

The Information on Study of the Implementation of STRAITREP in the Straits of Malacca and Singapore and Its Future Implementation

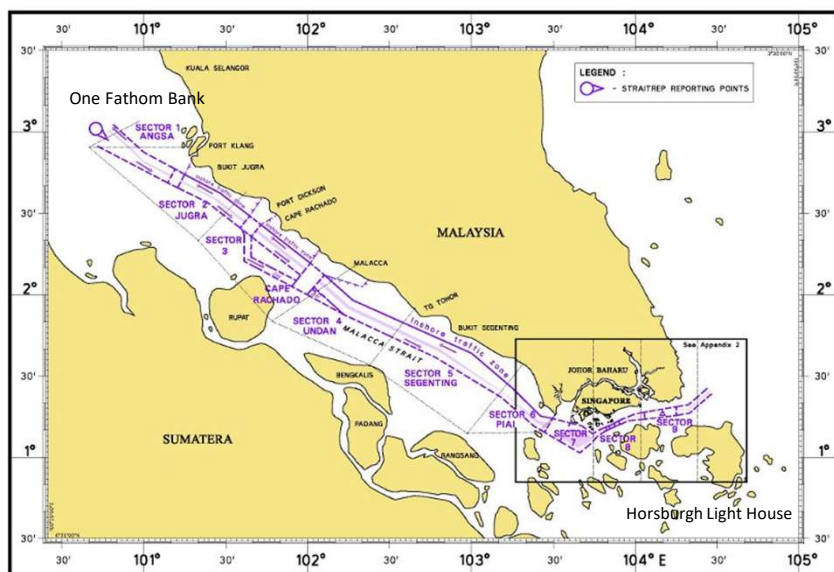
13th COOPERATION FORUM (CF)
KUALA LUMPUR, MALAYSIA
18 - 19 JULY 2022

BACKGROUND OF THE STUDY

- There are several accidents occurred on Singapore Strait;
- There are several incidents which caused damage on marine environment on several areas in the Straits of Malacca and Singapore.
- The adoption of MSC Resolution MSC.433 (98) on the Revised Guidelines and criteria for ship reporting system → to consider automated ship reporting by electronic means to reduce ship reporting burdens;
- The recommendation made by the IMO on 5th NCSR meeting → Invite Member states to review the adopted mandatory ship reporting system.

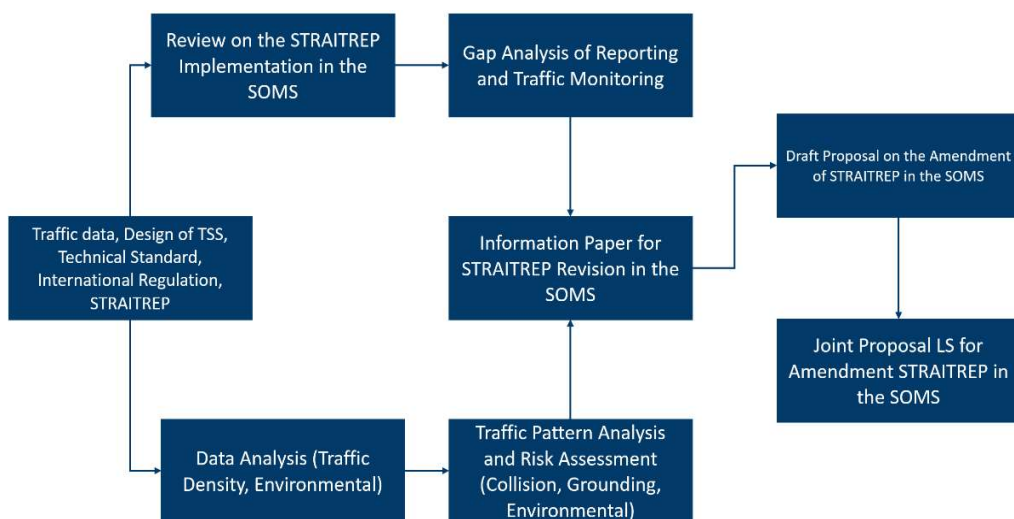


SOMS: TSS and STRAITREP

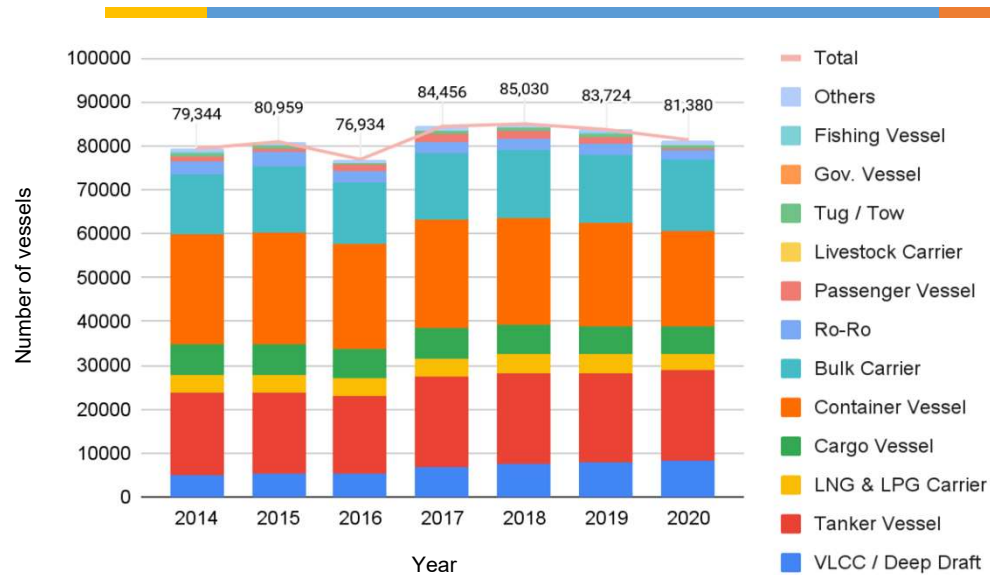


SECTOR	VHF CHANNELS	VTS AUTHORITIES
Sector 1	Channel 66	KLANG VTS
Sector 2	Channel 88	KLANG VTS
Sector 3	Channel 84	KLANG VTS
Sector 4	Channel 61	KLANG VTS
Sector 5	Channel 88	KLANG VTS
Sector 6	Channel 88	JOHOR VTS
Sector 7	Channel 73	SINGAPORE VTS
Sector 8	Channel 14	SINGAPORE VTS
Sector 9	Channel 10	SINGAPORE VTS

General Methodology



Traffic Data



Incident Data

Year	Collided	Grounded	Fire	Sink	Capsized	Other	Total
2007	5	1	1	1	-	-	8
2008	4	1	1	2	-	-	8
2009	1	-	-	-	-	-	1
2010	7	1	2	3	-	-	13
2011	3	4	-	1	-	-	8
2012	6	2	3	1	-	-	12
2013	3	1	2	-	-	1	7
2014	3	4	2	-	-	1	10
2015	2	2	-	6	3	-	13
2016	1	3	-	1	-	-	5
2017	5	2	1	3	1	-	12
2018	2	-	-	-	-	1	3
2019	1	-	-	-	1	1	3
Total	43	21	12	18	5	4	103

Source: TTEG Report 2007 - 2019

Incident Data by Sector in TSS

Sector	Collided	Grounded	Fire	Sink	Capsized	Other	Total
Sector 1	1	3	-	-	-	-	4
Sector 2	2	1	2	1	-	1	7
Sector 3	1	1	2	1	-	1	6
Sector 4	1	-	-	1	-	-	2
Sector 5	3	3	2	2	-	-	10
Sector 6	1	-	1	1	-	-	3
Sector 7	3	-	-	-	-	-	3
Sector 8	19	3	-	-	-	-	22
Sector 9	7	2	1	3	1	-	14

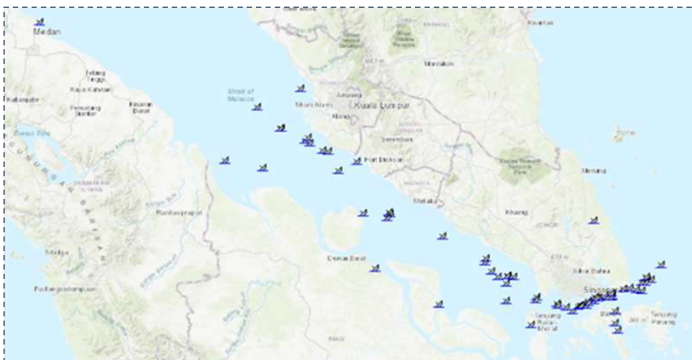
Source: TTEG Report 2007 - 2019



MV SHAHRAZ dan MV SAMUDRA SAKTI I grounded at Batu Berhanti



MV TINA I grounded at Batu Berhanti



Mapping of Ship Accident Locations in the Straits of Malacca and Singapore

Risk Assessment

Basis of Risk Assessment

$$R = P \cdot C$$

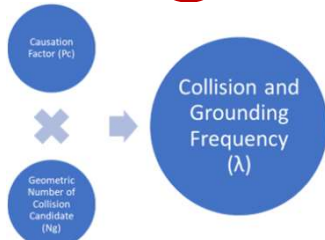
R = Risk

P = Frequency of occurrence

C = Consequences of the incident

IWRAP Perspective

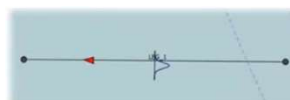
$$R = \textcircled{P} \cdot C$$



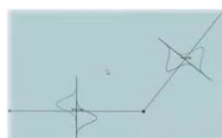
Head-on



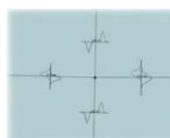
Overtaking



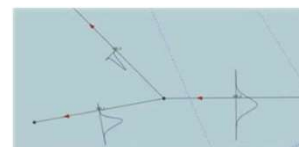
Bending



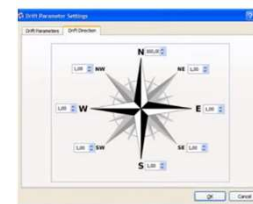
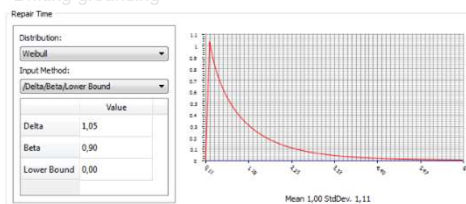
Crossing

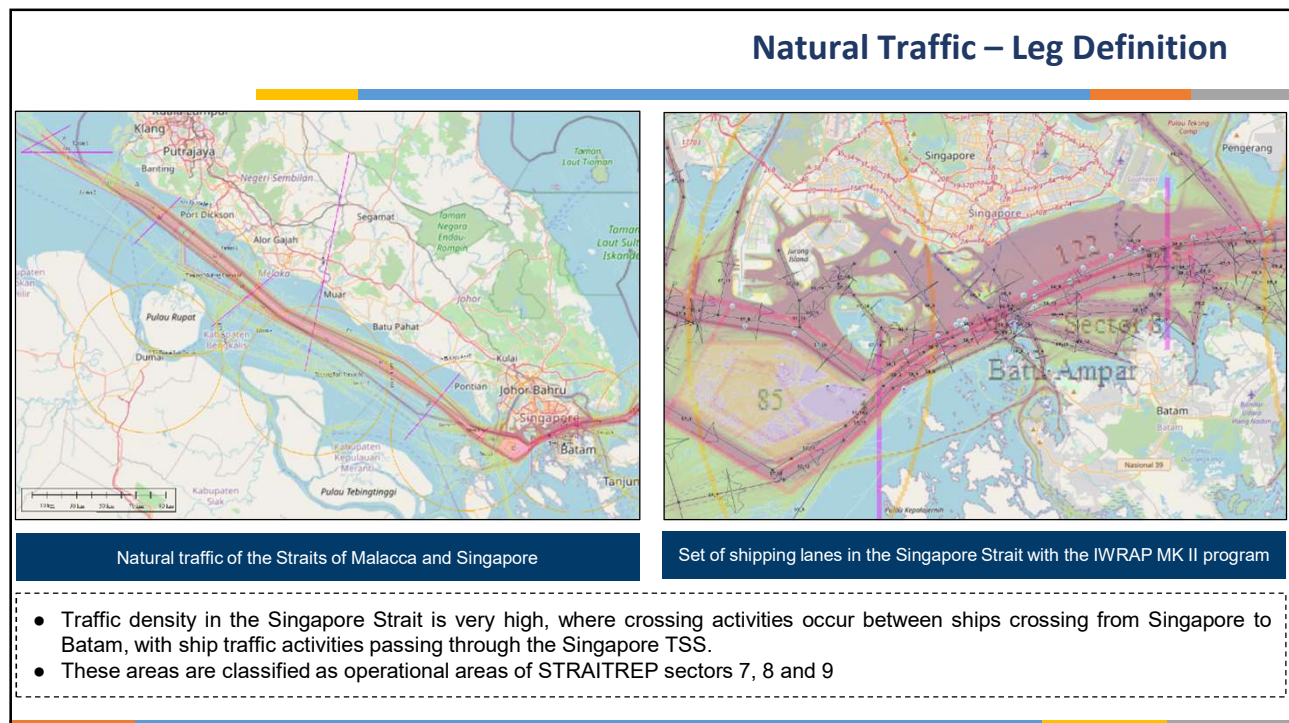
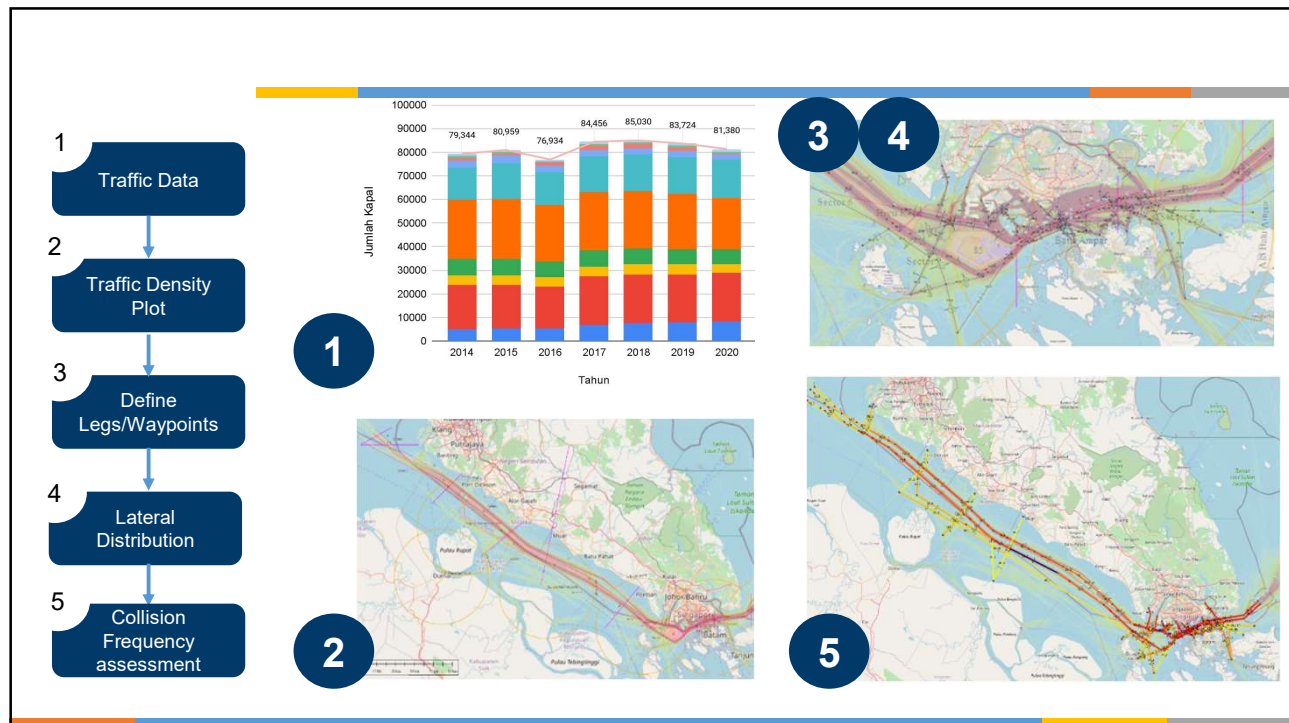


Merging



Drifting grounding





Risk Assessment – Sector Distribution

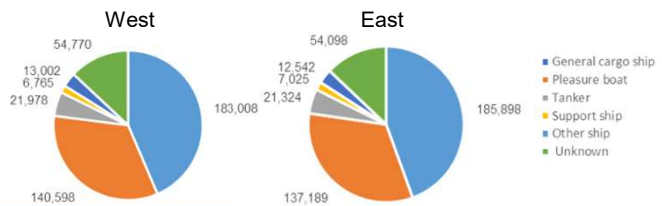


Sector Distribution in IWRAP

Using AIS data from VTS Dumai and VTS Batam in 2019

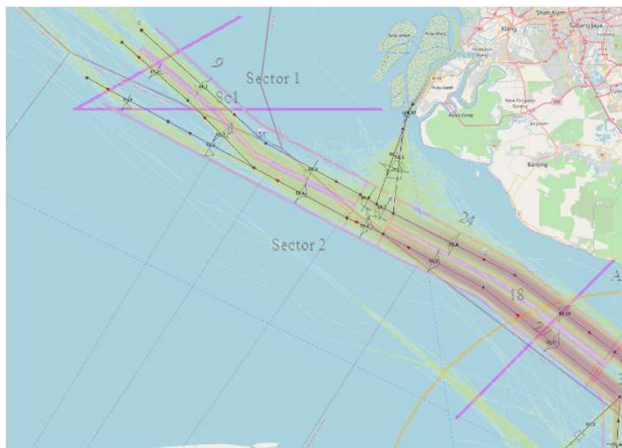
Note: *) Total trips

Total of Traffic Crossing Each Sector			
Sector	Total*)	West	East
Sector 1	2,835	1,147	1,688
Sector 2	3,680	1,459	2,221
Sector 3	61,064	30,100	30,964
Sector 4	70,170	34,890	35,280
Sector 5	78,815	39,989	38,826
Sector 6	72,584	34,136	38,448
Sector 7	90,383	45,714	44,669
Sector 8	109,624	58,066	51,558
Sector 9_west	242,969	121,334	121,635
Sector 9_east	106,073	53,286	52,787
Total traffic	838,197	420,121	418,076

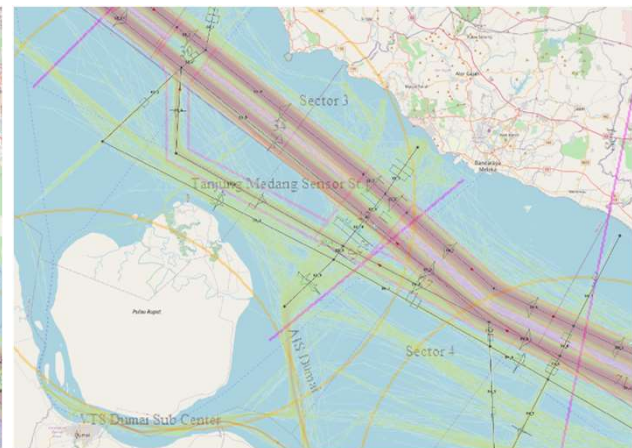


Risk Assessment – Leg Modelling

AIS Data : 01-14 September 2019



Legs in Sector 1 and 2



Legs in Sector 3 and 4

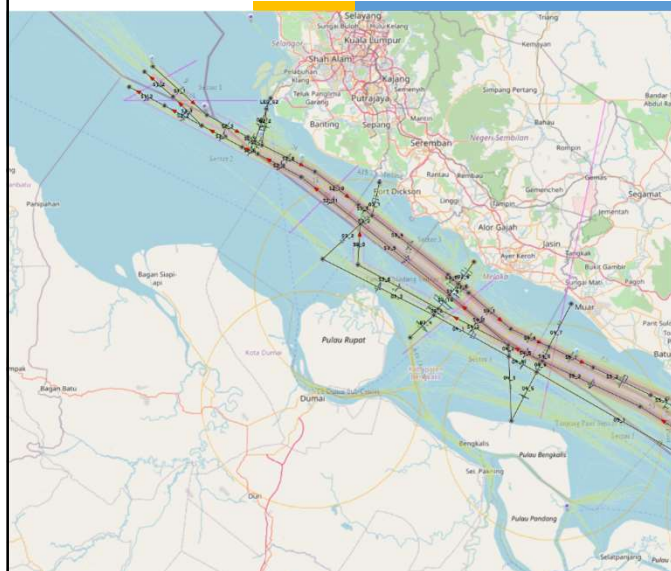
[illegible]

AIS Data : 01-September 2019

Leg Modelling for VTS Batam Coverage Area

Leg Modelling for VTS Dumai and Batam Coverage Areas

Risk Assessment – Leg Modelling



Leg Modelling for Dumai VTS Coverage Area

Sector	Total of Leg	
	TSS Area	Outside TSS
Sector 1	3	0
Sector 2	11	2
Sector 3	10	6
Sector 4	6	7
Sector 5	6	1
Sector 6	5	1
Sector 7	15	19
Sector 8	12	18
Sector 9	9	15

- Leg modelling based on traffic in TSS and traffic in and out to TSS
- Traffic distribution follows existing ship data

Result of Risk Assessment

Ship-Ship Results - Model: 'BatamDumai_Sep19' Job: 'BatamDumai_Sep19 traffic 100%

Item	General cargo ship	Bulk carrier	Ro-Ro cargo ship	Passenger ship	Fast ferry	Support ship	Fishing ship	Pleasure boat	Other ship	Struck sum
Crude oil tanker	0.000428331	0.000315507	0.0119747	0.00256431	0.0280849	0.0007121	0.0385475	0.000143822	0.00530463	0.000143822
Oil products tanker	0.000428331	0.000315507	0.0119747	0.00256431	0.0280849	0.0007121	0.0385475	0.000143822	0.00530463	0.000143822
Chemical tanker	0.000428331	0.000315507	0.0119747	0.00256431	0.0280849	0.0007121	0.0385475	0.000143822	0.00530463	0.000143822
Gas tanker	0.000428331	0.000315507	0.0119747	0.00256431	0.0280849	0.0007121	0.0385475	0.000143822	0.00530463	0.000143822
Container ship	0.000428331	0.000315507	0.0119747	0.00256431	0.0280849	0.0007121	0.0385475	0.000143822	0.00530463	0.000143822
General cargo ship	0.000428331	0.000315507	0.0119747	0.00256431	0.0280849	0.0007121	0.0385475	0.000143822	0.00530463	0.000143822
Bulk carrier	0.000428331	0.000315507	0.0119747	0.00256431	0.0280849	0.0007121	0.0385475	0.000143822	0.00530463	0.000143822
Ro-Ro cargo ship	0.000428331	0.000315507	0.0119747	0.00256431	0.0280849	0.0007121	0.0385475	0.000143822	0.00530463	0.000143822
Passenger ship	0.000428331	0.000315507	0.0119747	0.00256431	0.0280849	0.0007121	0.0385475	0.000143822	0.00530463	0.000143822
Fast ferry	0.000428331	0.000315507	0.0119747	0.00256431	0.0280849	0.0007121	0.0385475	0.000143822	0.00530463	0.000143822
Support ship	0.000428331	0.000315507	0.0119747	0.00256431	0.0280849	0.0007121	0.0385475	0.000143822	0.00530463	0.000143822
Fishing ship	0.000428331	0.000315507	0.0119747	0.00256431	0.0280849	0.0007121	0.0385475	0.000143822	0.00530463	0.000143822
Pleasure boat	0.000428331	0.000315507	0.0119747	0.00256431	0.0280849	0.0007121	0.0385475	0.000143822	0.00530463	0.000143822
Other ship	0.000428331	0.000315507	0.0119747	0.00256431	0.0280849	0.0007121	0.0385475	0.000143822	0.00530463	0.000143822
Striking sum	0.000428331	0.000315507	0.0119747	0.00256431	0.0280849	0.0007121	0.0385475	0.000143822	0.00530463	0.000143822

IWRAP MK II Program Simulation Results for Total Collision

Frequency of Each Collision

Collision type	Frequency
Overtaking	1.11E+00 Incidents/Year
Head On	2.09E-01 Incidents/Year
Crossing	2.39E-01 Incidents/Year
Merging	8.26E-02 Incidents/Year
Bend	1.12E-02 Incidents/Year
Total Collisions	1.66E+00 Incidents/Year

Leg in TSS with Highest Total Collision Frequency

Leg	Frequency
Leg S8_10	7.96E-02 Incidents/Year
Leg S7_9	6.49E-02 Incidents/Year
Leg S5_3	6.24E-02 Incidents/Year
Leg S9_4	6.06E-02 Incidents/Year
Leg S9_7	6.01E-02 Incidents/Year
Total	3.28E-01 Incidents/Year
Percentage of total	19.78%

Results of Collision Risk Assessment

The results of the IWRAP MK II program simulation for Total Collision per Sector

1

	Sector 1	Sector 2	Sector 3	Sector 4	Sector 5	Sector 6	Sector 7	Sector 8	Sector 9	Total
TSS area	1.79E-04	3.47E-02	5.69E-02	4.78E-02	8.50E-01	8.30E-02	1.45E-01	3.42E-01	2.61E-01	1.82E+00
Outside TSS	0.00E+00	0.00E+00	6.20E-04	1.03E-04	4.65E-05	3.90E-05	1.35E-01	1.03E-01	3.99E-02	2.79E-01
Total	1.79E-04	3.47E-02	5.75E-02	4.79E-02	8.50E-01	8.30E-02	2.80E-01	4.45E-01	3.01E-01	2.10E+00
Weight	0.01%	1.65%	2.74%	2.28%	40.48%	3.95%	13.33%	21.21%	14.34%	100.00%

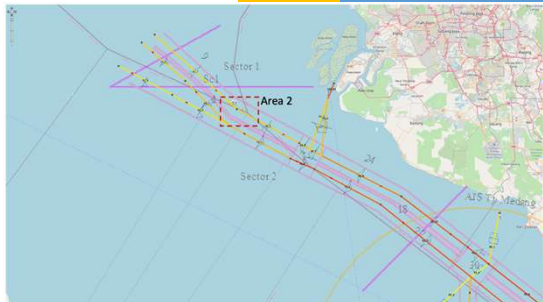


2

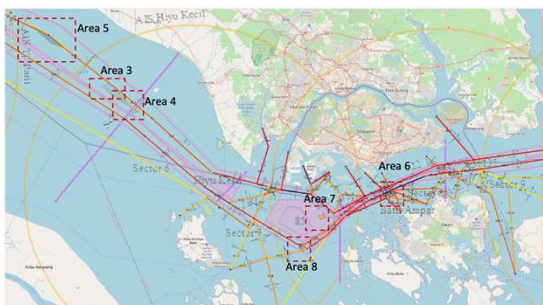
	Sector 1	Sector 2	Sector 3	Sector 4	Sector 5	Sector 6	Sector 7	Sector 8	Sector 9	Total
TSS area	1.79E-04	3.47E-02	5.69E-02	4.78E-02	1.01E-01	8.30E-02	1.45E-01	3.42E-01	2.61E-01	1.07E+00
Outside TSS	0.00E+00	0.00E+00	6.20E-04	1.03E-04	4.65E-05	3.90E-05	1.35E-01	1.03E-01	3.99E-02	2.79E-01
Total	1.79E-04	3.47E-02	5.75E-02	4.79E-02	1.01E-01	8.30E-02	2.80E-01	4.45E-01	3.01E-01	1.35E+00
Weight	0.01%	2.57%	4.26%	3.54%	7.51%	6.14%	20.72%	32.96%	22.29%	100.00%

- (1) The simulation results show a very high frequency in Sector 5 (Leg S5_3) due to the large number of fishing vessels (size 0-25m) in the TSS and performing contra flow.
- (2) Traffic from fishing vessels is not included in the analysis, so a decrease in frequency is found in Sector 5.

Results of Grounding Incidents



	Sector 1	Sector 2	Sector 3	Sector 4	Sector 5	Sector 6	Sector 7	Sector 8	Sector 9	Total
Powered groundings	0.00E+00	2.55E-02	0.00E+00	0.00E+00	1.75E-02	0.00E+00	1.48E+00	2.90E-02	0.00E+00	1.55E+00
Drifting groundings	0.00E+00	8.01E-03	0.00E+00	0.00E+00	2.01E-01	0.00E+00	1.98E-01	9.32E-02	0.00E+00	5.00E-01
Total groundings	0.00E+00	3.35E-02	0.00E+00	0.00E+00	2.19E-01	0.00E+00	1.68E+00	1.22E-01	0.00E+00	2.05E+00
Weight	0.00%	1.63%	0.00%	0.00%	10.67%	0.00%	81.73%	5.96%	0.00%	100.00%



Year	2019	2024	2029	2034	2039
Number of Traffic	100%	110%	122%	135%	149%
Frequency (incidents per year)					
Powered Grounding	1.55E+00	1.70E+00	1.89E+00	2.09E+00	2.31E+00
Drifting Grounding	5.01E-01	5.51E-01	6.12E-01	6.77E-01	7.47E-01
Total Groundings	2.05E+00	2.26E+00	2.50E+00	2.77E+00	3.06E+00

Summary of Risk Assessment

Leg outside TSS with highest total collision frequency (Overtaking & Head On)

Leg	Frequency	
Leg O7_12	4.04E-02	Incidents/Year
Leg O8_2	3.88E-02	Incidents/Year
Leg O8_6	3.85E-02	Incidents/Year
Leg O9_14	3.75E-02	Incidents/Year
Leg O7_9	2.99E-02	Incidents/Year
Total	1.85E-01	Incidents/Year
Percentage of total	11%	

Waypoint with the highest total collision frequency (Crossing, Merging, and Bending)

Leg	Frequency	
WAYPOINT_24	7.59E-02	Incidents/Year
WAYPOINT_27	7.35E-02	Incidents/Year
WAYPOINT_20	4.08E-02	Incidents/Year
WAYPOINT_38	4.01E-02	Incidents/Year
WAYPOINT_25	4.00E-02	Incidents/Year
Total	2.70E-01	Incidents/Year
Percentage of total	16.3%	

IWRAP MK II program simulation results for Collision and Grounding

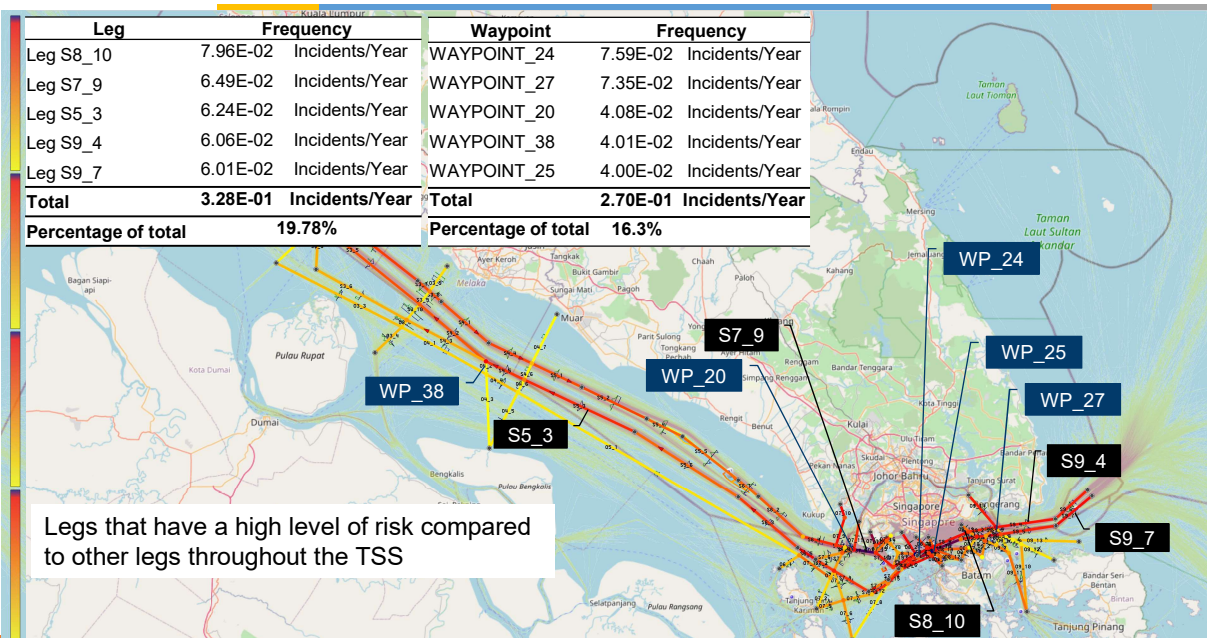
Year	2019	2024	2029	2034	2039
Total of Traffic	100%	110%	122%	135%	149%
Frequency (incidents per year)					
Powered Grounding	1.55E+00	1.70E+00	1.89E+00	2.09E+00	2.31E+00
Drifting Grounding	5.01E-01	5.51E-01	6.12E-01	6.77E-01	7.47E-01
Total Groundings	2.05E+00	2.26E+00	2.50E+00	2.77E+00	3.06E+00
Overtaking	1.11E+00	1.35E+00	1.66E+00	2.03E+00	2.47E+00
Head On	2.09E-01	2.53E-01	3.11E-01	3.80E-01	4.63E-01
Crossing	2.39E-01	2.90E-01	3.56E-01	4.36E-01	5.32E-01
Merging	8.26E-02	1.00E-01	1.23E-01	1.51E-01	1.83E-01
Bend	1.12E-02	1.35E-02	1.66E-02	2.03E-02	2.48E-02
Total Collisions	1.66E+00	2.00E+00	2.47E+00	3.02E+00	3.68E+00

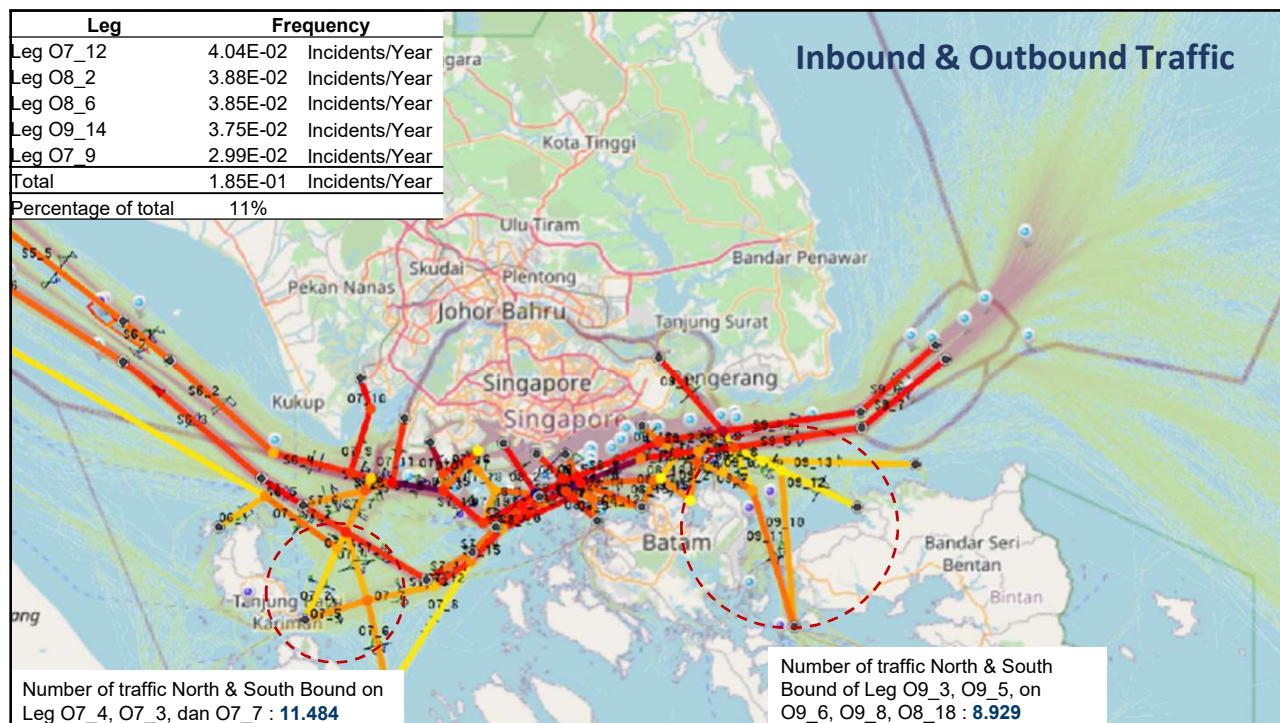
- The increase in traffic per year is 2% from VTS Klang and Port of Singapore data.
- The calculation is carried out using AIS data within 2 weeks (01-14 September 2019) from VTS Batam and VTS Dumai, so that traffic patterns can be detected. Because the traffic pattern will be biased if the time interval is too long.

RISK ASSESSMENT RESULT

Leg	Frequency	Waypoint	Frequency
Leg S8_10	7.96E-02 Incidents/Year	WAYPOINT_24	7.59E-02 Incidents/Year
Leg S7_9	6.49E-02 Incidents/Year	WAYPOINT_27	7.35E-02 Incidents/Year
Leg S5_3	6.24E-02 Incidents/Year	WAYPOINT_20	4.08E-02 Incidents/Year
Leg S9_4	6.06E-02 Incidents/Year	WAYPOINT_38	4.01E-02 Incidents/Year
Leg S9_7	6.01E-02 Incidents/Year	WAYPOINT_25	4.00E-02 Incidents/Year
Total	3.28E-01 Incidents/Year	Total	2.70E-01 Incidents/Year
Percentage of total	19.78%	Percentage of total	16.3%

Legs that have a high level of risk compared to other legs throughout the TSS





Proposed Revision of STRAITREP

Based on the risk assessment, accident data along the Malacca Strait and Singapore Straits as well as ship traffic to and from waterways as well as ports in Indonesia, as shown in the below table.

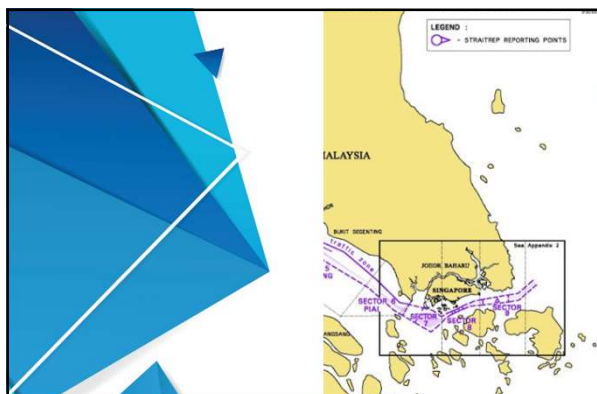
	Sector 1	Sector 2	Sector 3	Sector 4	Sector 5	Sector 6	Sector 7	Sector 8	Sector 9	Total
TSS area	1.79E-04	3.47E-02	5.69E-02	4.78E-02	1.01E-01	8.30E-02	1.45E-01	3.42E-01	2.61E-01	1.07E+00
Outside TSS	0.00E+00	0.00E+00	6.20E-04	1.03E-04	4.65E-05	3.90E-05	1.35E-01	1.03E-01	3.99E-02	2.79E-01
Total	1.79E-04	3.47E-02	5.75E-02	4.79E-02	1.01E-01	8.30E-02	2.80E-01	4.45E-01	3.01E-01	1.35E+00
Weight	0.01%	2.57%	4.26%	3.54%	7.51%	6.14%	20.72%	32.96%	22.29%	100.00%

Proposed Revision of STRAITREP

2. Revision of Reporting Items

STRAITREP MSC.73(69)

Designator	Function	Information Required (MSC.73(69))	Designator	Function	Information Required
A	Ship	Name of ship, call sign, IMO identification number (if available)	A	Ship	Name of ship, call sign, IMO identification number, and Flag State
C	Position	Latitudes and longitudes	P	Hazardous cargo	Indicate "Yes" or "No" whether vessel is carrying hazardous cargo
D	Position	True bearing and distance given in nm from clearly identifiable point	Q	Defect/damage/deficiencies/ other limitation	Brief detail of Defect/damage/deficiencies/ other limitation
E	True Course	A 3-digit group	X	Miscellaneous	Miscellaneous information concerning ship, such as navigational status, intended voyage, potential waste and other information if requested
F	Speed in knots	A 3-digit group			
P	Hazardous cargo	Indicate "Yes" or "No" whether vessel is carrying hazardous cargo			
Q	Defect/damage/deficiencies/ other limitation	Brief detail of Defect/damage/deficiencies/ other limitation			
R	Description of pollution or dangerous goods lost overboard	Brief detail of type of pollution			



THANK YOU