

## Meeting: CSN 21<sup>st</sup> User Group Meeting

**Place and date:** Lisbon, 9 March 2022

**Agenda item:** CSN service results

**Document number:** CSN 21.2.1

**Submitted by EMSA**

Summary	This paper provides summary information on the CleanSeaNet service results and performance in 2021.
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 service results of CleanSeaNet in 2021 and the near real time performance of the service.

The service is available to 24 coastal States:

- 22 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;
- Two European Free Trade Association (EFTA) coastal States: Norway and Iceland;

The figures presented in this paper refer to the service offered to the abovementioned 22 EU and 2 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.

## 2 CleanSeaNet results

### 2.1 Image delivery

The CleanSeaNet service delivered 6693 images using SAR imagery from Sentinel-1A/B (S1), Radarsat-2 (RS2), and TerraSAR-X/PAZ (TSX/PAZ) missions during 2021. Optical images were delivered by the CleanSeaNet service but in the context of exercises and emergency requests only. The optical imagery results are addressed in the paper CSN 21.3.1 Support operations, exercises and emergencies.

The Figure 1 shows the images delivered and the area monitored in the last three years. The number of images delivered in 2021 (6693) decreased by 16% when compared with 2020 (7924). The main reason for this decrease is related to the budget adjustment in 2021. In fact, the 2021 and 2019 budgets had the same

order of magnitude while the 2020 budget was substantially higher than the other two. The area covered by the service, in million square kilometres, followed the same decreasing trend (12% decrease) when compared with last year. In any case, the coverage requirements of all Member States were met and even exceeded in what concerns 2021 results.

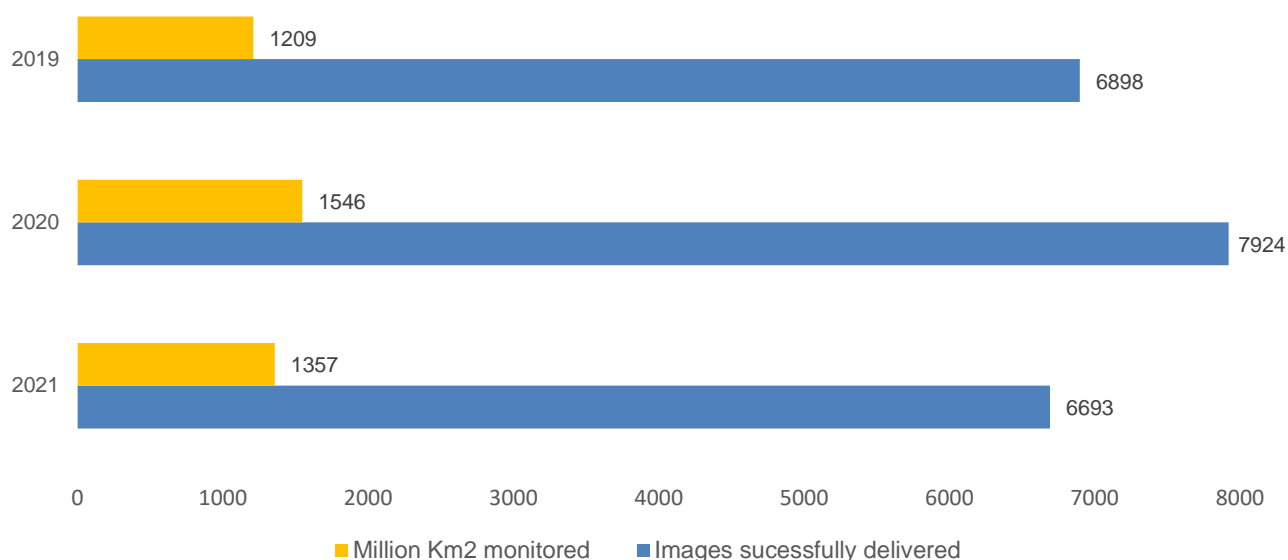


Figure 1 - CleanSeaNet delivered images and area monitored, 2019 - 2021

Table 1 shows the delivery ratio of the SAR satellite missions and compares the data with 2020. The delivery ratio of the RS2 and TSX/PAZ improved by 2% and 3%, respectively, when comparing 2020 with 2021. The S1 delivery ratio decreased 1% due to satellite unavailability during 2021, particularly due to the S1-B failure registered in late December.

Table 1 - CleanSeaNet images ordered and delivered per satellite mission 2020-2021

Satellite mission		2021	2020
SENTINEL-1A/B	Delivered Images	5924	7076
	% of delivery	(96%)	(97%)
RADARSAT-2	Delivered Images	433	462
	% of delivery	(96%)	(94%)
TERRASAR-X/PAZ	Delivered Images	336	386
	% of delivery	(96%)	(93%)
Total	Delivered Images	6693	7924
	% of delivery	(96%)	(96%)

The average monthly coverage of the CleanSeaNet areas is shown in the density map of Figure 2. This map shows the coverage requirements delivery and the average number of satellite images delivered in the EU and EFTA coastal States and French Outermost Regions.

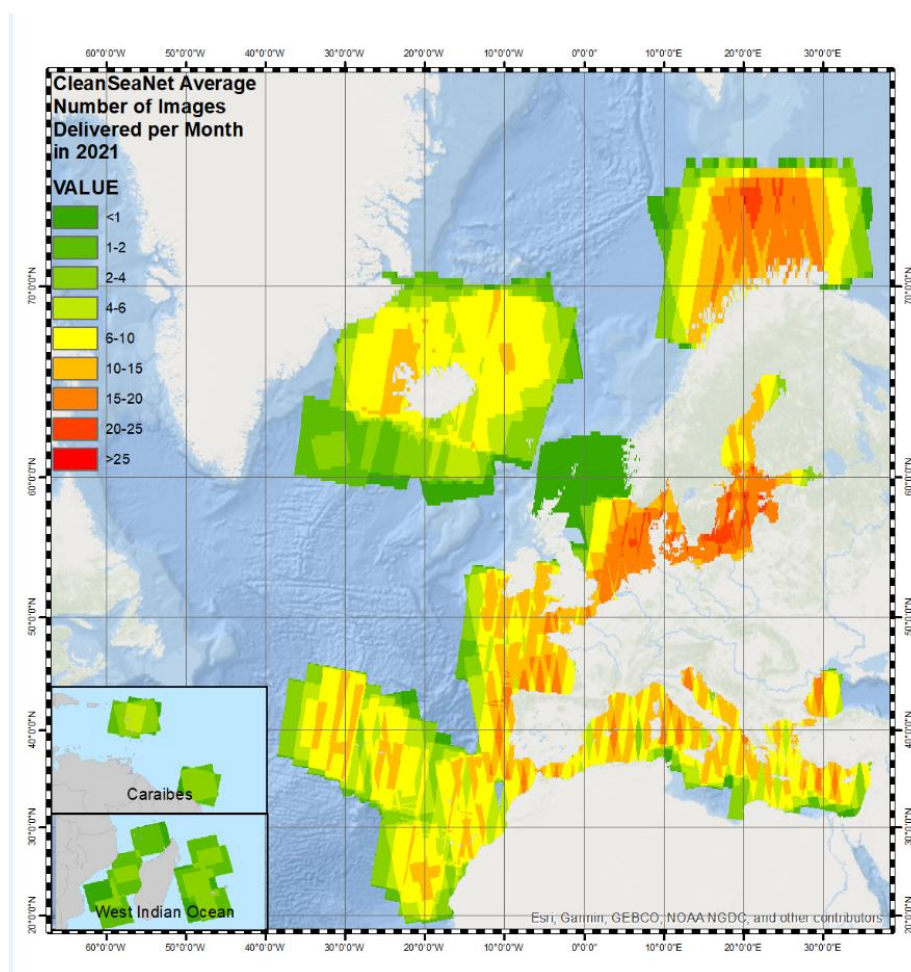


Figure 2 – CleanSeaNet density map monthly coverage in 2021

## 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. EMSA's contracts for the provision and processing of EO data, signed in 2018, introduced requirements for faster delivery of information to end users. Oil spill analysis sent to users became faster in the last few years and for most images the service is available within 20 minutes after image acquisition. Larger products, *i.e.* images over 150 000 km<sup>2</sup>, require additional time for processing and have a greater delivery time. Figure 3 shows the CleanSeaNet QRT performance of the EO services delivered by all SAR missions in 2021.

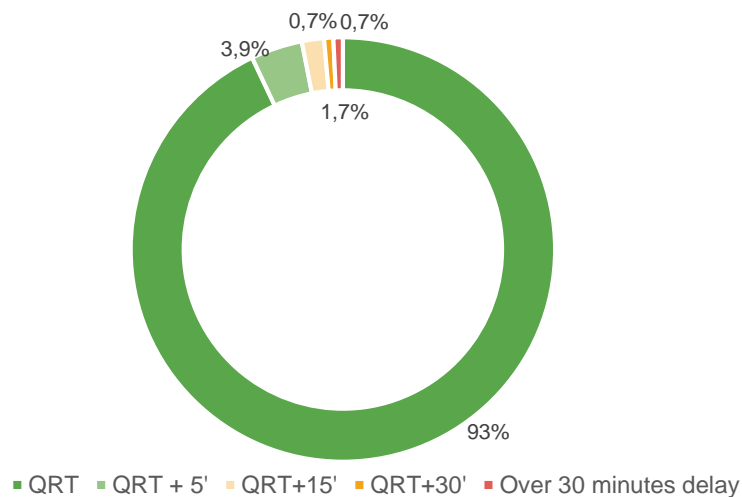


Figure 3 - CleanSeaNet QRT Performance (% of services per QRT service) - 2021

Figure 4 shows that during 2021, 93% of the total oil spill notifications were available to end users for analysis in less than 20 minutes, which confirms the rising tendency of the last years.

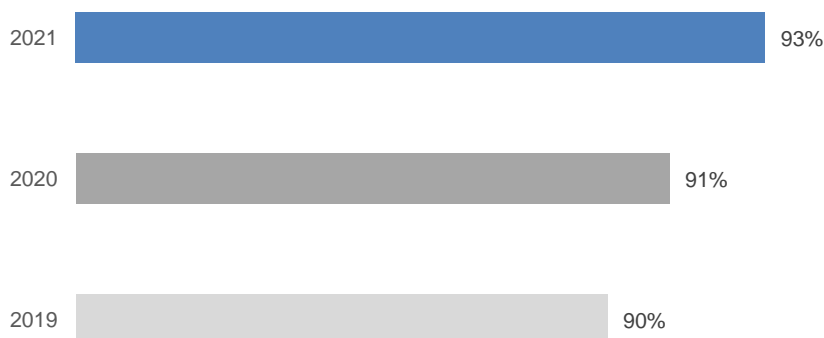


Figure 4 – Delivery times (QRT 20min) of oil spill notification in 2019 - 2021

## 2.3 CleanSeaNet detections

CleanSeaNet detections consist in possible oil spills detected in satellite imagery. The likelihood of a certain detection being an oil spill is indicated by two classification levels: Classification A and B. In 2021 the likelihood of the CleanSeaNet detections were (Figure 5):

- **Class A** detected spill has a higher detection confidence level: total of 3030 detections (49% of the detections)
- **Class B** detected spill has a lower detection confidence level: total of 3176 detections (51% of the detections)

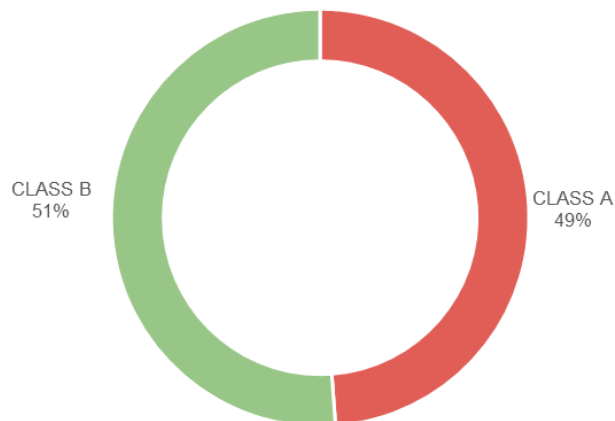


Figure 5 – Likelihood of CleanSeaNet detections 2021

The results displayed in Table 2 evidence that there were far less oil spills being detected in the 2021 than in 2020. In 2021, a total of 6206 possible oil spills were detected in 6693 delivered images. Comparing both years, there was a decrease of 20% of detected oil spills, accompanied by the decrease of 16% in the total number of images delivered. Considering the average of spills detected per image there was a reduction from 0.97 in 2020 to 0.93 in 2021, translated into a 4% drop.

Table 2 – Overview of CSN detections and delivered images

CSN Detections	2021	2020
Class A	3030	4383
% Class A	49%	57%
Class B	3176	3289
% Class B	51%	43%
Total CSN detections	6206	7672
Total of delivered Images	6693	7924
Average detections per image	0.93	0.97

Figure 6 shows the total number of possible spills detected and the average number of possible spills detected per million square kilometres, in the last three years.

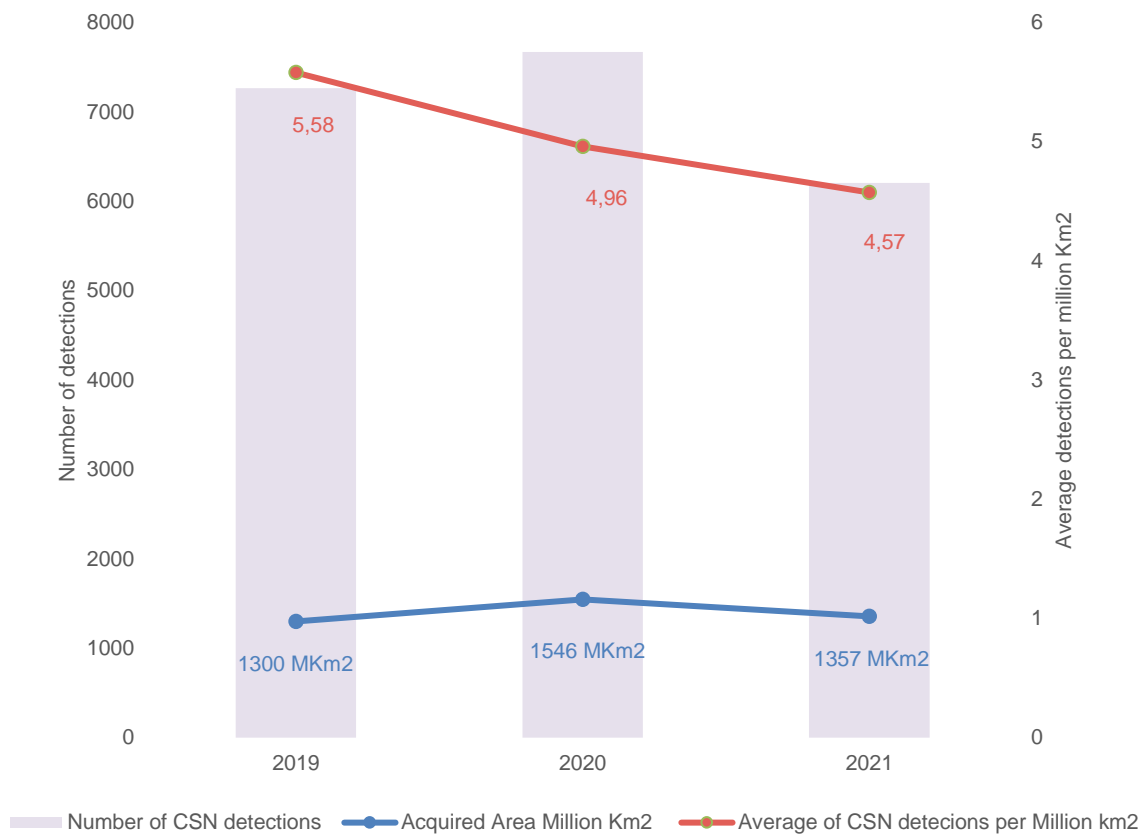


Figure 6 - CleanSeaNet possible pollution detected: 2019 – 2021

Previous CleanSeaNet User Group reports highlighted that in the period 2016 - 2018 there was a gradual growth in the number of possible spills detected per million square kilometre and that this was due to the intensified use of S1, which enabled the detection of much smaller spills. It was also acknowledged that in 2019 this trend inverted, as the size of the detected spills was not impacting the trend anymore.

The decreasing trend of the number of CSN detections per million square kilometres continued throughout 2020 and 2021. In 2021, the average number of possible CSN detections per million square kilometres was 4.96 and in 2020 was 4.57, evidencing an 8% decrease.

The histogram in Figure 7 presents the distribution of possible oil spill detections classified according to their area (km²). Overlapped is the 2021 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 2021, 51% of the CSN detected possible oil spills were lower than 2 km² and 71% were lower than 7 km².

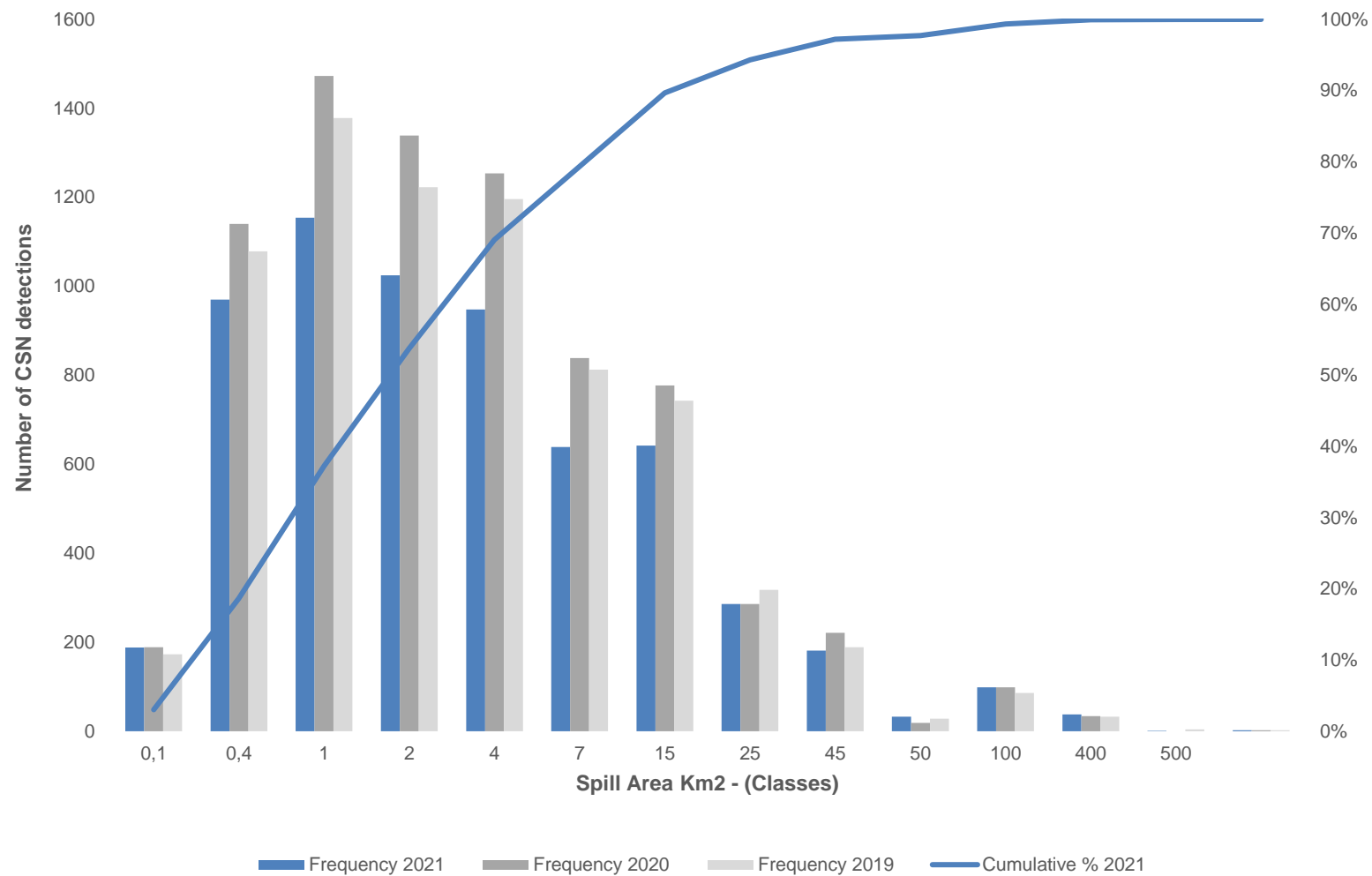


Figure 7 - Histogram of CleanSeaNet Oil spill detections according to area-classes (km2), 2019-2021

## 2.4 Geographical distribution of detections

Figure 8 shows the class A and B distribution of the possible oil spill detections within the alert areas of EU coastal States (except French Outermost Regions), Iceland and Norway in 2021.

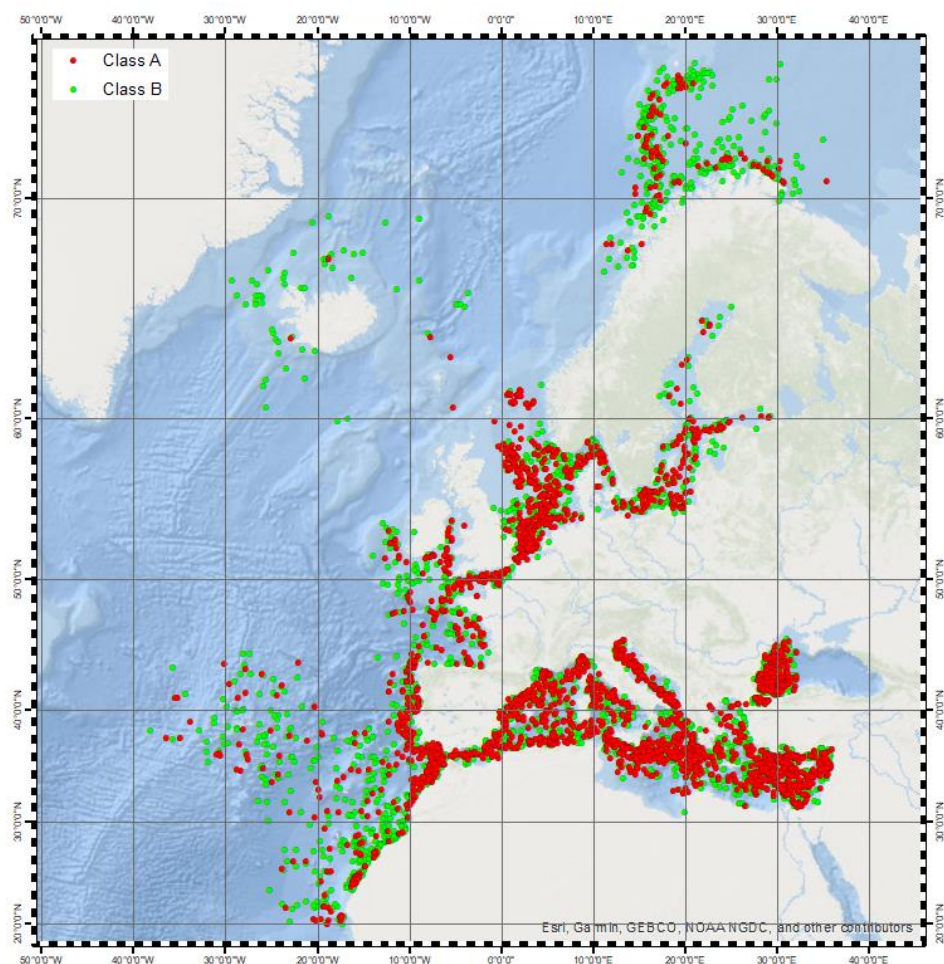


Figure 8 - Map of possible oil spills detected in CSN coastal States (except French Outermost Regions) in 2021.

Figure 9 shows the class A and B distribution of detections of possible oil spills in the French Outermost Regions, in 2021.



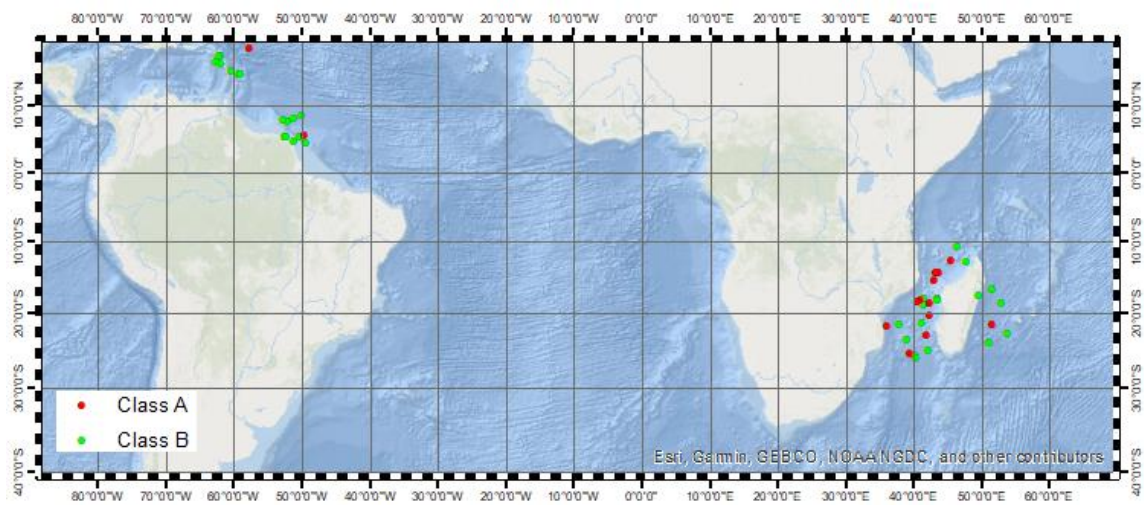


Figure 9 - Map of possible oil spills detected in French Outermost Regions, in 2021

### 3 Actions required

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