



## Fish-X

### D4.2: Insight Platform v1 User Manual for Testing Users

(excl. machine learning tool)

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## Abstract

The deliverable 'Insight Platform v1 user manual for testing users (excl. machine learning tool)' is delivered in association with the live version of the Insight Platform available at the following address:

<https://insight.groupcls.com>

The live Insight Platform v1 constitutes the main deliverable D4.2 due by the project. The present document gives an instant and static view of the Insight Platform open to public in November 2024. Although it is a User Manual giving simple instructions for a non-specialized public, it is preferable to have previous basic expertise in web applications, mapping tools and fisheries statistics. A simpler quick reference could be produced if considered useful by the reviewers. In the appendix, more explanations are given to clarify some specific processes such as the aggregation of vessels and time spent per zone.

Insight v1 is a living web site which will evolve until the end of the project with a second release (v2) that will incorporate more advanced filtering functions based on AI.

The manual and the web site will be used together by the Testing Users (e.g. members of the consortium and voluntary users) to navigate among the functions available and verify that the functional specifications expressed in the document D4.1 'Insight Platform functional definition and use case document' have been supported.



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## Acronyms and abbreviations

Abbreviation	Meaning
AI	Artificial Intelligence
AIS	Automatic Identification System
AWS	Amazon Web Services (cloud hosting Insight)
CFR	EU Common Fleet Register
DG Mare	Directorate-General Maritime Affairs and Fisheries
EEZ	Exclusive Economic Zone
EMODnet	European Marine Observation and Data Network
ERS	Electronic Reporting System
EU	European Union
FAO	Food and Agriculture Organization
FMC	Fisheries Monitoring Center
FRA	Fisheries Restricted Area
GDPR	General Data Protection Regulation (EU) 2016/679
GFCM	General Fisheries Commission for the Mediterranean and Black Sea
GUI	Graphical User Interface
ICES	International Council for the Exploration of the Sea
OSM	Open Street Map
MPA	Marine Protected Area
SSF	Small-Scale Fisheries
UTC	Coordinated Universal Time
UX	User Experience
VMS	Vessel Monitoring System
WGS 84	World Geodetic System 1984 (used by GNSS to determine a position)



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## Executive Summary

### Definition of the deliverables D4.2:

The deliverable 'Insight Platform v1 User Manual for Testing Users (excl. machine learning tool)' is delivered in association with the live version of the Insight Platform available at the following address:

<https://insight.groupcls.com>

The live Insight Platform v1 constitutes the main deliverable D4.2 due by the project. The live platform has been developed by CLS starting in the end of 2022 with a collection of users' needs provided by the consortium partners (in particular WWF and Sciaena) representing groups of end users. Since, IIMRO joined the project in June 2024 and brought some requirements for the Irish offshore Island's SSF monitoring.

### Audience – End Users:

The present document is a User Manual associated with the Insight Platform v1 as of November 2024. It aims at giving simple instructions for a non-specialised public having basic expertise in web applications, mapping tools, and fisheries. In appendices, more explanations are given to clarify some specific terms and processes.

The Insight platform v1 aims to provide a wide audience with access to fisheries monitoring datasets collected throughout the project through voluntary small-scale fishers participating in the project's use cases. The website displays several fishing indicators (density maps in v1, fishing effort in v2, KPIs, etc.) for small-scale fisheries. The audience following the Fish-X project, consist of fisher representatives, government officers, civil society, and scientists. This group is the first potential target audience of the platform. In addition, Insight is designed to allow other audiences (e.g. professional organisations of SSF fishers, NGOs, seafood buyers) already active to collect fisheries activities, to contribute by providing their own data sets. This offers an opportunity for ongoing projects at local or regional scale to display their activities on the portal and gain visibility.

### Data Sets to be visualised:

In the present version, Insight v1 is fed with vessel positioning data collected during the FISH-X project with volunteer small-scale fishers in Portugal, Croatia, and Ireland. The VMS data feed starts in August 2024. The concept of Insight allows interfacing more types of data sets





for vessel positioning or for electronic logbook. Generic interface formats are described in public Fish-X deliverable D4.1.

The digital data sets displayed in Insight v1 are derived from the VMS positions collected every 3 minutes. While it was initially planned to show also logbook reports from Electronic Reporting Systems (ERS), this function has been postponed until version 2 .

**The data to be visualised in Insight v1 are:**

- VMS presence (in number of vessels)
- VMS presence (in cumulated hours)

**More data will be added in Insight v2:**

- ERS activity (to be defined: number of reports, number of fishing hours, or catches depending on logbooks formats tested)
- Fishing activity (in number of hours, derived from number of hours of presence after AI anonymisation)
- and/or
- Fishing effort processed as a composite value (time x unit effort), which depends on the fishing gear:
  - o Gillnet, Trammel nets
  - o Pots and Traps,
  - o Set or drifting longlines (pelagic and demersal),
  - o Dredge,
  - o Pole and Lines
  - o Trolling lines
  - o Purse nets

**About personal data protection:**

The development of Insight is made by CLS in parallel with the development of a new generation of Fisheries Monitoring Center (FMC) and unified Electronic Reporting Systems (ERS) applications. Insight reflects the intention not to expose individual activities (e.g. vessels tracks, locations in ports) which could lead to the identification of individual fishers. As the protection of fishers' individual and professional data was one of the major concerns expressed at the inception of the project, the individual vessel tracks are not displayed. Instead, they are converted into times of presence and aggregated into density maps showing



statistical squares. These statistical squares disappear when there are less than three vessels present in the area.

All fishers who have accepted to take a NEMO VMS device onboard for the Fish-X project have signed a letter of consent which includes their agreement to contribute for populating Insight as a statistic tool. In parallel, they were given access to another portal called FishWeb, where they could see their own individual vessel tracks in real-time, for their own, or family purposes.

The processing of data in CLS and on the AWS cloud complies with the EU GDPR regulation, and it has been reviewed by the project's ethics advisors.

### **Next version: Insight Platform v2:**

In February 2025, for the Insight Platform v2, fishing effort will be estimated using state-of-the-art AI methods and displayed as fishing effort density maps and dashboards. As the concept of fishing effort varies with the type of fishing gear (e.g. gillnet, trammel nets, pots, trawl, longline etc), the Insight v2 fishing effort algorithms will be adapted to the specific types of vessels involved in the demonstrations.

In the Insight Platform v2 another major change will be implemented: the Insight Platform will receive VMS and ERS data under supervision of the Fish-X Data Space, following Gaia-X data protection rules. This interface to the Data Space was initially due for the version v1. Depending on the data sets which will be imported into the Insight Platform, it could cover applications such as fisheries monitoring, control, traceability, and market supporting applications.

This platform will also host data from several use cases and will provide to corresponding fishers simple and efficient tools that will help them prove their fishing grounds in case of conflicting uses of the maritime domain.

### **Fish-X project funding:**

The Fish-X project is co-funded by the European Commission Horizon Europe program (agreement no.: 101060879). The Fish-X project includes the development and operation of the Insight Platform and the Data Space environment to support the digital transition of Small-Scale Fisheries.



## 1. Home Page

Login to Insight is made at this address:

<https://insight.groupcls.com>

At present, the home page is not ready, it should display the partners logos and the EU flag and project details:



Presently, Insight v1 opens directly into the map page: <https://insight.groupcls.com/map> until a home page becomes available. Also, a button will be added from the official project web site (Fish-X.eu) to route the visitors to the Insight Platform.

## 2. Map Display

### 2.1 Buttons

By default, the map displays the entire globe projection, and the buttons in the right menu are used to zoom in to a specific area. Moving the map (panning) is made by clicking on the map and dragging the pointer.

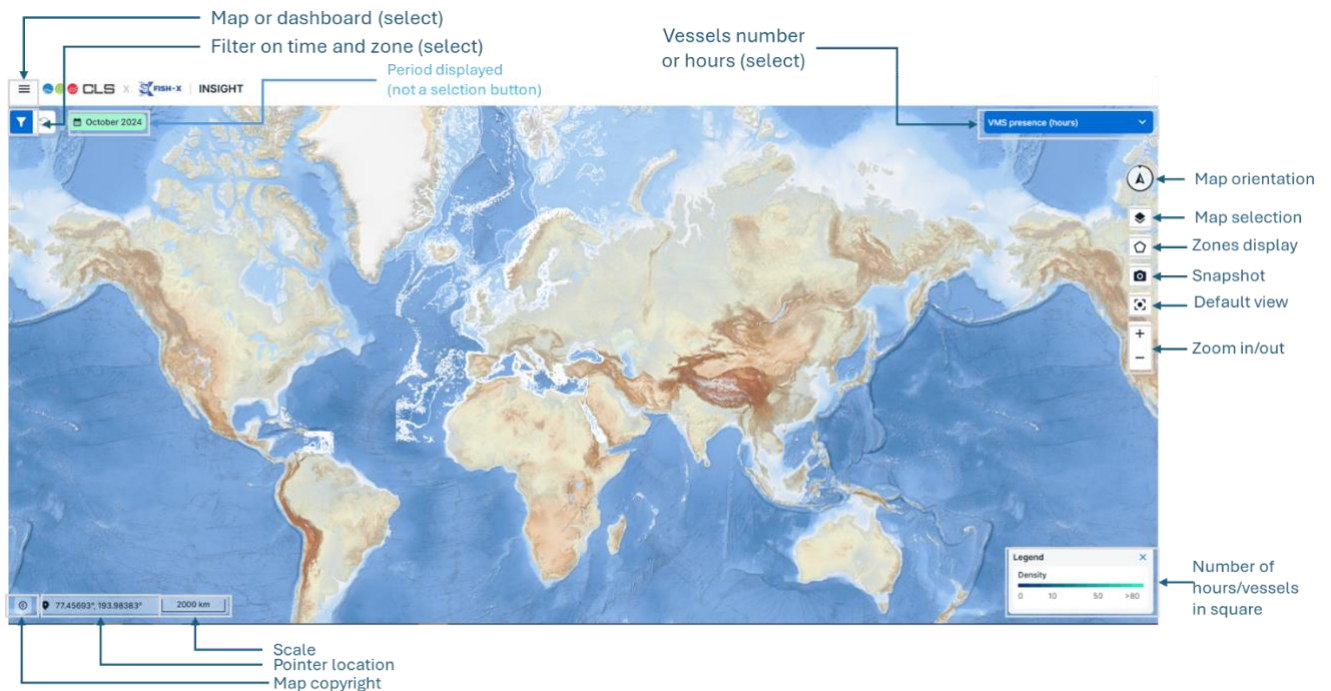


Figure 1 – Main map view

There are some buttons surrounding the main map display:

- **Buttons on the right side** relate to the map view:
  - o Map orientation (in case the map is rotating)
  - o Map selection by layer management, with two types of maps available
  - o Zone display, to display one or several layers of zones on top of the map
  - o Snapshot to download a jpg view
  - o Default view to return to the global map
  - o Zoom in and out (zooming is also possible using the mouse wheel)
- **Buttons on the top left side** are used to select:
  - o The display format (map or dashboard)
  - o The time period of the data sets
  - o The zones where data are displayed
- **Buttons on the top right side** refer to the selection of data sets to be displayed: number of vessels or number of hours by statistical square



This manual will give you a quick tour of their functions, it is proposed to use them in the following sequence of this manual, starting with the map display.

## 2.1 Select the map

In the right menu bar, click the Map Layer button, two types of maps are available:

- The EMODnet Bathymetry map is made available by the European Commission DG Mare. It displays the surface and sea floor relief. Over the Atlantic and Mediterranean regions, the EMODnet map includes a layer of bathymetric lines (isobaths)<sup>1</sup>. This type of map is of interest to understand in which water depths the vessels are fishing.
- The Open Street Map provides more map details of interest for the coastal context: the villages, cities, roads etc are indicated.

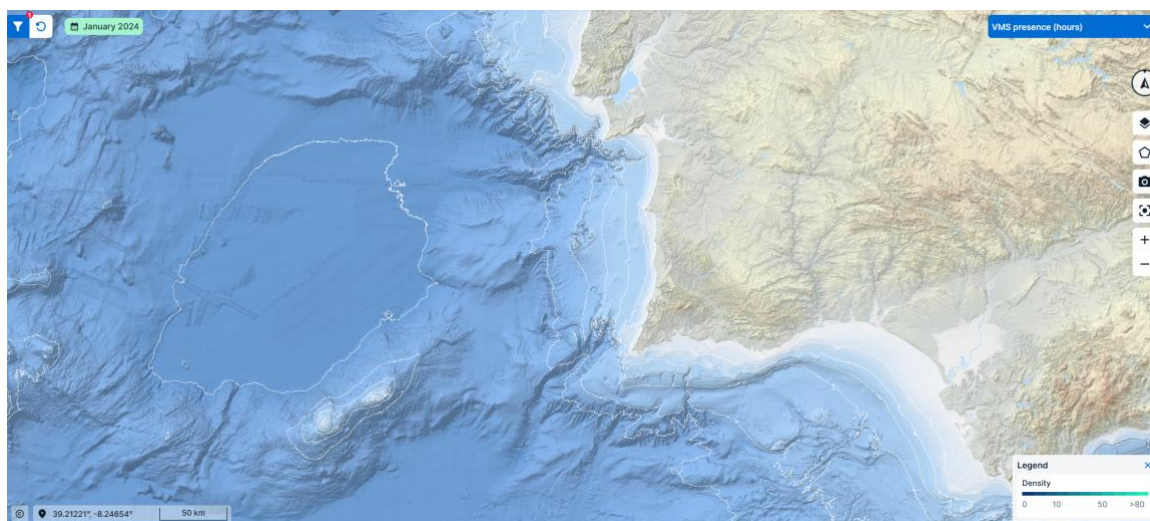


Figure 2 – Maps layer: EMODnet Bathymetry

When zooming on the lines their depth value appears. The following values are displayed: 50|100|200|500|1000|2000|5000|7000 meters depth.

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<sup>1</sup> <https://emodnet.ec.europa.eu/geonetwork/srv/eng/catalog.search#/metadata/4f7ab468-f4b9-4c2c-8d3b-49a375cf9964>

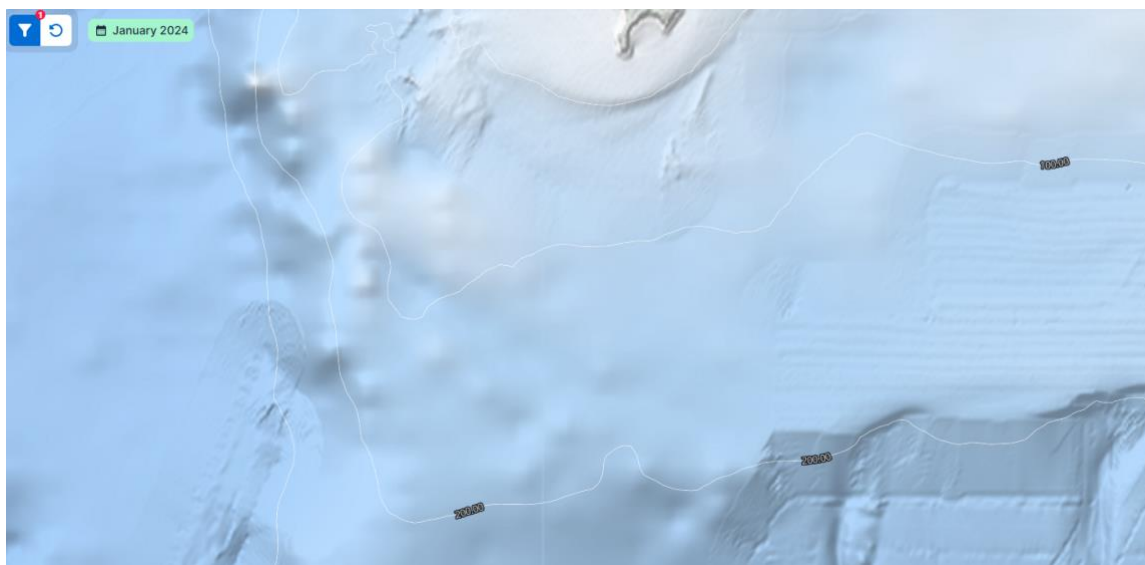


Figure 3 – Maps layer: Zoom on EMODnet isobaths and depths values

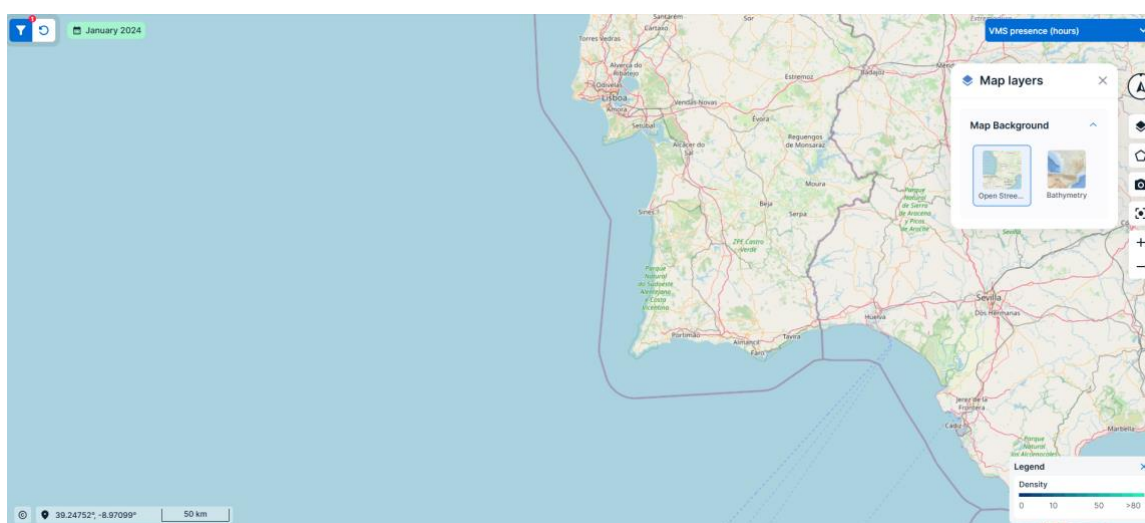


Figure 4 – Maps layer: Open Street Map

## 2.2 Select time period

In the map display, it is necessary to define for which period of time the data should be displayed. There are three choices:

- A day
- A month (cumulating all days in the month). Data was acquired since August 2024.



- A year (cumulating all months at the end of the year). Since data are only collected in 2024, the year display does not return results yet.

Click the funnel button (top left) and the window opens which allows selecting a day or a month to be displayed.

For selection of a month of data, proceed as follows:

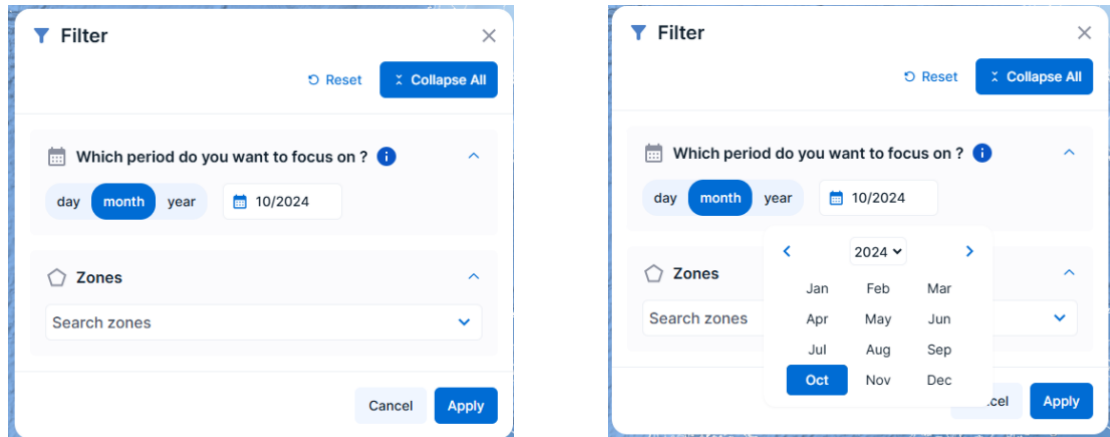


Figure 5 – Time period: month selection

- Click on the month button (Figure 5, left)
- Click on the calendar to choose which month will be displayed until the current month minus one month (Figure 5, right)
- Apply
- The map immediately displays the fishing vessels presence

For selection of a day of data, follow the same process:

- Click first on the day button (Figure 6, left)
- Click on the calendar to choose which day will be displayed (Figure 6, right)
- Apply
- The map immediately displays the fishing vessels presence

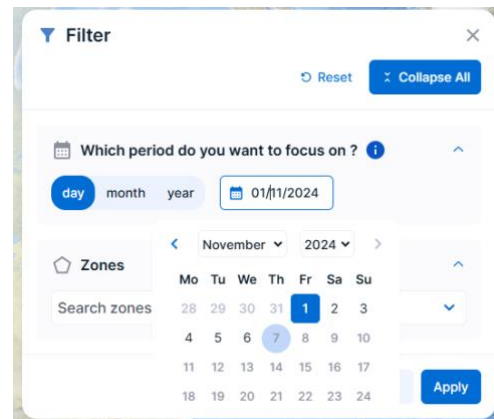
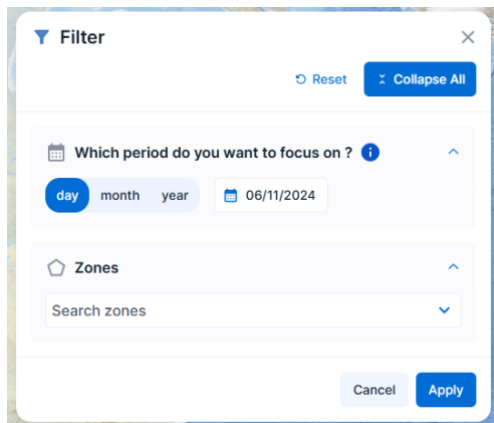


Figure 6 – Time period: day selection

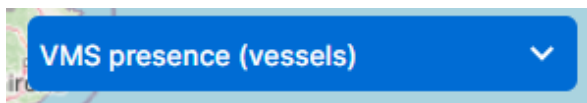
The Insight Platform does not display real-time data by design, as it is not made for control. Each day, the statistics are computed for the current day minus two days. For instance, on the 14<sup>th</sup> of October, the most recent daily statistics are for the 12<sup>th</sup> of October.

The monthly statistics are produced after the end of month, plus 2 days. So statistics for October will be available on the 3<sup>rd</sup> of November.

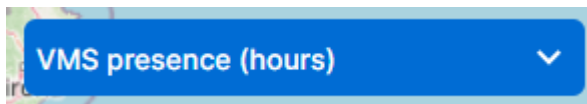
### 3. Vessel Presence Statistics

#### 3.1 Statistical squares

After the time period has been selected, the results immediately appear on the map as statistical squares. The button to the top right is used to select one of the results:



It counts the number of vessels present during the period in each square



It counts the number of hours of presence of these same vessels

The size of statistical squares varies with the zoom level. In large views with low zoom level, the squares cover larger areas, then aggregate more vessels or presence time. When zooming





in, each square progressively splits into smaller squares (division by 2 in height and width) to give results with a better resolution.

Zoom level	Size in degree
1	1.6°
2	0.8°
3	0.4°
4	0.2°
5	0.1°
6	0.05°
7	0.025°

Refer to the section 7 Appendix A if there is any interest to convert the statistical squares in kilometres.

Refer to the section 8 Appendix B to understand how the time spent in squares is calculated.

### 3.2 VMS presence (vessels)

Here is an example of the region of Algarve in Portugal during the month of September 2024. Each square represents a number of vessels present at any time in the square. The exact value is displayed when the pointer hovers above each square. Dark green squares represent the minimal number of vessels allowed: 3 vessels. If there are fewer than three vessels in an area, the square is not represented to protect individual activities.

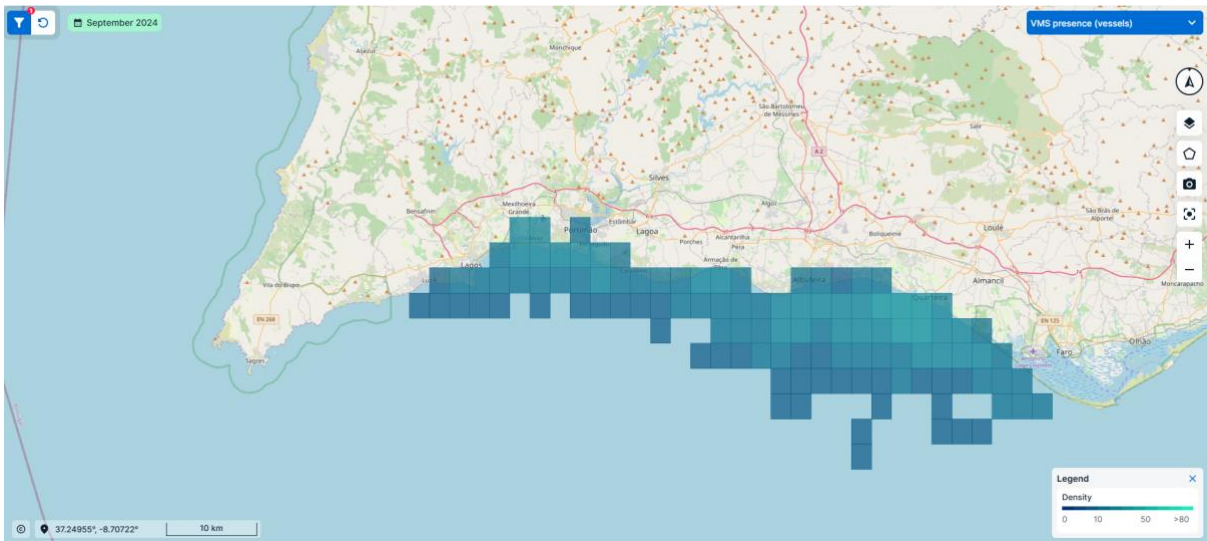


Figure 7 – Map of VMS presence (number of vessels)

The zooming function influences the number of squares as explained before, and also an effect on the count of vessels which will be explained in the following views taking an example in the Algarve region in September 2024.

Zooming is made by using the + / - buttons in the right menu or using the mouse wheel.

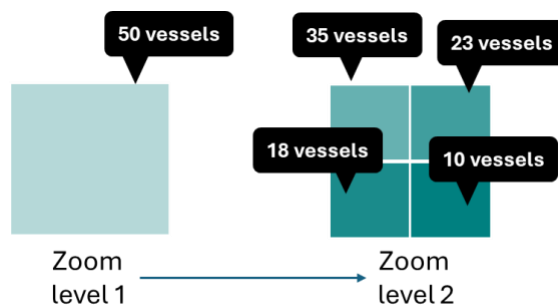
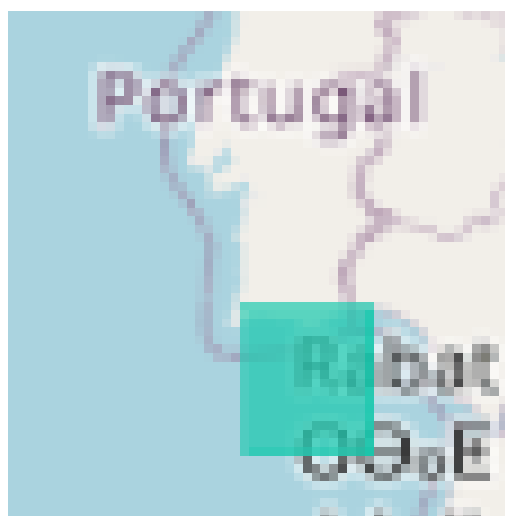


Figure 8 – Statistical squares change of size



1 square of 52 vessels



3 squares of 29, 36, 8 vessels  
for a total of 73 vessels



7 squares  
for a total of 120 vessels



40 squares  
for a total of 403 vessels

Figure 9 – Map of VMS presence (number of vessels) – Effect of zooming on squares

The number of vessels seem to multiply when zooming in while in fact the first square shows 52 active vessels in the Algarve region in September. This can be explained as a same vessel may be in different zones during the month, and it will be counted for each zone. The more zones there are, the more likely it is that the same boat will be counted in several zones.

This type of statistical representation is more relevant for cumulating hours than for counting vessels. Typically, the fishing effort calculation will cumulate all the fishing hours of all vessels



in a square. The detailed squares are of interest to determine the number of vessels in a given area, such as a future wind farm or an MPA, but users should avoid adding together the values of several squares. To know the total number of vessels in a given area, it is preferable to zoom out and find the square which covers this area.

### 3.3 VMS presence (hours)

Here is the same region of Algarve in Portugal during the same month of September 2024. Each square represents a number of hours spent by any of the vessels. The exact value is displayed when the pointer hovers above each square. Dark squares represent minimal numbers (1 or 2 hours). Light green squares represent peak presence (up to 252 hours here).

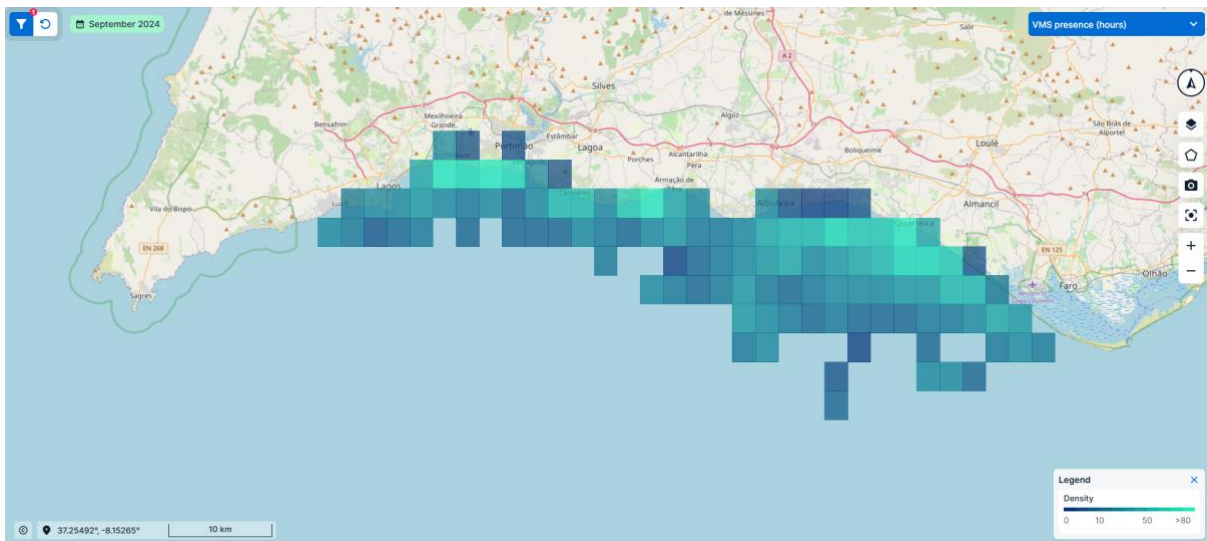
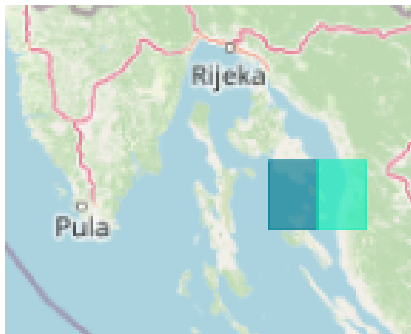


Figure 10 – Map of VMS presence (hours)

The change in zoom level will conserve the cumulated number of hours until the number of vessels drop below 3 vessels in a square. From the zoom level where less than three vessels were in the square, the individual hours are not counted.

Some squares with “0 hours” may appear which represent the presence of at least three vessels for less than one hour in total (e.g. 45 minutes).

This is illustrated in another area in Croatia, for the same period (September 2024). In the least zoomed view, there are 110 hours of presence distributed over two squares. When zooming, the squares are divided into 4 smaller squares and the squares with fewer than three vessels are not counted.



2 squares,  
17+93 = 110 hours



1 square  
16 hours

Figure 11 – Map of VMS presence (hours) – Effect of zooming on squares

### 3.4 VMS presence in zones

It is possible to filter positions in zones of interest using the top left menu (Funnel). The filter selects vessels data only for a list of defined zones. It is possible to filter on wide zones (FAO or GFCM) or Exclusive Economic Zones. To select a zone, scroll the vertical menu in “Search zones” (Figure 12, left).

It may be faster to start typing the first letters of the zone name (e.g. Port for Portuguese EEZ, as in Figure 12, right).

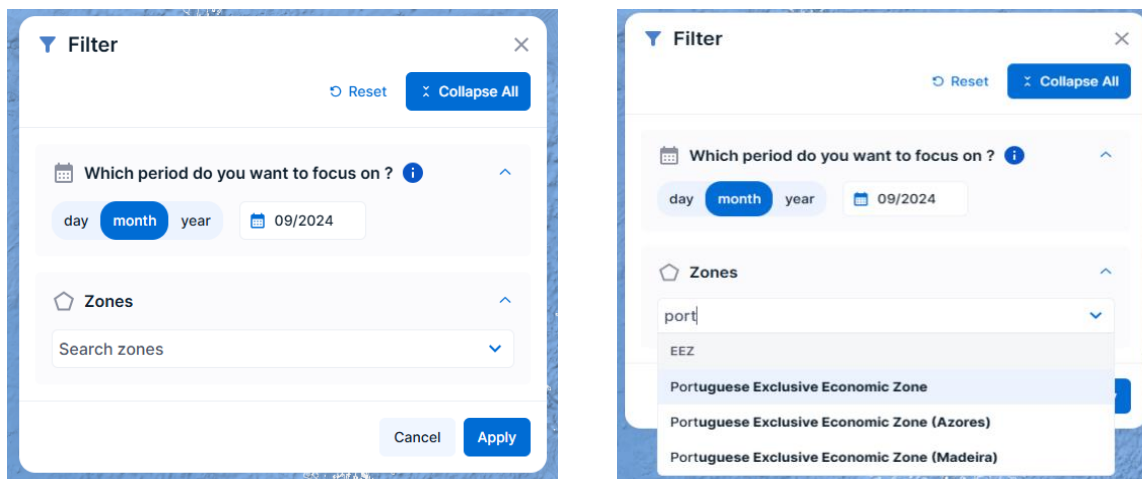


Figure 12 – Filtering positions in zones – Search Zone or type a zone name



The effect of the zone filter is illustrated in the two following views.

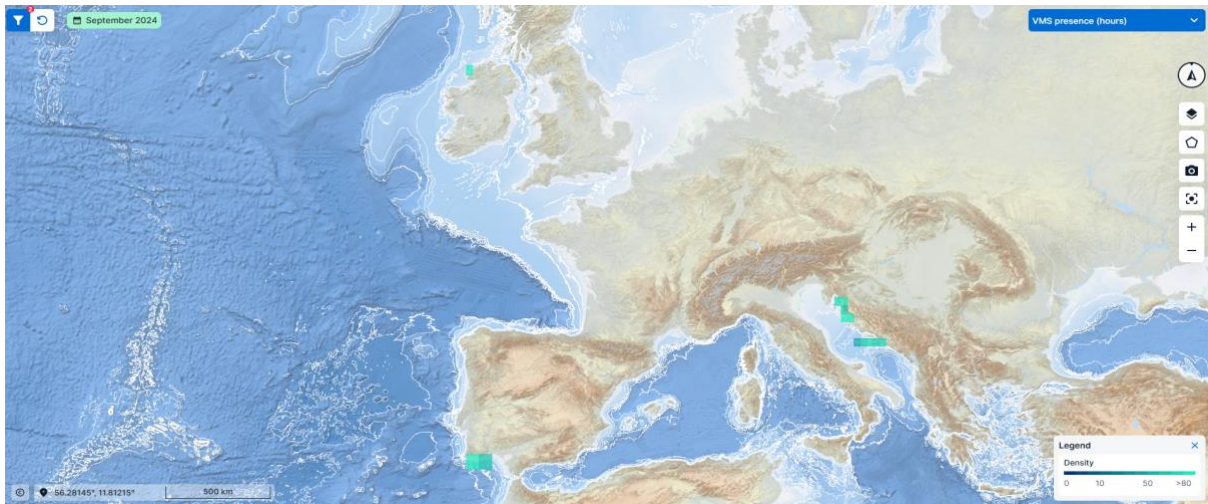


Figure 13 – Map of VMS presence (hours) – No zone filter applied, all three projects are displayed

Without selecting any filter, all three projects in Portugal, Croatia, and Ireland appear. When filtering on the Portuguese EEZ, only the vessels along the coasts of Portugal are displayed.



Figure 14 – Map of VMS presence (hours) – Portuguese EEZ filter applied, only the project in Portugal is displayed



## 4. Dashboards



Dashboards are a different way to represent the same statistical results. They are accessible in the top left menu next to the CLS and Fish-X logos. The results displayed in the dashboards refer to the same period of time which was selected in the map menu.

Dashboards are composed of two parts:

- Left side: It shows the number of active vessels for the total map or only the zones selected with the Zone Filter (funnel).
- Right side: six bar charts can be displayed sequentially, using the arrows.

### 4.1 Left side dashboard

A vessel is considered 'active' if it leaves port at least once during the defined period (day, month or year). Thus, we have developed a binary supervised classification algorithm, with two categories: PORT and OCEAN. This relatively simple machine learning model uses the following input data: distance from the shore, changes in instantaneous speed (provided by the VMS beacon) and changes in average speed. Positions classified as 'PORT' are excluded from the calculation of maps and statistical graphs.

### 4.2 Right side dashboards (bar charts)

The six dashboards provide examples and more relevant ones could be customized. For each dashboard, more details such as number of vessels appear when the pointer hovers over the bar charts. The present dashboards include:

- **Most populated GFCM Sub-Areas:** in September 2024, 25 Croatian vessels are in the GFCM Sub Area named "Northern Adriatic".
- **Most populated EEZ:** The Portugal EEZ with 52 vessels displayed.
- **Most populated FAO zones:** The zone 27 has 57 vessels.
- **Most populated GFCM FRA** (Deepwater FRA defined by all areas deeper than 1000 metre depth): no vessels in September 2024
- **Most populated MPA:** no vessels in MPAs in September 2024
- **Most populated areas in Croatia:** 8 vessels are in September in the Velebit channel

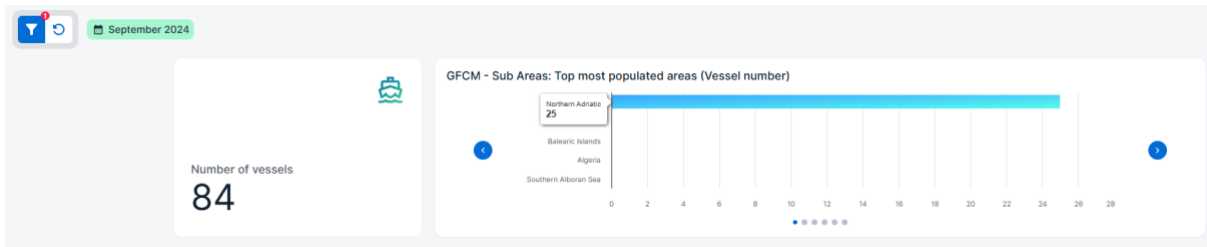


Figure 15 – Dashboard 1: Most populated GFCM sub-areas (with pointer hovers over the bar chart to display the number)



Figure 16 – Dashboard 2: Most populated EEZs

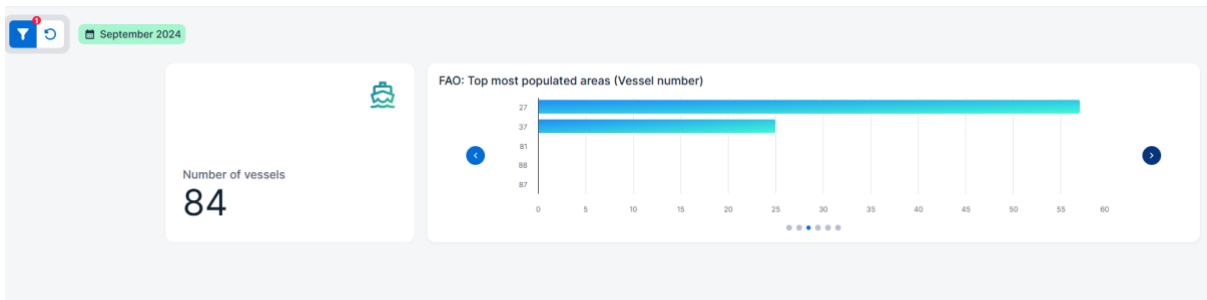


Figure 17 – Dashboard 3: Most populated FAO areas

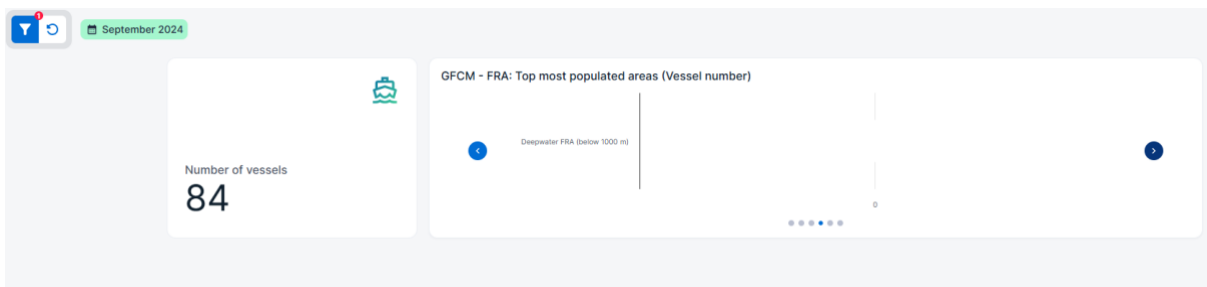


Figure 18 – Dashboard 4: Most populated GFCM Fisheries Restricted Areas



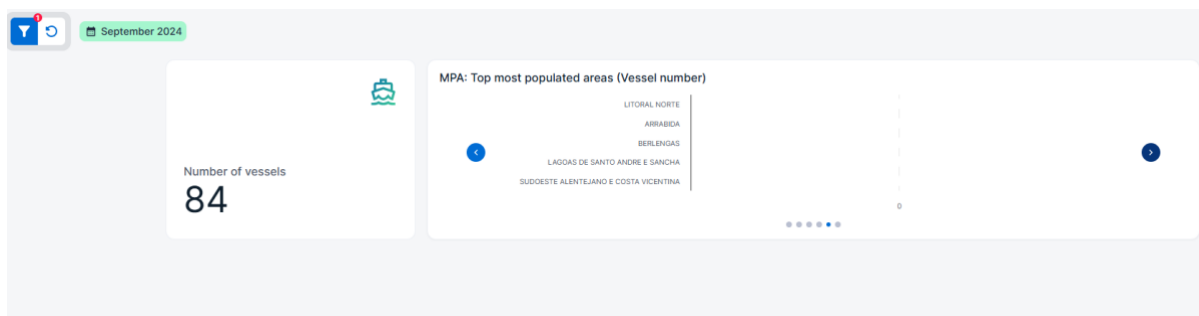


Figure 19 – Dashboard 5: Most populated MPAs

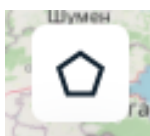


Figure 20 – Dashboard 6: Most populated areas in Croatia

## 5. Additional Display Tools

The following tools are accessible from the menu on the right. They are used to modify the background maps and do not affect the datasets displayed.

### 5.0 Zone Display



This menu is not used for data filtering (refer to section 3.4 for filtering vessels data). The button allows displaying one or several zones on the map, with several types of zones:

- FAO
- GFCM Sub-Areas
- GFCM FRA (Fisheries Restricted Areas)
- EEZ
- Marine Protected Areas (presently, only MPAs in Portugal are represented)
- Specific national zones (e.g. Velebit Channel in Adriatic Sea)



When hovering the pointer over the area, the names will be displayed:

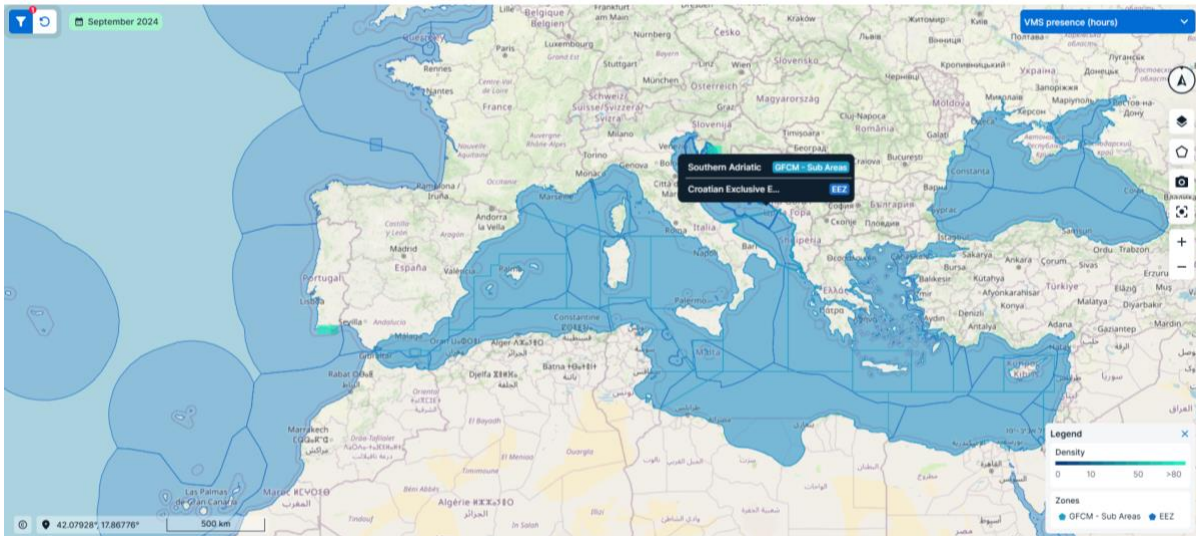
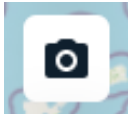


Figure 21 – Zone Display – GFCM Sub-Areas and EEZ layers with names of zones

## 5.1 Make a Snapshot



This button is used to create a jpg file from a specific map of interest and save it in the download directory.

## 5.2 Default View



This button is used for quick return to the minimal zoom level.

## 5.3 Orientation of the map



Like for a navigation application, the Insight map allows to be rotated in the plane, so the north is not displayed upwards. It can also be projected with a perspective effect. To do that, click and drag the map while pressing the Ctrl key on the keyboard. Return to flat north-south orientation by clicking on the navigation button.

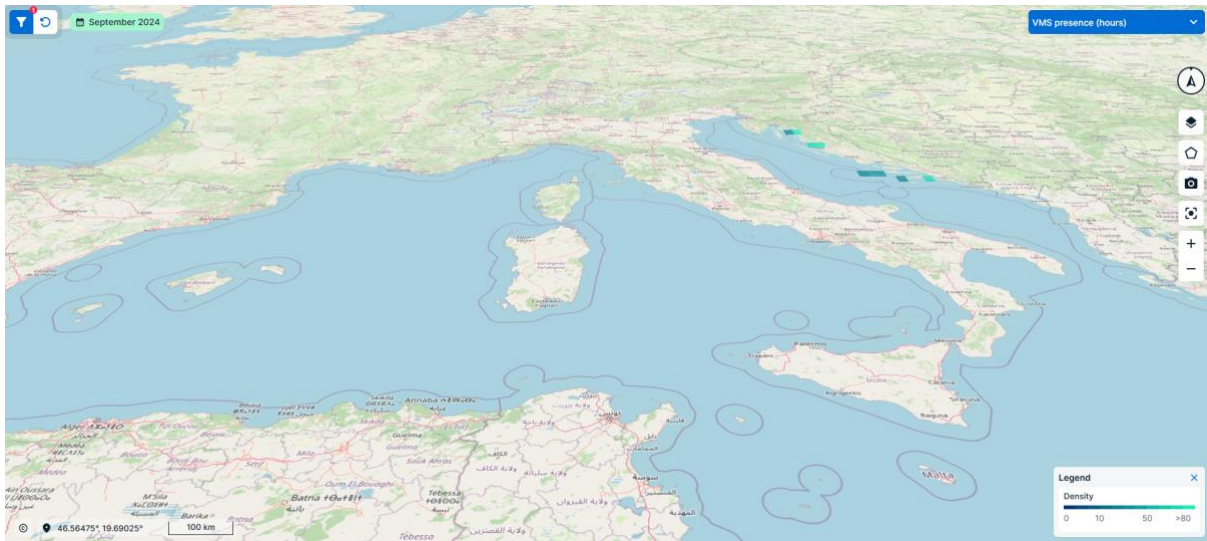


Figure 22 – Map orientation and perspective

## 5.4 Supported browsers

The latest versions of the following web browsers are supported:

- Chrome,
- Edge,
- Firefox,
- Safari

## 6. Performance

The Insight v1 platform is hosted on a Cloud provided by AWS, which will allow scalability to maintain a fast response level should the number of users and the volume of data increase. Presently, there are rather small data sets processed produced from the 110 vessels fitted with NEMO VMS devices during the Fish-X project. At present, the data from August 2024 until November 2024 are already integrated, and data will continuously be integrated until the end of the project in May 2025.

The consortium is now investigating which other ongoing projects could join and contribute by providing past data sets, in respect of all data protection obligations. Insight is by design able to scale up and accommodate 100.000 vessels or more, with vessel positioning at frequent intervals (typically 3 minutes) and daily electronic logbooks (in the v2 version).



The objective response times are as follows:

- Display the whole world density Map in less than: 10 s.
- Display a density Map using an EEZ or an FAO area as a filter in less than: 2 s.
- Display a density Map using a FRA or a sub-FAO area as a filter in less than: 1 s.

The response times have been tested with an Insight integration platform (not open to public) using a global AIS data feed to verify the load capacity. 36.000 vessels with 2.2 million positions were loaded. More tests are in progress.

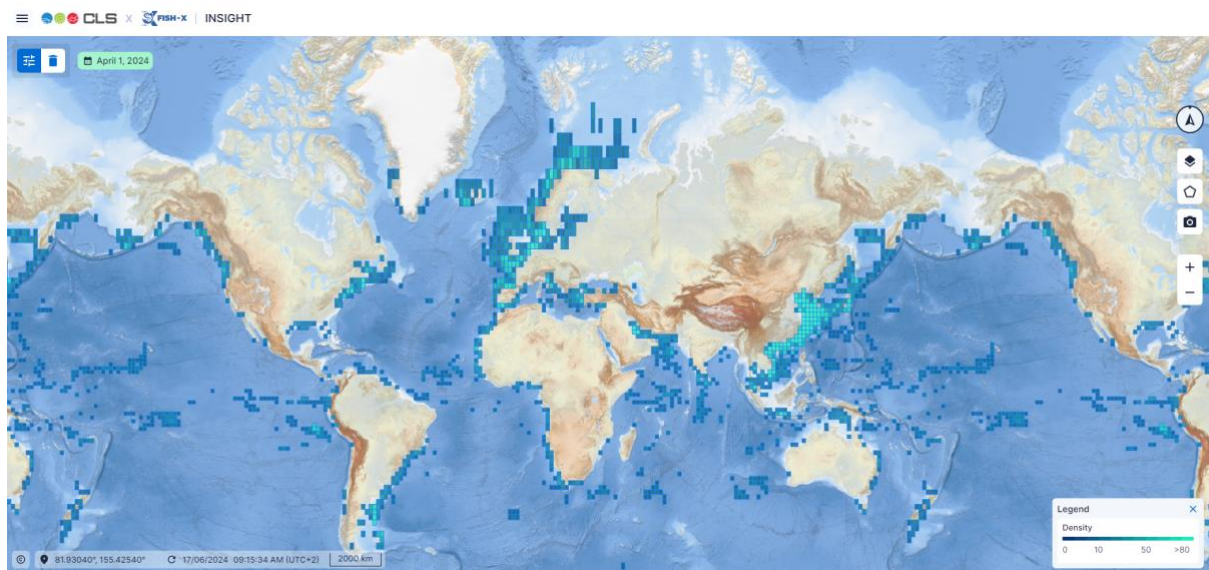


Figure 23 – Insight load test with global AIS feed



## 7. Appendix A: Relation between the squares' dimensions and the zoom level

All vessels' data are aggregated into statistical squares to illustrate the impact of fishing on each maritime area over periods of time (day, month, year).

There are seven sizes of squares, expressed in portions of degrees. Every region on the Earth's surface can be referenced by its coordinates, and surfaces can be defined by its bordering latitudes and longitudes, for instance 35°- 36°N / 15°-16°E. The parallels (circles at a given latitude) are smaller when approaching from the Equator to the Poles. When the statistical squares are converted from degrees to km, they appear to change of dimensions, their horizontal size is reducing for more northern latitudes with the vertical dimension remains unchanged.

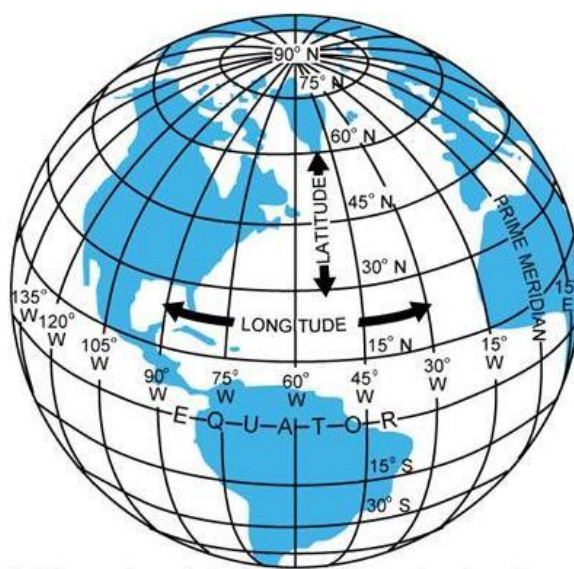


Figure 24 – Meridians and parallels defining coordinates on Earth

If users need to convert the statistical squares in kilometres, the approximate conversion for the three Fish-X test sites is as follows:



Zoom level	Size in degree	Approximate vertical size in km	Approximate horizontal size in km (in Algarve 37° latitude)	Approximate horizontal size in km (in Croatia 44° latitude)	Approximate horizontal size in km (in Ireland 54° latitude)
1	1.6°	177,8	142,0	127,9	104,5
2	0.8°	88,9	71,0	63,9	52,2
3	0.4°	44,4	35,5	32,0	26,1
4	0.2°	22,2	17,7	16,0	13,1
5	0.1°	11,1	8,9	8,0	6,5
6	0.05°	5,6	4,4	4,0	3,3
7	0.025°	2,8	2,2	2,0	1,6

Figure 25 – Statistical squares dimensions in degrees and approximate degrees

Above approximate values assume a round shape of the Earth, while it is rather a geoid.



## 8. Appendix B: Calculation of Time Presence in a Zone

The calculation of vessels presence in a zone (e.g. a statistical square) is based on the analysis of its trajectory. The trajectory is composed of consecutive locations, each of them associated with a time stamp. The interval between two consecutive locations depends on the VMS settings. Typically, the NEMO VMS devices used in Fish-X transmit a position every 3 minutes, but they could be set to different, less frequent intervals (e.g. 15 or 60 minutes).

To calculate the total number of hours spent in a statistical square, a dedicated algorithm is applied:

- It cumulates the times between consecutive VMS positions located inside the statistical square.
- For two consecutive VMS positions crossing the statistical square limit, it calculates the portion of the time interval in each square. If several squares are crossed between the two consecutive positions, a portion of time is calculated for each square, using a linear interpolation assuming that the vessel speed is fixed between two VMS positions. This latter case is illustrated with two consecutive positions (red dots) in different statistic squares, the algorithm processes the times intervals in each square (transit time from blue dot to blue dot):



Figure 26 - Calculation of entry/exit times for each square for time spent in zone





## 9. Appendix C – Definition of Terms

**AIS:** Automatic Identification Systems is a position reporting system primarily designed as an aid to navigation and safety at sea. AIS collects vessel positions at variable intervals (depending on their speed). AIS is installed on all types of merchant vessels (tankers, passengers, container carriers etc). AIS is not mandatory for vessels below 15 meters in the EU. Access to AIS data is provided by commercial suppliers which operate satellite constellations listening to AIS terminals onboard vessels, or through coastal receivers. A major difference of AIS with VMS is that vessels are allowed to switch off their AIS, if it may represent a threat (e.g., navigating in piracy areas), therefore, AIS cannot be used alone for enforcement of fisheries regulations.

**ERS:** Electronic Reporting Systems allow fishers to report their activities manually, without using paper logbooks, in compliance with EU regulations applicable for vessels above 12 meters soon to be extended to all vessels. The reports are necessary for measurement of fishing impact on fish stocks, with sufficient level of precision (per area and per species). The reports contain a unique identifier of the fishing trip and details of fishing trips from port departure to return to port, with a list of catches and quantities, specific events such as entry or exit of zone. The new EU control regulation will require SSF to report electronically (e.g., smartphone app) after each fishing trip before landing their catches including interactions with vulnerable species and lost fishing gears.

**Fishing Effort:** According to the FAO:<sup>2</sup> “Fishing effort is generally defined in terms of the time spent searching for fish (search duration) and/or the amount of fishing gear of a specific type used on the fishing grounds over a given unit of time e.g. a fishing operation, fishing activity, day or fishing trip. The measure of effort (unit of fishing effort) depends on the fishery and type of gear used.” The fishing effort represents the resources involved in the catching of fish, generally proportional to a duration of activity and a function of the fishing gear efficiency (number of hooks in a longline, or traps or lines for other techniques). In the context of the Insight Platform, the fishing effort will be the result of a calculation based on the vessel trajectory and additional data.

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<sup>2</sup> <https://www.fao.org/cwp-on-fishery-statistics/handbook/capture-fisheries-statistics/fishing-effort/en/>



**Gaia-X:** Gaia-X is an EU-initiative focused on crafting a software framework for regulating and governing cloud and edge technology stacks. It establishes a shared set of policies and regulations to promote transparency, controllability, portability, and interoperability across data and services. Gaia-X's architectural foundation is rooted in the decentralisation principle, resulting in a cooperative ecosystem of individual platforms that adhere to a common standard. The Gaia-X standard is dedicated to developing a data infrastructure founded on the principles of openness, transparency, and trust. So, what emerges is not a cloud, but a networked system that links many cloud services providers together, who keeps control of its own data.

Through Gaia-X, the formation and enhancement of data spaces are facilitated by trusted platforms that uphold consistent rules. This framework fosters mutual trust between users and providers on an objective technological basis, allowing them to exchange data securely and freely across multiple entities. The Fish-X Data Space builds on this initiative and hence offers its users the accompanying benefits.

**Marine Chart:** In this present context, marine charts are digital charts used as background of vessels locations, to help understanding the fishing activities with regards to the bathymetry and other features (buoys, protected areas etc). They are not used for navigation.

**UI:** User Interface screens with series of menus, selection buttons, etc available through an app on a smartphone, or through a web browser.

**VMS:** Vessel Monitoring System is a position reporting system which collects vessel positions at regular intervals (e.g., every two hours in the EU) imposed by most fisheries regulations in the world, applicable to all fishing vessels in the EU above 12 meters in length fishing for more than 24 hours, and this regulation will be progressively extended to vessels below 12 meters until 2030. The vessel masters are obliged to maintain an active VMS onboard, and interruption of VMS reports may be considered as infringements if not justified (e.g., vessel to port).