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Background

This document contains the draft HELCOM Annual report on discharges observed during aerial surveillance in the Baltic Sea 2020, which has been compiled by the Secretariat based on data reported by the Contracting Parties and satellite detections reported by the European Maritime Safety Agency (EMSA). The report was approved by the Annual Meeting of the Informal Working Group on Aerial Surveillance (IWGAS 2021), pending final verification by Poland regarding their data.

RESPONSE 27-2020 agreed on the amended HELCOM/Bonn Agreement annual surveillance reporting format. The amended reporting format was used for reporting aerial surveillance data for year 2020.

It should be noted that data for years 2017, 2018 and 2019 concerning spills from wrecks has been corrected for this report as multiple slicks obviously originating from a single spill or source should not be reported separately according to the reporting format. In 2020, 20 oil spills were detected from the wreck s/s Georg Buchner in Polish waters and two oil spills were detected from the wreck of the ELBING Class Torpedo boat T-30 in Estonian waters but were only included in the report as one spill, respectively.

The total number of aerial surveillance flight hours in 2020 with fixed-wing aircrafts in the Baltic Sea was 3858. No aerial surveillance was conducted by Latvia in 2020. No fixed-wing aerial surveillance was conducted by Lithuania, only by helicopter. Also Estonia conducted aerial surveillance using helicopter, in addition to fixed-wing aerial surveillance. As agreed by IWGAS 2018, a separate table on other than fixed wing aerial surveillance is included in the report. Russia has not reported any aerial surveillance data in 2020.

Altogether the HELCOM countries reported 159 spill observations in 2020 of which 41% were confirmed as discharges of mineral oil. The total estimated minimum volume of oil spills observed in 2019 amounted to 6,4 m³. The remaining 59% of the detections were identified as other substances (e.g. fish oil, vegetable oil, greywater), garbage, litter, floating objects or unknown observations, which could not be visually verified as mineral oil or other substances.

Action requested

The Meeting is invited to approve the draft HELCOM Annual report on discharges observed during aerial surveillance in the Baltic Sea 2020 for publishing on the HELCOM website.

**Annual report on
discharges observed during aerial surveillance in the Baltic Sea 2020**

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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 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 revised [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 2020. 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). 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 have also reported detections of other substances and unknown observations as included in the report.

Aerial surveillance activity

In total, 3858 flight hours with fixed-wing aircraft were carried out in 2020 within aerial surveillance activities of the Baltic Sea countries (**Table 1**), which is on the same level as in the last two years. All Baltic Sea countries reported aerial surveillance related data except for Russia. No aerial surveillance was conducted by Latvia in 2020. Estonia informed that 88:15 flight hours in 2020 were performed by aircraft technically equipped for sea surveillance while 311:42 flight hours were performed by aircraft without remote sensing equipment mainly for coastal visual patrol flights including harbour checks. This was due to a bird strike and resulting significant tail damage to the new Estonian patrol aircraft ES-PKY in September 2019.

In addition, the Lithuania conducted in total 48 flight hours with helicopter (none with fixed-wing aircraft) during which five spills were detected and 4:38 flight hours were conducted with the Estonian Police and Border Guard helicopter during which two spills were detected (**Table 5**).

The number of flight hours vary somewhat between the years owing to for example overhaul of aircraft, missions abroad etc. In 2020, Denmark, Estonia, Finland and Sweden increased their number of flight hours while there was a decrease in flight hours in Germany and Poland. 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 waters where only sporadic surveillance has been conducted in the last ten years. The number of flight hours by individual HELCOM countries, in 2000-2020, 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 2020, five countries carried out flights at night (**Figure 2**), in total 380 flight hours, which constituted 10% of all flight hours (14% in 2019). Most of these countries only conducted a minor share of their aerial surveillance in night-time. However, 45% of the total German flight hours were conducted in darkness in 2020, representing 58% 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 HELCOM 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 spot.

Altogether, CSN delivered for the HELCOM region a total of 1312 services in 2020 (1127 in 2019), indicating 432 possible detections (413 in 2019). In the HELCOM area, 51 % of the spill indications were checked within three hours of the alert. Out of these, 4% were confirmed to be mineral oil (5% in 2019). Satellite surveillance detections provided by EMSA in 2020, 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 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 HELCOM countries reported 159 spill observations in 2020 as presented in **Figure 4** and Table 1. Of the detected spills 41% were confirmed as discharges of mineral oil, in total 65 spills. The remaining 59% of the detections were identified as other substances (e.g. fish oil, vegetable oil, greywater), garbage, litter, floating objects or unknown observations, which could not be visually verified as mineral oil or other substances. Methodology for identifying hazardous 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.

The number of mineral oil spills has decreased significantly in the last six years. In 2020 a slight increase was seen in the number of oil spills compared to previous years (e.g. 45 in 2019). Multiple slicks obviously originating from a single spill or source should not be reported separately for the HELCOM report. In line with this, 20 oil spills were detected from the wreck s/s Georg Buchner in Polish waters and two spills were detected from the wreck of the ELBING Class Torpedo boat T-30 in Estonian waters but were only included in this report as one spill, respectively. Corrections have also been done for the 2017, 2018 and 2019 data concerning wrecks. The number of oil spills observed during aerial surveillance activity in individual countries in 2001-2020 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 2020, the PF index was 0,017, which is higher than in the last four years, due to the increase in the number of observations (**Figure 5**). **Figure 6** shows the total number of flight hours and observed oil spills during aerial surveillance from 1988 to 2020.

Of the total 65 mineral oil discharges detected in 2020, 63 (97%) were smaller than 1 m³, and of these oil spills as many as 55 were even smaller than 0.1 m³ (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 2020 amounted to 6,4 m³ (28 m³ in 2019 and 11,6 m³ in 2018). The higher volume in 2019 was mainly due to the two largest oil spills, which were estimated to be 16 m³ and 9,1 m³. The estimated volume of the oil spills has steadily been decreasing and during the last ten years a significant decrease has been recorded. The trend of the spill sizes for the years 1998-2020 is presented in **Figure 8**. **Figure 9** further illustrates the trend in total amount of oil detected and the number of spills observed in 1988-2020. A map illustrating the location of the detected oil spills in 2020 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 2020 (Table 1). In 21 spill detections the polluter was identified to be a ship and of these cases two were spills of mineral oil.

The identification of ships suspected of illegally discharging oil into the sea is facilitated by the SeatrackWeb (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 1988-2020, 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 (<http://maps.helcom.fi/website/mapservice/>).

Table 1. Annual aerial surveillance data for the Baltic Sea in 2020. 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	303:04:00	14:49:00	317:53:00	16	1	17	4	0	4	0	0	0	4	0.41
Estonia	399:50:00	0:07:00	399:57:00	23	0	23	8	0	8	0	0	5	7	1.16
Finland	593:00:00	35:00:00	628:00:00	12	0	12	9	0	9	0	1	5	3	0.62
Germany	270:45:00	222:15:00	493:00:00	5	2	7	4	0	4	0	1	0	4	2.75
Latvia	0:00:00	0:00:00	0:00:00	0	0	0	0	0	0	0	0	0	0	0.00
Lithuania	0:00:00	0:00:00	0:00:00	0	0	0	0	0	0	0	0	0	0	0.00
Poland	179:26:00	0:00:00	179:26:00	14	0	14	4	0	4	0	0	1	3	0.83
Russia														
Sweden	1732:00:00	108:00:00	1840:00:00	78	8	86	31	5	36	0	3	3	11	0.64
Total	3478:05:00	380:11:00	3858:16:00	148	11	159	60	5	65	0	5	14	32	6.41

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	Unknown
Denmark	10	0	1	0	9	3	0	0	0	3
Estonia	5	0	0	0	5	10	0	0	0	10
Finland	3	0	0	0	3	0	0	0	0	0
Germany	1	0	0	0	1	2	0	0	0	2
Latvia	0	0	0	0	0	0	0	0	0	0
Lithuania	0	0	0	0	0	0	0	0	0	0
Poland	1	0	1	0	0	9	0	0	0	9
Russia										
Sweden	50	0	14	0	36	0	0	0	0	0
Total	70	0	16	0	54	24	0	0	0	24

Number of flight hours (h) per HELCOM country, 2001-2020

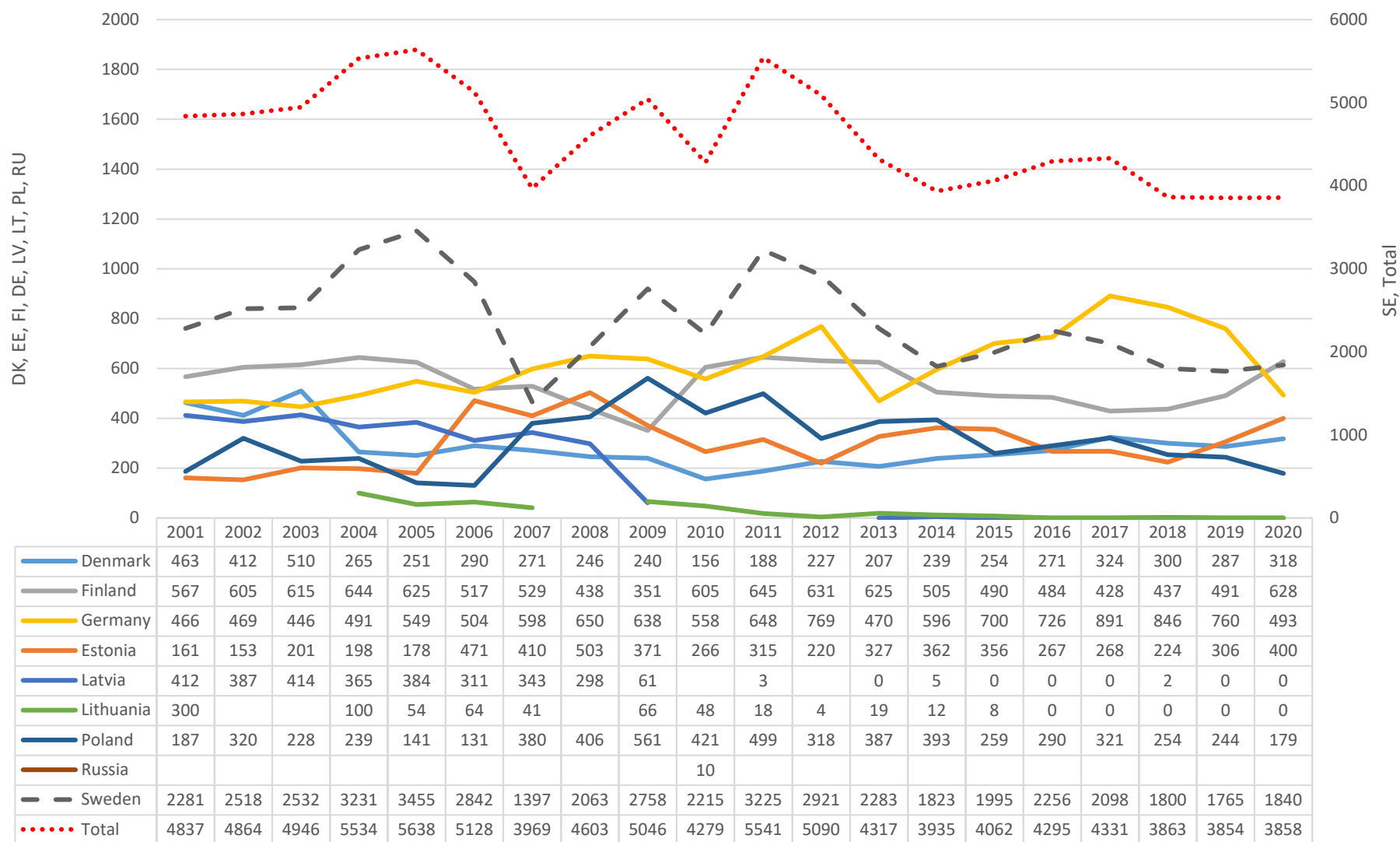


Figure 1 Number of flight hours per HELCOM Contracting Party, 2001-2021. Note that the number of flight hours for Sweden and the total number of flight hours are indicated on the vertical axis on the right, which uses a different scale.

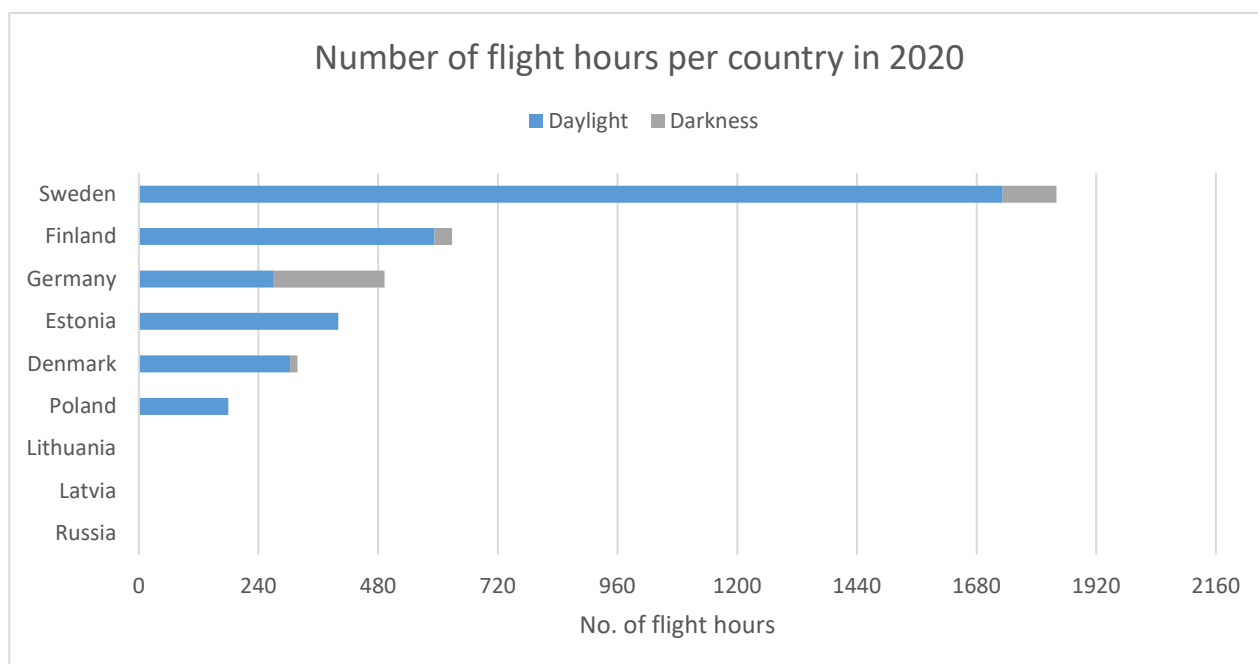


Figure 2 Number of flight hours per country in 2020.

Table 2 Satellite detections of spills in HELCOM countries' waters in 2020 provided by EMSA CleanSeaNet (CSN), including verified detections.

Country	Detected	Verified satellite detections by country					Not checked or no feedback (within 3h)
		Confirmed mineral oil	Confirmed other substances	Confirmed unknown spills	Confirmed natural phenomena	Nothing found	
Denmark	97	3	13	3	9	32	37
Estonia	40	3	3	1	0	14	19
Finland	58	0	21	0	2	7	28
Germany	14	0	2	0	3	2	7
Latvia	16	0	0	0	0	1	15
Lithuania	3	0	1	0	1	1	0
Poland	33	1	5	0	0	5	22
Russia	18	0	1	0	0	0	17
Sweden	153	2	16	3	5	59	68
Total	432	9	62	7	20	121	213

Disclaimer:

- 1) Feedback relates with the location of the spill and not with the country providing feedback (i.e. if Finland provides feedback for a spill in Estonian waters this is reported as verification in Estonian waters).
- 2) Information provided is based on feedback provided by the coastal states.

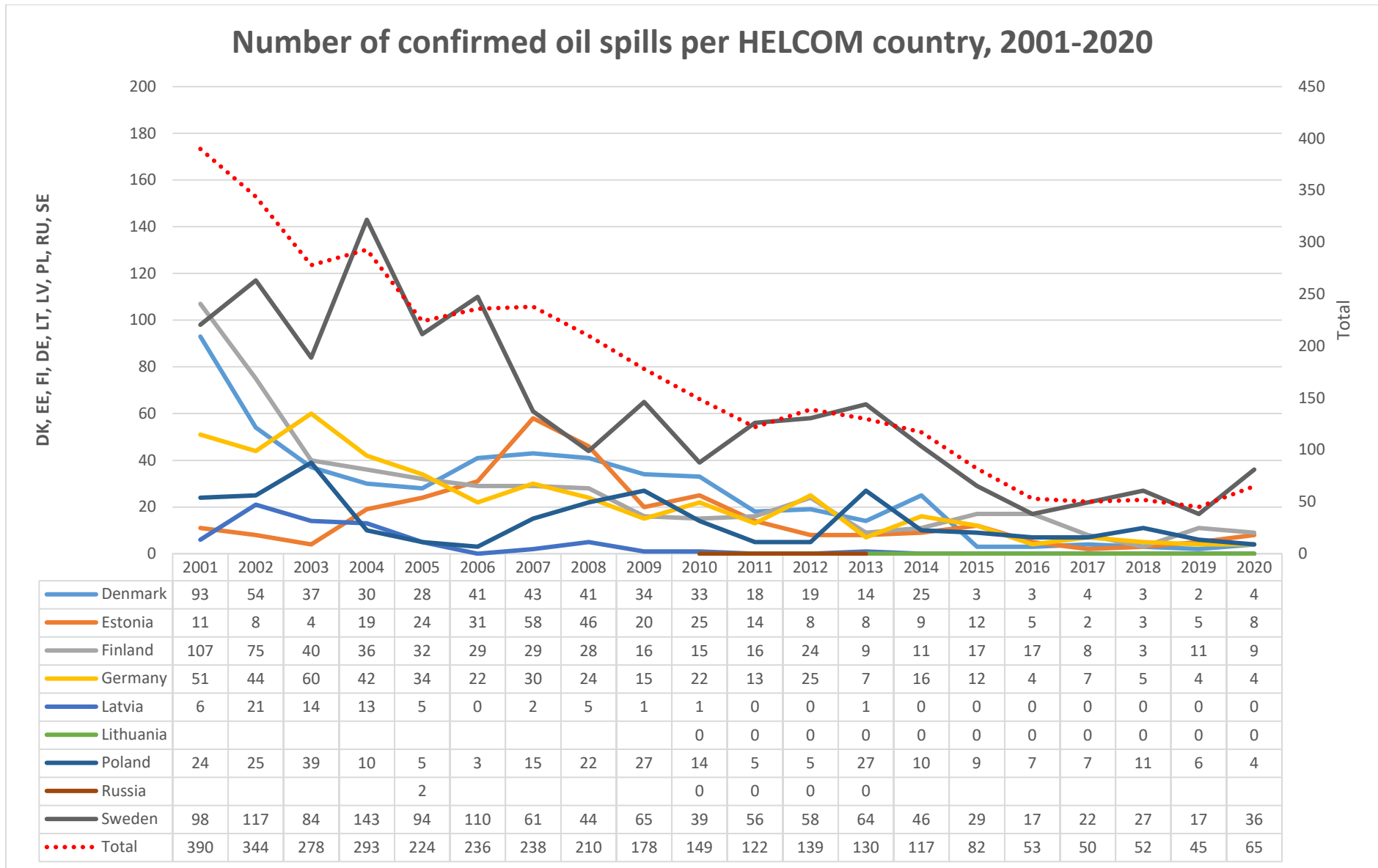


Figure 3 Number of confirmed oil spills per HELCOM country, 2001-2021. Note that the total number of spills is indicated on the vertical axis on the right, which uses a different scale.

Discharges observed in the Baltic Sea during aerial surveillance in 2020



- Spill category**
- Oil
 - Other substances
 - Unkown
 - Exclusive Economic Zone
 - Territorial Waters

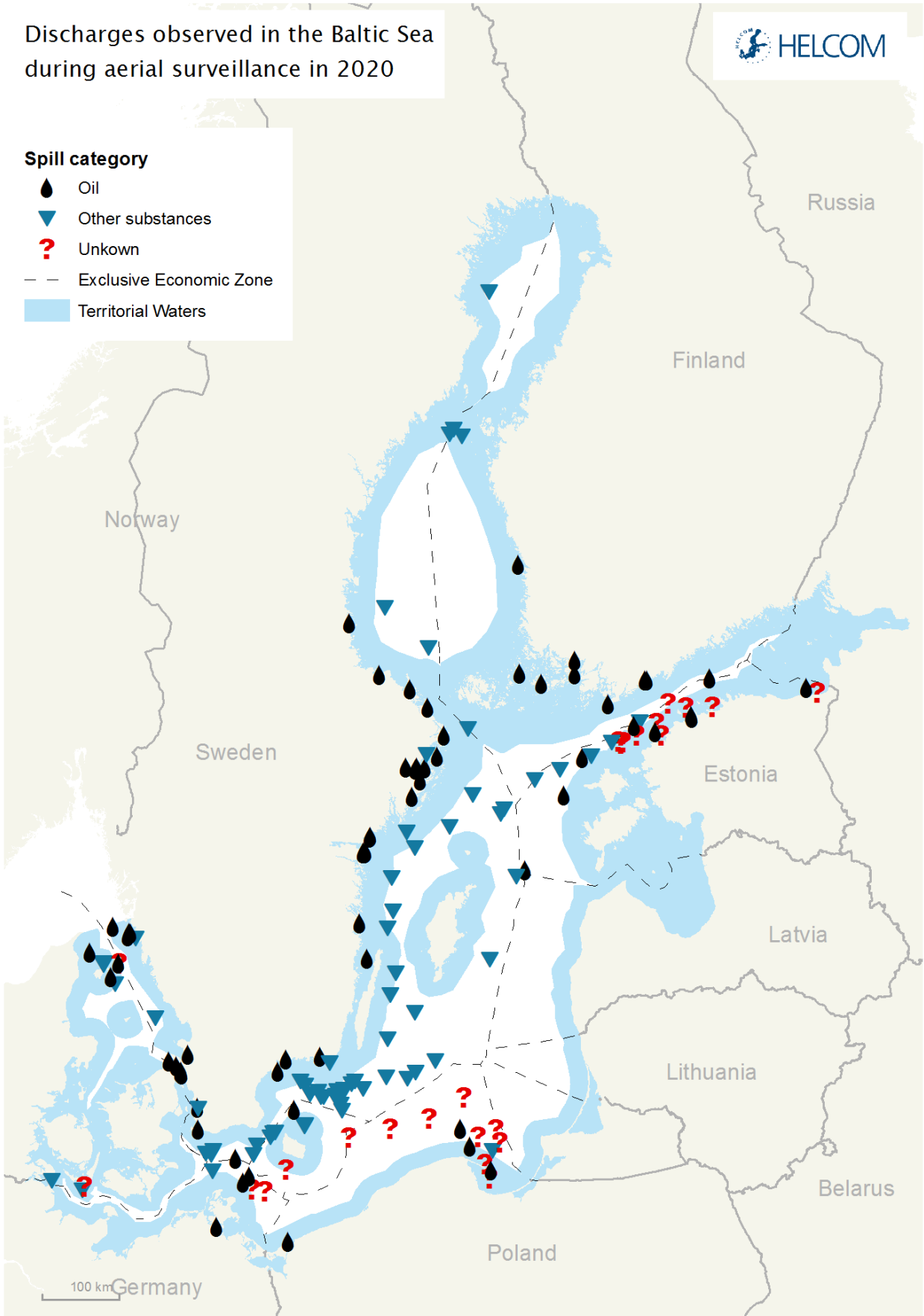


Figure 4 Location of spills observed in the Baltic Sea area in 2020 indicated by type of spill.

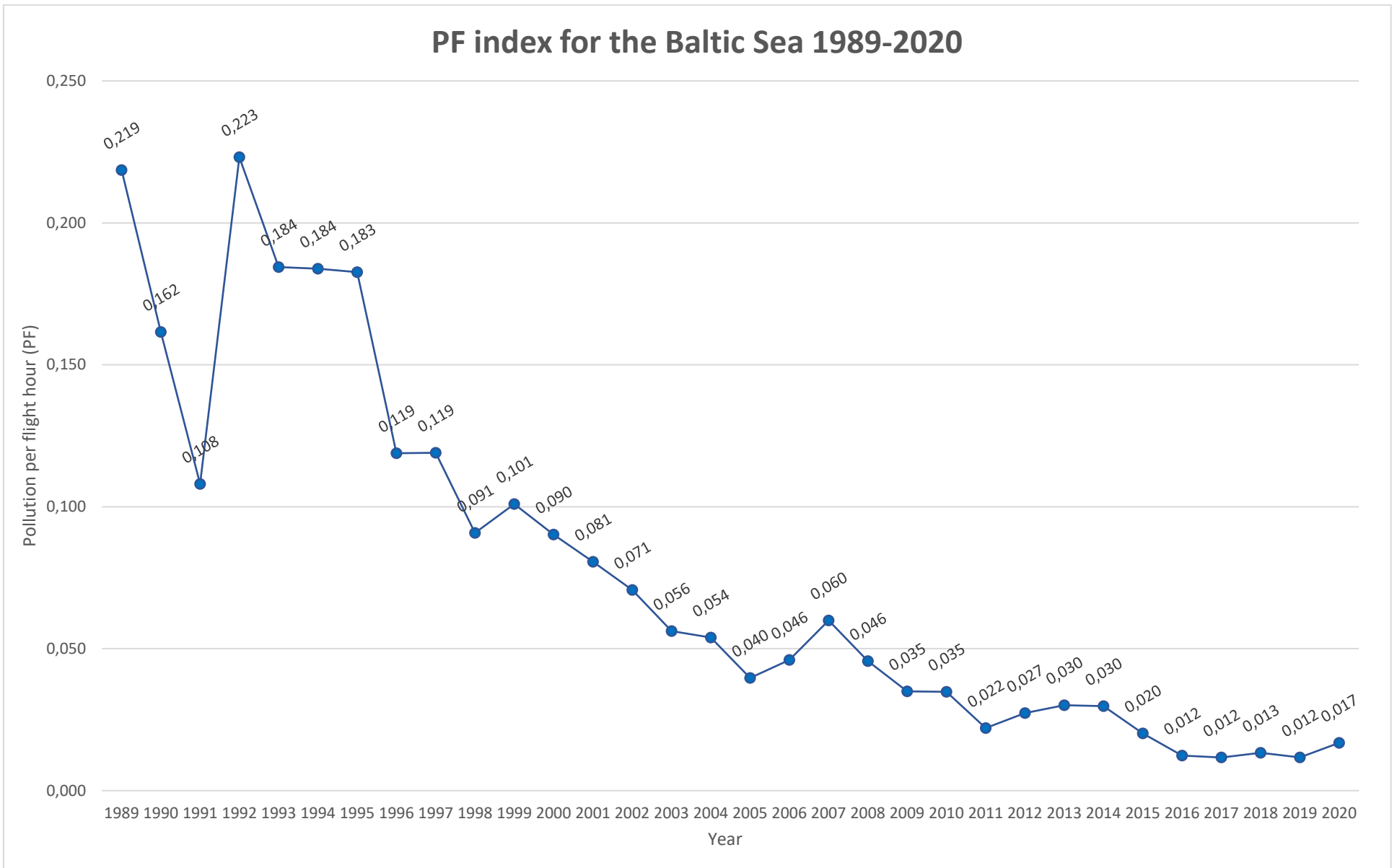


Figure 5 Pollution per flight hour index for the Baltic Sea, 1989-2020.

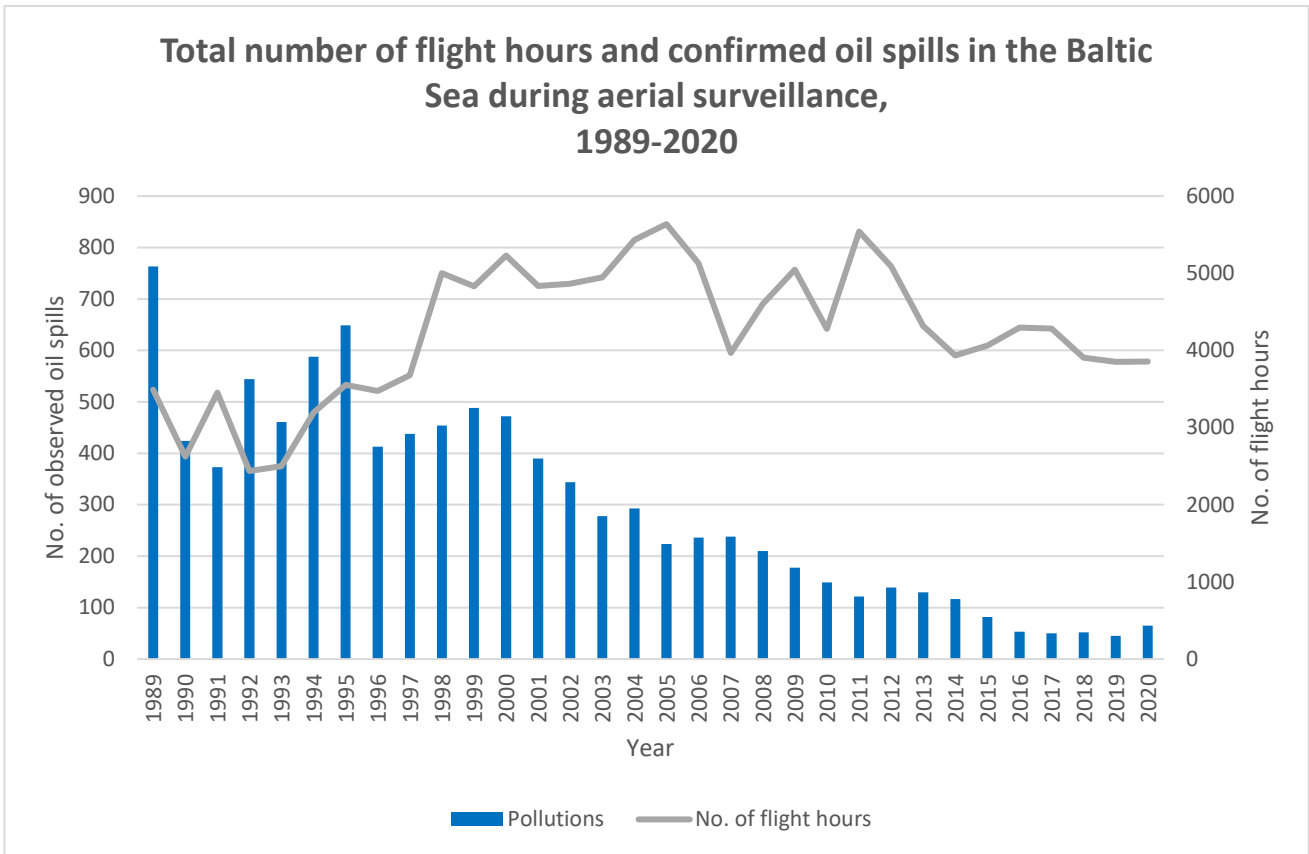
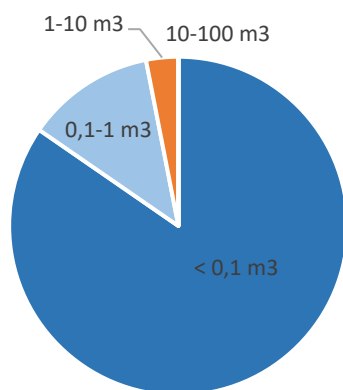


Figure 6 Total number of flight hours and confirmed oil spills in the Baltic Sea during aerial surveillance, 1989-2020.

Oil discharges detected in the Baltic Sea during aerial surveillance in 2020 according to size of spill



■ < 0,1 m3 ■ 0,1-1 m3 ■ 1-10 m3 ■ 10-100 m3 ■ > 100 m3 ■ unknown

Figure 7 Oil discharges detected in the Baltic Sea during aerial surveillance in 2020 according to estimated volume of the spill.

Oil discharges by spill size observed during aerial surveillance in the Baltic Sea, 1998-2020

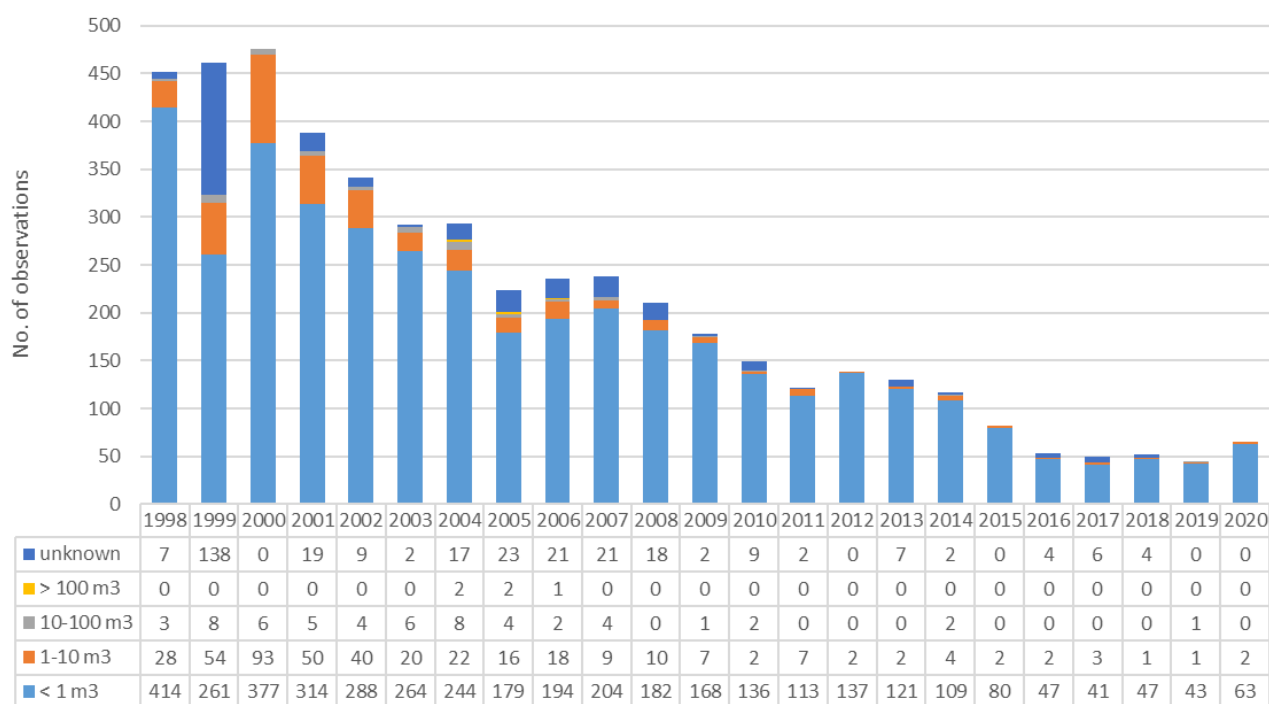


Figure 8 Illegal oil discharges according to estimated volume of the spill during aerial surveillance in the Baltic Sea, 1998-2020.

Table 3 Confirmed oil spills in HELCOM countries' waters by size in 2020.

Size	Denmark	Estonia	Finland	Germany	Latvia	Lithuania	Poland	Russia	Sweden	Total
< 0,1 m ³	2	6	8	2	0	0	3		34	55
0,1-1 m ³	2	2	1	0	0	0	1		2	8
1-10 m ³	0	0	0	2	0	0	0		0	2
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	4	8	9	4	0	0	4		36	65

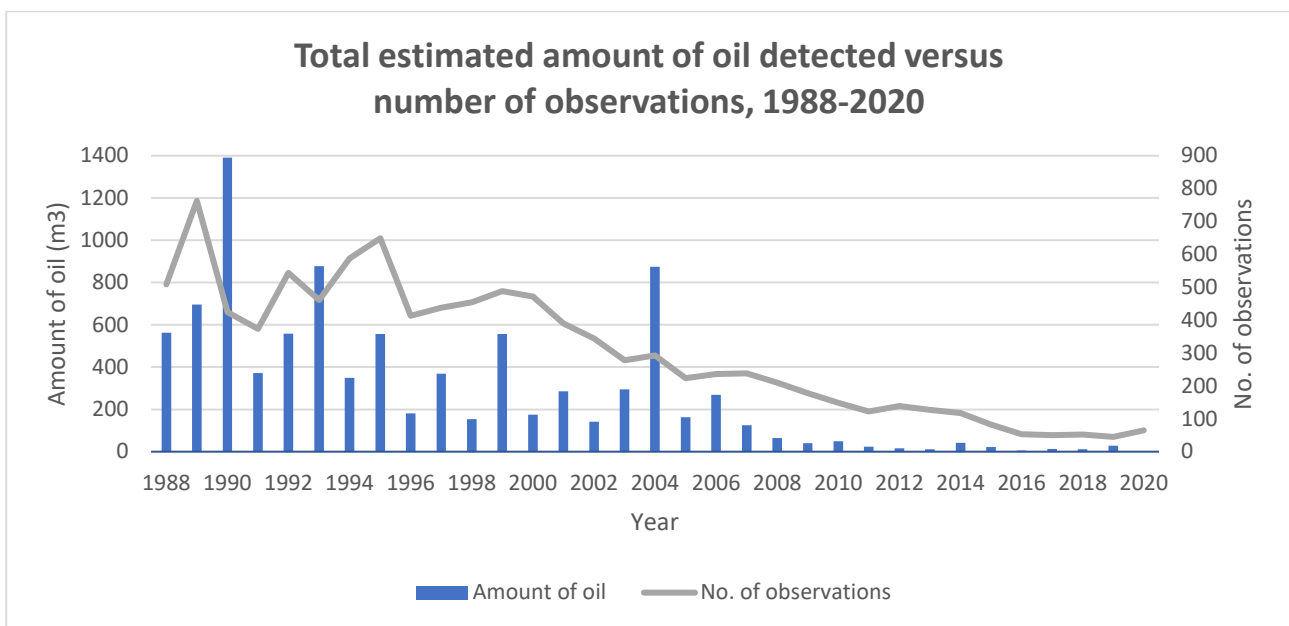


Figure 9 Total estimated amount of oil detected versus number of observations, 1988-2020.

Discharges observed in the Baltic Sea during aerial surveillance in 2020



Size of spill

- < 0,1 m³
- 0,1 - 1,0 m³
- 1,0 - 10,0 m³
- - Exclusive Economic Zone
- Territorial Waters

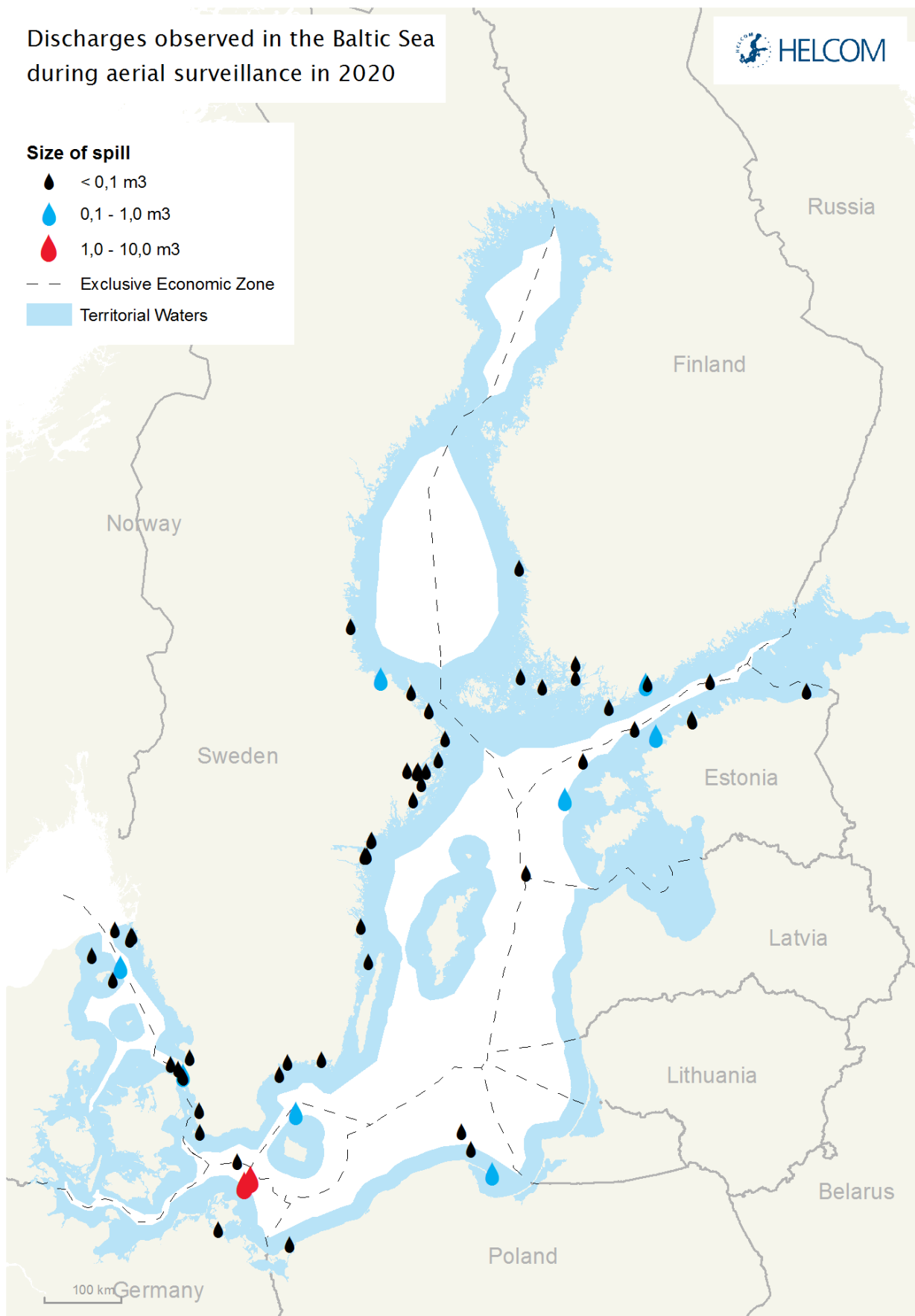


Figure 10 Location of oil spills observed in the Baltic Sea area in 2020 indicated by size.

Table 4 Aerial surveillance data 1988-2020.

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	
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	
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	
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	
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	
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	
Lithuania			348	78	133			65				250	300			100	54	64	41			66	48	18	4	19	12	8	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	
Russia	1618		629	32																													
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	
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	

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	
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	
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	
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	
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	
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	
Lithuania			8	34	28																		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	
Russia	82	184		3	13													2						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	
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	

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
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
Flight hours	3491	2624	3453	2438	2500	3198	3553	3474	3680	5002	4833	5230	4837	4864	4946	5434	#####	5128	3969	4603	5046	4279	5541	5090	4317	3935	4062	4295	4284	3907	3854	3857
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

Table 5 Spills detected by other types of aerial surveillance than fixed-wing aircraft in 2020 reported by the Contracting Parties.

Country	Year	Spill ID	Flight Type	Day/Night	Date	Time	Wind speed	Wind direction	CP Area (Super) CEPCOs only)	Latitude	Longitude	Length	Width	Area	Spill/Polution Category	IF OIL: Estimated min. volume	IF OIL: Vol. Category	IF OS or GAR: Type of substance spilled	Polluter/Source	Remarks
Estonia	2020	EE_HE_01	N	D	23/05/2020	07:14				59.0866	21.4966	0.100	0.000	0.002	UNK					
Estonia	2020	EE_HE_02	N	D	23/05/2020	07:17				59.0183	21.4066	0.100	0.000	0.001	UNK					
Lithuania	2020	LT-01	N	D	09/04/2020	06:36				55.6533	20.8583	3.10	0.15	0.46	Sand				Dredger/Barge "Tiger"	Allowed cargo discharge
Lithuania	2020	LT-02	N	D	26/04/2020	17:26				55.755	20.5733	10.58	0.85	2.75	UNK				UNK	
Lithuania	2020	LT-03	N	D	15/06/2020	07:09				56.0283	19.9217	5.20	0.27	1.40	Palm oil				ION M (IMO 9864344)	Dumped residues in accordance with MARPOL
Lithuania	2020	LT-04	N	D	09/08/2020	07:05				55.755	20.5733			0.58	Diesel oil	1 t			Klaipeda port	Uknow polluter from port
Lithuania	2020	LT-05	N	D	28/12/2020	13:55				55.0767	20.915	2.0	0.05	0.29	Crude oil	0,48 t			Butinge terminal	SPM buoy cargo hose failure

