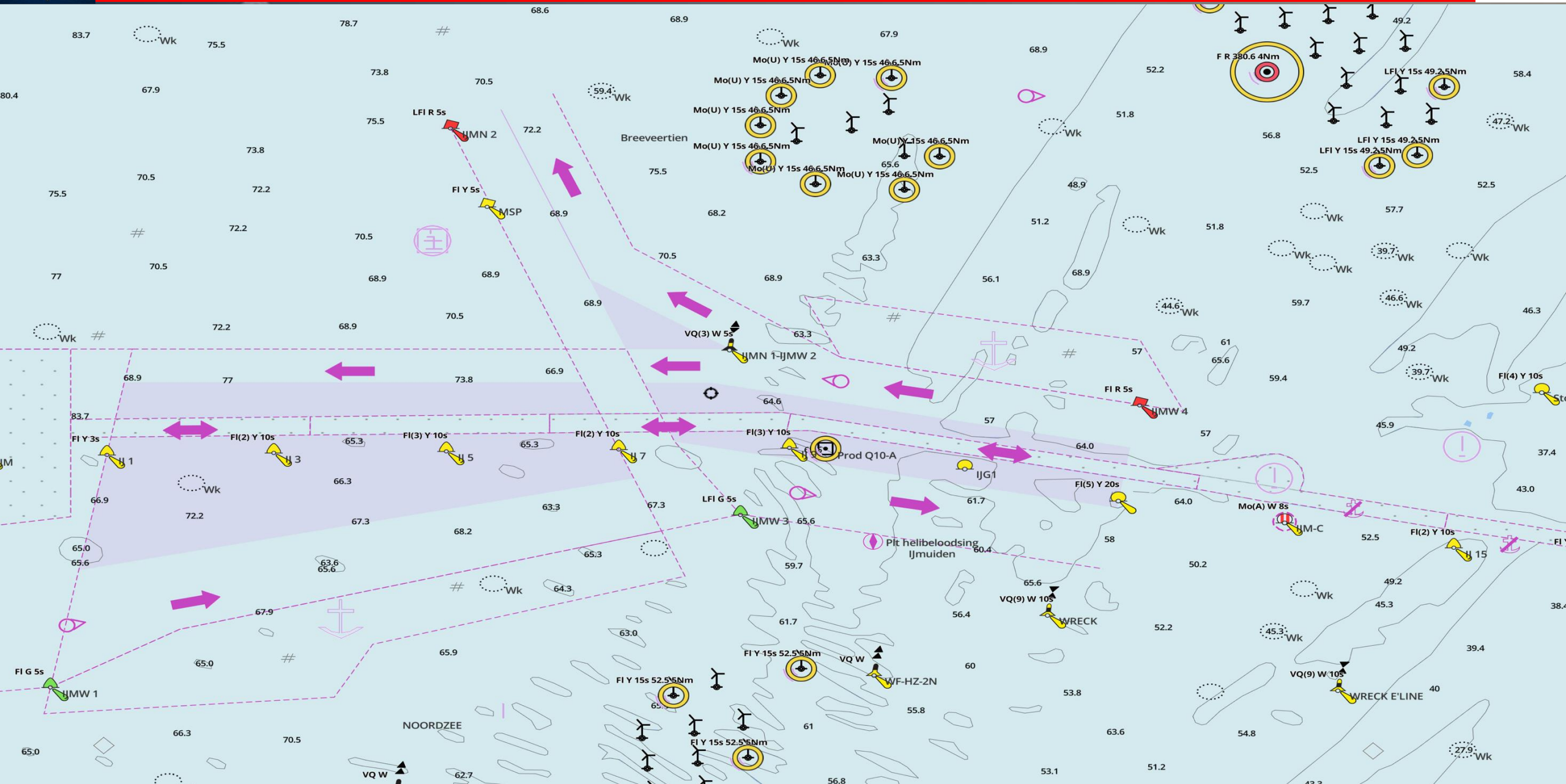


English Channel - Animation



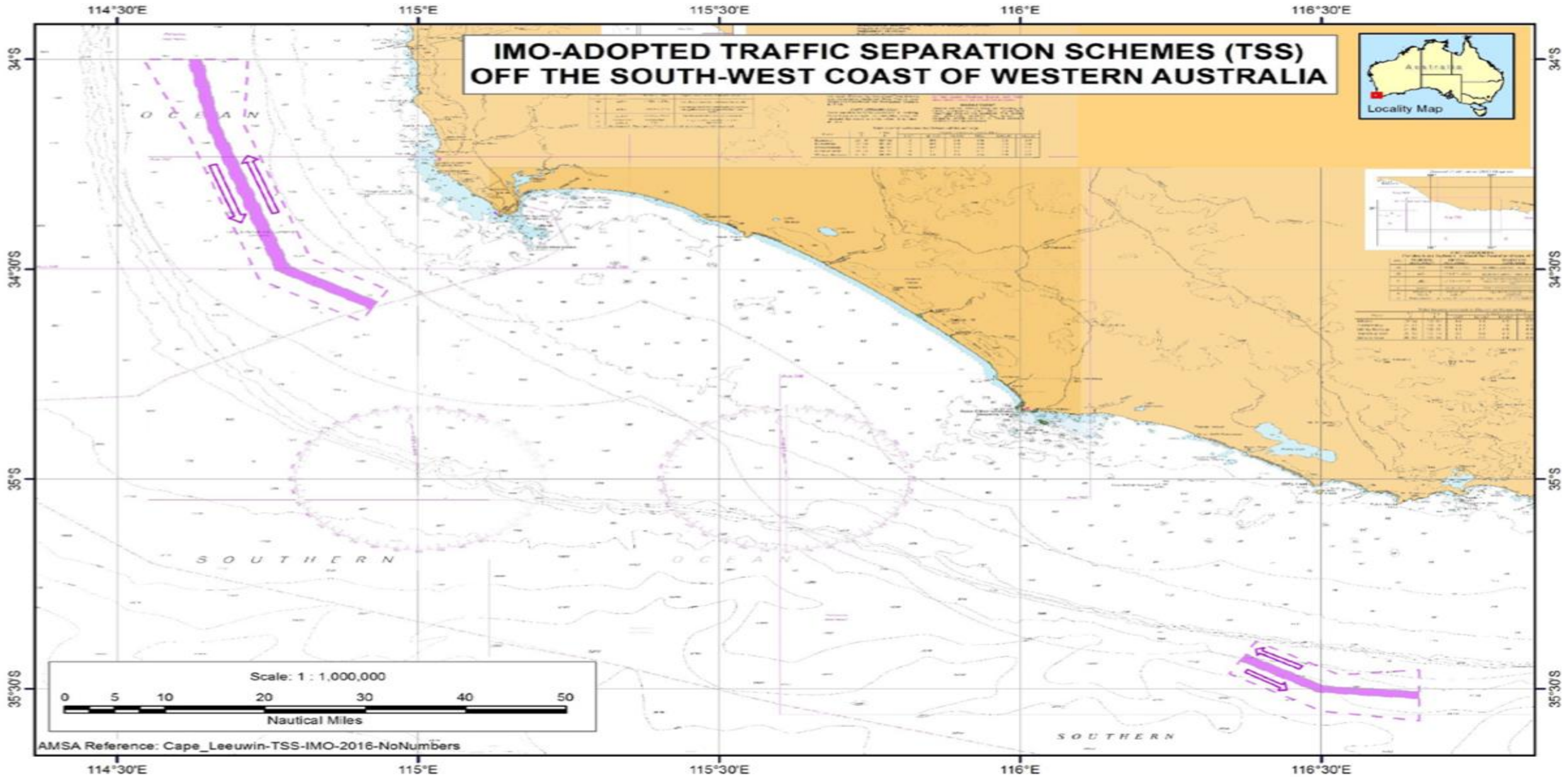


Traffic Separation Scheme - Amsterdam (Approaches)



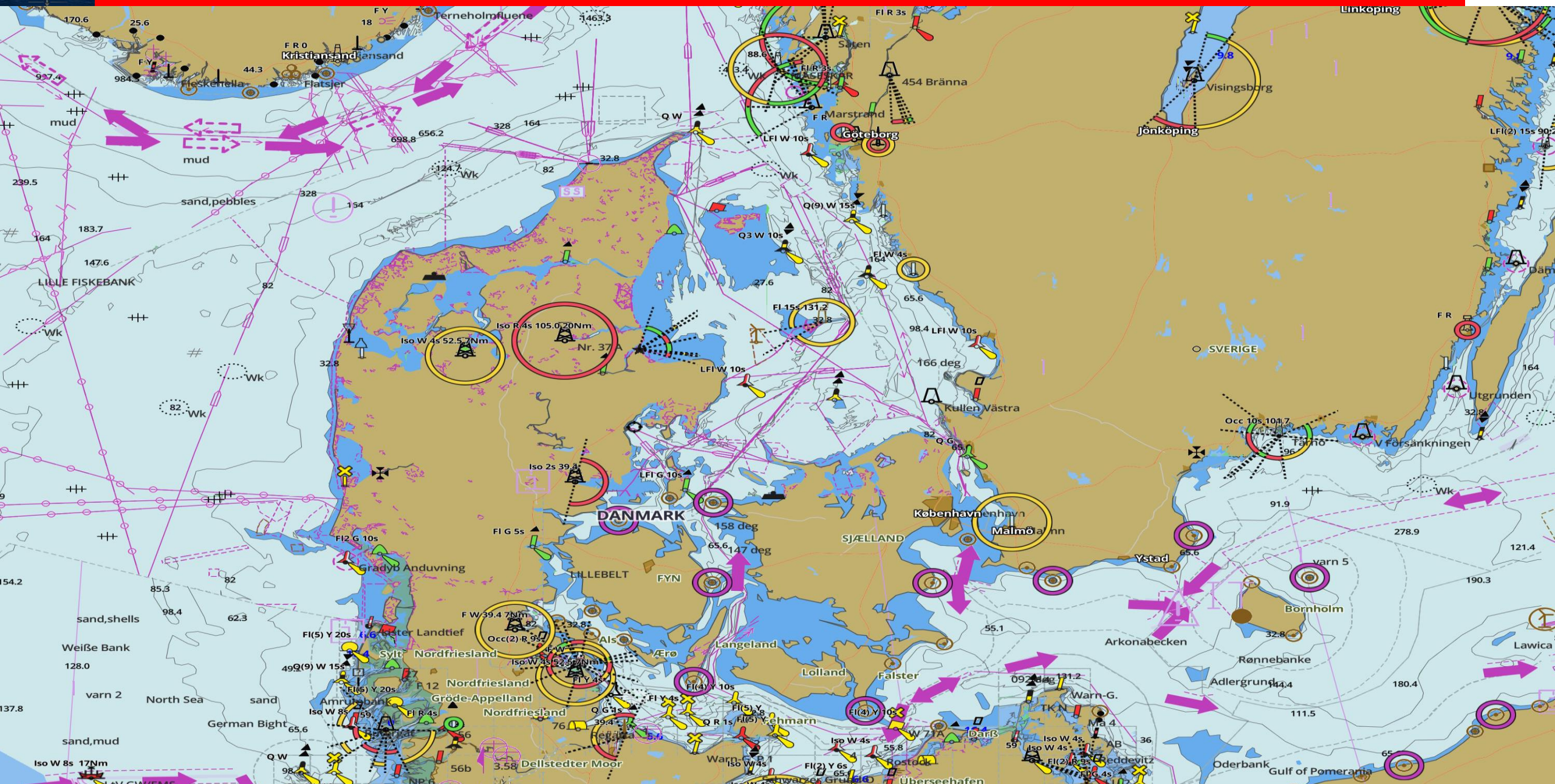


Traffic Separation Schemes - Australian





Traffic Separation Scheme - Baltic



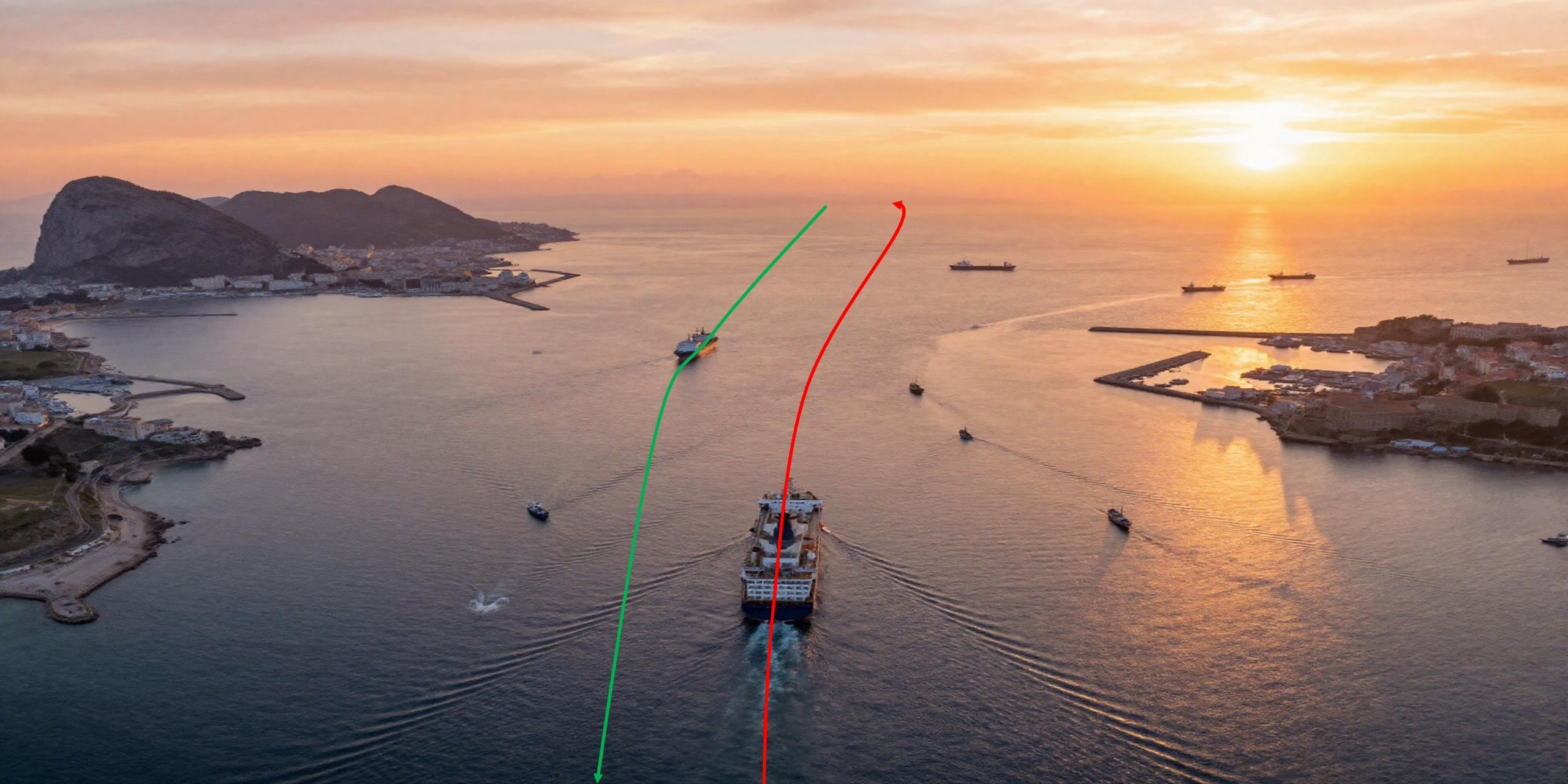


Traffic Separation Schemes - Chile





(Strait of) Gibraltar - Visualisation





Head-On Situation



Day - other vessel ahead or nearly ahead on a reciprocal or nearly reciprocal course



Night - masthead lights in a line or nearly in a line and/or both sidelights



Take action - alter course to starboard





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 power-driven 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

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.



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

Mike Schuler

Total Views: 0

February 12, 2026

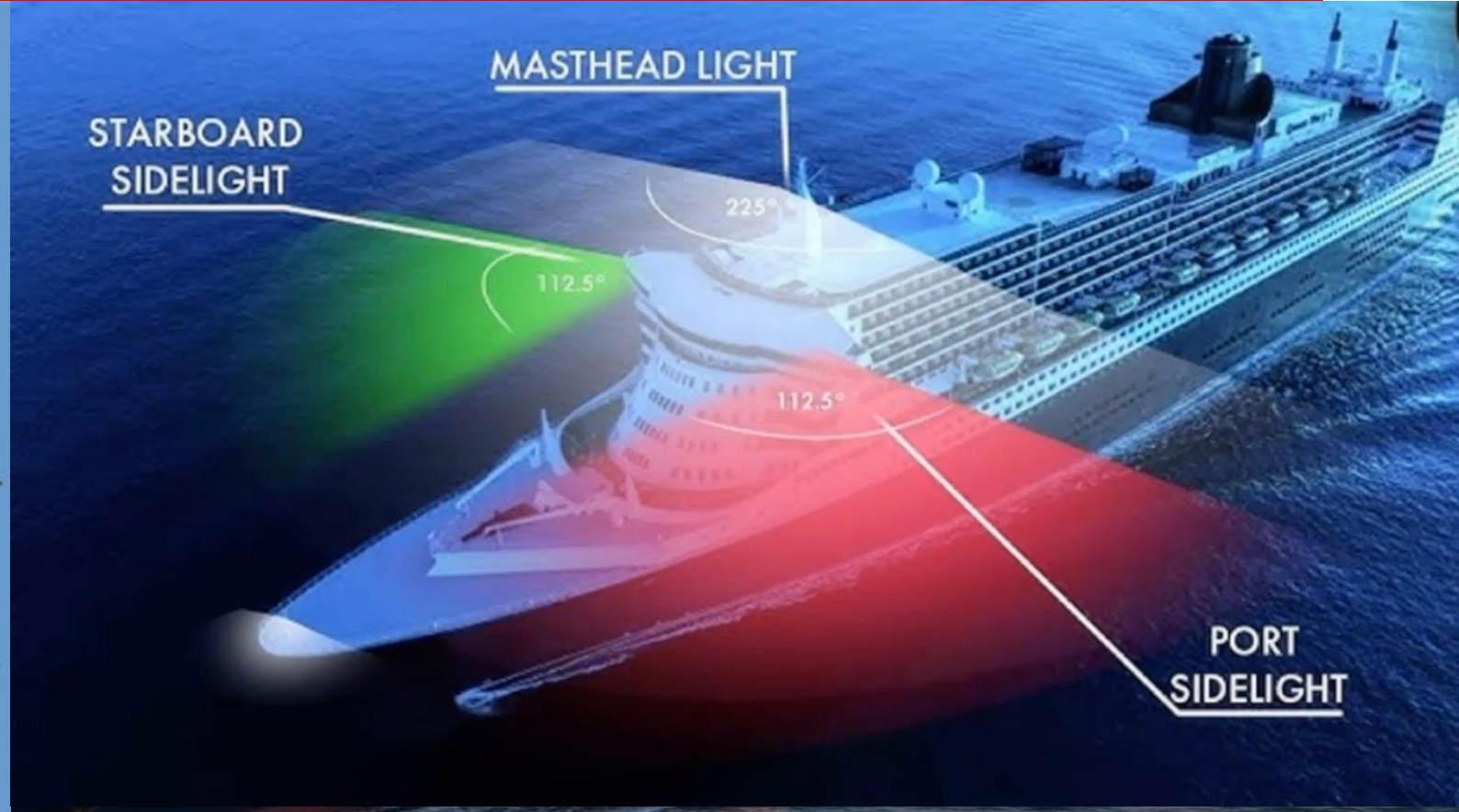
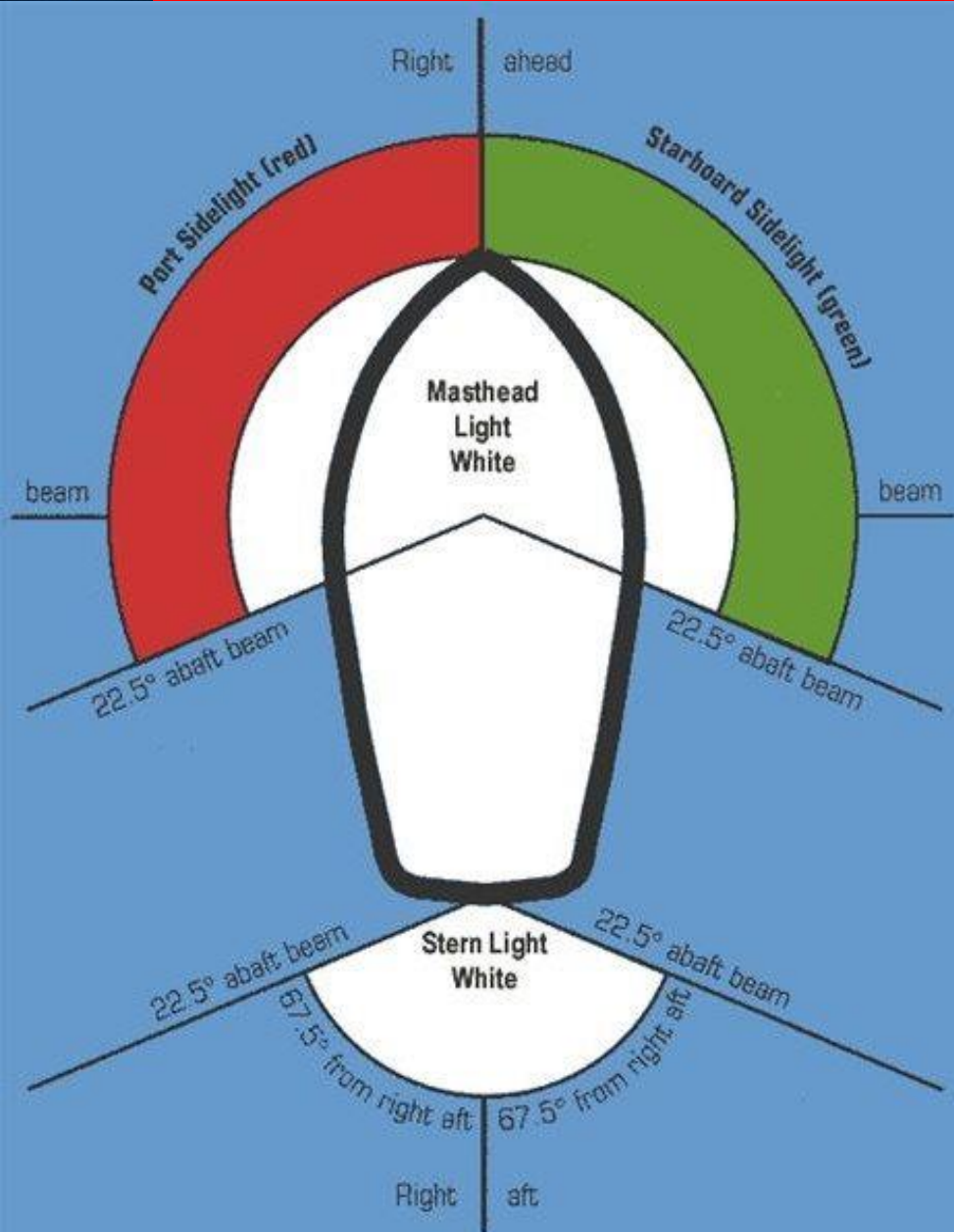
More than two years after the cargo ship *Verity* sank following a collision in the German Bight, the UK's Marine Accident Investigation Branch has released its [final report](#)—and its conclusion is stark: the loss of five lives was entirely preventable.

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."



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 **Silver Nova**, 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 - Silver Nova



Stern Light

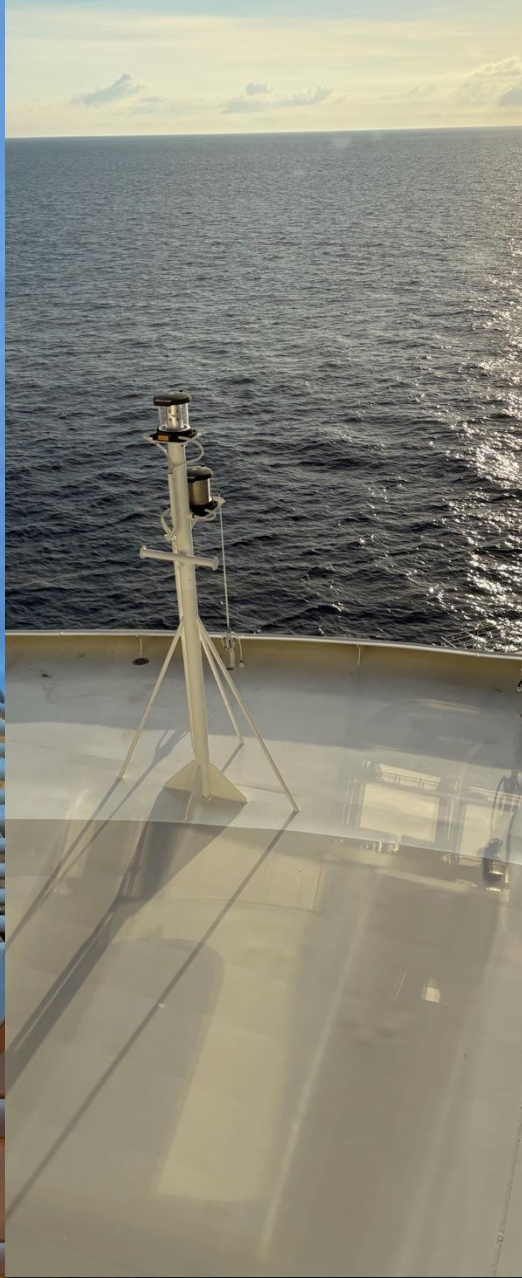
Masthead Lights

Side Lights



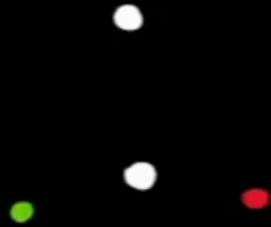


Masthead Lights - Silver Nova





































Head-On Situation - Night Animation





A Shape/Light Sequence for Every Eventuality



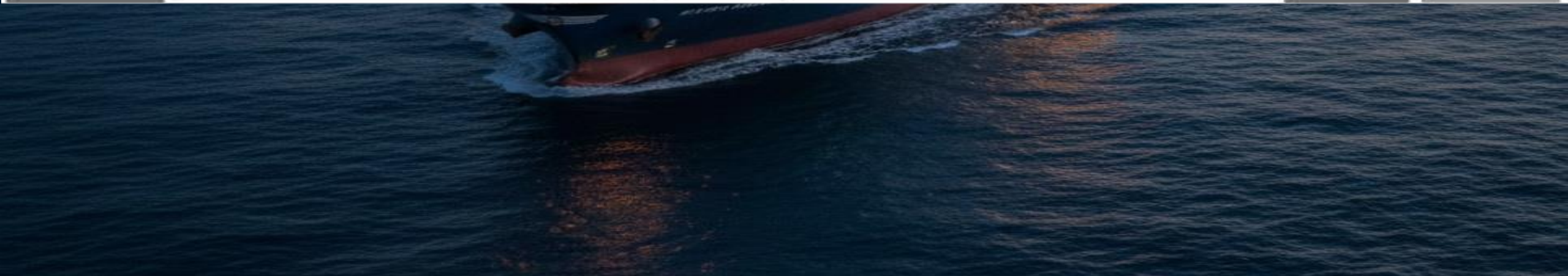
<p>Rule 25</p> <p>Sailing vessels</p>	  <p>Less than 7m</p> <p>If not showing navigation lights, hand held torch shown in time to prevent collision.</p>		  <p>Less than 7m</p> <p>If not showing navigation lights, hand held torch shown in time to prevent collision.</p>	 <p>Under both sail & power</p>	
<p>Rule 26</p> <p>Fishing Vessels Trawling (also see Annex II)</p>	 <p>Over 50 m underway & trawling</p>	 <p>Over 50m</p>	 <p>Over 50 m underway & trawling</p>		
<p>Rule 26</p> <p>Fishing Vessels Other than Trawling (also see Annex II)</p>	 <p>Fishing vessels with non-trawling gear extended more than 150m not underway</p>	 <p>Underway</p>	 <p>Fishing vessels with non-trawling gear extended more than 150m not underway</p>		
<p>Rule 27</p> <p>Vessels not under command</p>					
<p>Rule 27</p> <p>Vessels not under comm'd making way through water</p>					
<p>Rule 27</p> <p>Power-Driven Vessels restricted in ability to manouevre</p>	 <p>Not making way</p>	 <p>Making way</p>	 <p>Not making way</p>		



A Shape/Light Sequence for Every Eventuality



Rule 28 Vessels constrained by draft					
Rule 29 Pilot Vessels on Pilot Duty	 Under way	 At anchor	 Under way	 At anchor	
Rule 30 Vessels at anchor	 Vessels over 50m <small>may also show deck lights</small>	 Vessels less than 50m	 Vessels over 50m <small>may also show deck lights</small>		Bell & gong signals as per rule 35(g) plus: on approach of another vessel
Rule 30 Vessels aground	 Vessels over 50m		 Vessels over 50m		Bell & gong signals as per rule 35(h)





... Even for a Submarine





Sound Signals You Might Hear



INTERNATIONAL

PART D — SOUND AND LIGHT SIGNALS



Rule 34 — Maneuvering and Warning Signals

(a) When vessels are in sight of one another, a power-driven vessel underway, when maneuvering as authorized or required by these Rules, shall indicate that maneuver by the following signals on her whistle:



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





Remember



All of the 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 Silver Nova are so serious about their work



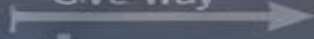
Next Presentation (Date at Time)



Rule 19



Give Way



Receiving Situation
Stand on





Thank You

