



11 March 2019

## SEMINAR ON THE EFFECTIVE IMPLEMENTATION OF IALA STANDARDS

The Sheraton Istanbul Atakoy, Istanbul, Turkey

The use of IALA Standards, Recommendations and Guidelines to ensure appropriate Aid to Navigation Assessment and Delivery

Roger Barker  
Trinity House



# SOLAS Chapter V: Regulation 13



- 1. Each Contracting Government undertakes to provide, as it deems practical and necessary either individually or in co-operation with other Contracting Governments, aids to navigation, Contracting Governments undertake to take into account the international recommendations and guidelines\* when establishing such aids.*
- 2. In order to obtain the greatest possible uniformity in aids to navigation, Contracting Governments undertake to take into account the international recommendations and guidelines\* when establishing such aids.*

*\* Refer to the appropriate recommendations and guidelines of IALA and SN/Circ.107 - Maritime Buoyage System*



**IALA**



## **NAVGUIDE 2018**

MARINE AIDS TO NAVIGATION MANUAL

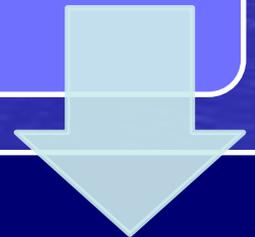
8TH EDITION

INTERNATIONAL ASSOCIATION OF MARINE  
AIDS TO NAVIGATION AND LIGHTHOUSE AUTHORITIES

Standards



Recommendations



Guidelines

## AtoN Planning and Service Requirements

- Obligations and regulatory compliance
- AtoN Planning (Offshore signals, bridge signals, traffic signals, MBS, fairway design)
- Virtual marking
- Levels of service (objectives, Availability and Categories)
- Risk Management
- Quality management

## AtoN Design and Delivery

- Visual signalling (Vision, Colour, Conspicuity, Rhythmic characters)
- Range and performance (visual and audible)
- Design, Implementation & Maintenance
- Power systems
- Floating AtoN (buoys, moorings, stability...)
- Environment, Sustainability & Legacy

## Radionavigation Services

- Satellite positioning and timing
- Terrestrial radio positioning and timing (including eLoran, eChayka, R-mode)
- RACON & Radar positioning
- Augmentation services including SBAS & GBAS

## Vessel Traffic Services

- VTS implementation
- VTS operations
- VTS data and information management
- VTS communications
- VTS technologies
- VTS Auditing and assessing
- VTS additional services

## Training and Certification

- Training and assessment
- Competency certification and revalidation
- Simulation in training
- Human factors and ergonomics
- Capacity building

## Digital Communications Technologies

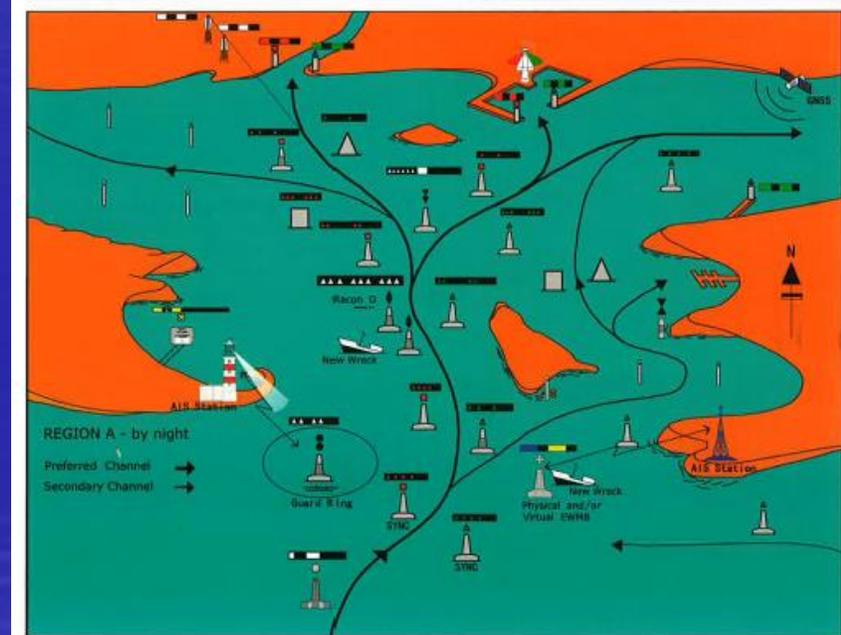
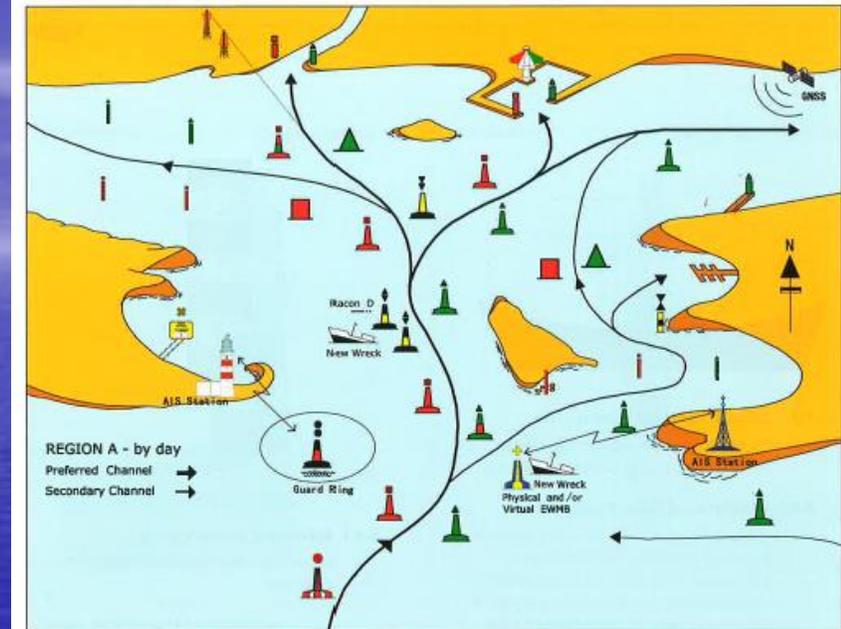
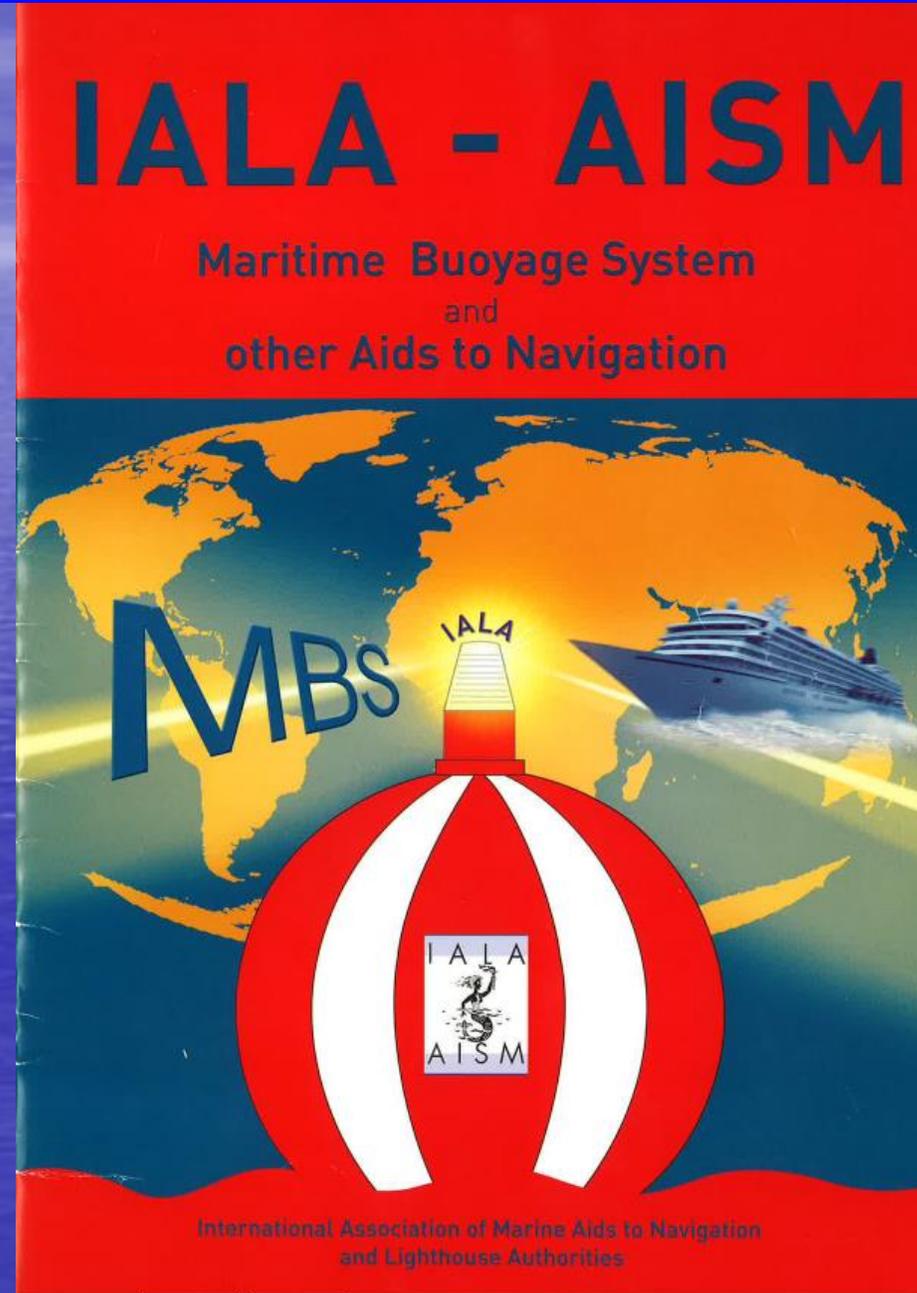
- Wide/Medium bandwidth systems (AIS & VDES)
- Narrow bandwidth systems (NAVDAT, MF beacons)
- Harmonised maritime connectivity (Maritime Internet of Things (Intelligent sensors, AtoN monitoring))

## Information Services

- Data models and data encoding (MSPs, IVEF, S-100, S-200, ASM)
- Data exchange systems
- Terminology, symbology and portrayal

# Standard 1010 – AtoN Planning & Service Requirements

## The IALA Maritime Buoyage System



# Standard 1010 - Risk Management

1.4. Risk Management	R1002	Risk Management for Marine Aids to Navigation	ARM	Nor.		[G]1018	Risk Management (May 2013)
						G1123	The Use of IALA Waterway Risk Assessment Programme (IWRAP MkII) (June 2017)
						G1124	The Use of Ports and Waterways Safety Assessment (PAWSA MkII) Tool (June 2017)
						G1138	The Use of the Simplified IALA Risk Assessment Method (SIRA) (Dec 2017)
						[G]1104	The Application of Maritime Surface Picture for Analysis in Risk Assessment and the Provision of [Marine] Aids to Navigation Service Delivery (Dec 2013)



## IALA GUIDELINE

G1124

THE USE OF PORTS AND W  
ASSESSMENT (PAWSA) MK

**Edition 1.0**

June 2017

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International Association of Marine Aids to Navigation and Lighthouse Authorities  
Association Internationale de Signalisation Maritime

**Edition 1.0**

June 2017

Revokes IALA Recommendation O-134  
IALA Risk Management Tool for Ports and

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## IALA MODEL COURSE

L1 3

AIDS TO NAVIGATION MANAGER TRAINING  
LEVEL 1 - USE OF THE IALA RISK  
MANAGEMENT TOOLS

**Edition 2.0**

December 2015

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# Education

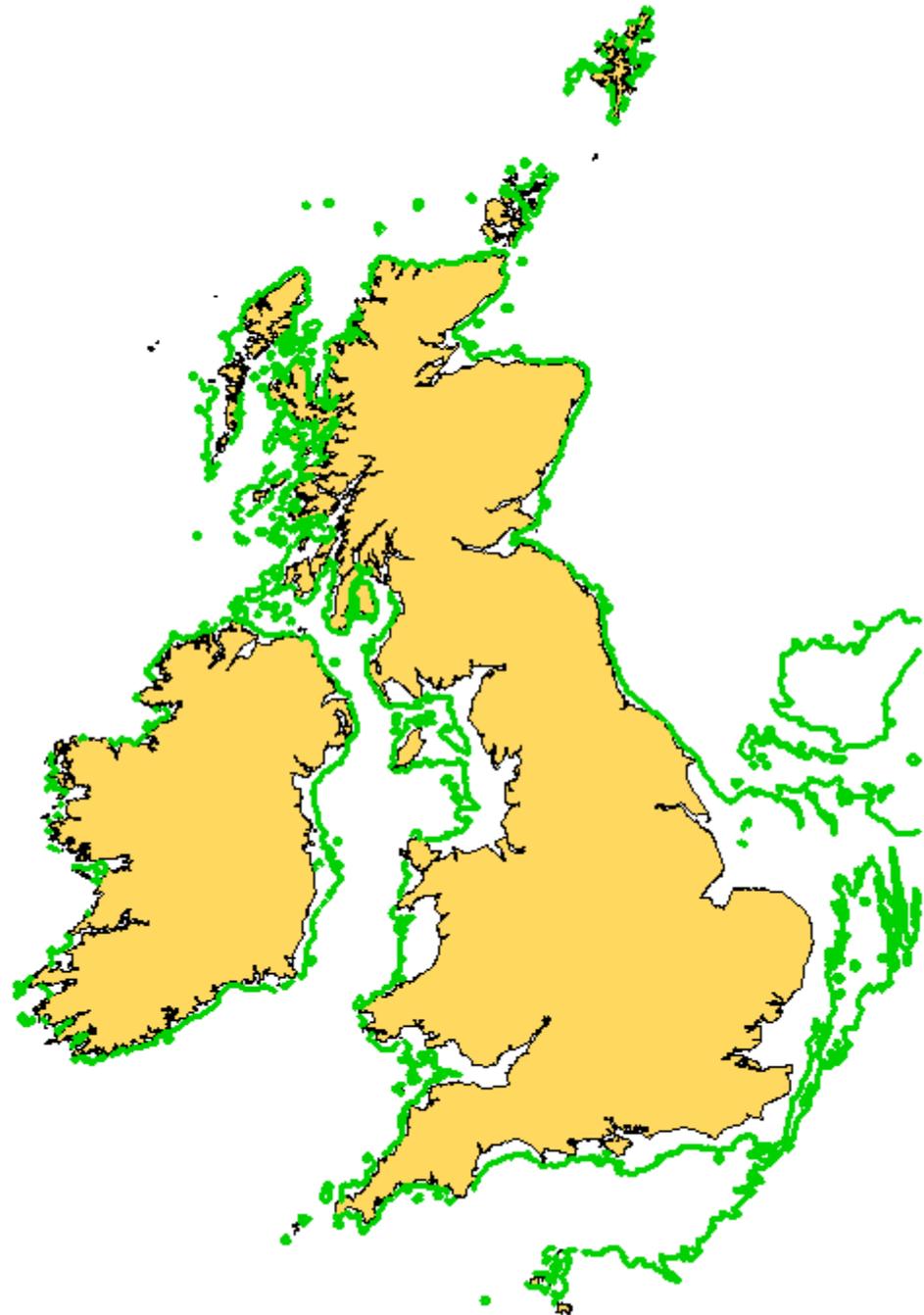
Guideline 1018

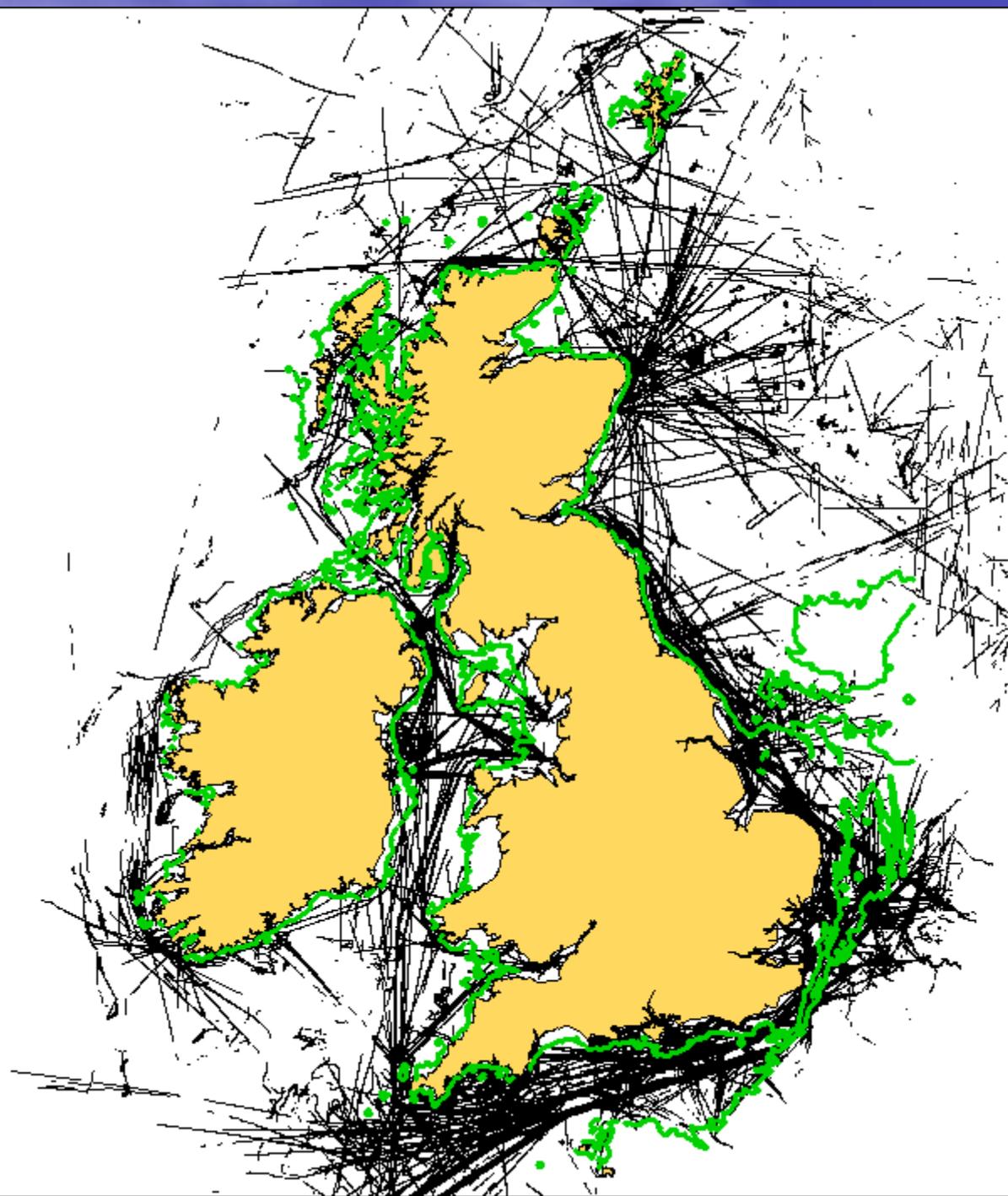


ON AS A TOOL FOR  
AND AtoN PLANNING

# Volume of traffic and degree of risk

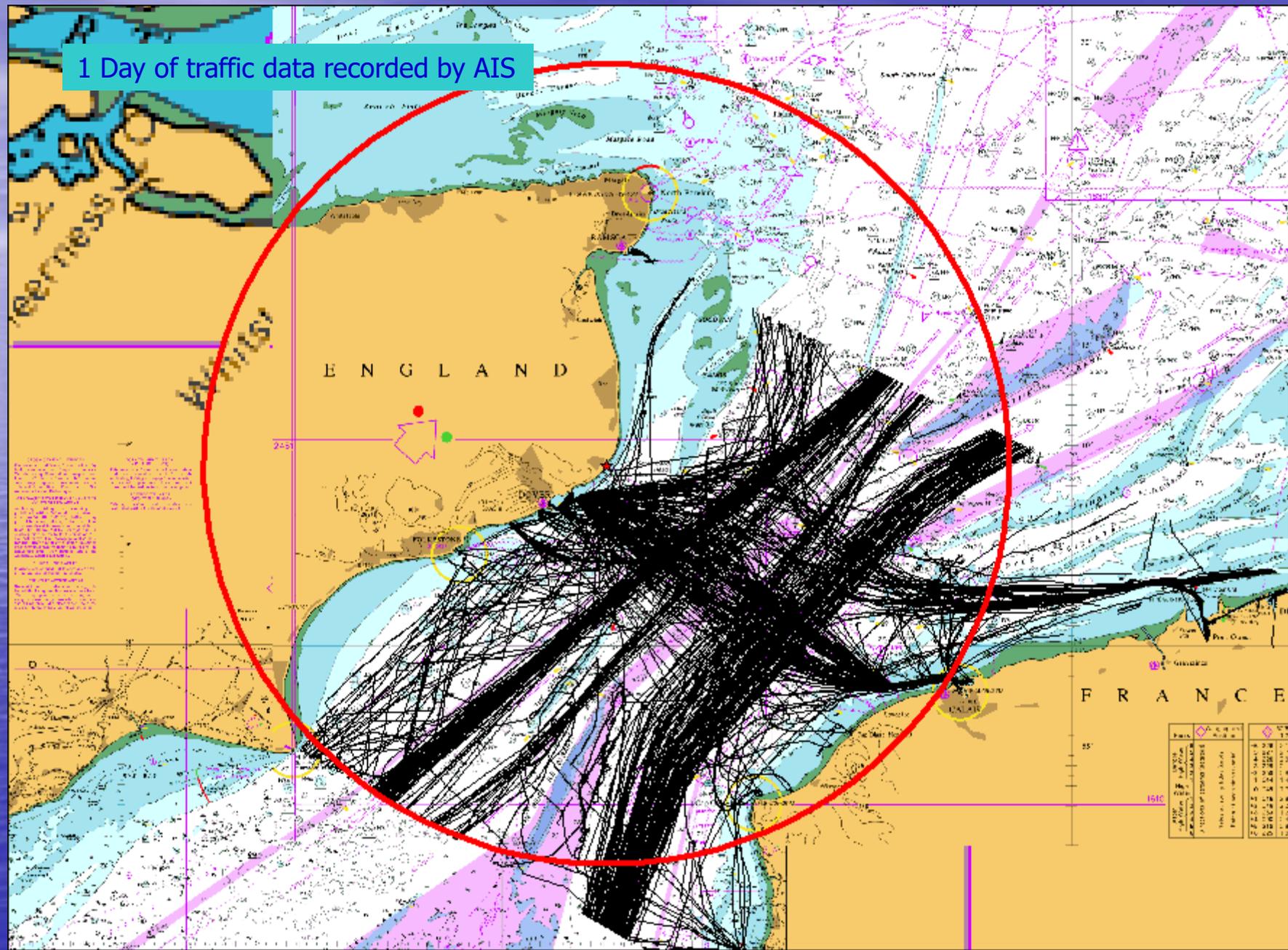






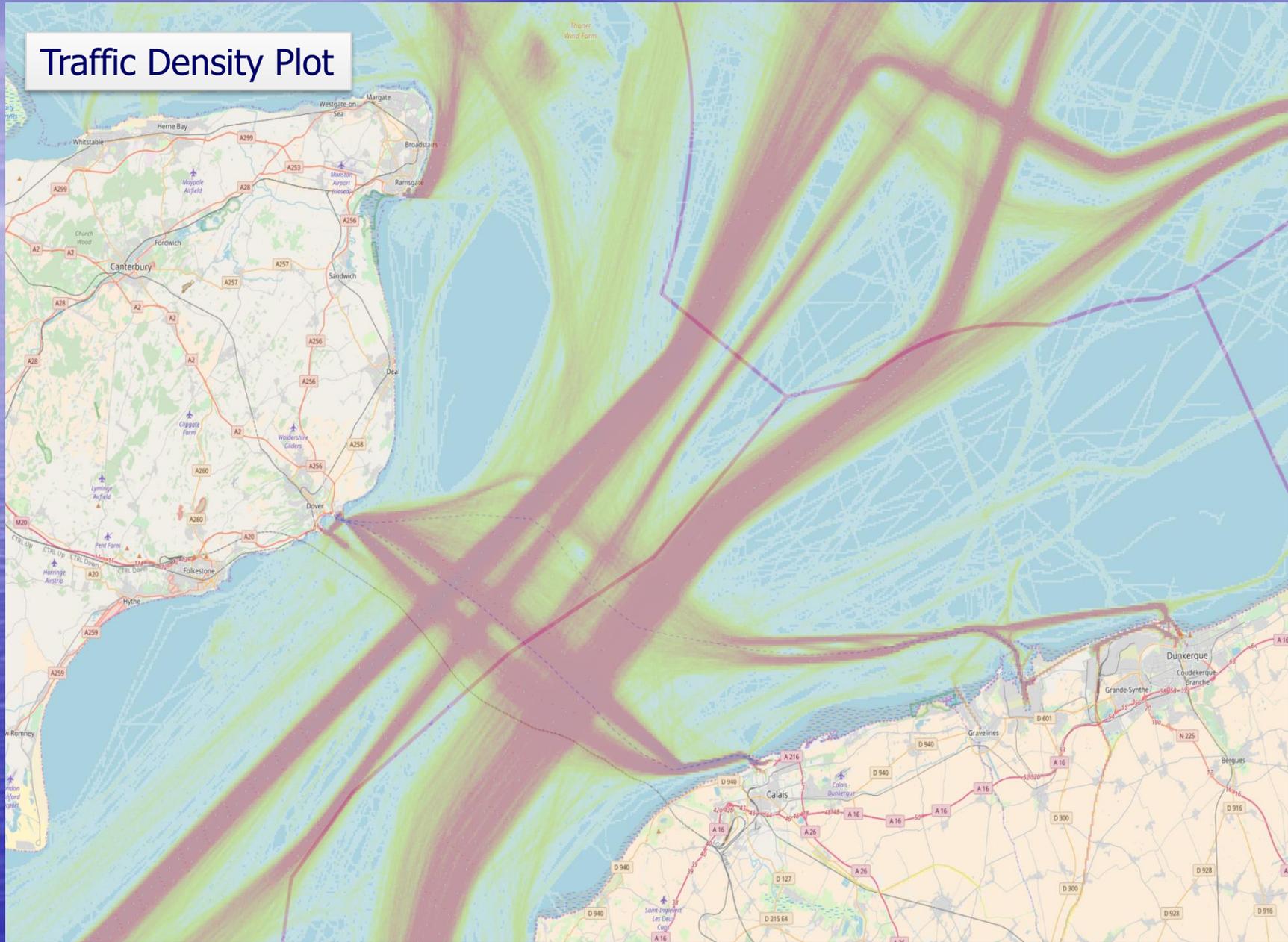


1 Day of traffic data recorded by AIS

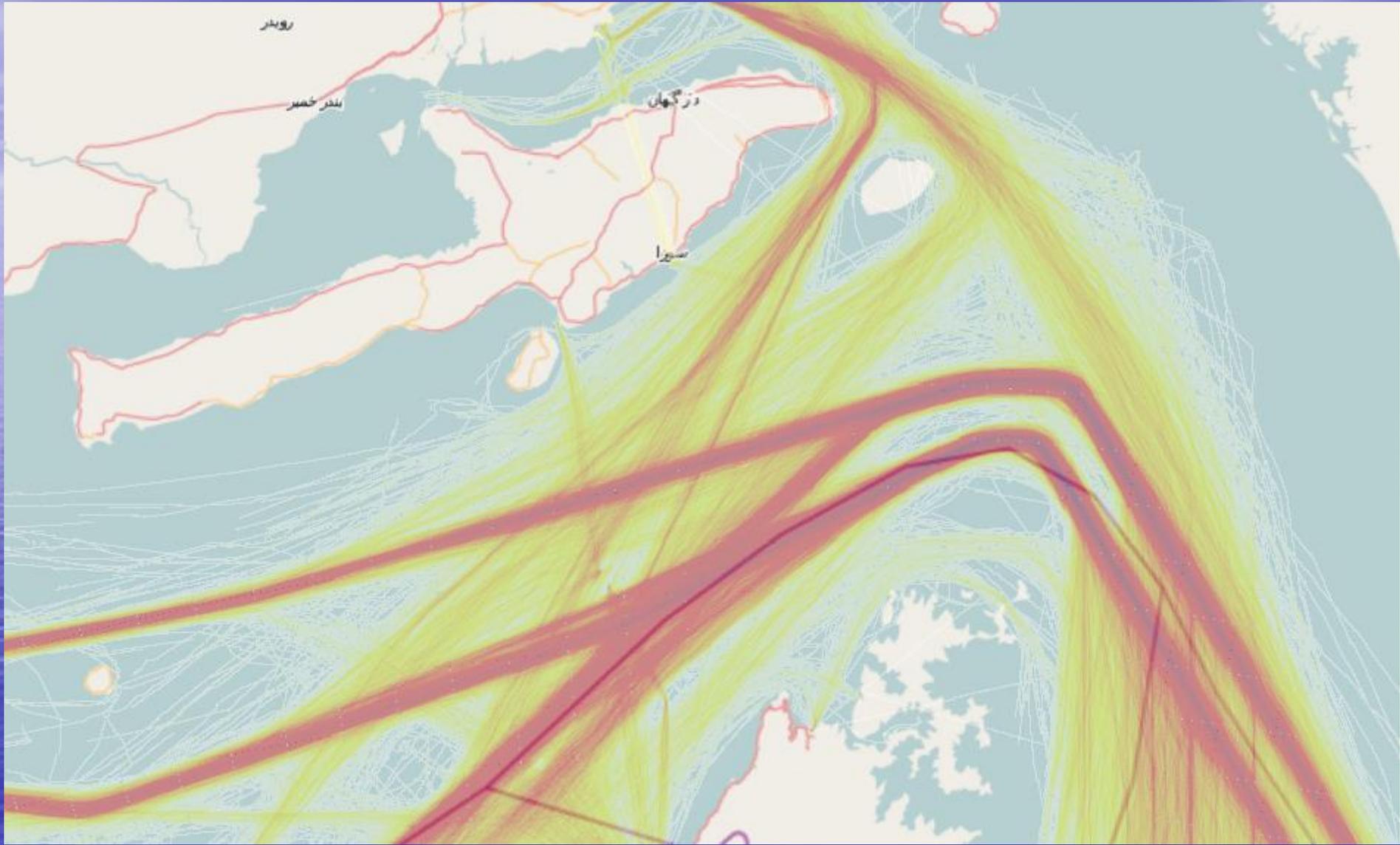


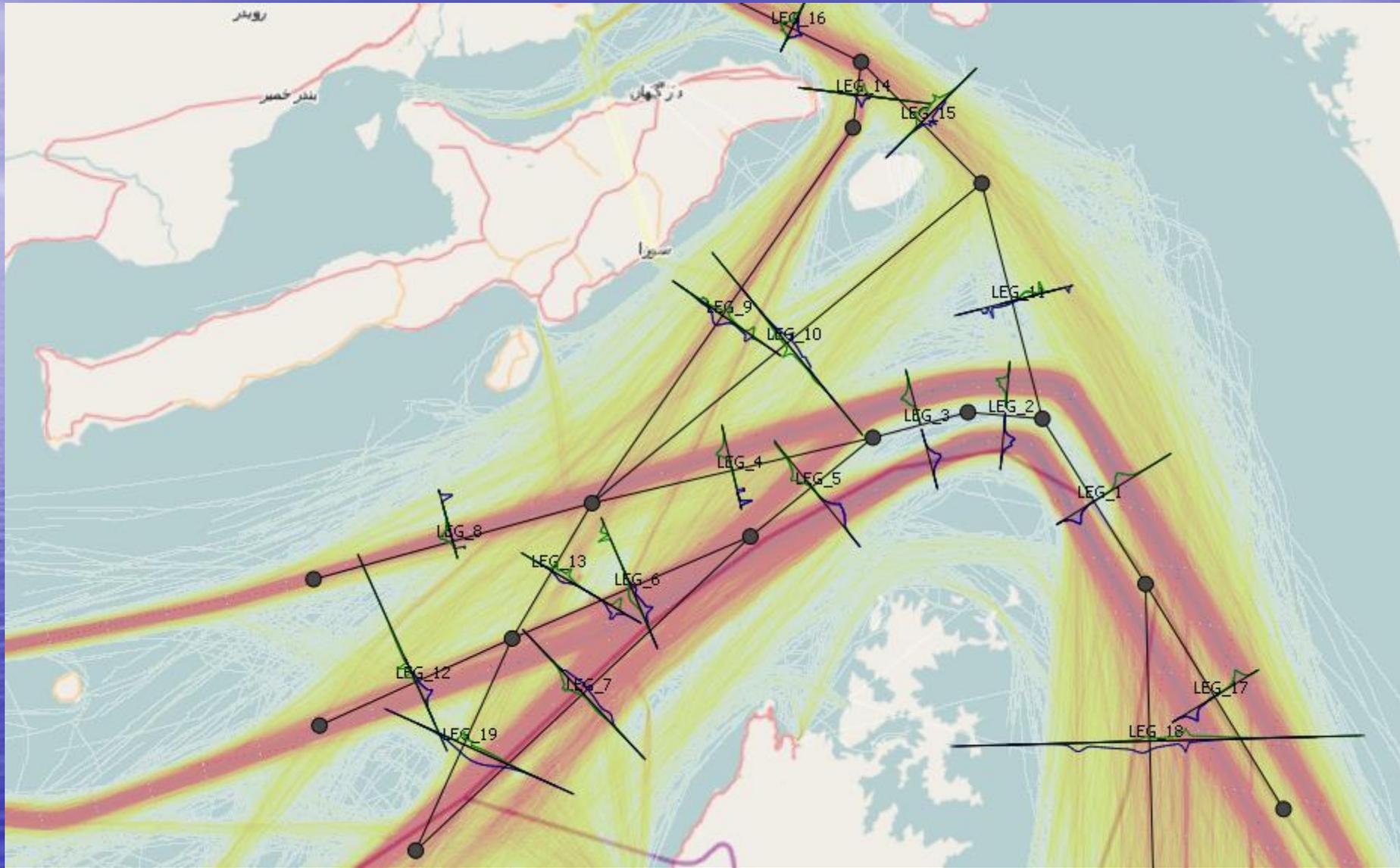


# Traffic Density Plot









IWRAP Mk2 Extended v3.3.0 - Licensed to Roger Barker (Trinity House) - by GateHouse - Expires 28 Jan 2011 - [Job View]

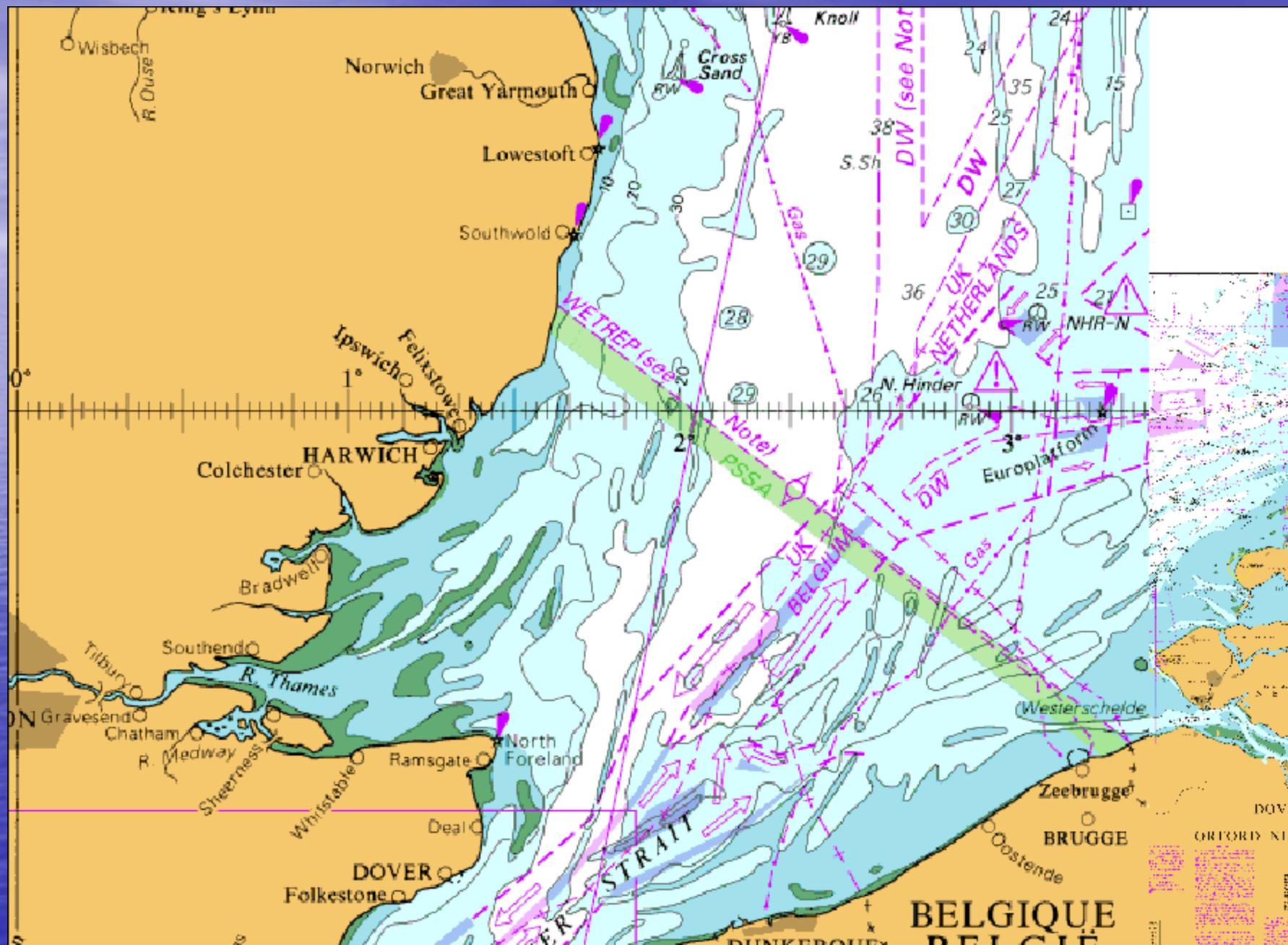
File Edit Tools Settings Data Model Actions Map View Help

**Jobs**

State	Name	Algorithm	Model	Started	Completed
Completed	SMT 2	Incident v1.0	003-Roger Paris...	Tue 18. Jan 00:3...	Tue 18. Jan 00:39:24 2011
Completed	SMT1	Incident v1.0	003-Roger Paris...	Tue 18. Jan 00:2...	Tue 18. Jan 00:20:47 2011
Completed	Test 03 - Ground	Incident v1.0	003-Roger Paris...	Thu 13. Jan 10:3...	Thu 13. Jan 10:33:20 2011
Completed	Test 03 - paris	Incident v1.0	003-Roger Paris...	Thu 13. Jan 10:3...	Thu 13. Jan 10:31:40 2011
Completed	Revised Dover - Trond	Incident v1.0	Dover_Trond v1.1	Wed 22. Dec 10:...	Wed 22. Dec 10:35:24 2010
Completed	Dover - back at TH	Incident v1.0	Dover rhb1 v1.5	Mon 29. Nov 10:...	Mon 29. Nov 10:57:49 2010
Completed	Roger later test	Incident v1.0	Dover rhb1 v1.4	Thu 18. Nov 12:...	Thu 18. Nov 12:03:51 2010
Completed	Dover 2	Incident v1.0	Dover rhb1 v1.4	Thu 18. Nov 11:...	Thu 18. Nov 11:57:40 2010
Completed	Dover 1	Incident v1.0	Dover rhb1 v1.3	Thu 18. Nov 10:...	Thu 18. Nov 10:35:31 2010
Completed	Hatter 2 with groundings	Incident v1.0	Hatter RHB 2 v1.2	Wed 17. Nov 15:...	Wed 17. Nov 15:49:22 2010
Completed	Hatter 1	Incident v1.0	Hatter RHB 2 v1.2	Wed 17. Nov 15:...	Wed 17. Nov 15:03:50 2010
Completed	Test 6	Incident v1.0	002-Roger Paris...	Wed 17. Nov 10:...	Wed 17. Nov 10:40:01 2010
Completed	Test 5	Incident v1.0	002-Roger Paris...	Wed 17. Nov 10:...	Wed 17. Nov 10:39:30 2010
Completed	Test 4- am 17th	Incident v1.0	002-Roger Paris...	Wed 17. Nov 08:...	Wed 17. Nov 08:33:46 2010

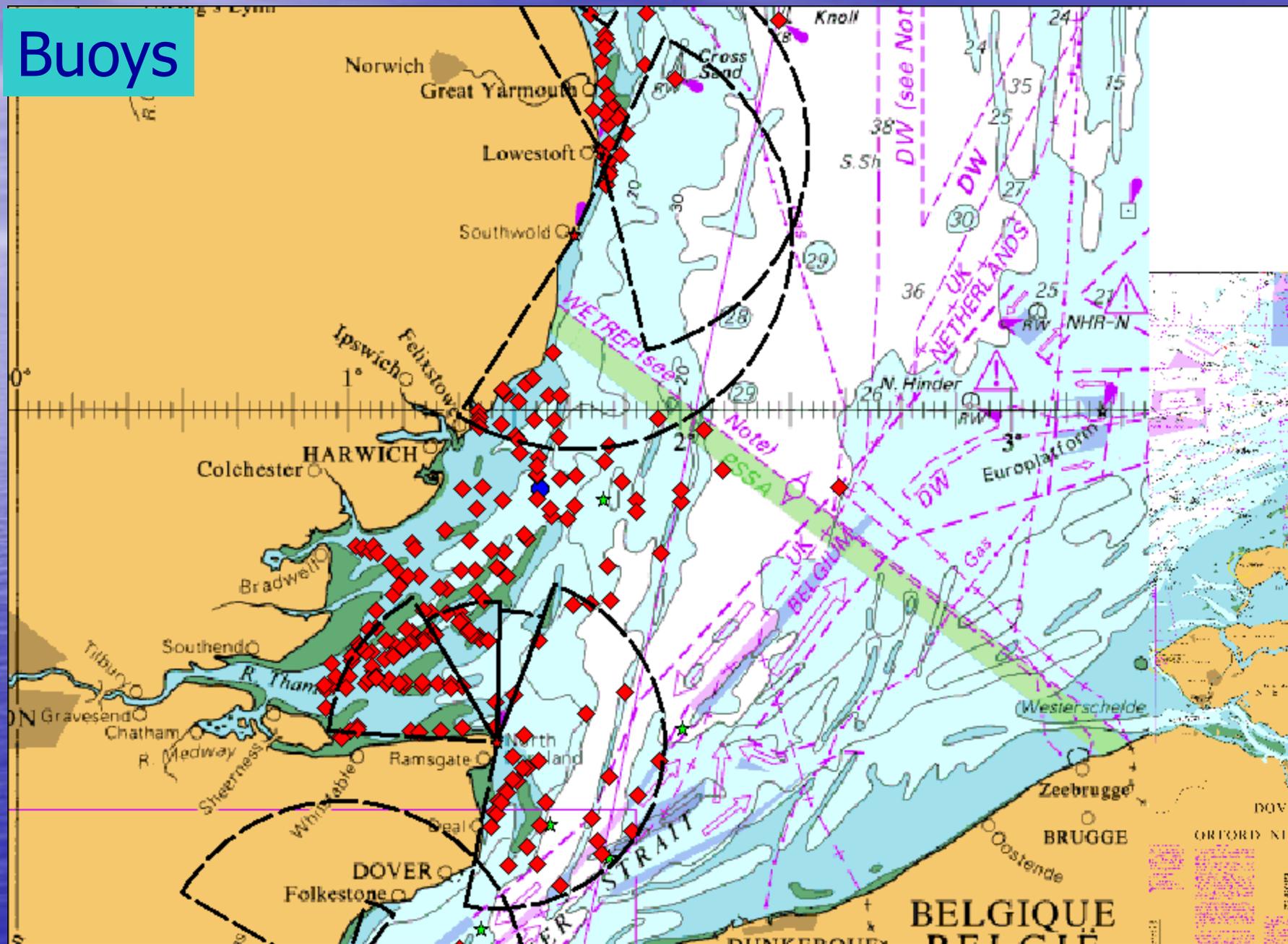
**Results**

	SMT1	SMT 2	Unit
Powered Grounding	0	0.101241	Incidents/Year
Drifting Grounding	0	0.138527	Incidents/Year
Total Groundings	0	0.239768	Incidents/Year
Overtaking	0.0003448	0.00149128	Incidents/Year
HeadOn	1.13873e-06	0.000545787	Incidents/Year
Crossing	0.00105619	0.00539827	Incidents/Year
Merging	0.000117865	0.000766928	Incidents/Year
Bend	0.000532078	0.00362934	Incidents/Year
Area	6.49847e-08	9.91125e-08	Incidents/Year
Total Collisions	0.00205214	0.0118317	Incidents/Year

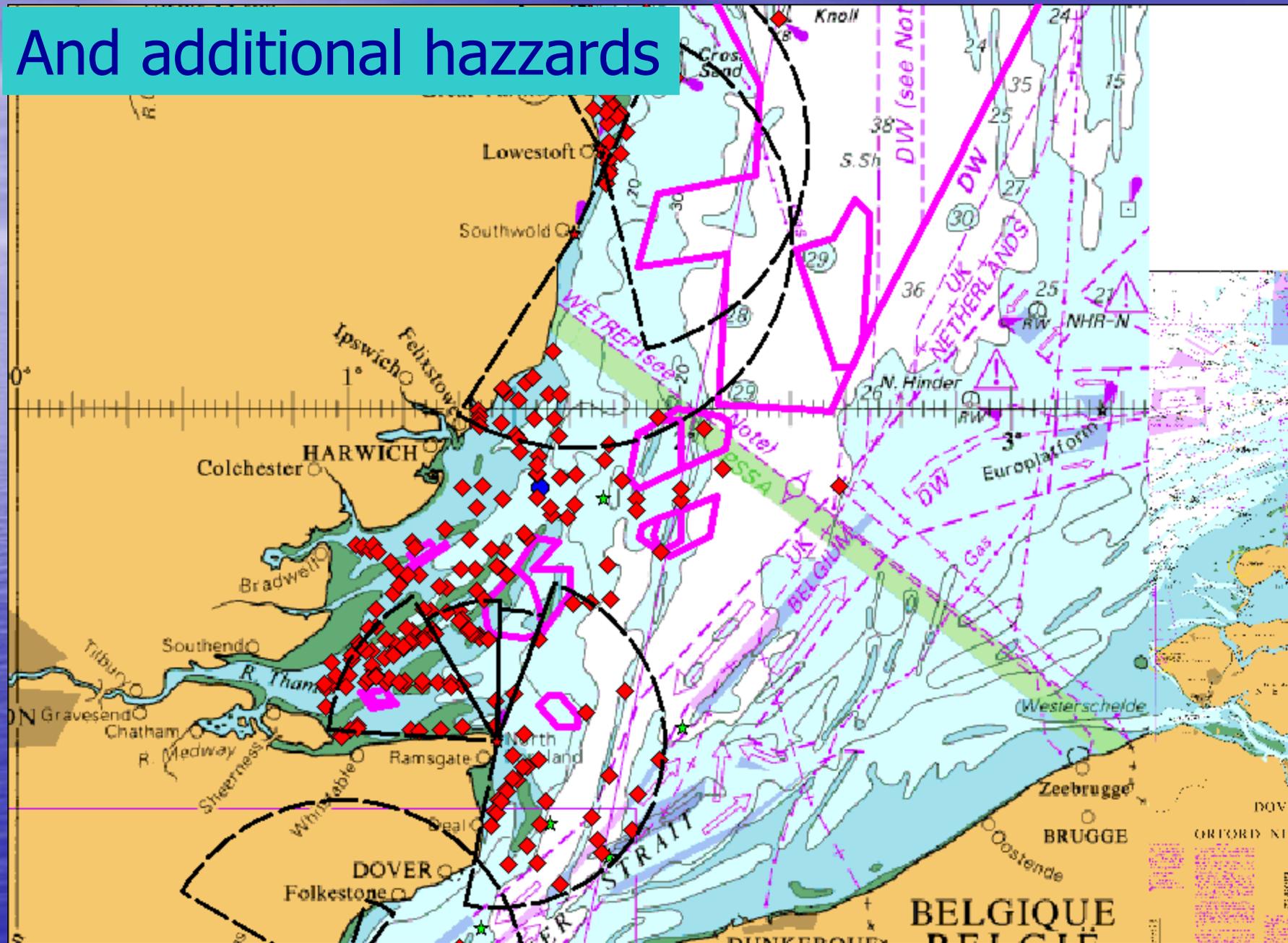


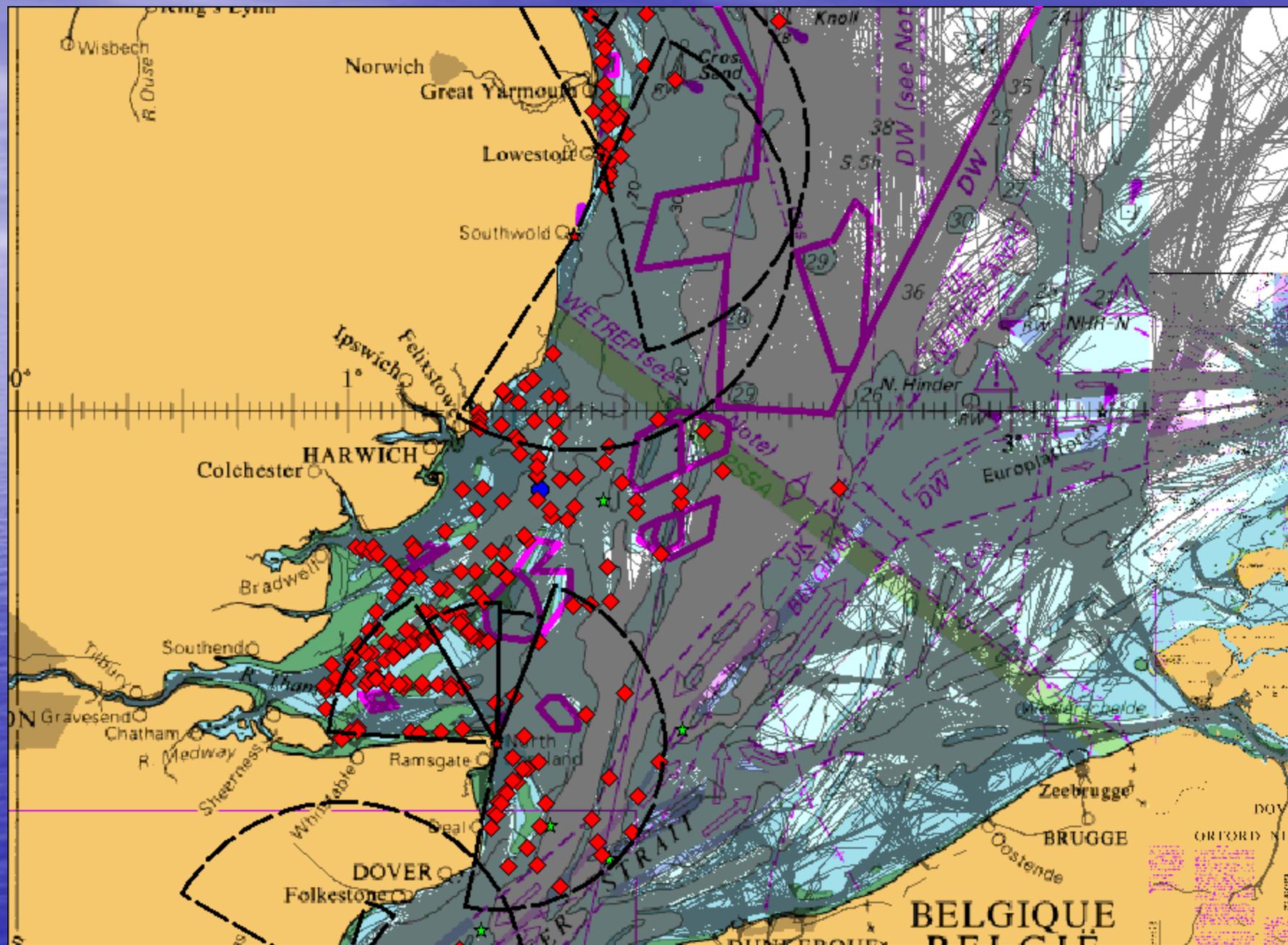


# Buoys

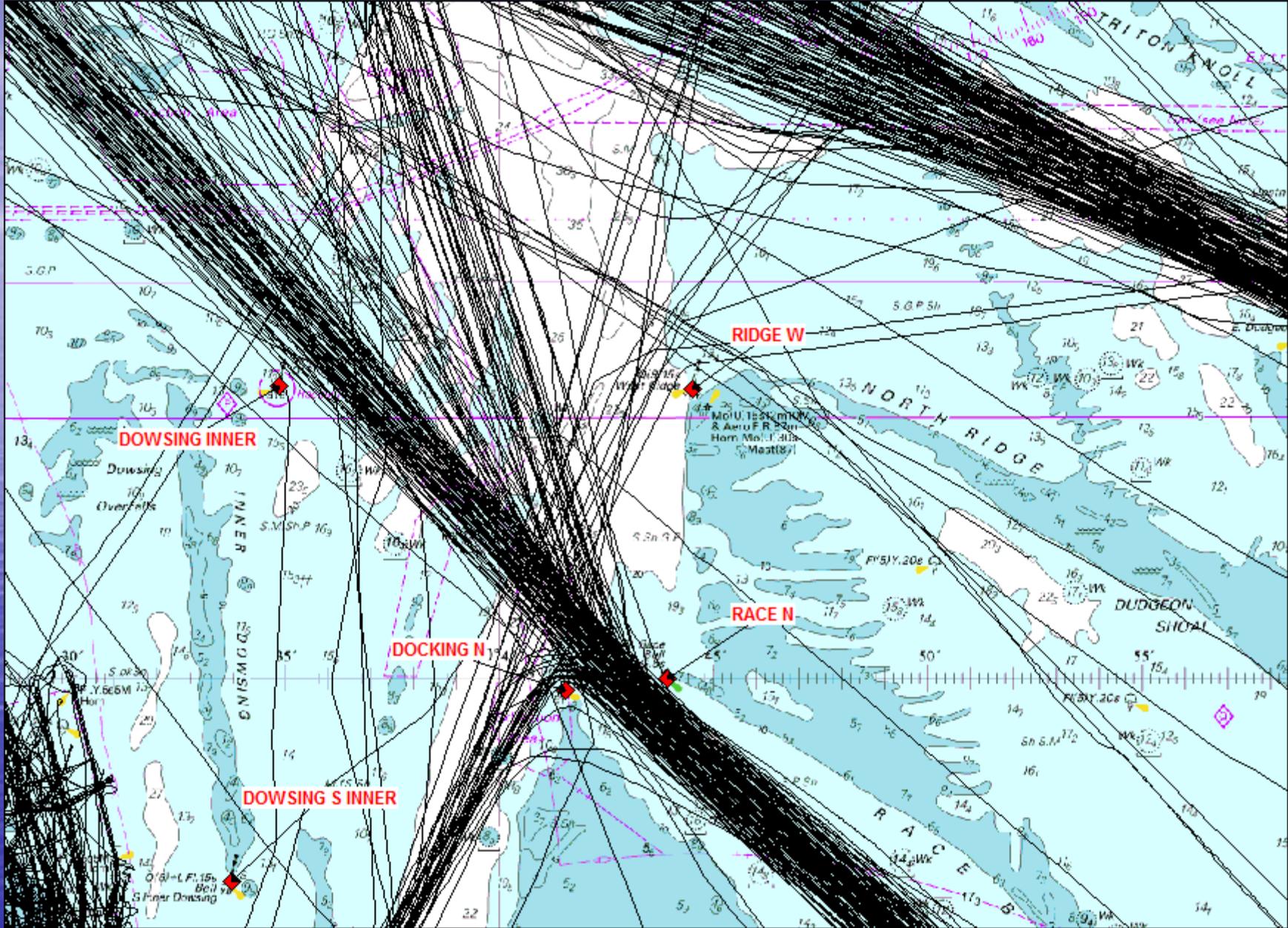


# And additional hazards

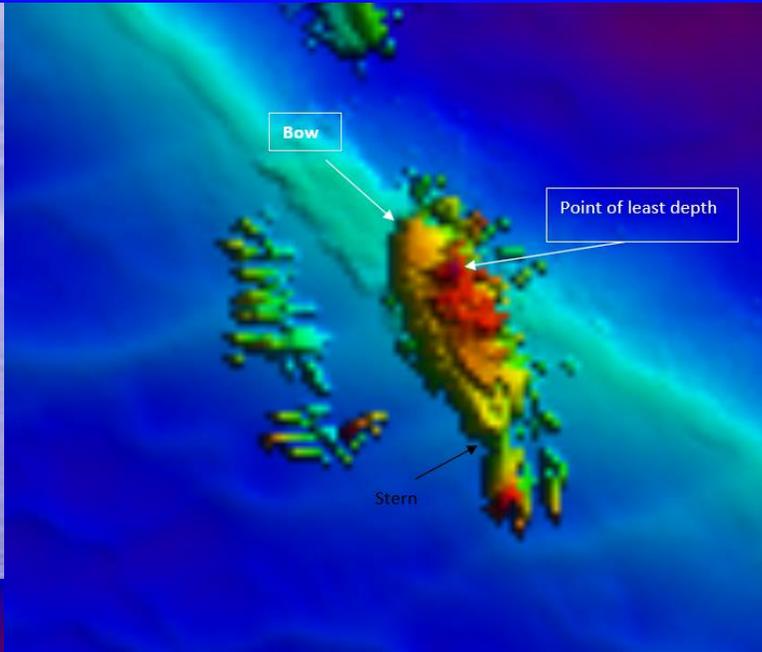








# Wrecks & New Dangers



## Survey Conclusions

Least Depth

5.10m LAT

LAT/LONG

52° 25.230' N 001° 43.67' E

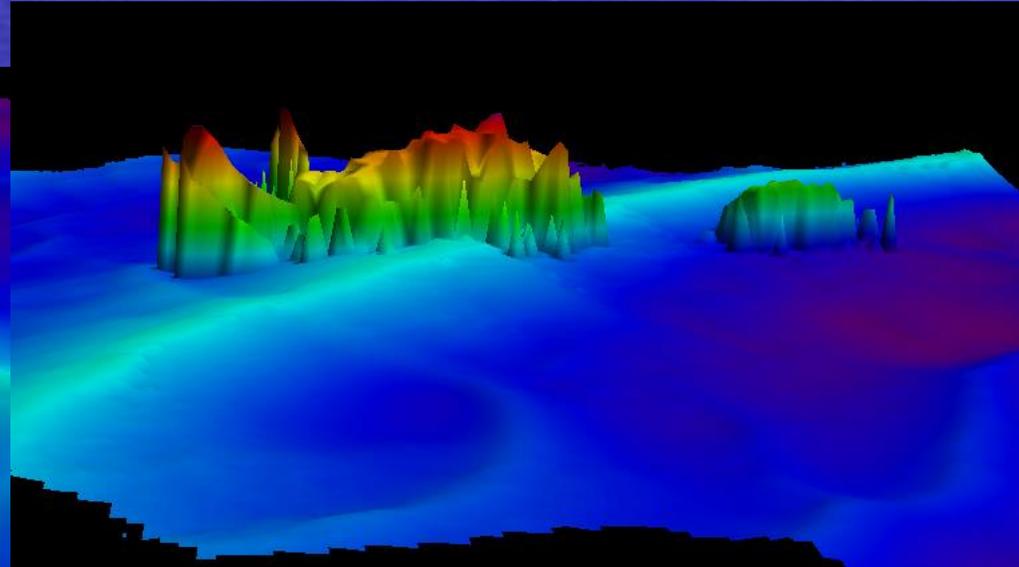
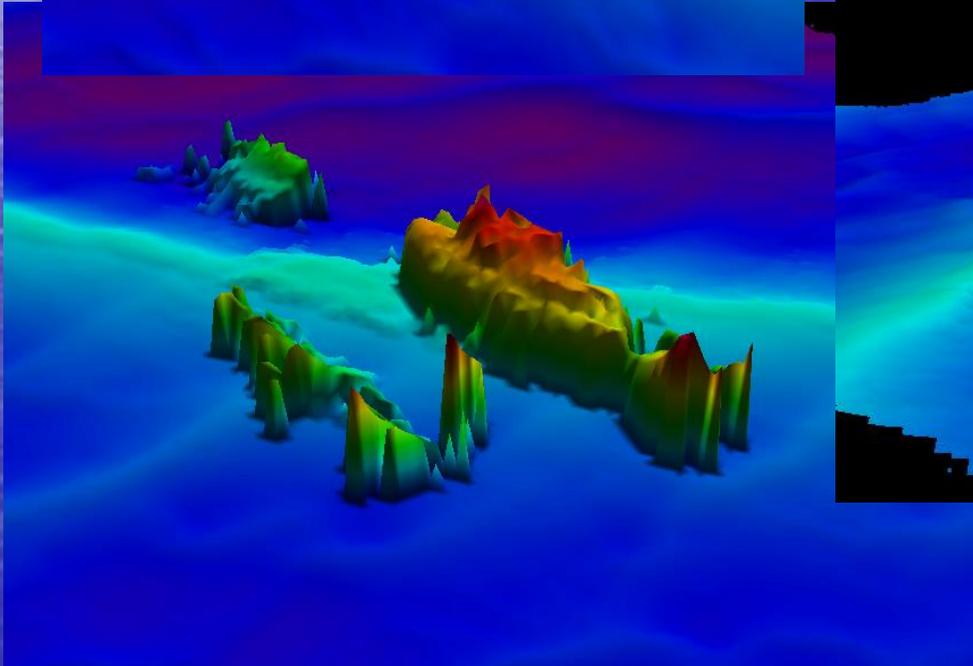
Surround Depths

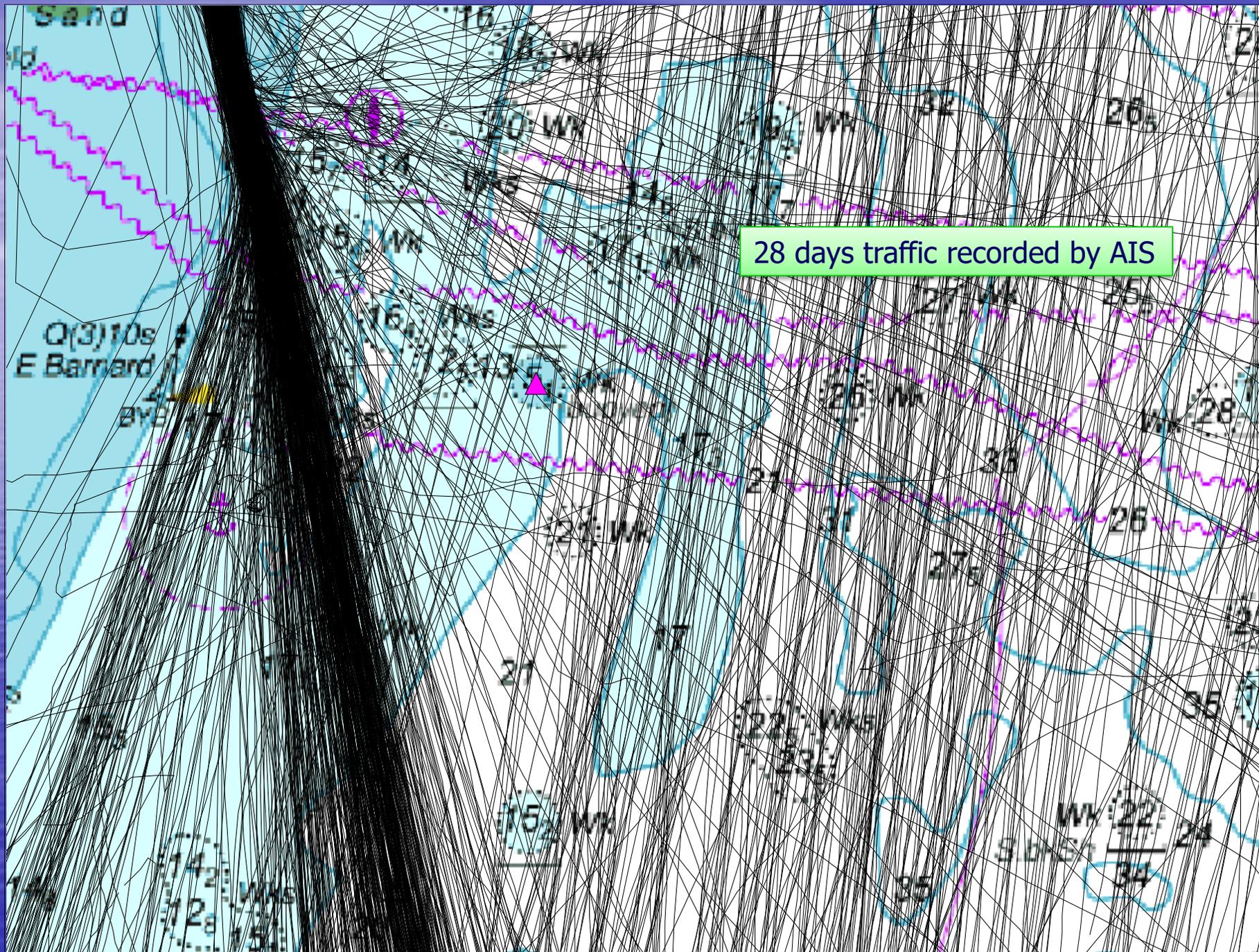
12.5m – 24m LAT

Orientation

Heading 350° approx.

Laying upright



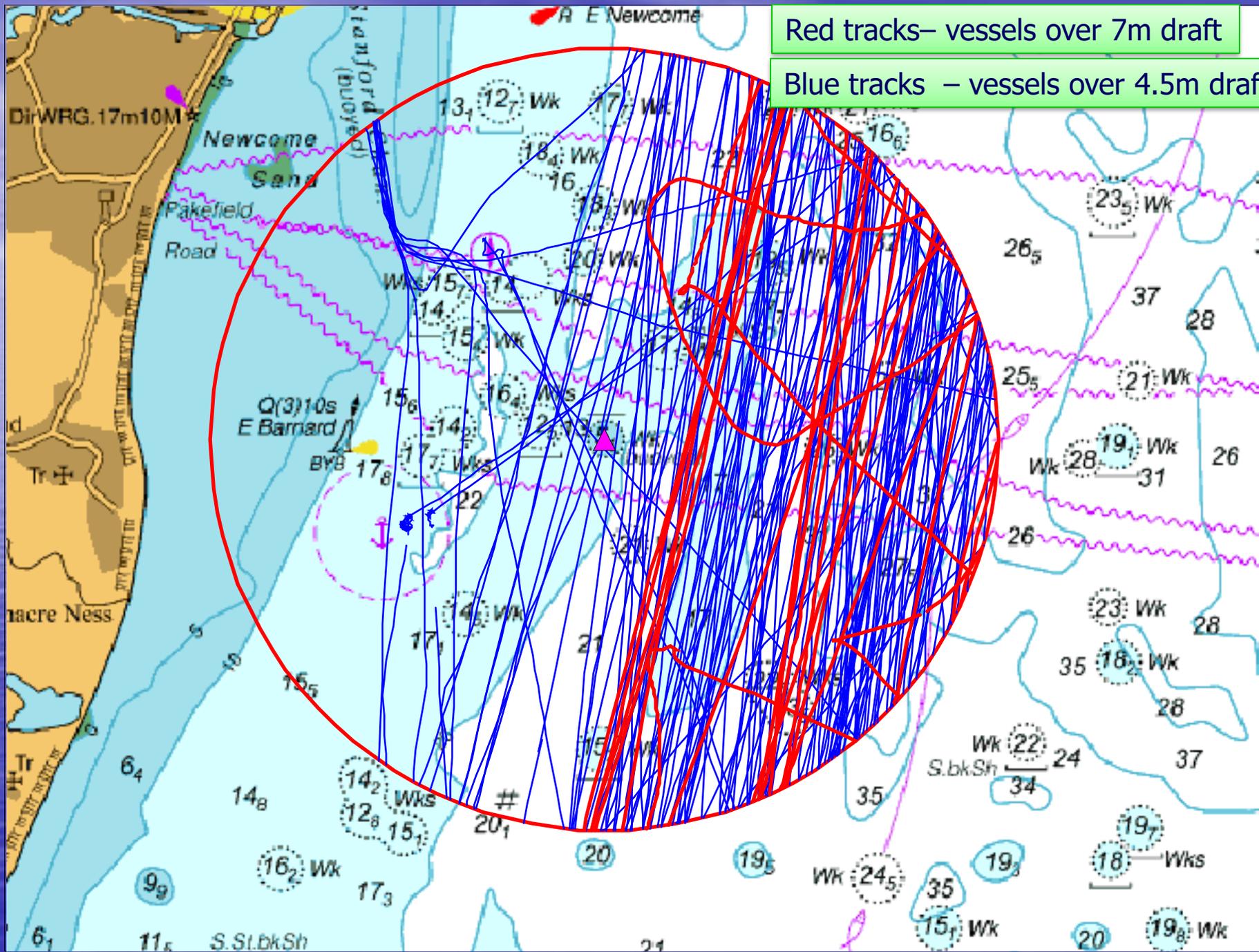


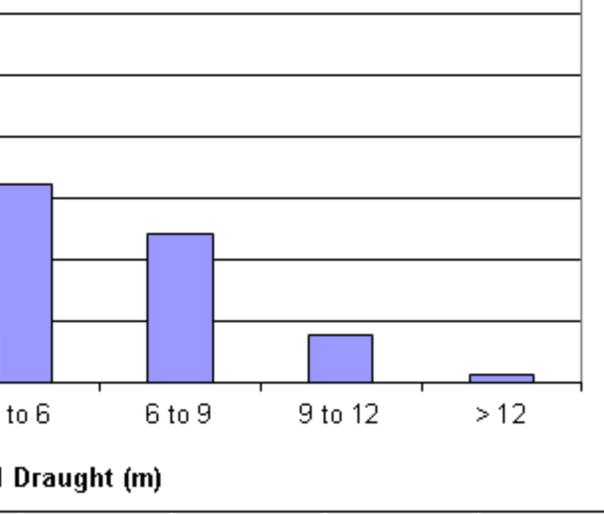
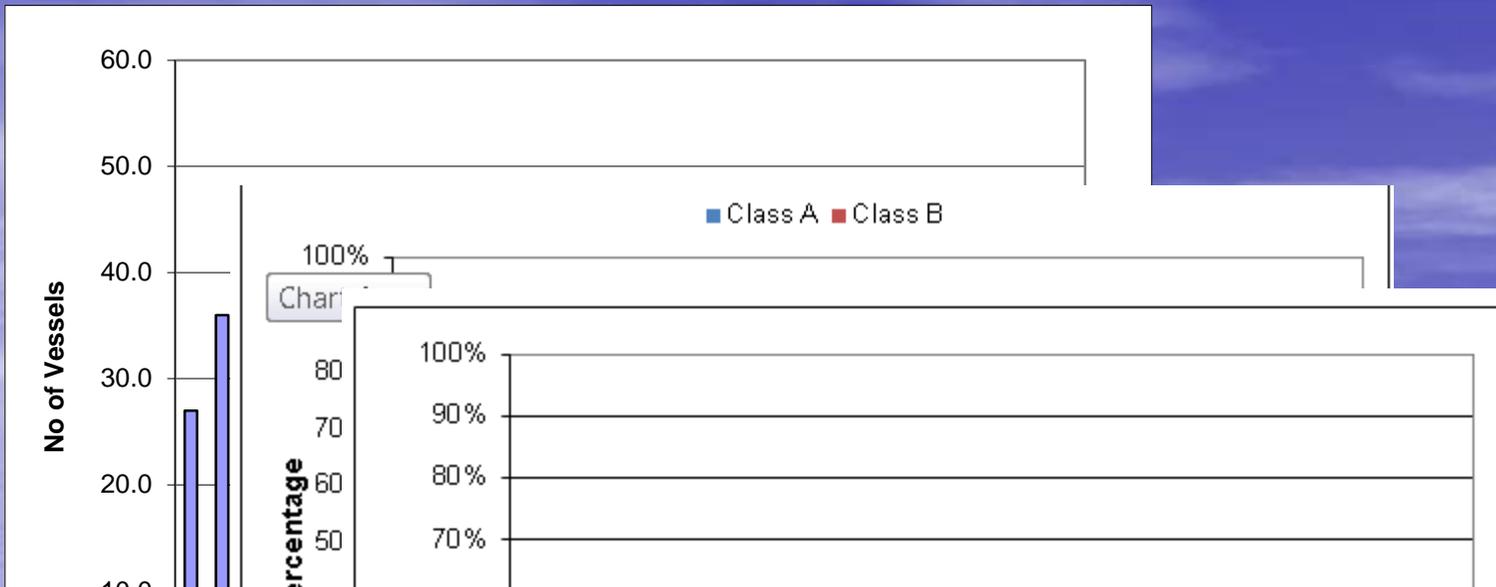
28 days traffic recorded by AIS



Red tracks– vessels over 7m draft

Blue tracks – vessels over 4.5m draft





Draught (m)			
to 6	6 to 9	9 to 12	> 12
373	0	373	42 %
106	0	106	12 %
39	0	39	4 %
872	11	883	99 %

Total by Class	
B	All
0 %	5 %
0 %	0 %
0 %	0 %
0 %	2 %
0 %	0 %
0 %	15 %
0 %	11 %
1 %	5 %
0 %	3 %
0 %	42 %
0 %	12 %
0 %	4 %
1 %	100 %

# Standard 1020 – AtoN Design and Delivery

IALA1020 AtoN Design and Delivery	2.1. Visual AtoN	R0106 E-106	The Use of Retroreflecting Material on Aids to Navigation Marks within the IALA Maritime Buoyage System(June 2017)	ENG	Nor.		New	Guideline on Retroreflective materials	ENG
		R0108 E-108	The Surface Colours used as Visual Signal on Aids to Navigation (Dec 2017)	ENG	Nor.		G1134	Surface Colours Used as Visual Signals on AtoN (Dec 2017)	ENG
		R0110 E-110	The Rhythmic Characters of Lights on Aids to Navigation (June 2012)	ENG	Nor.		[G]1116	Selection of Rhythmic Characters and Synchronisation of Lights for [Marine] Aids to Navigation (Dec 2015)	ENG
		R0112 E-112	Leading Lights (Dec 2005)	ENG	Nor.		[G]1023	Design of Leading Lines (Dec 2005)	ENG



## IALA RECOMMENDATION

E-112  
LEADING LIGHTS

**Edition 1.1**  
December 2005

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## IALA RECOMMENDATION

E-110  
RHYTHMIC CHARACTERS OF LIGHTS ON  
TO NAVIGATION

**Edition 4.0**  
December 2016

10, rue des Gaudines - 78100 Saint Germain en Laye, France  
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## IALA GUIDELINE

1116  
SELECTION OF RHYTHM  
SYNCHRONISATION C  
NAVIGATION

**Edition 1.0**  
December 2016

*Revokes IALA Guideline 1069*

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## GUIDELINE

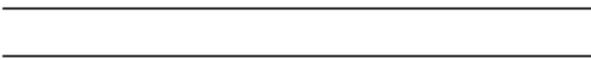
G1134  
SURFACE COLOURS USED AS VISUAL SIGNALS  
ON AtoN

**Edition 1.0**  
December 2017

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**Table 2** *Rhythmic character of lights*

	Class	Abbreviation	General description	IALA Specification	Particular use in the IALA Maritime Buoyage System
1	FIXED LIGHT	F	A light showing continuously and steadily.	A single fixed light should be used with care because it may not be recognized as an aid to navigation light.  	A single fixed light shall not be used.
2	OCCULTING LIGHT		A light in which the total duration of light in a period is longer than the total duration of darkness and the intervals of darkness (eclipses) are usually of equal duration.	A light in which the total duration of light in a period <i>is clearly</i> longer than the total duration of darkness and all the eclipses are of equal duration.	
2.1	Single-occluding light	Oc	An occulting light in which an eclipse is regularly repeated	The duration of an appearance of light should not be less than three times the duration of an eclipse. The period should not be less than 2 s   Example: $l = 3 \text{ s}$ ; $d = 1 \text{ s}$ ; $p = 4 \text{ s}$	A single-occluding <i>White</i> light indicates a safe-water mark.

# Marine Spatial planning and Offshore structures

IALA Recommendation O-139

on

The Marking of Man-Made Offshore Structures

Edition 2

December 2013

Edition 1: December 2008



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2.2. Range and Performance	R0200 E-200-0	Marine Signal Lights Overview	ENG	Inf.		New	Navigation (June 2017) May be converted into Guideline (There is presently no guidance or range checks of lighted AtoN should be conducted. The WWA has developed to do this which could be added as a guideline)
	R0201 E-200-1	Marine Signal Lights - Colours	ENG	Nor.			No document
	R0202 E-200-2	Marine Signal Lights - Calculation, Definition and Notation of Luminous Range	ENG	Nor.			No document
	R0203 E-200-3	Marine Signal Lights – Terms of Measurement	ENG	Nor.		G1065	AtoN Signal Light Beam Vertical Di (Dec 2017)
						New	Existing E200-3 will be converted into a guideline on Measurement
						New G1133	guideline G1133 Marine Signal Light Calculation of Luminous Intensity.

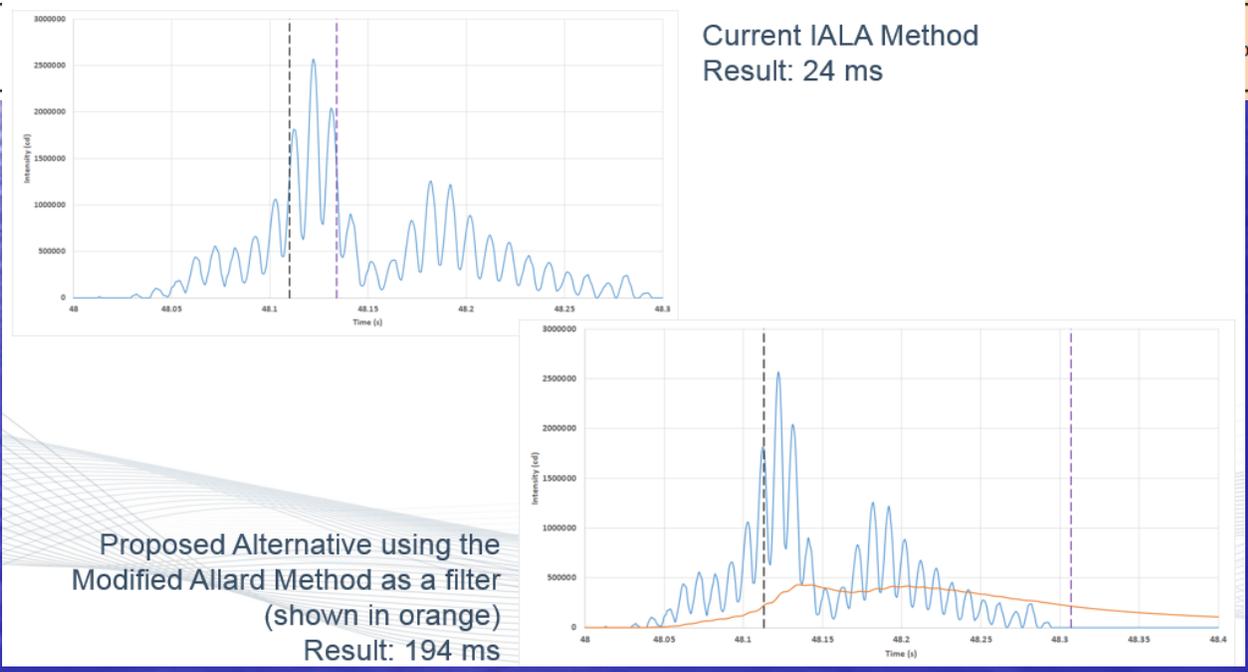


# GUIDELINE

## G1135 DETERMINATION AND CALCULATION OF EFFECTIVE INTENSITY

**Edition 1.0**  
December 2017

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## IALA GUIDELINE

G1004

LEVEL OF SERVICE

**Edition 3.0**

June 2017

## 5 CALCULATION OF AVAILABILITY

Availability should be calculated using the following equation, with the most accurate time available and is calculated over a continuous three (3) calendar year period and expressed as a percentage:

$$\text{Availability} = \frac{\text{Total Time} - \text{Down Time}}{\text{Total Time}}$$

### Equation 1 Availability expressed as a percentage (%)

Where:

Total Time is the time that an AtoN or System of AtoN should be performing its specified function.

Down Time is the sum of the periods during which the AtoN or system of AtoN are unable to perform its specific function.

It does not include those periods when the mariner has been notified of a discrepancy by prior publications through a Preliminary Notice to Mariners.<sup>1</sup>

The IALA Guideline on Availability and Reliability of Aids to Navigation should be consulted for further information on calculating availability. A failure is the malfunction of an AtoN or system of AtoN to display its proper characteristics or to be on its assigned position for its intended use by the mariner. As such, a failure of a technical function is not necessarily considered an AtoN discrepancy.

For example, if the main power supply has failed but the light continues to function at normal intensity on standby power, this is not considered a failure, since the AtoN continues to provide its characteristics to the mariner. The failure may be caused by equipment malfunction, or scheduled or unscheduled maintenance work.

Aid to Navigation	Category	No Units	Days Out	Days Possible	No of Faults	Days Available	IALA Target %	Availability %
AIS	3	33	204.55	35,088	12	34,883.45	97.0	99.42
DAYMARK	3	554	23.02	591,469	6	591,445.98	97.0	100.00
DIR Light	1	1	0.06	1,097	1	1,096.94	99.8	99.99
HAZARD WARNING	3	114	224.34	121,855	20	121,630.66	97.0	99.82
LIGHT	1	70	42.44	75,902	52	75,859.56	99.8	99.94
LIGHT	2	187	194.03	194,402	46	194,207.97	99.0	99.90
LIGHT	3	271	559.75	292,300	75	291,740.25	97.0	99.81
POSITION	1	89	70.99	89,621	13	89,550.01	99.8	99.92
POSITION	2	129	97.34	138,437	16	138,339.66	99.0	99.93
POSITION	3	252	80.08	271,457	17	271,376.92	97.0	99.97
RACON	1	55	67.58	56,506	35	56,438.42	99.8	99.88
SEC LIGHT	1	11	1.86	11,838	2	11,836.14	99.8	99.98
TOPMARK	2	201	318.41	214,190	32	213,871.59	99.0	99.85
TOPMARK	3	121	96.22	126,421	8	126,324.78	97.0	99.92

Training  
[The WWA]

Influencing

**SUCCESS**

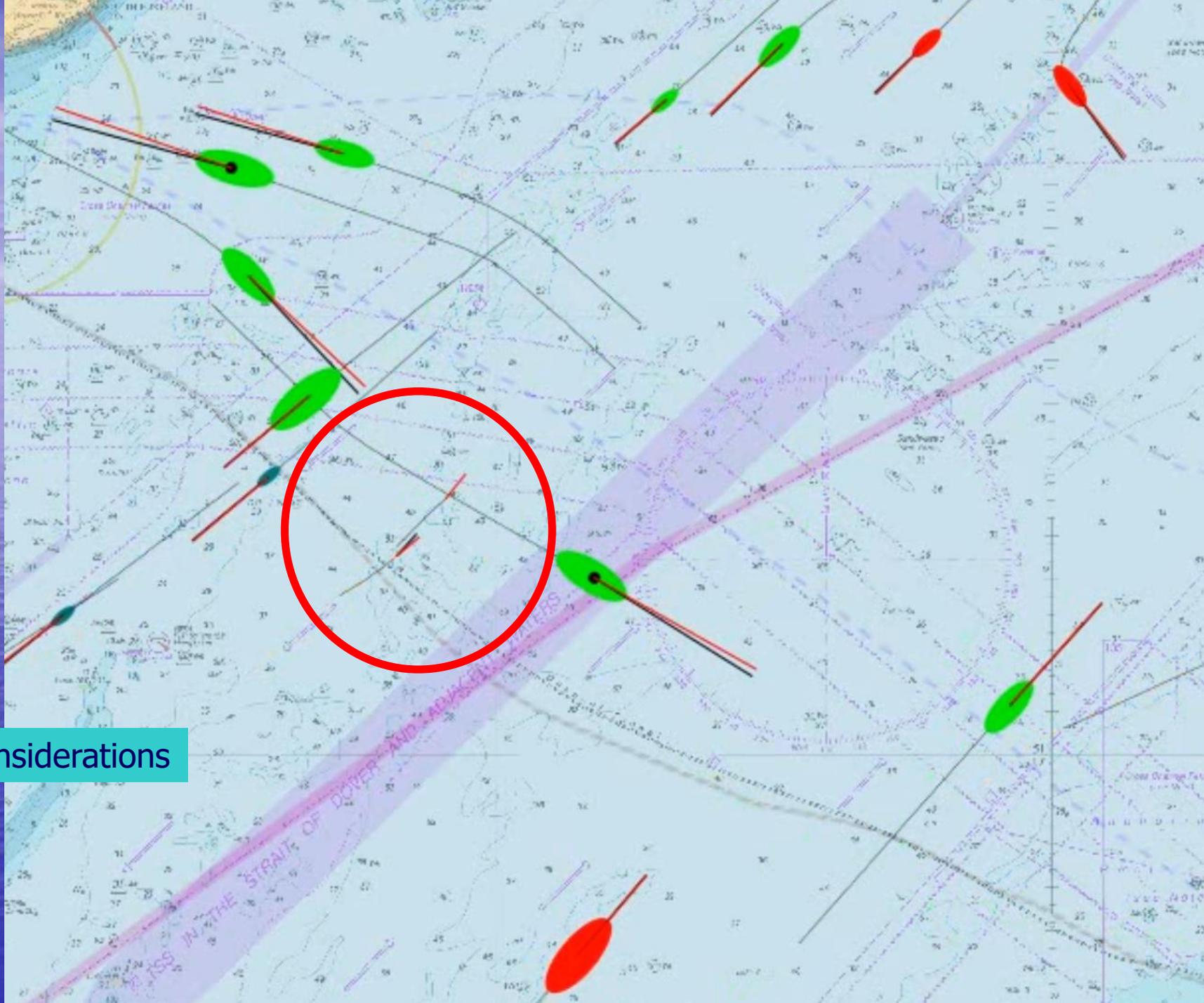
VTS

**CHALLENGES, SUSTAINABLE PLANET**

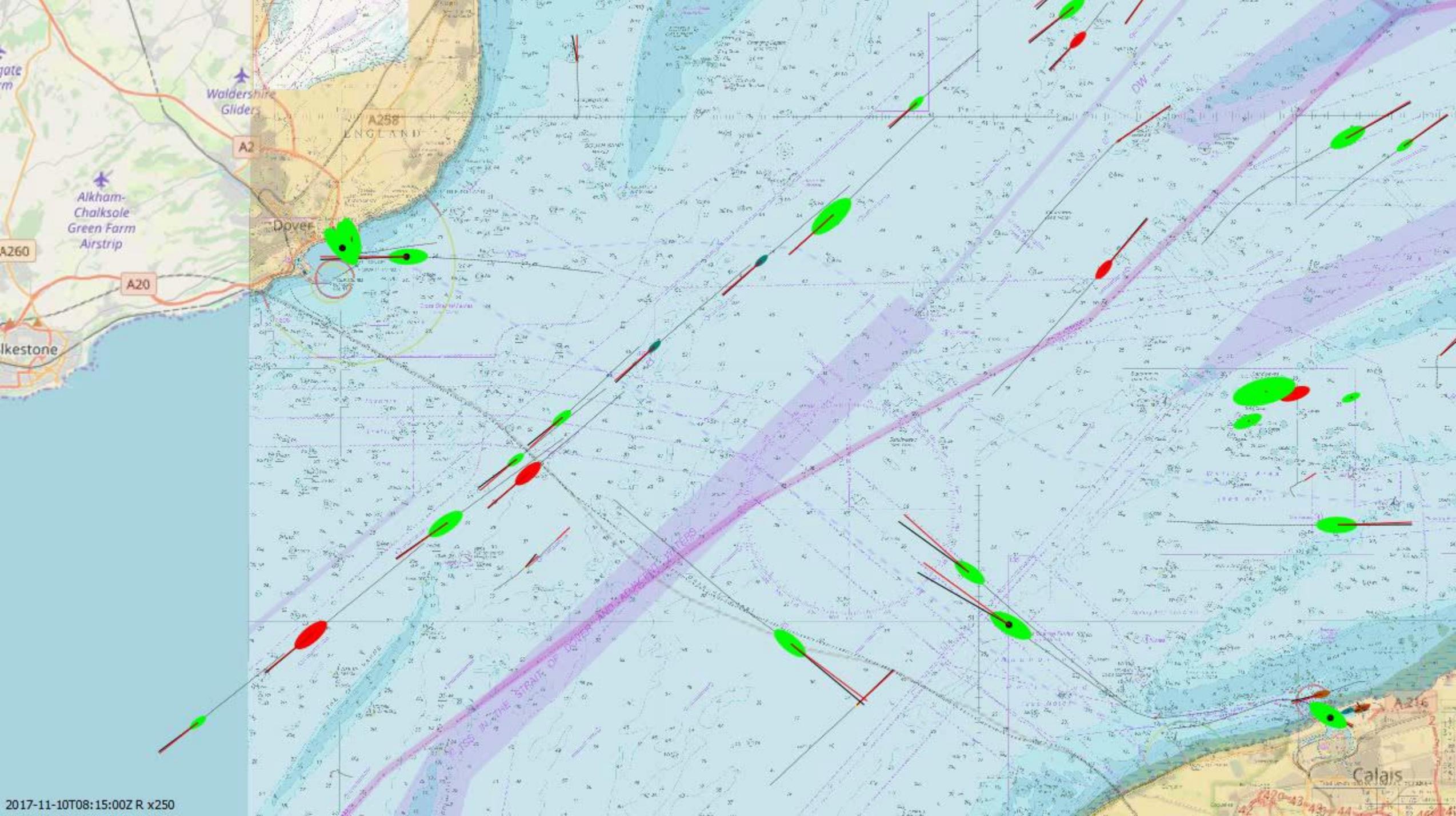
E-Navigation  
& Radio  
Navigation

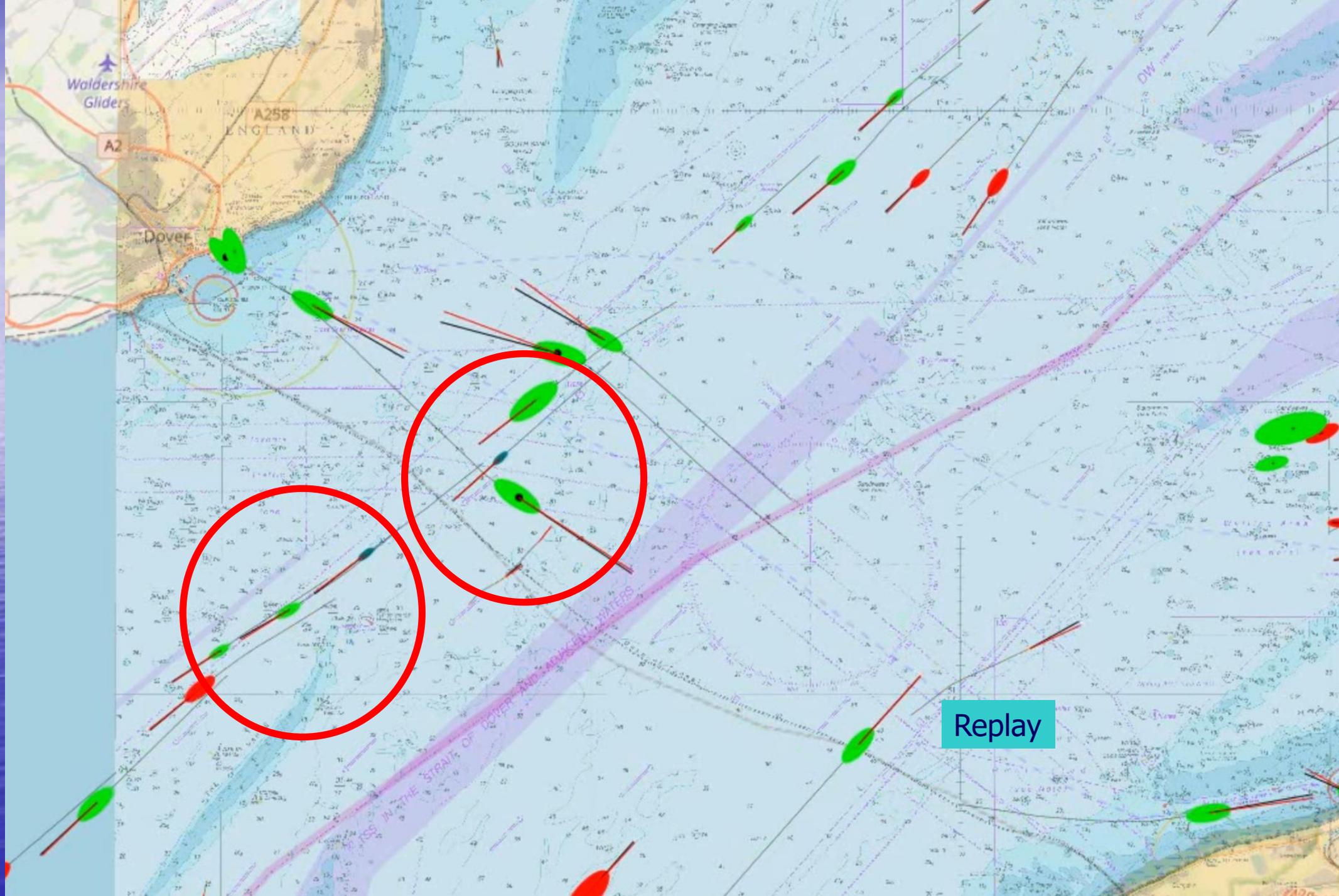
Innovation

Collaboration  
[The Committees]



Further risk considerations





Waldershire  
Gliders

A2

A258  
ENGLAND

Dover

Replay

