RESPONSE

Annual report on discharges observed during aerial surveillance in the Baltic Sea 2023

Baltic Marine Environment Protection Commission

Response to spills

2024

helcom.fi

Published by:
Helsinki Commission – HELCOM
Katajanokanlaituri 6 B
00160 Helsinki, Finland

www.helcom.fi

For bibliographic purposes this document should be cited as:
"HELCOM Annual report on discharges observed during aerial surveillance in the Baltic Sea, 2023. HELCOM (2024)."

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Introduction

Co-operation on aerial surveillance within the Baltic Sea area was established already during the 1980s within the framework of the Helsinki Commission (HELCOM). Through the Helsinki Convention (Article 14, Annex VII Regulation 7) the Contracting Parties (the nine Baltic Sea countries and the European Commission) have agreed to develop and apply individually or in co-operation, surveillance activities covering the Baltic Sea area in order to spot and monitor oil and other substances released into the sea.

The Contracting Parties have also committed themselves to undertake appropriate measures to conduct the surveillance by using, inter alia, airborne surveillance equipped with remote sensing systems. In addition to the provisions of the Helsinki Convention, the HELCOM Recommendation 34E/4 recommends the Contracting Parties to take actions to cover the whole of the Baltic Sea area with regular and efficient airborne surveillance, develop and improve the existing remote sensing systems and to co-ordinate surveillance activities which take place outside territorial waters. More on the aerial surveillance cooperation in the Baltic Sea can be found in Chapter 6 of the HELCOM Response Manual.

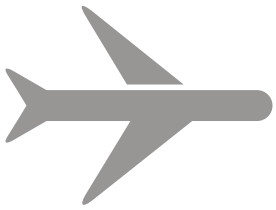
The purpose of regional aerial surveillance is to detect spills of oil and other harmful substances and thus prevent violations of the existing regulations on prevention of pollution from ships. Such spills are a form of pollution which threatens the marine environment of the Baltic Sea area. If possible, an identity of a polluter should be established and the spill should be sampled from both the sea surface and on board the suspected offender to enable prosecution.

In order to follow-up these commitments, and to provide an overview of the situation in the region, the HELCOM Secretariat compiles annually data on discharges observed in the Baltic Sea area during national and joint co-ordinated aerial surveillance activities.

This report presents data from 1988 up to 2023. Data has been reported by the HELCOM Contracting Parties and quality assured by the HELCOM Secretariat.

The report focuses on aerial surveillance conducted with fixed-wing aircraft. Nevertheless, since 2019 a separate section with data from other types of aerial surveillance such as helicopters and drones, has been included in the reports upon decision by the 2018 meeting of the HELCOM Informal Working Group on Aerial Surveillance, IWGAS 2018 (renamed in January 2023 to HELCOM Expert Group on Aerial Surveillance, EG Surveillance). The data has been kept separate from the data of aerial surveillance by fixed-wing aircraft, in order not to disrupt the valuable statistics compiled over the years.

The focus of the report is on detected spills of mineral oil. However, since 2014, the reporting not only covers detections of mineral oil but also spills of other substances and unknown substances. The Contracting Parties are also to report detections of garbage, litter and floating objects.



Aerial surveillance activity

In total, 2920 flight hours with fixed-wing aircraft were carried out in 2023 within aerial surveillance activities of the Baltic Sea countries (Table 1). This is the lowest number of flight hours since the mid-1990s.

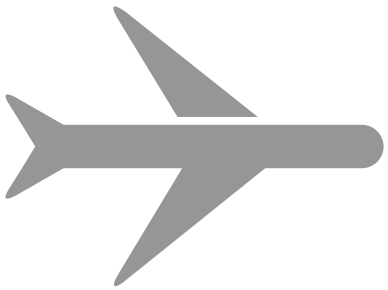
All Baltic Sea countries reported aerial surveillance related data in 2023, except for Russia. However, Lithuania did not conduct aerial surveillance with fixed-wing aircraft. Estonia informed that 274:08 flight hours were performed by an aircraft technically equipped for sea surveillance and 113:51 flight hours were performed by an aircraft without remote sensing equipment (mainly near coastal visual patrol flights including harbour checks).

In addition, Latvia conducted 450 flight hours with EMSA Remotely Piloted Aircraft Systems (RPAS), and Lithuania conducted 40 flight hours with helicopter (none fixed-wing aircraft) (Table 5). RPAS flight hours reported by Latvia were part of a Multipurpose Maritime Operation (MMO) between Latvia, Finland and Estonia. It is unknown how many of the reported flight hours were for pollution detection purposes.

The number of flight hours vary somewhat between the years. Reasons for the low number of flight hours in 2023 were inter alia maintenance and technical challenges, as well as organizational changes in some countries. In 2023, Germany increased their number of flight hours while there was a decrease in flight hours by Finland and Sweden. The number of flight hours in 2023 by Denmark, Estonia and Poland stayed on a similar level as in 2022. No regular aerial surveillance has been conducted in Russian waters since the beginning of 1990s and thus the number of spills in these areas are unknown. This also concerns Latvian and Lithuanian waters where only sporadic surveillance has been conducted in the last decade. The number of flight hours by individual Baltic Sea countries, in 2004-2023, is shown in Figure 1.

Certain flight proportions should be ensured for detections in darkness, when deliberate discharges are more likely to occur, which means that the aircraft should be properly equipped to detect oil at night or during poor visibility. In 2023, four countries carried out flights at night (Figure 2), in total 356 flight hours, which constituted 12,2% of all flight hours (7,2% in 2022). Most of these countries only conducted a minor share of their aerial surveillance in night-time. However, 43% of the total German flight hours were conducted in darkness in 2023, representing 69% of all aerial surveillance conducted in darkness.

In addition to aerial surveillance, the Contracting Parties utilize satellite images to detect illegal discharges of oil and other substances. Satellite surveillance in the Baltic Sea area has been intensified since 2007 due to the CleanSeaNet (CSN) satellite surveillance service, provided to the Baltic Sea countries by European Maritime Safety Agency (EMSA). The satellite images are delivered in near real time to provide first indication of possible oil slicks to be checked by aircraft on-site.Altogether, CSN delivered for the HELCOM region a total of 1152 services in 2023 (992 in 2022), indicating 389 possible detections (295 in 2022). In the HELCOM area, 62 % of the spill indications were verified on site. Out of these, 2,6% were confirmed to be mineral oil (1,4% in 2022). Satellite surveillance detections provided by EMSA in 2023, including confirmed mineral oil detections, are presented in Table 2.



Detected spills of mineral oil and other substances

In general, the number of detected oil spills in the Baltic Sea has been constantly decreasing (Figure 3), even though the density of shipping has grown and the aerial surveillance activity in the countries has been substantially improved, e.g. the high number of flight hours has been maintained and remote sensing equipment on board aircrafts, like Side Looking Airborne Radar (SLAR), has been more widely used. This is likely a result of intensive aerial surveillance in the Baltic Sea which indicates to the ships that they are constantly being watched. The aerial surveillance is complemented by satellite surveillance to enable bigger area coverage and optimisation of flights effectiveness.

Altogether the Baltic Sea countries reported 133 spill observations in 2023 as presented in Figure 4 and Table 1. Of the detected spills, 24% were confirmed as discharges of mineral oil, in total 32 spills. This is the lowest ever recorded. The number of detected mineral oils spills has in the last seven years been between 45-65 while the number in the beginning of the 2000s was still close to 500. The remaining 76% of the detections were identified as other substances (e.g. other noxious liquid substances, fish oil, vegetable oil or greywater) or unknown observations, which could not be visually verified. Methodology for identifying harmful substances in aerial surveillance is not yet in place. These substances might cause a threat to the marine environment and would be important to be able to identify.

Multiple slicks obviously originating from a single spill or source have been treated as one in this report. In line with this, seven spills from wreck M/S Estonia and two spills from another wreck were detected in 2023 in Finnish waters but were only included in this report as one spill. In addition, Sweden reported one spill which was suspected to be from the shipwreck Rone. The number of oil spills observed during aerial surveillance activity in individual countries in 2003-2023 is presented in Figure 3.

A good way to evaluate the number of oil discharges is to reflect it as Pollution per Flight Hour (PF) Index, which compares the total number of observed oil spills to the total number of flight hours. A decreasing PF Index over the years indicates less oil spills or/and increased surveillance activity. In 2023, the PF index was 0,011 (Figure 5). The PF Index decreased in 2023 due to the decrease in the number of detected mineral oil discharges. Figure 6 shows the total number of flight hours and observed oil spills during aerial surveillance from 1989 to 2023.

In total 32 mineral oil discharges were detected in 2023and of these 21 were even smaller than 0.1 m^3 (100 litres). The share of each size category of oil spills is presented in Figure 7 and further divided by country waters in Table 3. The total estimated minimum volume of oil spills observed in 2023 amounted to 19 m^3 due to three spills being between 1,7 and 2,8 m^3 and one spill 9,3m^3 (total volume 2,7 m^3 in 2022 and 5,1 m^3 in 2021). The origin of the large spill was from the passenger ferry Marco Polo, which hit ground south-east of Sweden in late October 2023. The statistics show that the estimated volume of the oil spills has steadily been decreasing and during the last ten years a significant decrease has been recorded. However, as the figures in 2023 demonstrates, one major accident can easily change these statistics. The trend of the spill sizes for the years 2004-2023 is presented in Figure 8. Further, Figure 9 illustrates the trend in total amount of oil detected and the number of spills observed in 2004-2023. A map illustrating the location of the detected oil spills in 2023 by size is depicted in Figure 10.

In a vast majority of cases of detected discharges polluters remain unknown, which was also the case in 2023 (Table 1). In 22 spill detections, the polluter was identified to be a ship and of these cases five were spills of mineral oil. Three mineral oil detections were from other sources like wrecks (see above).

The identification of ships suspected of illegally discharging oil into the sea is facilitated by the SeaTrack Web (STW) oil drift forecasting system developed within HELCOM. This tool, in combination with the HELCOM Automatic Identification System (AIS), is used for backtracking and forecasting simulation of detected oil spills and matching the ship tracks with oil spill backtracking trajectory. STW/AIS has also been integrated with satellite information to increase the likelihood that polluters will be identified.

Aerial surveillance data for the years 1988-2023, including the number of flight hours per country, confirmed oil spills in country waters as well as data on the PF Index is contained in Table 4.

Data on the individual observed oil spills can be viewed and downloaded in the HELCOM map and data service.

Power BI dashboard on observed discharges in the Baltic Sea (1998–2023)

An interactive data visualization dashboard has been developed by the HELCOM Secretariat to offer users a more open and analytical view into the aerial surveillance dataset (dashboard accessible here). This dashboard presents data on detected spills of mineral oil in the Baltic Sea from 1998 until 2023. Reporting on spills of other substances and unknown substances is also included from 2014 onwards. The dashboard has been developed using 'Power BI' a data visualization software developed by Microsoft.

The dashboard is interactive meaning that users can filter data based on fields of interest. Users can drill-down into the dataset by simply selecting a data field via the visual, dropdown, or map. Based on the selected data field, e.g., 'Year', the dashboard will pull and display data only for that selected year. To select multiple data fields, hold the 'Ctrl' button on the keyboard, and then select one or more fields, e.g., 'Year', 'Country', 'Spill category', etc. Dashboard data is refreshed by selecting 'F5' on the keyboard and can be saved as a PDF for print by selecting 'Ctrl+P'.

The ability to filter and tailor data queries is helpful for large datasets, such as the aerial surveillance dataset, as it offers a more granular level of analysis. Furthermore, the data is visualized and made accessible in a format for quick summary of trends and comparisons over time. This is not achieved through static visuals and reports. However, the findings presented in this 2023 aerial surveillance report offer the official HELCOM narrative following in-depth analysis of the data, the dashboard is simply a tool for users to further explore the data within an open and accessible online tool.

The dashboard can be embedded into websites and shared using the URL. Data that is linked to the dashboard is available for viewing and download from the HELCOM Map and Data Service.

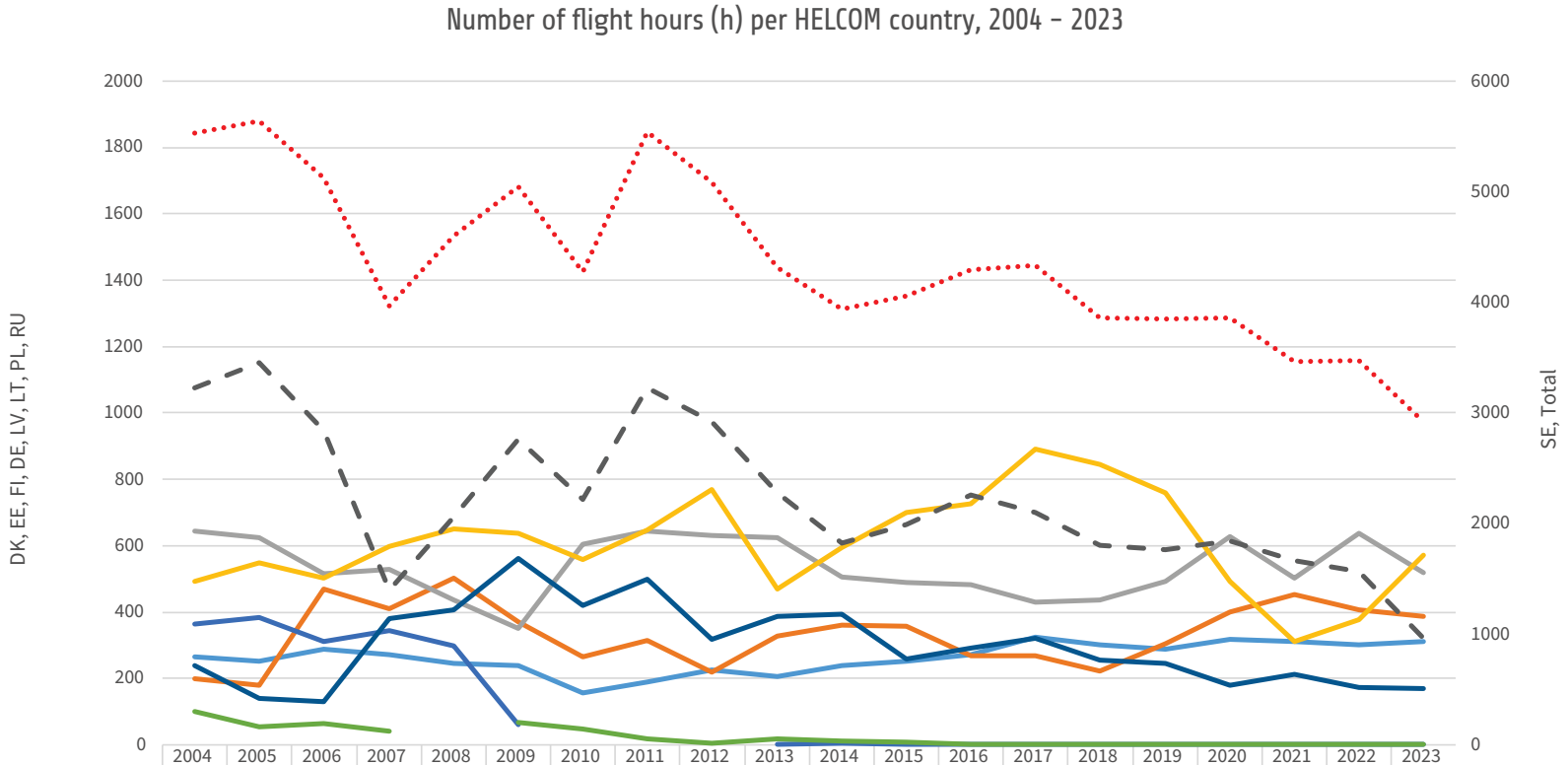
Table 1. Annual aerial surveillance data for the Baltic Sea in 2023. The flight hours are the total number of hours of aerial surveillance conducted by a country in the Baltic Sea area. The detections of mineral oil, other substances and unknown substances are reported as detections within a country's Exclusive Economic Zone (EEZ).

Country	No. of flight hours			No. of detections inside national EEZ			Detections confirmed / observed as mineral oil spills			No. of polluters (mineral oil)				Estimated volume (m^3)
	Daylight	Darkness	Total	Daylight	Darkness	Total	Daylight	Darkness	Total	Rigs	Ships	Other	Unknown	
Denmark	291:37	19:12	**310:49**	14	1	**15**	3	0	**3**	0	0	0	3	**0,18**
Estonia	387:59	0:00	**387:59**	13	0	**13**	4	0	**4**	0	0	0	4	**1,10**
Finland	477:00	42:00	**519:00**	21	0	**21**	8	0	**8**	0	1	2	5	**3,27**
Germany	324:10	246:25	**570:35**	9	3	**12**	2	3	**5**	0	0	0	5	**0,74**
Latvia	2:00	0:00	**2:00**	0	0	**0**	0	0	**0**	0	0	0	0	**0,00**
Lithuania	0:00	0:00	**0:00**	0	0	**0**	0	0	**0**	0	0	0	0	**0,00**
Poland	170:49	0:00	**170:49**	9	0	**9**	6	0	**6**	0	2	0	4	**2,22**
Russia														
Sweden	910:46	48:27	**959:13**	58	5	**63**	4	2	**6**	0	2	1	3	**11,52**
Total	**2564:21**	**356:04**	**2920:25**	123	9	**133**	27	5	**32**	0	5	3	24	**19,03**

Remarks:
Estonia: 274:08 flight hours were performed by aircraft technically equipped for sea surveillance, 113:51 flight hours were performed by aircraft without remote sensing equipment (mainly near coastal visual patrol flights including harbour checks).
Finland: In total seven detections from wreck M/S Estonia and two from another wreck. The detections have been included in this report as one spill per wreck.
Latvia: 450 flight hours with EMSA Remotely Piloted Aircraft Systems (RPAS) (see Table 5). Not included in Table 1 as it contains surveillance with fixed wing aircraft only.
Lithuania: Lithuania conducted 40 flight hours with helicopter (see Table 5). Not included in Table 1 as it contains surveillance with fixed wing aircraft only.
Sweden: One spill was suspected to be from shipwreck Rone.

Table 1. Continued.

Country	Detections confirmed/ observed as other substances	No. of polluters (other substances)				Unknown detections	No. of polluters (unknown detections)		
		Rigs	Ships	Other	Unknown		Rigs	Ships	Other
Denmark	**5**	0	0	0	5	**7**	0	0	0
Estonia	**2**	0	0	0	2	**7**	0	0	0
Finland	**6**	0	0	0	6	**7**	0	0	0
Germany	**0**	0	0	0	0	**7**	0	0	0
Latvia	**0**	0	0	0	0	**0**	0	0	0
Lithuania	**0**	0	0	0	0	**0**	0	0	0
Poland	**0**	0	2	0	0	**3**	0	0	0
Russia									
Sweden	**47**	0	17	0	30	**10**	0	0	0
Total	**60**	**0**	**19**	**0**	**43**	**41**	**0**	**0**	**0**



	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Denmark	265	251	290	271	246	240	156	188	227	207	239	254	271	324	300	287	318	312	301	311
Estonia	198	178	471	410	503	371	266	315	220	327	362	356	267	268	224	306	400	452	408	388
Finland	644	625	517	529	438	351	605	645	631	625	505	490	484	428	437	491	628	504	637	519
Germany	491	549	504	598	650	638	558	648	769	470	596	700	726	891	846	760	493	312	378	570
Latvia	365	384	311	343	298	61		3		0	5	0	0	0	2	0	0	0	0	2
Lithuania	100	54	64	41		66	48	18	4	19	12	8	0	0	0	0	0	0	0	0
Poland	239	141	131	380	406	561	421	499	318	387	393	259	290	321	254	244	179	214	175	171
Russia							10													
Sweden	3231	3455	2842	1397	2063	2758	2215	3225	2921	2283	1823	1995	2256	2098	1800	1765	1840	1668	1571	959
Total	5534	5638	5128	3969	4603	5046	4279	5541	5090	4317	3935	4062	4295	4331	3863	3854	3858	3462	3470	2920

Figure 1. Number of flight hours per HELCOM Contracting Party, 2004–2023. Note that the number of flight hours for Sweden and the total number of flight hours are indicated on the vertical axis on the right, which uses a different scale.

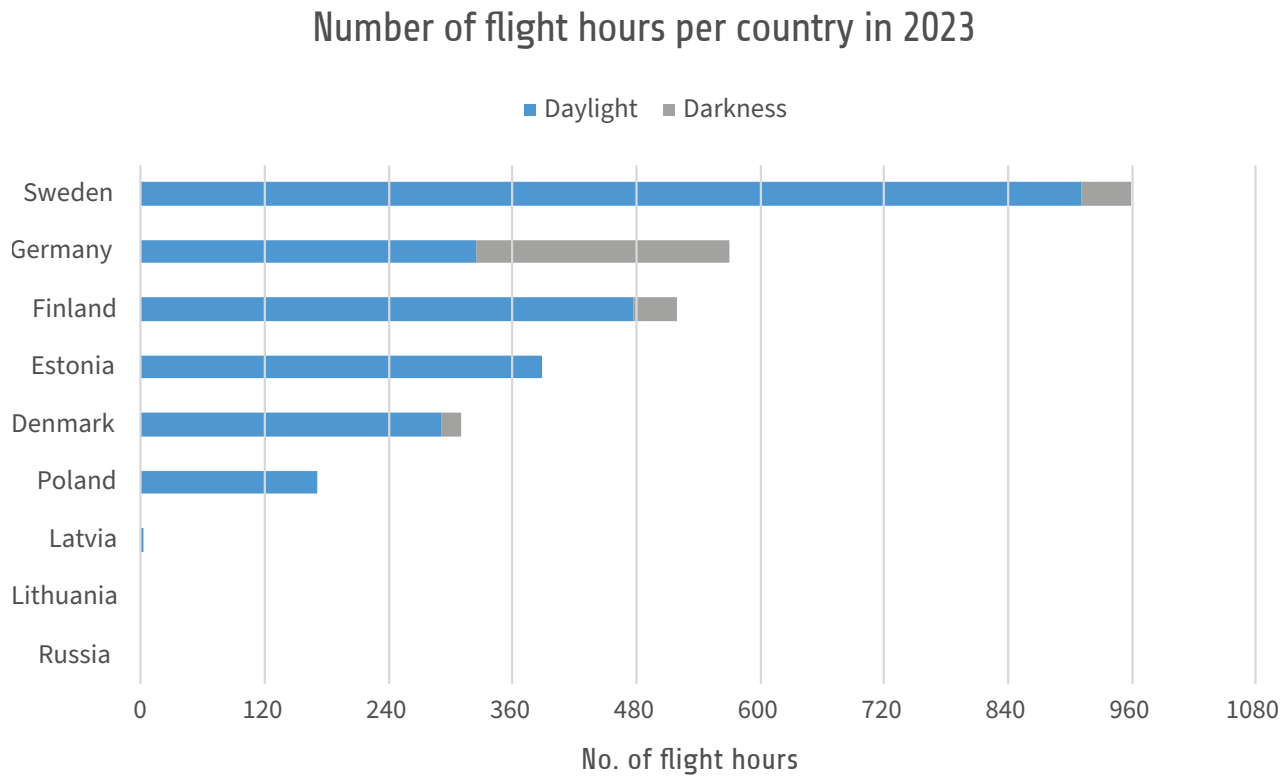


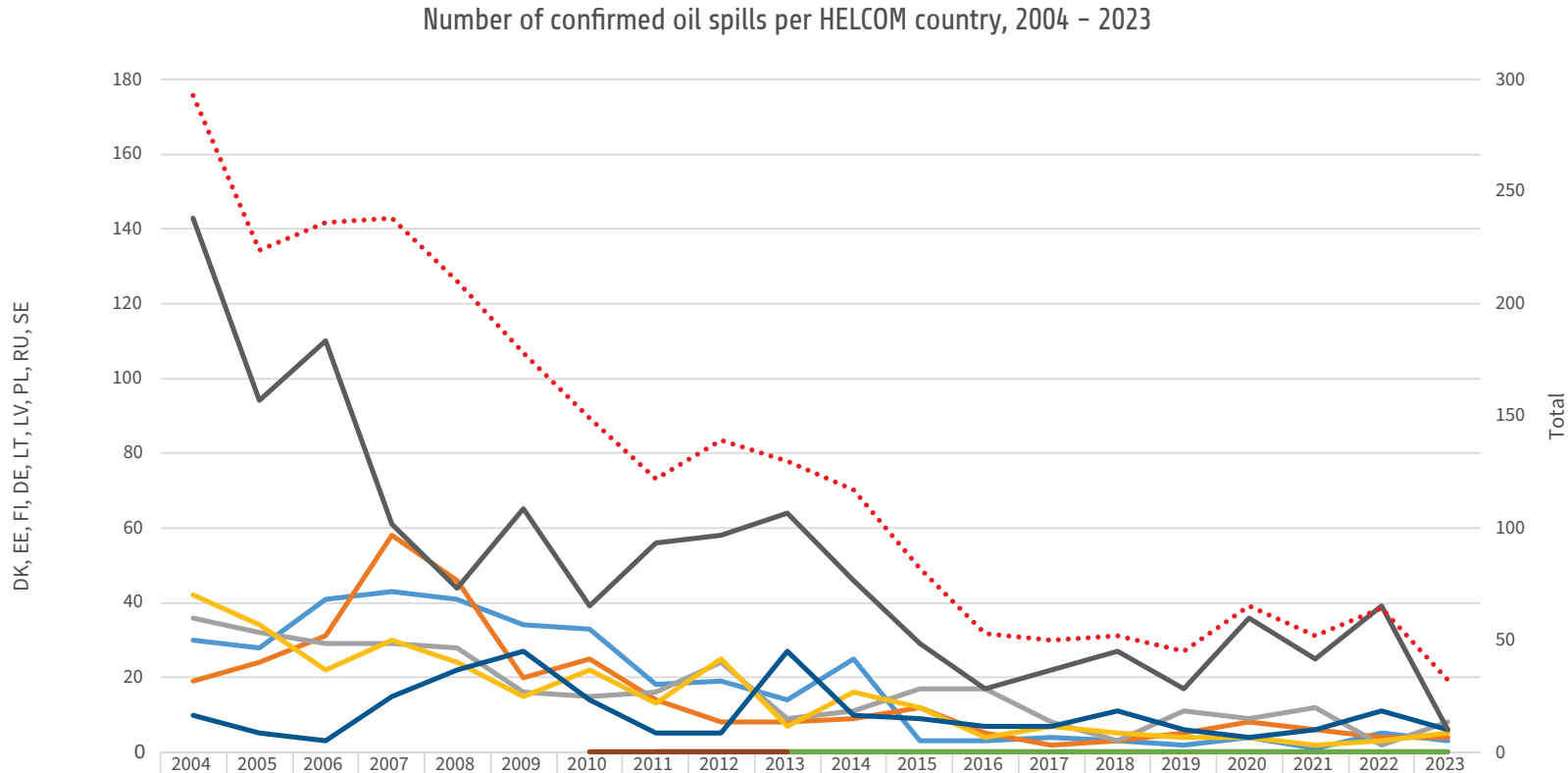
Figure 2. Number of flight hours per country in 2023.

Table 2. Satellite detections of spills in HELCOM countries' waters in 2023 provided by EMSA CleanSeaNet (CSN), including verified detections[1].

HELCOM Coastal Country	On-site observations						No on-site observation		No feedback provided		Total of detections
	Mineral oil	Natural phenomena	Nothing observed	Other substance	Unknown feature observed	Total %	Reason for no verification	Total %	No feedback provided	Total %	
Denmark	1	9	23	12	1	78%	13	22%	0	0%	59
Estonia	1	3	31	13	0	91%	4	8%	1	2%	53
Finland	1	0	6	9	2	44%	4	10%	19	46%	41
Germany	2	5	5	3	1	94%	1	6%	0	0%	17
Latvia	0	0	1	1	0	7%	2	7%	25	86%	29
Lithuania	0	0	0	0	0	0%	0	0%	1	100%	1
Poland	0	0	6	5	0	32%	23	68%	0	0%	34
Russia[2]	0	0	0	0	0	0%	0	0%	30	100%	30
Sweden	5	15	47	28	7	82%	11	9%	12	10%	125
Grand Total	**10**	**32**	**119**	**71**	**11**	**62%**	**58**	**15%**	**88**	**23%**	**389**

1 The allocation of the 2023 CSN detections per HELCOM coastal country was done using the EEZs published on the HELCOM website (http://maps.helcom.fi). The 2023 statistics produced to the CSN UG were based in Indicative EEZs retrieved from the Marine Regions webpage (https://www.marineregions.org/eezmapper.php) which does not coincide with the HELCOM coastal countries' regions in all cases. Thus, it is likely that the figures concerning CSN detections in this paper are slightly different from the statistics presented in the CSN UG, namely for Finland, Poland and Sweden.

2 HELCOM Coastal Country. Note that Russia is not a user of CleanSeaNet.



	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Denmark	30	28	41	43	41	34	33	18	19	14	25	3	3	4	3	2	4	1	5	3
Estonia	19	24	31	58	46	20	25	14	8	8	9	12	5	2	3	5	8	6	4	4
Finland	36	32	29	29	28	16	15	16	24	9	11	17	17	8	3	11	9	12	2	8
Germany	42	34	22	30	24	15	22	13	25	7	16	12	4	7	5	4	4	2	3	5
Latvia								0	0	0	0	0	0	0	0	0	0	0	0	0
Lithuania							0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poland	10	5	3	15	22	27	14	5	5	27	10	9	7	7	11	6	4	6	11	6
Russia		2					0	0	0	0										
Sweden	143	94	110	61	44	65	39	56	58	64	46	29	17	22	27	17	36	25	39	6
Total	293	224	236	238	210	178	149	122	139	130	117	82	53	50	52	45	65	52	64	32

Figure 3. Number of confirmed oil spills per HELCOM country, 2004–2023. Note that the total number of spills is indicated on the vertical axis on the right, which uses a different scale.

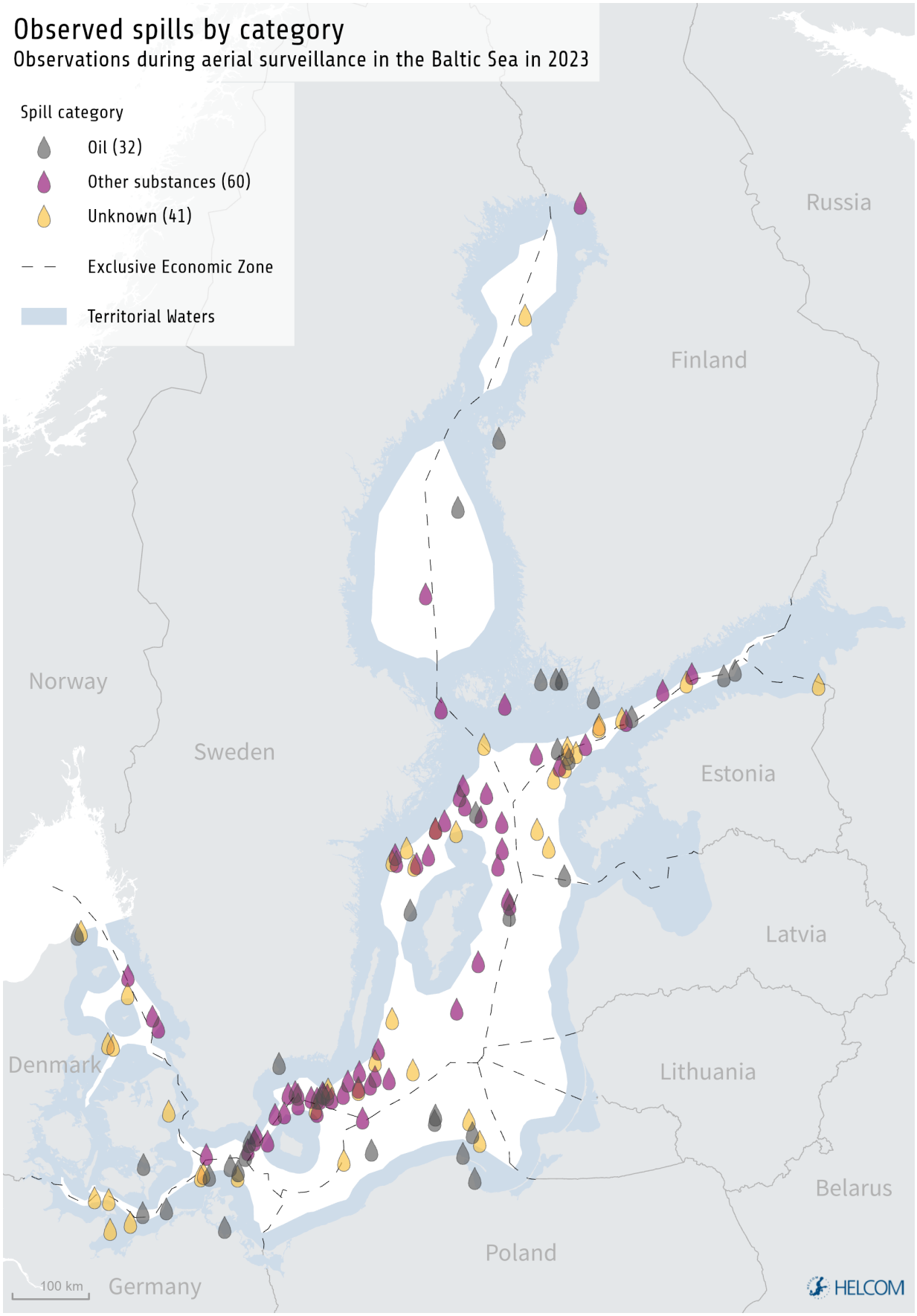


Figure 4. Location of spills observed in the Baltic Sea area in 2023 indicated by type of spill. Number of spills in brackets.

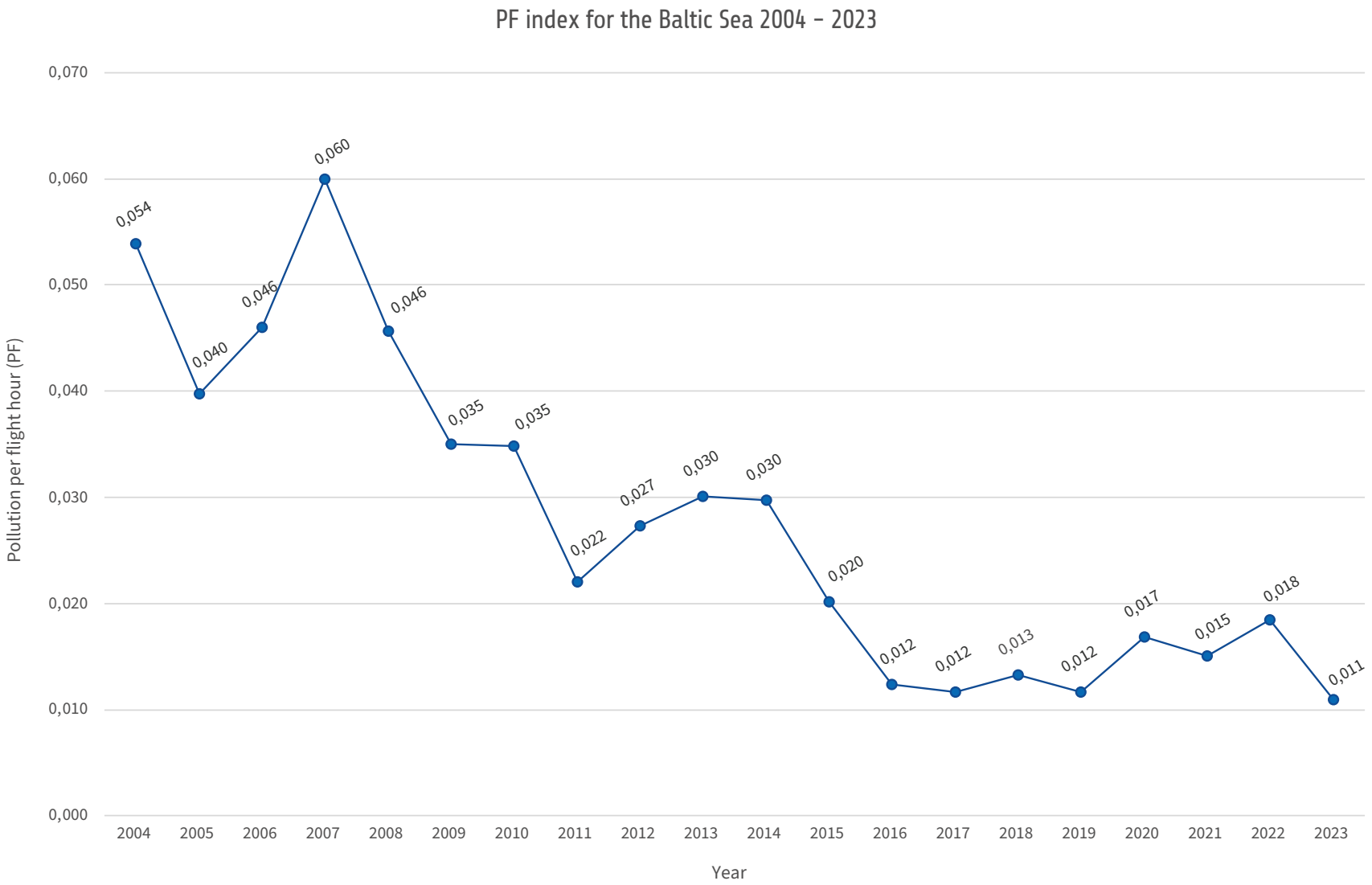


Figure 5. Pollution per flight hour index for the Baltic Sea, 2004–2023.

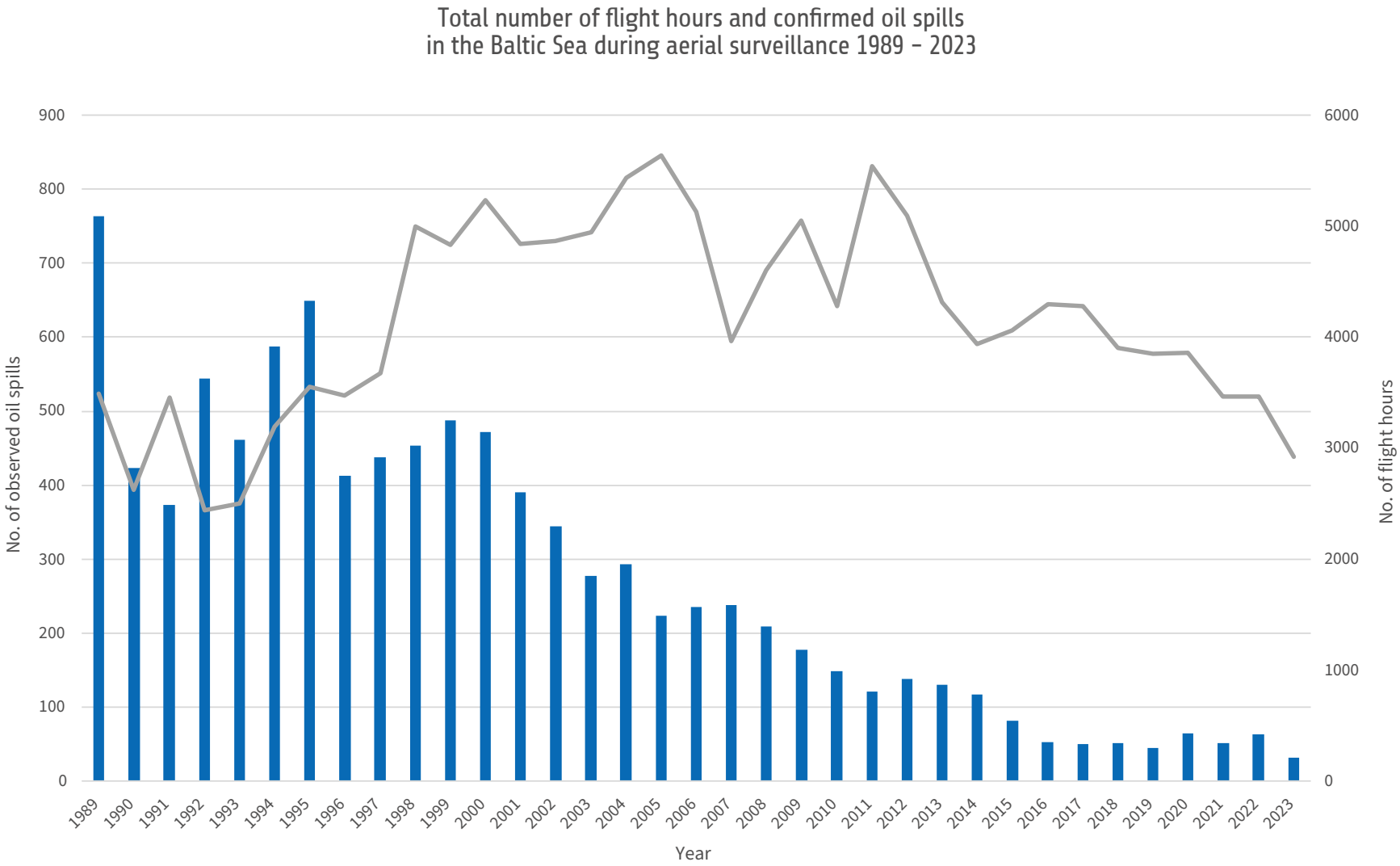


Figure 6. Total number of flight hours and confirmed oil spills in the Baltic Sea during aerial surveillance, 1989–2023.

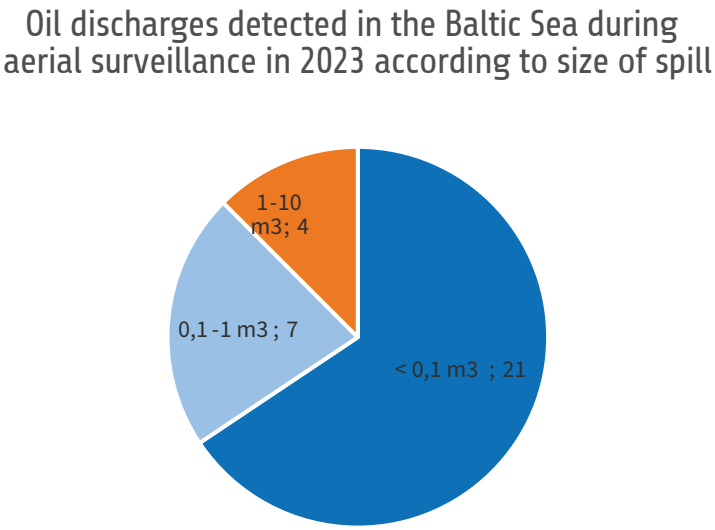
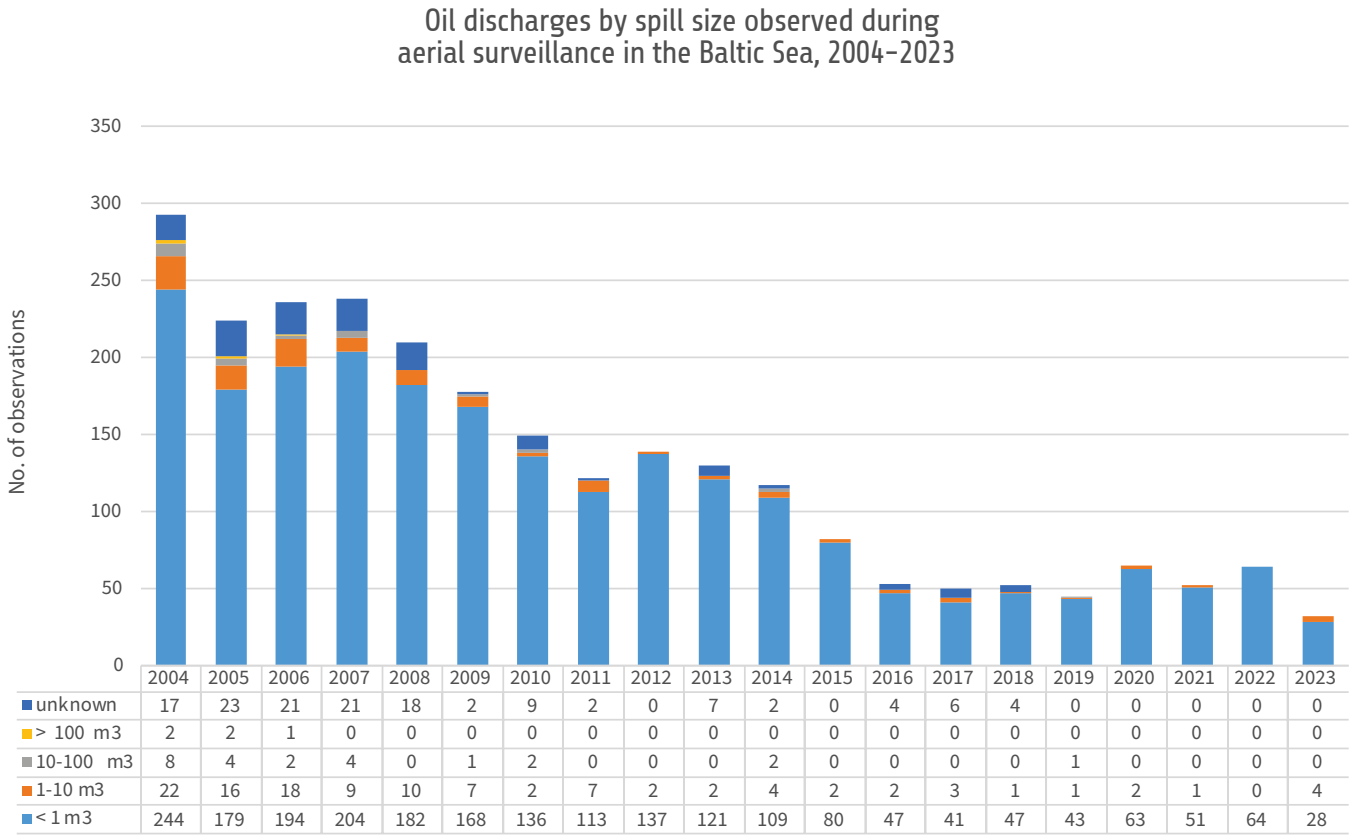


Figure 7. Oil discharges detected in the Baltic Sea during aerial surveillance in 2023 according to estimated volume (m3) of the spill.



	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
unknown	17	23	21	21	18	2	9	2	0	7	2	0	4	6	4	0	0	0	0	0
> 100 m3	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10-100 m3	8	4	2	4	0	1	2	0	0	0	2	0	0	0	0	1	0	0	0	0
1-10 m3	22	16	18	9	10	7	2	7	2	2	4	2	2	3	1	1	2	1	0	4
< 1 m3	244	179	194	204	182	168	136	113	137	121	109	80	47	41	47	43	63	51	64	28

Figure 8. Oil discharges according to estimated volume of the spill during aerial surveillance in the Baltic Sea, 2003–2023.

Table 3. Confirmed oil spills in HELCOM countries' waters by size in 2023.

Size	Denmark	Estonia	Finland	Germany	Latvia	Lithuania	Poland	Russia	Sweden	Total
< 0,1 m3	3	1	6	3	0	0	5		3	21
0,1-1 m3	0	3	1	2	0	0	0		1	7
1-10 m^3	0	0	1	0	0	0	1		0	4
10-100 m^3	0	0	0	0	0	0	0		0	0
> 100 m^3	0	0	0	0	0	0	0		0	0
unknown	0	0	0	0	0	0	0		0	0
Total	**3**	**4**	**8**	**5**	**0**	**0**	**6**		**5**	**32**

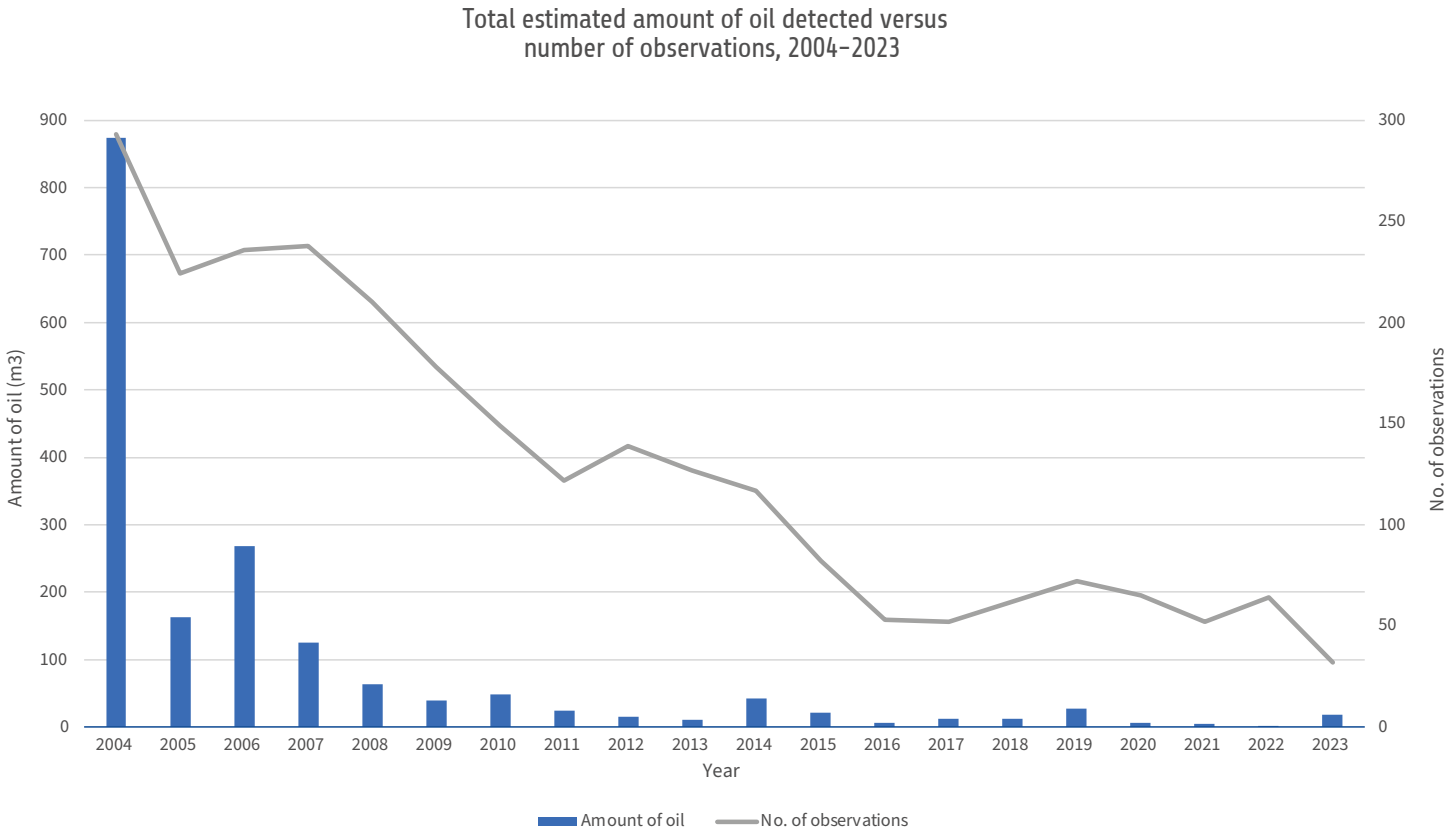


Figure 9. Total estimated amount of oil detected versus number of observations, 2003–2023.

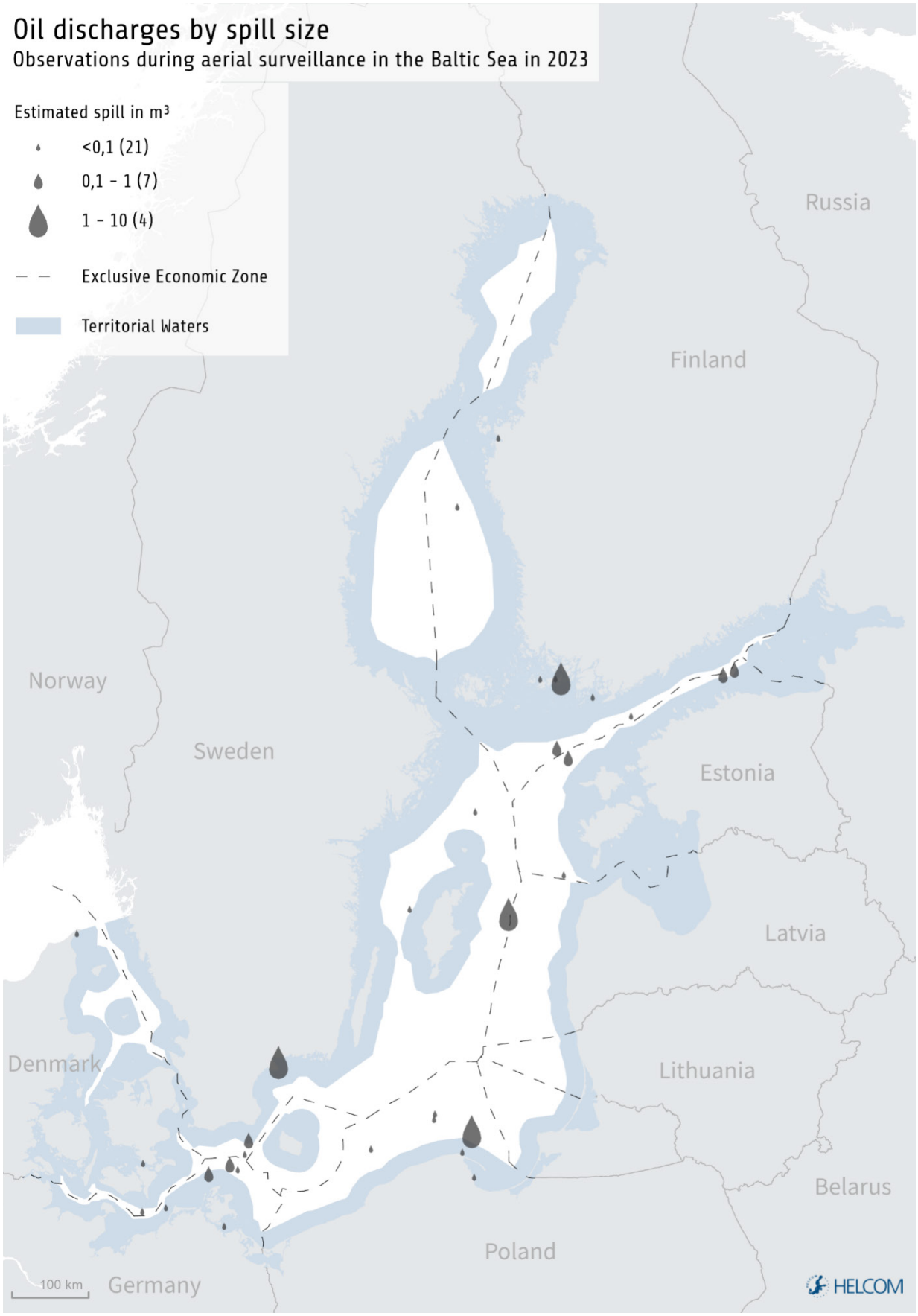


Figure 10. Location of oil spills observed in the Baltic Sea area in 2023 indicated by size. Number of spills in brackets.

Table 4. Aerial surveillance data 1988–2023.

Flight hours by country																																			
	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Denmark		292	199	172	153	253	225	275	209	325	416	497	463	412	510	265	251	290	271	246	240	156	188	227	207	239	254	271	324	300	287	318	312	301	311
Estonia					40	420	420	305	284	236	268	212	161	153	201	198	178	471	410	503	371	266	315	220	327	362	356	267	268	224	306	400	452	408	388
Finland							355	400	355	649	603	660	567	605	615	644	625	517	529	438	351	605	645	631	625	505	490	484	428	437	491	628	504	637	519
Germany	142	168	129	267	201	290	291	313	288	206	286	439	466	469	446	491	549	504	598	650	638	558	648	769	470	596	700	726	891	846	760	493	312	378	570
Latvia		400	408	127	24	18	8	8	64	577	320	436	412	387	414	365	384	311	343	298	61		3		0	5	0	0	0	2	0	0	0	0	2
Lithuania			348	78	133			65				250	300			100	54	64	41		66	48	18	4	19	12	8	0	0	0	0	0	0	0	0
Poland	131	164	140	62	49	179	301	345	291	465	375	362	187	320	228	239	141	131	380	406	561	421	499	318	387	393	259	290	321	254	244	179	214	175	171
Russia	1618		629	32																		10													
Sweden	1600	1600	1600	1700	1900	2038	1953	1763	2189	2544	2565	2374	2281	2518	2532	3231	3455	2842	1397	2063	2758	2215	3225	2921	2283	1823	1995	2256	2098	1800	1765	1840	1668	1571	959
Total	**3491**	**2624**	**3453**	**2438**	**2500**	**3198**	**3553**	**3474**	**3680**	**5002**	**4833**	**5230**	**4837**	**4864**	**4946**	**5534**	**5638**	**5128**	**3969**	**4603**	**5046**	**4279**	**5541**	**5090**	**4317**	**3935**	**4062**	**4295**	**4331**	**3863**	**3854**	**3858**	**3462**	**3470**	**2920**

Number of oil observations detected in country waters																																			
	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Denmark	129	159	34	46	18	17	30	48	36	38	53	87	68	93	54	37	30	28	41	43	41	34	33	18	19	14	25	3	3	4	3	2	4	1	5	3
Estonia					18	7	4	3		3	10	33	38	11	8	4	19	24	31	58	46	20	25	14	8	8	9	12	5	2	3	5	8	6	4	4
Finland								26	42	104	53	63	89	107	75	40	36	32	29	29	28	16	15	16	24	9	11	17	17	8	3	11	9	12	2	8
Germany	90	139	45	85	76	43	75	55	44	34	23	72	51	51	44	60	42	34	22	30	24	15	22	13	25	7	16	12	4	7	5	4	4	2	3	5
Latvia			73	20	15	6					33	18	17	6	21	14	13	5	0	2	5	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0
Lithuania				8	34	28																	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Poland	40	69	88	14	92	110	104	72	50	25	33	18	51	24	25	39	10	5	3	15	22	27	14	5	5	27	10	9	7	7	11	6	4	6	11	6
Russia	82	184		3	13													2					0	0	0	0										
Sweden	168	212	184	197	278	250	375	445	241	234	249	197	158	98	117	84	143	94	110	61	44	65	39	56	58	64	46	29	17	22	27	17	36	25	39	6
Total	**509**	**763**	**424**	**373**	**544**	**461**	**588**	**649**	**413**	**438**	**454**	**488**	**472**	**390**	**344**	**278**	**293**	**224**	**236**	**238**	**210**	**178**	**149**	**122**	**139**	**130**	**117**	**82**	**53**	**50**	**52**	**45**	**65**	**52**	**64**	**32**

Calculations																																			
Year	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**
Pollutions	763	424	373	544	461	588	649	413	438	454	488	472	390	344	278	293	224	236	238	210	178	149	122	139	130	117	82	53	50	52	45	65	52	64	32
Flight hours	3491	2624	3453	2438	2500	3198	3553	3474	3680	5002	4833	5230	4837	4864	4946	5434	5638	5128	3969	4603	5046	4279	5541	5090	4317	3935	4062	4295	4284	3907	3854	3858	3462	3470	2920
PF index	0,219	0,162	0,108	0,223	0,184	0,184	0,183	0,119	0,119	0,091	0,101	0,090	0,081	0,071	0,056	0,054	0,040	0,046	0,060	0,046	0,035	0,035	0,022	0,027	0,030	0,030	0,020	0,012	0,012	0,013	0,012	0,017	0,015	0,018	0,011

Table 5. Flight hours with RPAS and helicopters in 2023 reported by the Contracting Parties.

Country	Year	Flight Type	No. of flight hours			Remarks
			Daylight	Darkness	Total	
Latvia	2023	RPAS	225:00	225:00	450:00	Aerial surveillance conducted with EMSA RPAS
Lithuania	2023	N	40:00	00:00	40:00	Aerial surveillance was conducted with LAF helicopter

Remarks: RPAS flight hours reported by Latvia were part of a Multipurpose Maritime Operation (MMO) between Latvia, Finland and Estonia. It is unknown how many of the reported flight hours were for pollution detection purposes.