



## **Annual 2009 HELCOM report on illegal discharges observed during aerial surveillance**



Photo: Maritime Office in Gdynia

## 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 2009 data.

## Surveillance activity

In total, 5046 flight hours were carried out within the surveillance activities of the Baltic Sea countries in 2009 (**Table 1**), which is 10% more than the year before. Sweden, Poland and Lithuania increased their surveillance activities from 2008, whereas Estonia, Latvia and Finland reported fewer flight hours and the remaining countries conducted a similar amount of flight hours.

Most parts of the Baltic with regular traffic zones are covered by national aerial surveillance, but still one Contracting State did 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 1989-2009 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 2009, six countries carried out their flights at night (**Figure 2**), which constituted 15% of all flight hours (in 2008 - 14%).

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). The satellite images are delivered in near real time to provide first indication of possible oil slicks to be checked by aircraft on a spot.

Altogether, EMSA provided 608 satellite scenes for the users of CleanSeaNet in the Baltic Sea in 2009 (the same as in 2008), indicating 280 possible detections (413 in 2008). From these images, on average 0.46 oil spill indications were detected (0.68 in 2008). In the HELCOM area, 58% of the spill indications (163) were checked and out of these 21% (34) were confirmed to be oil (26%% in 2008).

Satellite surveillance detections, including confirmed oil, in 2009 is presented in **Table 2**.

## Oil spills

Altogether 178 oil spills were observed in 2009 (**Table 1**), which is 32 less than in 2008 and 60 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 1988-2009 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 majority of the countries decreased comparing to 2008 and reached the record low for the whole Baltic Sea (**Figure 4** and **Figure 5**, respectively). **Figure 6** shows the total number of flight hours and observed oil spills during 1988-2009.

168 (96%) of the oil discharges detected in 2009 were smaller than 1 m<sup>3</sup>, and of these oil spills as much as 138 were even smaller than 0.1 m<sup>3</sup> or 100 litres. One oil spill was over 10 m<sup>3</sup> in size and the total estimated volume of oil spills observed in 2009 amounted to 40.3 m<sup>3</sup>. 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 2009, out of the total number of confirmed illegal discharges (178) as little as in 8 cases (4.5%) the polluters were identified (**Table 1**), which is 13 less than in 2008, in which year 210 oil spills were observed. 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 1988-2009, including the number of observations by countries and PF Index by countries, are contained in **Table 4**.

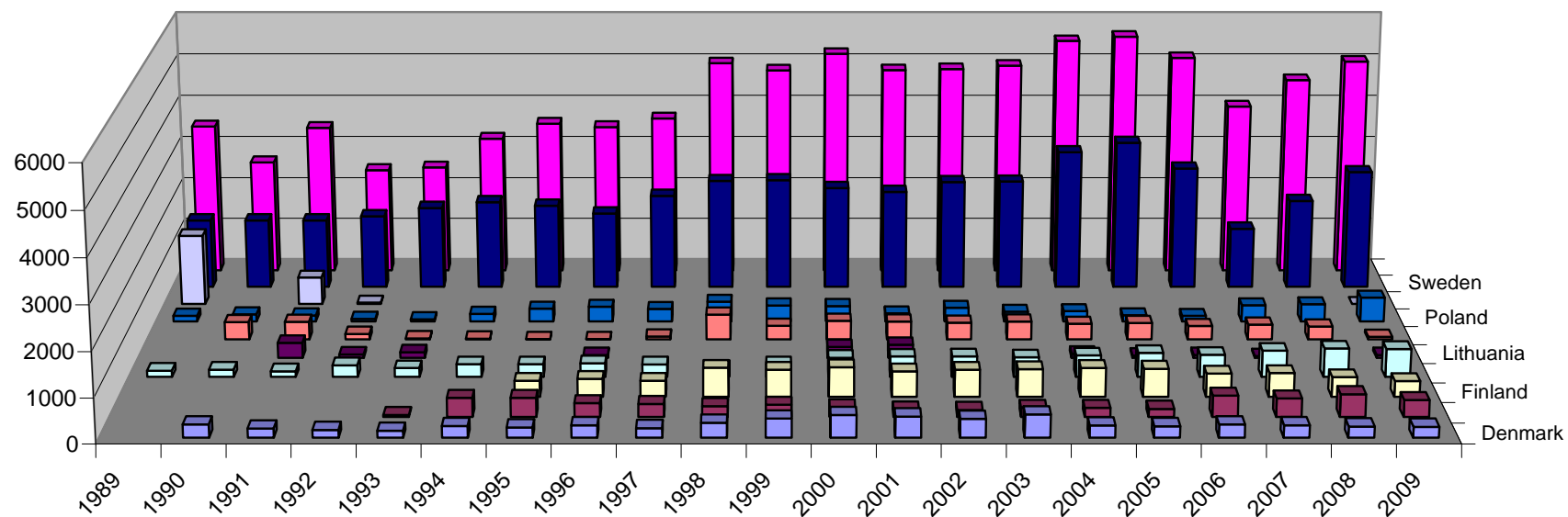
Explanation of terms used in this report is provided in **Annex**.

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](#).

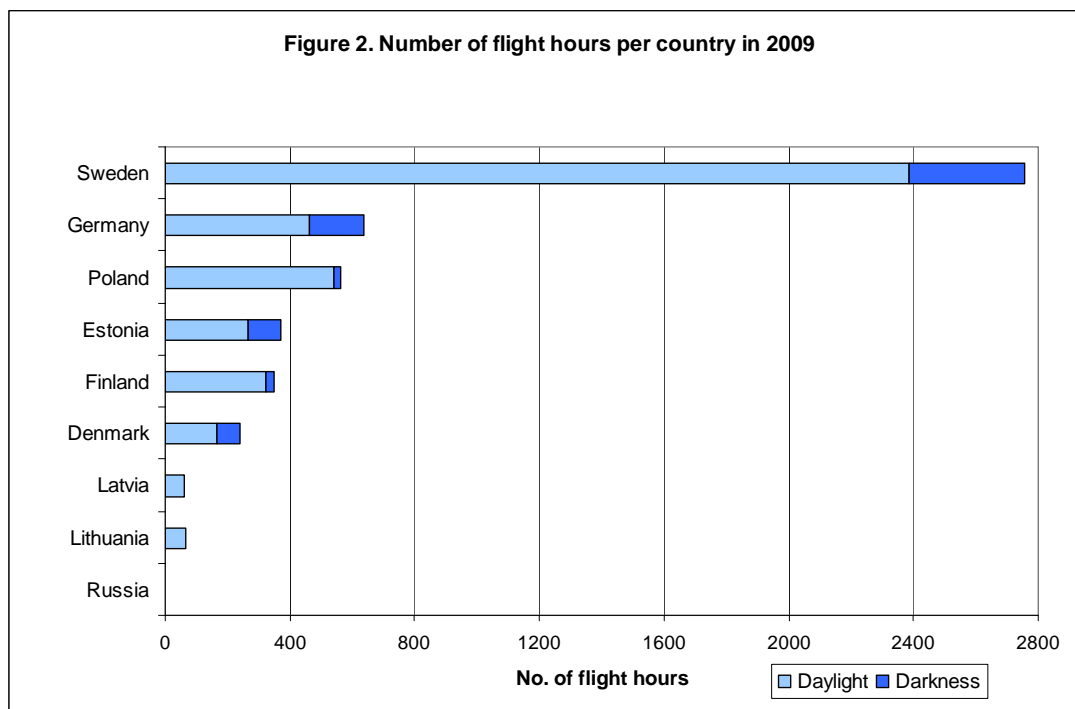
**Table 1. Annual HELCOM aerial surveillance data, 2009**

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[1]
	Daylight	Darkness	Total	Daylight	Darkness	Total	Daylight	Darkness	Total		Rigs	Ships	Unknown	Total	
Denmark	165.5	74.25	239.75	56	36	92	31	3	34	16.8466	-	-	34	34	
Estonia	265	106	371	17	14	31	16	4	20	16.01	-	2	18	20	
Finland	323	28	351	19	-	19	15	1	16	2.126	-	1	15	16	
Germany	462.1	175.9	638	16	12	28	13	2	15	1.759	-	-	15	15	
Latvia	61	-	61	1	-	1	1	-	1	0.196	-	-	1	1	
Lithuania	66	-	66	-	-	-	-	-	-	-	-	-	-	-	
Poland	540.85	20.08	560.93	26	-	26	27	-	27	3.28939	-	1	26	27	
Russia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Sweden	2386	372	2758	57	27	84	50	15	65	2.161		4	61	65	5 spills of fish and palm oil also detected
<b>Total</b>	4269.45	776.23	5045.68	192	89	281	153	25	178	40.26199	0	8	170	178	

Figure 1. Number of flight hours per HELCOM country (hours), 1989-2009



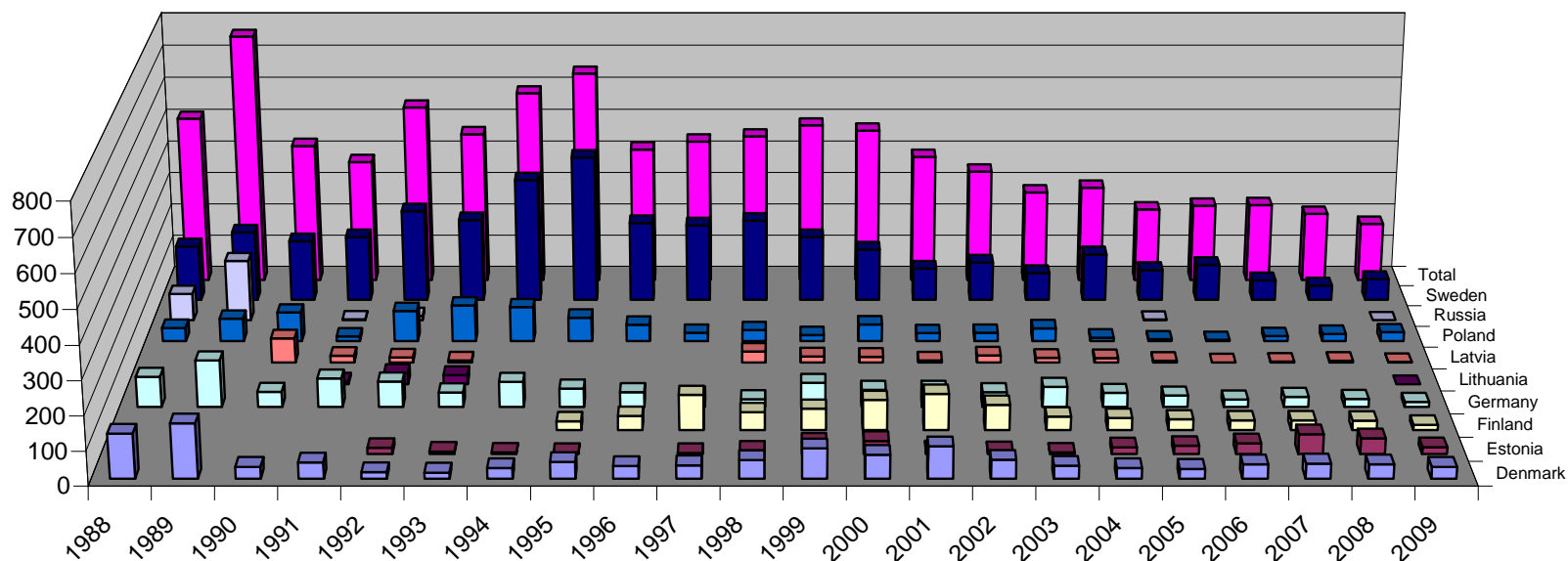
	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Denmark		292	199	172	153	253	225	275	209	325	416	497	463	412	510	265	251.2	289.8	270.6	245.8	239.8
Estonia					40	420	420	305	284	236	268	212	161	153	201	198.2	178.5	470.5	410	503	371
Finland							355	400	355	649	603	660	567	605	615	644	625	517	529	438	351
Germany	142	168	129	267	201	290	291	313	288	206	286	439	466	469	446	491.4	548.8	503.5	598.1	649.7	638
Lithuania			348	78	133			65				250	300			100	54	64	41		66
Latvia		400	408	127	24	18	8	8	64	577	320	436	412	387	414	365	384	311	343	298	61
Poland	131	164	140	62	49	179	301	345	291	465	375	362	187	320	228	239.4	141.1	130.5	380	405.5	560.9
Russia	1618		629	32																	0
Sweden	1600	1600	1600	1700	1900	2038	1953	1763	2189	2544	2565	2374	2281	2518	2532	3231	3455	2842	1397	2063	2758
Total	3491	2624	3453	2438	2500	3198	3553	3474	3680	5002	4833	5230	4837	4864	4946	5534	5638	5128	3969	4603	5046



**Table 2. Satellite detections of oil spills in HELCOM countries waters, including detections verified by aerial surveillance, 2009**

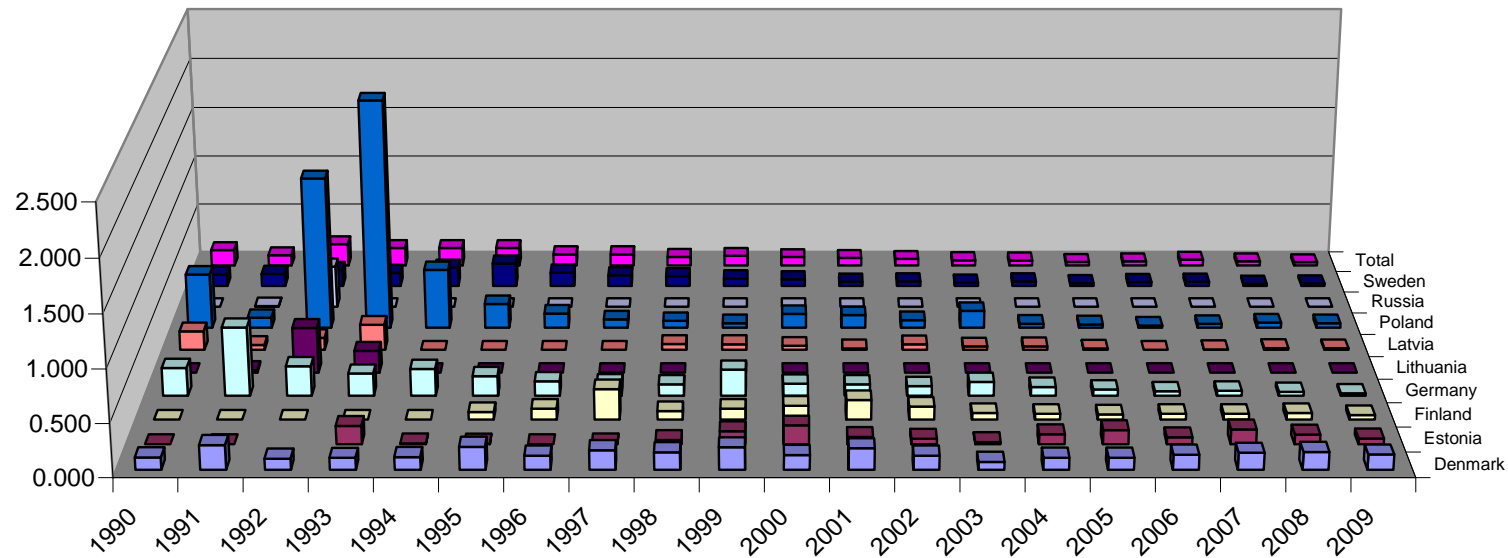
Country	Satellite detections	Satellite detections verified by aerial surveillance			
		Confirmed mineral oil	Confirmed other oil or chemical	Confirmed natural phenomena	No detections
Denmark	56	5	4	5	10
Estonia	20	2	2	1	12
Finland	7	-	-	3	4
Germany	15	3	3	2	5
Latvia	19	2	-	-	8
Lithuania	1	-	-	1	-
Poland	31	4	-	8	7
Russia	10	-	-	-	-
Sweden	121	7	5	26	168
<b>Total</b>	<b>280</b>	<b>23</b>	<b>12</b>	<b>46</b>	<b>122</b>

Figure 3. Number of confirmed oil spills per HELCOM country, 1988-2009



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

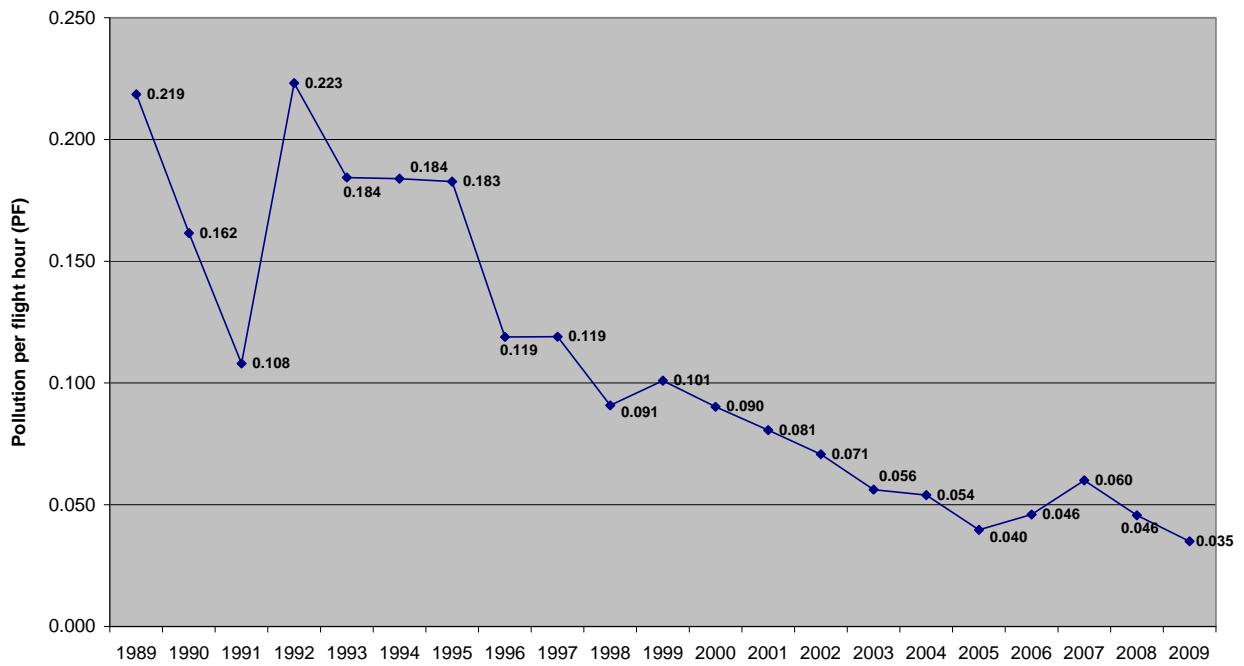
Figure 4. PF Index per HELCOM country, 1990-2009



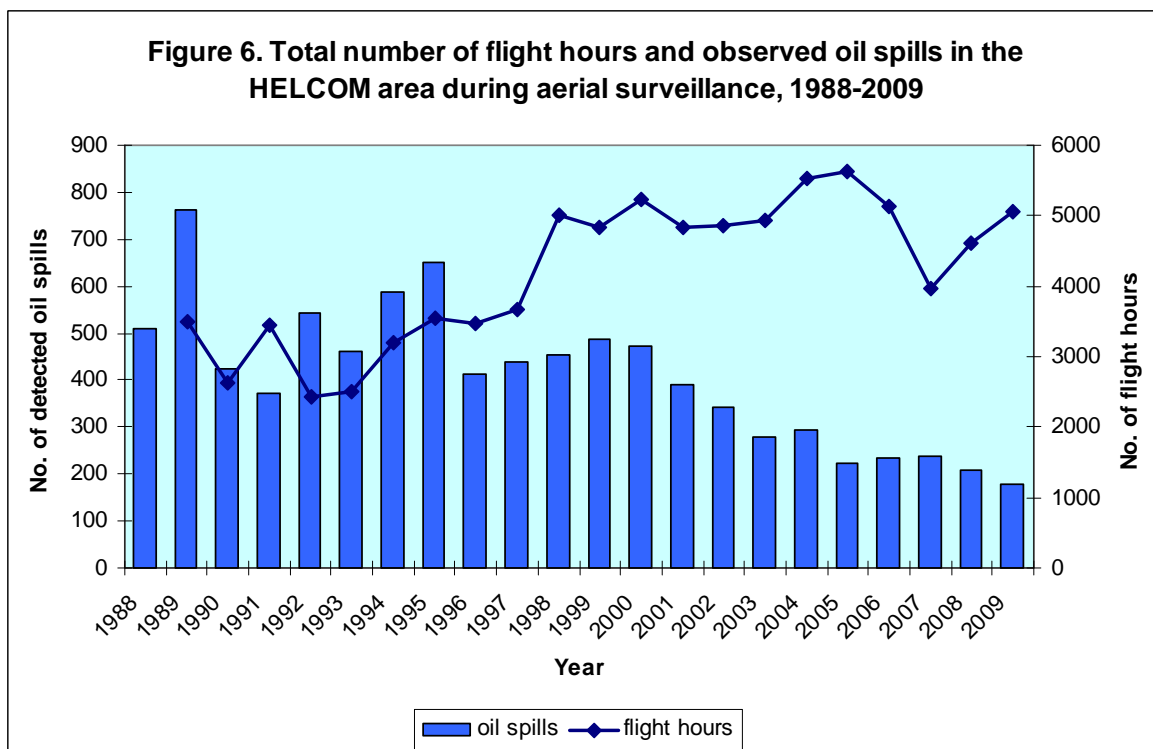
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Denmark	0.116	0.231	0.105	0.111	0.119	0.213	0.131	0.182	0.163	0.209	0.137	0.201	0.131	0.073	0.113	0.111	0.141	0.159	0.167	0.142
Estonia	0.000	0.000		0.175	0.010	0.007	0.000	0.011	0.042	0.123	0.179	0.068	0.052	0.020	0.096	0.134	0.066	0.141	0.091	0.054
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	0.046
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	0.024
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	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	0.016
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	0.048
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	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	0.024
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	0.035



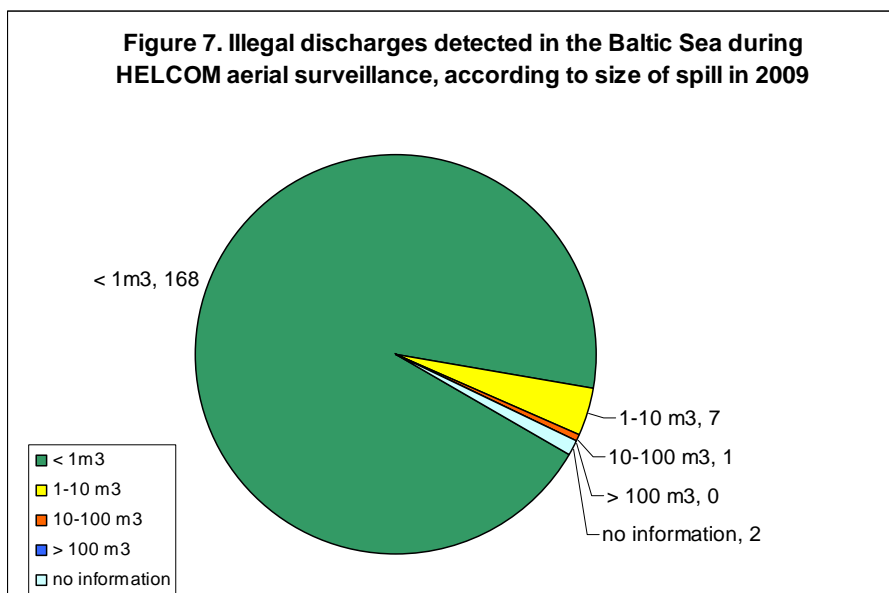
**Figure 5. PF Index for the HELCOM area, 1989-2009**



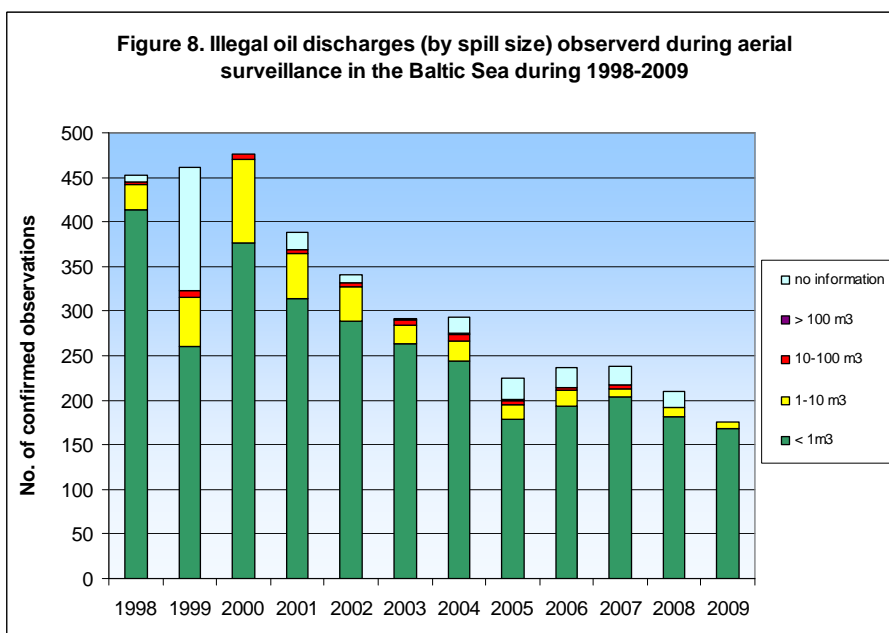
**Figure 6. Total number of flight hours and observed oil spills in the HELCOM area during aerial surveillance, 1988-2009**



**Figure 7. Illegal discharges detected in the Baltic Sea during HELCOM aerial surveillance, according to size of spill in 2009**



**Figure 8. Illegal oil discharges (by spill size) observed during aerial surveillance in the Baltic Sea during 1998-2009**



**Table 3. Confirmed oil spills in HELCOM countries' exclusive economic zone by size, 2009**

Size	Denmark	Estonia	Finland	Germany	Latvia	Lithuania	Poland	Russia	Sweden	Total
< 1m³ (<100litres)	31 (24)	17 (9)	15 (13)	14 (12)	1		26 (22)		64 (58)	168 (138)
1-10 m³	1	3	1	1			1			7
10-100 m³	1									1
> 100 m³										0
unknown	1								1	2
<b>Total</b>	<b>34</b>	<b>20</b>	<b>16</b>	<b>15</b>	<b>1</b>	<b>0</b>	<b>27</b>	<b>0</b>	<b>65</b>	<b>178</b>

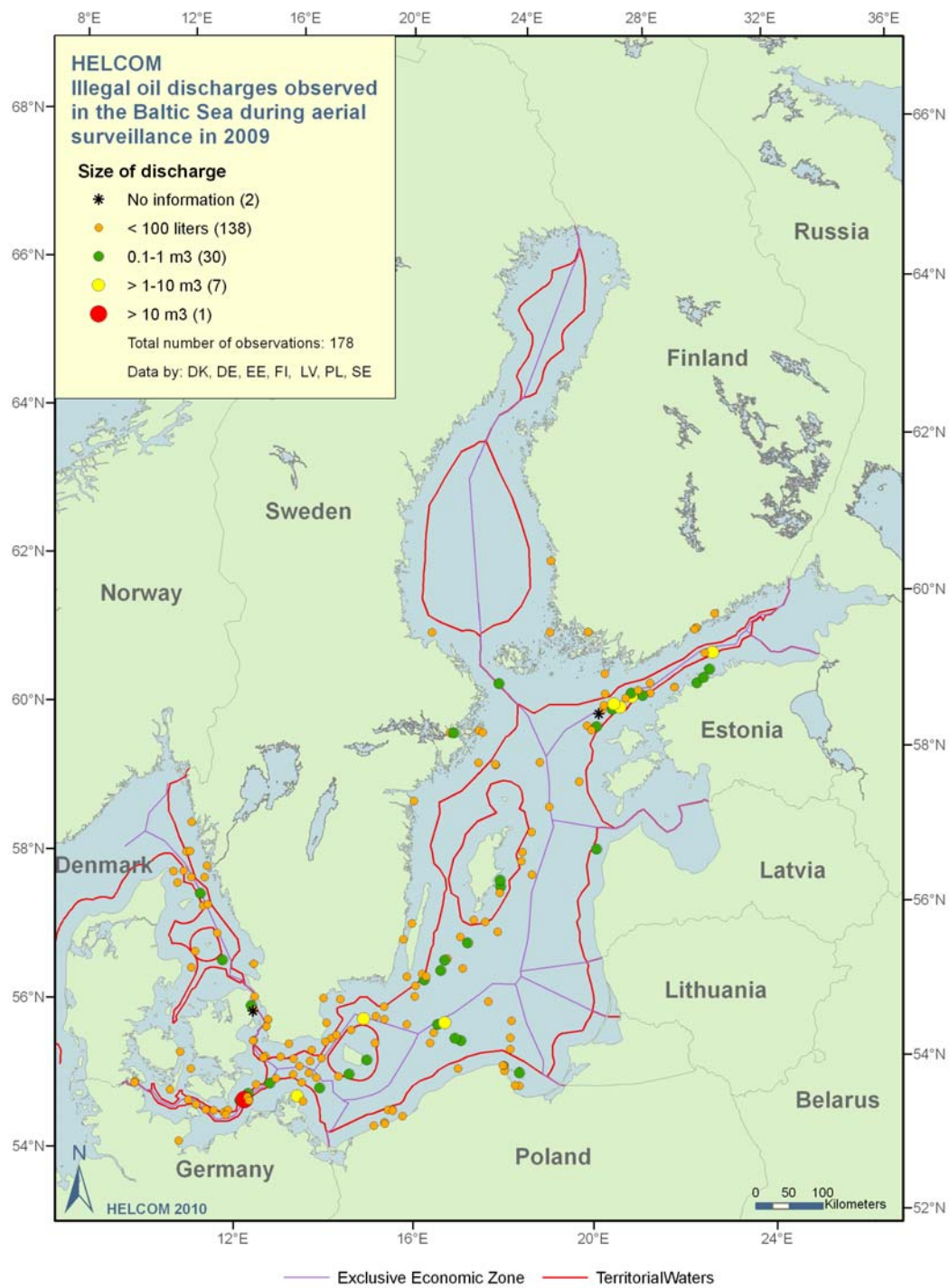


Figure 9. Location of the oil spills observed in the Baltic Sea area in 2009.

**Table 4. Aerial surveillance data 1998-2009**

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
<b>Denmark</b>		292	199	172	153	253	225	275	209	325	416	497	463	412	510	265	251.19	289.78	270.63	245.76	239.75
<b>Estonia</b>					40	420	420	305	284	236	268	212	161	153	201	198.16	178.49	470.53	410	503	371
<b>Finland</b>							355	400	355	649	603	660	567	605	615	644	625	517	529	438	351
<b>Germany</b>	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	638
<b>Lithuania</b>			348	78	133			65				250	300			100	54	64	41		66
<b>Latvia</b>		400	408	127	24	18	8	8	64	577	320	436	412	387	414	365.02	384	311	343	298	61
<b>Poland</b>	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	560.93
<b>Russia</b>	1618		629	32																	0
<b>Sweden</b>	1600	1600	1600	1700	1900	2038	1953	1763	2189	2544	2565	2374	2281	2518	2532	3231	3455	2842	1397	2063	2758
<b>Total</b>	<b>3491</b>	<b>2624</b>	<b>3453</b>	<b>2438</b>	<b>2500</b>	<b>3198</b>	<b>3553</b>	<b>3474</b>	<b>3680</b>	<b>5002</b>	<b>4833</b>	<b>5230</b>	<b>4837</b>	<b>4864</b>	<b>4946</b>	<b>5534.012</b>	<b>5637.58</b>	<b>5128.34</b>	<b>3968.72</b>	<b>4603</b>	<b>5046</b>

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	2009
<b>Denmark</b>	129	159	34	46	18	17	30	48	36	38	53	87	68	93	54	37	30	28	41	43	41	34
<b>Estonia</b>					18	7	4	3		3	10	33	38	11	8	4	19	24	31	58	46	20
<b>Finland</b>								26	42	104	53	63	89	107	75	40	36	32	29	29	28	16
<b>Germany</b>	90	139	45	85	76	43	75	55	44	34	23	72	51	51	44	60	42	34	22	30	24	15
<b>Lithuania</b>				8	34	28																0
<b>Latvia</b>			73	20	15	6					33	18	17	6	21	14	13	5	0	2	5	1
<b>Poland</b>	40	69	88	14	92	110	104	72	50	25	33	18	51	24	25	39	10	5	3	15	22	27
<b>Russia</b>	82	184		3	13													2				0
<b>Sweden</b>	168	212	184	197	278	250	375	445	241	234	249	197	158	98	117	84	143	94	110	61	44	65
<b>Total</b>	<b>509</b>	<b>763</b>	<b>424</b>	<b>373</b>	<b>544</b>	<b>461</b>	<b>588</b>	<b>649</b>	<b>413</b>	<b>438</b>	<b>454</b>	<b>488</b>	<b>472</b>	<b>390</b>	<b>344</b>	<b>278</b>	<b>293</b>	<b>224</b>	<b>236</b>	<b>238</b>	<b>210</b>	<b>178</b>

Calculations

<b>Year</b>	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
pollutions	763	424	373	544	461	588	649	413	438	454	488	472	390	344	278	293	224	236	238	210	178
<b>Total flight hours</b>	<b>3491</b>	<b>2624</b>	<b>3453</b>	<b>2438</b>	<b>2500</b>	<b>3198</b>	<b>3553</b>	<b>3474</b>	<b>3680</b>	<b>5002</b>	<b>4833</b>	<b>5230</b>	<b>4837</b>	<b>4864</b>	<b>4946</b>	<b>5434</b>	<b>5637.58</b>	<b>5128</b>	<b>3969</b>	<b>4603</b>	<b>5046</b>
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

## 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.