Bonn Agreement
Accord de Bonn

Bonn Agreement Aerial Surveillance Programme

Annual report on aerial surveillance for 2016

CONTENTS

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Introduction

1. The nine countries bordering the North Sea work together within the Bonn Agreement to undertake aerial surveillance using specially equipped aircraft and specialised personnel to detect spills of oil and other harmful substances and enforce international environmental regulations.

2. The North West European Waters – the main part of which is formed by the North Sea – have been declared a Special Area by the International Maritime Organization for the purpose of MARPOL Annex I (Oil). This took effect on 1 August 1999, from which date the discharge of all oily wastes at sea in the Special Area is prohibited. This report demonstrates the effectiveness of cooperation in aerial surveillance among North Sea countries and their collective effort to detect marine pollution.

3. This report presents the results of aerial surveillance operations undertaken as a collective effort under the Bonn Agreement. In addition to national flights carried out under the Bonn Agreement in their own parts of the maritime area and other aerial surveillance undertaken for national purposes, the Bonn Agreement countries also coordinate flights of the following types:

   a. *Tour d'Horizon* (TdH) flights - monthly flights carried out by countries in turn to survey the offshore area of the North Sea where offshore oil and gas activities take place;

   b. *Coordinated Extended Pollution Control Operations* (CEPCO), where some neighbouring countries cooperate to survey intensively an area with high traffic density during a relatively short period (e.g. 24 hours). Contracting Parties may also decide to organise a so called "Super CEPCO" where Bonn Agreement Contracting Parties, often together with countries from neighbouring regions, cooperate in the surveillance of a specific area over a period of up to 10 days.

4. This report compiles, in Tables 1 - 4, data for all the surveillance undertaken for Bonn Agreement purposes. These tables are based on data related to the number of flight hours, the number of spills and their estimated volume. This report differs from those for 2000-2002 in that the data on the number of oil spills was related in those reports to the geographical coverage of the surveillance by side-looking airborne radar (SLAR). Following the revision of the reporting format by BONN 2003, this is no longer the case. In the 2008 reporting round a draft revised reporting format has been used which was then harmonised with the Helsinki Commission. OTSOPA 2013 agreed to update the reporting format to include data on confirmed detections/observations of "other substances" and "unknowns", as Contracting Parties had identified increasing numbers of these types of spills.

5. Finally, for the first time data have been added on sulphur emission monitoring flights, performed in the North Sea SECA by some Contracting Parties in the framework of a European pilot project on MARPOL Annex VI enforcement, called CompMon (see para.17.). This type of aerial surveillance concerns a new demand for service.

Commentary

6. The results of the follow-up of "identified polluters" (see Tables 1 and 3) are not included in this report since it may take a year or more to obtain the outcome of court or administrative proceedings in the country responsible for such proceedings (acting as flag state, coastal state or port state). In cooperation with the North Sea Network of Investigators and Prosecutors (NSN) the Bonn Agreement has published the North Sea Manual on Maritime Oil Pollution Offences providing detailed information *inter alia* on the legal and organisational framework, national laws of North Sea states and technical and operational means of securing evidence.

7. For most of the detections observed/confirmed as oil slicks or other substances, the source of the slick (i.e. the polluter) has not been identified. Most visible slicks, however, come from shipping and offshore installations.

8. A summary report on the EU-EMSA CleanSeaNet Service that supports Bonn Agreement Contracting Parties with satellite images is at Appenix 2. The report presents CleanSeaNet data for the North Sea for the period 1 January 2015 – 31 December 2016.

9. This report includes estimates of the total amounts of oil discharged based on the aerial surveillance data. These oil volume estimates have been obtained by means of a simple addition of the estimated (minimum)[1] volumes of the various mineral oil slicks detected/observed at the sea surface for a given year, per type of flight and per country. These estimates use the Bonn Agreement Colour Code until 2003 and from 2004 use its replacement, the more scientifically underpinned Bonn Agreement Oil Appearance Code (BAOAC), as the standard oil volume estimation method. The use of the BAOAC (just like the older Bonn Agreement colour code) results in a best estimate of the amount of oil detected on the sea surface within a reliable order of magnitude. It leads to a minimum and maximum estimated quantity, which basically reflects the respective use of the minimum and maximum oil layer thicknesses defined for each oil appearance. More detailed information on the BAOAC, the oil slick appearances and the use of the code can be found in the Bonn Agreement Aerial Operations Handbook and the BAOAC Photo Atlas.

10. However, as only limited aerial surveillance is conducted, it can be concluded that there is the potential for other incidents of oil in the sea not being detected over the course of any one year. Moreover, oil slicks are often detected with no known source, and already weathered to a certain degree, thus the amount estimated may be less than originally discharged. The Contracting Parties to the Bonn Agreement therefore consider the aerial surveillance data currently available to be too sparse and too diverse to allow for a reliable overall annual estimation of oil inputs in the entire Bonn Agreement area and that such estimates should be interpreted as indicative only.

11. The quantities of oil discharged into the North Sea by the offshore industry are reported to the OSPAR Commission by the countries under whose jurisdiction offshore oil extraction takes place (the total quantity of oil discharged from the offshore oil and gas industry into the OSPAR maritime area through discharges and spillages of oil in 2014 was 4 001 tonnes. There are at present no equivalent reliable figures for the amount of oil input to the North Sea from land-based sources or from shipping.

12. In 2016 Contracting Parties observed 65 mineral oil slicks in the Bonn Agreement area and for all of these, volumes were estimated (as outlined in table 5). Figure 1 shows the percentage of slicks subdivided into different size categories.

[1] As agreed within the Bonn Agreement, the minimum oil volumes should preferably be used for enforcement and statistical purposes, whereas the maximum oil volumes should preferably be used in the context of oil pollution response.

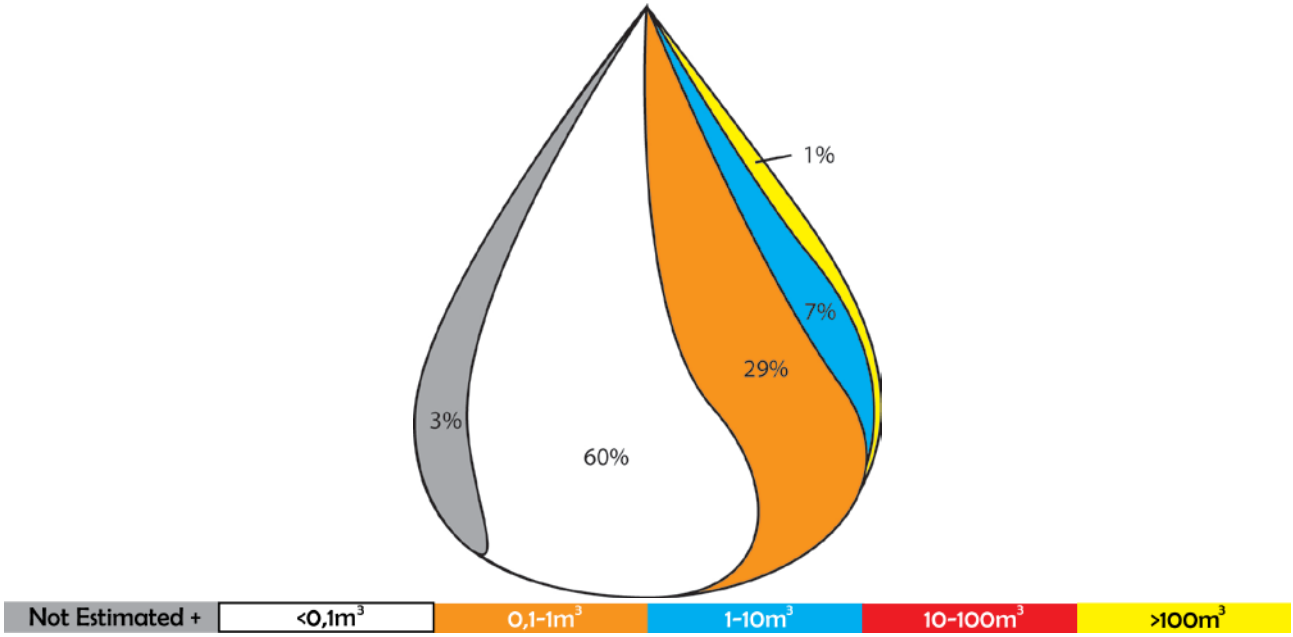


Figure 1: Percentage of mineral oil slicks in size categories observed in the Bonn Agreement area in 2016

13. Detections of other substances (including HNS) and unknown detections have also been reported as part of the annual aerial surveillance reporting. This has been included as national evidence and has pointed to an increase in spills of other substances and therefore it was agreed that this should be tracked at a regional level. In 2016 there were 61 detections of other substances and 188 detections of unknown substances. These have been outlined in Figure 5 (Map) and are mainly in the areas of highest shipping density.

14. An overview of the locations of oil slicks observed during 2016 is given in Figure 3 (Map). A common HELCOM / Bonn Agreement map showing the location of oil slicks observed by aerial surveillance and their estimated minimum volumes in the Baltic Sea and North Sea areas in 2016 is given in Figure 3. An overview of slicks observed during Bonn Agreement aerial surveillance activities during 2016 categorised by spill type is given in Figure 4. A common HELCOM/Bonn Agreement map showing spills observed in 2016 categorised by spill type (oil, other substance and unknown) is given in Figure 5. When examining Figures 3, 4, 5 and 6, the reader should take account of the following:

a. the density of ship traffic, and thus the associated likelihood of observing slicks, are highest in the traffic corridor along the south-eastern shore of the Bonn Agreement area;

b. Contracting Parties' flight hours reported in Table 1 are mostly spent surveying the national zones of interest, which in most cases correspond with the national EEZ or continental shelf areas. There are large differences in the sizes of these zones of interest and the respective total numbers of hours spent surveying them. This implies that the relative frequency with which areas are visited – and thus the potential density of the observations – varies significantly between Contracting Parties.

15. The format of the report's tables 1 – 4 was modified in 2000, 2003, 2013 and 2014. The 2000 to 2002 data reflects the relation of the observation with SLAR coverage through the concept of 'BA flight hour' (i.e. one hour of airborne remote sensing over the sea at a standardised speed of 335 km per hour). As a result of this revision of the reporting format in 2000, the flight hour data up to 1999 are absolute numbers and from 2000 to 2002 the flight hour data are standardised on SLAR-coverage, i.e. corrected for relative aircraft speed. For the countries for which the average aircraft speed is significantly different from the standard speed (e.g. Belgium and UK) the data up to 1999 and from 2000 will not be comparable. As a result of a new revision of the reporting format in 2003, from 2003 onwards, the data are again absolute

numbers. In 2013 the format was updated to include data on confirmed detections/observations of "other substances" and "unknowns", as Contracting Parties had identified increasing numbers of these types of spills and agreed to collect this data for the 2012 report.

16. Figures 7, 8 and 9 outline the number of flight hours per country, the number of mineral oil slicks observed per country and the ratio of flight hours to mineral oil slicks. The ratio of slicks to flying hours has reduced again from 2015.

17. Figure 10 relates to the new additional data on other substances and unknowns, which has been collected at the regional level since 2012. It outlines the number of spills confirmed observed as mineral oil and other substances and those that could not be identified as unknown, broken down by country. Contracting Parties will continue to gather this information in future years to identify trends in spills other than mineral oil.

18. Three Bonn Agreement Contracting Parties (Belgium, Denmark and The Netherlands) participating as partners in the European CompMon project[2] (2015-2016), *inter alia* performed airborne compliance monitoring of fuel sulphur content through exhaust gases in the North Sea SECA[3]. They hereby voluntary piloted effective targeting of ships for the enforcement of IMO Marpol Annex VI, using SOx sniffer sensors on board of aircraft, with the aim to increase the efficiency of on-board inspections in port. These aerial monitoring efforts gave the following results: (i) More than 2000 vessels have been monitored in the North Sea SECA area; (ii) most (~90%) were compliant, but in general ca.10% was found non-compliant; (iii) more non-compliancy was observed further offshore, indicating that there is an adaptive behaviour by a significant number of ships that shift fuel when approaching a port or estuary; (iv) a further increase of 5-10% in non-compliance was also observed near SECA borders.

19. In 2016, 338 flight hours of pollution surveillance were performed in the Spanish waters of the Bay of Biscay As a result, 29 spills were detected, 12 confirmed as mineral oil, 7 as other substances and 11 unknowns. All slicks were in the size-categories (<1m3) except one, just above 1m3. These detectios didn't require combat response operations. Among these slicks, four red-handed vessels were identified.

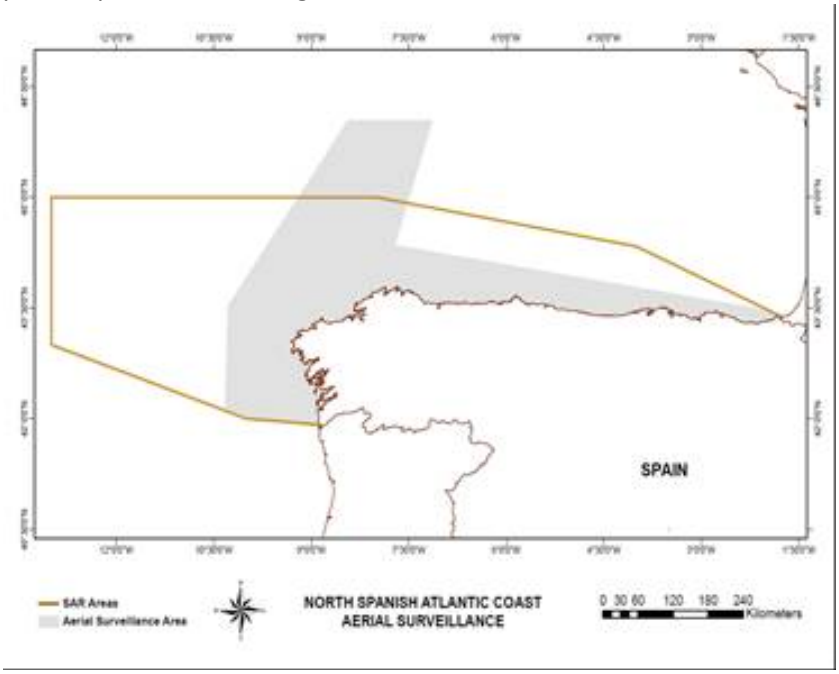


Figure 2: Spanish aerial Surveillance area, Bay of Biscay

[2] http://compmon.eu/
[3] Sulphur Emission Control Area

Table 1. Summary of data relating to National Flights during 2016,

Country	No. of flight hours			No. of detections inside national EEZ			Detections confirmed / observed as mineral oil spills			No. of polluters (mineral oil)				Estimated volume (m^3)	Detections confirmed /observed as other substances	No. of polluters (other substances)				Unknown detections	No. of polluters (unknown detections)				Remarks
	Daylight	Darkness	Total	Daylight	Darkness	Total	Daylight	Darkness	Total	Rigs	Ships	Other	Unknown			Rigs	Ships	Other	Unknown		Rigs	Ships	Other	Unknown	
Belgium	254:30	18:30	273:00	6	0	7	2	0	3	0	3	0	0	2.13	2	0	2	0	0	2	0	2	0	0	
Denmark	151:52	8:54	160:46	56	1	57	24	1	25	20	0	0	5	13.96	20	3	1	0	16	12	0	0	0	12	
France	896:00	10:00	906:00	4	0	4	2	0	2	0	2	0	0	0.06	2	0	2	0	0	0	0	0	0	0	
Germany	605:32	278:50	884:22	27	11	38	10	1	11	0	1	0	10	8.01	9	0	0	0	9	18	0	0	0	18	
Ireland	683:00	0:00	683:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Netherlands	859:54	209:51	1069:45	173	15	188	15	1	16	1	5	0	9	6.18	28	0	13	0	15	145	2	10	0	133	
Norway	293:00	0:30	293:30	18	0	18	17	0	17	4	6	0	8	0.45	0	0	0	0	0	0	0	0	0	0	
Sweden	227:31	12:53	240:24	13	6	19	8	0	8	0	0	0	0	0.29	0	0	0	0	0	11	0	0	0	1	
UK*	92:00	0:00	92:00	4	0	4	4	0	4	2	1	0	1	174.38	0	0	0	0	0	0	0	0	0	0	
Total	**4063:19**	**539:28**	**4602:47**	**301**	**33**	**335**	**82**	**3**	**86**					**205.46**	**61**					**188**					

Note for Table 1:

- One of the oil spill detections in Belgium's data, the oil spill of > $1m^3$, is accidental oil pollution coming from the Flinterstar wreck. It is in fact a merging of 23 consecutive minor accidental oil slicks found at the wreck between Jan. 1st and Sept. 5th (end of the wreck removal operations).
- Besides the 7 detections made inside the waters of Belgium, the Belgian aircraft also made 7 spill detections outside its waters in the Quadripartite zone of joint responsibility (4 in UK, 3 in FR waters), and 1 detection in SE waters during a transit flight. These spill detections have been reported to these respective countries and included in their national detection data for 2016.
- The UK is Investigating an incident at the Clair Platform, which resulted in a release of up to an estimated 95mt of crude oil, as a result of production process instability. There was no shoreline impact, all the oil dispersed naturally.

Table 2: Summary of data related to satellite detections in 2016

Country	Satellite detections					
	Detected	Confirmed mineral oil	Confirmed other substances	Confirmed "unknown" spills	Confirmed natural phenomena	Nothing found
Belgium	4		1			2
Denmark	145	4	21		5	87
France	17		1			4
Germany	52	1	14	3	8	3
Ireland	12	1				11
Netherlands	66		12			50
Norway	143	75	1		2	
Sweden	26		6	1		17
UK	476	10	13	14	6	143
Total	**941**	**91**	**69**	**6**	**21**	**317**

Confirmed oil spills in this table are in addition to those in Table 1. Note that the confirmed mineral oil detections are not always confirmed by remote sensing aircraft and can be confirmed by other means.

Table 3. Summary of data relating to Co-ordinated Extended Pollution Control Operations (CEPCO) flights during 2016

Country	No. of flights	No. of flight hours			No. of detections			Detections confirmed / observed as mineral oil spills			No. of polluters (mineral oil)				Estimated volume (m^3)	Detections confirmed/ observed as other substances	No. of polluters (other substances)				Unknown Detections	No. of polluters (unknown detections)			
		Daylight	Darkness	Sum	Daylight	Darkness	Sum	Daylight	Darkness	Sum	Rigs	Ships	Other	Unknown			Rigs	Ships	Other	Unknown		Rigs	Ships	Other	Unknown
Belgium	0	0:00	0:00	0:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Denmark	0	2:50	3:15	6:05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
France	0	0:00	0:00	0:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Germany	0	0:00	0:00	0:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ireland	0	0:00	0:00	0:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Netherlands	0	35:15	10:25	45:40	11	6	17	0	0	0	0	0	0	1	0.07	5	0	0	0	5	11	0	0	0	11
Norway	0	6:30	0:00	6:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sweden	0	0:00	0:00	0:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
UK	0	0:00	0:00	0:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**0**	**44:35**	**13:40**	**58:15**	**11**	**6**	**17**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0.07**	**5**	**0**	**0**	**0**	**5**	**11**	**0**	**0**	**0**	**11**

Table 4. Summary of data relating to Tour d'Horizon (TdH) flights during 2016

Country	No. of flights	No. of flight hours			No. of detections in TdH area			No. of polluters (mineral oil)				Estimated volume (m^3)	Detections confirmed/observed as other substances	No. of polluters (other substances)				Unknown detections	No. of polluters (unknown detections)			
		Daylight	Darkness	Total	Daylight	Darkness	Total	Rigs	Ships	Other	Unknown			Rigs	Ships	Other	Unknown		Rigs	Ships	Other	Unknown
Belgium																						
Denmark	3	9:21	0:04	9:25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
France																						
Germany	4	15:15	0:00	15:15	1	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
Ireland																						
Netherlands	6	16:10	0:00	16:10	4	0	4	4	0	0	0	2.73	0	0	0	0	0	0	0	0	0	0
Norway	3	12:00	0:00	12:00	2	0	2	2	0	0	0	0.01	0	0	0	0	0	0	0	0	0	0
Sweden	4	15:10	0:00	15:10	10	0	10	5	0	0	5	2.02	4	0	0	0	4	1	0	0	0	1
UK	4	18:45	0:00	18:45	3	0	3	3	0	0	0	3.08	0	0	0	0	0	0	0	0	0	0
Total	**24**	**86:41**	**0:04**	**86:45**	**20**	**0**	**20**	**14**	**0**	**0**	**5**	**7.83**	**5**	**1**	**0**	**0**	**4**	**1**	**0**	**0**	**0**	**1**

Table 5. Distribution of the estimated sizes of confirmed/observed oil slicks

Country	Not quantified	Category 1: <0,1m^3	Category 2: 0,1-1 m^3	Category 3: 1–10 m^3	Category 4: 10–100 m^3	Category 5: >100m^3	Number of Slicks	Number of quantified Slicks	%
Belgium	2			1			3	1	**3.45**
Denmark		12	11	2			25	25	**28.74**
France		2					2	2	**2.30**
Germany		4	5	2			11	11	**12.64**
Ireland									**0.00**
Netherlands		10	5	1			16	16	**18.39**
Norway		16	2				18	18	**20.69**
Sweden	1	6	1				8	7	**9.20**
UK		2	1			1	4	4	**4.60**
Total	**3**	**52**	**25**	**6**	**0**	**1**	**87**	**84**	**100**
%	**3.45**	**59.77**	**28.74**	**6.90**	**0.00**	**1.15**	**100.00**		

Figure 3: Overview of slicks observed during Bonn Agreement aerial surveillance activities during 2016

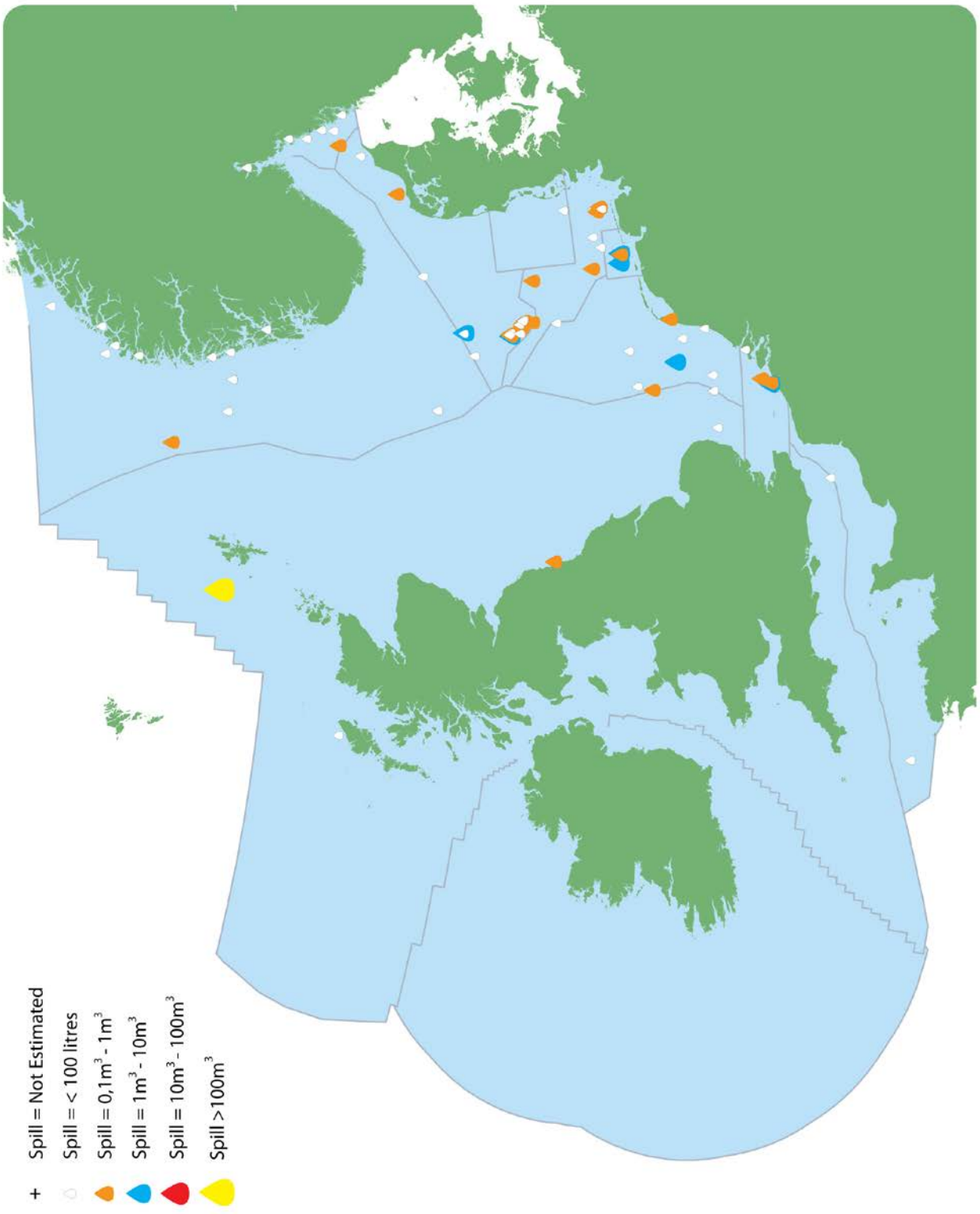


Figure 4: Common HELCOM / Bonn Agreement map showing the location of oil spills confirmed/observed by aerial surveillance within the Baltic Sea and North Sea areas in 2016

Awaiting data from HELCOM

Figure 5: Overview of slicks observed during Bonn Agreement aerial surveillance activities during 2016 categorised by spill type

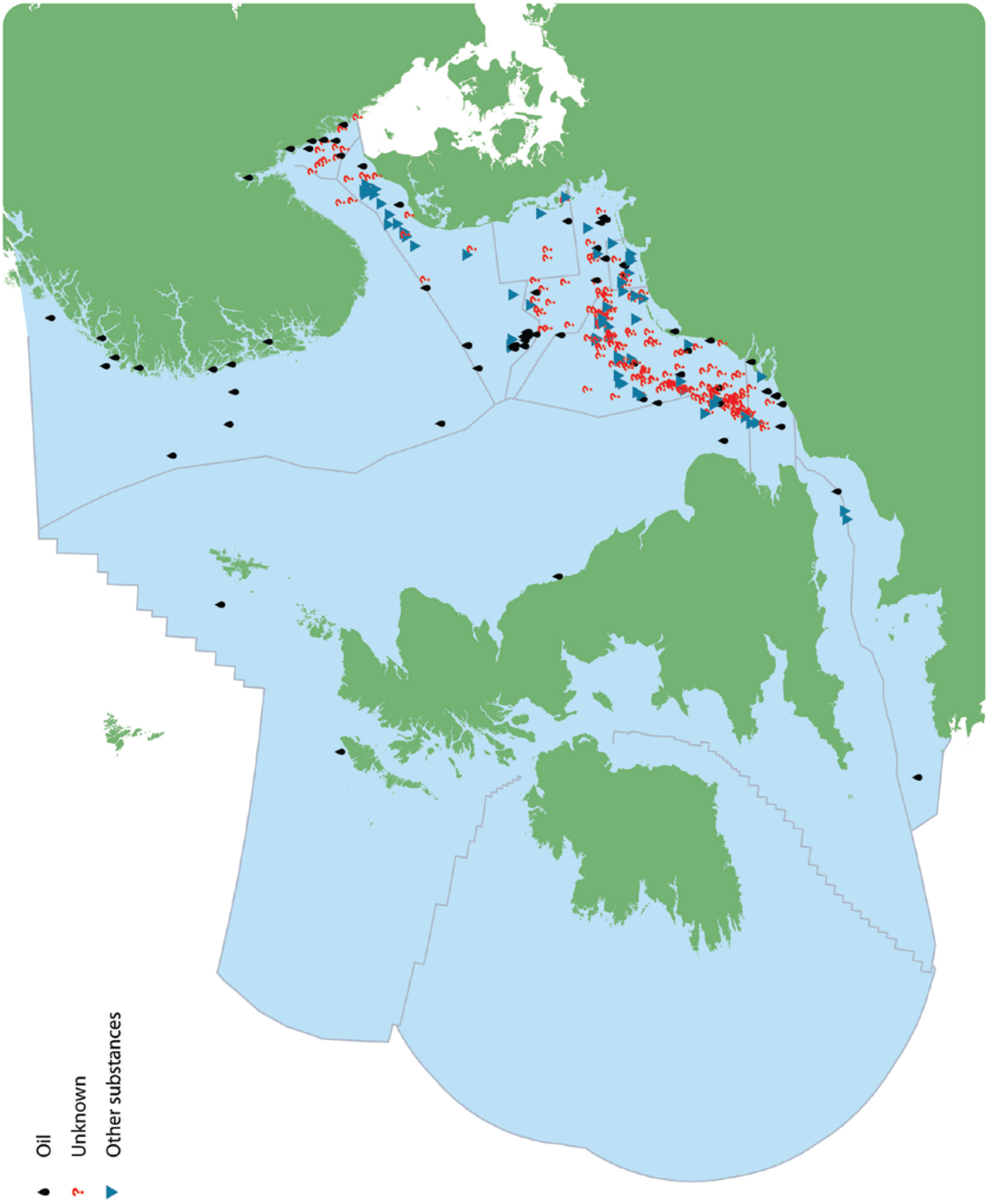


Figure 6: Common HELCOM / Bonn Agreement map showing slicks observed during HELCOM/Bonn Agreement aerial surveillance activities during 2016 categorised by spill type

Awaiting data from HELCOM

Figure 7: Number of flight hours per country 1990 – 2016

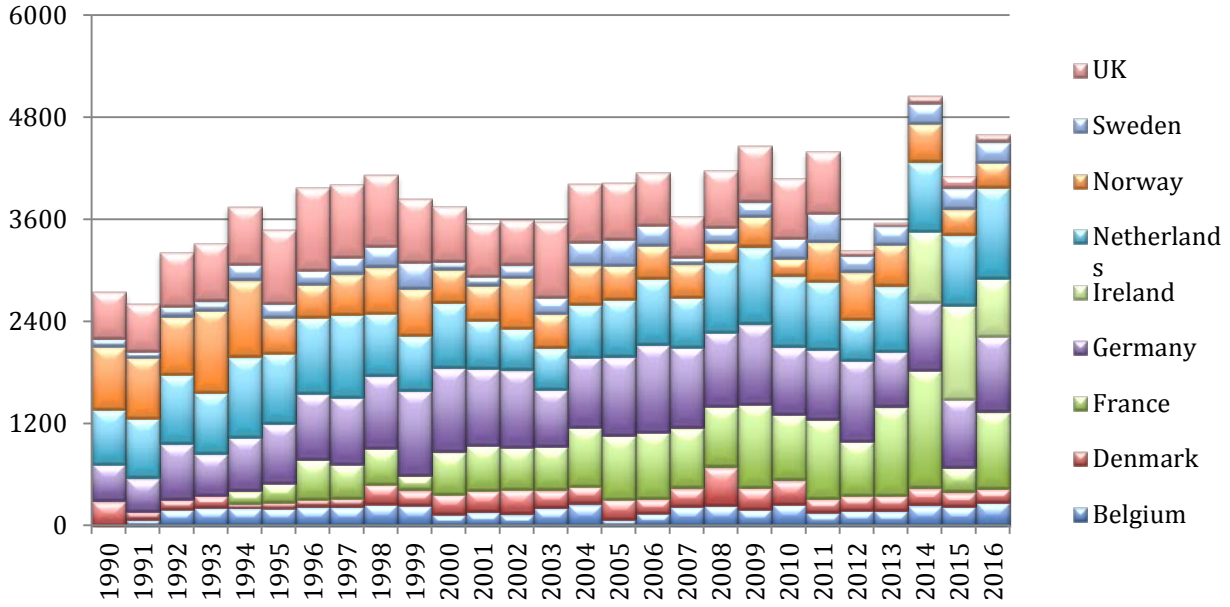


Figure 8: Number of slicks observed 1990 – 2016

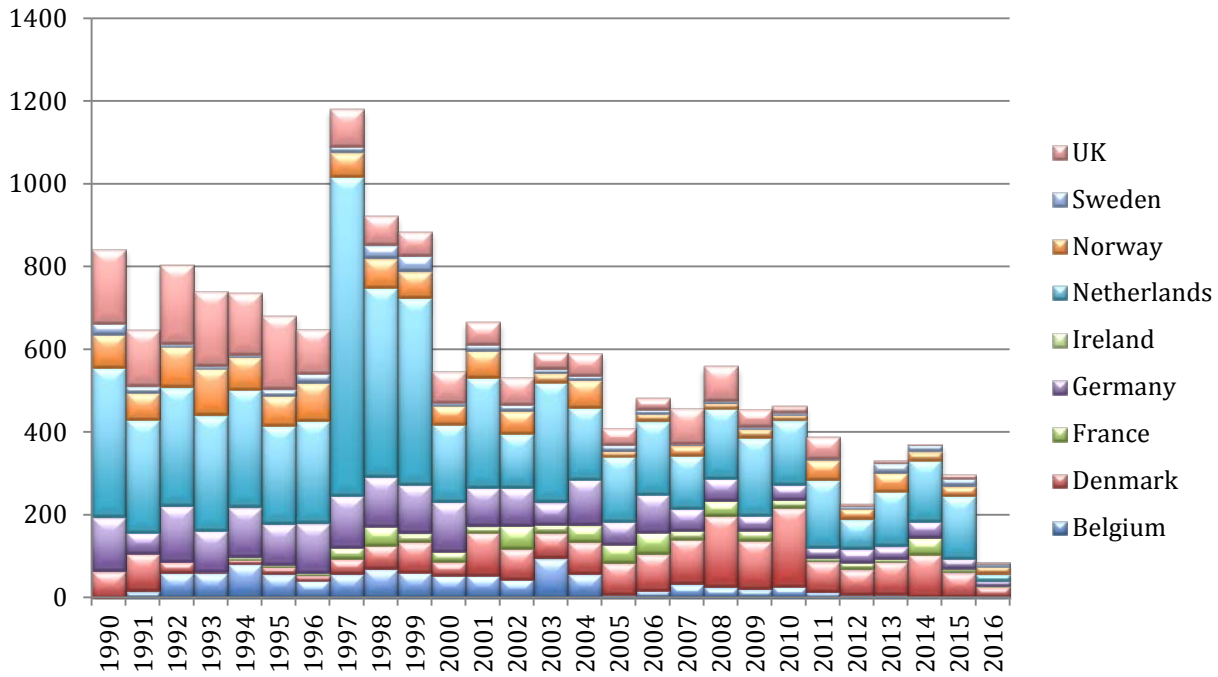


Figure 9: Total numbers: all flight hours and all observed slicks 1986 – 2016 and their ratio

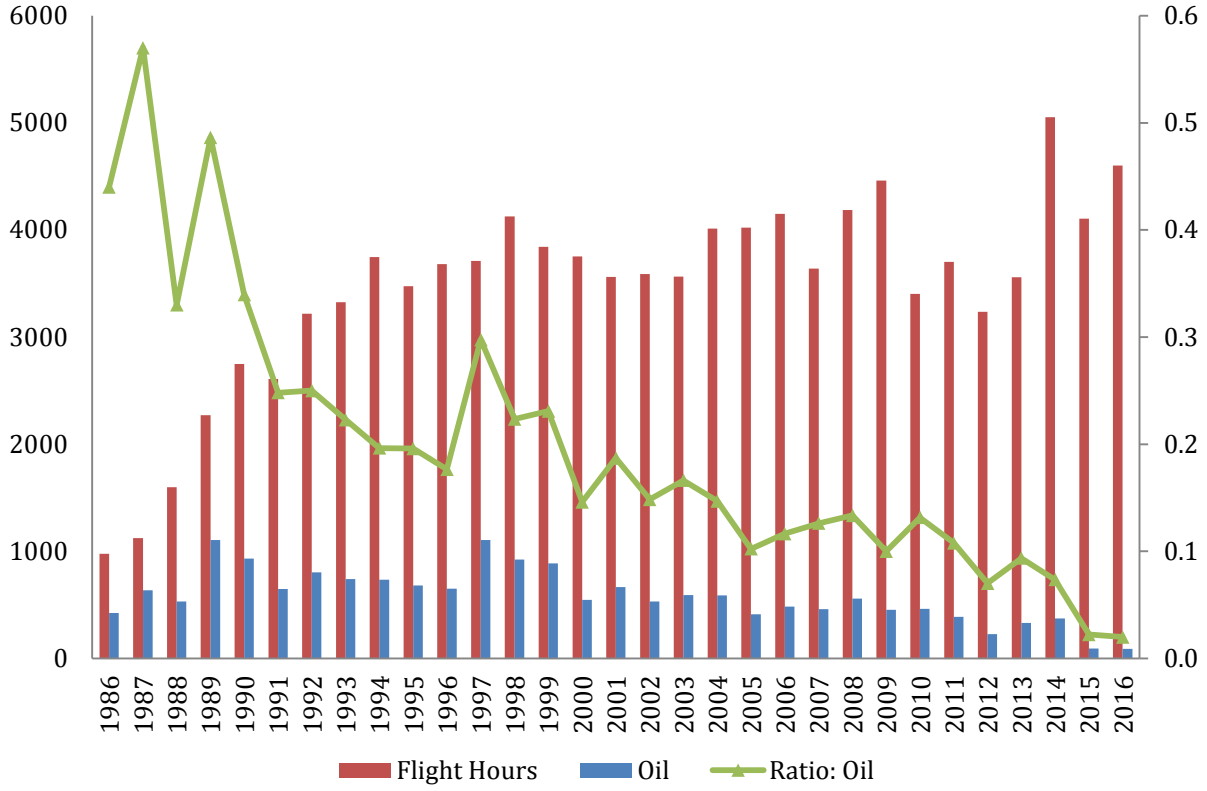
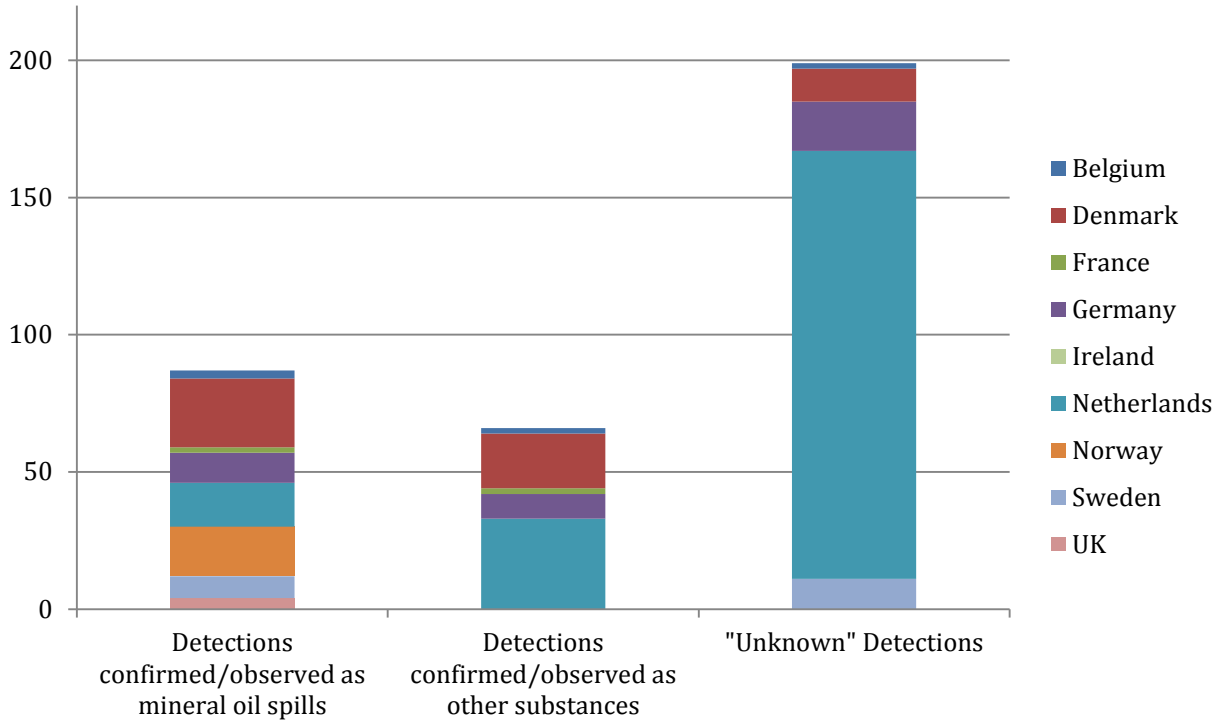


Figure 9: Number of mineral oil, other substances and unknown slicks observed 2016



ANNEX 1

Instructions for filling in the joint Bonn Agreement/HELCOM annual reporting form on illegal discharges observed during aerial surveillance

Reporting format

The Contracting Parties will report on their entire annual surveillance activity in the reporting year. This is data obtained during flights over their National Exclusive Economic Zone and outside their responsibility zone e.g. (Super) CEPCO or Tour de Horizon. The following format explanations and data standards should be used to complete the attached MS Excel reporting sheet – meeting the outlined standards is of the utmost importance to ensure inclusion of Contracting Parties data in the Bonn Agreement Aerial Surveillance database.

When reporting the annual data to the Bonn Agreement Secretariat, Table 1 should include only those spills that are inside the reporting Contracting Party's own national EEZ.

Each Contracting Party will send (using Table 6) a compilation of the spills detected in other Contracting Parties' EEZs to the Contracting Party in question at the end of February of the following year. The receiving Contracting Party will compare the data with their annual national data, delete any duplicates and complete their national data where needed. By doing so, all Contracting Parties will be able to obtain a full annual national dataset containing all spills inside their EEZ – inclusive of those detected by other Contracting Parties – and report this dataset (reflected in tables 1, 5 and 6) to the Bonn Agreement Secretariat by the end of March.

Once received by the Secretariat, Aerial Surveillance data will be quality controlled to ensure the data standards have been met- any queries will be forwarded to agreed contact points for resolution before the data is included in the database.

Where applicable, all values are to be presented using a comma as a decimal separator (" , ") and a space as a thousand separator (" "). All coordinates are to be calculated using WGS84 and to be presented as decimal degrees.

Reporting deadlines

The deadlines for the submission of aerial surveillance data are:

a. the end of February for reporting data on spills in the EEZs of other Contracting Parties to the Contracting Parties concerned; and

b. the end of March for the submission of full national data sets to the Secretariat.

Please:

- **do not remove, add or adjust any columns or calculations included in the MS Excel reporting sheet.**
- **only fill out the reporting sheet as it is delivered to you each year, do not use old versions. They may appear to be replicas but subtle variations are present due to the on-going streamlining of the reporting process at the Secretariat.**

Table 1. National flights

This data should be completed for flights which were conducted in the EEZ of the reporting Contracting Party

Country	Year	No. of flight hours			No. of detections inside national EEZ			Detections confirmed / observed as mineral oil spills			No. of polluters (mineral oil)				Estimated volume (m^3)	Detections confirmed/observed as other substances	No. of polluters (other substances)				Unknown detections	No. of polluters (unknown detections)				Remarks
		Daylight	Darkness	Total	Daylight	Darkness	Total	Daylight	Darkness	Total	Rigs	Ships	Other	Unknown			Rigs	Ships	Other	Unknown		Rigs	Ships	Other	Unknown	

Column Header	Format Example	Explanation
Country	Netherlands	Full country name the reported data applies to
Year	2013	The year that the reported data applies to
No. of flight hours – Daylight	136:24	The number of flight hours and minutes carried out in daylight - From 30 minutes after Morning Civil Twilight, until 30 minutes before Evening Civil Twilight as given in the Air Almanac – shown as a colon separated value. No decimal values
No. of flight hours – Darkness	86:23	The number of flight hours and minutes carried out in darkness - From 30 minutes before Evening Civil Twilight, until 30 minutes after Morning Civil Twilight as given in the Air Almanac – shown as a colon separated value. No decimal values
No. of flight hours – Total	222:47	= (No. of flight hours - Daylight) + (No. of flight hours – Darkness) – shown as a colon separated value. No decimal values
No. of detections inside national EEZ - Daylight	67	The number of detections in daylight, within the EEZ of the country reporting the data - From 30 minutes after Morning Civil Twilight, until 30 minutes before Evening Civil Twilight as given in the Air Almanac
No. of detections inside national EEZ – Darkness	23	The number of detections in darkness, within the EEZ of the country reporting the data - From 30 minutes before Evening Civil Twilight, until 30 minutes after Morning Civil Twilight as given in the Air Almanac
No. of detections inside national EEZ – Total	90	= (No. of detections inside own EEZ – Daylight) + (No. of detections inside own EEZ – Darkness)
Detections confirmed / observed as mineral oil spills –	12	Of the “No. of detections inside own EEZ – Daylight” the total number of those

daylight		detections observed as mineral oil and confirmed as mineral oil
Detections confirmed / observed as mineral oil spills – Darkness	5	Of the "No. of detections inside national EEZ – Darkness" the total number of those detections observed as mineral oil and confirmed as mineral oil
Detections confirmed / observed as mineral oil spills – Total	17	= (Detections confirmed / observed as mineral oil spills – Daylight) + (Detections confirmed / observed as mineral oil spills – Darkness)
No. of polluters (mineral oil) – Rigs	2	The number of offshore installations positively identified as the source of the oil detection
No. of polluters (mineral oil) – Ships	2	The number of ships positively identified as the source of the oil detection
No. of polluters (mineral oil) – Other	90	The number of oil detections which do not fit into either the "Rigs" or "Ships" category
No. of polluters (mineral oil) – Unknown	86	The number of oil detections which could not be associated with a source
Estimated Volume (m^3)	27,36	Volume of all spills confirmed/observed as mineral oil as calculated using the Bonn Agreement Oil Appearance Code using the lower figure (BAOAC minimum) – presented as a decimal value using a comma as a decimal separator
Detections confirmed/observed as other substances ('OS')	3	The number of detections observed as other substances or confirmed as other substances ('OS') – independent of the time of day the detection was made
No. of polluters (other substances) – Rigs	2	The number of offshore installations positively identified as the source of the OS detection
No. of polluters (other substances) – Ships	2	The number of ships positively identified as the source of the OS detection
No. of polluters (other substances) – Other	90	The number of OS detections which do not fit into either the "Rigs" or "Ships" category
No. of polluters (other substances) – Unknown	86	The number of OS detections which could not be associated with a source

Unknown ('UNK') detections	70	The number of detections that could not be visually verified as mineral oil or other substances ('unknowns' or 'UNK') (((No. of UNK detections inside national EEZ – Total) – (Detections confirmed / observed as mineral oil spills – Total)) - Detections confirmed/observed as other substances)
No. of polluters (unknown detections) – Rigs	2	The number of offshore installations positively identified as the source of the UNK detection
No. of polluters (unknown detections) – Ships	2	The number of ships positively identified as the source of the UNK detection
No. of polluters (unknown detections) – Other	90	The number of UNK detections which do not fit into either the "Rigs" or "Ships" category
No. of polluters (unknown detections) – Unknown	86	The number of UNK detections which could not be associated with a source
Remarks	Source of rig spills identified as…	Any additional textual information to inform on particular situations

Table 2. Satellite detections

To be completed by NORWAY only (satellite data for the other Bonn Agreement countries will be taken directly from the EMSA CleanSeaNet report)

Country	Year	Detected	Confirmed mineral oil	Confirmed other substances	Confirmed unknown spills	Confirmed natural phenomena	Nothing found

Column Header	Format Example	Explanation
Country	France	Full country name the reported data applies to
Year	2013	The year that the reported data applies to
Detected	215	The number of satellite detections inside national EEZ
Confirmed mineral oil	7	The number of satellite detections confirmed as mineral oil
Confirmed other substances	3	The number of satellite detections confirmed as other substances
Confirmed unknown spills	2	The number of satellite detections which could not be visually verified
Confirmed natural phenomena	1	The number of satellite detections confirmed as natural phenomena
Nothing found	202	The number of verified satellite detections where nothing could be found

Table 3. Coordinated Extended Pollution Control Operations (CEPCO)

Country	Year	No. of flight hours			No. of detections inside CEPCO area			Detections confirmed / observed as mineral oil spills			No. of polluters (mineral oil)				Estimated volume (m^3)	Detections confirmed/observed as other substances	No. of polluters (other substances)				Unknown detections	No. of polluters (unknown detections)				Remarks
		Daylight	Darkness	Total	Daylight	Darkness	Total	Daylight	Darkness	Total	Rigs	Ships	Other	Unknown			Rigs	Ships	Other	Unknown		Rigs	Ships	Other	Unknown	

Column Header	Format Example	Explanation
Country	Netherlands	Full country name the reported data applies to
Year	2013	The year that the reported data applies to
No. of flight hours – Daylight	136:24	The number of flight hours and minutes carried out in daylight - From 30 minutes after Morning Civil Twilight, until 30 minutes before Evening Civil Twilight as given in the Air Almanac – shown as a colon separated value. No decimal values
No. of flight hours – Darkness	86:23	The number of flight hours and minutes carried out in darkness - From 30 minutes before Evening Civil Twilight, until 30 minutes after Morning Civil Twilight as given in the Air Almanac – shown as a colon separated value. No decimal values
No. of flight hours – Total	222:47	= (No. of flight hours - Daylight) + (No. of flight hours – Darkness) – shown as a colon separated value. No decimal values
No. of detections inside CEPCO area - Daylight	67	The number of detections in daylight, within the predefined CEPCO area - From 30 minutes after Morning Civil Twilight, until 30 minutes before Evening Civil Twilight as given in the Air Almanac
No. of detections inside CEPCO area – Darkness	23	The number of detections in darkness, within the predefined CEPCO area - From 30 minutes before Evening Civil Twilight, until 30 minutes after Morning Civil Twilight as given in the Air Almanac
No. of detections inside CEPCO – Total	90	= (No. of detections inside CEPCO area – Daylight) + (No. of detections inside CEPCO area – Darkness) within the predefined CEPCO area
Detections confirmed / observed as mineral oil spills – Daylight	12	Of the "No. of detections inside CEPCO area – Daylight" the total number of those detections observed as mineral oil and confirmed as mineral oil
Detections confirmed / observed as mineral oil spills – Darkness	5	Of the "No. of detections inside CEPCO area– Darkness" the total number of those detections observed as mineral oil and confirmed as mineral oil
Detections confirmed / observed as mineral oil spills –	17	=(Detections confirmed / observed as mineral oil spills – Daylight) + (Detections

Total		confirmed / observed as mineral oil spills – Darkness)
No. of polluters (mineral oil) – Rigs	2	The number of offshore installations positively identified as the source of the oil detection
No. of polluters (mineral oil) – Ships	2	The number of ships positively identified as the source of the oil detection
No. of polluters (mineral oil) – Other	90	The number of oil detections which do not fit into either the “Rigs” or “Ships” category
No. of polluters (mineral oil) – Unknown	86	The number of oil detections which could not be associated with a source
Estimated Volume (m3)	27,36	Volume of all spills confirmed/observed as mineral oil as calculated using the Bonn Agreement Oil Appearance Code using the lower figure (BAOAC minimum) – presented as a decimal value using a comma as a decimal separator
Detections confirmed/observed as other substances (‘OS’)	3	The number of detections observed as other substances or confirmed as other substances (OS) – independent of the time of day the detection was made
No. of polluters (other substances) – Rigs	2	The number of offshore installations positively identified as the source of the OS detection
No. of polluters (other substances) – Ships	2	The number of ships positively identified as the source of the OS detection
No. of polluters (other substances) – Other	90	The number of OS detections which do not fit into either the “Rigs” or “Ships” category
No. of polluters (other substances) – Unknown	86	The number of OS detections which could not be associated with a source
Unknown (‘UNK’) detections	70	The number of detections which could not be visually verified as mineral oil or other substances (‘unknowns’ or ‘UNK’) (((No. of detections inside CEPCO area – Total) – (Detections confirmed / observed as mineral oil spills – Total)) - Detections confirmed/observed as other substances)
No. of polluters (unknown detections) – Rigs	2	The number of offshore installations positively identified as the source of the UNK detection
No. of polluters (unknown detections) – Ships	2	The number of ships positively identified as the source of the UNK detection
No. of polluters (unknown detections) – Other	90	The number of UNK detections which do not fit into either the “Rigs” or “Ships”

		category
No. of polluters (unknown detections) – Unknown	86	The number of UNK detections which could not be associated with a source
Remarks	Source of rig spills identified as…	Any additional textual information to inform on particular situations

Table 4. Tour d'horizon flights

Country	Year	No. of flights	No. of flight hours			No. of detections in TdH area			No. of polluters (mineral oil)				Estimated volume (m^3)	Detections confirmed/observed as other substances	No. of polluters (other substances)				Unknown detections	No. of polluters (unknown detections)				Remarks
			Daylight	Darkness	Total	Daylight	Darkness	Total	Rigs	Ships	Other	Unknown			Rigs	Ships	Other	Unknown		Rigs	Ships	Other	Unknown	

Column Header	Format Example	Explanation
Country	Netherlands	Full country name the reported data applies to
Year	2013	The year that the reported data applies to
No. of flights	Number (Int)	The number of flights carried out by all Contracting Parties combined
No. of flight hours – Daylight	136:24	The number of flight hours and minutes carried out in daylight - From 30 minutes after Morning Civil Twilight, until 30 minutes before Evening Civil Twilight as given in the Air Almanac – shown as a colon separated value. No decimal values
No. of flight hours – Darkness	86:23	The number of flight hours and minutes carried out in darkness - From 30 minutes before Evening Civil Twilight, until 30 minutes after Morning Civil Twilight as given in the Air Almanac – shown as a colon separated value. No decimal values
No. of flight hours – Total	222:47	= (No. of flight hours - Daylight) + (No. of flight hours – Darkness) – shown as a colon separated value. No decimal values
No. of detections in TdH area- Daylight	67	The number of detections in daylight, during the TdH routing - From 30 minutes after Morning Civil Twilight, until 30 minutes before Evening Civil Twilight as given in the Air Almanac

No. of detections in TdH area– Darkness	23	The number of detections in darkness, during the TdH routing - From 30 minutes before Evening Civil Twilight, until 30 minutes after Morning Civil Twilight as given in the Air Almanac
No. of detections in TdH area– Total	90	= (No. of detections during TdH routing - Daylight) + (No. of detections during TdH routing - Darkness)
Detections confirmed / observed as mineral oil spills – Daylight	12	Of the "No. of detections inside own EEZ – Daylight" the total number of those detections observed as mineral oil and confirmed as mineral oil
Detections confirmed / observed as mineral oil spills – Darkness	5	Of the "No. of detections inside national EEZ – Darkness" the total number of those detections observed as mineral oil and confirmed as mineral oil
Detections confirmed / observed as mineral oil spills – Total	17	= (Detections confirmed / observed as mineral oil spills – Daylight) + (Detections confirmed / observed as mineral oil spills – Darkness)
No. of polluters (mineral oil) – Rigs	2	The number of offshore installations positively identified as the source of the oil detection
No. of polluters (mineral oil) – Ships	2	The number of ships positively identified as the source of the oil detection
No. of polluters (mineral oil) – Other	90	The number of oil detections which do not fit into either the "Rigs" or "Ships" category
No. of polluters (mineral oil) – Unknown	86	The number of oil detections which could not be associated with a source
Estimated Volume (m^3)	27,36	Volume of all spills confirmed/observed as mineral oil as calculated using the Bonn Agreement Oil Appearance Code using the lower figure (BAOAC minimum) – presented as a decimal value using a comma as a decimal separator
Detections confirmed/observed as other substances (OS)	3	The number of detections observed as other substances or confirmed as other substances (OS) – independent of the time of day the detection was made

No. of polluters (other substances) – Rigs	2	The number of offshore installations positively identified as the source of the OS detection
No. of polluters (other substances) – Ships	2	The number of ships positively identified as the source of the OS detection
No. of polluters (other substances) – Other	90	The number of OS detections which do not fit into either the “Rigs” or “Ships” category
No. of polluters (other substances) – Unknown	86	The number of OS detections which could not be associated with a source
Unknown (UNK) detections	70	The number of detections which could not be visually verified as mineral oil or other substances (‘unknowns’ or ‘UNK’) (((No. of detections during TdH routing – Total) – (Detections confirmed / observed as mineral oil spills – Total)) - Detections confirmed/observed as other substances)
No. of polluters (unknown detections) – Rigs	2	The number of offshore installations positively identified as the source of the UNK detection
No. of polluters (unknown detections) – Ships	2	The number of ships positively identified as the source of the UNK detection
No. of polluters (unknown detections) – Other	90	The number of UNK detections which do not fit into either the “Rigs” or “Ships” category
No. of polluters (unknown detections) – Unknown	86	The number of UNK detections which could not be associated with a source
Remarks	Source of rig spills identified as ..	Any additional textual information to inform on particular situations

Table 5. Spill statistics

Volume category		No. of spills detected	Spill IDs
<0,1m^3	1		
<0,1-1m^3	2		
1-10 m^3	3		
10-100 m^3	4		
>100 m^3	5		

Column Header	Format	Explanation
No. of spills detected	7	The total number of detected or observed mineral oil spills, where the volume was estimated, that fit into each category
Spill IDs	UK-01, UK-02, UK-08, UK-14, UK-21, UK-22, UK-55	The Spill IDs (taken from Table 6 – Observed Spills) of all spills which have been counted towards each category

Table 6. Observed spills

Multiple slicks obviously originating from a single spill should not be reported separately but should be combined and the centre point reported as the location.

Country	Year	Spill ID	Flight Type	Date	Time	Wind speed	Wind direction	Latitude	Longitude	Length	Width	Area	Spill category	Estimated volume	Polluter	Category	Flight type	Casefile	Remarks

Column Header	**Format**	**Explanation**
Country	Belgium	Full country name the reported data applies to
Year	2013	The year that the reported data applies to
Spill ID	BE-01	An unique code which will enable each individual spill to be individually identified (*) Note: in case of a spill consisting of several slicks (multiple slicks clearly originating from 1 spill), only 1 spill ID should be added (and not x '(partial) slick' IDs). In this case, the centre point should be reported as location.
Flight Type	N	The type of flight the detection was made during: National = "N" CEPCO = "C" Super CEPCO = "S"
Date	27/03/2013	The date of the individual detection
Time	08:20	The time of the detection
Wind speed	2	The wind speed in m/s at the time of the detection
Wind direction	210	The wind direction in degrees at the time of the detection
Latitude	51,3683	The latitude of the detection in decimal degrees, using WGS84 - See also Note under 'Spill ID' above for spill consisting of several slicks (*)

Longitude	2,6733	The longitude of the detection in decimal degrees, using WGS84 - See also Note under 'Spill ID' above for spill consisting of several slicks (*)
Length	2,3	The length of the detection in kilometres
Width	0,1	The width of the detection in kilometres
Area	0,092	The area of the detection square kilometres^2
Spill category	OIL	The category the detection falls into from: "OIL", "OS", "UNKNOWN"
Estimated volume	0,01564	Volume of the detection confirmed/observed as mineral oil as calculated using the Bonn Agreement Oil Appearance Code using the lower figure (BAOAC minimum) in m^3
Polluter	Other	Enter "rig", "ship", "other" or "unknown"
Category	1	The category (1, 2, 3, 4 or 5) that the detection falls into: <0,1m^3 = "1" <0,1-1m^3 = "2" 1-10 m^3 = "3" 10-100 m^3 = "4" >100 m3 = "5"
Casefile	BE-0008	The name of the casefile the detection refers to
Remarks	Case pending	Any additional information to inform on particular situations

Table 7. Observed TdH Spills

Each country should report all observations from their Tour d'Horizon mission directly to the Bonn Agreement Secretariat, regardless of the location of the spills, at the same time as reporting their other surveillance data.

Country	Year	Flight Type	Date	Time	Latitude	Longitude	CP Area	Area Cov	Daylight or Darkness?	Detection ID	If Oil: Min Volume	If Oil: Max Volume	Polluter Type	Polluter ID	Is detection a verification of (CSN) Sat alert?	In flight Report?	Post Flight Fax sent?	Post Flight email sent?	Reporting made to?	Remarks

Column Header	**Format**	**Explanation**
Country	Belgium	Full country name the reported data applies to
Year	2013	The year that the reported data applies to
Flight Type	TDH	The type of flight the detection was made during: TDH =Tour D'Horizon
Date	27/03/2013	The date of the individual detection
Time	08:20	The time of the detection
Latitude	51,3683	The latitude of the detection in decimal degrees, using WGS84
Longitude	2,6733	The longitude of the detection in decimal degrees, using WGS84
CP Area	Belgium	The Contracting pater EEZ in which the detection was made
Area covered	0,092	The area of the detection in square kilometres^2
Daylight or Darkness	Daylight	Detection in Daylight or darkness
Detection ID	Oil	The category the detection falls into from: "OIL", "OS", "UNKNOWN"
If Oil: Min Volume	0.073	Minimum spill volume in square kilometres
If Oil: Max Volume	0.03	Maximum spill volume in square kilometres

Polluter type	RIG	Type of Polluter either “RIG”, “SHIP” or “UNKNOWN”
Polluter Id	Platform Alpha	The name of the Rig or Ship if identifiable
Is detection a verification of (CSN) Sat alert?	Y	Is detection a verification of (CSN) Sat alert Y or N
In Flight Report	Y	Has an in Flight Report been undertaken Y or N
Post flight Fax sent	N	Has a post flight fax report been sent Y or N
Post flight Email sent	Y	Has a post flight email report been sent Y or N
Reporting made to	National Contact Point	Who has the post flight report been sent to: national focal point or other?
Remarks	Case pending	Any additional information to inform on particular situations

Table 8. TdH Flight Routing

Date	Flight Number	Waypoint Code (Incl. Airports)	Position (only if waypoint not in Aerial Operations Handbook)

Column Header	Format	Explanation
Date	27/03/2013	The date of the start of the flight
Flight Number	NL: 1046, BE: 13046, UK: Endurance 446, Etc.	The number of the TdH Flight
Way Point Code (Including Airports)	T10, T11, T12, EGNT	The Waypoint codes for the flight taken from the Aerial Operations Handbook including Airports
Position	N XX0 XX,XX' E/W XXX0 XX,XX'	The position of the flight route (only if different from the waypoints in the Aerial Operations Handbook)

Appendix 2:
CleanSeaNet Statistic for 2016 in the Bonn Agreement region
Presented by EMSA Unit C.3 Earth Observation Services

Introduction

This document presents CleanSeaNet (CSN) Service Statistics for the Bonn Agreement covering 2016. Specifically, this report summarizes the results of CleanSeaNet service deliveries, CleanSeaNet detections and the Verification Activities carried out by the Coastal States. Additionaly its proposed to align the CleanSeaNet Bonn Agreement Alert Area with the area used for Bonn Agreement statistics.

CleanSeaNet Service Deliveries

In 2016, the CleanSeaNet service was provided using images from SENTINEL-1, RADARSAT-2 and TERRASAR-X.
During this period, CSN delivered for the Bonn Agreement region a total of 759 services. Figure 1, shows the monthly distribution of services.

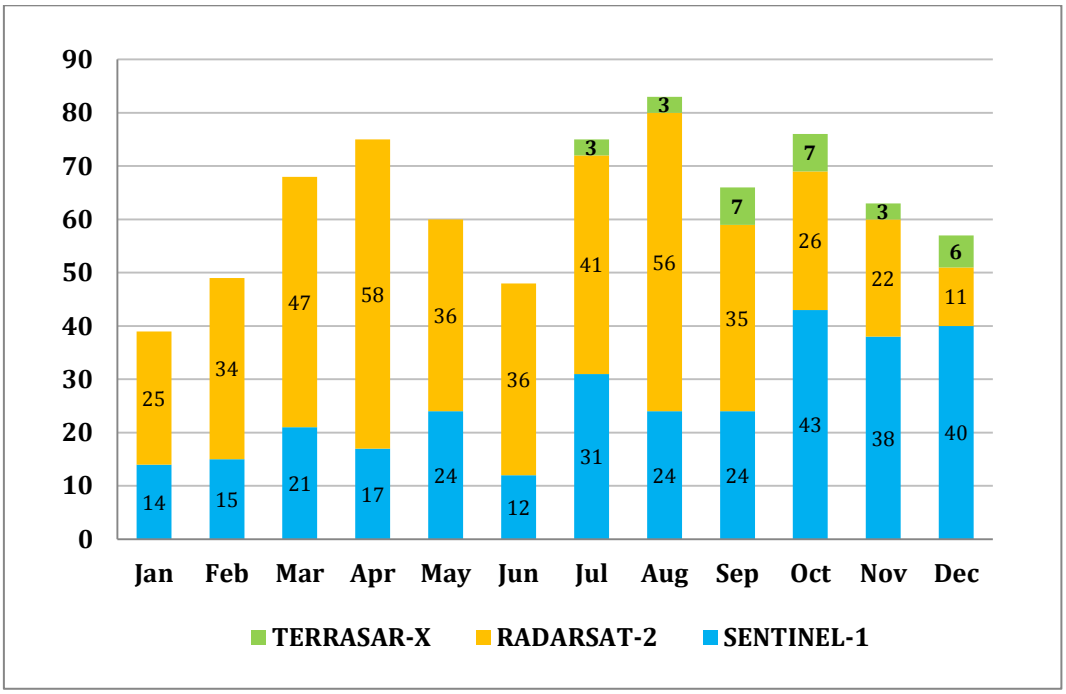


Figure 1: CleanSeaNet delivered services in 2016 for the Bonn Agreement region.

CleanSeaNet Detections

In 2016, 992 detections were reported: 564 Classification A[4], 428 Classification B[5]. Figure 2, shows the monthly distribution of CSN detections classified as A and B.

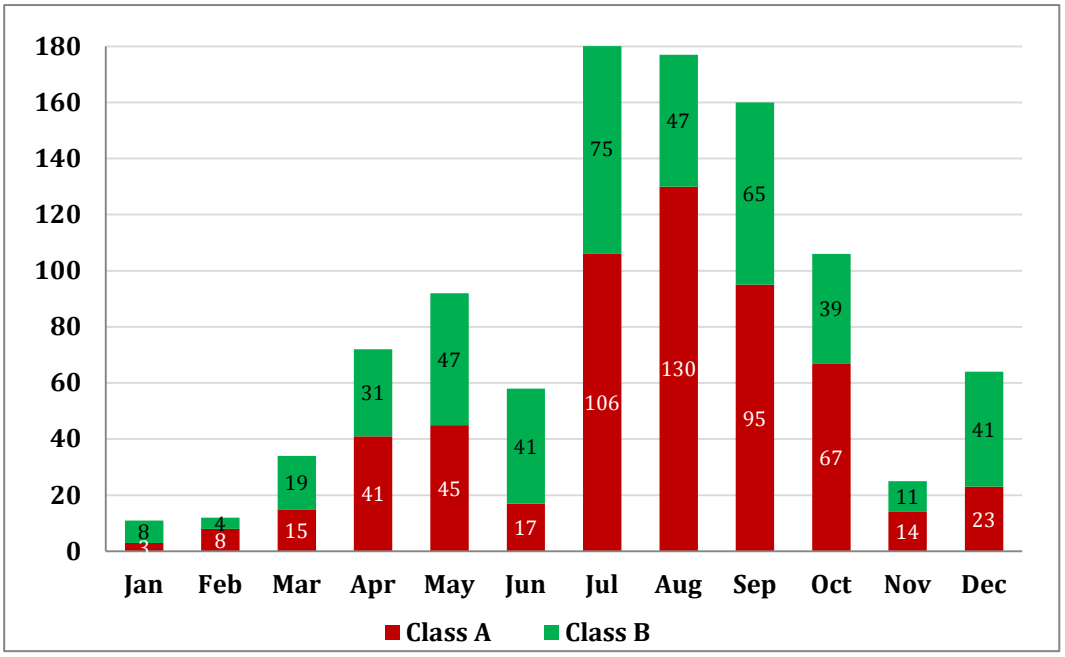


Figure 2: Monthly distribution of CSN detections (Classification A and B).

[4] Classification A - Detected spill is most probably oil (mineral, vegetable/fish oil) or a chemical.
[5] Classification B - Detected spill is less probably oil (mineral/vegetable/fish oil) or a chemical.

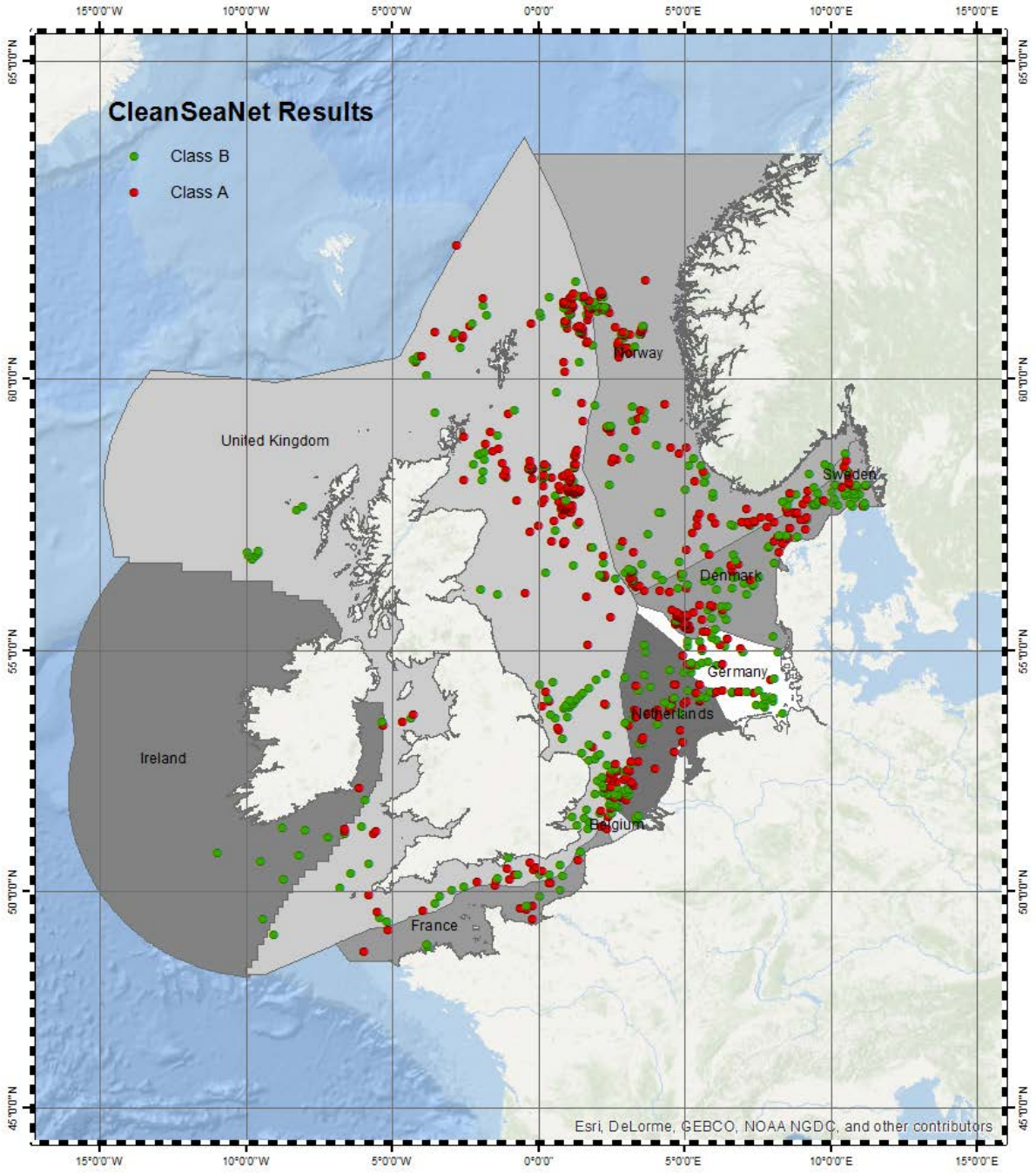


Figure 3. Spatial distribution of CSN in the Bonn Agreement region in 2016.

There are a number of possible reasons why the number of detections has increased (518 detections in 2015; 992 detections in 2016):

- Volume of services has increased (665 services in 2015; 779 services in 2016)
- Optimization of CleanSeaNet planning, due to use of new tools, increased the ratio of sea surface to land surface captured on the images in 2016.

- It is likely that the inclusion of new satellites, particularly Sentinel-1A, may have resulted in improved detection capabilities. The spatial resolution of Sentinel-1 means that it is now possible to detect smaller spills than before; these smaller spills are more numerous and would not have been detected previously. The average size of spills detected in 2016 was 25% smaller than in 2015. In 2015 no spills below 0.1km2 were detected whereas this threshold decreased to 0.04 km2 in 2016.

A high number of CleanSeaNet detections in the Bonn Agreement region would appear to come from offshore installations. Many of the detections were confirmed as mineral oil nevertheless this does not mean these spills exceeded legal limits (e.g. Produced water discharged limits).

Verification activities

During the reporting period, out of the 992 detections, 553 were checked by the Coastal States. Of the 553, 20 (4%) were confirmed as being "Mineral oil confirmed", 90 (16%) were reported as "other substance", 18 (3%) were reported as "unknown feature" and 21 (4%) were reported as "natural phenomena" and 404 (73%) were reported as "nothing observed"

Figure 3 below shows the monthly distribution of CSN checked detections and verification results.

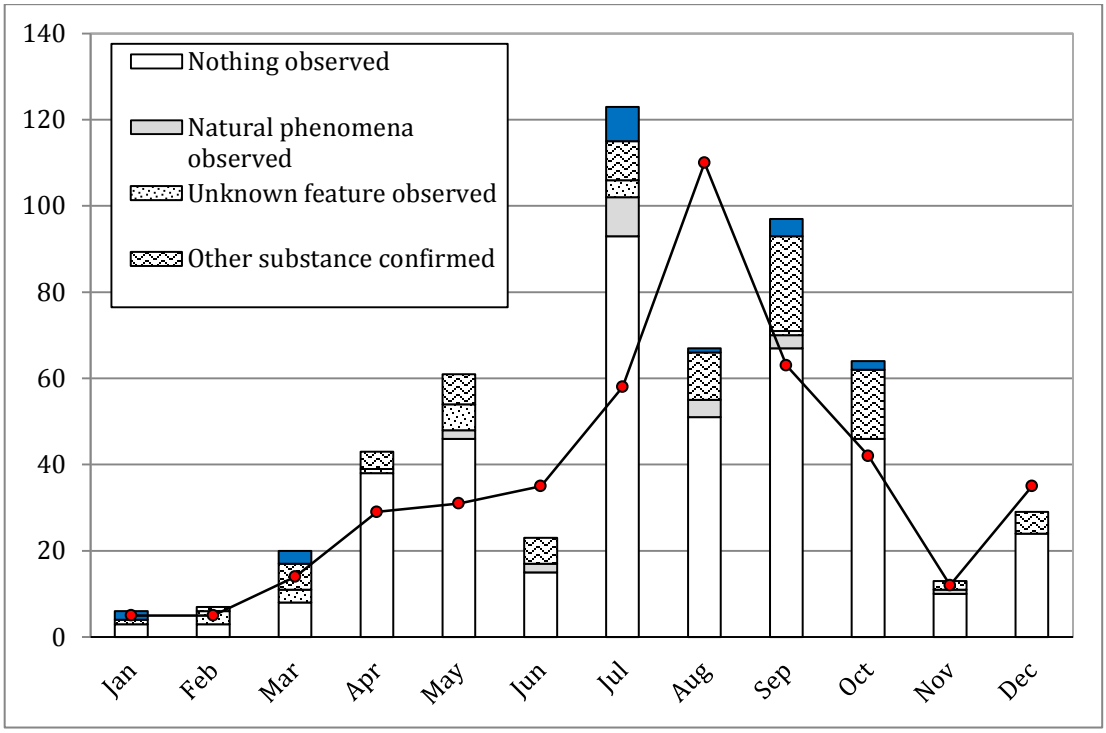


Figure 4: Monthly distribution of checked detections and verification results.
(Source: Feedback provided by Member States and stored in the CleanSeaNet database)

Table 1 below presents the annual distribution of checked detections and verification results per country.

Country	Satellite detections	Satellite detections checked by coastal States	Not checked or no

		Mineral oil confirmed	Other substance confirmed	Unknown feature observed	Natural phenomena observed	Nothing observed	
Belgium	4		1			1	2
Denmark	145	4	21		5	28	87
France	17		1			12	4
Germany	52	1	14	3	8	23	3
Ireland	12	1					11
Netherlands	66		12			4	50
Norway	194	4	22		2	44	122
Sweden	26		6	1		2	17
United Kingdom	476	10	13	14	6	290	143
Total	992	20	90	18	21	404	439

Table 1: CSN checked detections and verification results per country.

It should be noted that, in this table, CleanSeaNet detections are distributed between countries using national areas communicated to EMSA by the Bonn Agreement secretariat. The centre position of the spill is used to decide in which country's area CleanSeaNet detections shall fall.

It should also be noted that alert areas defined by each country are very often different of national areas used in this report. This could for example be due to the operational need to be alerted before a spill could affect national waters. In addition, an alert is generated each time a spill contour polygon intersects an alert area. Therefore the number of detections per country in this report and the number of CleanSeaNet oil spill notifications alerts for the same country are different.

Finally, Figure 4 next page shows the spatial distribution of CSN detections and verification activities carried out by the Coastal States in the Bonn Agreement region in 2016.

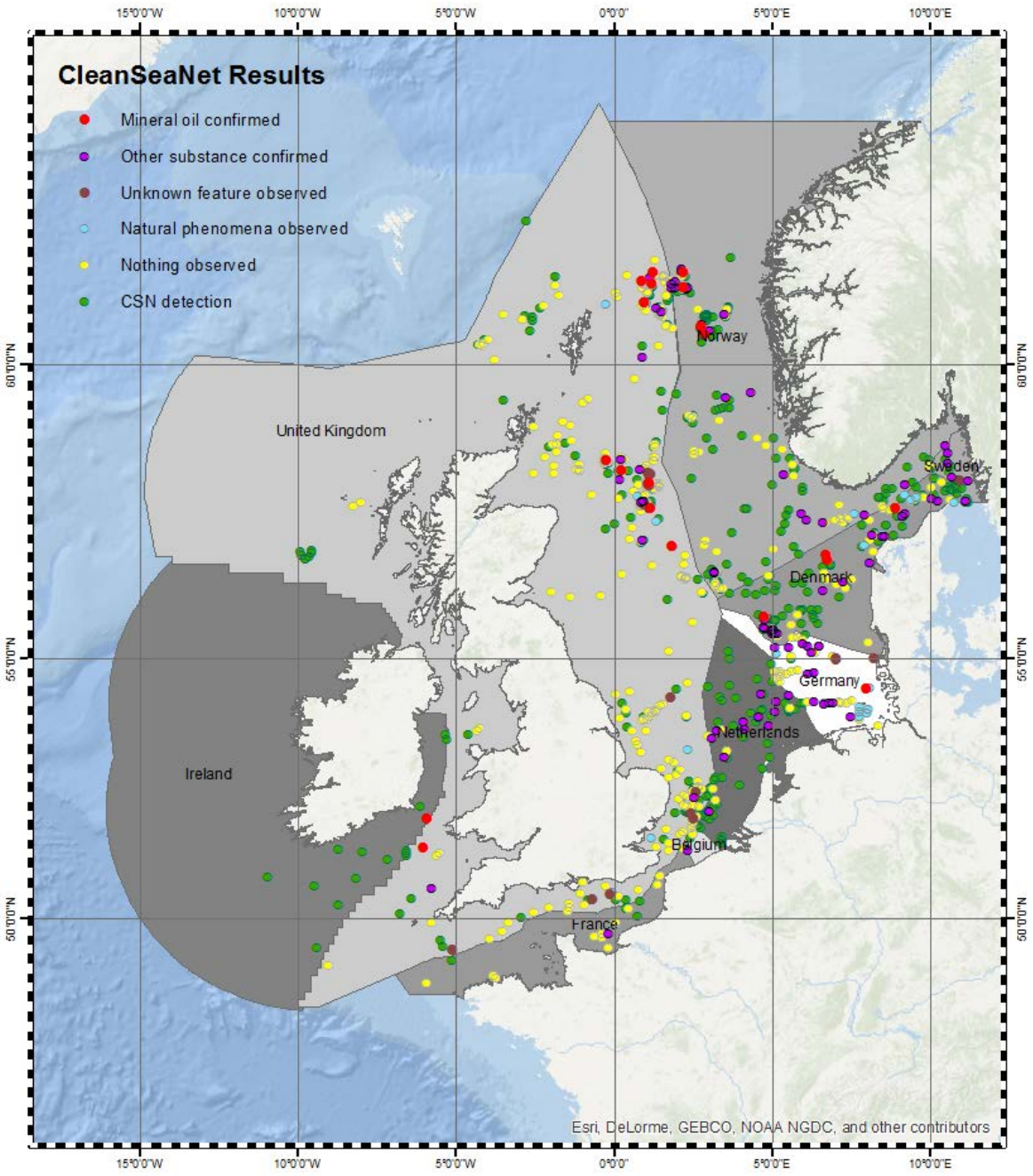


Figure 5. Spatial distribution of CSN detections and the verification activities carried out by the Coastal States in the Bonn Agreement region in 2016.

CleanSeaNet Bonn Agreement Alert Area:

Its proposed to replace the current CleanSeaNet Bonn Agreement Alert Area (Figure 6) with the area used for Bonn Agreement statistics (Figure 5).
With the current area, EMSA noticed that possible oils spills detections along some flight tracks could lie outside the alert area and therefore missed to be reported (see example on Figure 7).

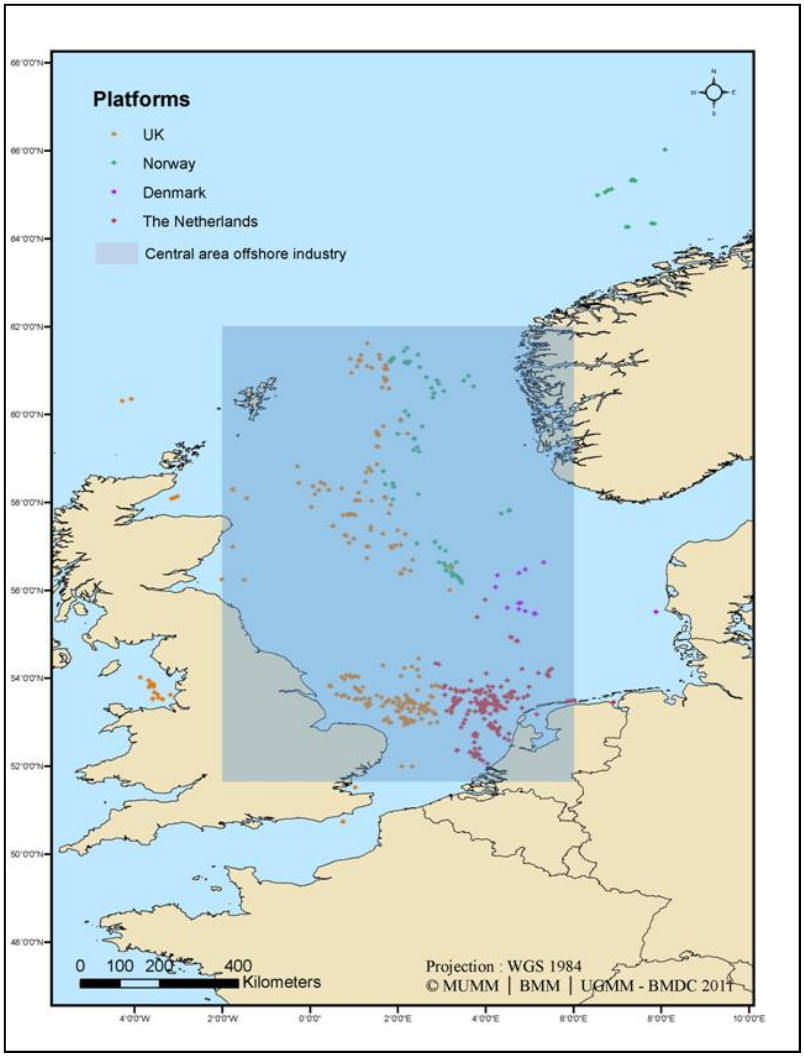


Figure 6. CleanSeaNet Bonn Agreement Alert Area as in "CleanSeaNet Procedure for requesting support to a TdHz ", Version: 1.0 Date: 26 May 2016.

Figure 7. Example of TdHz flight paths with areas outside CleanSeaNet Bonn Agreement Alert Area flagged in red.