

HELSINKI COMMISSION

Baltic Marine Environment

Protection Commission



Annual 2011 HELCOM report on illegal discharges observed during aerial surveillance



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 the spill should be 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. This 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 2011 data.

Surveillance activity

In total, 5541 flight hours with fixed-wing aircraft were carried out in 2011 within surveillance activities of the Baltic Sea countries (**Table 1**). This is an increase of 30 % compared to the previous year (4279 flight hours in 2010). The increase in number of reported flight hours in 2011 is due to a fewer number of overhaul works as well as no participation in missions abroad and hence an increase in the surveillance capacity in the Baltic Sea compared to 2010. The number of flight hours in 2011 is close to the record high number of 5638 flight hours in 2005. All countries except for Lithuania and Russia increased the number of flight hours in 2011. In addition, Finland, Lithuania and Russia conducted some aerial surveillance with helicopters. The number flight hours by individual HELCOM countries, in 1989-2011, 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 2011, six countries continued to carry out flights at night (**Figure 2**), which constituted 15 % of all flight hours (12 % in 2010).

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 528 satellite scenes for the users of CleanSeaNet in the Baltic Sea in 2011 (647 in 2010), indicating 182 possible detections (186 in 2010). In the HELCOM area, 40 % (72) of the spill indications were checked and out of these 11 % (8) were confirmed to be mineral oil (15 % in 2010). Satellite surveillance detections provided by EMSA, including confirmed mineral oil, in 2011 is presented in **Table 2**.

Oil spills

Altogether 122 oil spills were observed in 2011 (**Table 1**), which is the lowest number of spills recorded so far. The number of spills in 2011 was 27 less than in 2010 and 56 less than in 2009. 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, has been more widely used. The number of oil spills observed during aerial surveillance activity in individual countries in 1988-2011 is presented in **Figure 3**. Please note that the total number of spills is indicated on the second vertical axis 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. In 2011 the total number of flight hours increased and the number of observed spill decreased which gave to the lowest recorded PF Index (0.022) so far for the whole Baltic Sea (**Figure 4**). **Figure 5** shows the total number of flight hours and observed oil spills in 1988-2011.

Of the total 122 oil discharges detected in 2011, 113 (93 %) were smaller than 1 m³, and of these oil spills as much as 93 were even smaller than 0.1 m³ or 100 liters. None of the spills were estimated to be larger than 5 m³ and the total estimated volume of oil spills observed in 2011 amounted to 24 m³, which is 50 % less than in 2010 (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 2010 by size is depicted in **Figure 9**.

In a vast majority of cases of detected illegal discharges polluters remain unknown. In 2011, out of the total number of confirmed illegal discharges (122), as little as in 11 cases (9 %) the polluters were identified (**Table 1**), two of which were from a wreck. 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 1988-2011, 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 **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 in 2011

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	173,3	15	188,3	64	4	68	17	1	18	3,74	0	2	16	18	
Estonia	263	52	315	22	2	24	14	0	14	12,65	0	0	14	14	
Finland	605	40	645	20	2	22	16	0	16	0,06	0	3	13	16	
Germany	465,6	182,3	647,9	12	2	14	12	1	13	2,59	0	0	13	13	
Latvia	3	0	3	0	0	0	0	0	0	0	0	0	0	0	
Lithuania	18	0	18	0	0	0	0	0	0	0	0	0	0	0	
Poland	486,41	12,4	498,81	9	1	10	4	1	5	1,23	0	0	3	3	Two spills from wreck
Russia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Sweden	2690	535	3225	44	12	56	47	9	56	3,28	0	4	52	56	
Total	4704,31	836,70	5541,01	171	23	194	110	12	122	23,55	0	9	111	120	

Figure 1. Number of flight hours (h) per HELCOM country, 1989-2011

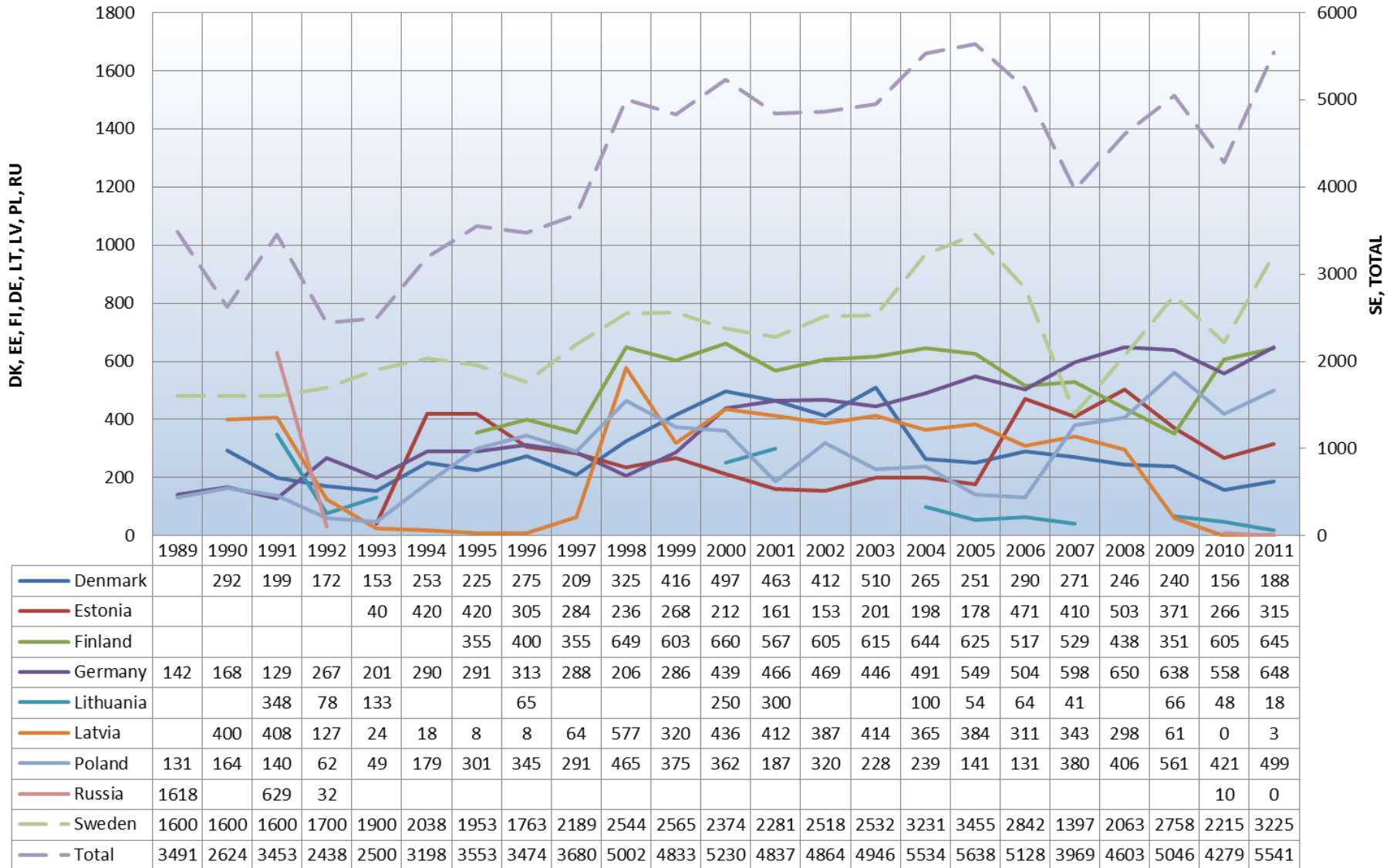


Figure 2. Number of flight hours per country in 2011

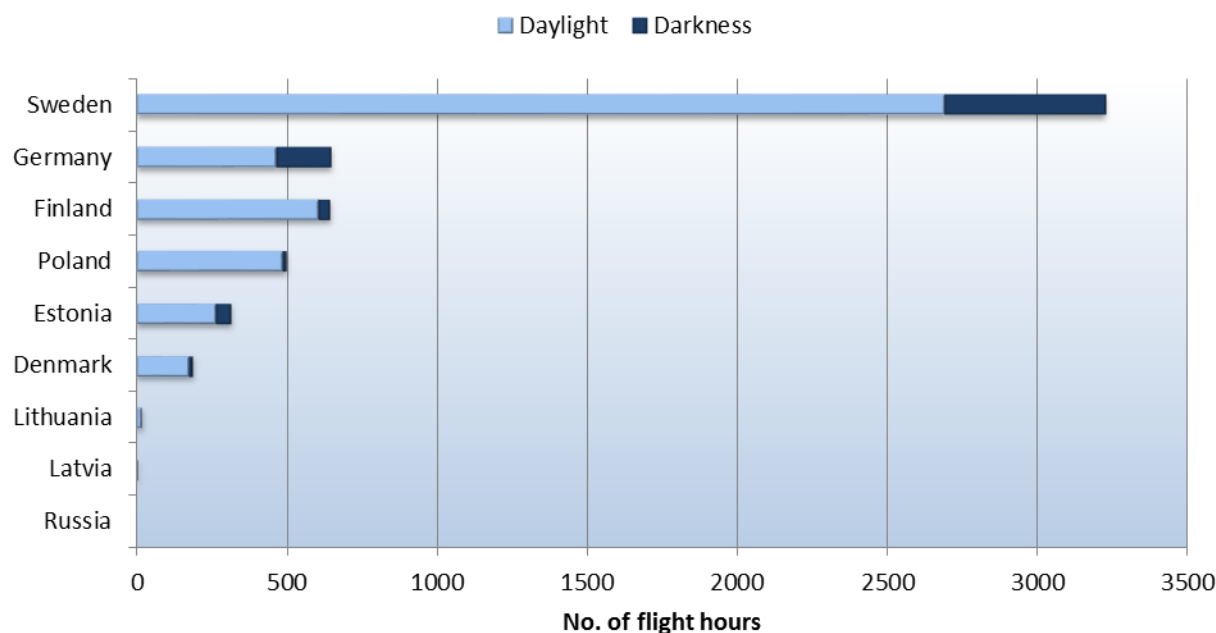


Table 2. Satellite detections of oil spills in HELCOM countries waters provided by EMSA, including verified detections in 2011

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	24	0	0	1	0	5	18
Estonia	20	3	0	0	5	4	8
Finland	9	3	5	0	2	3	0
Germany	7	1	0	0	0	6	0
Latvia	10	0	0	0	0	0	10
Lithuania	2	0	0	0	0	0	2
Poland	32	0	5	5	3	11	8
Russia	8	0	0	0	0	0	8
Sweden	70	1	0	1	2	6	60
Total	182	8	10	7	12	35	110

Disclaimer:

- 1) Feedback relates with the country providing feedback and not with the location of the spill (i.e. if Finland provides feedback for a spill in Estonian waters this is still reported as a Finnish feedback).
- 2) Due to the commission phase of Clean Sea Net V2, that took place during 2011, some feedbacks and detections may have been lost or incorrectly stored in the database.

Figure 3. Number of confirmed oil spills per HELCOM country, 1988-2011

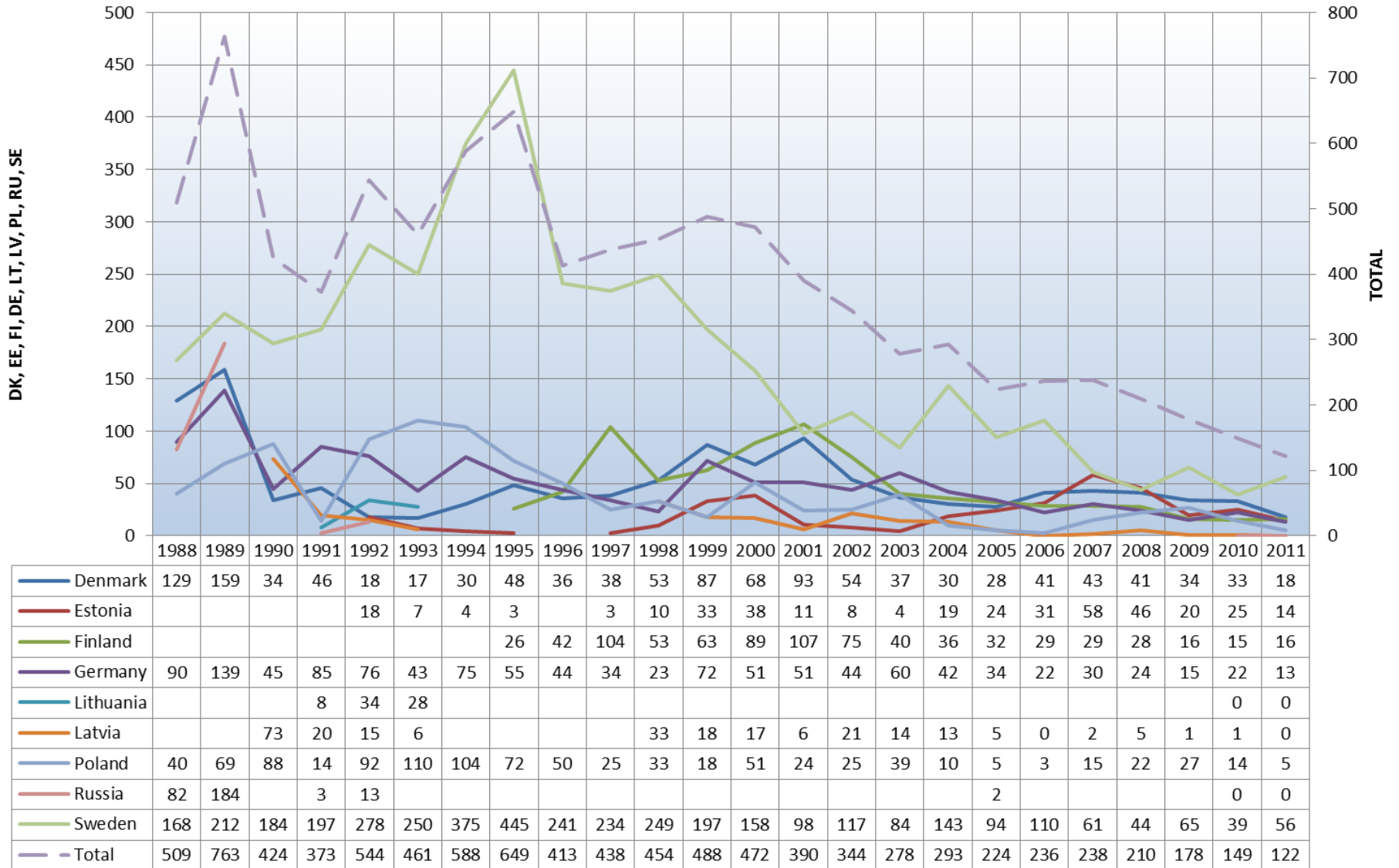


Figure 4. PF Index for the HELCOM area , 1989-2011

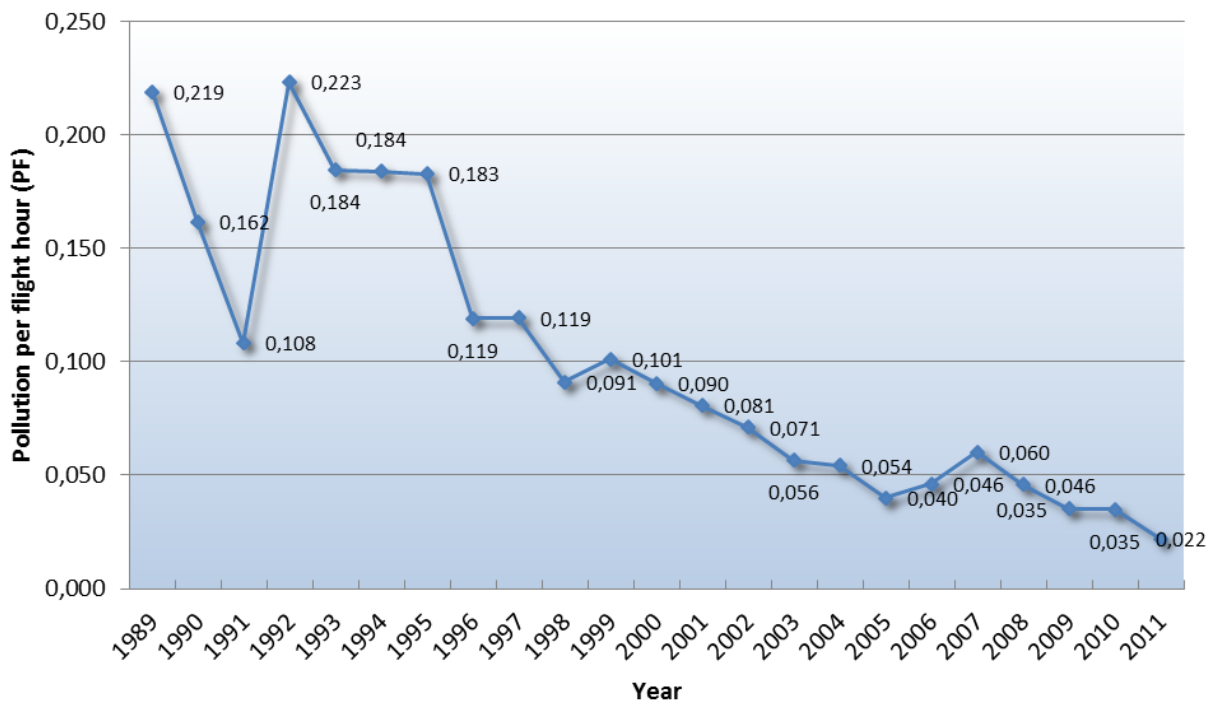


Figure 5. Total number of flight hours and observed oil spills in the HELCOM area during aerial surveillance, 1988-2011

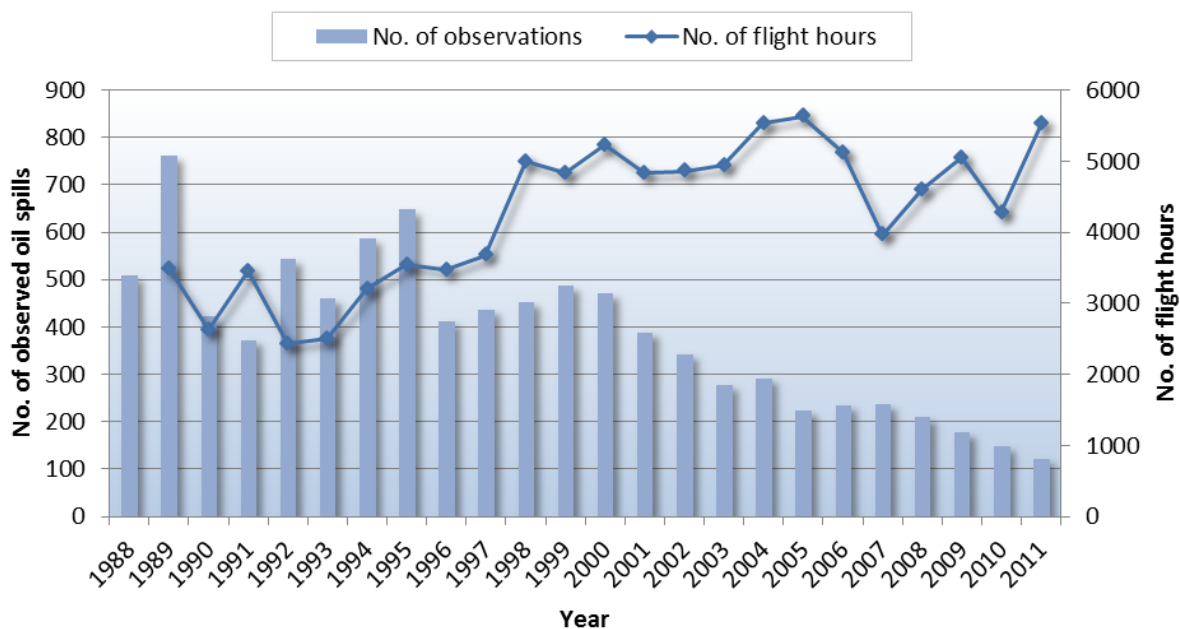
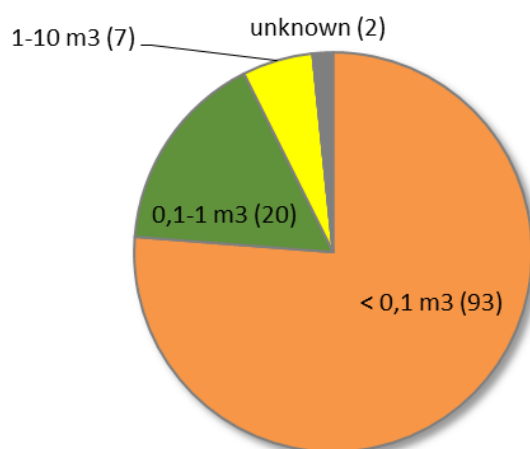
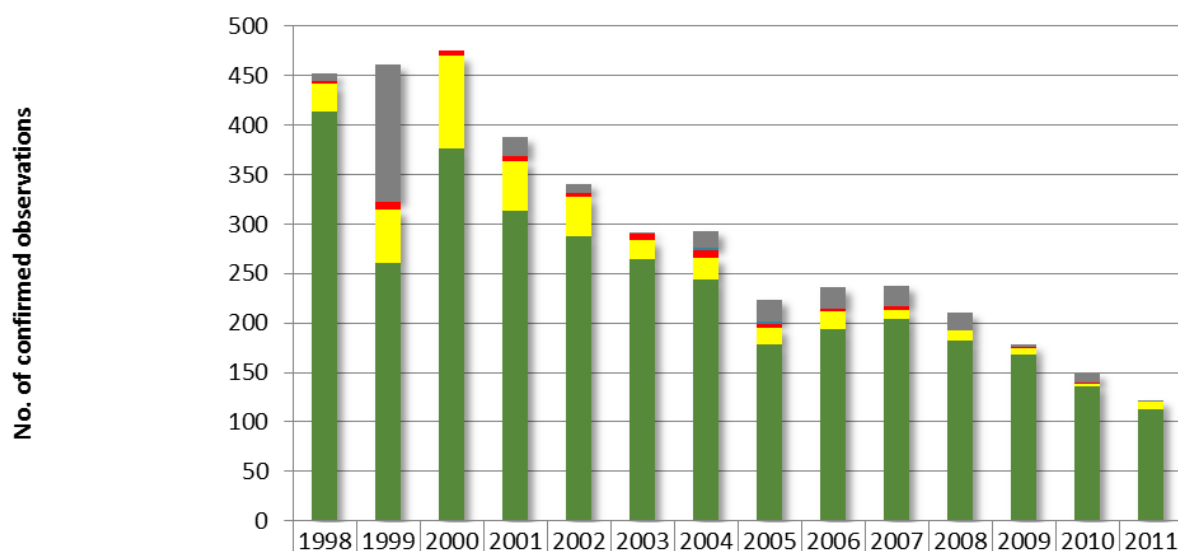


Figure 6. Illegal oil discharges detected in the Baltic Sea during aerial surveillance in 2011, according to size of spill



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

Figure 7. Illegal oil discharges by spill size observed during aerial surveillance in the Baltic Sea, 1998-2011

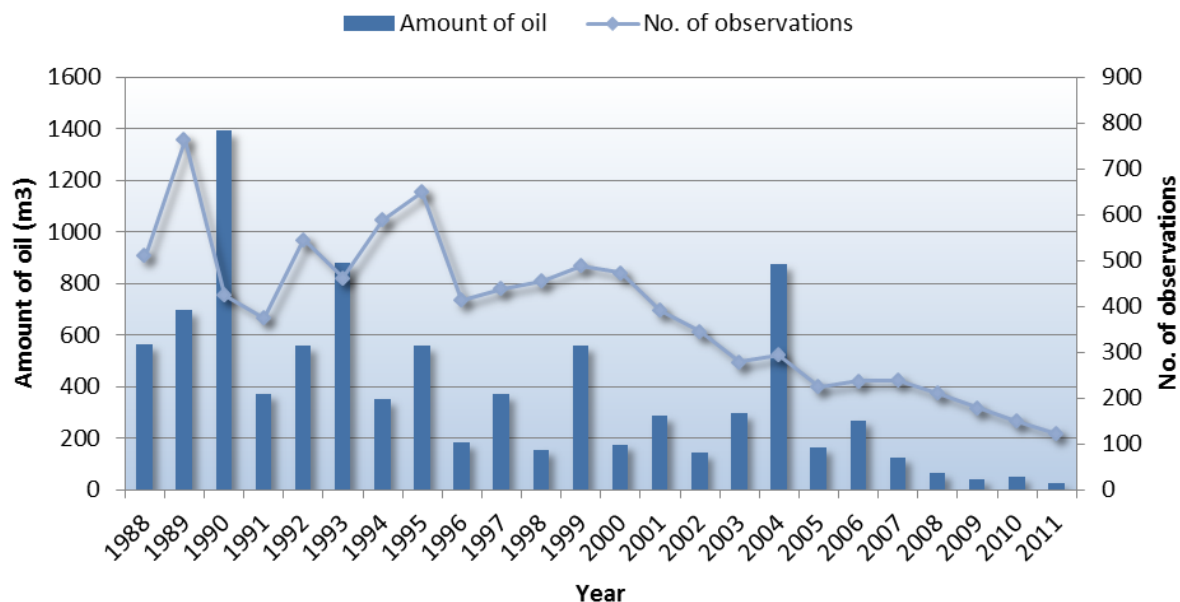


	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
unknown	7	138	0	19	9	2	17	23	21	21	18	2	9	2
> 100 m3	0	0	0	0	0	0	2	2	1	0	0	0	0	0
10-100 m3	3	8	6	5	4	6	8	4	2	4	0	1	2	0
1-10 m3	28	54	93	50	40	20	22	16	18	9	10	7	2	7
< 1 m3 (incl. < 0,1 m3)	414	261	377	314	288	264	244	179	194	204	182	168	136	113

Table 3. Confirmed oil spills in HELCOM countries' waters by size in 2011

Size	Denmark	Estonia	Finland	Germany	Latvia	Lithuania	Poland	Russia	Sweden	Total
< 0,1 m ³	13	5	15	7	0	0	4	0	49	93
0,1-1 m ³	4	5	1	3	0	0	0	0	7	20
1-10 m ³	1	4	0	1	0	0	1	0	0	7
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	2	0	0	0	0	0	2
Total	18	14	16	13	0	0	5	0	56	122

Figure 8. Total estimated amount of oil detected versus number of observations, 1988-2011



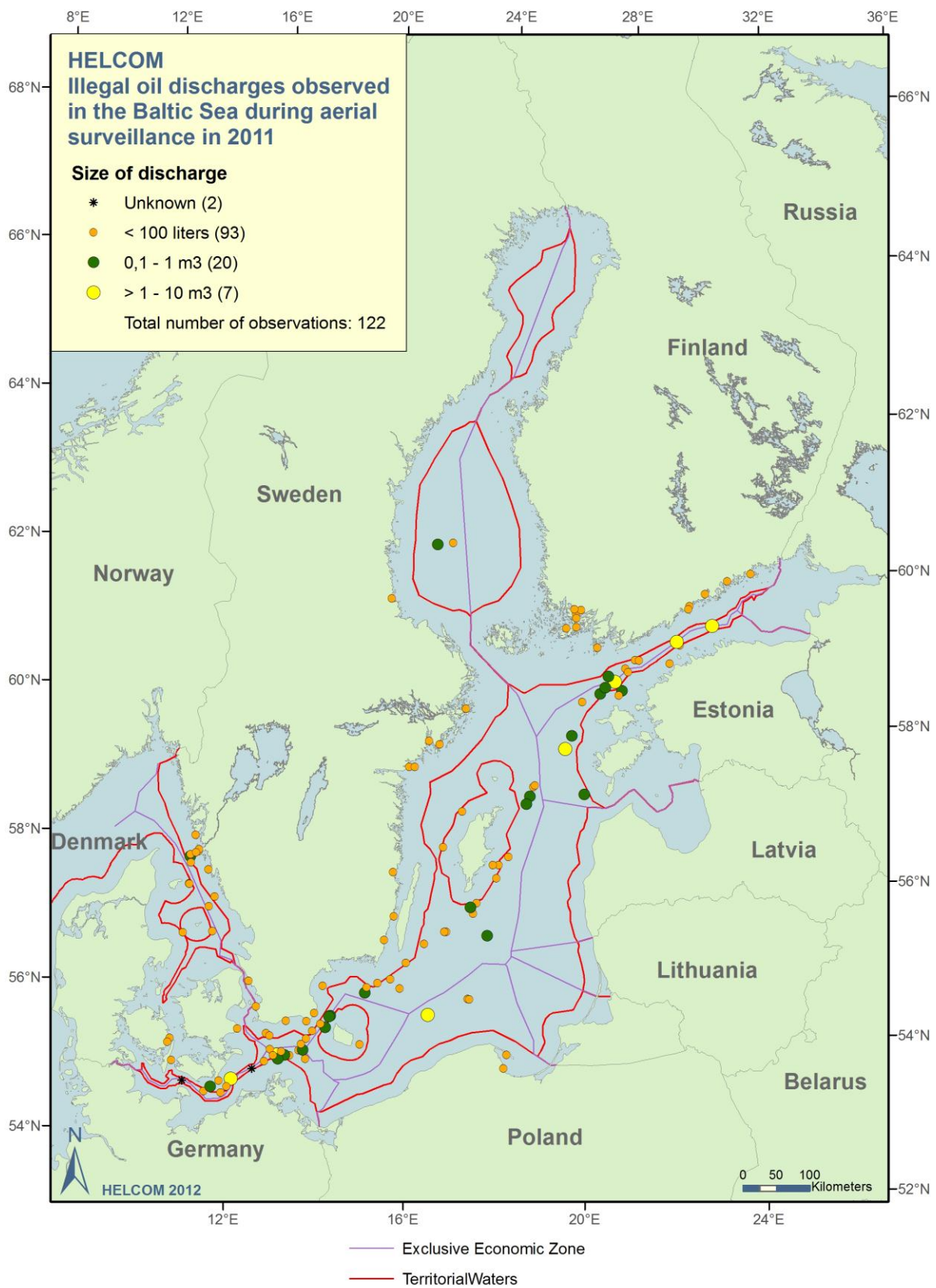


Figure 9. Location of oil spills observed in the Baltic Sea area in 2011 indicated by size.

Table 4. Aerial surveillance data 1988-2011

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
Denmark		292	199	172	153	253	225	275	209	325	416	497	463	412	510	265	251	290	271	246	240	156	188
Estonia					40	420	420	305	284	236	268	212	161	153	201	198	178	471	410	503	371	266	315
Finland							355	400	355	649	603	660	567	605	615	644	625	517	529	438	351	605	645
Germany	142	168	129	267	201	290	291	313	288	206	286	439	466	469	446	491	549	504	598	650	638	558	648
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	0	3
Poland	131	164	140	62	49	179	301	345	291	465	375	362	187	320	228	239	141	131	380	406	561	421	499
Russia	1618		629	32																		10	0
Sweden	1600	1600	1600	1700	1900	2038	1953	1763	2189	2544	2565	2374	2281	2518	2532	3231	3455	2842	1397	2063	2758	2215	3225
Total	3491	2624	3453	2438	2500	3198	3553	3474	3680	5002	4833	5230	4837	4864	4946	5534	5638	5128	3969	4603	5046	4279	5541

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
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
Estonia					18	7	4	3		3	10	33	38	11	8	4	19	24	31	58	46	20	25	14
Finland								26	42	104	53	63	89	107	75	40	36	32	29	29	28	16	15	16
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
Lithuania				8	34	28																	0	0
Latvia			73	20	15	6					33	18	17	6	21	14	13	5	0	2	5	1	1	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
Russia	82	184		3	13													2					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
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

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
Observations	763	424	373	544	461	588	649	413	438	454	488	472	390	344	278	293	224	236	238	210	178	149	122
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
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

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.