NOVEMBER 2020 #40

Information Bulletin

Centre of Documentation, Research and Experimentation on Accidental Water Pollution

FEATURE: Aquatic litter

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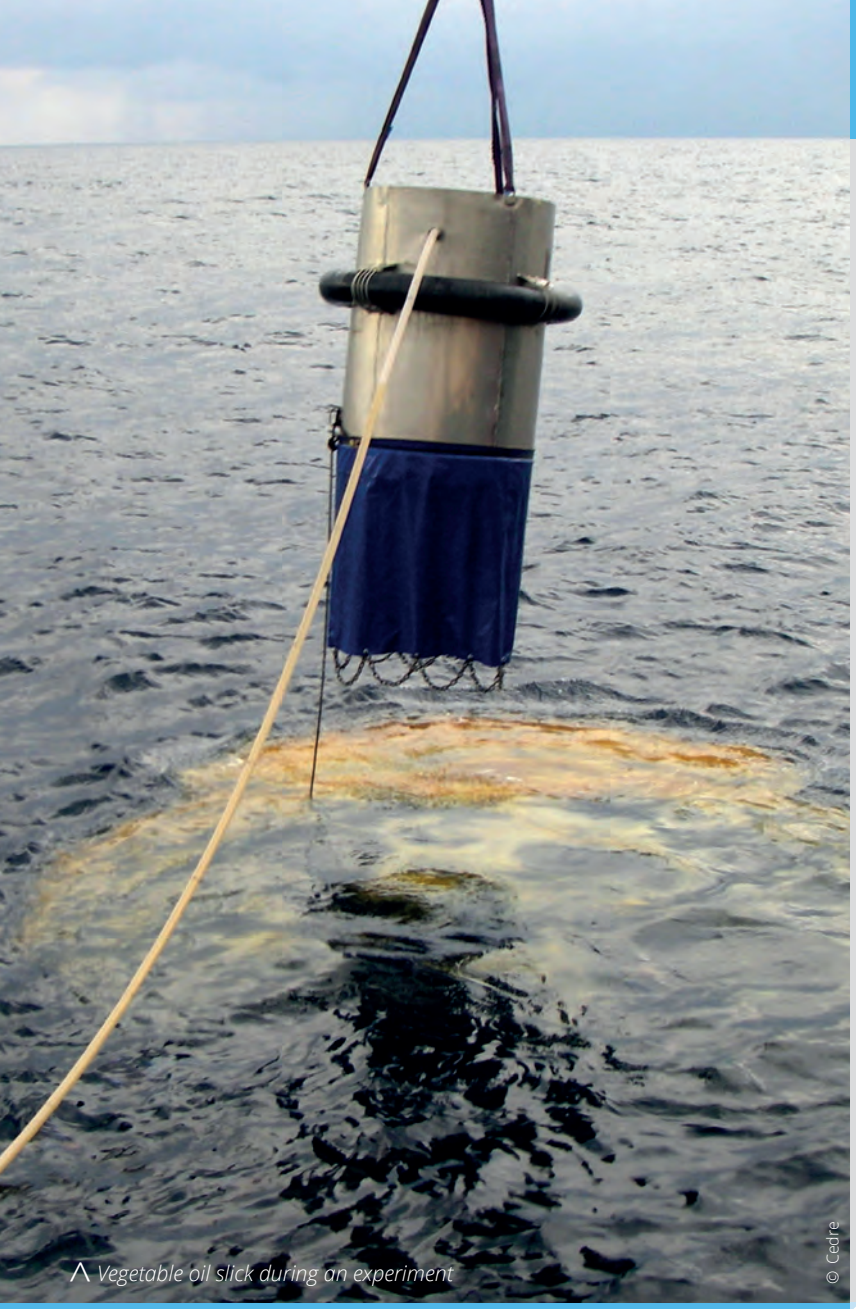

Vegetable oil slick during an experiment

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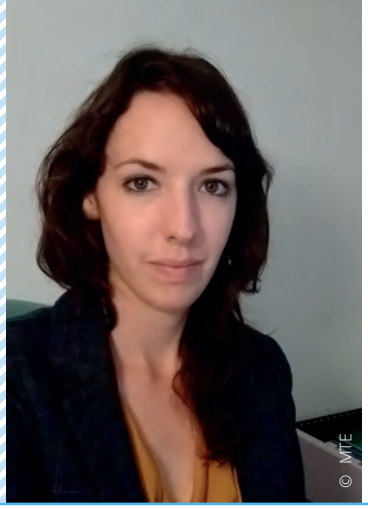


EDITORIAL

Litter at sea and on the shoreline, in particular plastics, is a major concern. It is progressively smothering life in our oceans and defacing our beaches. It also generates high socio-economic costs: cost of clean-up operations, negative impacts on tourism and fisheries, etc. The impact on human health is also an issue. Marine litter has various origins:

- activities within catchment areas, sometimes well upstream of estuaries: the litter is then carried by watercourses and wastewater and rainwater drainage networks,

- professional activities at sea (shipping, fisheries, etc.) and other users such as pleasure boaters,

- coastal activities.

The vast majority of aquatic litter is plastic. But what we do not see is also the contamination by microplastics which provide a surface for many species and pollutants, promoting their transfer across long distances (non-native species, viruses, bacteria, metals, etc.).

When litter is present at sea, it is difficult to take action. Cleaning the oceans would be too costly, and litter would continue to reach the sea. Emphasis must be placed on preventing litter at the source, developing reuse, preventing dumping and raising public awareness with a view to fostering resource efficiency and the circular economy.

Against this backdrop, the French Directorate for Water and Biodiversity called upon Cedre for its knowledge of French coastal areas and inland waters. For several years, Cedre has been the focal point for scientific and technical support on the theme of beach litter and microplastics for the French Ministry for the Ecological Transition:

- at national level, for the implementation of public policies relating to aquatic litter reduction and response under the Marine Strategy Framework Directive (MSFD),

- and at international level, in particular under the Regional Seas Conventions (OSPAR, the Barcelona Convention, etc.).

The Ministry is proud to rank among the partners of this first issue of the Cedre Information Bulletin to address the question of aquatic litter.

Bénédicte Jénot,
"Marine Strategy Framework Directive, marine litter and international cooperation" Project Manager,
Marine Ecosystems Policy Office,
French Ministry for the Ecological Transition (MTE)

Cedre celebrates 40th anniversary with an artistic approach!

To mark the 40-year milestone since the first meeting of its Board of Governors, Cedre opted for an original angle by bringing art into our day-to-day scientific reality throughout 2019.

By Agnese Diverres, Information Department Manager at Cedre.

Areas of expertise at Cedre

At the instigation of Thibault Honoré, artist, art lecturer at the University of Western Brittany (UBO) and Director of Studies for the Arts Department, who harbours a passion for scientific mediation and research on resilience, 15 students turned their interest to Cedre and our work. During a first visit, then a discussion session with 3 scientists, they discovered the different job profiles and topics relating to accidental water pollution by oil, chemicals, marine litter and microplastics. They then set to work in pairs on the possible themes and 6 of them chose accidental water pollution as a working focus.

6 student artists in residence

From 20th to 24th May, we thus hosted 6 first and second year students studying for a degree in art at UBO. Accompanied by their tutor, Thibault Honoré, they were able to start their experimentation and research in residency, during which they were able to talk to Cedre's staff to glean their insight and advice.

Sample of drilling extract

In addition, a 7 cm diameter borehole was drilled at Cedre's technical facilities in collaboration with geologists Nathalie Babonneau and Pierre Sans-Joffre from the Ocean Geosciences Laboratory at IUEM (Institut Universitaire Européen de la Mer) with help from undergraduate students studying for a degree in Earth Science, specialised in Geology, at UBO. The matter extracted (sand, drilling mud, gravel and even oil residue) was used to build a sculpture, and a graphical video was produced from the infrared images collected during the drilling.

Glimpse of the Harmonic exhibition

Exhibition and panel session at the RESSAC festival

To celebrate Cedre's 40th anniversary with an original approach and to mark the end of this year of close collaboration between UBO-IUEM research artists and scientists, we partnered the first edition of the "RESSAC" (REcherche S en Sciences Arts et Création) science culture festival organised in Brest from 16th to 22nd November 2019.

Various works were on exhibit in our entrance foyer as part of a project dubbed Harmonic: paraffin sculptures by Thibault Honoré, a digital video by the art students set against a musical composition by Etienne Hendrickx as well as photo coverage of the work and productions made by the students during the week-long residency and exhibited under the project *Pulsatio* in the Abords exhibition room at UBO.

In addition to being one of the festival's 5 exhibition venues, Cedre also organised a panel session on 18th November focusing on the concept of disasters. The panel was composed of Nathalie Babonneau, researcher in marine sedimentology, Florence Poncet, researcher in marine geography at Cedre, Natalia Leclerc, Vice President for Culture and Development at UBO and Thibault Honoré. The exhibition was inaugurated by Bernard Tramier, Honorary President of Cedre's Strategy Committee, whose 50th meeting was held on 22nd November.

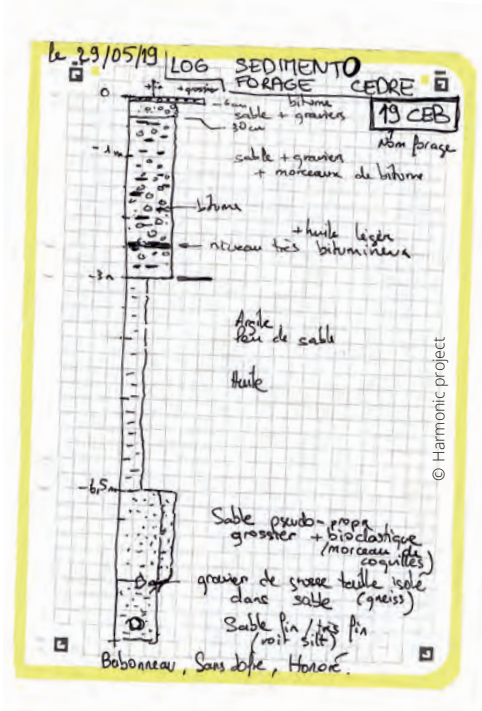


Diagram of the drilling operation which led to the Harmonic project

Marking 20 years since the *Erika* oil spill

By Corinne Caroff, Cedre.

On 12th December 1999, the Malta-registered and Italian-operated oil tanker *Erika* was sailing in severe weather conditions. It issued a mayday and the crew were safely evacuated before the vessel broke in two and the bow section sank in the French Exclusive Economic Zone, south of the Pointe de Penmarc'h. The stern section sank the following day. The two parts of the wreck now lie at a depth of 120 metres. Of the 31,000 tonnes of heavy fuel oil the ship was carrying, almost 20,000 were released into the sea.

On 12th December, France's Maritime Prefect for the Atlantic activated the POLMAR offshore contingency plan and mobilised Cedre: our emergency response centre was activated and our agreement with Météo France was implemented to forecast slick drift, while technical advisers were placed at the disposal of the Maritime Prefect and dispatched to shoreline command posts. Daily reviews were drafted for the authorities.

The following day, simulation experimentation was launched in the Polludrome® with the heavy fuel oil (n°6) spilt from the *Erika* to advise the authorities on the most appropriate response methods. Some 450 km of coastline were oiled and the departments of Vendée, Charente-Maritime, Loire-Atlantique (worst affected area), Finistère and Morbihan activated their POLMAR shoreline contingency plan. In summer 2000, some 11,200 tonnes of oil were pumped out of the wreck by Total. An estimated total of 210,000 tonnes of waste were collected from the beaches and processed. Approximately 150,000 birds, mainly common guillemots, were killed by this oil spill.

Clean-up operations in Belle-Île-en-Mer (Morbihan)

Legal proceedings began on 12th February 2007 and came to a close on 25th September 2012 with the verdict delivered by the Supreme Court which recognised the notion of "ecological damage", allowing nature protection organisations and local authorities to receive compensation. Loopholes in maritime safety in Europe were highlighted and the European Commission put forward measures through the *Erika I*, *II* and *III* legislative packages to prevent such a disaster from reoccurring.

40 years of expertise in accidental water pollution and still seeking innovation opportunities

By François Cuillandre, President of Cedre's Board of Governors.

In 2019, Cedre celebrated its 40th anniversary, its 50th Strategy Committee meeting and its 76th Board of Governors meeting. That's quite an achievement!

Created in the aftermath of the *Amoco Cadiz* spill, Cedre has provided considerable input to the spill response sector both in France and worldwide. Its teams have been deeply committed to large-scale projects, experimentation programmes, groundwork studies, training courses, product analysis and equipment testing, constantly fostering innovation, while always ready 24/7 to respond and provide advice on spills in marine or inland waters, anywhere around the globe.

As President of Cedre's Board of Governors, I am proud of the strategic priorities defined and in particular the decision to focus at European level on litter and microplastic pollution in marine and inland waters, a priority since 2014, in addition to oil and chemical spills. This is a current social issue yet scientists have been aware of it for many years and the wealth of articles in the feature of this issue n°40 of the Cedre Information Bulletin are evidence of this. The French Ministry for the Ecological Transition, a member of Cedre's Strategy Committee, has supported this activity from the outset and is now significantly encouraging the actions implemented to mitigate marine litter and microplastic pollution by tasking Cedre with various projects and responsibilities in this vast field.

I have every confidence that its 50-strong team and its governing bodies will rise to the challenge as they always have before and wish them every success!

Public policies on aquatic litter

Industrial plastic pellets and other microplastics along the high tide line on a beach in southern Finistère

By Bénédicte JENOT, "Marine Strategy Framework Directive, marine litter and international cooperation" Project Manager, Marine Ecosystems Policy Office, MTE

The French Ministry for the Ecological Transition (MTE) pursues an ambitious policy to mitigate this form of pollution. Our responsibility is to act quickly and practically, to rise to this challenge, by involving all the relevant stakeholders. The actions implemented by MTE are defined by the "circular economy" roadmap, MSFD programmes of measures and international actions, as France is involved in many marine litter action plans, including through the G7, the G20, the Regional Seas Conventions, notably OSPAR (see inset), and international and European working groups.

Upstream actions

Within this framework, France has taken severe measures by introducing bans on various single-use plastic items or plastic items with an impact on the marine environment, for instance plastic bags, plates and cups, cotton buds or microbeads used in cosmetics (Law on Energy Transition for Green Growth, Egalim law, Law on reclaiming biodiversity, nature and landscapes, Law against waste and for a circular economy).

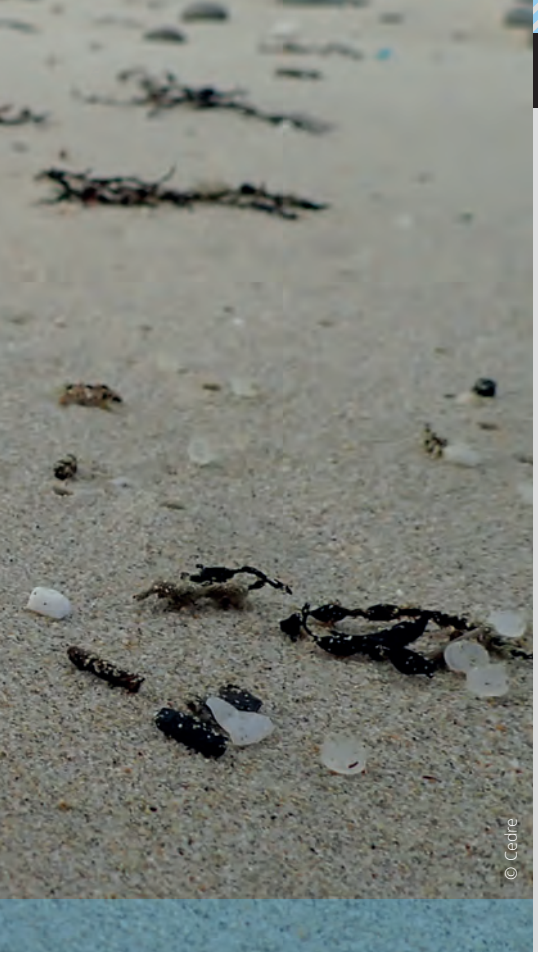
The directive on single-use plastics and fishing gear published in the Official Journal of the European Union on 12th June 2019 reiterates many of these bans and is set to lead to the development of a collection and management chain for waste generated by the fisheries and aquaculture sector. The focus should be on prevention to instigate a change in behaviour. MTE is devoted to seeing plastics transition to a circular economy and supports concrete actions to promote the eco-design, recyclability and use of recycled plastics. The French Government published its circular economy roadmap in late April 2018.

Actions in watercourses and networks

Large quantities of litter are carried to the sea through wastewater and rainwater networks as well as by watercourses. The French biodiversity plan therefore provides for "the recovery of litter and plastic particles before they reach the sea" and an ambitious target of "zero plastic at sea by 2025". To best meet the goals of the roadmap against plastic pollution established by the Interministerial Committee for the Sea in November 2018, MTE developed a draft roadmap "zero plastic at sea 2019-2025". It aims to greatly reduce the input of macro- and micro-litter, in particular plastics, into the seas and oceans by 2025.

This roadmap is organised into 5 areas:

1. Upstream, onshore plastic pollution prevention actions
2. Litter response actions on transfer routes: watercourses, wastewater and rainwater
3. Plastic litter response actions on the shoreline and at sea
4. Awareness-raising, information and education actions
5. Cross-cutting coordination actions.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OSPAR: a Regional Action Plan for Prevention and Management of Marine Litter in the North-East Atlantic

In the early 2000s, following the OSPAR Pilot Project on Monitoring Marine Beach Litter, the OSPAR region countries were the first in Europe to develop a standardised monitoring method for the litter on Europe's beaches and to use it to assess this pollution. In 2010, OSPAR Ministers noted that "quantities of litter in many areas of the North-East Atlantic are unacceptable" and committed to "continue to develop reduction measures and targets" (Bergen Statement) in a bid to "substantially reduce marine litter in the OSPAR Maritime Area to levels where properties and quantities of marine litter do not cause harm to the coastal and marine environment". In this context, the main objectives of the Regional Action Plan are to:

- identify specific sources or items of marine litter that are of most concern,
- develop regional measures to reduce the input of marine litter, taking into account socio-economic aspects,
- define regionally coordinated, operational reduction targets, taking into account the MSFD targets,
- implement monitoring and necessary arrangements required to assess progress towards reaching the targets.

OSPAR definition of "marine litter"

(OSPAR Agreement 2014-01)

Marine litter covers any solid material which has been deliberately discarded, or unintentionally lost on beaches and on shores or at sea, including materials transported into the marine environment from land by rivers, draining or sewage systems or winds. It includes any persistent, manufactured or processed solid material. Marine litter originates from different sea- and land-based sources and is largely based on the prevailing production and consumption pattern.

< *Cover of the Marine Litter Regional Action Plan established within the framework of the OSPAR Convention*

more info
www ospar.org

The actions outlined in the roadmap call upon the mobilisation of the French Water Agencies and the French Environment and Energy Management Agency, ADEME, and focus primarily on litter prevention and awareness-raising among citizens and public stakeholders. They also include actions on watercourses and networks to ultimately prevent and reduce litter in the marine environment. Litter removal systems will be tested by the Water Agencies in the wastewater and rainwater treatment systems. System monitoring will be established to evaluate their efficiency and measure real litter flows.


© Cedre

∧ *Numerous bottle lids collected along a 100 m stretch of beach in the Landes area of France*

The actions set out in the roadmap are intended to provide the basis for action plans under the strategic coastline documents defined by the MSFD.

The issue of microplastics will also be integrated into the 2016-2021 micropollutants plan which aims to gain a better understanding of and reduce substances present in water due to human activities and harmful for flora and fauna. These actions are currently being defined. The main focus will be on metrology, as no standardised method currently exists to measure the microplastic content in water. Actions with local authorities are also under development.

Stakeholder meeting

A multi-stakeholder national marine litter workshop (coordinated by the State and gathering local authorities, scientists, NGOs, professional and industrial federations, etc.) meets twice a year with a single priority: to reinforce coordination between stakeholders involved in implementing litter policies and marine and aquatic environment policies.

The Comité France Océan (CFO), a think tank on the marine environment gathering civil stakeholders, aims to reinforce dialogue and put forward concerted, concrete proposals. Within CFO, a marine litter working group has been set up to discuss concrete actions to be implemented at local, national, European and international levels to mitigate the impact of litter on the marine environment.


© Cedre

∧ *Numerous cotton buds collected along a 100 m stretch of beach in the Landes area of France*

Beach litter monitoring

Litter at the Lamanchs monitoring site (Landes, France)

By Loïc Kerambrun, Camille Lacroix, Marine Paul and Silvère André, Cedre.

The French beach litter monitoring network

Within the framework of the OSPAR Convention, a marine litter monitoring programme based on a specific protocol was launched in the early 2000s, to which contracting parties are required to contribute. In France, this monitoring did not start until the beginning of the 2010s when, at the request of the French environment ministry, Cedre was able to begin supplying input for the OSPAR database thanks to French data provided by the few organisations (marine nature parks, social integration enterprises and environmental NGOs) that were interested in stranded litter and accepted Cedre's proposal to adopt a single monitoring protocol.

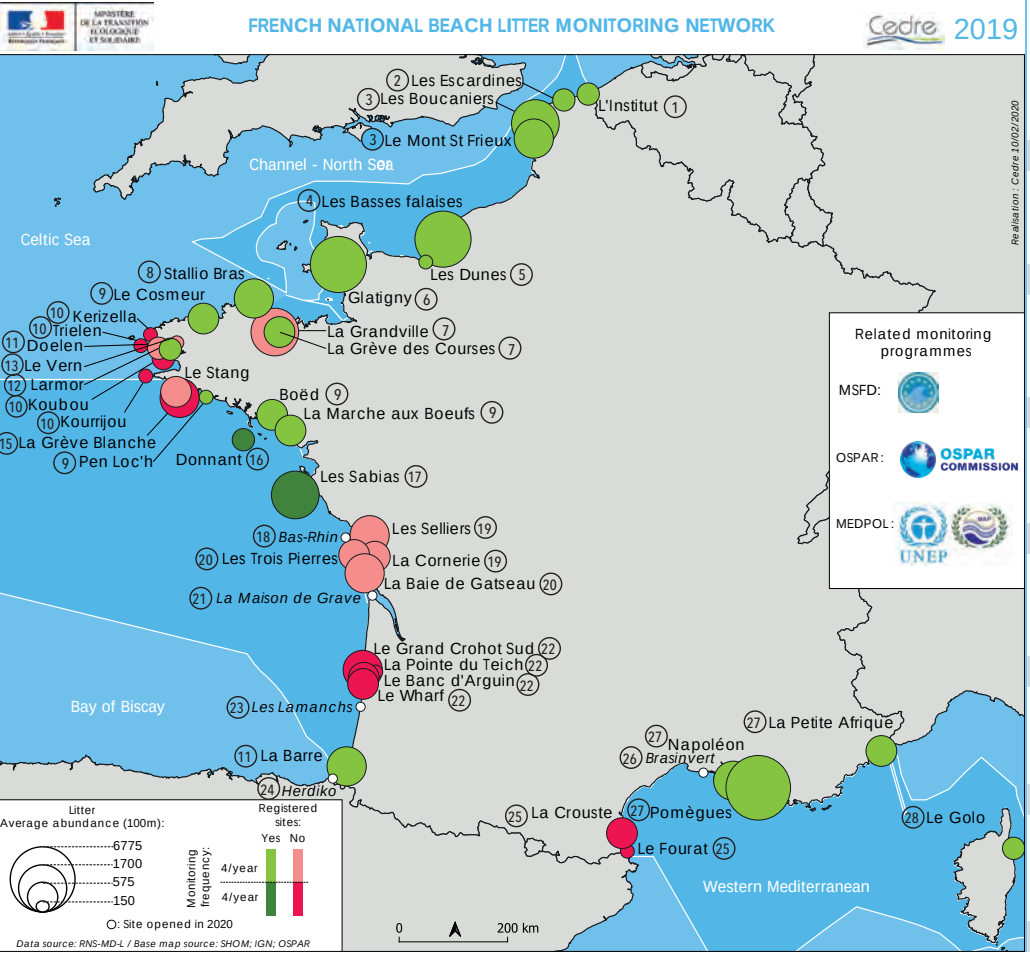
The implementation of the Marine Strategy Framework Directive (MSFD), which also takes marine litter into consideration in assessing Good Environmental Status (GES), spurred interest in this monitoring network, especially as the protocol defined in 2014 under the directive was largely based on the OSPAR protocol (with the exception of a more detailed characterisation using a more extensive list of litter items under the MSFD).

The new regulatory challenge and its associated objectives for the roll-out of the network (10 sites for each Marine Sub-Region by 2020) as well as the experience drawn from the initial network very soon highlighted the need to certify field operators–and provide funding in some cases–to ensure the long-term viability of the network and the reliability of the data collected: this professionalisation process began in 2018. In France, a complete national network now exists providing balanced geographical coverage: the national beach litter monitoring network (*Réseau national de Surveillance des Macro-Déchets sur le Littoral* or RNS-MD-L) which comprises **46 sites** and relies on **27 field operators** (figures for January 2020).

The data collected by the network is now stored in Ifremer's Quadrige2 system via the DALI (Data Litter) application specifically developed in 2017-2018 by Ifremer with support from Cedre and certain field operators, at the request of the ministry.

This data has already contributed to assessments conducted by Cedre under the MSFD (2018 assessment) and under the Regional Seas Conventions–the Barcelona Convention and to a greater extent OSPAR (Intermediate Assessment 2017). It is also used for EU purposes, for instance to justify certain new measures or directives such as the recent directive on single-use plastics and fishing gear.

Collecting litter on Stang beach (Finistère) as part of the national beach litter monitoring programme



1 Adélie
2 Flandre Maritime
3 Estuaires picards Mer d'Opale
Sea-Mer Asso
4 Aquacaux
5 Vallée du Lorno
6 Côtentin
7 Réserve Naturelle Baie de Saint-Brieuc
8 Réserve Naturelle Sillon de Talbert
9 Bretagne Vivante
10 Iroise
11 Iroise
Surfrider Foundation Europe
12 AGSEL
13 Elorn
14 Pays Bigouden Sud
15 Lycée Professionnel Maritime de Guilvinec
16 Belle Ile en Mer
17 L'Ile d'Yeu
18 Ile de Ré
19 T.E.O.
20 LPO
21 Médoc
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23
24
25 Golfe du Lion
26 Parc naturel régional de Camargue
27
28 Bastia Golo Méditerranée

Roll-out of other national networks

To meet the needs of the MSFD, two other national monitoring networks are currently being established by Cedre.

The first, the national monitoring network for microplastics in beach sediment (RNS-mP-P) focuses on microparticles present in sand through analysis work conducted at Cedre on samples taken by certain RNS-MD-L field operators.

Collecting litter on the banks of the Seine (Seine-Maritime)

The second, the national monitoring network for litter from drainage basins (RNS-MD-BH) comes in answer to the need to assess inputs from watersheds contributing to shoreline pollution, by evaluating litter washed up on the banks upstream of estuaries. The aim here is to expand the RNS-MD-L monitoring effort to the outflow of the main drainage basins by studying sites located immediately upstream of the estuaries, just above the boundary of any possible inflow of litter from activities in the estuary.

ABOUT

Cedre, co-lead of OSPAR's Beach Litter Expert Group

By Camille Lacroix, Cedre.

Since 2020, Cedre has been coordinating, on behalf of France and in collaboration with the Netherlands, the work of the Expert Group for the Beach Litter indicator within the OSPAR Intersessional Correspondence Group on Marine Litter. The main roles of this informal group composed of experts from the different OSPAR Contracting Parties are to develop the monitoring programme for the Beach Litter indicator and to ensure its consistency with the objectives set out by OSPAR under its North East Atlantic Environment Strategy. Furthermore, this group is tasked with preparing the Beach Litter indicator evaluations both for OSPAR Intermediate Assessments and the ten-year Quality Status Report for the North-East Atlantic.

Offshore monitoring

Abandoned cables collected during trawling

By François Galgani, Ifremer.

The Marine Strategy Framework Directive (MSFD) has played an imported role in the establishment of offshore marine litter monitoring. This form of monitoring did not exist during the first year of the directive and its implementation required a strategy tailored to the national context to be defined. Ten years after the first work was conducted, in particular on initial assessment, this monitoring effort is implemented through regular fishing campaigns organised each year in all the French marine sub-regions, allowing for harmonised, long-term monitoring. With support from a European group that defined the protocols and identical, homogeneous sampling conditions in all Member States, offshore monitoring currently concerns two criteria of Descriptor* 10.

In addition to sampling on beaches (see p.8), criterion 10D1 also concerns floating litter and litter on the seabed. For floating litter, inventories and counts are conducted in an opportunistic manner by observers onboard European DCF* surveys (EVHOE*, IBTS*, CGFS* and MEDITS*) who assess fish stocks for scientific purposes and define fishing quotas. The protocols are harmonised, listing floating waste in various broad categories such as the most commonly found types of plastics (sheets, bags, bottles) and driftwood. The monitoring of litter on the seabed is more extensive, involving all Member States, with identical protocols and a European database system managed by ICES* (DATRAS* data) for the OSPAR region and the institutional programme MEDITS in the Mediterranean. Every year, several hundred trawls are conducted in France following which the litter collected is divided into 39 main categories, in particular various types of plastics (bags, bottles, etc.) and abandoned, lost or otherwise discarded fishing gear or ALDFG (e.g. nets, lines, pots).

The second criterion of the directive (criterion 10DC2) taken into consideration for monitoring concerns floating microplastics. Gradually rolled out over the past few years through different trawl fishing expeditions, the measurement of microplastics provides an overview for each marine sub-region through which their evolution over time can be monitored. The densities measured vary greatly between the Mediterranean–heavily impacted with levels in excess of 100-150,000 particles per km²–and the Atlantic where the maximum average densities do not exceed a few tens of thousands of particles.

Litter collected during a MEDITS trawl survey in the Mediterranean

All the results of these surveys are useful for assessing trends and have already pointed to the need for reduction measures for single-use plastics, laid out under the new European directive on single-use plastics (such as plastic bags for instance). This data will reveal whether the specific reduction measures in the natural environment, such as the ban on single-use plastics or better management of fishing gear, are effective over time. Ultimately, the data from these surveys will be used to define good environmental status thresholds and environmental targets to be set in 2020 for litter on the seabed. Member States are currently discussing the extension of MSFD monitoring to trawl surveys in coastal zones and seabed observation surveys using video imagery (remote operated underwater vehicles) or monitoring by submarine dives, in particular in marine protected areas where regular monitoring of marine fauna can be expanded to litter on the seabed. The initiatives set up should ultimately provide monitoring cover across all French marine areas affected by marine litter.

? HELP LIST

***CGFS**
Channel Ground Fish Survey

***DATRAS**
DAtabase of TRAwl Survey

***DCF**
Data Collection Framework

***Descriptor**
There are 11 quality descriptors, common to all the European Union Member States, to define Good Environmental Status

***EVHOE**
Assessment of fishing resources in western Europe

***IBTS**
International Bottom Trawl Survey

***ICES**
International Council for the Exploration of the Sea

***MEDITS**
International bottom trawl survey in the Mediterranean sea

Impact of litter on marine fauna

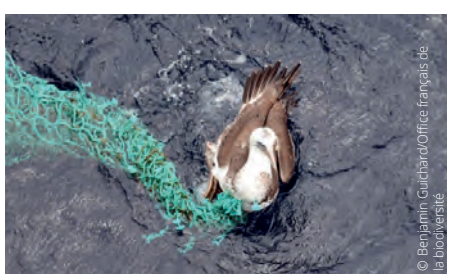
By Aurélie Blanck, Benjamin Guichard and Sophie Beauvais, French Office for Biodiversity.

The MSFD calls for the assessment of the impact of litter on marine fauna. Under the French marine litter monitoring programme, three sub-programmes are devoted to this specific issue; two target the ingestion of litter by megafauna while the third covers entanglement of fauna due to litter.

As concerns litter ingestion, on the Channel-North Sea coastline, a single monitoring system is currently operational. It focuses on northern fulmars found dead on the shoreline. This monitoring, conducted within the framework of the OSPAR Convention, consists in analysing the litter contained in the seabirds' stomachs. France's northern coastline corresponds to the southernmost limit of the fulmar's geographical distribution; this monitoring is therefore only possible in the eastern part of the Channel. It is conducted on the shores of Normandy and Hauts-de-France by three associations, the *Groupe Ornithologique du Nord* (GON), *Picardie Nature* and the *Groupe ornithologique Normand* (GoNm) which coordinates all these monitoring efforts that are partially funded by the French Office for Biodiversity (OFB). In France, the last MSFD assessment (based on 2013-2016 data) showed that more than 83% of fulmars collected were affected by plastic litter. Nevertheless, these results should be taken with some degree of caution given the small sample size (less than 10 fulmars each year in France, while OSPAR recommends a sample of 50 to 100 individuals to calculate this indicator). By pursuing this monitoring over several years, a more robust analysis of the "fulmar" indicator will be achieved. Furthermore, plans are currently under consideration to extend this type of monitoring to other species of seabird as well as to other geographical areas (Atlantic coastline).

On the Atlantic and western Mediterranean coastlines, the assessment of the "litter ingestion" indicator under the MSFD focuses mainly on ingestion by sea turtles. Monitoring consists in analysing the litter found in the digestive tract of turtles found dead on the shoreline or captured alive in fishing gear. This monitoring is coordinated by two beached turtle networks, the French eastern Atlantic sea turtle network (RTMAE) and the French Mediterranean sea turtle network (RTMF). This ongoing monitoring and the improvement in the analysis of causes of mortality in beached turtles will provide information for this indicator. To assess the impact of litter on marine fauna, new indicators are under development in relation to entanglement or strangulation by litter. Several possibilities are being explored.

The first focuses on monitoring litter in the nests of common shags. The presence of these birds along all the European coasts makes them a good indicator at the scale of each Marine Sub-Region (MSR) of the French coastline. A similar monitoring programme for cormorant nests is already underway at several sites and in several colonies using a standardised protocol. It is set to become an ongoing programme and to be expanded under MSFD monitoring in the Channel and Atlantic through the *Observatoire Régional de l'Avifaune* (regional bird observatory) and the *Observatoire Oiseaux Marins et Côtiers* (OFB sea and coastal birds observatory), as well as in the Mediterranean via the *Office de l'Environnement de la Corse* (OEC). The monitoring of entanglement in gannets across the Celtic Seas MSR (90 observations for the Sept-Îles colony) will also provide contextual information on entanglement.



A northern gannet trapped in a net

The second possibility focuses on the entanglement and strangulation of sea turtles and marine mammals observed and described by the above-mentioned sea turtle networks and the national stranding network, RNE.

The third initiative underway involves monitoring interaction between litter and subtidal epibenthic fauna (Ifremer/French national museum of natural history). This type of monitoring could be performed by scuba divers in shallow waters, in particular within marine protected areas. In deep waters, the analysis of video images recorded by remote operated vehicles during scientific campaigns is being explored.

Seabirds as indicators of marine environment health status in the North Sea: the northern fulmar

In 2002, the OSPAR Convention decided to include litter in its system of Ecological Quality Objectives (EcoQOs). The ingestion of plastic litter was the chosen criterion to assess its impact on marine fauna, given that the quantity ingested is a relatively accurate reflection of the abundance of litter present in the marine environment. In this respect, the northern fulmar (*Fulmarus glacialis*) became the indicator for ingestion. These seabirds forage exclusively at sea and do not regurgitate solid particles but retain them for several weeks. Furthermore, the marine litter contained in their stomach was already the focus of monitoring in the Netherlands at the time. The fulmar indicator was again chosen in 2010 to assess the Good Environmental Status (GES) of European marine waters under the MSFD.

Analysis of a fulmar's stomach contents

The long-term goal defined by OSPAR (Fulmar Litter EcoQO) is for less than 10% of beached northern fulmars to exceed 0.1 g of plastic in their stomachs. We are still far short of this goal, with 58% of dead fulmars found on the beaches of the North Sea having more than 0.1 g of plastic in the stomach during the period 2005-2014. What's more, the quantity of plastic found has remained almost identical throughout this ten year period.

By Loïc Kerambrun, Cedre.

CleanAtlantic project

A holistic approach to tackling marine litter in the Atlantic Area

By Marisa Fernández, CleanAtlantic coordinator and Head of the Department of Control and Management of the Marine Environment and Resources at CETMAR (*Centro Tecnológico del Mar*, Vigo, Spain).

Development of best practices, protocols, and testing new tools to support the prevention, monitoring, mapping, and removal of marine litter in the Atlantic Area.

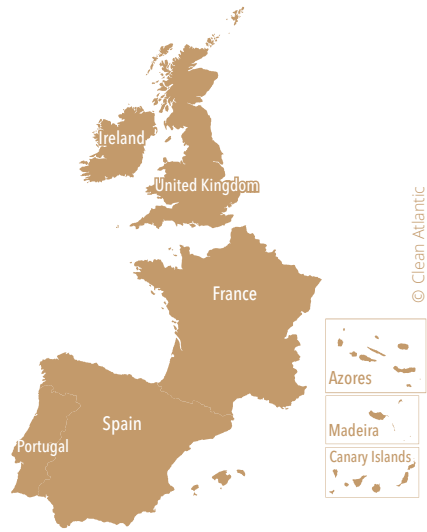
The CleanAtlantic project on "Tackling Marine Litter in the Atlantic Area" is a European project funded by the Interreg* Atlantic Area Transnational Program (2014-2020). With a budget close to €3.25M (75% funded by ERDF) and run over 3 years (from 2017 to 2020), CleanAtlantic aims to protect biodiversity and ecosystem services in the Atlantic Area by improving capabilities to monitor, prevent and remove marine litter.

The project partnership includes 19 partners covering the entire Atlantic area: France (Cedre included), Ireland, Portugal, Spain and the United Kingdom. Among them, CleanAtlantic counts on the participation of key marine litter actors such as the governmental departments in charge of the Marine Strategy Framework Directive (MSFD) and their scientific advisory bodies, the OSPAR Secretariat, and KIMO*. These partners are one of the assets of the project as their participation helps CleanAtlantic to build on the existing expertise and deliver results that will contribute to the ongoing regional action plans (e.g. OSPAR Marine Litter Regional Action, see p.7) and the implementation of the MSFD. Over and above this intense team work, CleanAtlantic seeks collaboration with other marine litter stakeholders outside the partnership, such as the maritime and fishing sectors, environmental authorities, researchers, key organisations in this field, and volunteers.

CleanAtlantic tackles several facets of the marine litter problem, namely monitoring and data management; modelling; prevention, management, and removal of marine litter; and awareness-raising. Among the activities currently in progress and the related expected outcomes, it is worth mentioning that CleanAtlantic is building centralized online databases and interactive maps to show the available data on the presence of marine litter in the Atlantic area, and information on past and ongoing initiatives that address this environmental problem. The project is also developing the CleanAtlantic Knowledge Tool, which consists of an online database that will give easy access to resources relevant to any topic related to marine litter (e.g. monitoring, fishing for litter, awareness raising, waste management, etc.). This tool will include links to reports, guidelines, videos, infographics, apps, etc. sourced from the results delivered by EU and national R&D projects, as well as the materials published by organisations working on marine litter. So far, a total of 123 projects, 82 organisations, and 717 resources have been closely analysed and classified.

Other key outcomes of the project include interfaces for storing and analysing data, improved protocols for monitoring –including protocols for entanglement–, and also 5 case studies regarding economic impacts of marine litter and the derived policy recommendations. Focusing on environmental impacts, in-depth scientific studies on the harm caused by cotton buds and cigarette filters and the role of marine debris as vectors of non-indigenous species will be delivered.

With regards to the identification of marine litter hotspots, CleanAtlantic is working on the development of models for forecasting the drift of marine litter, studying the influence of land- and ocean-based sources, and proposing potential litter reduction scenarios.



Countries with organisations involved in the CleanAtlantic project

In terms of the removal of marine litter, the partners are collaborating with the fishing industry in Spain and a volunteer group in the United Kingdom to capture and implement best practices in waste management, develop protocols for reducing fishing-related litter, carry out fishing for litter passive and active scheme activities, and test different protocols for the removal of Abandoned, Lost or otherwise Discarded Fishing Gear (ALDFG).

Lastly and also very importantly, CleanAtlantic is working to increase public awareness of the environmental impact of marine litter and give tips on how everyone can help to tackle this type of pollution.

Overall, CleanAtlantic aims to contribute to empower the different Atlantic stakeholders to turn the tide on marine litter.

Cedre's role in the CleanAtlantic project

more info
www cleanatlantic.eu

By Loïc Kerambrun, Camille Lacroix, Silvère André, Marine Paul and Aurore Zéler, Cedre.

Characterising shoreline pollution

What types of litter are most the frequent on beaches in the Atlantic area? Are there regional specificities?

The statistical analysis conducted from the data in the OSPAR Beach Litter database (obtained through a monitoring programme which records the number and detailed category of all the litter found in a single 100 m section of beach, 4 times a year) for 62 sites along the Atlantic coast of 5 countries during the period 2016-2019 reveals:

• the predominance of plastic litter across the Atlantic area, representing 89% of the total litter collected, and the high prevalence of certain types of litter (plastic fragments, rope and string, cotton buds, bottle lids and caps, cigarette butts);

• differences between beaches in northern and southern regions, with more single-use plastic found on the Iberian coasts (in particular cigarette butts, which are composed of synthetic fibres, of which large quantities were collected on certain beaches) and more litter from fishing and aquaculture (in particular thin ropes) in northern countries.

An inventory of initiatives

What current and past initiatives have been organised in the Atlantic area to combat marine litter?

An online survey was launched to find answers to these questions in the project's 5 countries among different stakeholders (local authorities, NGOs, site managers, etc.) and was shared on social media. It identified 253 initiatives, actions and measures (105 in France, 56 in Portugal, 52 in Spain, 23 in the United Kingdom and 17 in Ireland). These initiatives are divided into 5 main categories (observation and monitoring: 59; cleaning and collection: 103; circular economy: 22; awareness-raising: 61, and policies: 8), and each category is subdivided into 4 to 9 subcategories. This inventory continues to be conducted on an ongoing basis beyond the scope of the survey. All these initiatives will very soon be accessible via an interactive platform available from the project website.

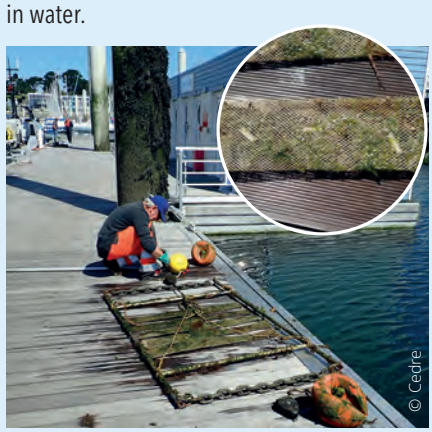
Impact assessment: cigarette butts

Cigarette butts are commonly found on beaches. What is their fate when they reach the sea and what is their environmental impact?

⋀ *Artificial cigarette smoking to obtain identical butts*

To answer these questions, Cedre, in collaboration with Cefas (UK) and IEO (Spain), is exploring 4 aspects to assess: their behaviour, their decomposition, the chemical contamination they generate and their toxicity for marine organisms.

The first results point to complex behaviour due to the presence of air which affects their buoyancy and therefore their sinking time; intrinsic toxicity due to the chemical composition of cigarette butts with rapid transfer of contaminants in seawater; and overall slow decomposition that varies according to the compartment: very slow on the beach (butts practically intact after 11 months) and faster in water.



⋀ *Underwater device used to study the breakdown of cigarette butts, installed at the Marina du Château in Brest, in collaboration with Brest's marinas*

Good practices for shoreline litter collection

How can we clean beaches efficiently without risking causing harm to the environment?

An online survey will be launched for local authorities, site managers and NGOs in order to determine exactly who does what and how, in this field. Information and feedback will thus be collected and will lay the groundwork for drawing up recommendations and good practices, taking into account the operational constraints and environmental specificities of the different Atlantic regions. The survey will also be aimed at identifying major coastal litter hotspots.

Awareness-raising among professionals, school pupils and the general public

Diverse awareness-raising actions are carried out regularly by all the project partners in the form of conferences, workshops or simple project presentations for school pupils or during public events. Dissemination materials developed by the consortium are now available on the project website. Cedre has developed two games: one on identifying litter collected on the shoreline and the other on pollution of the marine environment by cigarette butts. Public awareness-raising by French partners will culminate in its crowning event at the next edition of the Brest international maritime festival thanks to a partnership with its organisers *Brest Événements Nautiques*. In addition to conducting ongoing awareness-raising throughout the event, Cedre will play a key role in preventing and reducing litter within the festival area and will assess the efficiency of the preventive and incentive measures taken by keeping a daily record of the litter recovered on the water together with a map of litter on the bottom, produced before and after the festival.

OceanWise project

Searching for solutions to reduce the impact of marine litter caused by expanded and extruded polystyrene (EPS and XPS)

By Sandra Moutinho, *Direçao-Geral de Recursos Naturais, Segurança e Serviços Marítimos* – DGRM, Portugal, project coordinator.

Back in 2014, the OSPAR Commission technical group on marine litter approved the first Marine Litter Action Plan (see p.7), with the aim to reduce and prevent the release of litter into the North-east European part of the Atlantic Ocean. This bold plan includes more than 30 collective actions to be undertaken by all the OSPAR area contracting countries, all dedicated to very specific problems which are considered as major sources of marine litter, of both sea-based and land-based origin.

One of the actions included in the OSPAR action plan is the reduction of the impact of products made of expanded or extruded polystyrene, such as fish boxes, fast-food containers for temperature sensitive food or drinks, and floating marine devices. Portugal, with the support of Ireland, took on the lead for this collective action. And thus, in 2016 we applied to an Interreg* Atlantic Area call which allowed us to guarantee the financing for an Atlantic Arc inclusive partnership, which then led us to invite 12 public and private entities from France, Ireland, Portugal, Spain and the United Kingdom. The project consortium encompasses the diversity required for the challenge we faced: it is a balanced mix of specialists and authorities from the fields of marine environment, waste management, circular economy, regulations, research, and innovation, as we know that tackling the problem of plastics lost at the sea is mostly a matter of preventing their loss on land.

The OceanWise approach

So, we assumed that the OceanWise approach would be about Circular Economy. At the same time as the OceanWise project was being designed, so was the new Plastics Strategy from the European Commission, which took on the concern for marine litter. The OceanWise project structure and aims are aligned with the general principles proposed by the European Commission. But what exactly does this mean in terms of the process and the objectives of the project? To put it simply, we framed our aim as "to produce a catalogue of sustainable solutions for the set of products or applications which are currently made of EPS/XPS plastic and which can be assumed to be a priority in terms of impact to the marine environment, and to compare them against alternatives whenever current circular economy options do not offer reasonable solutions to prevent EPS or XPS products from getting lost after being used and reaching the marine environment".

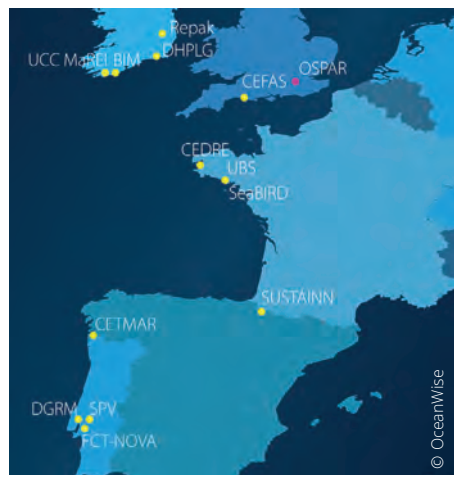
This catalogue is to be shaped as a set of recommendations to improve public policies and also as best practices for the industry, and it is the end product of the OceanWise project, to be released in 2021.

Active involvement of stakeholders has been key to the process

We designed this 3-year project to include an extensive period of stakeholder engagement. Across the five countries covered by the project, we organise a comprehensive set of workshops which are open to the participation of all the industries and other interested parties which can help us design the best proposals to keep EPS and XPS within circular economy cycles, as well as to inform the project team about the current situations for which no sustainable solutions are attainable under the current economy or industry practices. We have just initiated the second round of workshops, and two more sets are scheduled in the five countries to engage the group of participants next year.

First lessons learnt

It is still far too soon to draw conclusions, but so far we are happy to feel that as the dialogue between stakeholders evolves under the OceanWise umbrella, the project team, and so indeed also the stakeholders themselves, are beginning to envisage operational solutions that can contribute to a much more circular economy for some of the applications or uses of EPS. Sometimes, it may be about forging industrial synergies, other times it will be about changing regulations, or introducing investment to help keep economic value in the discharged products. Within the process of listening to the stakeholders, many innovation proposals have arisen, which will be put to the experienced opinion of the project stakeholders and other specialists before they integrate the final catalogue of solutions and best practices.



OceanWise project partners

Cedre's role in the OceanWise project

By Loïc Kerambrun, Camille Lacroix, Silvère André, Marine Paul and Aurore Zéler, Cedre.

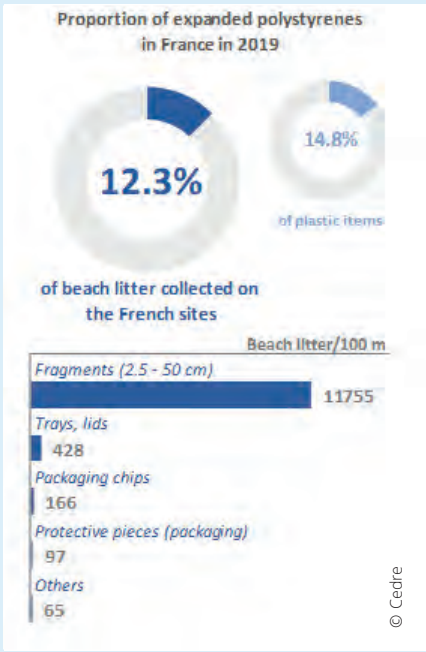
Characterising shoreline pollution in the Atlantic area

What is the proportion of expanded polystyrene (EPS) and extruded polystyrene (XPS) in beach litter?

In reality, little information is available on this form of pollution. As OSPAR inventories do not distinguish EPS/XPS from plastics in general, they cannot be used as a reference. The study is based on other sources with a more limited timeframe and geographical coverage. The monitoring organised under the MSFD makes this distinction, however it is too recent and has not yet been implemented in the countries studied, with the exception of France for 2019. The other statistical source is a short study carried out in the United Kingdom. The main parameters selected (average, percentage of total litter and most commonly found items) will be calculated mainly for the Atlantic coasts of France and the United Kingdom.

For France, initial results indicate that in 2019, more than 15,000 litter items (>2.5 cm) identified as EPS/XPS were collected at the monitoring sites, representing 12.3% of the total abundance of litter and 14.8% of plastic litter recorded. The vast majority of EPS/XPS is collected in the form of fragments. Objects such as trays and lids as well as packaging materials (packing chips and strands or protective padding) are also found.

Fragments of EPS collected on the French shoreline



Assessing the fate and impact of EPS/XPS in the marine environment

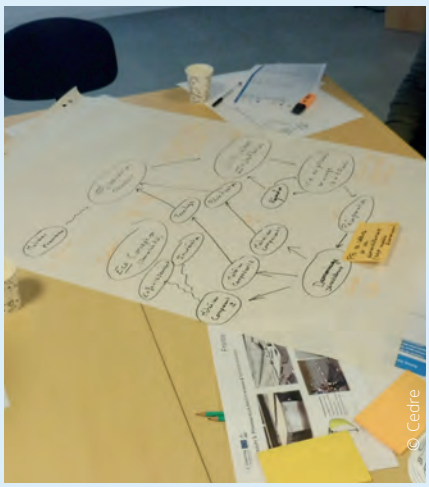
What is their environmental impact and their fate at sea? What alternative materials are on offer by industry today?

To answer these questions, Cedre, in collaboration with UBS and Cefas, is exploring 4 aspects to assess EPS/XPS and their alternatives: behaviour, decomposition, the contamination generated due to the release of chemicals and the toxicity for marine organisms.

Studying the release of contaminants by new and weathered EPS on Cedre's artificial beach

Involving institutional, industrial and professional stakeholders and the general public

Like all the members of the consortium, the French partners (UBS, SeaBird and Cedre) are jointly organising, at national level, a series of four participatory workshops. Two have already taken place, the first in Lorient and the second in Brest, each of which were attended by some twenty stakeholders with diverse backgrounds.



Mind mapping the life cycle of EPS/XPS during a participatory workshop organised at Cedre as part of the OceanWise project

? HELP LIST

***Interreg**

European programme intended to promote interregional cooperation within Europe and the development of shared solutions in the fields of urban, rural and coastal development, economic development and environmental management

***KIMO**

International organisation committed to protecting, preserving and improving the marine environment

A zoom in on Cedre's experimental tools

By Camille Lacroix, Cedre.

An array of tools to study the fate and impacts of litter and facilities to test response equipment along the land-sea continuum.

Oil, styrene, polystyrene... From oil, plastics were just a step away. Historically specialised in the study of the behaviour, fate and impacts of oil and chemicals spilt at sea, Cedre is now heavily involved in the issue of "aquatic litter".

With its analytical skills and its unique facilities and tools, most of which were initially developed to study oil and chemicals, Cedre is able to perform instrumented experiments at different scales (from laboratory to pilot scale) and to provide answers to a wide array of questions, whether for research or equipment assessment purposes.

At our facilities, analysis and experimental work can be carried out, both indoors and outdoors, in saline, brackish or freshwater conditions, thanks to a seawater supply, used either raw (from the Brest roadstead) or filtered (aquarium water from Océanopolis), and, in accordance with our QHSE policy (ISO 9001 and ISO 14001 certification, version 2015) in complete environmental safety, with a complementary mobile filtration system that retains all types of dissolved and particulate contaminants.

Shoreline test bench

Simulation: foreshore (mud, sand), immersion-emersion, fresh to salt water

Study: behaviour, weathering

Analytical laboratory

The Microplastic/Sediment Separator extracts microplastics from sediment.

Pyrolysis-GC-MS is used to analyse polymers and additives contained in plastics.

GC-MS/MS is used to analyse additives and other contaminants in different matrices: plastics, water, sediment and biota.

And soon a **Fourier-Transform Infrared Analyser** to analyse the polymer(s) contained in plastics, and a **weathering chamber** to weather plastics in controlled conditions.

Polludrome®

Simulation: calm to rough (swell, wind, current), fresh to salt water, Arctic to tropical conditions, surface, water column and bottom

Study: behaviour, equipment assessment

Facilities to assess the impacts on organisms

Temperature-controlled experimentation tunnel and room

Cedre is certified to study living organisms and has two temperature-controlled rooms, one equipped with aquariums of various sizes and the other with aquaculture tanks to study the effects on different organisms: bacteria, algae, crustaceans, molluscs or fish.

Experimentation columns

Simulation: water column, fresh to salt water, static and dynamic

Study: behaviour

Possibilities for experimentation in real conditions (*in situ*)

Through various collaborations, Cedre is able to carry out experiments in the natural environment over varying time periods to study the behaviour and weathering of litter in the marine environment (Brest marinas, etc.).

PORTS DE PLAISANCE BREST

Floating mesocosms

Simulation: surface and water column, fresh to salt water, Arctic to tropical conditions

Study: behaviour, weathering

Weathering systems

Simulation: surface and bottom, fresh to salt water

Study: weathering

Urban structures

Simulation: outfalls above and below surface, drains, gutters, controlled release

Study: behaviour, equipment assessment

Port structures

Simulation: wharf, pontoon, slipway, controlled release

Study: equipment assessment

Man-made beach

Simulation: sand, stones, riprap, salt water to brackish environment, at the surface or buried, controlled release

Study: weathering, equipment assessment

Outdoor test tank

Simulation: water body, salt water to brackish environment, surface and bottom, controlled release

Study: weathering, equipment assessment

From the laboratory to the natural environment

Aquatic litter and research: a collaborative effort

By Camille Lacroix and Ronan Jézéquel, Cedre.

Aquatic litter (both marine and freshwater) is a complex issue which calls upon numerous disciplines to better understand its distribution, behaviour, fate and impacts, and thus support decision-making and solution development. Against this backdrop, research into aquatic litter at Cedre is set within a collaborative fabric gathering university laboratories and major research institutes both in France (CNRS, Ifremer, ANSES…) and abroad (Cefas in the UK, IEO in Spain, etc.). It is also set within national and regional scientific networks such as the "Polymers and Oceans" GDR and the dedicated community in Western Brittany. Positioned at the interface between research and decision-making, Cedre is also involved in several working groups focusing on different aspects of this issue (microplastics measurements, biomonitoring, litter in rivers, etc.) set up under different frameworks (national plans, G7, etc.).

Cedre's involvement in French and European research: a few recent projects

① **AQUAECOs**
Study of the effects of microplastics and pesticides liable to end up in the environment on farmed shellfish.

② **CLEANATLANTIC**
Study of the fate and impact of cigarette butts on the marine environment

③ **MERLIN microplastiques**
Study of the impact of microplastics exposure in fish

④ **MICMAC**
Evaluation of plastic pollution in the Scattered Islands.

⑤ **NANOPLASTICS**
Characterisation and study of the impacts and health risks of micro- and nanoplastics in the marine environment.

⑥ **OCEANWISE**
Study of the impact of foamed polystyrene on the marine environment.

National and regional networks to bring together the scientific community

French national research group on the fate of plastics in the aquatic environment created in early 2019

This research group (GdR), led by CNRS and jointly funded by CNRS, ANSES and Ifremer, aims to bring together the French scientific community involved in research into the fate of polymers in the aquatic environment and to promote the emergence of new interdisciplinary research.

Today, the group comprises 215 researchers from 45 laboratories working in three main scientific areas: the study of the behaviour of plastics from the moment they enter the environment up until their ultimate fate, the study of the impacts of plastics and the long-term risks, and finally the study of possibilities for the future and the best solutions.

more info
www gdr-polymeresetoceans.fr

By Fabienne Lagarde (IMMM) for the GdR's executive committee.

Construction of a marine litter community and associated dynamics in Western Brittany

The issue of marine litter is complex and multifaceted and cannot be addressed by a single community. Our goal is therefore to build a combined community focused on this issue together with local dynamics in Western Brittany.

An initial event was organised in July 2019 to identify the local community working on marine litter and to gain insight into the parties involved. In the long term, the purpose of the community will be to foster synergies and to trigger concrete actions such as the organisation of workshops, student projects, collaborative tender bidding, contribution to the life of the community at local level and enhancement of its visibility at national and international levels. On the latter point, two international workshops on the general theme of "marine debris", its observation and identification, were organised in Brest in December 2018 and 2019.

By René Garello (IMT Atlantique and IEEE OES) and Christophe Maes (IRD).

MICMAC project: microplastics, macroplastics – pollution assessment in the Scattered Islands

By Camille Lacroix, Cedre.

The Scattered Islands, located in a remote part of the Indian Ocean, are home to an extraordinary environment, making them a reference ecosystem. They are an ideal observatory to provide insight into forthcoming major environmental changes such as plastic pollution.

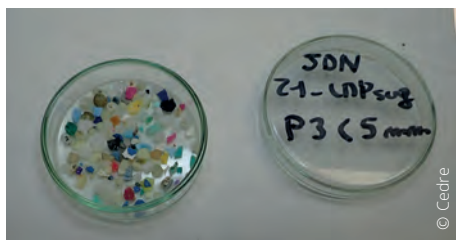
Funded as part of the 'Scattered Islands' 2018-2020 inter-organisational research programme led by the French Southern and Antarctic Lands (TAAF), the MICMAC project focuses on assessing levels of plastic pollution in four of the Scattered Islands (Europa, Juan de Nova, Glorioso Islands and Tromelin). This project, led by CNRS and carried out in partnership with Cedre, the IMRCP laboratory (UMR 5623) in Toulouse and the LOMIC laboratory (UMR 7621) in Banyuls-sur-Mer, revolves around a month-long expedition aboard the *Marion Dufresne* which took place in April 2019, during which macro, micro and nanoplastic levels were assessed on and around the Scattered Islands. As part of the project, Cedre was tasked with sampling and analysing macro-litter (> 5 mm) and large microplastics (between 1 and 5 mm) found on the shoreline. To do so, the protocols used in mainland France for beach litter monitoring programmes under the Marine Strategy Framework Directive (MSFD) were applied.

Litter on a beach on Tromelin Island.

Litter collected from a beach on Europa Island prior to sorting and identification phases

"The objective of this operation was to characterise the quantities and compositions of litter found on the islands' coastlines as well as identifying their origins (deep sea or coastal) and source activities with respect to ocean currents."

The sorting and identification of macro-litter was entirely conducted during the expedition. In total, 13 sites across the four islands were studied. 14,455 litter items were collected and sorted, with on average 1,213 litter items found per 100 m of beach. The project continues in 2020 with the laboratory analysis of samples of sand taken on the shoreline of the islands in order to determine their microplastic content and to assess the contamination across the four Scattered Islands.



Microplastics collected from the high tide mark on a beach on Juan de Nova Island.

Litter and microplastics along the high tide mark on a beach on Juan de Nova Island.

ABOUT

MICMAC: a review of plastic pollution, from large to infinitely small

The two-fold specificity of the MICMAC project is that it focuses on remote islands considered in most studies as non-anthropised reference areas and it combines varied approaches to study all sizes of plastics.

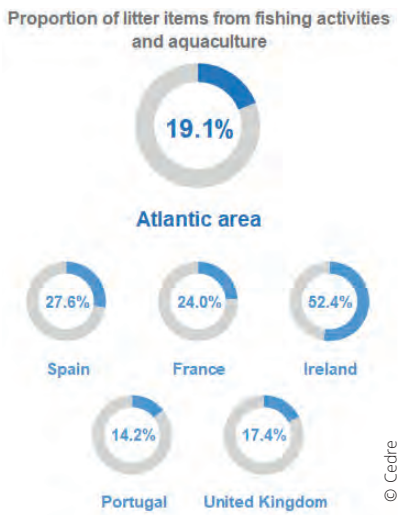
Through the protocols implemented during the assignment, whether offshore, in coastal waters or on the shores of the islands, the omnipresence of plastic pollution was revealed both on and around the four islands visited. These results confirm that, although remote, these islands are greatly affected by anthropogenic pollution, which raises the question of the environmental impact of this pollution on islands considered to be sanctuaries of biodiversity. Laboratory analysis of the samples we brought back will now reveal the extent of invisible pollution due to the presence of micro- and nanoplastics.

By Alexandra Ter Halle, CNRS researcher and MICMAC project leader.

Litter from fisheries and aquaculture

By Loïc Kerambrun, Cedre.

The analysis of data from the French national beach litter monitoring networks (such as RNS-MD-L, coordinated by Cedre) shows that in certain coastal sectors, a non-negligible proportion of the total amount of beached litter is from the fishing industry (pieces of net, fishing traps and pots, floats, trace lines, etc.) and aquaculture (spat collectors on dishes or ropes, oyster bags, etc.), which increasingly leads professionals from both sectors to introduce initiatives to mitigate this pollution.



Data from the CleanAtlantic project 2016-2019

Ropes, including many pieces of trawlnet left from net mending, collected on the shores of Finistère

As a member of the OSPAR Marine Litter technical group which promotes the voluntary Fishing for Litter initiative (whereby fishermen bring to shore litter caught in their nets while fishing) and a partner in 2 Interreg projects, CleanAtlantic and OceanWise, which address certain aspects of this issue, Cedre has gradually become increasingly involved in this issue. This new area of focus, which is naturally tackled in close collaboration with stakeholders from the fishing and aquaculture industry, mainly concerns the following aspects:

- awareness-raising and information dissemination actions, with and for marine stakeholders such as maritime schools, seafood distribution professionals, etc.
- hosting interns from maritime institutions
- an inventory of marine litter prevention, reduction, recovery and recycling initiatives in France and the Atlantic area (CleanAtlantic)
- the organisation of conferences or more specific participatory workshops (OceanWise)
- the improvement of knowledge on litter collected at sea, with the development of a protocol with a view to defining typologies for such waste
- participation in specific workshops such as those devoted to used fishing gear (PechPropre) organised by the *Coopération Maritime*.

When fishermen clean the seas: Fishing for Litter

Fishermen often bring onboard litter in their fishing nets and gear. Over and above the time spent removing this litter, there is the question of what to do with it: throw it back overboard or bring it to shore, but then who will deal with it? To resolve this situation, in 2004 KIMO International launched a project dubbed Fishing for Litter (FFL) in a bid to bring on board one of the main players: the fishing industry. FFL is built on a simple idea: providing fishing boats with large bags to collect the debris gathered in their nets during normal fishing activities. Once unloaded in a participating port, the bags are collected regularly and the rubbish is recycled or disposed of on land. FFL reduces the quantity of litter at sea while also raising awareness within the fishing industry. All the fishermen involved are volunteers and are not paid for this task. The OSPAR Convention approved the Fishing for Litter project as one of the measures in its Regional Action Plan for Marine Litter and requests that its Member States introduce this system. Since then, FFL has been frequently implemented in the United Kingdom, the Netherlands, Sweden and the Faroe Islands, as well as more locally and recently in Spain. In France, the *ReSeaclons* project (which includes the recycling of plastic litter and is led by the *Institut marin du Seaquarium* in Grau-du-Roi) is beginning to roll out such as system in the Mediterranean, while in Charente-Maritime, two projects are in their prospective phase, one by LPO (*Ligue pour la Protection des Oiseaux*) and the other by T.É.O (*Taho'e Éco-Organisation*).

Fishing For Litter

By Loïc Kerambrun, Cedre.

From the beach to better practices: students at the vocational maritime school in Guilvinec take action

The monitoring of litter on a beach in Guilvinec, through the RNS-MD-L network, was the opportunity to raise students' awareness of the issue of marine litter and proved to be an excellent springboard to get them thinking about better practices in their future career.

Initial observation of litter collected on the Grève Blanche beach in Guilvinec in early 2019 revealed a large quantity of litter generated by the fishing industry, in particular small pieces of trawlnet left over from net mending operations. Following discussions with professionals and teachers, we explored the origin of this type of litter and the equipment required to reduce its presence on the shoreline. This inspired Maëlisse (BTS student) to put forward a new tool as part of her technical project: a small basket, styled the "Sacabout", that fishermen can attach to their belt to collect scraps of rope when mending nets on the deck or quayside. With the Sacabout project, Maëlisse Audugé was an award-winner in the maritime initiatives competition during the festival "Les aventuriers de la mer" held in Lorient in October 2019, thanks to which she was able to pursue the development of her project.

By Fabien Quéroué, teacher and Maëlisse Audugé, student in 2nd year of a vocational technical diploma in Fishing and Marine Environment Management.

Lycée Professionnel Maritime du Guilvinec

Cedre: information dissemination and awareness-raising actions

By Camille Lacroix, Cedre.

Information dissemination and awareness-raising play an essential role in the fight against litter in the environment.

Poor practices and poor knowledge of the fate and impact of litter are sources of pollution. Furthermore, in a perpetually changing world in which information is deformed as fast as it spreads, it is important that scientists contribute to the dissemination of clear, reliable and objective information, to ensure a better understanding for all of the challenges raised by litter and to put in place good practices, while avoiding the pitfall of well-intentioned but ill-conceived ideas.

In this context, Cedre carries out numerous awareness-raising actions for the general public and school pupils, and supports industrial and economic stakeholders in the maritime sector.

Informing the general public...

... by regularly taking part in information dissemination and awareness-raising actions, especially through events such as European Researchers' Night and other less frequent events (*Festival des déchets*, *Défi Plastique*, *Festival du Film Scientifique de Roscoff*, etc.). Regular contacts with the media which result in articles being published or documentaries broadcast contribute to information dissemination to the general public.

Panel session at the Festival des Déchets in Brest, on 3rd June 2019

Accompanying industry and coastal and offshore stakeholders...

...by taking part in panel sessions and conferences, or organising participatory workshops. Our latest action: the signature of a partnership with *Brest Événements Nautiques,* the organisers of the Brest International Maritime Festival.

Raising awareness among future stakeholders...

... by regularly giving talks to school pupils. Such discussion sessions provide better insight into young people's perception of this type of pollution. Since late 2019, Cedre has also been a scientific partner in a participatory science programme for school pupils, launched by the *Fondation Tara Océan*.

Cedre partners the Brest International Maritime Festival

The Brest International Maritime Festival and Cedre are working together to raise public awareness of the issue of marine litter.

For its next edition, Cedre and the Brest International Maritime Festival decided to form a partnership. The aim is to reduce the festival's environmental impact to a minimum and to raise awareness among the 712,000 visitors on environmental issues related to marine pollution. *Brest Événements Nautiques* is keen to boost its commitment and to reinforce its eco-responsibility objectives by involving scientists in its initiative.

By Camille Lacroix, Cedre.

Plastic in the magnifying glass: participatory science at the crossroads of awareness-raising and monitoring

In early 2020, the *Fondation Tara Océan* launched an educational operation to raise awareness of plastic pollution among school pupils while acquiring useful data for scientific research and decision-making at European level, under the MSFD.
This participatory science project conducted in collaboration with Cedre and the *Observatoire Océanologique de Banyuls-sur-Mer* and in partnership with the French Environment and Energy Management Agency, ADEME, has a dual scientific and educational purpose. Based on a simple protocol adapted from the OSPAR/MSFD protocols, the classes will take samples of litter and microplastics with a view to measuring the pollution on the beaches and banks of mainland France. This new ongoing initiative will be more broadly deployed in the coming years.

By Brigitte Sabard and Pascaline Bourgain in charge of the project at *Fondation Tara Océan*, Jean-François Ghiglione from the *Observatoire Océanologique de Banyuls-sur-Mer*, a scientific partner in the project.

Trials on surface oil detection systems

Subsea view of the sensors in the oil layer

By Mikaël Laurent, engineer in the Analysis and Resources Department at Cedre.

Cedre was tasked by one of its partners with assessing the performances of the main technologies available on the market for point detection of floating oil. This project was carried out over a two-year period (2018 and 2019) and involved setting up a multidisciplinary team of 9 people from Cedre's different departments. The study was divided into 3 distinct, iterative parts, meaning that each phase depended on the results of the previous.

The first phase mainly consisted in identifying the main technologies available on the market, presenting the project to the suppliers of the equipment to be tested and defining the terms and conditions of their participation in the project. Cedre's team was then given training by each supplier to ensure each system was correctly operated during the trials, then the technical characteristics were collected from the suppliers in order to prepare for the experimental work in the two following phases.

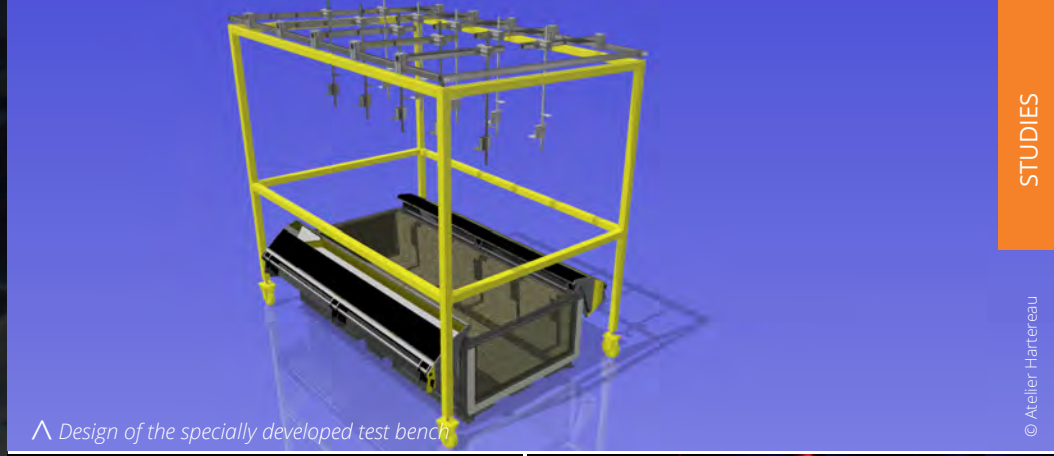
Following the first phase, 19 sensors, divided into 8 technological groups, were selected for the trials.

Phase 2 of the project was devoted to assessing the selected detection systems, using various oils. A test protocol and a test bench were specially developed and validated by all the suppliers of the systems to be tested. The test bench was designed to guarantee the same trial conditions for each sensor tested and was required to be capable of simultaneously presenting the same thickness of oil under each of the sensors. For this, the team came up with an ingenious system to simultaneously release oil at both sides of the test bench.

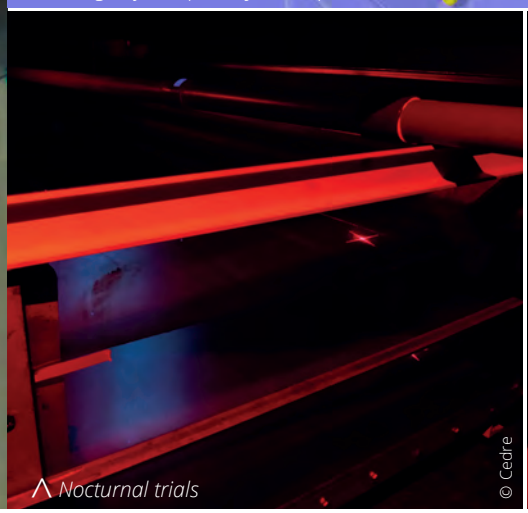
To ensure a constant temperature throughout this trial phase, Cedre's flume tank, known as the Polludrome®, was temporarily removed from its temperature-controlled room to make way for the test bench designed for the trials, during which the temperature was set to 20°C.

During this phase, all the sensors were tested with 3 different oils, each of which were first used as "fresh" oil, then emulsified with freshwater (50% water content in the mixture), giving a total of 6 types of oil. The performances of the 19 sensors were assessed on these oils defined by their viscosity and their state (unmodified and modified/emulsified).

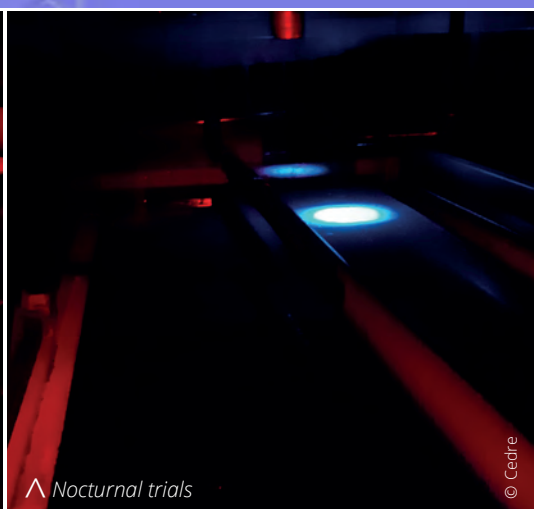
Preparing the test bench for nocturnal trials



Design of the specially developed test bench



Nocturnal trials



Nocturnal trials

For each oil type, the systems were tested with an increasingly thick layer of floating oil, with each thickness preserved for a period of 30 minutes, and the detection time was measured for each sensor. Their ability to detect two consecutive leaks (without cleaning of the sensors between two leaks) was also studied to define a reversibility criterion.

The results of this second phase revealed the detection threshold thicknesses for each oil type tested as well as the limitations of certain sensors, in particular in the case of high viscosity or emulsified oils.

The third project phase consisted in assessing the influence of environmental parameters on the performances of the 19 sensors. To avoid penalising certain sensors, the oil type and thickness with the best result for the highest number of sensors were identified following the second test phase and were selected to conduct the third and final project phase (diesel with a thickness of 10 cm).

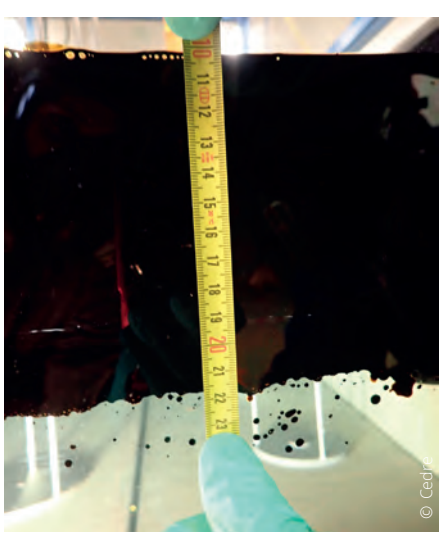
False alarms and detection times were recorded. The trials were carried out in the same test bench as that used for phase 2.

The following environmental parameters were studied:

- light variation: dark and full daylight (optical sensors only);
- addition of floating matter (polystyrene sheets and beads);
- recreation of heavy rain at the water surface;
- ice formation at the water surface (negative ambient temperature);
- addition of mud in the water (turbidity similar to that of an estuary);
- oil leak on dry ground (no water in test bench).

The results of this final phase showed that certain sensors are sensitive to environmental conditions and that false alarms can be triggered. Through the studies and evaluations conducted during this project, our partner will be able to qualify surface oil detection systems based on founded and contextualised technical content.

This trial campaign demonstrates the capacity of Cedre's team to design test protocols and bespoke experimental tools to meet a specific need.



Measuring the thickness of the oil layer

Sinking of the *Grande America*

∧ *The* Grande America *sinking in the Atlantic*

In our Bulletin n° 39, we included a "last minute" article on the *Grande America* blaze and sinking, which occurred between 10th and 12th March 2019. As promised at the time, today we are reviewing the incident in more detail.

By Nicolas Tamic,
Operations Manager
at Cedre
and Anne Le Roux,
Emergency Response
Coordinator.

On 10th March, the roll-on/roll-off container ship *Grande America*, travelling from Hamburg (Germany) and bound for Casablanca (Morocco), was some 260 km (160 miles) off the French coast, to the south-west of Brittany, Finistère when a fire broke out at around 8 pm, but was soon brought under control. The ship was transporting 365 containers on its decks, 45 of which contained hazardous substances, as well as 2,000 vehicles (cars, trucks, trailers, heavy-duty vehicles) on its garage decks. The situation was reported to the Étel Maritime Rescue Coordination Centres (MRCC) and, shortly before midnight, the ship's captain informed the maritime authorities that the situation onboard had worsened. The fire had broken out again and several containers were ablaze.

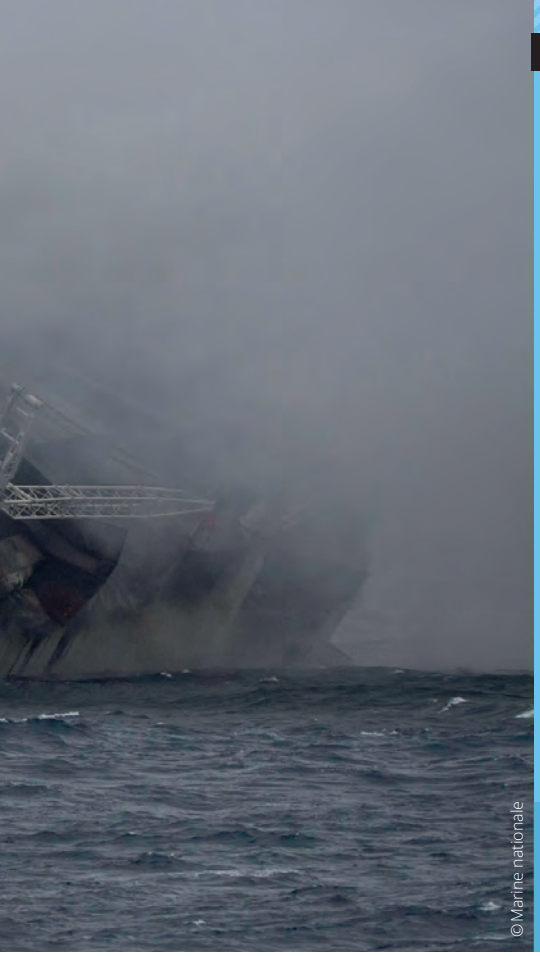
The French Maritime Prefect ordered the emergency assistance and salvage tug *Abeille Bourbon* to be sent on site. Meanwhile, at around 2 am, the captain together with the 25 crew members and the single passenger onboard abandoned the vessel and boarded a lifeboat. The weather conditions were harsh. At around 4 am, under the coordination of the MRCC Étel, the British Royal Navy frigate *HMS Argyll* saved all 27 people.

On 11th March, the *Abeille Bourbon* arrived on site at 10 am and began operations to extinguish the raging blaze. At 1:30 pm, the Maritime Prefect decided to elevate the ANED (assistance to a vessel in distress) status, under the French maritime emergency response system (ORSEC), to level 3, which meant setting up a crisis management team within the crisis command centre at the Maritime Prefecture for the Atlantic. Cedre joined this team and was particularly involved in the study of the cargo of hazardous substances liable to be released at sea.

Firefighting operations were suspended on 12th March as they were unable to extinguish the fire spreading inside the *Grande America*. In addition, the vessel was beginning to list worryingly to starboard. Around ten containers fell overboard. The ship was drifting slowly eastwards and was now some 350 km (215 miles) from the French shoreline. At around 3:30 pm, the ship sank in waters 4,600 m deep, 350 km off Oléron island, with approximately 2,200 tonnes of bunker fuel, 200 tonnes of diesel and 70 tonnes of mineral oil onboard.

A particularly lengthy offshore oil recovery operation was then implemented. The French Navy, backed up by resources from the European Maritime Safety Agency (EMSA) and Spain (thanks to the activation of the Biscaye Plan), worked relentlessly to locate and recover the bunker fuel that had leaked from the vessel as well as the containers drifting at sea. The shipowner also contributed to operations.

IN SHORT


© Marine nationale

© Cedre

27 people saved

580 m³ of liquid waste collected

36 tonnes of solid waste collected

23 days of crisis management

On 2nd April, the Maritime Prefect ended offshore operations. On 19th April, an assistance vessel chartered by the shipowner, after a meticulous inspection of the wreck, sealed the light leaks of oil found rising to the surface. These operations appear however to have been insufficient to contain the oil remaining in the tanks of the wreck and oil was reported to have washed up on the coast in February 2020. In total, in France some 36 tonnes of solid waste and 580 m³ of liquid waste were recovered. To the best of our knowledge, birdlife was little affected thanks to the remoteness of the wreck from the coast.

Feedback from this incident highlights the performance and solidity of the French maritime emergency response system, ORSEC. Thanks to regular exercises conducted by the Maritime Prefecture for the Atlantic, quick and appropriate action was taken, while appropriately anticipating the behaviour and evolution of the spill. Finally, this feedback also underlines the optimal relations between the French Navy and Cedre, both in terms of analysis and decision support. It is now essential to ensure close monitoring of the wreck in light of the recent leakage observed and to consider more consolidated treatment of the wreck.

Cedre's role

Cedre was mobilised from 11th March by the Maritime Prefect for the Atlantic. Due to the nature of some of the cargo, a chemical engineer joined the crisis management team to address the possible behaviour of potentially hazardous noxious substances onboard the vessel.

At Cedre's operational response centre, the team prepared for battle. Chemists, cartographers, GIS specialists, ecotoxicologists and marine biologists came together to offer the Maritime Prefect first-rate expertise.

Cedre's laboratory and its Polludrome® as well as French Navy LASEM laboratory in Brest were called upon to determine the characteristics of the bunker fuel, an IFO380, which was shown to be a persistent oil, with low dispersibility and high viscosity in the long term (around 350,000 cSt) and whose predicted emulsification was close to 70%, causing it to become increasingly heavy with an expected density of close to 1.012. Finally, the oil's adherence to oleophilic recovery systems drops very rapidly. These major factors complicated recovery operations; predictions suggested that in the long term the oil would drift below the surface, making aerial and satellite detection more difficult.

These observations triggered the Maritime Prefect's decision to activate the drift committee.

Led by Cedre and composed of SHOM (the French Naval Hydrographic and Oceanographic Service), Ifremer and Météo-France, this committee provided detailed drift forecasts throughout operations, allowing the Maritime Prefect to reposition offshore recovery efforts based on the analyses provided by committee, while adapting them according to behaviour predictions supplied by the laboratory.

Alongside operations at sea, Cedre also analysed oil samples taken from a few oiled seabirds, some of which were shown to be contaminated with the fuel oil from the vessel. Cedre was also involved in preparing for shoreline response operations. One of our engineers was dispatched to the Prefecture for the South-West Defence and Safety Zone in Bordeaux to set out plans for shoreline response with the authorities in case oil should reach the coasts in this region. Shoreline clean-up operations were prepared by identifying primary and secondary waste storage sites, determining the conditions for the involvement of personnel from local authorities, private companies and addressing volunteer management.

Cedre also received a delegation of councillors from south-west France to present its facilities and expertise in providing support to local authorities in case of shoreline pollution.

Cedre launches its digital training platform

By Romain Dietschi, Studies and Training Department engineer at Cedre.

Following a feasibility and development study conducted as part of the 2017 technical programme, Cedre embarked on a gradual digital transition for certain training materials.

This led to the development of an e-learning module on "Surveying sites polluted by oil" then, in 2018, a second module on the "Behaviour of chemicals spilt in water" thanks to co-funding granted by the Region of Brittany. These two learning modules are now available in English.

Designed for a varied audience, each module lasts around 2 hours and can be followed up by discussions with one of Cedre's training engineers via the discussion forum. Specialised documents on the issue (survey forms, guides, etc.) are also available.

Seeking partnerships to develop new tools and in particular to create a hosting platform for our modules, Cedre and the International Office for Water decided to work together. It was through this collaboration that our online training platform came to fruition. A testing phase began in June 2019 and the platform was opened to the public in early April.

This platform has become an integral part of Cedre's learning ecosystem, allowing participants enrolled in our on-site courses to access the learning materials and additional resources before, during and after the course. After creating an account, trainees can chat with the other participants in their group and with the trainers. In this way, Cedre can keep in touch with trainees and provide long-term personalised support.

Finally, with this new tool, now available in English, Cedre will be able to offer its partners and clients a knowledge sharing solution and to take part in European and international programmes as a digital training player.

Learning module 1: Surveying sites polluted by oil

For every major spill, shoreline surveys are critical. They allow decision-makers to prioritise the response, to be aware of the extent of the pollution at a specific time and to assign resources (personnel and equipment) to deploy and define the most appropriate response techniques. The command centre needs standard and reliable information on the extent of the shoreline pollution. This course aims to train anyone who may assist authorities in charge of the response with the surveying of oiled sites.

Following this online course, trainees will be able to:
- Identify which information is important and relevant to give to your command centre to conduct the response;
- Perform a survey mission in the field;
- Precisely fill in the standard survey form for the oiled shoreline;
- Segment a shoreline and desribe an oiled shoreline properly.

Learning module 2: Behaviour of HNS spilled on water

Understanding the behaviour of chemicals spilled on water is mandatory to deal with incidents involving HNS (Hazardous and Noxious Substances). Anticipation and solid knowledge of transported substances will help to mitigate the consequences on humans and the environment. This online course is intended for local authorities, seafarers on board chemicals tankers, bulk and gas carriers or container ship and anyone interested in gaining a better understanding of the fate of HNS spills and the consequences for the environment and human health

Following the course, trainees will be able to:
- Identify relevant information and parameters affecting the behaviour of HNS spilled on water;
- Anticipate impacted areas (atmosphere, water surface, water column or seabed);
- Refer to appropriate codes and regulations;
- Reduce risks and impacts on environment and/or human health by taking measures according to HNS characteristics

Discover these new training modules in English on our platform elearning.cedre.fr

Exercises for the Tanger Med port complex

By Natalie Monvoisin, Training and Studies Department Manager at Cedre.

For the third year running, two engineers from Cedre travelled to Tangier in Morocco from 12th to 15th November to conduct a technical audit of the oil spill response equipment at the Tanger Med port complex.

As part of a multiannual contract, Cedre visits the facilities every year to improve the port's spill preparedness.

In 2019, Cedre drew up a precise inventory of all the spill response equipment available and checked that it was in good working order by inspecting or testing it. During this visit, two exercises were also organised with the Safety Brigade, involving:

- the simulation of a spill at the service wharf, requiring containment and recovery operations to be organised and specific port response equipment to be deployed;
- a scenario involving a spill at the HTTSA (Horizon Tangier Terminals SA) oil storage terminal, the main aim of which was to contain the oil slicks by deploying a self-inflating boom between the moored vessel and the quay.

During this 4-day mission, Cedre's engineers were able to check all the equipment, train key port personnel, and, together with the port's decision-makers, lay the groundwork for future cooperation between Cedre and Tanger Med Port Authority (TMPA).

Deploying a spill response boom

Agreement signed between Cedre and the Côtes d'Armor Departmental Council

By Nicolas Tamic, Deputy Director at Cedre.

On 19th March 2019, the Côtes-d'Armor Departmental Council renewed its partnership agreement with Cedre for a further five years, for the provision of assistance either for preventative measures or in the event of a spill in this area, on the shoreline or in a port area under the responsibility of the department or commune.

Through this agreement, the Department Council or one of the local authorities in the Côtes d'Armor area can benefit from Cedre's expertise, whether remotely via its 24/7 assistance or on site according to the extent of the spill.
Cedre also provides preventive support by helping the local and port authorities to define their spill response equipment procurement policy and by promoting a complementary approach between neighbouring municipalities. Finally, through this agreement, the Department Council has places set aside for its agents on the spill response training courses run by Cedre.

Pollustats, a new publication

By Agnese Diverres, Information Department Manager at Cedre.

Cedre has recently launched a new publication called "Pollustats". This document, released as a bilingual (French/English) version for the years 2017, 2018 and 2019, is composed of data obtained from an inventory of incidents around the world made known to Cedre and having resulted in an oil or HNS spill in surface waters. Our team of engineers with expert knowledge of these data are at your disposal for further information.

more info
www. cedre.fr

Taiwanese delegation visits Cedre

Training and signature of a partnership agreement

By Natalie Monvoisin, Training and Studies Department Manager at Cedre.

In August 2019, Cedre received a Taiwanese delegation led by Taiwan's Vice-Minister of the Environment and the Director-General of the Ocean Conservation Administration for training. This training, which fell within the scope of our continued collaboration with the Taiwan administration, marked a new beginning following changes to Taiwan's national oil spill response organisation, with the Ocean Conservation Administration taking over duties previously held by the Environmental Protection Administration (EPA). Two training sessions, one devoted to oil spills and the other HNS spills, were attended by 23 representatives from different administrations and private companies in Taiwan.

In addition, a visit to the POLMAR stockpile in Brest and a demonstration by Brest's naval firefighters offered first-hand insight into the French spill response equipment.

Signing of the partnership agreement

During this visit, on 30th August, the Ocean Conservation Administration, represented by its Director-General Ms Julia Hsiang-Wen Huang, signed a partnership agreement with Cedre to develop cooperation in the field of accidental water pollution, in the presence of Mr Ching-Ta Chuang, Taiwan's Vice-Minister of the Environment and Mr Richard Wen-Jiann Ku, representative of the Taipei Representative Office in France. This agreement is a vote of confidence in the services provided by Cedre and will give a new impetus to the relations between Cedre and the Taiwanese authorities and professionals.

International cooperation: GI WACAF

By Natalie Monvoisin, Training and Studies Department Manager at Cedre.

Launched in 2006, the Global Initiative for West, Central and Southern Africa (GI WACAF) is a cooperation project between the International Maritime Organization (IMO) and IPIECA, the global oil and gas industry association for advancing environmental and social performance, to enhance the capacity of partner countries to prepare for and respond to marine oil spills.

The aim of GI WACAF is to develop and consolidate the national oil spill preparedness and response systems of 22 countries in west, central and southern Africa. The project works in the spirit of the International Convention on Oil Pollution Preparedness, Response and Cooperation (OPRC 1990).

The 8th Regional Conference of the Global Initiative for West, Central and Southern Africa on oil spill prevention and response was held in Cape Town in late October 2019.

To fulfil its mission, the GI WACAF project designs and organises workshops, seminars and exercises to communicate around existing good practices in all aspects of preparedness and response, drawing on the expertise and experience of governments, industry and other organisations working in this specialised sector. 2019 was a particularly rich year for collaboration between Cedre, IMO and IPIECA, with three actions implemented respectively in the Democratic Republic of the Congo (a national workshop on updating the country's POLMARC contingency plan), South Africa (the 8th GI WACAF Regional Conference) and Senegal (to represent the GI WACAF project during the national exercise SAMAREX 2019).

more info
www giwacaf.net

Cedre receives G7 Parliamentary Speakers

Nicolas Tamic presenting Cedre's Polludrome® to the G7 delegation

By Nicolas Tamic, Deputy Director at Cedre.

On the sidelines of the G7 Leaders' Summit in Biarritz, a meeting of the G7 parliamentary speakers was held in Brest at the initiative of the President of the French National Assembly.

Within this framework, Cedre received a delegation composed of Richard Ferrand, President of the French National Assembly, Roberto Fico, President of the Italian Chamber of Deputies, Bruce Stanton, Deputy Speaker of the Canadian House of Commons, Nancy Pelosi, Speaker of the United States House of Representatives, John Bercow, Speaker of the House of Commons of the United Kingdom, Mairead McGuinness, First Vice-President of the European Parliament and Teresa Castaldo, Ambassador of Italy to France, accompanied by Vice-Admiral Jean-Louis Lauzier, Maritime Prefect for the Atlantic, and François Cuillandre, Mayor of Brest and President of Cedre's Board of Governors.

In mid-2019, initial contact was established with the official departments of the National Assembly in order to organise this exclusive visit. Coordinated by the Maritime Prefect for the Atlantic, the visit aimed to present France's original mechanism for law enforcement at sea from the perspective of oil spill response. While in many countries sovereign powers are granted to a single administration, the French system has the specificity of building its offshore organisation on a complementary approach involving various players placed under a single authority in charge of decision-making and coordination. Spill response at sea offered excellent insight into this organisation by illustrating the role of the Maritime Prefect as the central authority and the resources at his disposal, in particular the French Navy for offshore operations and Cedre for the expertise provided in terms of pollutant identification and behaviour and environmental monitoring.

On the morning of 7th September, the G7 parliamentary speakers, invited to explore ocean preservation, visited Cedre's facilities. Following a presentation of state action at sea by the Maritime Prefect for the Atlantic, the delegation was then taken on a tour of Cedre's technical facilities, with a particular focus on the analysis laboratory, the Polludrome®, which was operating at the time, and the spill response equipment showroom. CEPPOL, the French Navy Centre of Practical Expertise in Pollution Response, then gave a containment and recovery demonstration involving the deployment of an offshore boom and the operation of pumps and skimmers in one of Cedre's outdoor test tanks.

In addition to its contribution to the local scientific and maritime landscape, this visit from a high-ranking delegation once again reinforces Cedre's role as a national and international expert organisation and key partner to the authorities.

Raphaël Facchinetti, Director of CEPPOL, presenting the resources available for law enforcement at sea

NEW RECRUITS

Nicolas Loaec

Before joining Cedre, Nicolas began his career on a fruit tree farm where he worked for 10 years, an experience during which he developed versatility and autonomy. Following a first contract with Cedre in 2015, Nicolas returned in 2019 as a technician, this time on a permanent contract. His main duties focus on contributing to the preparation of the technical facilities, supervising trainees during the many practical sessions of our training courses and organising Cedre's new showroom. He is involved in preparing equipment tests and trials at Cedre's facilities and was also involved in experimentation in the field in the Arctic.

Romain Fautaire

During his first year at university, Romain signed up to the French Navy and embarked on a military career in which he obtained a diploma as in PA and staff management skills. He occupied a series of PA positions with high-ranking military and civil authorities, within major commands, ministries and operational units, both in France and abroad. In 2008 and 2009, he contributed to two major political events: the French presidency of the European Union and the NATO summit in France. Between 2015 and 2017, he organised the participation of the *École de maistrance* in the major ceremonies and national parades. Drawn by the appeal of fresh challenges, he set about a career transition and joined Cedre in June 2019 as PA to the Operations Manager.

Vanessa Lebriez

With a Personal Assistant vocational diploma, Vanessa worked for 20 years in a large pharmaceutical laboratory in Normandy. She occupied various positions, first a training logistics officer for 4 years, then a training assistant for 6 years, and later a training course design officer for 10 years, during which she was responsible, together with 2 colleagues, for organising training for some 1,000 employees divided between 2 sites and specialised in production, maintenance and logistics. From the analysis of each employee's needs to course organisation and the selection of and relations with training organisations, Vanessa is very conversant with the training sector and its specificities, in particular funding issues. With this expertise, her thirst for learning and her appetite for social relations, she took up the position of technical assistant to the Studies and Training Department at Cedre in late August 2019.

Camille Laot

Camille studied graphic design, obtaining a vocational qualification in communication followed by a bachelor's degree in graphic design from the *Institut Supérieur des Arts Appliqués* (LISAA) in Rennes. After several work placements with communication agencies in Finistère, she began her career as a graphic and motion designer in a Brest-based agency where she produced numerous print, digital and video materials. In late August 2019, she joined Cedre as a graphic and web designer in Cedre's Information Department. Her skills, creativity and versatility bring us even greater autonomy in creating all the most up-to-the-minute communication materials.

Erell Cann

After a bachelor's degree in Management specialised in Sales and Marketing from ESC in Rennes and a third year in Economic and Social Administration, Erell began her career as a sales assistant with the advertising agency for the radio stations NRJ and Chérie FM in Brest. She then became a sales assistant with the agricultural cooperative Triskalia in Landerneau, first in potato plants, then grain. Eager to discover a new sector of activity, she then joined the bank Crédit Mutuel de Bretagne at its Landerneau branch where she worked as a customer advisor for two years. Erell joined Cedre's team in November 2019 as a Quality, Hygiene, Safety and Environment assistant and Analysis and Resources Department assistant. Through her varied duties, she is able to draw upon her organisation skills, her meticulosity and her flavour for commercial relations.

NEW HORIZONS

Pierre Richard

As an industrial automation technician, Pierre was recruited by Cedre in 1992 to contribute to equipment tests and experimentation, during which he was quick to reveal his ingenuity by designing test benches and protocols to meet the sometimes original requirements of certain specifications. An erratic river, an estuary with strong current, the open sea, ice floes, mangrove swamps... no environment has ever stumped him! Meanwhile, drawing on his technical skills and his innovation capacity and adaptability, Pierre has contributed to many spill response operations across France, Europe and in the Middle East. He was heavily involved in shoreline clean-up operations following the *Erika* oil spill, mainly in the Vendée area on Noirmoutier Island and in Bourgneuf Bay, which he criss-crossed countless times to monitor clean-up operations on the beaches, sea walls and oyster farms. He was equally involved in the response to the *Prestige* oil spill, in Gironde, in the Arcachon basin, where he put to use his ingenuity to develop protection systems for the sea basin and its oyster farms. To reward his hard work, Pierre was awarded the title of Knight of the Order of Maritime Merit. Leaving for a field mission with Pierre, whether for trials or spill response, was always an opportunity to learn and develop good "field skills". For this, many of us here at Cedre are very grateful to him. We have no doubt that he will continue to put his ingenuity to good use, helping out his family and friends. All the best Pierre!

NEW PUBLICATIONS

Operational Guide on "Use of Sorbents"

(65 pages)

In January, we published an updated version of the French language operational guide on sorbents, first released in 2009. The English version, "Use of Sorbents for Spill Response", is due to be updated shortly. This guide is aimed at professionals liable to use sorbents as part of response operations to accidental oil or chemical pollution on water or on the ground. It takes into account new practices and knowledge, in particular with a new section on chemical spills, organising the information from an operational perspective. Intended for both operators and decision-makers, this practical guide provides information on sorbent types, specifications, particularities, regulations, deployment techniques and waste disposal, as well as precautions and limitations of use. The guide is available in digital format free of charge on Cedre's website (click on Resources, Publications, Operational Guides), while hard copies cost €25.

Operational Guide on "Wildlife Rehabilitation" in English

(127 pages)

The English language version of the operational guide on wildlife rehabilitation has recently been released in digital format. This practical guide focuses on wildlife response in the event of oil or chemical pollution.

In addition to bird rehabilitation, it also addresses the procedures applicable to pinnipeds, otters and turtles. The document can be downloaded free of charge from our website in English. The French version of this guide is available online free of charge, or printed copies are on sale for €25.

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www cedre.fr

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Various documents and tools for further reading

Cedre AT A GLANCE

Based in BREST for **40 years**

50 staff

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60 training courses annually

60 contingency plans delivered in the past 10 years

20 countries visited each year

150 emergency activations each year

75 oils studied in 12 years

Recognised documentary resource centre with **22,000** references

20+ multipartner projects in 10 years

INTERNATIONAL EXPERTS IN SPILL PREPAREDNESS AND RESPONSE

Marine waters / Inland waters / Oil
Chemicals / Microplastics / Litter
Authorities / Private organisations

Emergency hotline (24/7)
+33 (0) 2 98 33 10 10

INTERNATIONAL SCOPE

GETTING TO Cedre

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BREST STATION
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