



Baltic Marine Environment Protection Commission

Annual report on  
**Illegal discharges  
observed during  
aerial surveillance  
2013**

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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.

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 illegal 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 illegal discharges observed in the Baltic Sea area during national and joint co-ordinated aerial surveillance activities.

This 2013 HELCOM aerial surveillance report presents data from 1988 up to 2013. Please note that the focus of the report is on detected spills of mineral oil and it only takes into account detections from fixed-wing aircraft. The figures do not include detections, from i.e. helicopters or ships, and thus may be different than those in reports based on such information. In the future reports more attention will be paid to spill other than oil in addition to mineral oil spills.

## Surveillance activity

In total, 4317 flight hours with fixed-wing aircraft were carried out in 2013 within aerial surveillance activities of the Baltic Sea countries (**Table 1**). This is a decrease of 15 % compared to the previous year (5090 flight hours in 2012), owing to overhaul on aircraft and challenging economic circumstances.

All Baltic Sea countries except for Latvia and Russia conducted aerial surveillance in 2013. Only Estonia and Poland increased the number of flight hours while a significant decrease in flight hours was recorded for Germany and Sweden, which are the countries that are conducting most aerial surveillance in the Baltic Sea. Also a small increase in the number of flight hours could be seen in Lithuania. The number of flight hours by individual HELCOM countries, in 1989-2013, is shown in **Figure 1**. Please note that the number of flight hours for Sweden and the total number of flight hours, are indicated on the secondary vertical axis 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 2013, only five countries carried out flights at night (**Figure 2**), which constituted 15 % of all flight hours (16 % in 2012).

In addition to 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 (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 a spot.

Altogether, EMSA provided 565 satellite scenes for the users of CleanSeaNet in the Baltic Sea in 2013 (579 in 2012), indicating 130 possible detections (185 in 2012). In the HELCOM area, 61 % (79) of the spill indications were checked. Out of these 7 % (6) were confirmed to be mineral oil (14 % in 2012). Satellite surveillance detections provided by EMSA in 2013, including confirmed mineral oil, is presented in **Table 2**.

## Oil spills

In general, the number of detected oil spills in the Baltic Sea has been constantly decreasing, even though the density of shipping has rapidly 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 130 oil spills were observed in 2013 (**Table 1**). The number of spills in 2013 was nine less than in 2012. It should be noted that of the 130 spills, 18 were detected from the same wreck (m/s Gerorg Buchner) on different occasion during the year and three other spills from different wrecks were also detected. The number of oil spills observed during aerial surveillance activity in individual countries in 1988-2013 is presented in **Figure 3**. Please note that the total number of spills is indicated on the secondary vertical axis in **Figure 3**.

A good 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. In 2013 a small increase in the PF Index could be seen (0.030) compared to the PF Index in 2012 (0.027) and the lowest recorded PF Index in 2011 (0.022). This is mainly due to the decrease in the number of flight hours (**Figure 4**). **Figure 5** shows the total number of flight hours and observed oil spills during aerial surveillance in 1988-2013.

Of the total 130 oil discharges detected in 2013, 121 (93 %) were smaller than 1 m<sup>3</sup>, and of these oil spills as many as 104 were even smaller than 0.1 m<sup>3</sup> (100 liters). The share of each size category of oil spills is presented in **Figure 6** and further divided by country waters in **Table 3**. None of the spills were estimated to be larger than 2.4 m<sup>3</sup> and the total estimated minimum volume of oil spills observed in 2013 amounted to 11 m<sup>3</sup>, which is the lowest recorded so far. The estimated volume of the oil spill has steadily been decreasing and during the last years a significant decrease has been recorded, for instance the decrease has been as much as 77 % compared to 2010 (49 m<sup>3</sup>), however keeping in mind that these are only estimations. The trend of the spill sizes for the years 1998-2013 is presented in **Figure 7**. **Figure 8** further illustrates the trend in total amount of oil detected and the number of spills observed in 1988-2013. A map illustrating the location of the detected spills in 2013 by size is depicted in **Figure 9**.

In a vast majority of cases of detected illegal discharges polluters remain unknown. In 2013, out of the total number of confirmed mineral oil spills (130), in as few as 15 cases (12 %) the polluting ship was identified. Altogether 16% of the spills were from wrecks (**Table 1**). 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 1988-2013, 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**. Explanation of terms used in this report is provided in the **Annex**.

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/index.html>).

**Table 1 Annual aerial surveillance data for the Baltic Sea in 2013**

Country	No. of flight hours			No. of detections by countries (incl. in other countries EEZ)			Detections confirmed/ observed as oil spills in own waters (incl. reports by other countries)			Estimated volume m3 (in own waters)	No. of polluters (including reports from other countries)				Remarks
	Daylight	Darkness	Total	Daylight	Darkness	Total	Daylight	Darkness	Total		Rigs	Ships	Unknown	Total	
Denmark	197,05	10	207,05	34	11	45	14	0	14	0,54	0	1	13	14	
Estonia	271	56	327	12	3	15	8	0	8	1,01	0	1	7	8	
Finland	570	55	625	14	2	16	9	0	9	0,11	0	3	6	9	incl.1 wreck oil leak under unknown
Germany	314,9	154,6	469,5	13	3	16	7	0	7	0,56	0	0	7	7	
Latvia	0	0	0	0	0	0	1	0	1	0,98	0	0	1	1	
Lithuania	19	0	19	0	0	0	0	0	0	0	0	0	0	0	
Poland	386,5	0	386,5	31	0	31	27	0	27	2,62	0	0	27	27	incl.18 wreck oil leaks under unknown
Russia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Sweden	1928	355	2283	134	8	142	64	0	64	5,33	1	10	53	64	incl.2 wreck oil leaks under unknown
<b>Total</b>	<b>3686,45</b>	<b>630,60</b>	<b>4317,05</b>	<b>238</b>	<b>27</b>	<b>265</b>	<b>130</b>	<b>0</b>	<b>130</b>	<b>11,16</b>	<b>1</b>	<b>15</b>	<b>114</b>	<b>130</b>	

Number of flight hours (h) per HELCOM country, 1989-2013

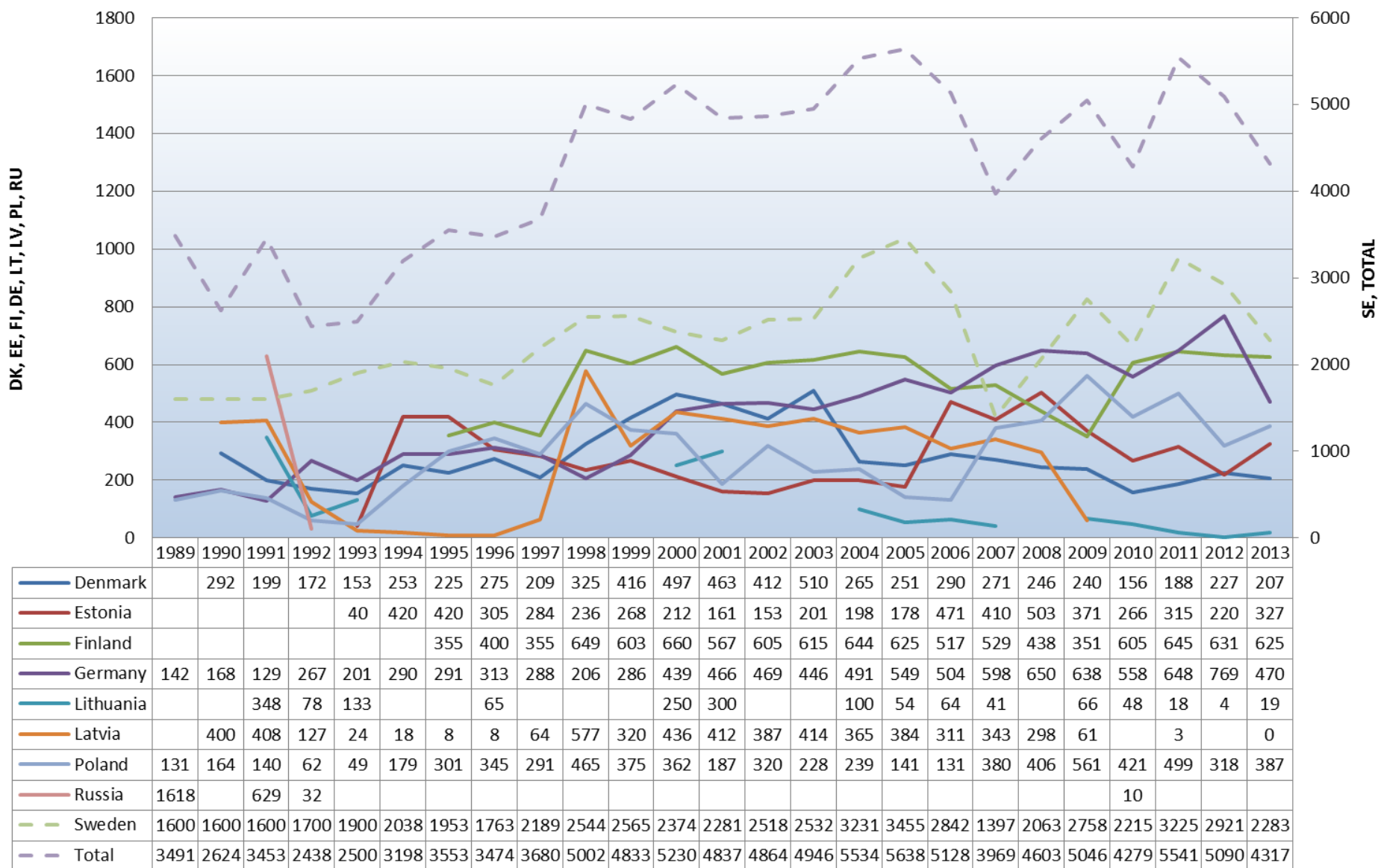
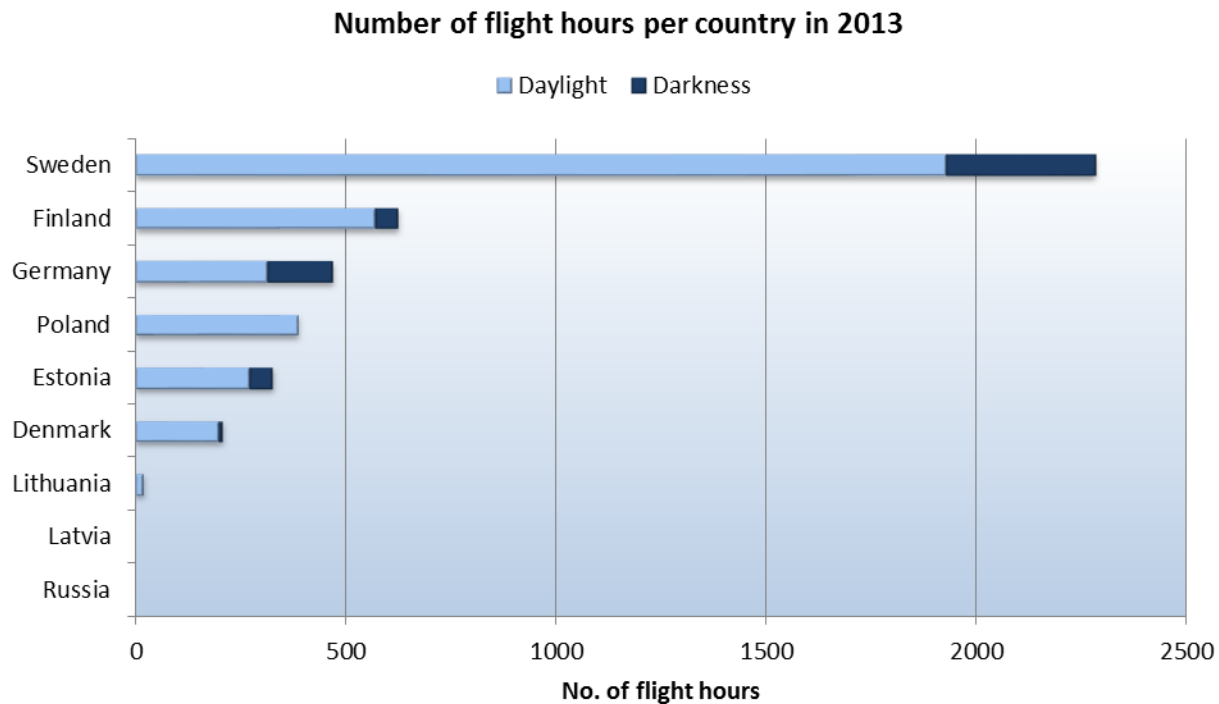


Figure 1 Number of flight hours per HELCOM country, 1989-2013. Note that the number of flight hours for Sweden and the total number of flight hours, are indicated on the secondary vertical axis.



**Figure 2 Number of flight hours per country in 2013.**

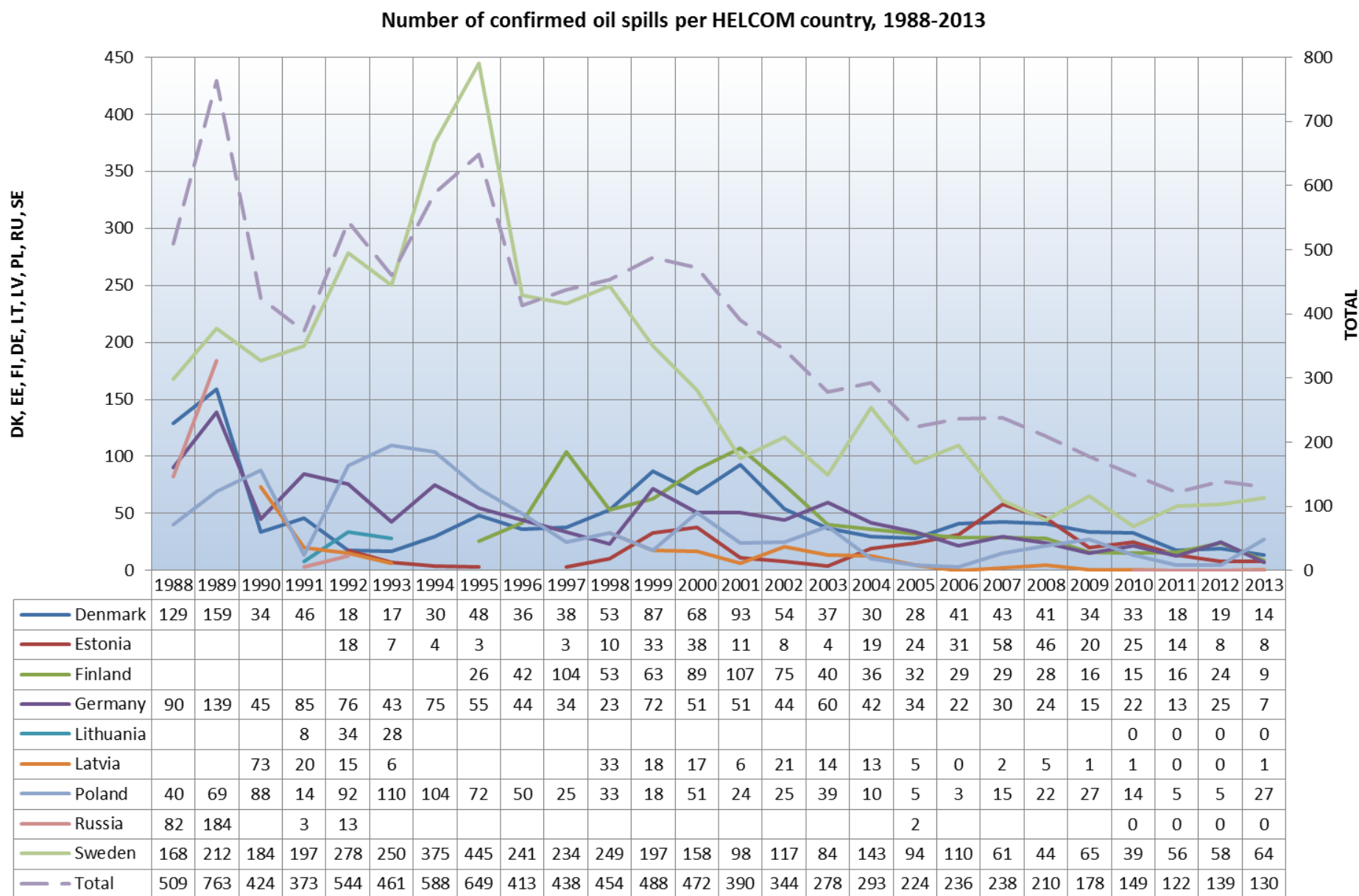
**Table 2 Satellite detections of oil spills in HELCOM countries waters provided by EMSA, including verified detections in 2013**

Country waters	Satellite detections	Verified satellite detections by country					Not checked or no feedback
		Confirmed mineral oil	Confirmed other oil, chemical, sewage or garbage	Confirmed natural phenomena	Unknown substance	Nothing found	
Denmark	27	0	1	6	1	8	11
Estonia	9	1	1	1	3	3	0
Finland	3	0	1	0	0	1	1
Germany	11	3	2	1	1	3	1
Latvia	3	0	0	0	0	0	3
Lithuania	1	0	0	0	0	0	1
Poland	15	0	1	3	1	5	5
Russia	8	0	0	0	0	0	8
Sweden	53	2	8	8	5	9	21
<b>Total</b>	<b>130</b>	<b>6</b>	<b>14</b>	<b>19</b>	<b>11</b>	<b>29</b>	<b>51</b>

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, 1988-2013. Note that the total number of spills is indicated on the secondary vertical axis.

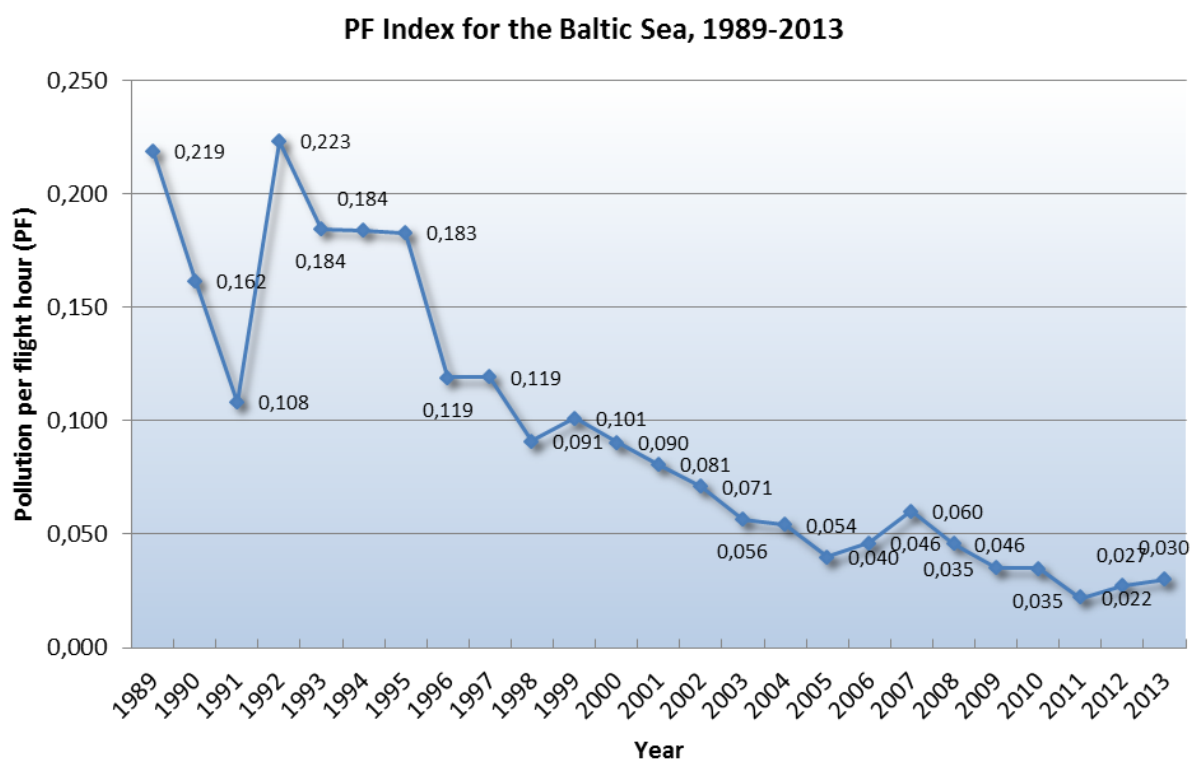


Figure 4 Pollution per flight hour index for the Baltic Sea, 1989-2013.

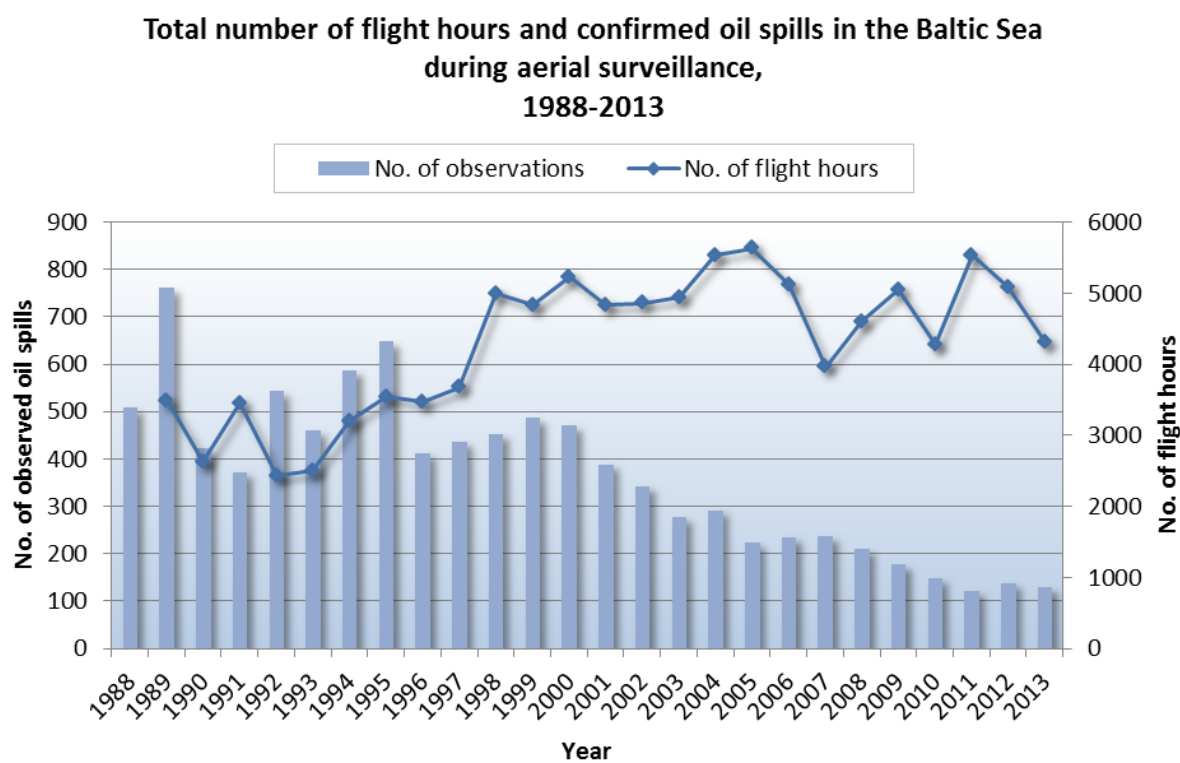
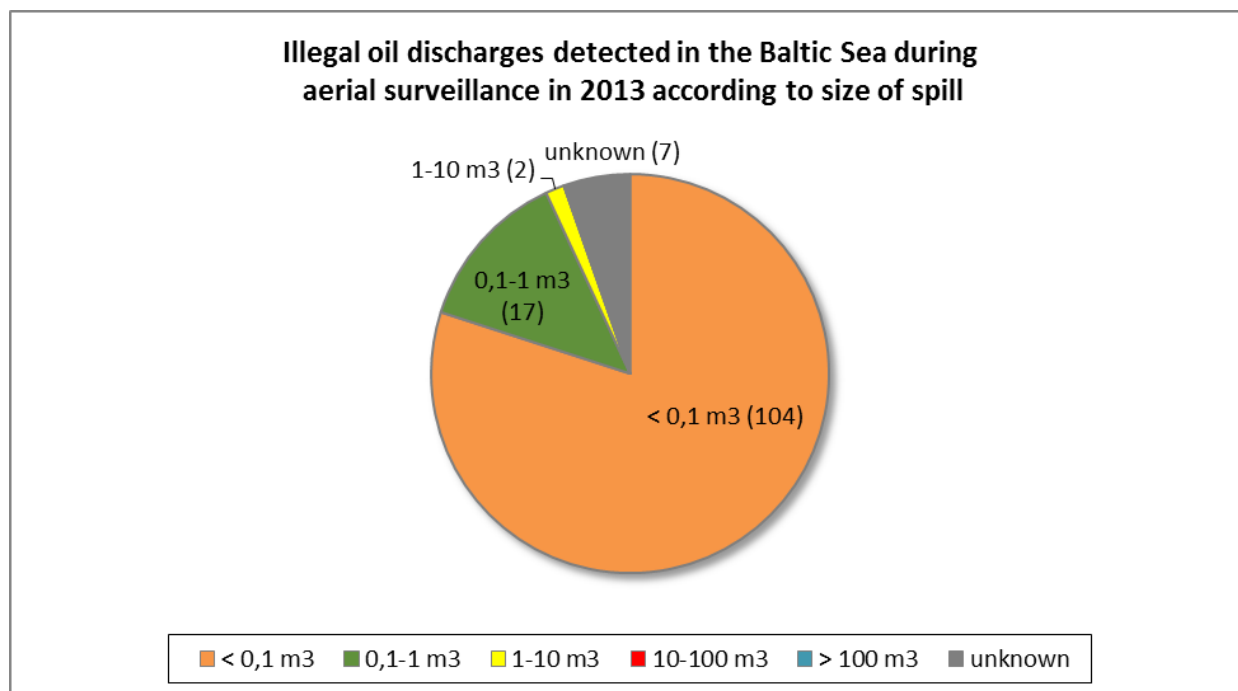
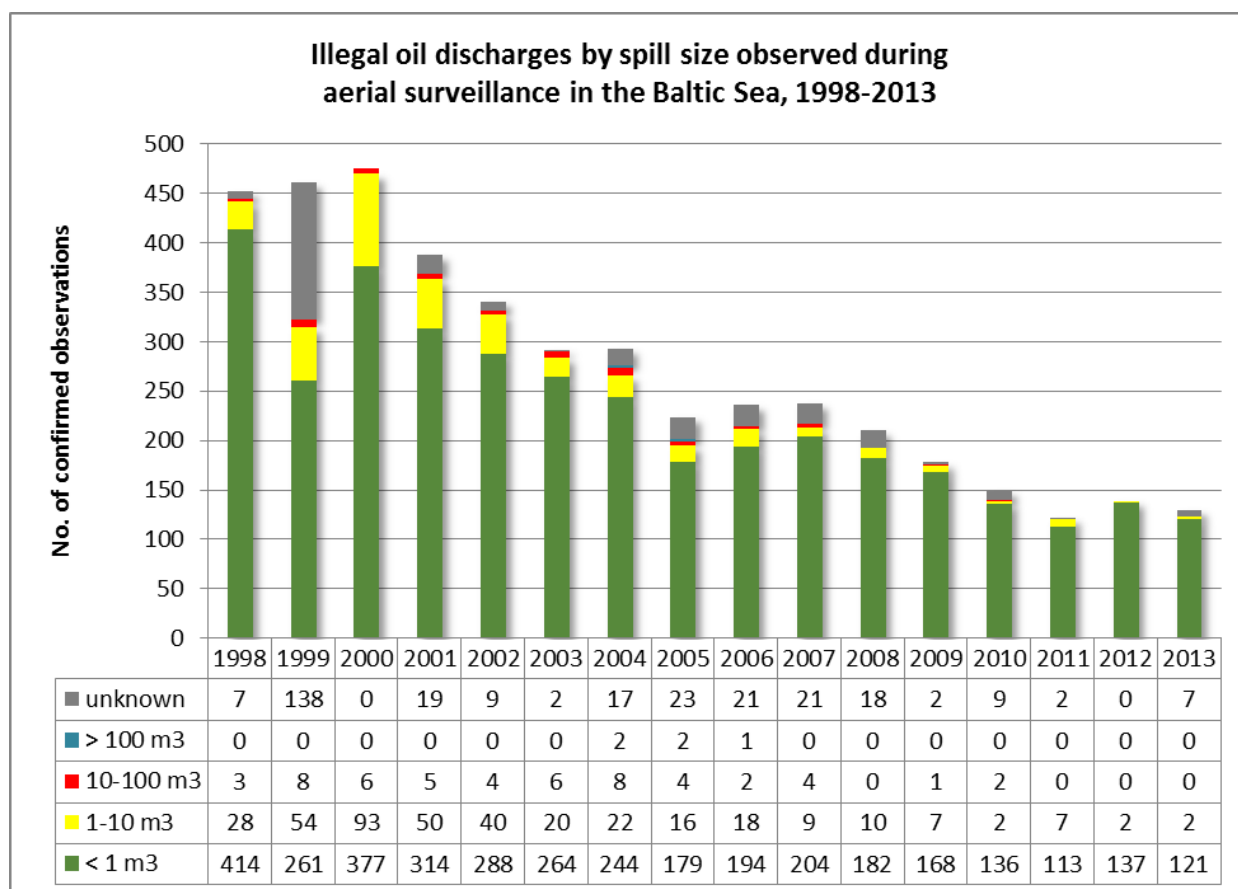


Figure 5 Total number of flight hours and confirmed oil spills in the Baltic Sea during aerial surveillance, 1988-2013.



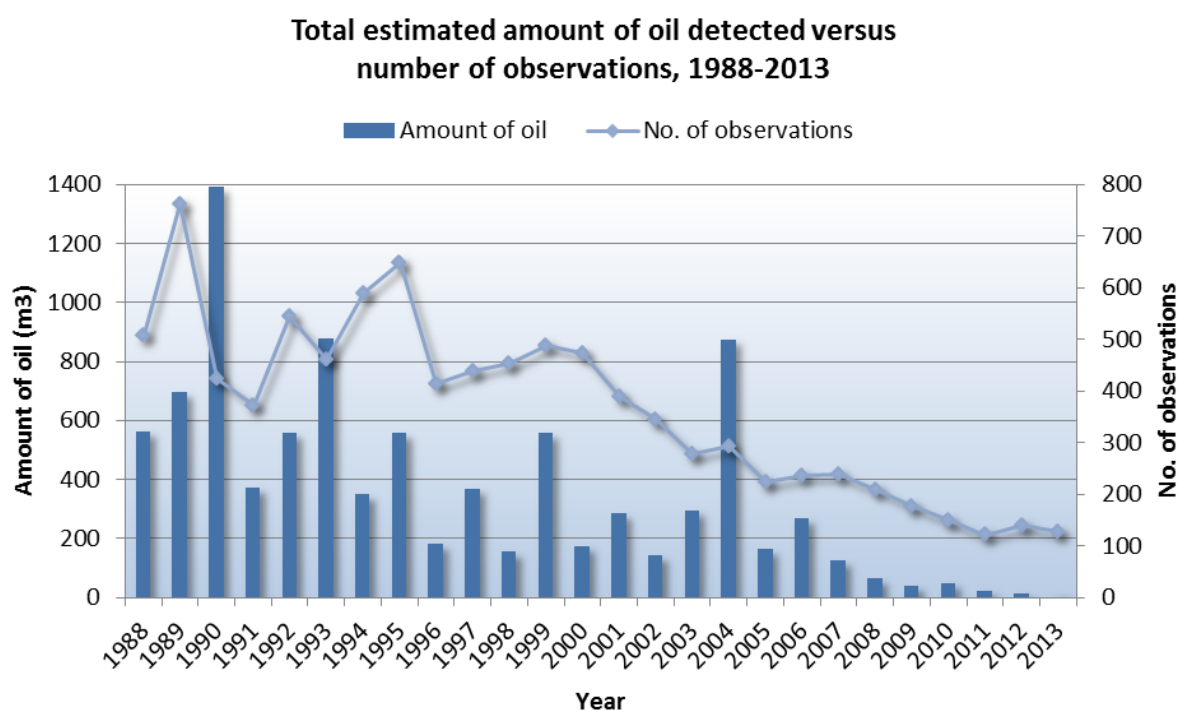
**Figure 6** Illegal oil discharges detected in the Baltic Sea during aerial surveillance in 2013 according to estimated volume of the spill.



**Figure 7** Illegal oil discharges according to estimated volume of the spill during aerial surveillance in the Baltic Sea, 1998-2013

**Table 3 Confirmed oil spills in HELCOM countries' waters by size in 2013**

Size	Denmark	Estonia	Finland	Germany	Latvia	Lithuania	Poland	Russia	Sweden	Total
< 0,1 m <sup>3</sup>	12	7	9	4	0	0	26	0	46	104
0,1-1 m <sup>3</sup>	2	1	0	3	1	0	0	0	10	17
1-10 m <sup>3</sup>	0	0	0	0	0	0	1	0	1	2
10-100 m <sup>3</sup>	0	0	0	0	0	0	0	0	0	0
> 100 m <sup>3</sup>	0	0	0	0	0	0	0	0	0	0
unknown	0	0	0	0	0	0	0	0	7	7
<b>Total</b>	<b>14</b>	<b>8</b>	<b>9</b>	<b>7</b>	<b>1</b>	<b>0</b>	<b>27</b>	<b>0</b>	<b>64</b>	<b>130</b>



**Figure 8 Total estimated amount of oil detected versus number of observations, 1988-2013.**

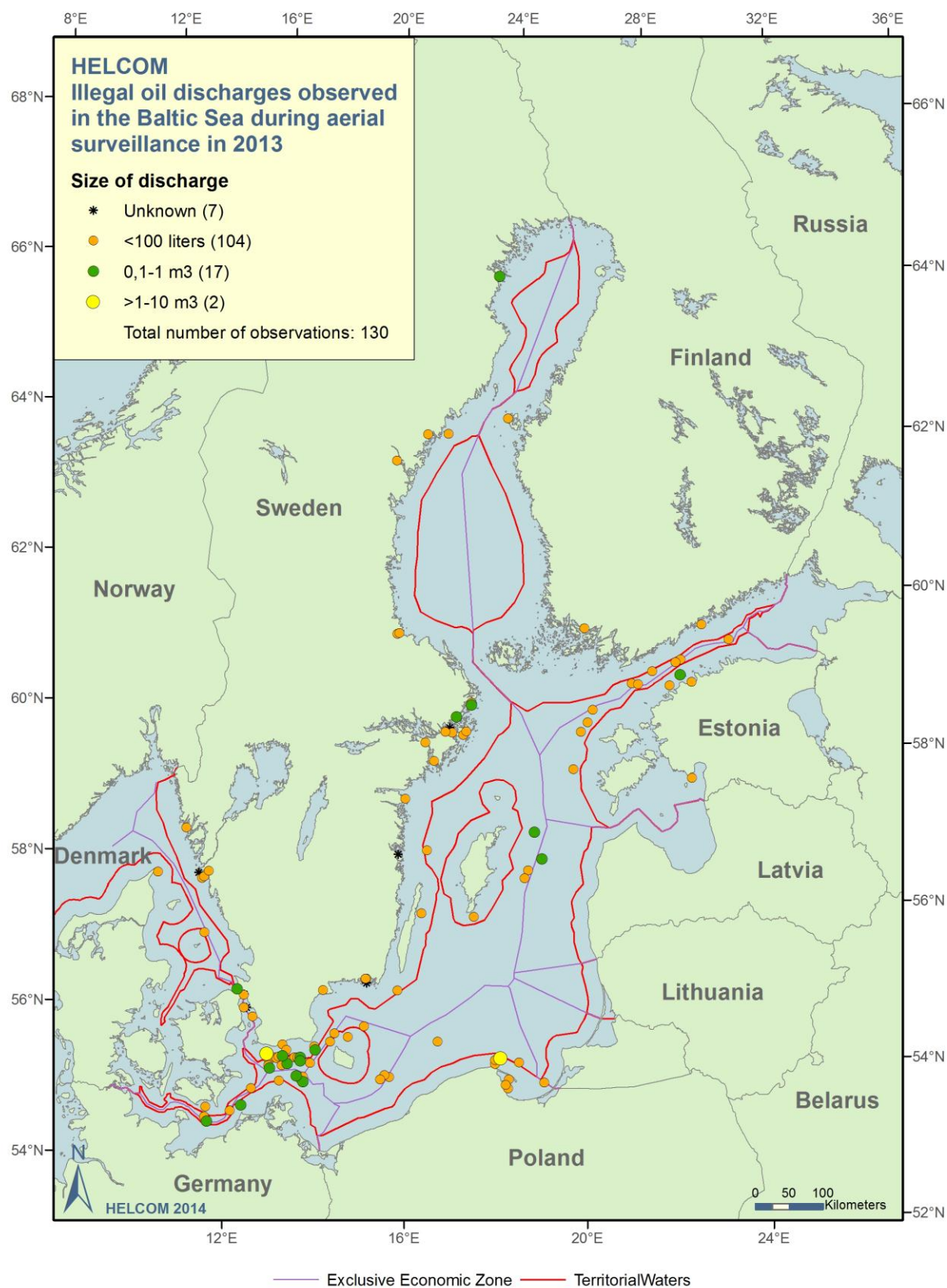


Figure 9 Location of oil spills observed in the Baltic Sea area in 2013 indicated by size.

**Table 4 Aerial surveillance data 1988-2013**
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
<b>Denmark</b>		292	199	172	153	253	225	275	209	325	416	497	463	412	510	265	251	290	271	246	240	156	188	227	207
<b>Estonia</b>					40	420	420	305	284	236	268	212	161	153	201	198	178	471	410	503	371	266	315	220	327
<b>Finland</b>							355	400	355	649	603	660	567	605	615	644	625	517	529	438	351	605	645	631	625
<b>Germany</b>	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
<b>Lithuania</b>			348	78	133			65				250	300			100	54	64	41		66	48	18	4	19
<b>Latvia</b>		400	408	127	24	18	8	8	64	577	320	436	412	387	414	365	384	311	343	298	61		3		
<b>Poland</b>	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
<b>Russia</b>	1618		629	32																		10			
<b>Sweden</b>	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
<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</b>	<b>5638</b>	<b>5128</b>	<b>3969</b>	<b>4603</b>	<b>5046</b>	<b>4279</b>	<b>5541</b>	<b>5090</b>	<b>4317</b>

Number of spills 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
<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	33	18	19	14
<b>Estonia</b>					18	7	4	3		3	10	33	38	11	8	4	19	24	31	58	46	20	25	14	8	8
<b>Finland</b>								26	42	104	53	63	89	107	75	40	36	32	29	29	28	16	15	16	24	9
<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	22	13	25	7
<b>Lithuania</b>				8	34	28																				
<b>Latvia</b>			73	20	15	6					33	18	17	6	21	14	13	5	0	2	5	1	1			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	14	5	5	27
<b>Russia</b>	82	184		3	13													2								
<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	39	56	58	64
<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>	<b>149</b>	<b>122</b>	<b>139</b>	<b>130</b>

Calculations

	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
<b>Pollutions</b>	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
<b>Flight hours</b>	3491	2624	3453	2438	2500	3198	3553	3474	3680	5002	4833	5230	4837	4864	4946	5434	5637	5128	3969	4603	5046	4279	5541	5090	4317
<b>PF index</b>	<b>0,219</b>	<b>0,162</b>	<b>0,108</b>	<b>0,223</b>	<b>0,184</b>	<b>0,184</b>	<b>0,183</b>	<b>0,119</b>	<b>0,119</b>	<b>0,091</b>	<b>0,101</b>	<b>0,090</b>	<b>0,081</b>	<b>0,071</b>	<b>0,056</b>	<b>0,054</b>	<b>0,040</b>	<b>0,046</b>	<b>0,060</b>	<b>0,046</b>	<b>0,035</b>	<b>0,035</b>	<b>0,022</b>	<b>0,027</b>	<b>0,030</b>

**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 potential spills identified in satellite images.
Confirmed mineral oil	The number of satellite detections verified by Coastal States as being mineral oil.
Confirmed other oil, chemical, sewage or garbage	The number of satellite detections verified by Coastal States as being vegetable or fish oil, chemical, sewage or garbage.
Confirmed natural phenomena	The number of verified/investigated satellite detections consisting of algae or natural phenomena as currents, waves, ice etc.
Unknown substance	The number of satellite detections verified by Coastal States as being undefined substances.
Nothing found	The number of satellite detections verified by Coastal States where nothing was found.
Not checked	The number of satellite detections which have not been verified by Coastal States.



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