



Baltic Marine Environment Protection Commission

Annual 2012 HELCOM report on illegal discharges observed during aerial surveillance



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 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.

The purpose of this 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 2012 HELCOM aerial surveillance report presents data from 1988 up to 2012.

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.

Further, the figures do not include other detections, from i.a. helicopters or ships, and thus may be different than those in reports using such information.

Surveillance activity

In total, 5090 flight hours with fixed-wing aircraft were carried out in 2012 within surveillance activities of the Baltic Sea countries (**Table 1**). This is a slight decrease of 8 % compared to the previous year (5541 flight hours in 2011), owing to overhaul work on aircraft and participation in missions abroad, which reduced the surveillance capacity in the Baltic Sea.

All Baltic Sea countries except for Latvia and Russia conducted aerial surveillance in 2012. Only Denmark and Germany increased the number of flight hours in 2012 while the number of flight hours decreased or stayed approximately the same for the other five countries. The number flight hours by individual HELCOM countries, in 1989-2012, 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 2012, six countries continued to carry out flights at night (**Figure 2**), which constituted 16 % of all flight hours (15 % in 2011).

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 579 satellite scenes for the users of CleanSeaNet in the Baltic Sea in 2012 (588 in 2011 not including January due to change from CSN version 1 to version 2), indicating 185 possible detections (same as in 2011). In the HELCOM area, 50 % (92) of the spill indications were checked. Out of these 14 % (13) were confirmed to be mineral oil (11 % in 2011). Satellite surveillance detections provided by EMSA in 2012, including confirmed mineral oil, is presented in **Table 2**.

Oil spills

Altogether 139 oil spills were observed in 2012 (**Table 1**). The number of spills in 2012 was 17 more than in 2011, when the number of spills was record low (122), but still 10 less than in 2010. 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. The number of oil spills observed during aerial surveillance activity in individual countries in 1988-2012 is presented in **Figure 3**. Please note that the total number of spills is indicated on the second 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 2012 a small increase in the PF Index could be seen (0.027) compared to the lowest recorded PF Index in 2011 (0.022). This is due to the decrease in the number of flight hours and at the same time an increase in the number of spills (**Figure 4**). **Figure 5** shows the total number of flight hours and observed oil spills in 1988-2011.

Of the total 139 oil discharges detected in 2012, 137 (99 %) were smaller than 1 m³, and of these oil spills as much as 115 were even smaller than 0.1 m³ or 100 liters. None of the spills were estimated to be larger than 3.3 m³ and the total estimated volume of oil spills observed in 2012 amounted to 16 m³, which is the lowest recorded so far. Compared to 2011 the estimated volume of spills observed decreased with 34 % (24 m³) in 2012 and compared to 2010 the decrease was as much as 68 % (49 m³). The share of each size category of oil spills is presented in **Figure 6** and further divided by country waters in **Table 3**. The trend of the spill sizes for the years 1998-2011 is presented in **Figure 7**. **Figure 8** further illustrates the trend in total amount of oil detected and the number of spills observed in 1988-2011. A map illustrating the location of the detected spills in 2012 by size is depicted in **Figure 9**.

In a vast majority of cases of detected illegal discharges polluters remain unknown. In 2012, out of the total number of confirmed illegal discharges (139), as little as in 14 cases (10 %) the polluters were identified (**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 1988-2012, including the number of flight hours per country, observations 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 2012

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	225,33	1,4	226,73	36	4	40	19	0	19	1,83	0	2	17	19	
Estonia	173	47	220	16	4	20	8	0	8	4,58	0	0	8	8	
Finland	568	63	631	34	0	34	24	0	24	0,69	0	6	18	24	
Germany	544,5	224,6	769,1	25	4	29	21	4	25	0,89	0	0	25	25	
Latvia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Lithuania	4	0	4	0	0	0	0	0	0	0	0	0	0	0	
Poland	315,62	2,87	318,49	6	0	6	5	0	5	3,32	0	2	3	5	
Russia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Sweden	2556	365	2921	49	5	54	58	0	58	4,30	0	4	54	58	
Total	4386,45	703,87	5090,32	166	17	183	135	4	139	15,60	0	14	125	139	

Figure 1. Number of flight hours (h) per HELCOM country, 1989-2012

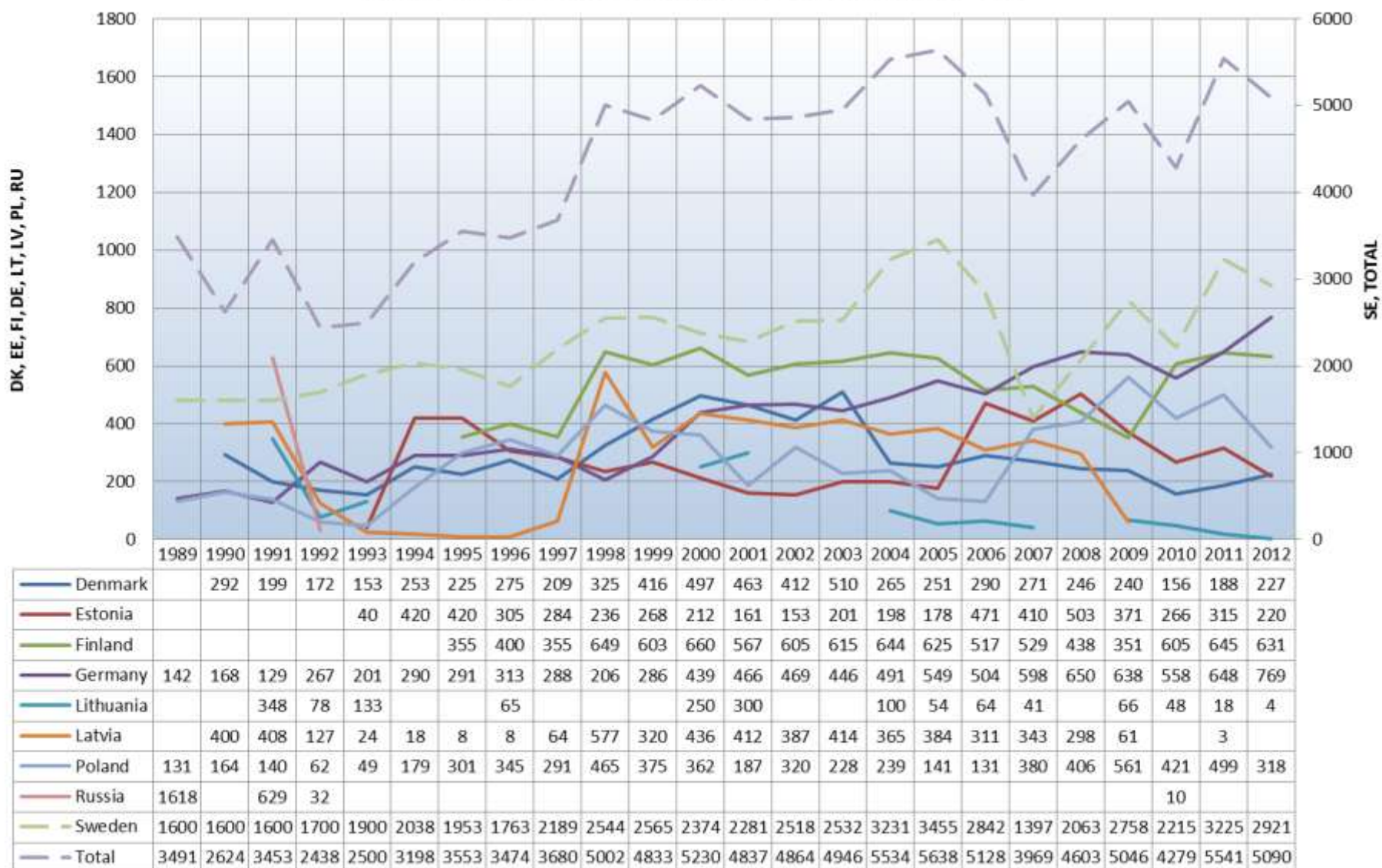


Figure 2. Number of flight hours per country in 2012

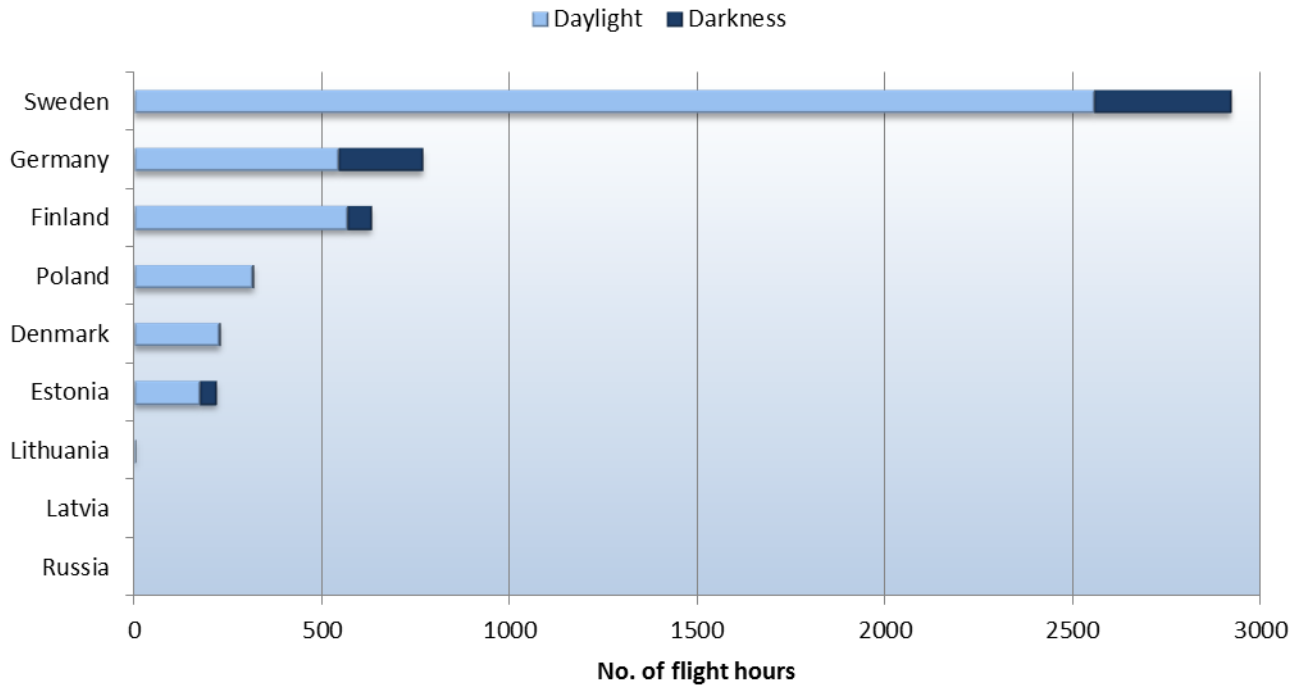


Table 2. Satellite detections of oil spills in HELCOM countries waters provided by EMSA, including verified detections in 2012

Country waters	Satellite detections	Verified satellite detections by country					Not checked
		Confirmed mineral oil	Confirmed other oil, chemical, sewage or garbage	Confirmed natural phenomena	Unknown substance	Nothing found	
Denmark	36	3	3	11	0	4	15
Estonia	10	0	1	0	0	3	6
Finland	11	0	2	3	1	2	3
Germany	31	7	1	8	2	13	0
Latvia	4	0	0	0	0	0	4
Lithuania	2	0	0	0	0	1	1
Poland	23	0	0	0	0	1	22
Russia	12	0	0	0	0	0	12
Sweden	56	3	1	9	6	7	30
Total	185	13	8	31	9	31	93

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, 1988-2012

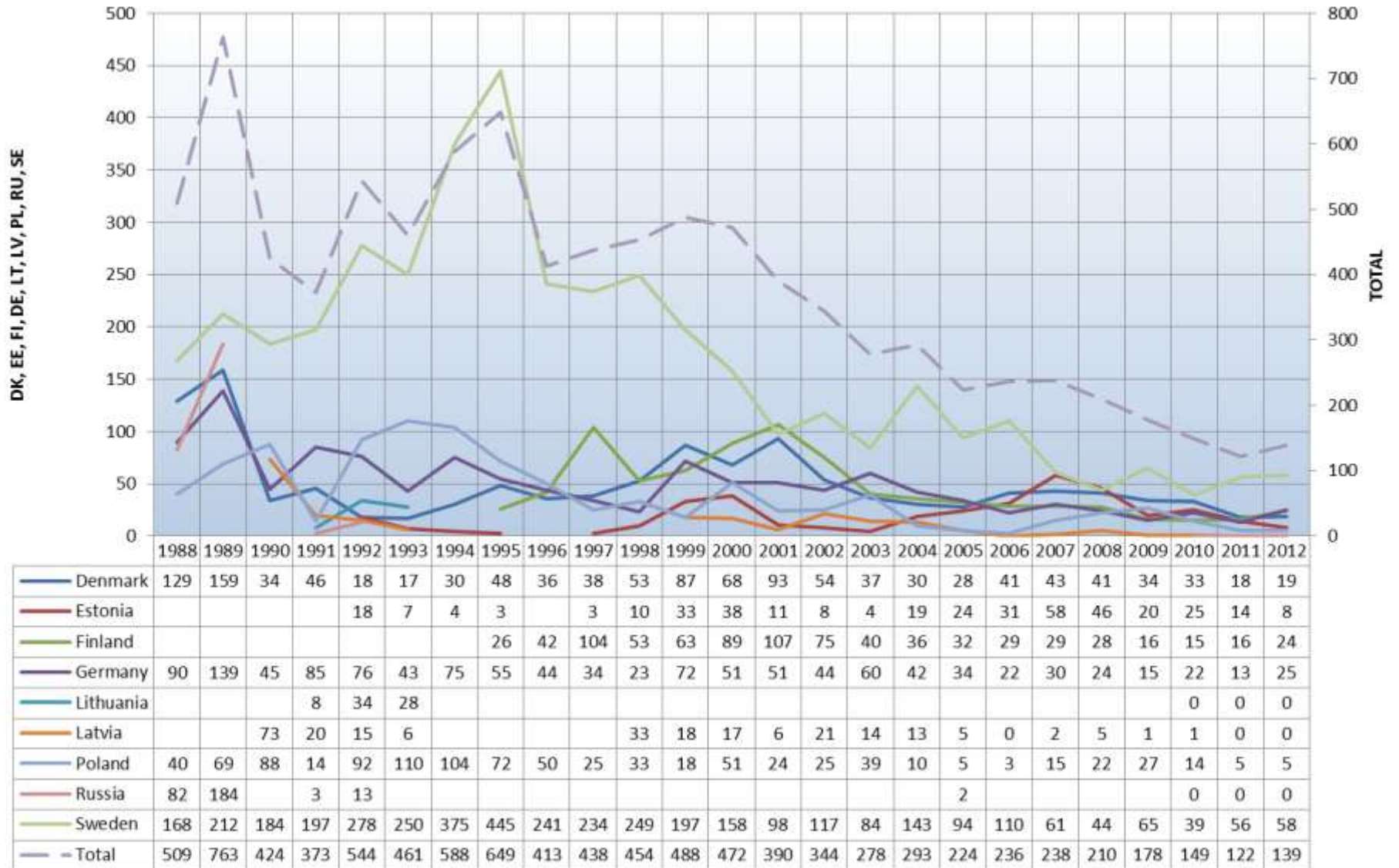


Figure 4. PF Index for the HELCOM area , 1989-2012

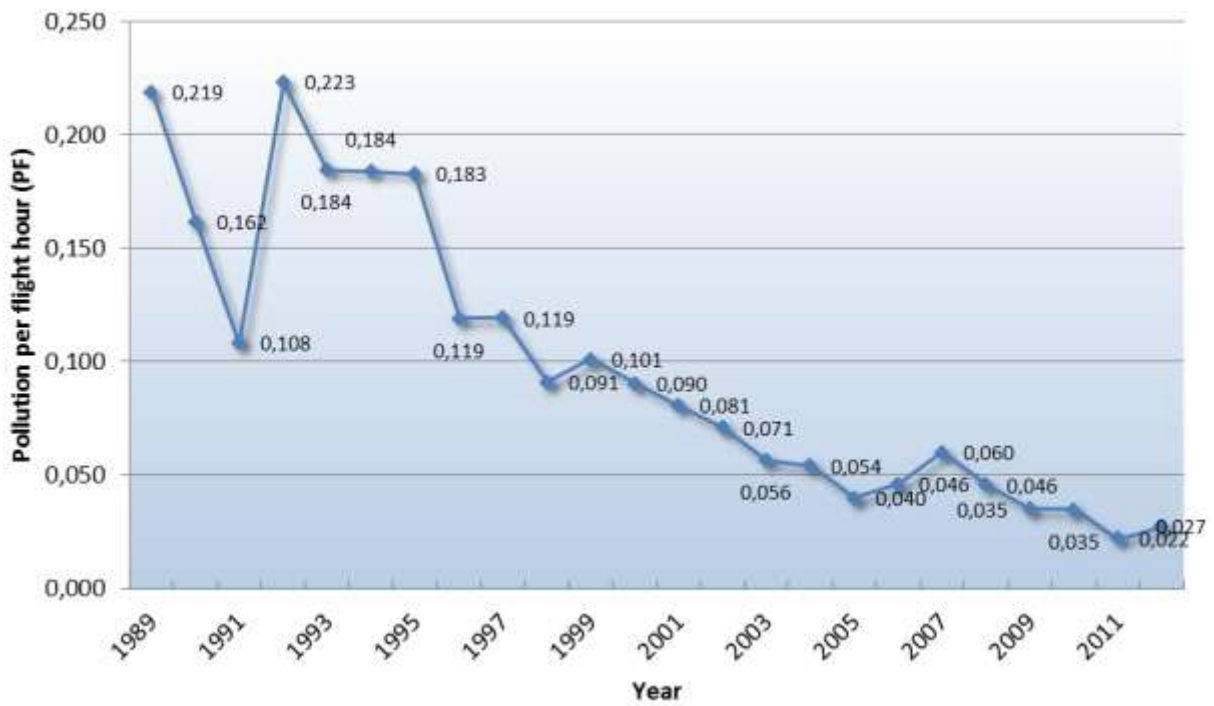


Figure 5. Total number of flight hours and observed oil spills in the HELCOM area during aerial surveillance, 1988-2012

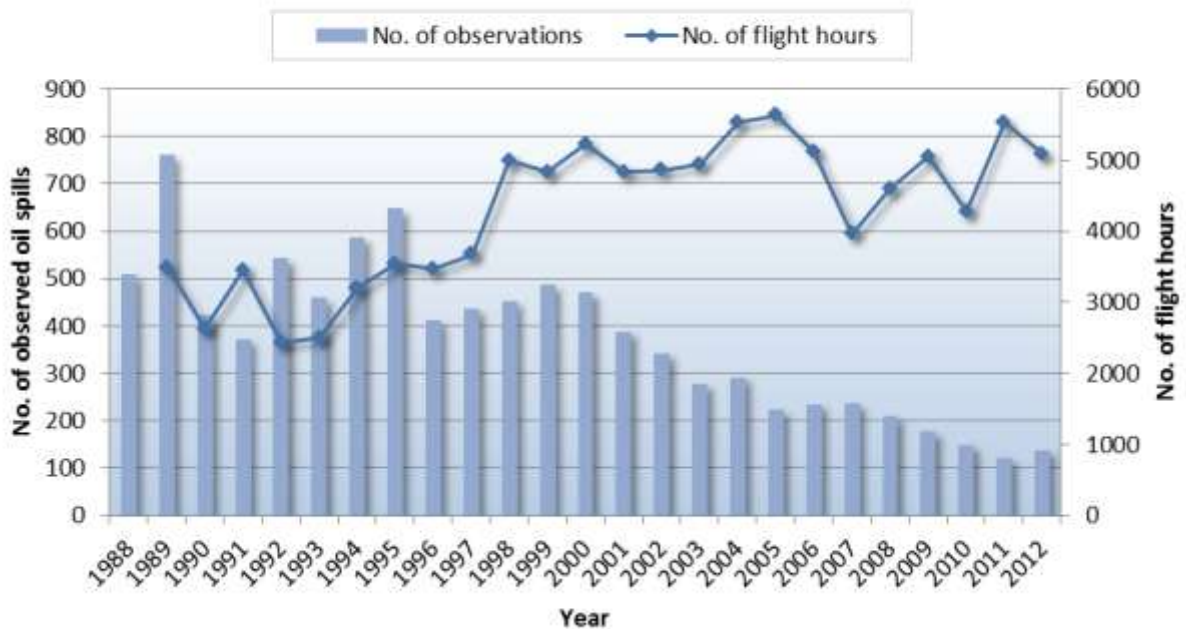


Figure 6. Illegal oil discharges detected in the Baltic Sea during aerial surveillance in 2012, according to size of spill

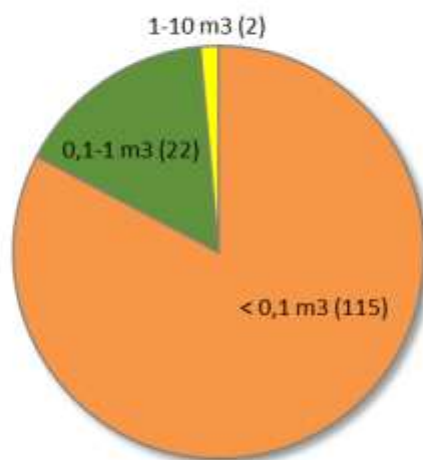


Figure 7. Illegal oil discharges by spill size observed during aerial surveillance in the Baltic Sea, 1998-2012

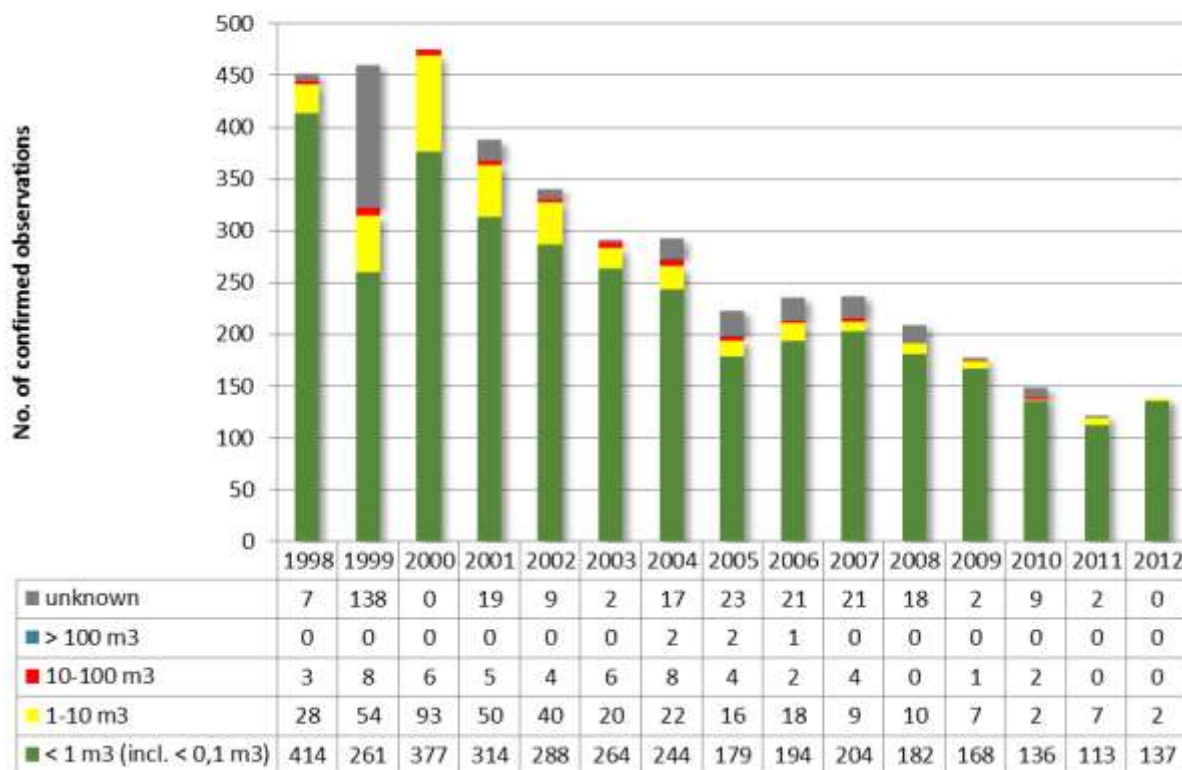
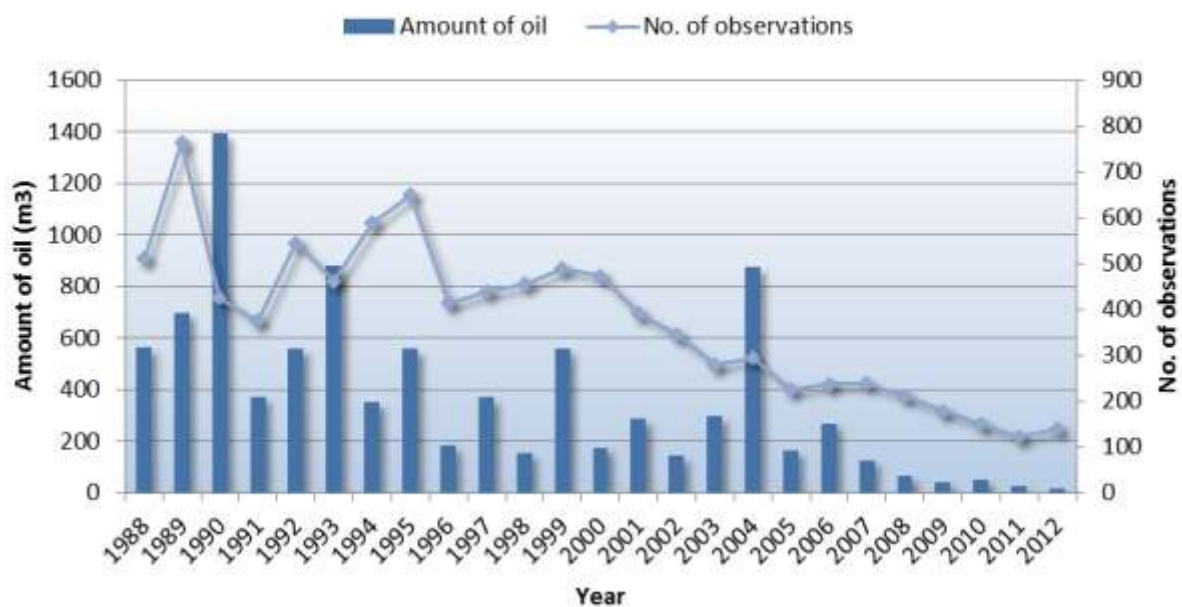


Table 3. Confirmed oil spills in HELCOM countries' waters by size in 2012

Size	Denmark	Estonia	Finland	Germany	Latvia	Lithuania	Poland	Russia	Sweden	Total
< 0,1 m ³	14	0	22	23	0	0	4	0	52	115
0,1-1 m ³	5	8	2	2	0	0	0	0	5	22
1-10 m ³	0	0	0	0	0	0	1	0	1	2
10-100 m ³	0	0	0	0	0	0	0	0	0	0
> 100 m ³	0	0	0	0	0	0	0	0	0	0
unknown	0	0	0	0	0	0	0	0	0	0
Total	19	8	24	25	0	0	5	0	58	139

Figure 8. Total estimated amount of oil detected versus number of observations, 1988-2012



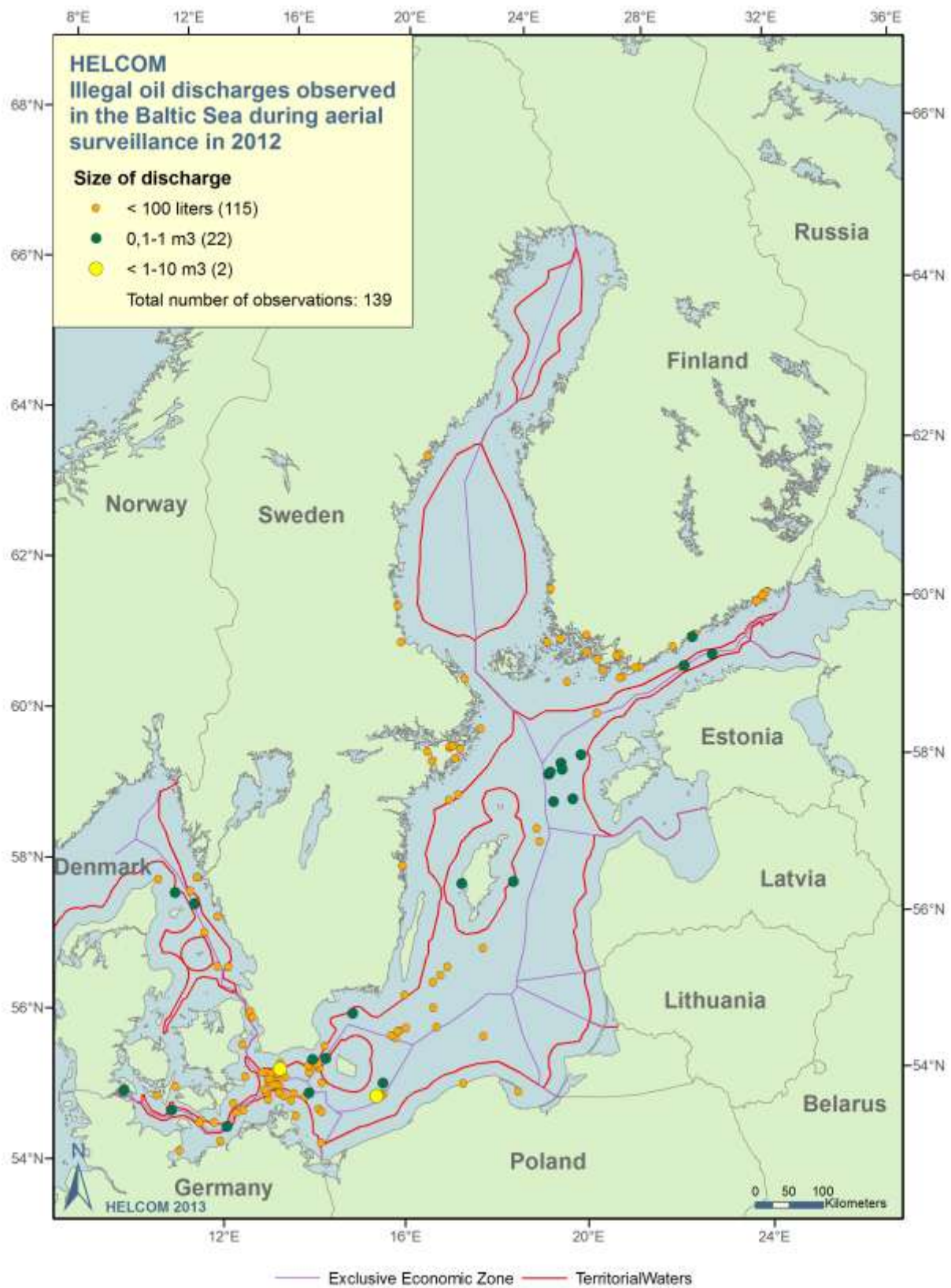


Figure 9. Location of oil spills observed in the Baltic Sea area in 2012 indicated by size.

Table 4. Aerial surveillance data 1988-2012

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
Denmark		292	199	172	153	253	225	275	209	325	416	497	463	412	510	265	251	290	271	246	240	156	188	227
Estonia					40	420	420	305	284	236	268	212	161	153	201	198	178	471	410	503	371	266	315	220
Finland							355	400	355	649	603	660	567	605	615	644	625	517	529	438	351	605	645	631
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
Lithuania			348	78	133			65				250	300			100	54	64	41		66	48	18	
Latvia		400	408	127	24	18	8	8	64	577	320	436	412	387	414	365	384	311	343	298	61		3	4
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
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
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

Number of 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
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
Estonia					18	7	4	3		3	10	33	38	11	8	4	19	24	31	58	46	20	25	14	8
Finland								26	42	104	53	63	89	107	75	40	36	32	29	29	28	16	15	16	24
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
Lithuania				8	34	28																	0	0	0
Latvia			73	20	15	6					33	18	17	6	21	14	13	5	0	2	5	1	1	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
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
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

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
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
flight hours	3491	2624	3453	2438	2500	3198	3553	3474	3680	5002	4833	5230	4837	4864	4946	5434	5637,58	5128	3969	4603	5046	4279	5541	5090
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

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 reports originated through the EMSA CleanSeaNet service within Baltic Coastal States waters.
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.