

HELSINKI COMMISSION

Baltic Marine Environment

Protection Commission



Annual 2008 HELCOM Report on Illegal Discharges Observed During Aerial Surveillance

(August 2009)

Introduction

The purpose of aerial surveillance is to detect spills of oil and other harmful substances which can threaten the marine environment of the Baltic Sea area. If possible, an identity of a polluter should be established and a spill sampled from both the sea surface and on board the suspected offender.

Co-operation on aerial surveillance within the Baltic Sea area has been established within the framework of the Helsinki Convention, which requires the Contracting Parties to take measures to conduct regular surveillance outside their coastlines and 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.

Additionally, HELCOM Recommendation 12/8 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.

Data on illegal discharges observed during national aerial surveillance activities of the coastal states in the Baltic Sea area are compiled by HELCOM on annual basis. This report is updated with 2008 data.

Surveillance activity

In total, 4603 flight hours were carried out within the surveillance activities of the Baltic Sea countries in 2008 (**Table 1**), which is 16% more than the year before. The increase is thanks to Sweden operating at full capacity again since May 2008, following a year of reduced surveillance activity in 2007, which resulted from an aircraft accident in 2006. Estonia, Germany and Poland also increased their surveillance activities from 2007, whereas Denmark, Finland, and Latvia reported fewer flight hours.

Since 2006, Finland has increased the use of helicopters during surveillance activities, and a second year in a row the number of observations from helicopters in that country has been high (20). However these data are not included in the report as only fixed wings observations are to be reported. Lithuania did not report any activity for 2008.

Most parts of the Baltic with regular traffic zones are covered by national aerial surveillance, but still some Contracting States do not carry out surveillance flights in accordance with the HELCOM Response Manual and the Recommendation. The number of hours flown by individual HELCOM countries in years 1989-2008 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 2008, five countries carried out their flights at night, including Estonia for the first time, thanks to the brand new remote sensing equipment onboard their aircraft enabling detection in darkness (**Figure 2**).

In addition to the aerial surveillance the Contracting Parties utilize satellite images to detect illegal discharges of oil. Satellite surveillance in the Baltic Sea area has been intensified since 2007 thanks to the CleanSeaNet satellite surveillance service provided to the HELCOM countries by European Maritime Safety Agency (EMSA).

Altogether, EMSA had provided 608 satellite scenes for the users of CleanSeaNet in the Baltic Sea in 2008 (comparing to 435 in 2007), indicating 413 possible detections (313 in 2007). From these images, on average 0.68 oil spill indications were detected (0.67 in 2007). In the HELCOM area, 43% of the spill indications (178) were checked and out of these 26% (46) were confirmed to be oil (33% in 2007).

Satellite surveillance detections, including confirmed oil, in 2008 is presented in **Table 2**¹.

Oil spills

Altogether 210 oil spills were observed in 2008 (**Table 1**), which is 28 less than in 2007. In general, the number of detected oil spillages in the Baltic Sea has been decreasing over the past years, even though the density of shipping has rapidly grown and the aerial surveillance activity in the countries has been substantially improved, e.g. the number of flight hours has increased and remote sensing equipment on board aircrafts, like Side Looking Airborne Radar, has been more widely used. The number of oil spills observed during aerial surveillance activity in individual countries in 1988-2008 is presented in **Figure 3**.

The best way to evaluate the number of illegal 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. Decreasing PF Index over the years indicates less oil spills or/and increased surveillance activity.

PF Index for individual countries as well as for the whole Baltic Sea in the period of 1990-2008 is presented in **Figure 4** and **Figure 5**, respectively. Additionally, **Figure 6** shows the total number of flight hours and observed oil spills during 1988-2008.

182 (87%) of the oil discharges detected in 2008 were smaller than 1 m³, and of these oil spills as much as 148 were even smaller than 0.1 m³ or 100 litres. No confirmed oil spill was over 10 m³ in size and the total estimated volume of oil spills observed in 2008 amounted to 64 m³. The number of oil spills in each size category is presented in **Figure 7** and **Figure 8** as well as **Table 3**. A map illustrating their location is depicted in **Figure 9**.

In a vast majority of cases of detected illegal discharges polluters remain unknown. In 2008, out of the total number of confirmed illegal discharges (210) as much as in 21 cases (10%) the polluters were identified, which is 14 more than in 2007, in which year 238 oil spills were observed (**Table 1**). The identification of ships suspected of illegally discharging oil into the sea is facilitated by the Seatrack Web oil drift forecasting system (STW) 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 1988-2008, including the number of observations by countries and PF Index by countries, are contained in **Table 4**.

Explanation of terms used in this report is provided in **Annex**.

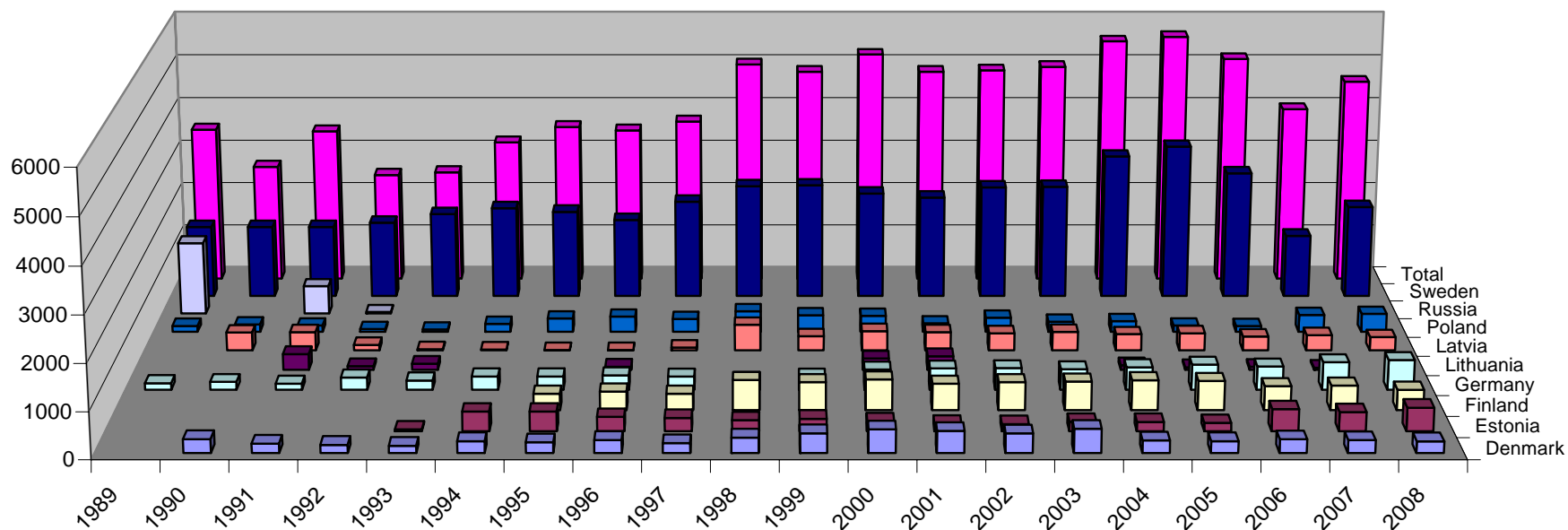
Data on the individual observed oil spills can be viewed in the web-based interactive map service [Maritime Accident and Response Information System \(MARIS\)](#) and downloaded as a GIS shape file via the [HELCOM data delivery service](#).

¹ Please note that data in table 2 is incomplete, therefore it does not sum up to match numbers mentioned in the paragraph above.

Table 1. Annual HELCOM aerial surveillance data, 2008

Country	No. of flight hours			No. of detections by CP (incl. in other CPs EEZ)			Detections confirmed/ observed as oil spills in own EEZ (incl. reports by other CPs)			Estimated volume m3 (in own EEZ)	No. of polluters (including reports from other CPs)				Remarks
	Daylight	Darkness	Total	Daylight	Darkness	Total	Daylight	Darkness	Total		Rigs	Ships	Unknown	Total	
Denmark	188.9	56.86	245.76	53	20	73	41		41	14.666		5	36	41	
Estonia	323	180	503	59	22	81	45	1	46	44.38		2	44	46	
Finland	416	22	438	35		35	28		28	0.864		7	21	28	Finnish helicopters detected 20 slicks (17 in Finnish and 3 in Estonian EEZ)
Germany	444.4	205.3	649.7	29	12	41	18	6	24	2.8		1	23	24	
Latvia	298		298	5		5	5		5	0.0106			5	5	
Lithuania			-			-			-	-				-	
Poland	399.61	5.93	405.54	21		21	22		22	0.303			22	22	
Russia			-			-			-	-				-	
Sweden	1960	103	2063	43	4	47	40	4	44	1.2836		6	38	44	
Total	4029.91	573.09	4603	245	58	303	199	11	210	64.3072	0	21	189	210	

Figure 1. Number of flight hours per HELCOM country (hours), 1989-2008



	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Denmark		292	199	172	153	253	225	275	209	325	416	497	463	412	510	265	251.19	289.78	270.63	245.76
Estonia					40	420	420	305	284	236	268	212	161	153	201	198.16	178.49	470.53	410	503
Finland							355	400	355	649	603	660	567	605	615	644	625	517	529	438
Germany	142	168	129	267	201	290	291	313	288	206	286	439	466	469	446	491.43	548.82	503.5	598.08	649.7
Lithuania			348	78	133			65				250	300			100	54	64	41	
Latvia		400	408	127	24	18	8	8	64	577	320	436	412	387	414	365.02	384	311	343	298
Poland	131	164	140	62	49	179	301	345	291	465	375	362	187	320	228	239.4	141.08	130.53	380.01	405.54
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
Total	3491	2624	3453	2438	2500	3198	3553	3474	3680	5002	4833	5230	4837	4864	4946	5534	5637.6	5128.3	3968.7	4603

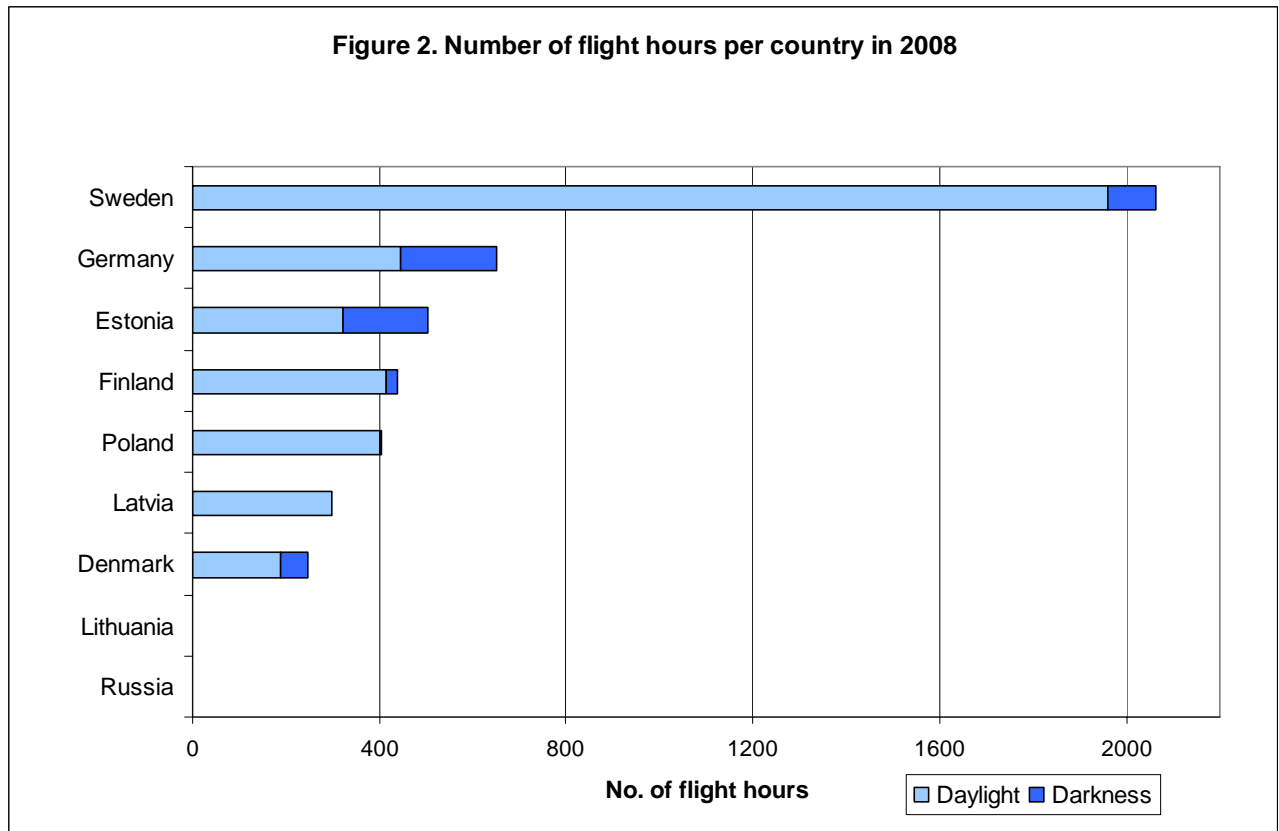
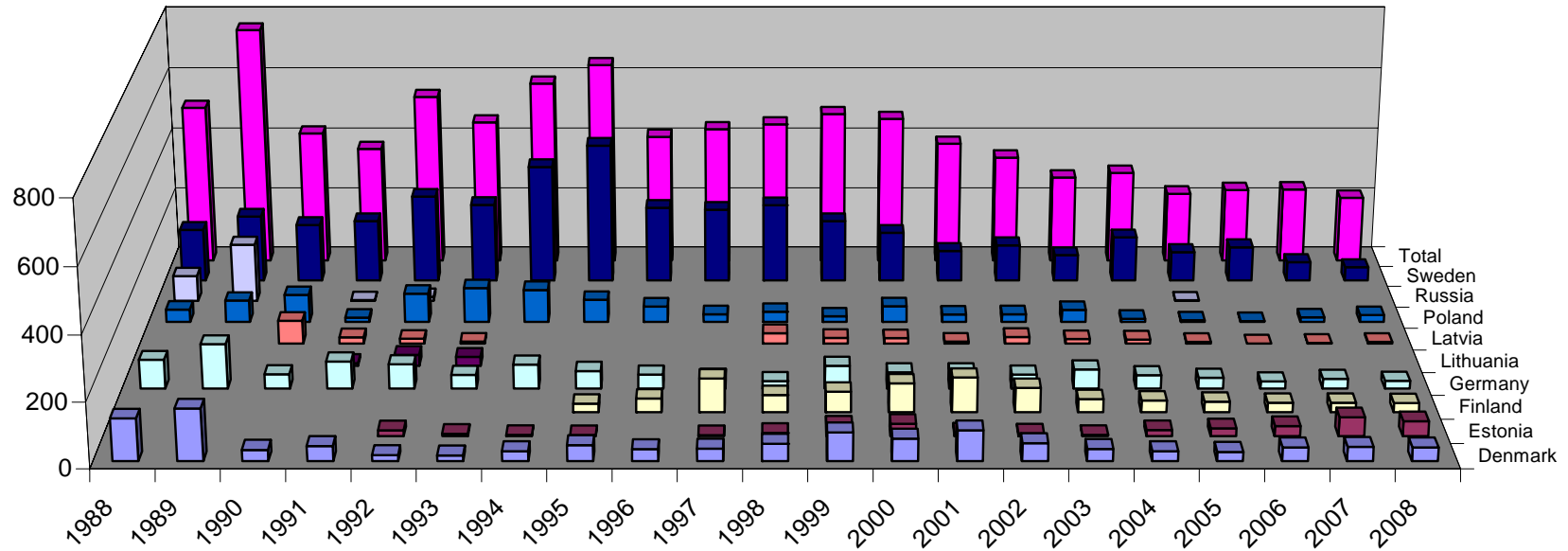


Table 2. Satellite detections of oil spills, including detections verified by aerial surveillance, 2008

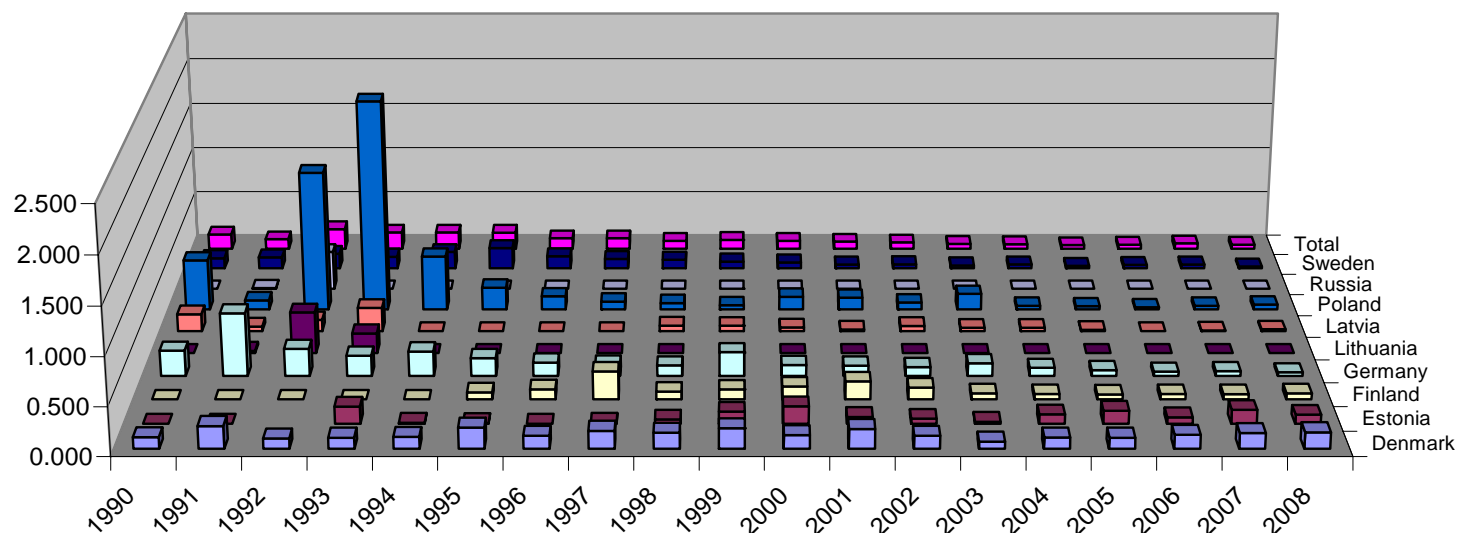
Country	Satellite detections	Satellite detections verified by aerial surveillance			
		Confirmed mineral oil	Confirmed other oil or chemical	Confirmed natural phenomena	Nothing has been found
Denmark	44	5	12	3	24
Estonia	47	7	11		3
Finland	28	9	3	3	3
Germany	13	1	1	1	2
Latvia					
Lithuania					
Poland	45	2	3	3	14
Russia					
Sweden	191	14	10	15	152
Total	368	38	40	25	198

Figure 3. Number of confirmed oil spills per HELCOM country, 1988-2008



	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Denmark	129	159	34	46	18	17	30	48	36	38	53	87	68	93	54	37	30	28	41	43	41
Estonia					18	7	4	3		3	10	33	38	11	8	4	19	24	31	58	46
Finland								26	42	104	53	63	89	107	75	40	36	32	29	29	28
Germany	90	139	45	85	76	43	75	55	44	34	23	72	51	51	44	60	42	34	22	30	24
Lithuania				8	34	28															
Latvia			73	20	15	6					33	18	17	6	21	14	13	5	0	2	5
Poland	40	69	88	14	92	110	104	72	50	25	33	18	51	24	25	39	10	5	3	15	22
Russia	82	184		3	13														2		
Sweden	168	212	184	197	278	250	375	445	241	234	249	197	158	98	117	84	143	94	110	61	44
Total	509	763	424	373	544	461	588	649	413	438	454	488	472	390	344	278	293	224	236	238	210

Figure 4. PF Index per HELCOM country, 1990-2008



	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Denmark	0.116	0.231	0.105	0.111	0.119	0.213	0.131	0.182	0.163	0.209	0.137	0.201	0.131	0.073	0.113	0.111	0.141	0.159	0.167
Estonia	0.000	0.000		0.175	0.010	0.007	0.000	0.011	0.042	0.123	0.179	0.068	0.052	0.020	0.096	0.134	0.066	0.141	0.091
Finland	0.000	0.000	0.000	0.000	0.000	0.073	0.105	0.293	0.082	0.104	0.135	0.189	0.124	0.065	0.056	0.051	0.056	0.055	0.064
Germany	0.268	0.659	0.285	0.214	0.259	0.189	0.141	0.118	0.112	0.252	0.116	0.109	0.094	0.135	0.085	0.062	0.044	0.050	0.037
Lithuania	0.000	0.023	0.436	0.211	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Latvia	0.183	0.049	0.118	0.250	0.000	0.000	0.000	0.000	0.057	0.056	0.039	0.015	0.054	0.034	0.036	0.013	0.000	0.006	0.017
Poland	0.537	0.100	1.484	2.245	0.581	0.239	0.145	0.086	0.071	0.048	0.141	0.128	0.078	0.171	0.042	0.035	0.023	0.039	0.054
Russia	0.000	0.005	0.406	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sweden	0.115	0.123	0.164	0.132	0.184	0.228	0.137	0.107	0.098	0.077	0.067	0.043	0.046	0.033	0.044	0.027	0.039	0.044	0.021
Total	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	0.053	0.040	0.046	0.060	0.046

Figure 5. PF Index for the HELCOM area, 1989-2008

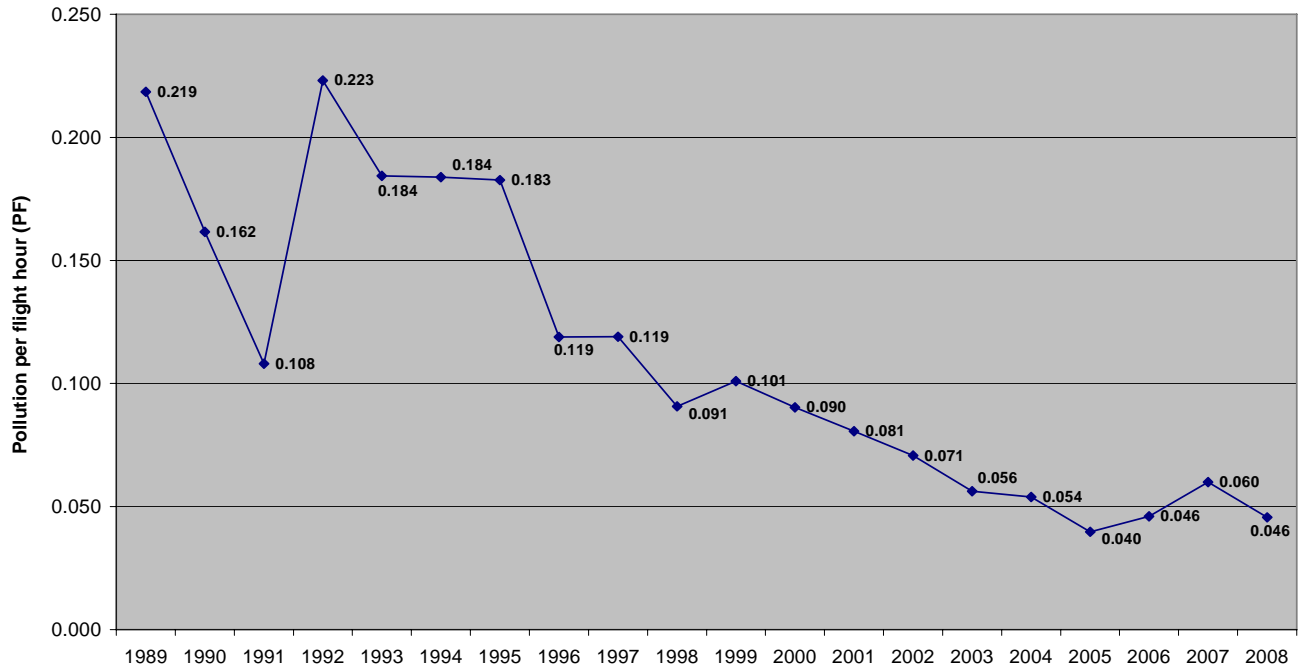


Figure 6. Total number of flight hours and observed oil spills in the HELCOM area during aerial surveillance, 1988-2008

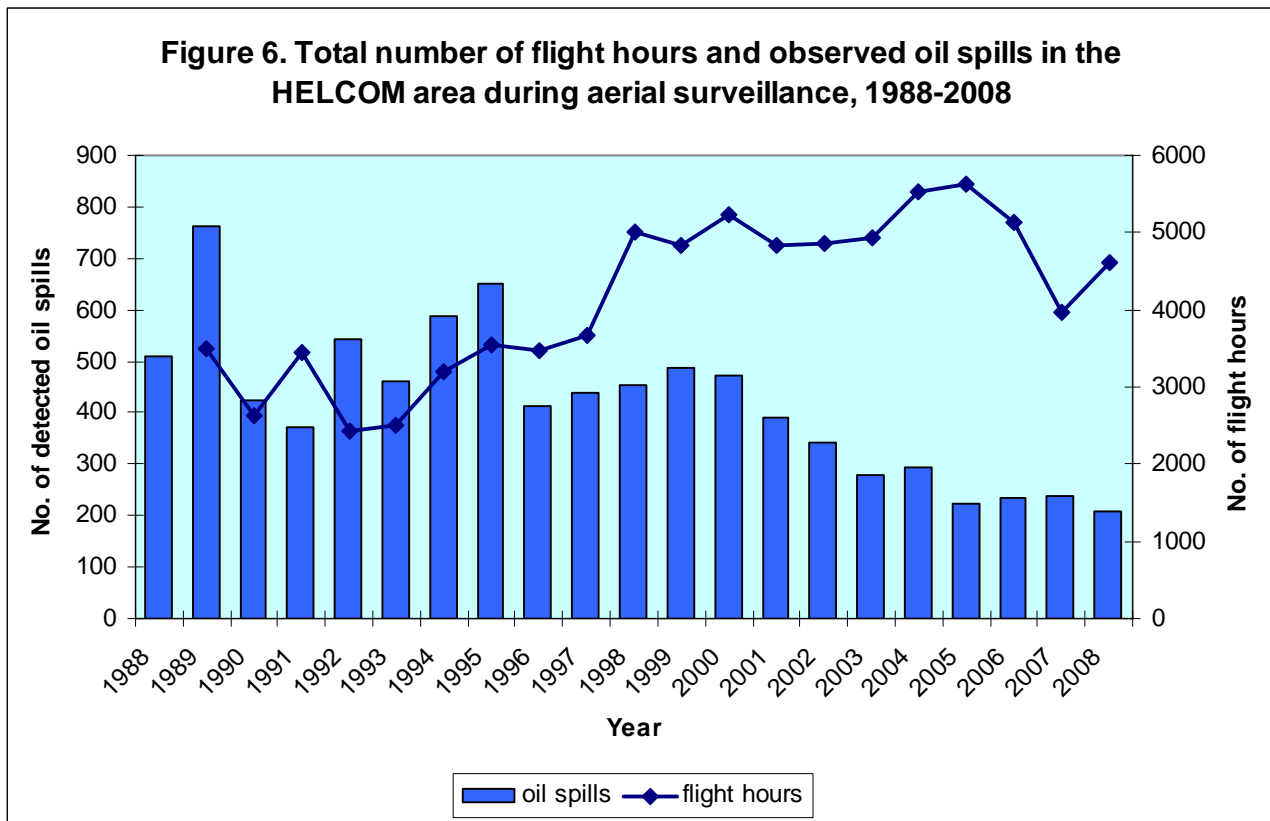


Figure 7. Illegal oil discharges detected in the Baltic Sea during HELCOM aerial surveillance, according to size of spill in 2008

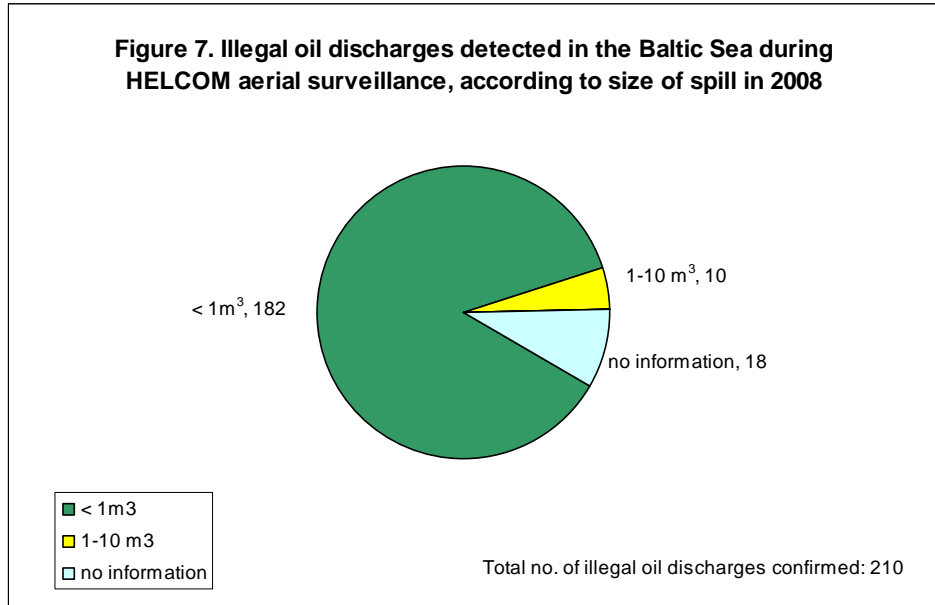


Figure 8. Illegal oil discharges (by spill size) observed during aerial surveillance in the Baltic Sea during 1998-2008

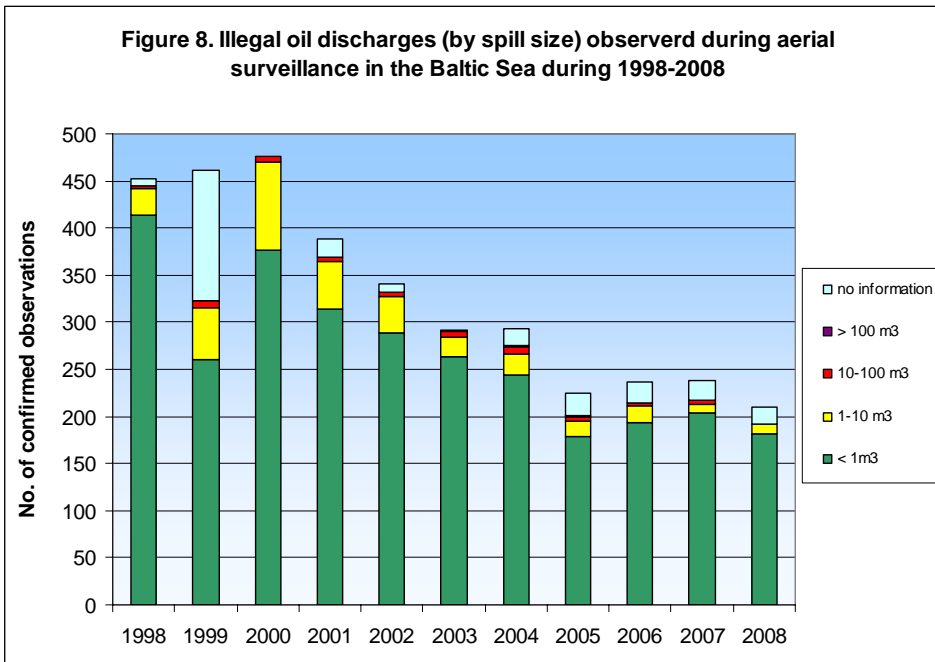


Table 3. Confirmed oil spills in HELCOM countries' exclusive economic zone by size, 2008

Size	Denmark	Estonia	Finland	Germany	Latvia	Lithuania	Poland	Russia	Sweden	Total
< 1 m ³	39	39	28	13	5		22		36	182
1-10 m ³	2	7		1						10
10-100 m ³										0
> 100 m ³										0
unknown				10					8	18
Total	41	46	28	24	5	0	22	0	44	210

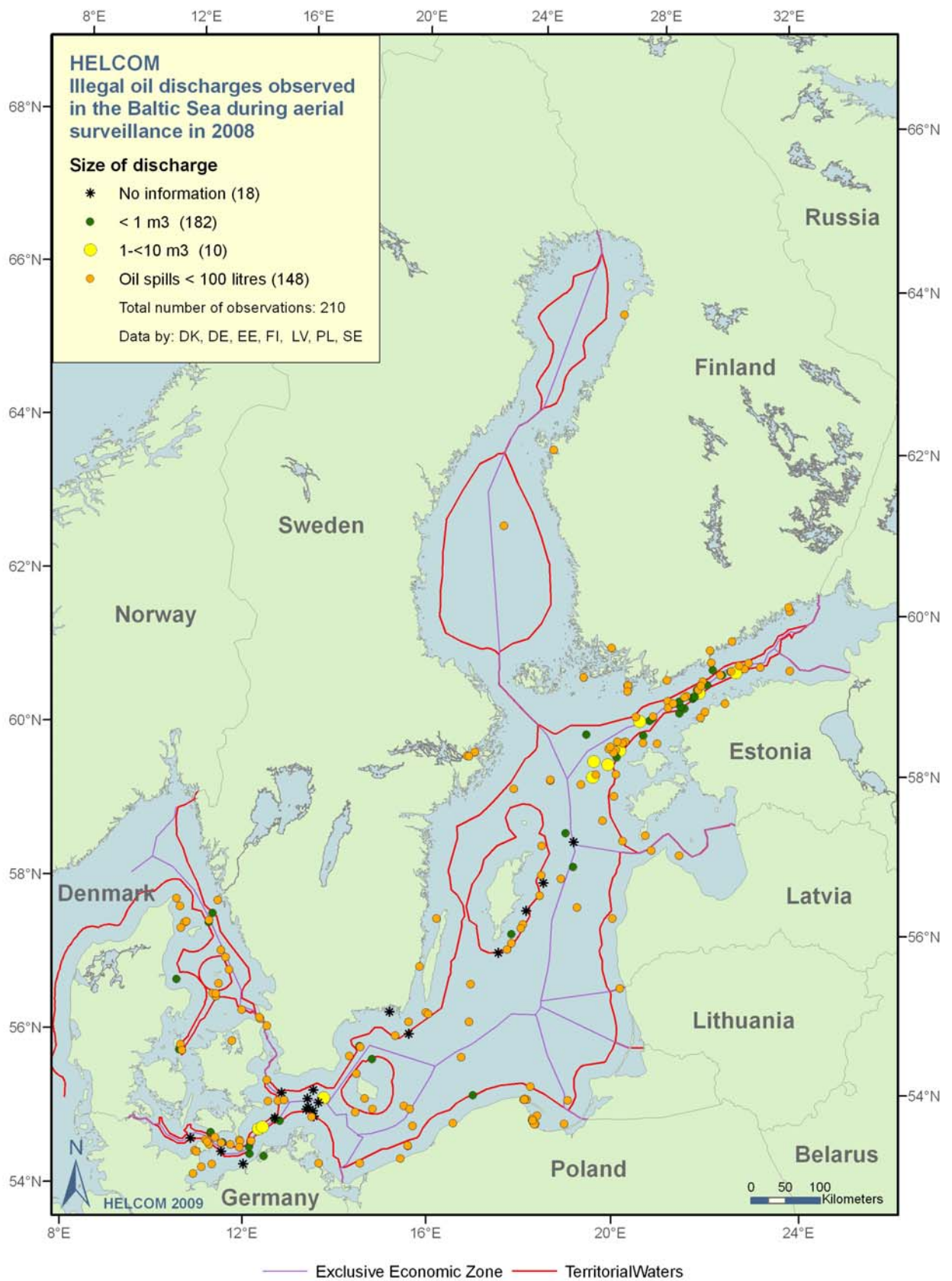


Figure 9. Location of the oil spills observed in the Baltic Sea area in 2008. The orange coloured observations are spills of less than 100 litres in size.

Table 4. Aerial surveillance data 1998-2008

Flight hours by country

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Denmark		292	199	172	153	253	225	275	209	325	416	497	463	412	510	265	251.19	289.78	270.63	245.76
Estonia					40	420	420	305	284	236	268	212	161	153	201	198.16	178.49	470.53	410	503
Finland							355	400	355	649	603	660	567	605	615	644	625	517	529	438
Germany	142	168	129	267	201	290	291	313	288	206	286	439	466	469	446	491.432	548.82	503.5	598.08	649.7
Lithuania			348	78	133			65				250	300			100	54	64	41	
Latvia		400	408	127	24	18	8	8	64	577	320	436	412	387	414	365.02	384	311	343	298
Poland	131	164	140	62	49	179	301	345	291	465	375	362	187	320	228	239.4	141.08	130.53	380.01	405.54
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
Total	3491	2624	3453	2438	2500	3198	3553	3474	3680	5002	4833	5230	4837	4864	4946	5534.012	5637.58	5128.34	3968.72	4603

Number of observations by country

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Denmark	129	159	34	46	18	17	30	48	36	38	53	87	68	93	54	37	30	28	41	43	41
Estonia					18	7	4	3		3	10	33	38	11	8	4	19	24	31	58	46
Finland								26	42	104	53	63	89	107	75	40	36	32	29	29	28
Germany	90	139	45	85	76	43	75	55	44	34	23	72	51	51	44	60	42	34	22	30	24
Lithuania				8	34	28															
Latvia			73	20	15	6					33	18	17	6	21	14	13	5	0	2	5
Poland	40	69	88	14	92	110	104	72	50	25	33	18	51	24	25	39	10	5	3	15	22
Russia	82	184		3	13													2			
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Total	509	763	424	373	544	461	588	649	413	438	454	488	472	390	344	278	293	224	236	238	210

Calculations

Year	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
pollutions	763	424	373	544	461	588	649	413	438	454	488	472	390	344	278	293	224	236	238	210
flight hours	3491	2624	3453	2438	2500	3198	3553	3474	3680	5002	4833	5230	4837	4864	4946	5434	5637.58	5128	3969	4603
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

Definitions used in the report

No. of flight hours	Nationally allocated flight hours carried out by trained observers per Contracting Party
Day (daylight)	From 30 minutes after Morning Civil Twilight, until 30 minutes before Evening Civil Twilight as given in the Air Almanac
Night (darkness)	From 30 minutes before Evening Civil Twilight, until 30 minutes after Morning Civil Twilight as given in the Air Almanac
Detections	Number of first reports on possible pollutions obtained in aerial operations (raw data)
Detections confirmed	Number of the total detections (first reports) that have been verified and/or identified by means of instruments or visually and are confirmed by a trained operator as a mineral oil pollution
Estimated volume of a spill	Total volume of one spill calculated using the Bonn Agreement Oil Appearance Code
Identified polluter	Name of vessel, platform or other source positively identified as the polluter
Slick	An area of (possible) pollution
Spill	A collection of one or more slicks originating from the same source
Satellite detections	The number of satellite detections is the number of reports obtained through satellite detections within the EEZ of the contracting party – including those obtained from other countries
Confirmed mineral oil	The number of verified/investigated satellite detections consisting of mineral oil.
Confirmed other oil or chemical	The number of verified/investigated satellite detections consisting of vegetable or fish oil or chemical.
Confirmed natural phenomena	The number of verified/investigated satellite detections consisting of algae or natural phenomena as currents, waves, ice etc.
Nothing has been found/ no detections	The number of verified/investigated satellite detections that nothing has been found.