

## Meeting: CSN 20<sup>th</sup> User Group Meeting

**Place and date: Lisbon, 10 March 2021**

**Agenda item: CSN service results**

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**Submitted by EMSA**

Summary	This paper provides summary information on the CleanSeaNet service results and performance in 2020.
Action to be taken	The CSN User Group is invited to take note of the information provided.

### 1 Background

The scope of this paper is to present the results of CleanSeaNet in 2020 and to report the near real time performance of the service.

The service is available to 28 coastal States:

- 23 coastal European Union (EU) Member States (Belgium, Bulgaria, Croatia, Cyprus, Denmark, Estonia, Finland, France (including French Overseas Departments in the French Antilles under French Sovereignty), Germany, Greece, Ireland, Italy, Latvia, Lithuania, Malta, Netherlands, Poland, Portugal, Romania, Slovenia, Spain, Sweden, United Kingdom);
- Two European Free Trade Association (EFTA) coastal States, Norway and Iceland;
- Three candidate countries, Albania, Montenegro and Turkey (until August 2020<sup>1</sup>). The service has also been made available to other projects or territories under specific conditions<sup>2</sup>.

In this paper figures refer only to the service offered to these 28 EU and EFTA coastal States and paid through the funding foreseen under Regulation (EU) No 911/2014 of the European Parliament and of the Council of 23 July 2014 on multi-annual funding for the actions of the European Maritime Safety Agency in the field of response to marine pollution caused by ships and oil and gas installations.

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<sup>1</sup> From September 2020 onwards, the service to Turkey was provided under the framework of the SAFEMED project.

<sup>2</sup> The service is also being provided, through Copernicus Maritime Surveillance Service (CMS), to Kingdom of Denmark Overseas Territories in Greenland as well to Portugal for supporting Sao Tome and Principe authorities. Through the SAFEMED IV and BCSEA European Neighbourhood Policy Programmes, CleanSeaNet was also made available across the Mediterranean, the Black Sea, the Red Sea, and the Caspian Sea to official project beneficiary countries.

## 2 CleanSeaNet results

### 2.1 Image delivery

As in previous years, the CleanSeaNet service was provided using SAR imagery from RADARSAT-2, SENTINEL-1 and TERRASAR-X missions during 2020. Additionally, 6 out of 8 ordered optical images were delivered in support to four distinct oil spill emergencies and one exercise. A total of 7930 SAR and optical images were delivered out of 8245 ordered images.

Table 1 - CleanSeaNet images ordered and delivered per mission, 2020.

Satellite		2020	2019
SENTINEL-1A/B	Delivered Images	7076	5961
	% of delivery	(97%)	(95%)
RADARSAT-2	Delivered Images	462	578
	% of delivery	(94%)	(93%)
TERRASAR-X	Delivered Images	386	365
	% of delivery	(93%)	(79%)
VHR resolution optical (Deimos, Spot, Geoeye, Worldview1/3)	Delivered Images	6	1
	% of delivery	(75%)	(100%)
Total	Delivered Images	7930	6905
	% of delivery	(96%)	(94%)

Comparing with previous year, the total of delivered images during 2020 increased 15%. The delivery ratio improved by 2% across all the Satellite platforms when comparing 2020 and 2019, with all the SAR missions improving their reliability in terms of successfully delivered CSN services.

Since 2018 there is a continuous increase (71% higher) in the number of images delivered (4645 in 2018 and 7930 in 2020), due to two main factors:

- EMSA continues relying mostly on the Sentinel-1A/B to acquire EO data needed for the service (an increase of 84% between 2018 and 2020), due to high quality of the products for oil spill detection, good availability over European waters and reduced costs thanks to the existing license agreement with the Commission.
- EMSA re-negotiated its service provision contracts in 2018 which besides of improving the delivery timeliness requirements enabled some reductions on the downlinking, processing and analysis component of the service.

### 2.2 CleanSeaNet quasi real time (QRT) performance

The service QRT performance is characterised by the delivery time of the alert report which contains all necessary operational information for the coastal States to take any initial action. Recent EMSA's contracts, signed in 2018, introduced requirements for faster delivery of information to end users. Oil spill analysis sent

to users are now faster and for most images the service is available within 20 minutes. Larger products require additional time for processing (i.e. images over 150 000 km<sup>2</sup>) and take additional minutes. The figure below shows the CleanSeaNet QRT performance of services delivered by SAR missions.

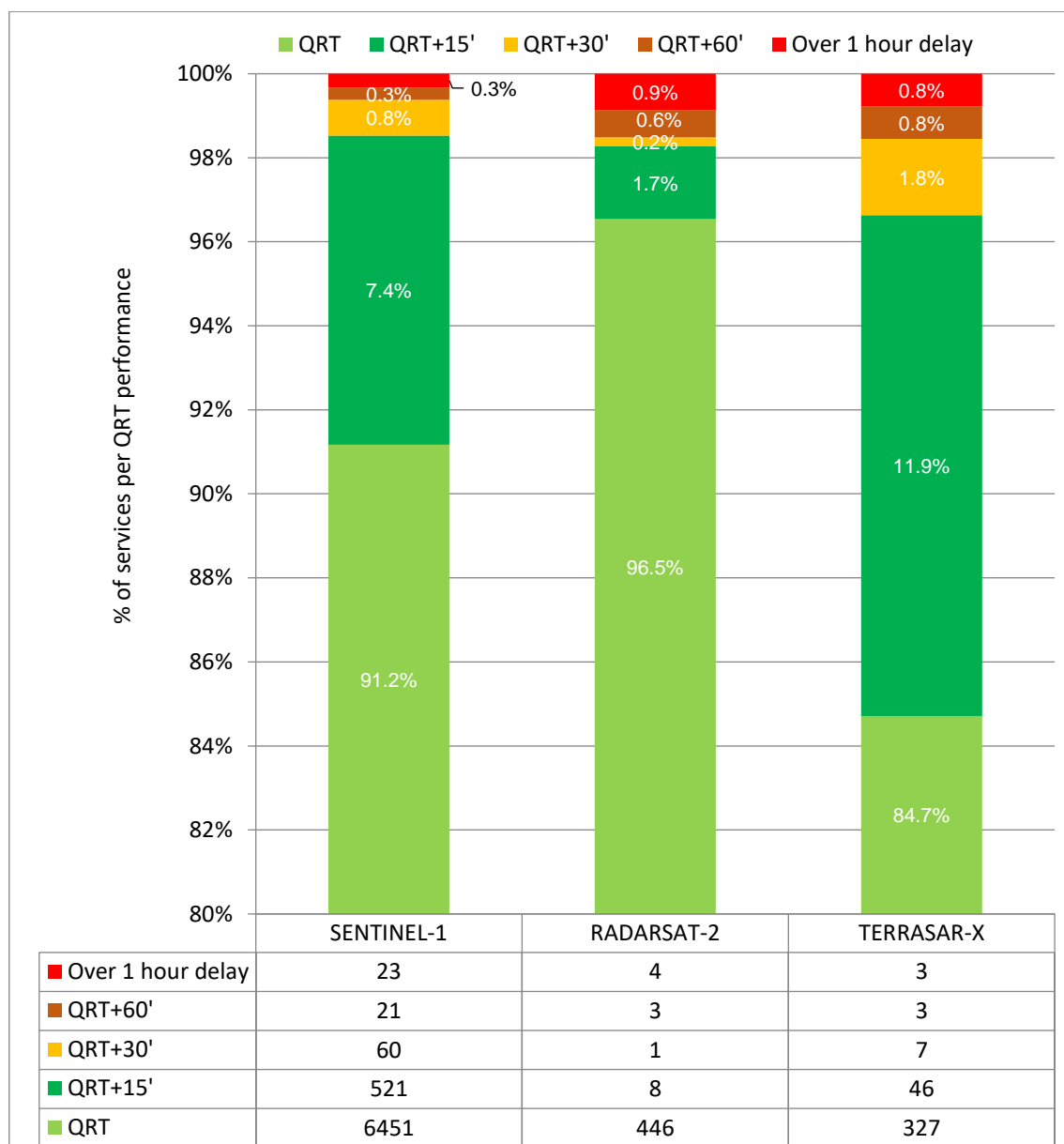


Figure 1 - CleanSeaNet QRT Performance by mission, 2020.

In 2020 only TERRASAR-X demonstrated a QRT performance below the 90%. However, considering the QRT plus 15 minutes each of the SAR missions had performed between 96% and 99% - Figure 1.

While TERRASAR-X saw a decrease in 1 point of percentage in the compliance of QRT requests (20 minutes) for the delivery times of the services, it should be noted that there was an improvement for the other two satellite missions – Figure 2.

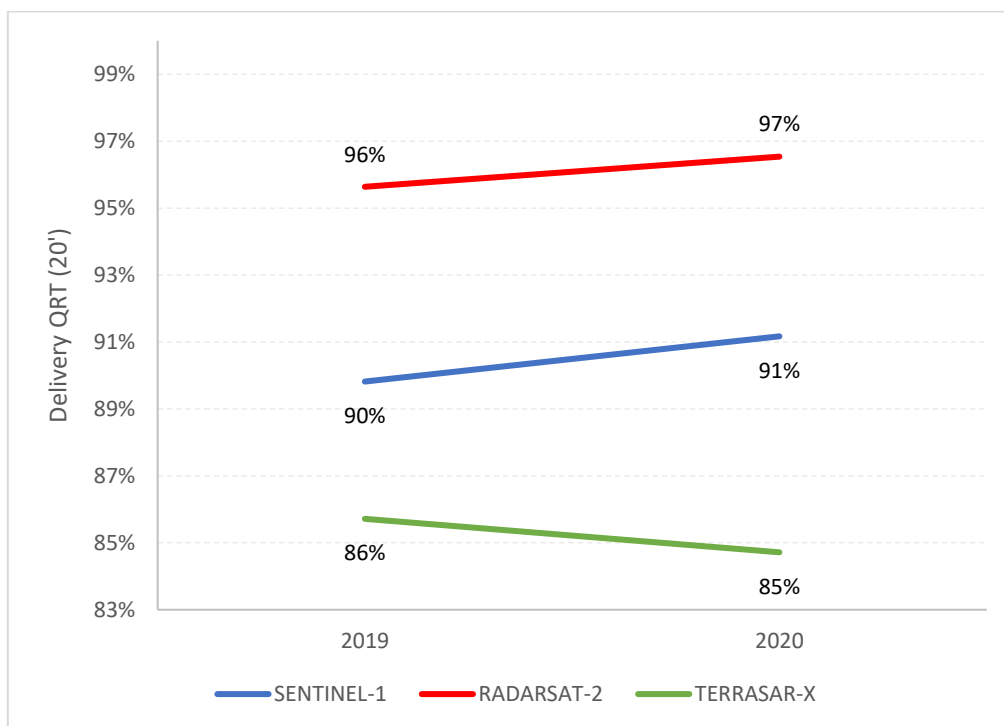


Figure 2 – Delivery times (QRT 20'). of oil spill notification in 2019 and 2020.

Overall, during 2020, 91% of the total alert reports were available to end users for analysis in less than 20 minutes, increasing to 96% this percentage if we consider additional 5 minutes.

## 2.3 CleanSeaNet detections

It is important to note that detections consist of "possible" oil spills due to the existence of limitations of radar detection for the identification of spills: sea roughness can mask the dampening effect and the lack of information predicted from the SAR satellite images on the nature of the spill (mineral oil, fish or vegetable oil, other look-alikes). More information is required to discriminate between oil spills and look-alikes and in most cases, it requires on site verification.

With regards to the likelihood of oil existence on the sea surface, the CleanSeaNet detections are separated into two classes:

- **Class A** – (2020 results: 4383) the detected spill has a higher detection confidence level.
- **Class B** – (2020 results: 3289) the detected spill has a lower detection confidence level.

The total of delivered services in 2020 was 7930 with total of 7672 possible oil spills detected. When comparing 2020 against 2019, there is an increase of 6% on the overall possible oil spills detected, compared with an increase of 15% in the number of delivered images. Considering the average of spills detected per image, there was a reduction from 1.05 in 2019 to 0.97 in 2020, which is roughly 8%.

Table 2 – Overview of CSN detections and delivered images.

CSN Detections	2020	2019
Class A	4383	4405
% Class A	57%	61%
Class B	3289	2860
% Class B	43%	39%
Total CSN detections	7672	7265
Total of delivered Images	7930	6905
Average detections per image	0.97	1.05

Figure 3 shows that the total of CSN detections is lower than the delivered of images, which was not occurring over the last years as determines the average of CSN detections per image.

The percentage of possible oil spills with higher detection confidence level (Class A – 57%) is higher than the percentage of the correspondent for Class B (43%).

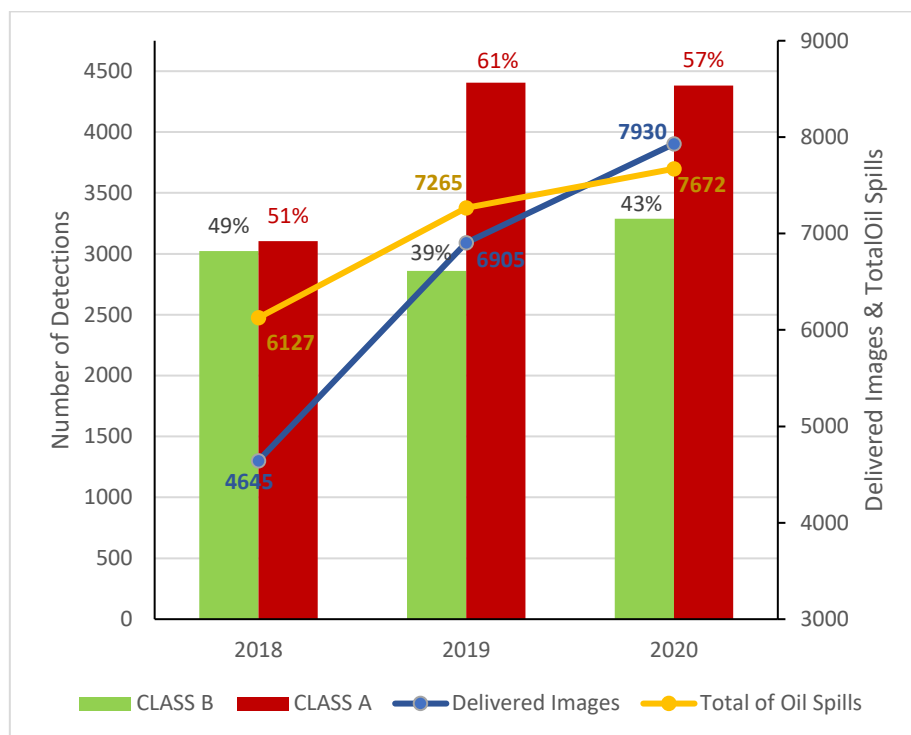


Figure 3 - CleanSeaNet possible oil spills detected per Class: 2018 – 2020.

Figure 4 below shows the total number of possible spills detected and the average number of possible spills detected per million km<sup>2</sup>.

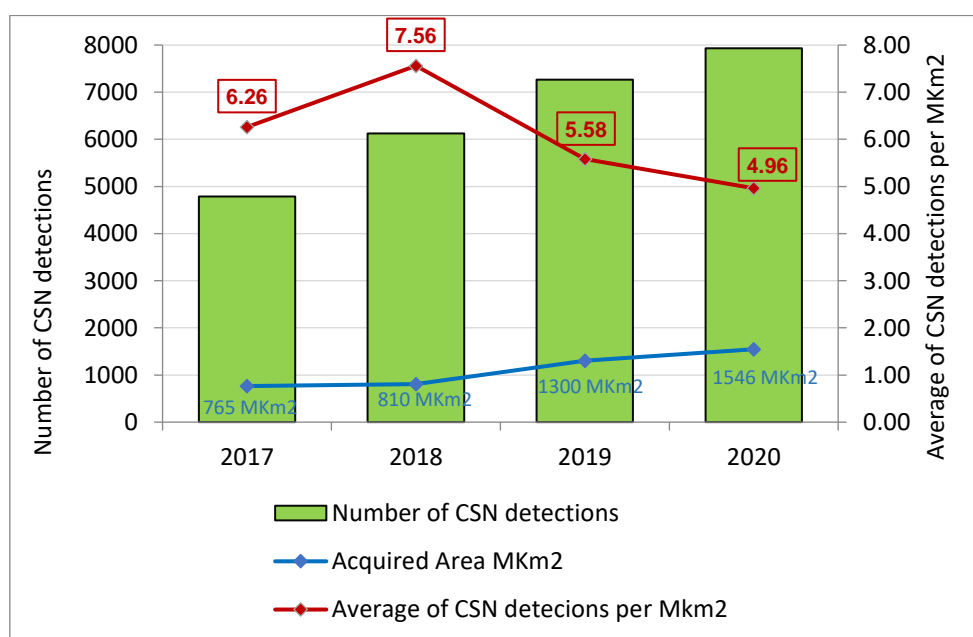


Figure 4 - CleanSeaNet possible pollution detected: 2017 – 2020.

Between 2016-2018 there was a gradual increase in the trend of number of possible spills detected per million km<sup>2</sup>. As stated previously this is due to the increased use of Sentinel-1 that enabled detection of much smaller spills. As from the 2018 onwards the ratio of use of Sentinel to other satellites has stabilized, and therefore the size of the spills detected is not impacting the trend any longer. Therefore, there in 2019 the trend started reversing.

The area monitored was about 1,546 billion square kilometre in 2020 (an increase of 19% comparing with 2019), which is coupled with a considerable reduction in the average number of detections per million km<sup>2</sup> from 5.58 in 2019 and to 4.96 in 2020.

The histogram in the figure below presents the distribution of possible oil spill detections classified according to their area (km<sup>2</sup>). Overlapped is the cumulative percentage for each area class of oil spill ( $\sum$ number of detections in area class / total number of oil spills detected in the year). In 2020 the oil spills are in generally similar in size when comparing with 2019, 54% of the CSN detected possible oil spills are lower than 2km<sup>2</sup> and 81% are lower in size than 7km<sup>2</sup>.

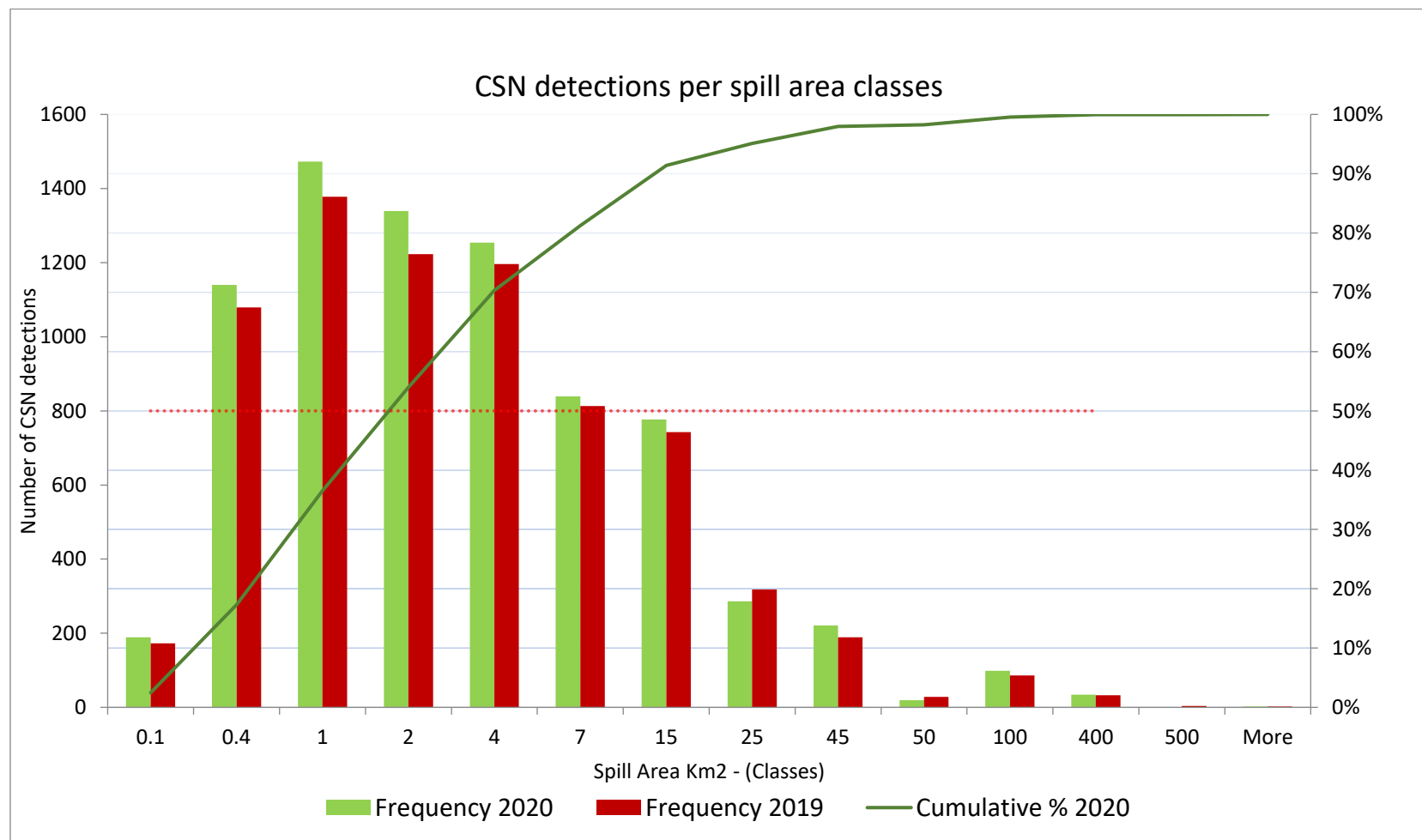


Figure 5 - Histogram of CleanSeaNet Oil spill detections according to area-classes (km2): 2020 vs 2019.

## 2.4 Geographical distribution of detections

Figure 6 shows the distribution of possible oil spills detections within the alert areas of EU coastal States (except French Outermost Regions), Iceland, Norway, Turkey and Montenegro.

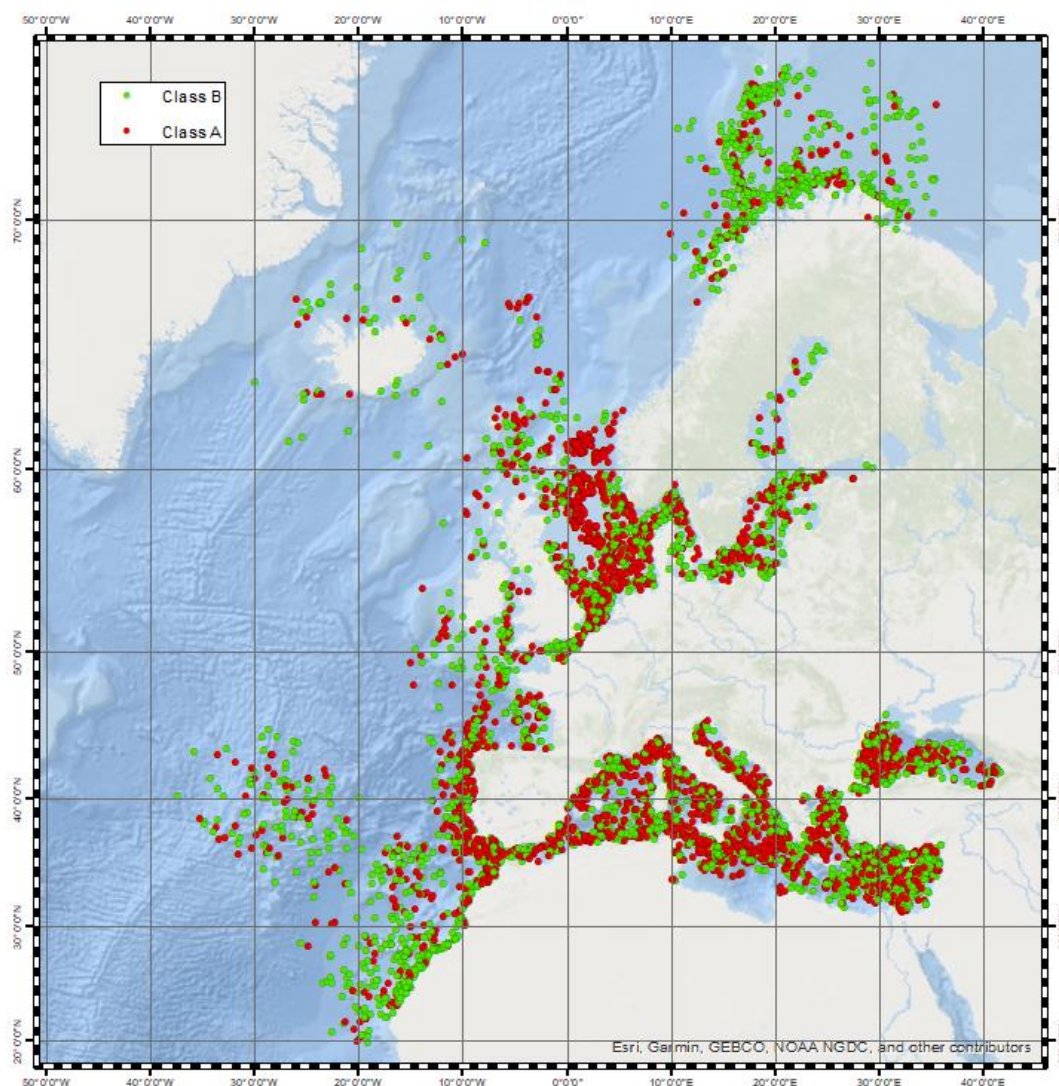


Figure 6 - Map of (probable and possible) spills detected in EU coastal States (except French Outermost Regions), Iceland, Norway, Turkey and Montenegro, 2020.

Figure 7 shows the distribution of detections of probable and possible oil spills in the French Outermost Regions.

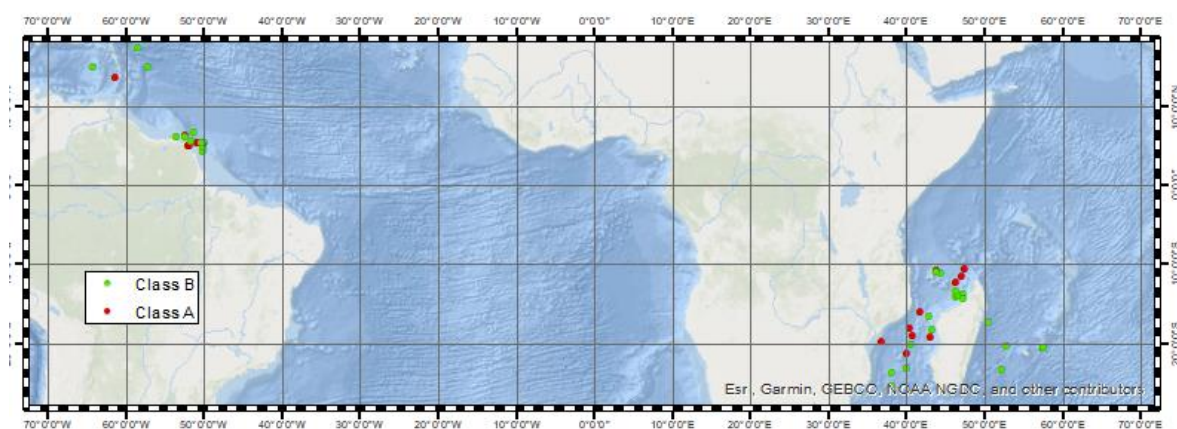


Figure 7 - Map of (probable and possible) spills detected in French Outermost Regions, 2020.

### 3 Actions required

The CSN User Group is invited to take note of the information provided.