

Enclosure One: Saxa NRA Vessel Traffic Analysis 2025

Introduction

1. A comprehensive examination of maritime activity in the Saxa Range areas and Warning Zone over a four-year period (2021-2024) has been undertaken to establish a comparative understanding of patterns, volumes, types and concentrations of vessels routes to support the Navigational Risk Assessment (NRA). The analysis of this data is summarised in Section 5 of the NRA main document. For illustrative purposes a nominal Launch Vehicle (LV) trajectory, based on the RFA One rocket, is shown at Figure E1-1.

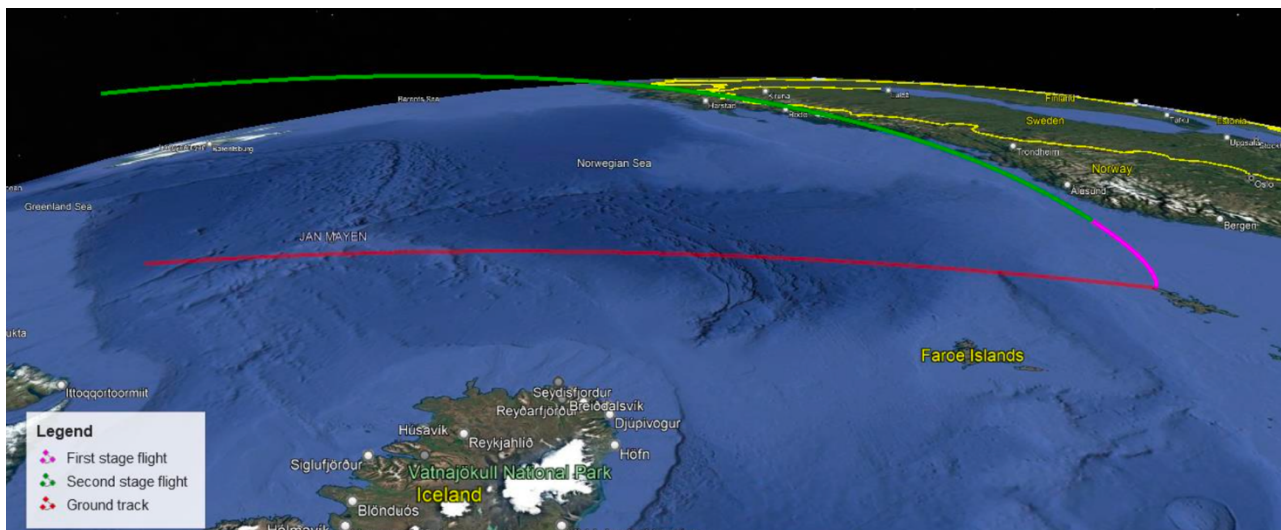


Figure E1-1

Areas of Analysis

2. The areas for analysis to determine the numbers, concentrations and patterns of vessels cover both the Nordic Sea and Arctic Ocean/Beaufort Sea and include the defined Saxa Hazard Areas¹. Both the Nordic Sea and Arctic Ocean the Range areas (which contain Warning Zones² and are illustrated in Figure E1-2) are analysed as a rocket trajectory will pass over this sea space. The Saxa maritime Launch Exclusion Zone (LEZ), in which specific risk to life may exist, is also scrutinised for vessel types and numbers and are shown at Figure E1-3.

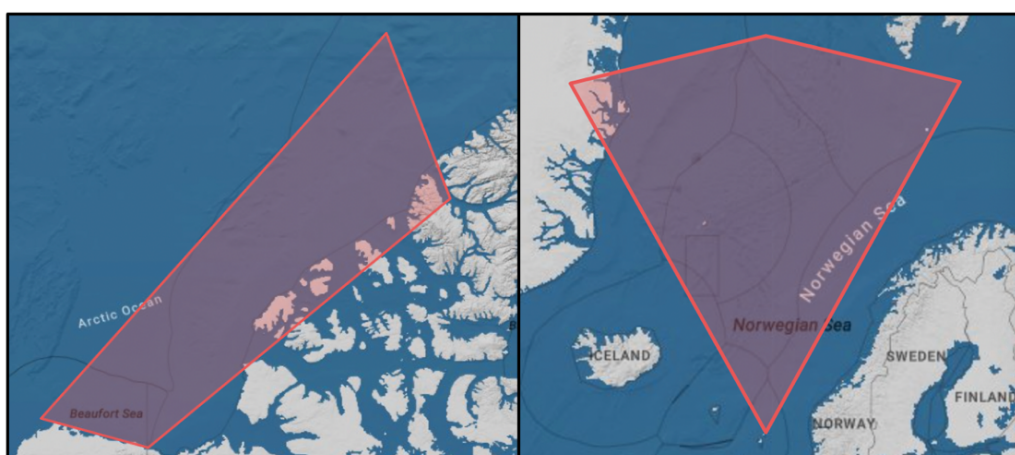


Figure E1-2

¹ Hazard areas are defined as geometric volumes on land, sea, or airspace where restrictions, exclusions, or warnings must be applied. Their purpose is to ensure safety by keeping these areas clear of hazards arising from the operator's spaceflight activities, and clear of people, vessels, or infrastructure that might be exposed to those hazards. Hazard areas are determined through flight safety analysis, based on the containment of stage impacts and the assessment of unacceptable risks.

² The Exclusion Zone and Warning Zones for which Marine Safety Information (inc. Notices to Mariners and Navwarns) will be required.

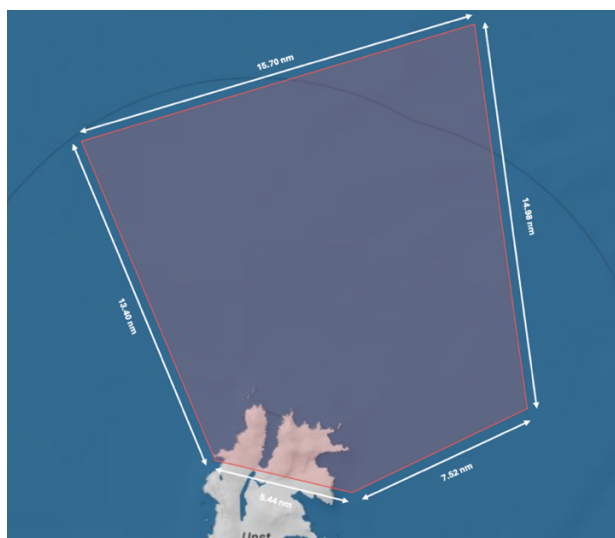


Figure E1-3

3. The following tables show numbers and types of vessels in each defined area and the average over the 4 years³. The monthly peak over that 4-year period will be identified from which a daily average will be obtained. An analysis then be undertaken based on overall numbers, patterns, routes and concentrations of vessels to determine if the risk to marine traffic from Saxa launch operations is tolerable without additional control measures.

Saxa Extended Range – Nordic Sea

4. The Saxa extended Range in the Nordic Sea is 505,000nm². Vessel numbers over a 4-year period is shown at Table E1-A. The highest volume of ships in this period was cargo vessels, closely followed by fishing vessels. Cargo vessels will invariably transit through the area quickly; however, fishing vessels will loiter in the same area for extended periods.

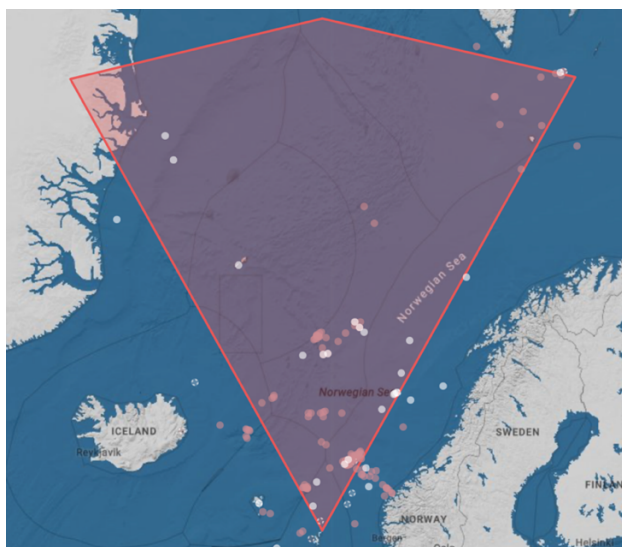


Figure E1-4

5. The overall maritime activity in the Saxa Extended Range is determined to be **extremely low** relative to its size. This is illustrated at Figure E1-4 which displays the total vessel count for 25 August 2024 (August is historically the busiest month of the year for maritime activity, and 25 August was the busiest day of the month, thus this shows ‘worst case scenario’) of 191 vessels in the entire extended Range.

³ A period of 4 years was chosen to full establish patterns, concentrations and movements of vessels over time.

6. The 4-year annual average was 2663.25, equating to 7.29 vessels per day and 0.00001 per nm². The Saxa Extended Range is not a Hazard Area, so these figures are shown to understand general traffic numbers, movements and concentrations in this sea space.

SAXA EXTENDED RANGE – NORDIC SEA					
Type of Vessel	2021	2022	2023	2024	4 Yr Mean
Fishing	715	749	848	904	804
Fish Carrier	32	31	34	34	32.75
Floating Oil Platform	1	1	0	1	0.75
Cargo	802	814	955	1010	895.25
Tanker	354	323	467	494	409.50
Sailing	119	106	145	149	129.75
Pleasure Craft	53	61	67	74	63.75
Tug and Towing Vessels	49	44	47	45	46.25
Passenger	123	135	142	152	138
Pilot Boat	6	6	6	6	6
Law Enforcement	15	17	12	13	14.25
Dredging	3	3	2	3	2.75
Search and Rescue	14	13	16	17	15
Coastguard/Research/Survey Vessel	26	30	19	22	24.25
Military	39	46	47	45	44.25
Offshore Support/Supply	23	29	28	32	28
Pipe/Cable/Buoy Layer	1	2	2	2	1.75
Inshore Work Boat	1	1	1	2	1.25
Diving ops	5	4	5	5	4.75
Total	2382	2416	2844	3011	2663.25

Table E1-A: 4-year vessel numbers Saxa Extended Range

Arctic Ocean/Beaufort Sea Range

7. The Saxa Arctic Ocean/Beaufort Sea Range is 251,690 nm². Vessel numbers over a 4-year period is shown at Table E1-B. The highest volume of ships in this period were tugs and towing vessels, which operate in the near shore generally servicing the oil and gas industry.

8. The overall maritime activity in the Arctic Ocean/Beaufort Sea Range is determined to be **extremely low** relative to its size. The 4-year annual average over this period was 128.75, equating to 0.35 vessels per day and 0.000001 per nm². There are no significant concentration of vessels in

the area so risk to marine traffic of Saxa operations is determined to be tolerable with implementation of Warning Zone over the areas through a Notice to Mariners prior to and during launch operations.

SAXA ARCTIC OCEAN/BEAUFORT SEA RANGE					
Type of Vessel	2021	2022	2023	2024	4 Yr Mean
Fishing	10	12	14	15	12.75
Fish Carrier	1	1	1	1	1
Cargo	11	20	25	23	19.75
Tanker	1	5	8	8	5.5
Sailing	2	8	7	7	6
Pleasure Craft	12	14	11	13	12
Tug and Towing Vessels	26	31	28	29	28.5
Passenger	7	10	16	14	11.75
Law Enforcement	2	2	2	2	2
Dredging	0	0	2	1	0.75
Search and Rescue	6	8	5	6	6.25
Coastguard Vessel/Ice Breaker	9	8	9	9	8.75
Research Vessel	6	6	8	7	6.75
Military	3	1	2	2	2
Hovercraft	1	1	1	1	1
Anti-Pollution	1	1	1	1	1
Inshore Work Boat	3	2	1	3	2.25
Drilling Vessel	0	0	1	0	0.25
Offshore Supply Ship	0	0	1	1	0.5
Total	101	130	143	143	128.75

Table E1-B: 4-year vessel numbers Arctic Ocean/Beaufort Sea Range

Launch Exclusion Zone

9. The Saxa Launch Exclusion Zone (LEZ) is 210nm², of which 203nm² is sea area. Vessel numbers over a 4-year period is shown at Table E1-C. The highest volume of ships in this period was fishing vessels, closely followed by cargo vessels. Fishing vessels will loiter in the same area for extended periods, particularly the local, inshore shellfish vessels.

10. The overall maritime activity in the Saxa LEZ is determined to be **low** relative to its size. The 4-year annual average over this period was 298.25, equating to 0.8 vessels per day and 0.003 per nm² as seen at Table E1-C.

RFA LEZ VESSEL ANALYSIS					
Type of Vessel	2021	2022	2023	2024	4 Yr Mean
Fishing	84	123	137	143	121.75
Fish Carrier	7	8	6	8	7.25
Cargo	106	101	96	111	103.5
Tanker	17	8	13	7	11.25
Sailing	13	7	21	27	17
Tug and Towing Vessels	2	4	6	4	4
Passenger	4	10	16	11	10.25
Law Enforcement/Coast Guard	1	1	3	2	1.75
Research/Survey Vessel	1	0	3	1	1.25
Military	1	0	0	1	0.5
Offshore Support/Supply	17	17	27	15	19
Pipe/Cable/Buoy Layer	0	0	1	2	0.75
Total	253	279	329	332	298.25

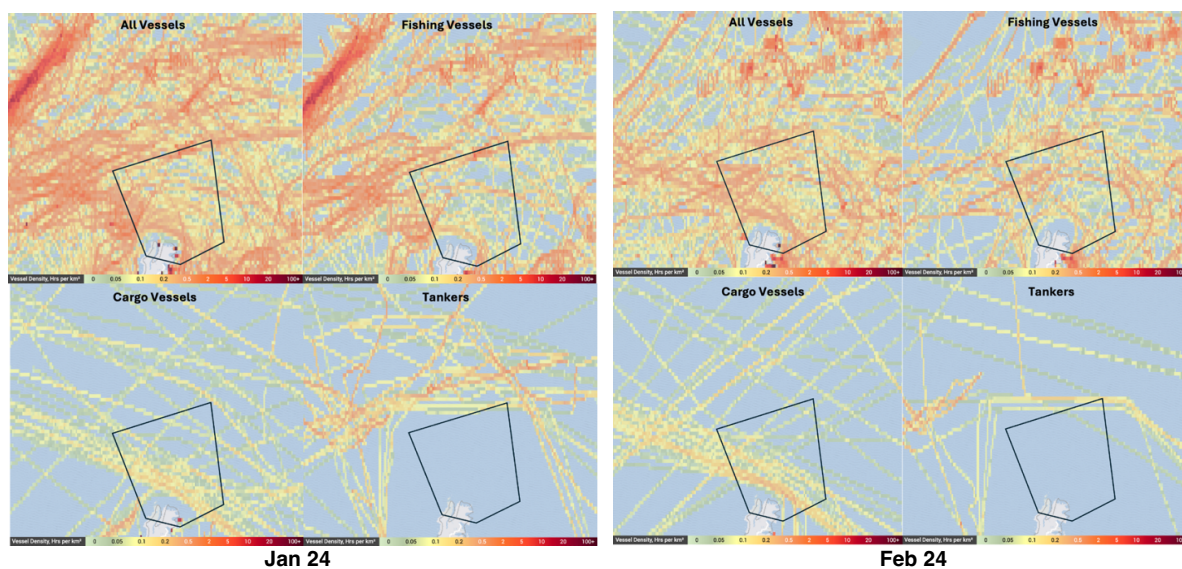
Table E1-C: 4-year vessel numbers Saxa LEZ

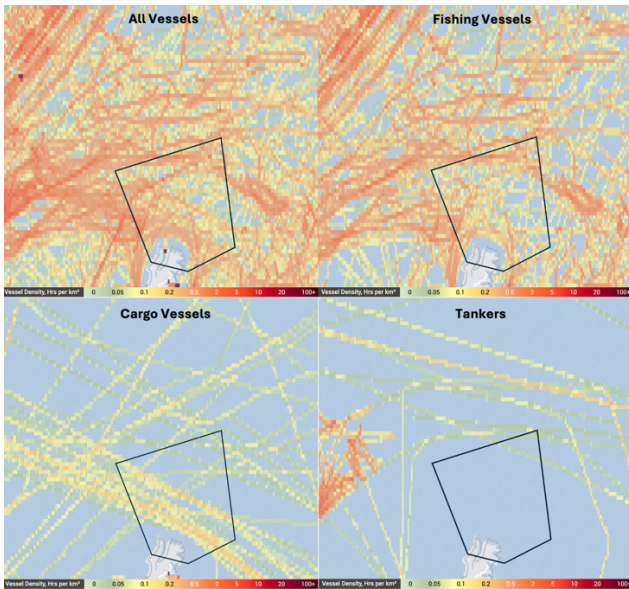
11. To provide patterns of vessel behaviour in the LEZ the heat maps below show monthly vessel activity over a 12-month period during 2024 based on the monthly vessel density scale at Figure E1-5.



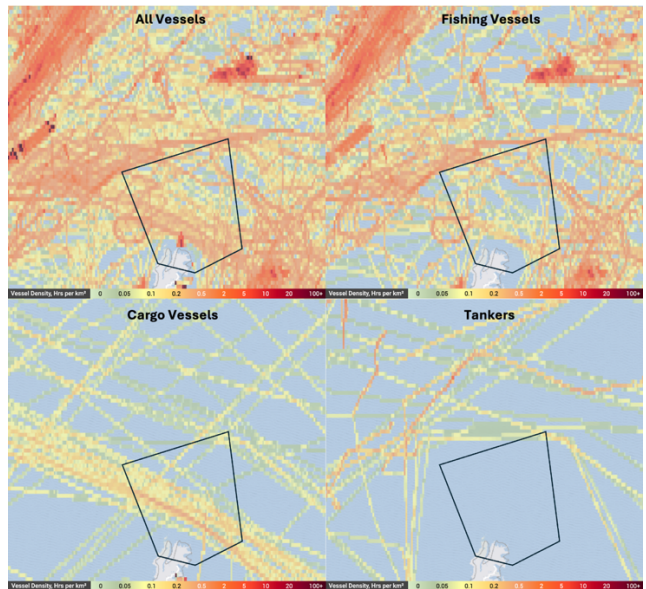
Figure E1-5: Vessel Density

HEAT MAPS

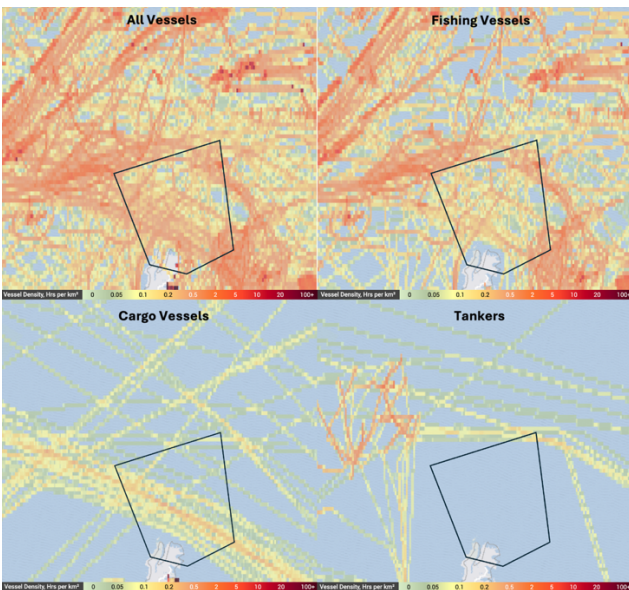




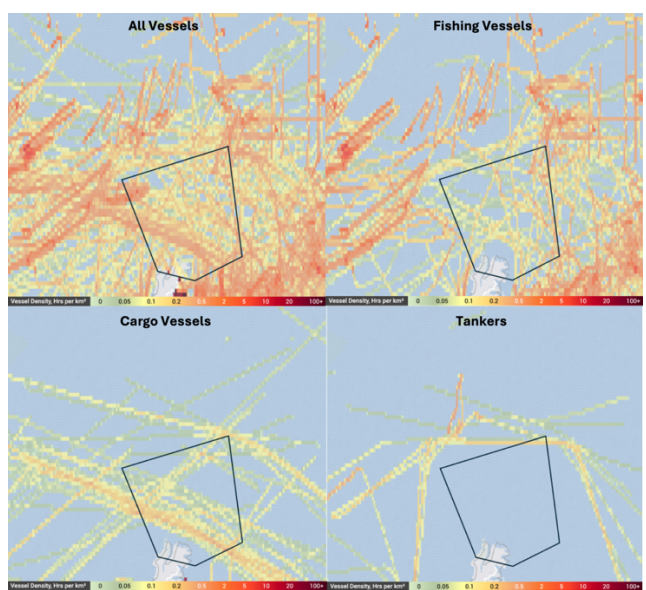
Mar 24



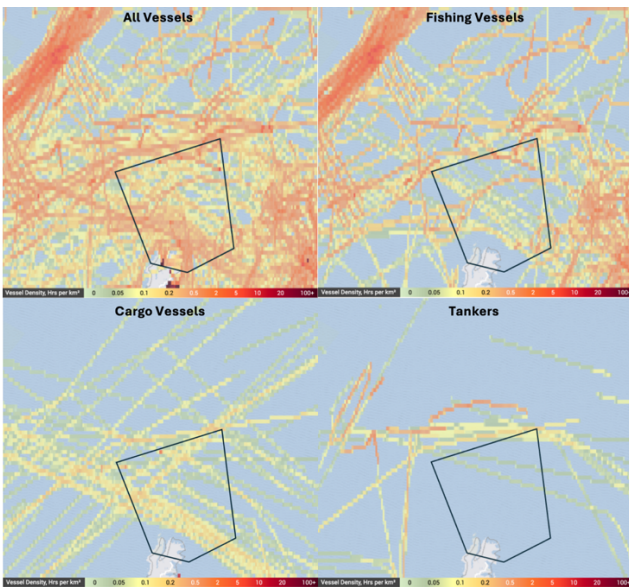
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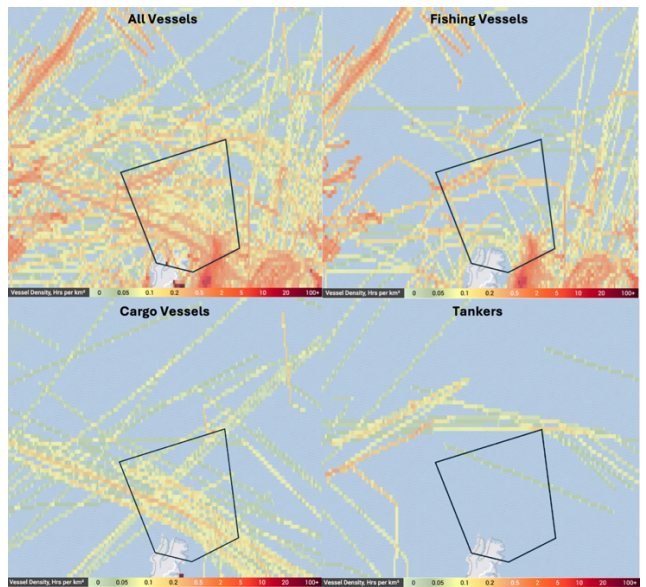
May 24



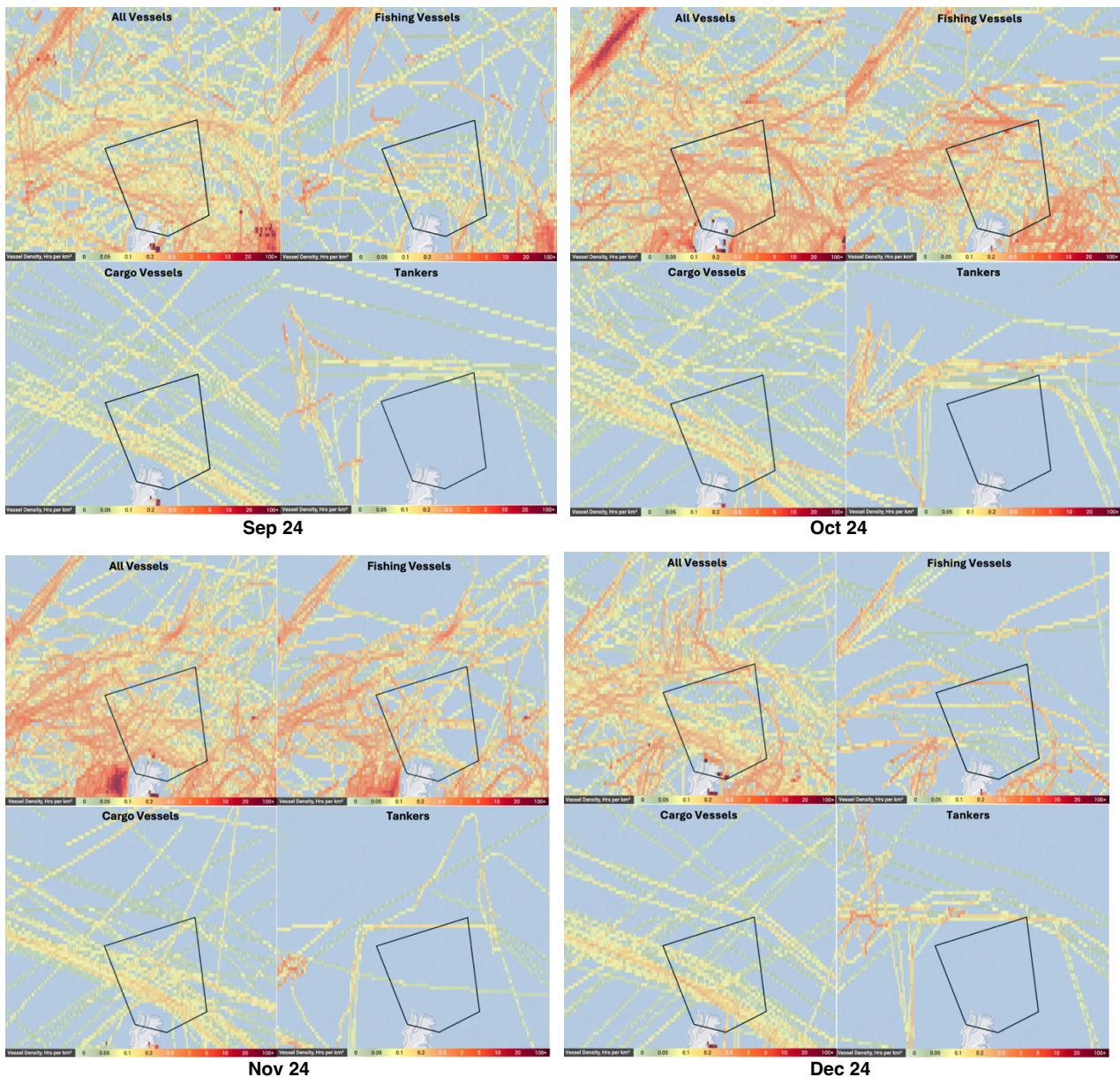
Jun 24



Jul 24



Aug 24



12. As can be seen from the heat maps fishing Vessels are the most prevalent vessels in the Saxa LEZ, followed by cargo vessels. Tankers transit the periphery of the LEZ using the mandated route to Shetland's Sullom Voe oil terminal. The monthly peak traffic is Mar – May.

13. While relatively low in terms of overall numbers as the vessel hours/km² are consistently below 10 vessel hours per month, the Saxa LEZ does contain volumes and concentrations of vessels where risk to these vessels from launch operations is not tolerable without additional control measures. Therefore, as described in Section 8 of the NRA, the following measure must be in place for launch operations:

- Admiralty charts annotated with space rocket launch operations warning hazard.
- Implementation of a Launch Exclusion Zone through NTMs.
- Full Marine Safety Information broadcasts prior to and during launch operations.
- Full surveillance of the LEZ by Saxa prior to and during launch operations, by any means as agreed by the regulator to ensure full coverage, is required to ensure that no vessels are in the LEZ during a rocket launch.
- Launch operations cease immediately if a vessel enters the LEZ.
- Saxa, as a Coast Station – Radio, communicates with any vessels approaching or within the LEZ advising of the dangers.

14. By implementing these control measures the risk is determined to be ALARP.