

North Sea aerial surveillance in 2022

In 2022, the Royal Belgian Institute of Natural Sciences (RBINS) performed a total of 244 flight hours over the North Sea in the framework of the national programme of aerial surveillance. 19 cases of operational discharges by ships have been observed. Additionally, suspicious sulphur values have been measured in the plumes of 47 vessels, while 35 vessels showed suspicious nitrogen values in their exhaust plumes. The aircraft also successfully participated in an internationally coordinated surveillance mission of the oil and gas installations in the central part of the North Sea and another international mission concerning the detection of chemical pollution at sea, combined with air emission controls at the border of the ECA (Emission Control Area) in Bretagne, France. In addition, two seasonal surveys of marine mammals were carried out. Finally, the aircraft also performed a number of on-call flights at the request of various Coast Guard partners for purposes such as checking for oil pollution, supporting a rescue operation for transmigrants at sea and assisting in the recovery of search and rescue (SAR) equipment lost at sea during an exercise.



The Belgian surveillance aircraft in action over the navy vessel P902 POLLUX during a national pollution response exercise POLEX. (©Belgian Navy)

Overview of surveillance flights

A total of 244 flight hours were performed over the North Sea in 2022 as part of the national aerial surveillance programme. This programme is organised by the Scientific Service MUMM (Management Unit of the Mathematical Model of the North Sea) of the Royal Belgian Institute of Natural Sciences, in collaboration with the Ministry of Defence.

Most of the flight hours were for national flights (220 hours)

- 211.5 hours in the context of the Belgian Coastguard:
 - 164 hours for pollution control: 74 hours for the detection of discharges of oil, other harmful substances and garbage ([MARPOL](#) Annex I, II and V respectively) and 90 hours for the monitoring of sulphur and nitrogen emissions from ships (MARPOL Annex VI/ SO₂ and NO_x ECA - Emission Control Area enforcement, see further) ;
 - 42.5 hours for fishery control, on behalf of and in cooperation with the Flemish Fishery Inspection Services;
 - 3 hours 'on call', during which flights were activated in response to specific alerts, namely for the verification of pollution at sea, to support a rescue operation at sea of transmigrants in French waters, and to assist in the recovery of SAR equipment lost at sea during an exercise.
 - 2 hours in the framework of a pollution combating exercise.
- 8.5 hours for marine mammals monitoring.

In addition, 24 hours were spent on international flights, mainly in the framework of the [Bonn Agreement](#), i.e. for a 'Tour d'Horizon' mission (to monitor drilling platforms in the North Sea) but also as part of a participation in the 'MANIFESTS Sea Trials', an international exercise held in Bretagne (France) and concerning the detection of chemical pollution. During this exercise, the Belgian Coast Guard aircraft carried out a small-scale air emission monitoring campaign at the ECA border (see below).

Accidental spills from ships

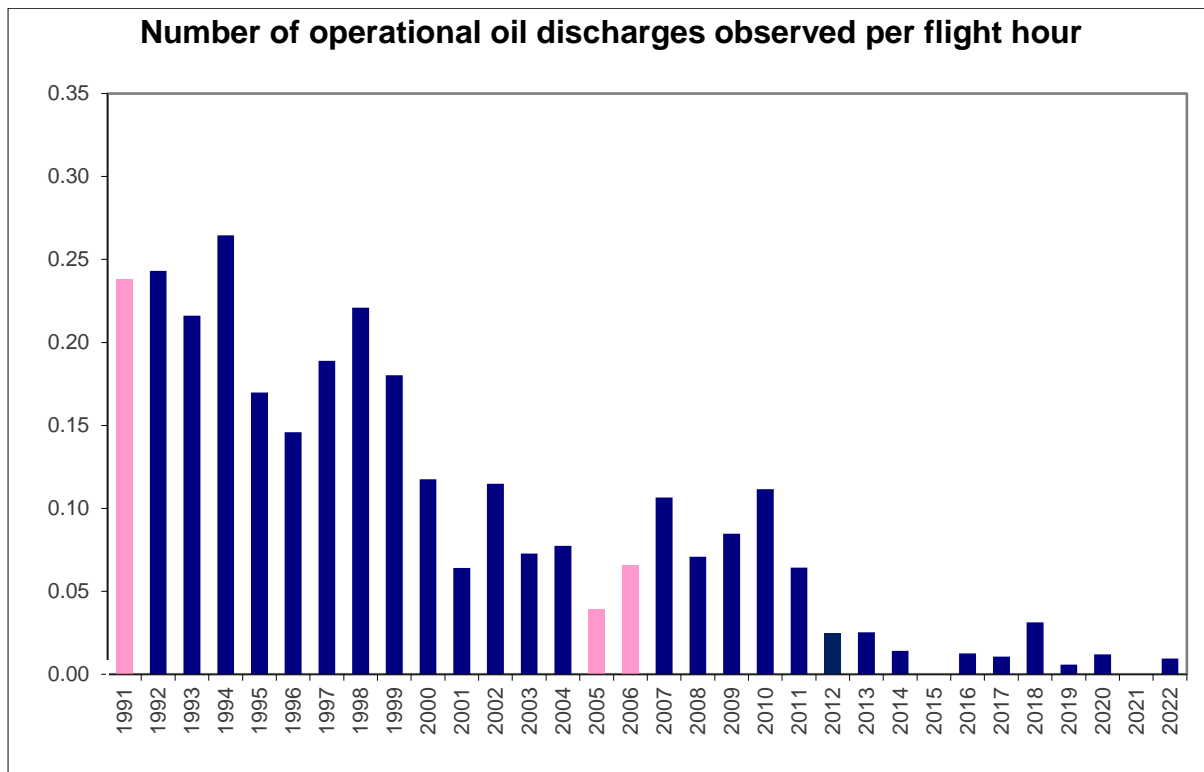
In August 2022, a few oil slicks were observed during several flights in British waters off Ramsgate, along the 'South Fall' sandbank. These slicks apparently came from a leak in the fuel tank of an old sunken wreck. Several British vessels were involved in the clean-up. There was no direct impact on Belgian waters.

Operational discharges from ships

2 operational discharges were recorded in 2022, which confirms the downward trend in observations indicating that the number of operational oil spills has decreased significantly over the last decade (see graph below).

The first, very weathered, oil discharge was observed at the estuary of the Westerschelde in Dutch waters. The oil slick was not treatable and could not be linked to a polluter.

A second (limited) oil slick was observed in the anchorage area of the Westhinder and appeared to be linked to a bulk carrier at anchor. A check on board the vessel by the Coast Guard (via the Navigation Police) did not bring any new elements that could have confirmed the suspicion of a violation.

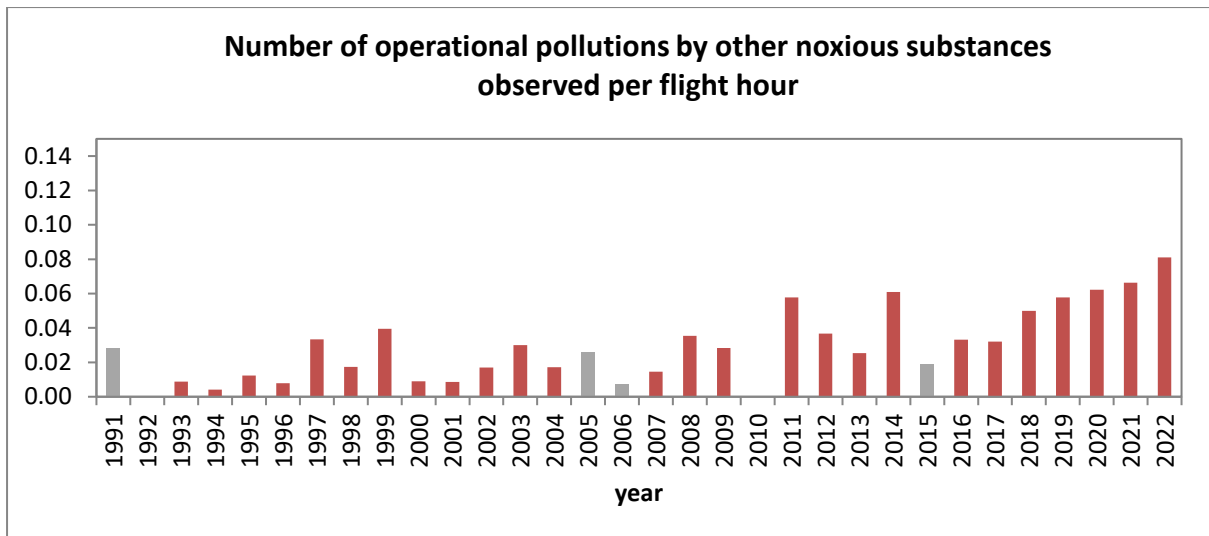


In 2022, no violation of Annex V of the MARPOL Convention concerning the pollution by garbage and solid bulk materials was observed.

However, no less than 17 cases of operational pollution (from ships) with noxious liquid substances other than oil (MARPOL Annex II) were observed.

Of these 17 observations, one pollution incident could be linked to a ship in British waters. Radio contact was established by VHF with the ship, which stated that it was an authorised discharge of FAME (fatty acid methyl ester) and that the UK Maritime Coast Guard Agency was informed of the operation. A flight report about this FAME discharge was written and transferred to the relevant UK authorities for verification and further follow-up.

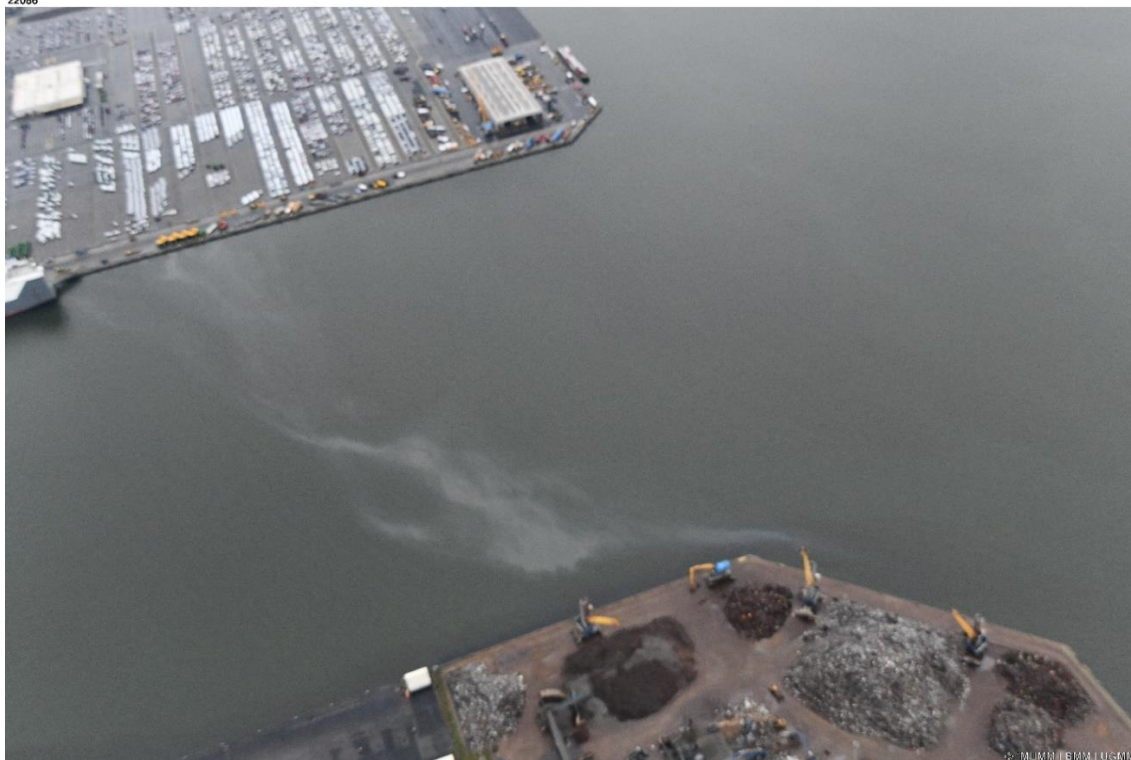
Contamination by harmful liquid substances other than oil remains a common problem, which, as reported in previous years, even appears to be on the rise (see graph below). It should be noted here that this often concerns legal discharges that are in accordance with international discharge standards, as contained in Annex II of the MARPOL Convention. Since 2021, the MARPOL Annex II discharge standards have also been tightened for so-called 'persistent floaters' such as paraffin-like substances, for which no violations were observed in 2022.



Oil pollution in Belgian ports and the Westerschelde

3 oil slicks were also identified in Belgian ports: 2 in the port of Antwerp and 1 in Ostend. The 2 oil slicks in the port of Antwerp were observed during transit flights between Antwerp airport (the aircraft's home base) and the North Sea. One of these two detections involved a group of 3 smaller spots with 5 different ships in the vicinity of the pollution. The spots could not be clearly linked to any of these ships. The other slick was spotted at the Antwerp gas terminal during a bunkering operation. An oil slick was also observed in the port of Ostend in 2022. At the time, it was a small slick with no polluter and too limited to be combated. All these observations were immediately reported to the competent authorities for follow-up.

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Oil pollution in the port of Antwerp-Bruges as seen from the Coast Guard aircraft © RBINS/MUMM

Monitoring of sulphur and nitrogen emissions from ships at sea

By using a sniffer sensor in the aircraft, our country is considered a pioneer in the international fight against the air pollution from ships at sea (monitoring and enforcement of annex VI of the MARPOL convention). The sensor allows the measurement of various air pollutants in the exhaust of ships in real conditions.

The measurement of sulphur emissions has already been part of the programme since 2016. In order to monitor the strict sulphur limits that apply to ship fuel in the North Sea Emission Control Area (ECA), 61 sniffer flights (for a total of 91 hours) were carried out by the aircraft in 2022 over the Belgian monitoring area. Of the 965 ships whose sulphur emissions were measured, 47 had a suspiciously high sulphur content. These ships were duly reported to the relevant maritime inspection services and 13 were subsequently inspected on shore.



Belgian Coast Guard aircraft in operation during a 'sniffer' flight © RBINS/MUMM

Thanks to the successful integration of a NO_x sensor in 2020, MUMM's aircraft can also measure the concentration of nitrogen compounds (NO_x) in the exhaust plumes of ships in order to monitor and enforce the stricter limits that apply from 1 January 2021 in the North Sea Emission Control Area. Belgium has thus become the first country ready to monitor these stricter restrictions. Of the 963 ships for which nitrogen emissions were monitored in 2022, 35 suspicious values were reported.

Since 2021, a new sensor has been added to the sniffer set-up, namely the black carbon sensor. This sensor measures the amount of black carbon in the exhaust plumes of ships, which is a measure for the soot concentration. The soot concentration of 182 ships was measured in 2022. When exceptionally high soot concentrations are measured, the competent maritime port authorities are asked to take a sample of the fuel used. In 2023, these fuel samples will be analysed in the OD Nature laboratories in Ostend.



Exhaust plume from a container ship © RBINS/MUMM

International 'Tour d'Horizon' mission

During the annual international 'Tour d'Horizon' mission to monitor marine pollution from oil rigs in the central North Sea (in Dutch, Danish, British and Norwegian offshore waters), carried out under the Bonn Agreement in September 2022, the surveillance aircraft detected a total of 16 spills, of which 15 were oil spills and 1 was a spill of an unknown substance that could not be visually verified due to a low cloud ceiling.

13 spills could be directly linked to an oil platform. The three remaining slicks were observed without ships or platforms in the vicinity. All these observations were systematically reported to the competent coastal State for further follow-up, in accordance with international procedures.



Oil spill connected to an offshore oil installation, as observed from the surveillance aircraft during the international TdH mission in 2022. © RBINS/MUMM

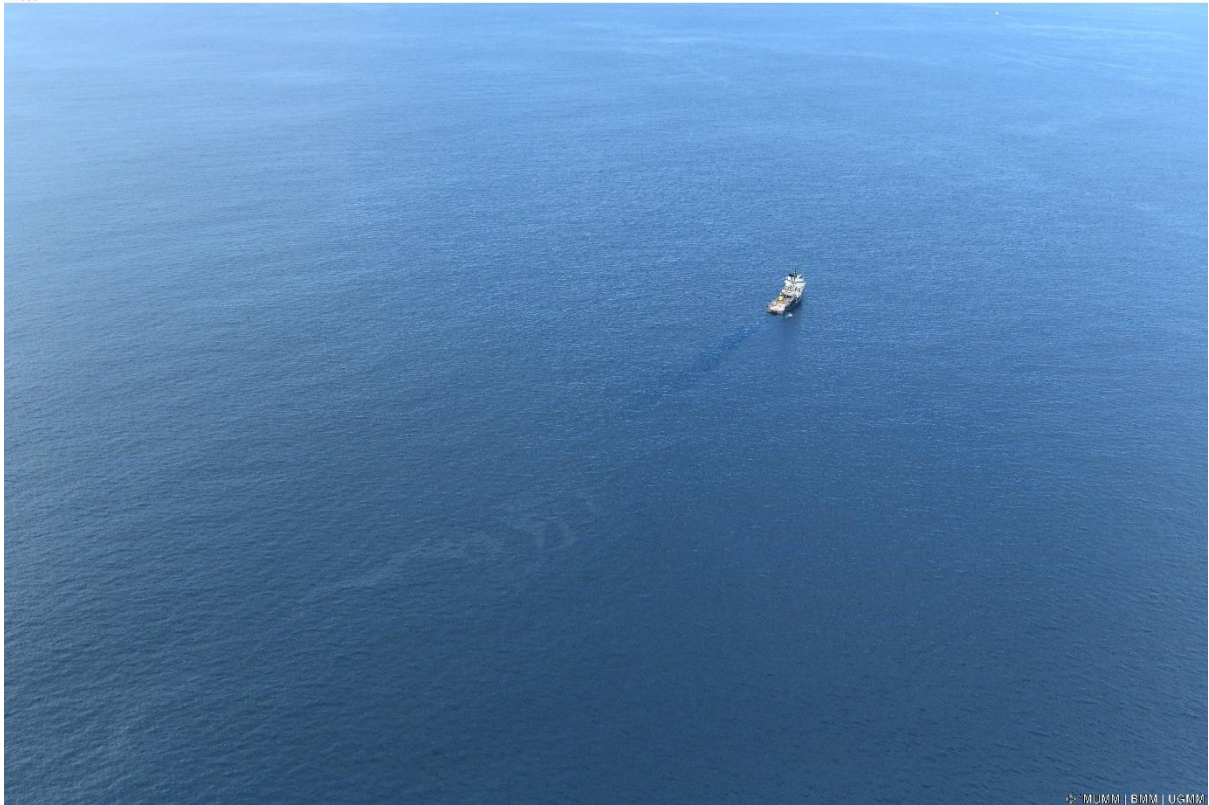
Other international missions: "MANIFESTS" Sea Trials and ECA border measurement campaign

From 30 May to 2 June, the aircraft participated in an international exercise in Bretagne (France) for the detection of chemical pollution. This mission was carried out in combination with air emission measurements at the border of the ECA area. Pollution by other chemicals at sea is an important issue as it is constantly increasing. Moreover, the large number of different chemicals transported, their respective behaviour at sea and the complexity of the regulations (MARPOL Annex II) make it necessary to increase efforts in this field of research. The MANIFEST project has identified the main categories of chemicals transported. Several sensors were tested to determine their ability to identify different substances. This was first done in the laboratory, but the final trial was an exercise at sea where the sensors were tested on ships and in airborne assets. The sea exercise went well and our aircraft was able to make a constructive contribution to the data collection. It is now up to the scientists to optimise the sensors to better monitor chemical releases in the future.

For the first time this year, air emission monitoring was also carried out at the border of the ECA area, north of Brest, at the entrance to the English Channel. There, ships are required to switch to low-sulphur fuels. A total of 62 ships were inspected during this mission, of which 18 were inspected in the immediate vicinity of the border and the remaining 44 were measured on their way to/from Bretagne. Of the 18 ships inspected at the border, 6 had suspicious sulphur levels and 2 had high NO_x emissions. 1 vessel was even observed with high NO_x values in its exhaust and high sulphur content in its fuel. These preliminary results seem to clearly show that increased surveillance at the border of the ECA is necessary in order to improve the application of Annex VI of the MARPOL Convention.

RBINS-MUMM has already issued a press release on this subject (see: https://odnature.naturalsciences.be/mumm/en/blog_news/post_2163)

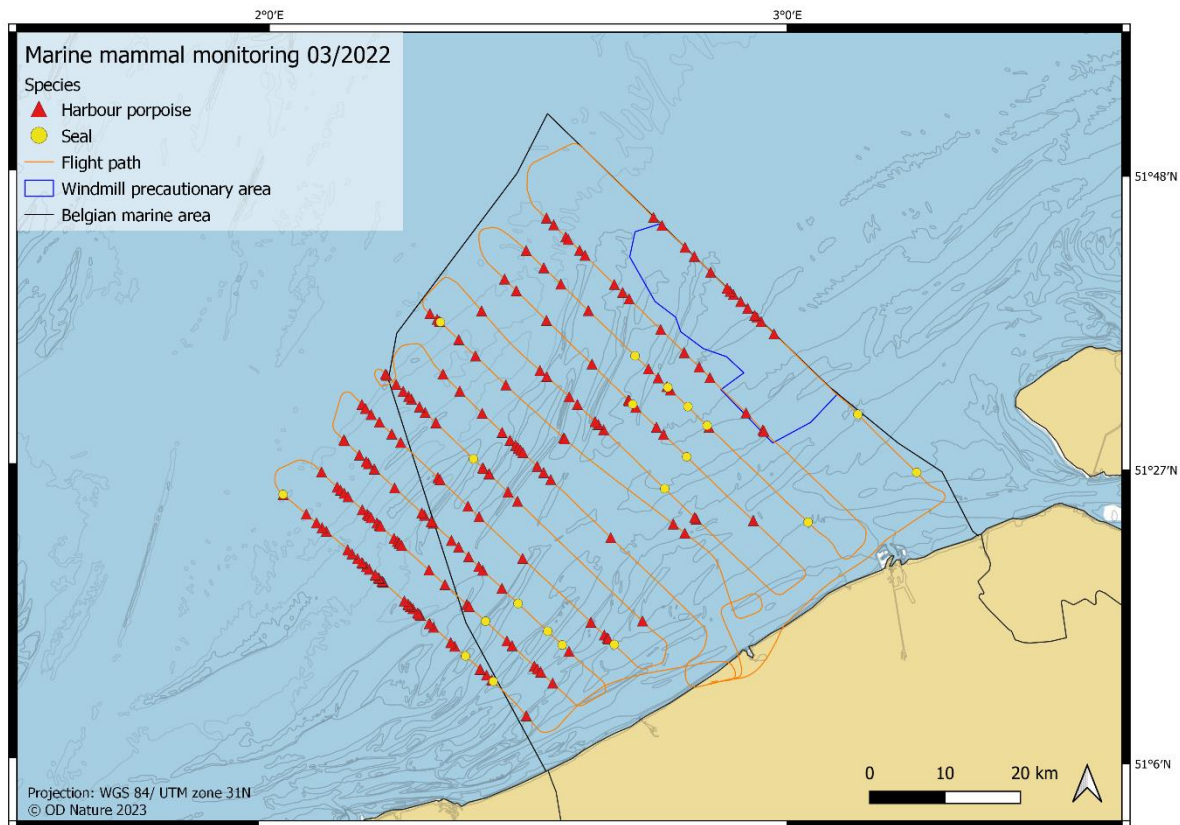
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Slick of chemicals observed from a Belgian Coast Guard aircraft © RBINS/MUMM

Monitoring of Marine Mammals

In 2022, the RBINS conducted marine mammals surveys in March and October. Respectively, 235 and 45 harbour porpoises were observed, resulting in average concentrations of 3.3 and 0.8 animals per km² of observed area. This is a lot of harbour porpoises for a surface area similar to that of Belgian waters, yet largely overlapping: over 11,000 in March and over 2,000 in October. A relatively high number of seals were also observed in 2022: 20 in March and 40 in October. There has never been so many.



Observations during the March 2022 campaign: harbour porpoises in red and seals in yellow © RBINS/MUMM

Extended maritime surveillance in the framework of the Coast Guard: navigation violations.

Within the framework of the cooperation within the Belgian Coast Guard, the surveillance aircraft also contributes to broader missions of enforcement of maritime regulations and safety at sea. For example, MUMM's air operators regularly report violations of navigation at sea to the Maritime Security Centre Belgium (MIK), such as ships sailing in the wrong direction in the shipping lanes. Operators also monitor areas at sea surrounded by a safety perimeter (e.g. around wind farms) and report suspected breaches of the rules relating to the automatic identification system (AIS) for ships.

In 2022, no less than 17 vessels were observed without AIS, an automatic identification system that, among other things, helps to avoid collisions. The vast majority (94%) of these being fishing vessels, this is a significant increase that confirms the upward trend already observed in recent years since all fishing vessels are required to use an AIS (since 2020 and the promulgation on 26 June 2022 of the Royal Decree on the introduction of several safety measures for fishing).

In addition, 11 violations related to entering prohibited areas were also reported to the competent authorities last year. This figure is also on the rise, which can be partly explained by the introduction of some new areas to be controlled, such as the aquaculture farm off the coast of Nieuwpoort and the calibration area for scientific instruments (near Ostend).

Finally, 46 navigation violations in the traffic separation scheme ("TSS") were observed by the Coast Guard aircraft in 2022. This is also a significant increase and mainly concerns vessels sailing in the opposite direction ("ghost sailing") or dropping anchor in one of the shipping lanes. These observations were systematically reported to the Directorate-General for Shipping (FPS Mobility and Transport) for follow-up. In view of the increasing number of violations and the consequent increased risk of collisions, the Directorate-General for Shipping has been carrying out specific legal follow-up on this subject since January 2023.



Intrusion of three fishing vessels into the safety perimeter of the Oostdyck radar tower © RBINS/MUMM