D1.1 ICT tool

Grant Agreement Nº	EASME/EMFF/2017/1.2.1.12/S2/03/SI2.789390	**Project Acronym**	OCEANETS
Project Title	Technological approaches for circular economy solutions in terms of prevention, recover, re-use and recycle of fishing gears to obtain added-value products in the textile industry		
Funding scheme	Sustainable Blue Economy: marine litter		
Start date of project	01/01/2019	**Duration of project**	30 months
Project coordinator	AIMPLAS		
Due date of Deliverable:	Month 21	**Actual date of Deliverable:**	Month 28
Participant responsible:	AVC	**Work Package related**	WP1

Dissemination Level *(mark with an ´X´ in the column to the far right)*	CO	Confidential, only for partners of the Consortium (including the Commission´s Services)	
	PU	Public	X
	PP	Restricted to other programme participants (including the Commission Services)	
	RE	Restricted to a group specified by the Consortium (including the Commission Services)	

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Content

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Overview

Deliverable 1.1 is the result of the actions performed during Work Package 1 "Prevention of the loss of fishing gear in the sea" coordinated by the *Asociación Vertidos Cero* (AVC) with the collaboration of the *Cooperativa de Armadores de Pesca del Puerto de Vigo* (ARVI). The aim of this WP is developing an IT tool that prevents the loss of fishing gear ("Loss of Fishing Gear Warning Tool"). This tool has been developed based on the recovery and introduction of historical georeferenced data about fishing gear loss, signalling those obstacles that might, potentially, generate total or partial losses of fishing gear. The "Loss of Fishing Gear Warning Tool" works as a collaborative online database that is updatable in real time, in which users can upload new data as well as download available information. Moreover, this WP has a second goal, which is raising the awareness of fishermen regarding marine litter and the key role they play in its prevention.

The main efforts of this task were centred in bringing the goals of the project to the fishing sector, thus generating trust, and giving prominence to the fishermen themselves to promote positive changes. Thus, the proposed development by OCEANETS was fit to the demands and requirements of the fishing sector, to guarantee the continuity of the actions beyond the duration of the project.

To achieve this goal, meetings took place between project and fishing sector representatives, with the aim of jointly developing the design for the IT tool. OCEANETS presented as target fleet the ARVI trawlers that operate in the Great Sole fishing area (FAO area 27.7). The tool is based in data georeferentiation, allowing to show data from any fishing area at a global level, without discrimination data acquisition according to the fishing gear employed. ARVI boasts more than 20 fishing vessels operating in the Great Sole area, and others in Spanish jurisdictional waters, that form the basis for the project's work and actions.

These meetings tackled the issues of gear hitching and total or partial loss of gear as well as marine litter in general. The issue of ghost fishing derived from lost or discarded fishing gear was discussed in more detail, as well as the opportunities this represents when effectively managed in land, with the objective of getting to know the fishermen's degree of commitment to this issue and their perception about problems derived from the management of waste, be it their own or those collected during their operations, as well as the project in general.

Actions Taken

The first step for the development of the "Loss of Fishing Gear Warning Tool" was finding common ground on how to integrate the tool in the day-to-day operations of its potential users (fishing ship captains and skippers).

It was then agreed to develop an independent tool (not integrated in their navigation systems) and to work with data in a .GPX format. This .GPX format, or GPS Exchange Format, is an XML scheme designed as a common GPS data format for software apps. It can be employed to describe waypoints, tracks and routes. The format is open and can be employed without the need to pay a licence. Location data (and optionally elevation, time of day and other information) can be stored in tags and exchanged between GPS devices and software. The more common software apps for data include the visualization of the projected tracks in several source maps, map annotation and geo-tagging of pictures in accordance with the time in which they were taken.

With this information the design of the first version of the "Loss of fishing gear warning tool" was undertaken. In the following images the earlier ideas for the tool's architecture (Image 1), the system for point registration (image 2) and the system for data download (Image 3) can be seen.

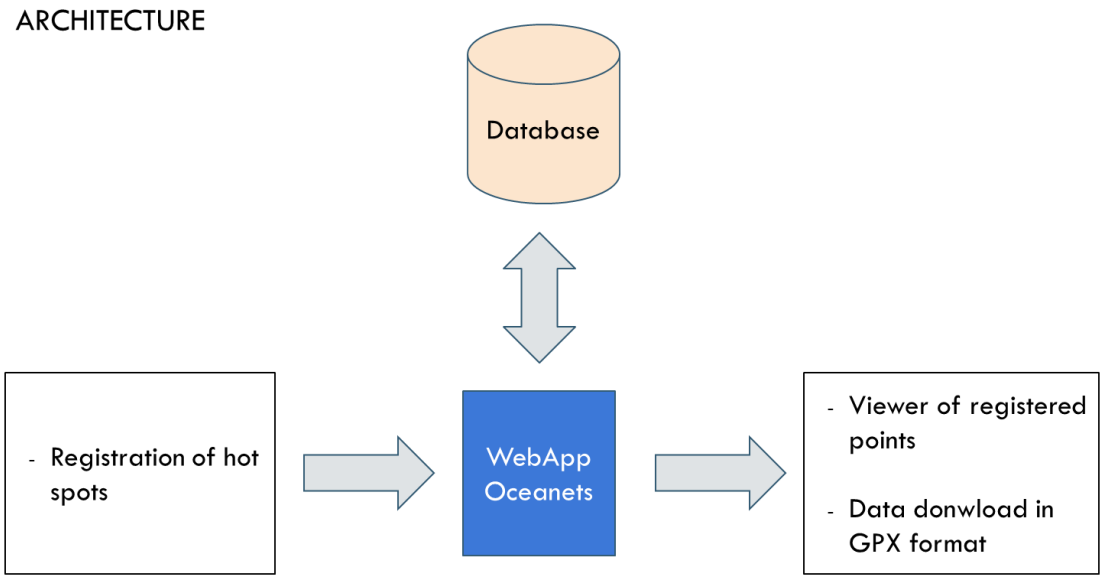

Image 1: First draft of the architecture of the Loss of fishing gear warning tool

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REGISTRATION OF ENTAGLEMENT POINTS

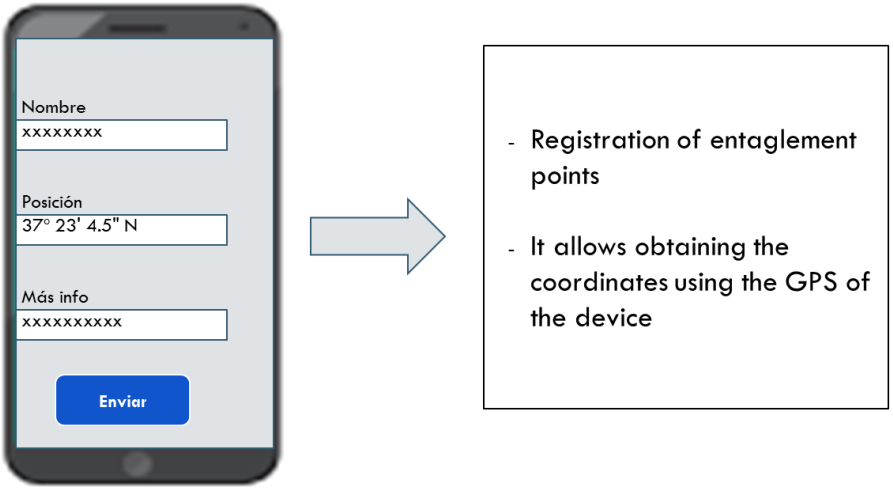

Image 2: First draft of the registration module of the Loss of fishing gear warning tool

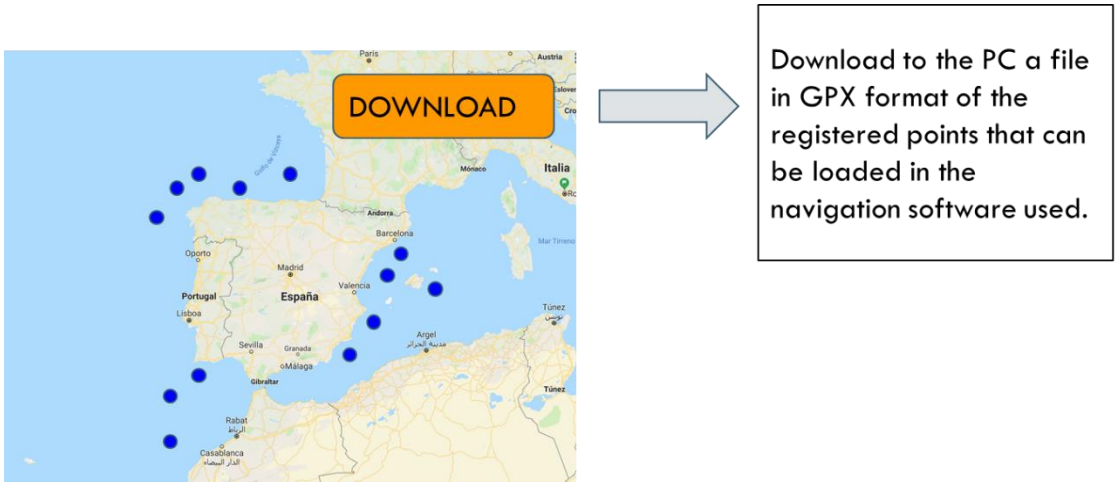

Image 3: First draft of the visualization and download module of the Loss of fishing gear warning tool

Taking this first version as its basis, the programming for the "Loss of Fishing Gear Warning Tool" was started. Thus, the database is based in MySQL 5.7 (Image 4) and the project's server is an Apache web server, with the app being developed in the Laravel framework.

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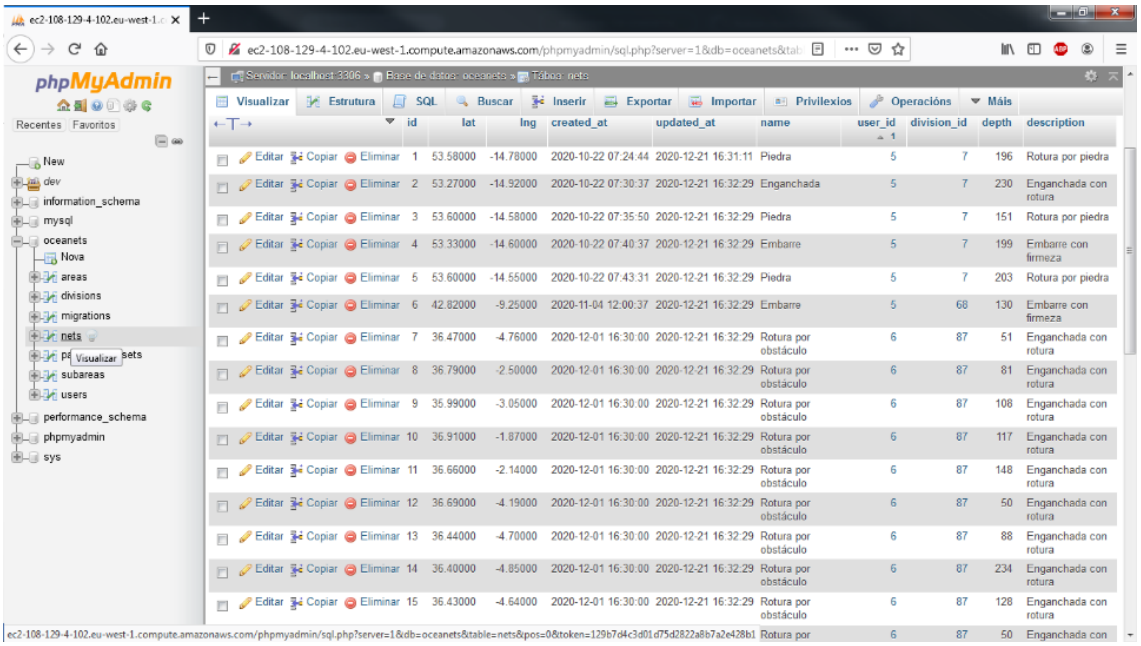

Image 4: Data base of the Loss of fishing gear warning tool

In this first version of the "Loss of Fishing Gear Warning Tool" information was loaded from the FAO 27 (Atlantic, Northeast), FAO 21 (Atlantic, Northwest) and FAO 37 (Mediterranean and Black Sea) were uploaded. Once registered, the user can create a new hotspot (location with obstacles dangerous for rigging or navigation) or download points from the enabled areas. To create points users must mark the GPS position, name the point, indicate depth and include a brief description of it (Image 5). In the deliverable 5.3 "User Manual" (available on the project website) the functionalities of the "Loss of fishing gear warning tool" has been described in detail.

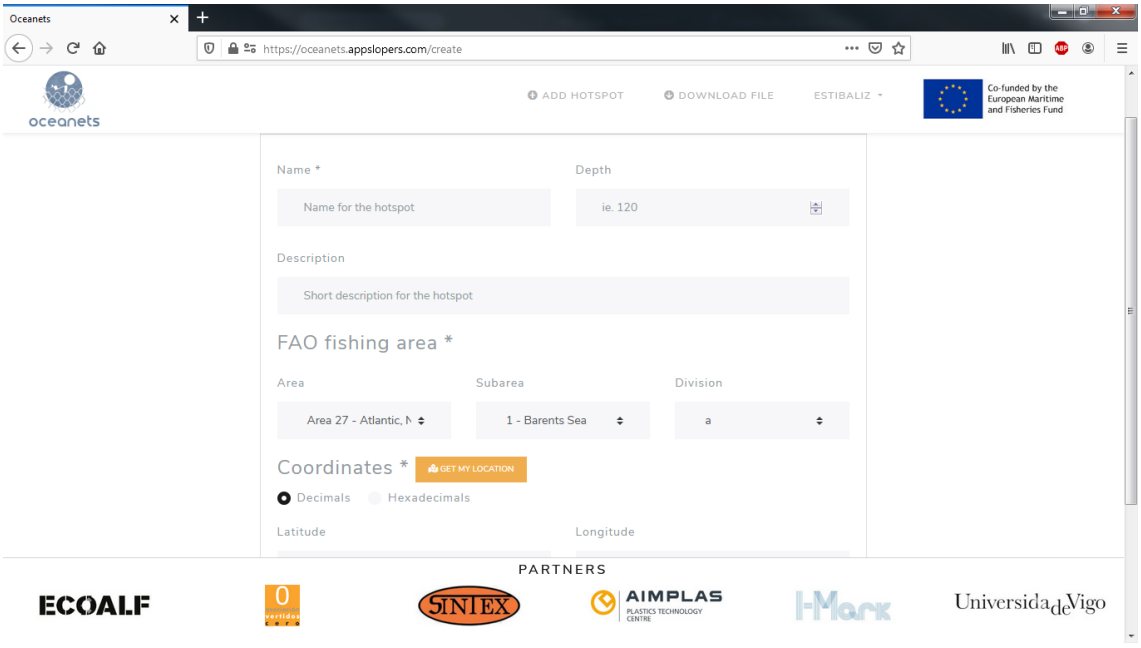

Image 5: "Add hotspot" screen of the Loss of fishing gear warning tool.

In September 2019, the tool was launched to the consortium members and in October 2019 it was released for testing amongst the B-Tester group (Image 6). From this point on the "Loss of Fishing Gear Warning Tool" (https://oceanets.appslopers.com/) has been updated in accordance with the feedback received from partners and users.

Image 6: Data visor of the Loss of fishing gear warning tool

Once the "Loss of Fishing Gear Warning Tool" was developed, AVC and ARVI started to jointly present and introduce the developed tool to its intended audience. In this stage a total of 6 meetings and workshops (physical and virtual) with potential users (fishing skippers, fishing gear manufacturers, shipowner companies…). Several different moments from these meetings can be seen in Image 7.

Image 7: Different moments at workshops of OceaNets project

The objectives of these workshops were:

- To present the ICT tool and receive comments about it and the project from the main stakeholders.
- To increase awareness about the importance of proper management of marine litter, fishing gear in particular.
- To explain the importance of the ICT tool in the new legal context.
- To recruit a group of fishermen to test the tool.

A few difficulties to properly obtain the relevant information were found by the team of AVC and ARVI that took part in these workshops.

The first one was the reticence of the fishing sector representatives to give up data that they considered proprietary knowledge and, in many cases, information that allows them to better position themselves in their work market. This situation was already foreseen and thus a great effort of outreach and awareness raising was undertaken. The work necessary to be able to reach fishing captains and skippers as an active part of the project was based in establishing a close and personal relationship, which was difficulted by the current health emergency due to Covid 19.

The second obstacle for data acquisition was due to the codification of data that the main navigation software programs employ. To avoid the use of pirate versions of their programs, software companies have done a great effort to codify data. This way, data loaded in a specific navigation software is only visible in updated versions of their own software, making exportation to other formats or visualization in different programs impossible.

To correct this situation a major effort was directed at performing personal interviews with fishermen and shipowners, and the spectrum of potential users was increased in order to include researchers and fishing observers. This way, two specific workshops not initially foreseen were performed, for researchers from the Spanish Institute of Oceanography and for fishing observers (Image 8).

These workshops were framed as part of work package 5, and their full description and detailed information about them can be found in deliverable D5.5 "Workshops".

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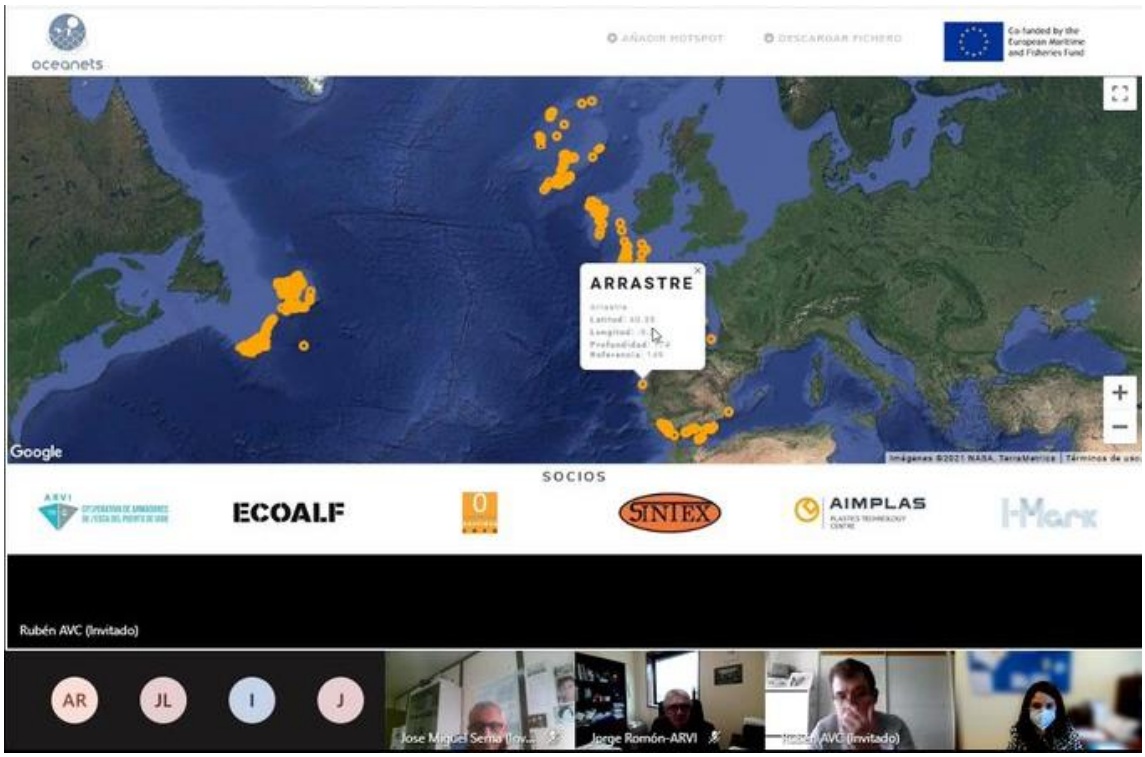


Image 8: Online workshop with scientific observers

Main results.

As a result of this work, the "Loss of fishing Gear Warning Tool" has been presented to more than 100 potential users. During the presentation of the tool the project was also introduced, and awareness about problems regarding marine litter was raised.

The initially proposed indicators were the following:

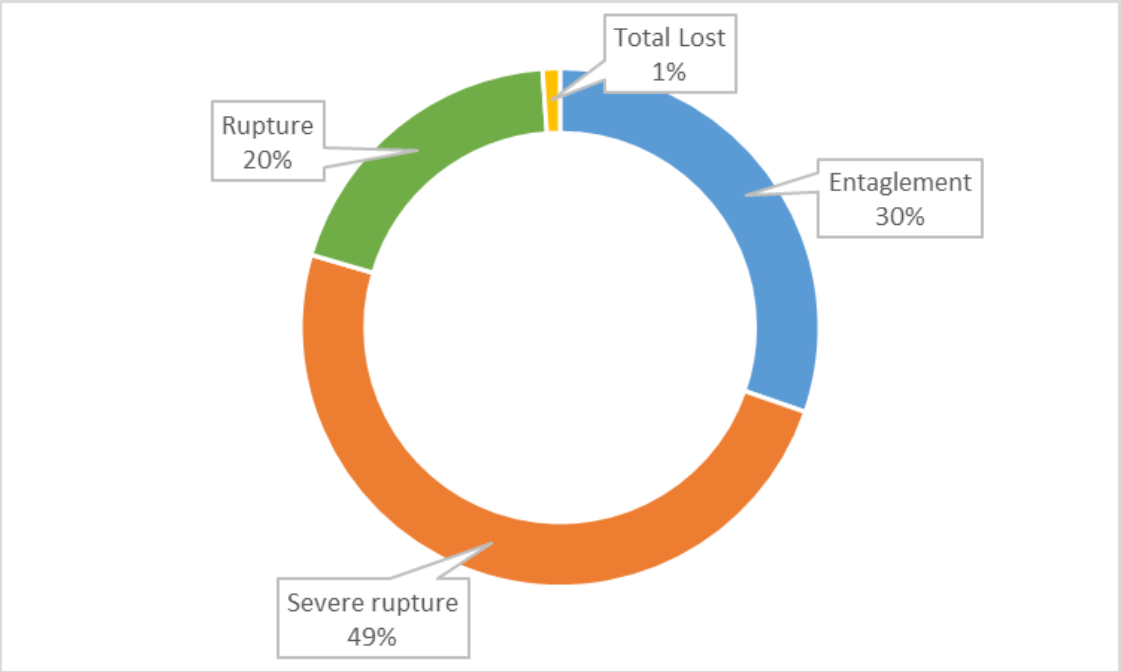
- Participation in the testing of the ICT tool: Min. 10 skippers
- Number of historical lost points of gear collected: Min. 100
- Number of new objects/dangerous points incorporated by users: Min. 25
- Number of downloads at technical report writing date: Min. 20

At the date of writing this deliverable, the project has achieved:

- 10 fishing skippers tested the tool during a fishing campaign (90 days).
- Compiling more than 500 historical hotspots of lost fishing gear located in the Northeast Atlantic (FAO 27), Northwest Atlantic (FAO 21) and Mediterranean Sea (FAO 37).
- 37 registered users, including fishing skippers, fishing observers and IEO researchers.
- Compiling more than 100 new objects/dangerous points incorporated by users
- More than 60 data downloads by users

The initial objective of the tool was to compile information about hotspots (locations with obstacles dangerous for fishing gear or navigation) located by trawling ships in the Great Sole area, in which information about 214 hotspots was acquired. On top of that, the OceaNets project has also acquired data from area FAO 21 (Atlantic Northeast), from area FAO 37 (Mediterranean and Black Sea), from Spanish coasts (FAO 27.8 and 27.9) and from North Sea (FAO 27.1 and 27.2). Moreover, data was also obtained from fishing vessels employing methods other than trawling, such as purse seine, gillnets or pair trawling. Towards unifying data, the points obtained have been categorized in 5 groups (lost fishing gear, container, shipwreck, rock and other obstacle), with 88% of data classified as "Other obstacle" and 0.5% as "Lost Fishing Gear".

The compiled points include a free-format description supplied by the users. These descriptions give us information about the damage caused by obstacles on fishing gears in these hotspots. This information is shown in Graph 1.



Graph 1: Type of event registered at the Loss of fishing gear warning tool

From this kind of events, it must be pointed out that 6 hotspots where entire fishing gears were lost have been located. These points are shown in Table 1.

Latitude (Dd)	Longitude (Dd)	Fishing area
43.63000	-3.17000	Bay of Biscay
43.81667	-49.61667	Northwest Atlantic (Division 21.3N)
44.46111	-48.93889	Northwest Atlantic (Division 21.3N)
43.60278	-49.67500	Northwest Atlantic (Division 21.3N)
43.66861	-50.01833	Northwest Atlantic (Division 21.3N)
48.11972	-47.25389	Northwest Atlantic (Division 21.3L)

Table 1: Lost fishing gear data registered at the Loss of fishing gear warning tool

Conclusions

During the workshops and interviews with fishermen they have all shown an interest for a tool such as the one featured in the OceaNets project.

Regarding awareness on marine litter, skippers have shown themselves to be broadly available to take part in projects related with the issue Moreover, and according to their point of view fishermen make a point on the fact that marine litter won't be properly managed until ship owners are aware of the issue (implementing on board protocols and making room available in fishing vessels to store marine litter and broken gear), as well as facilitating the deposit of marine litter once in port. On the other hand, captains and skippers point out that they are not aware of the projects related to the prevention of marine litter that are happening, but they're willing to participate. (All the information related to awareness raising activities can be consulted in deliverable D1.2 "Report on Awareness Activities")

The development of the "Loss of Fishing Gear Warning Tool" has allowed to generate a database of dangerous hotspots for operating fishing gear and navigation. This way, it has been possible to share information of interest that will theoretically allow to reduce gear entanglements in a precise fishing bank.

Towards future actions, it would be of interest to create a more complete user profile where the created points can be consulted and edited. This option was out of the scope of this first development but has been required by users.

Another of the points for improvement for future developments is a greater spatial resolution for the "Loss of Fishing Gear Warning Tool", through the screening of points in the visor, as hotspots have been detected that, without being duplicates, are so close together (less than 5 nautical miles). It is considered that these are obstacles and objects displaced by weather and have generated impacts in more than one occasion.

It is important to point out that Council Regulation (EC) No. 1224/2009, establishing a Community control system for ensuring compliance with the rules of the common fisheries policy, points out in its Article 48 that "*A Community fishing vessel shall have the equipment on board to retrieve lost gear*", "*The Master of a Community fishing vessel that has lost gear or part of it shall attempt to retrieve it as soon as possible*", "*If the lost gear cannot be retrieved, the master of the vessel shall inform the competent authority of its flag Member State, which shall then inform the competent authority of the coastal Member State, within 24 hours of the following: a) the external identification number and the name of the fishing vessel; b) the type of lost gear; c) the time when the gear was lost; d) the position where the gear was lost; e) the measures undertaken to retrieve the gear*". This regulation also allows Member States from exempting fishing vessels of less than 12 metres' length overall from part of these requirements should certain conditions be fulfilled.

Under the proposal for a Regulation of the European Parliament and of the Council amending Council Regulation (EC) No. 1224/2009, "*the reporting by the fishing vessel is to be done in an electronic logbook, and Member States are required to collect and record the information concerning lost gear and provide it to the Commission upon request. The information collected and available in the waste delivery receipts on passively fished waste in line with this Directive could also be reported in this way*".

In this legal context, the "Loss of Fishing Gear Warning Tool" is a development of interest that would allow to report the loss of fishing gear amongst fishing vessels and public bodies, as well as the generation of a database of lost fishing gear.

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