iSEAS

ACTION B2

Final SDI development report

(LIFE13 ENV/ES/000131)

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Author	CESGA
Responsible	CESGA
Involved partners	IEO, IIM-CSIC

Contents

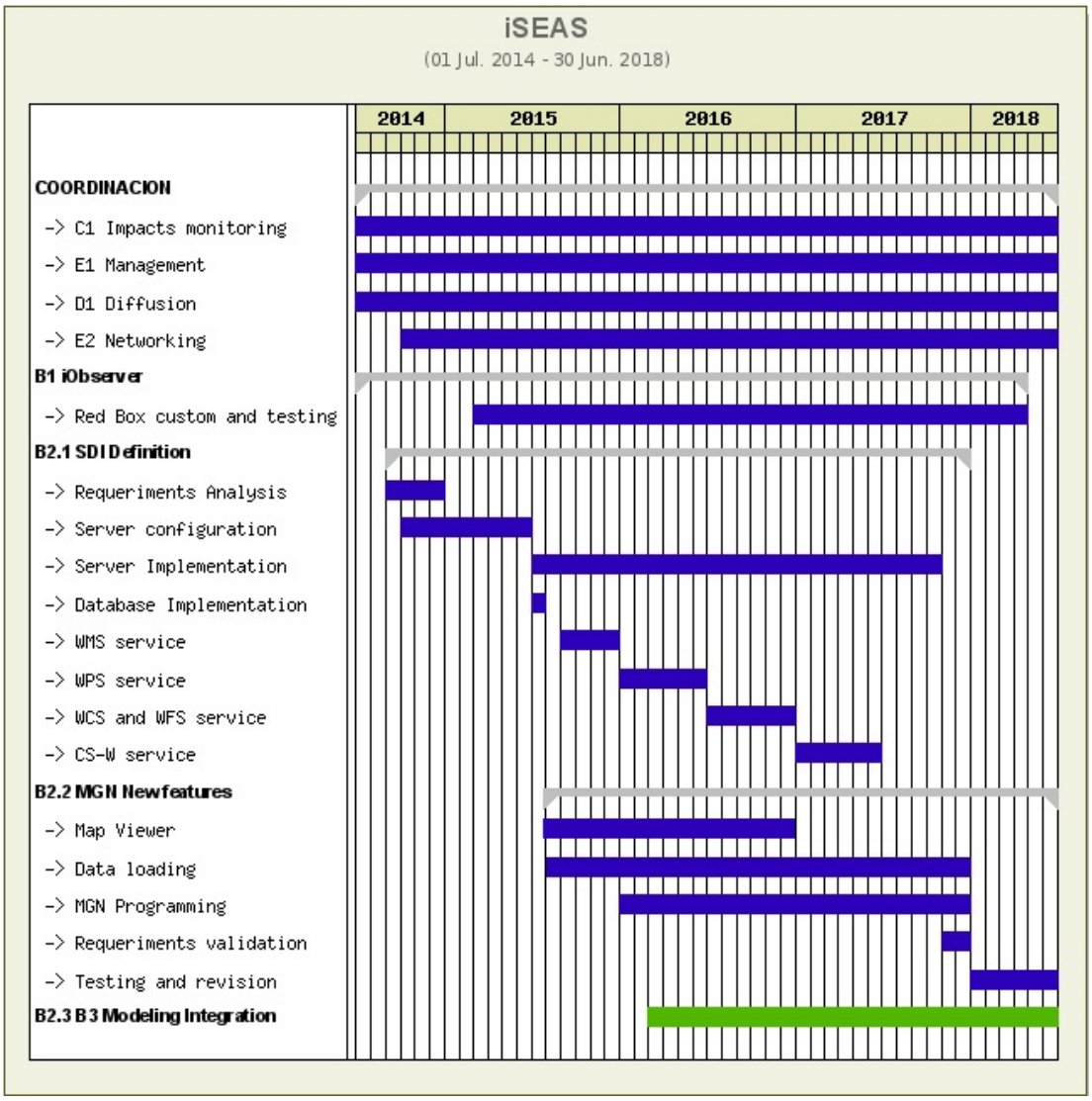
1. Introduction

This document describes the results obtained within Action B2 "*Development of a fish discards SDI*" aimed at achieving the main objective of the iSEAS project: the development and implementation of an efficient and comprehensive discard management network through the improvement of the implementation of both existing knowledge and innovative solutions, involving all stakeholders present in the fishing sector (fleets, ports, markets, industries, etc ...) and whose results are to minimize discards in addition to its optimal valorization to recover and produce chemicals of interest to the food and pharmaceutical industries.

With this objective, a Spatial Data Infrastructure (SDI) has been implemented, complying with the INSPIRE 2007/2 Directive, which allows access to geoservices specifically related to fishing discards. This infrastructure has the standard services of the OGC Web Map, Web Feature, Web Coverage, Web Processing and Catalog, and is based on a data model and its corresponding database that has been developed with the other project partners.

A RedBox tool has been created for the acquisition of catch information, within task B1 of implementation of new on-board technologies, and in coordination with the iObserver species identification system, which stores the data in real time and transmits it to the data server on the ground, housed in the CESGA.

An online Geoportal has also been developed with a map viewer to be able to consult all information of catches and species valorization. It also includes spatial and temporal maps based on spatial temporal models developed in task B3 for the activity of the selected fleets (considering the distribution of the species), giving fishermen the opportunity to avoid areas or periods with an abundance of unwanted catches and also contribute to obtain the most profitable, ecological and fuel-efficient catches, complying with the European Commission's policies regarding environmental protection.



Task breakdown

2. Model and database

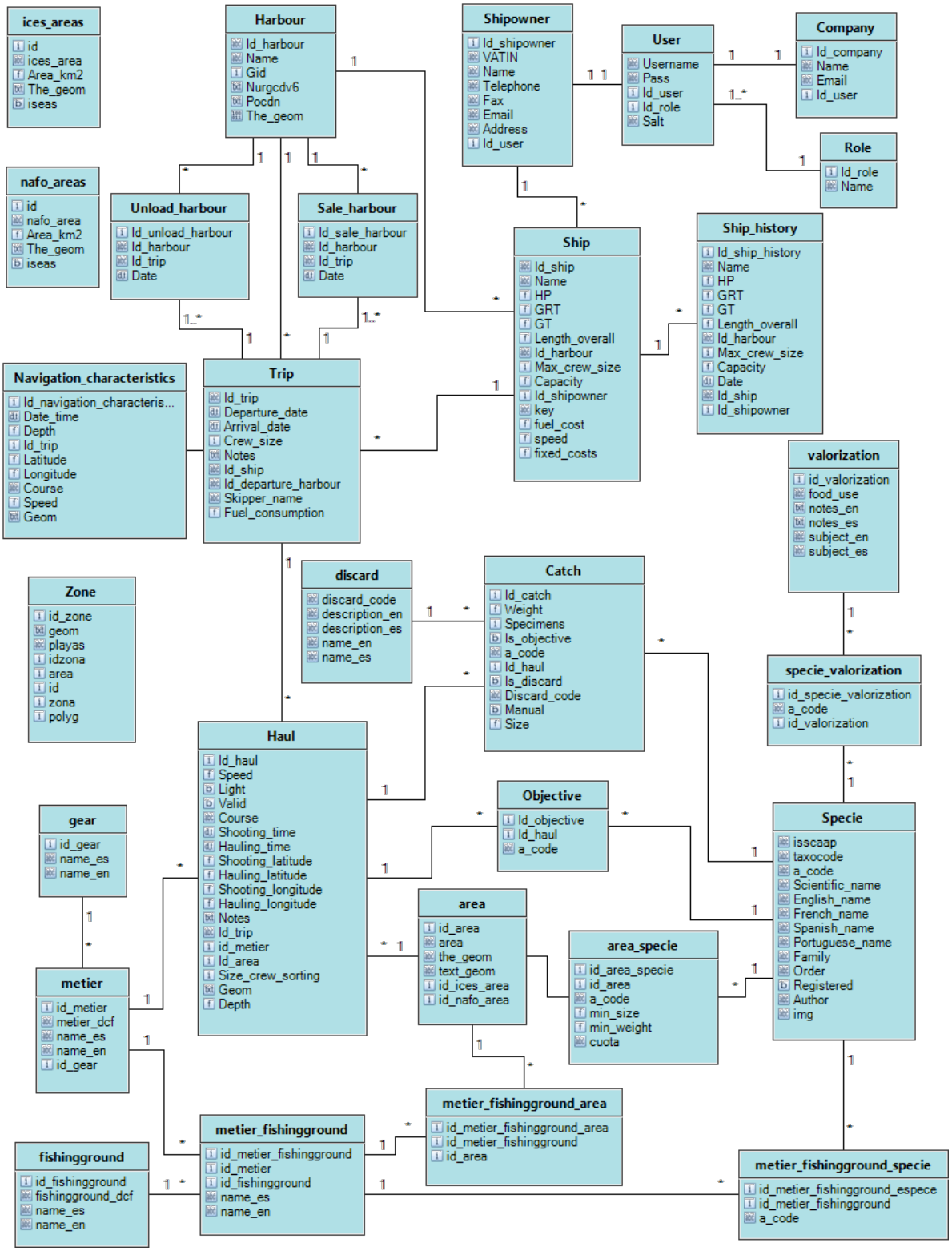
2.1. Data Model

The database is stored in a PostgreSQL database server system, version 9.2.17 with the PostGIS spatial data extension, version 2.1.8-1. The data model has been refined from the initial model included in the requirements specification document.

There are four access levels with their corresponding permissions to serve the information, both in the Geoportal and in the SDI services:

- Administrator (0): Has full access. It is a user who is responsible for maintenance of the system.
- Privileged access (1): Has access to read all data, services, reports and generated maps. It will be used by the research partners of the project.
- Data Introducer (2): In addition to access to basic data, has permission to enter fishing data and access its own. It is composed of the operators on board the fleets and the Observer and owners.
- Limited access (3): Access to basic data (ports, valuations, maps ...) and the results of the models. General public.

In collaboration with the IEO, the concept of metier and its relationship with fishing grounds, fishing areas, target species and gears is included in the data model. This is used to categorize catches and to feed the fishing suitability models of action B3. The operator selects the metier for each haul and from this and the GPS position the system automatically determines fishing area, fishing grounds, target species and used gear.



Updated Database Schema

Three main categories are defined to classify the catches that include the landing obligation and their marketability from a point of view conditioned by regulations:

- Marketable retained: sale for direct human consumption, whether usual catches or new catches that can be landed within the framework of the landing obligation.
- Retained not marketable: with landing obligation and aimed to other valorizations.
- Discarded: capture with no landing obligation, returned to the sea.

From an economic point of view, catches are classified in two categories:

- Wanted: only the retained marketable catch of commercial interest.
- Unwanted: retained marketable catch but of insufficient commercial value, retained not marketable and discarded catch.

The system is designed to work with time data in Coordinated Universal Time (UTC) format.

2.2. Relevant entities

The project involves 23 different species plus a special case "Other" in which the rest of the captured species are classified.

A_code	Scientific	Spanish	English
000	Other	Otra	Other
ANK	Lophius budegassa	Rape negro	Blackbellied angler
ARU	Argentina silus	Tomasa	Greater argentine
BOC	Capros aper	Ochavo	Boarfish
COD	Gadus morhua	Bacalao del Atlántico	Atlantic cod
CQL	Coelorinchus caelorhincus	Granadero acorazado	Hollowsnout grenadier
DAB	Limanda limanda	Limanda	Common dab
GHL	Reinhardtius	Fletán negro	Greenland halibut
GUR	Aspitrigla cuculus	Rubio	Red gurnard
HKE	Merluccius merluccius	Merluza europea	European hake
HOM	Trachurus trachurus	Jurel	Atlantic horse mackerel
LDB	Lepidorhombus boscii	Gallo de cuatro	Four-spot megrim
MAC	Scomber scombrus	Caballa del Atlántico	Atlantic mackerel
MEG	Lepidorhombus	Gallo del Norte	Megrim
MON	Lophius piscatorius	Rape blanco	Angler(=Monk)
PLA	Hippoglossoides	Platija americana	Amer. plaice(=Long rough
RED	Sebastes spp.	Gallinetas del	Atlantic redfishes nei
RHG	Macrourus berglax	Granadero berglax	Roughhead grenadier
RJC	Raja clavata	Raya de clavos	Thornback ray

RJN	Leucoraja naevus	Raya santiguesa	Cuckoo ray
RJR	Raja radiata	Raya radiante	Starry ray
SYC	Scyliorhinus canicula	Pintarroja	Small-spotted catshark
WHB	Micromesistius poutassou	Bacaladilla	Blue whiting(=Poutassou)
WIT	Glyptocephalus cynoglossus	Mendo	Witch flounder

iSEAS Species

The database includes the valorization data that is associated with each of the species for which it is relevant.

The reasons for discarding are defined according to the observer protocol of the IEO. These discard reasons apply to the unwanted catch and, therefore, are considered as reasons for non-desirability.

- CAC1: The species composition affect the exercise of discarding (high amounts of unwanted species restrict the selection)
- CAC2: Size composition (high rates of fish in small categories can interfere in the selection of sizes)
- CAC3: Total number captured (high total catches affect the selection)
- CAP1: The available space in the holds may affect the practice of discarding (if space is at a premium only retain high-value species or category)
- DAM1: Damaged specimens
- MAR1: No market in the port of landing
- MLS1: Undersized
- NAL1: Not allowed
- QAL1: In the long trips species are preserved worst may be discarded at the beginning and be retained in the last days
- QUO1: Excess of quota
- TIM1: By quota restrictions only retain high value species
- VAL1: Due to time constraints only retain high-priced categories
- WEA1: Poor housing conditions affect the selection

The database incorporates data with quotas at the country level for each species as well as minimum sizes. The system automatically classifies catches as marketable or not taking into account the availability of quota for the specific species and if it exceeds the minimum size.

2.3. Fishing data

The database incorporates fishing data from commercial vessels of Opromar with an observer from the IIM between 2014 and 2018.

	Trips	Sampled Hauls	Wanted (kg)	Unwanted (kg)	Total (kg)
Atardecer	2	8	3110	6389	9499
Ensenada de Bueu	2	10	3324	2946	6269
Gonzacove Dos	5	63	10416	25882	36298
Gonzacove Uno	3	26	4182	23806	27989
Hermanos Soage	1	5	1771	12279	14050
Nuevo San Cibrán	19	78	22056	37239	59295
Pescarosa Cuarto	1	2	7142	128	7269
Playa do Castro	3	8	6476	724	7200
Portosanto	11	275	63762	171252	235014
Ría de Marín	18	80	30150	44083	74233
	65	**555**	**152389**	**324728**	**477116**

IIM Fishing data summary

3. Web Service

The web service provides the RedBox application with access to the database for the synchronization of fishing data.

The web service implements a secure connection mechanism by Secure Sockets Layer (SSL) protocol between the RedBox and the web service at CESGA. Each ship have a unique key to ensure the transmission of catch data.

The performance of the web service has been optimized in terms of data volume to adapt to the greater requirements of the geographic data layers of the Areas entity.

4. RedBox

4.1. General scheme

The main task of the RedBox application is to record and manage the fishing data generated by a ship during the trip, based on the data entered by the operator and those generated by the artificial vision species recognition system IObserver and contextualize the catch information relating it to the Trip and the Haul.

The application connects to different ship navigation instruments and collects position, heading, speed and depth information at regular intervals.

It also provides a simple user interface that allows the operator to view and modify the information before being sent via satellite to the iSEAS project server at CESGA.

The following diagram presents an overview of the Red Box system within the general scheme of the iSEAS project:

Integration of RedBox in the general architecture of the system

The RedBox software will be installed on a PC, typically located on the ship's bridge. The software has been designed so that the technical requirements of the computer on which it is installed remain low.

A connection, typically by serial cable, allows the acquisition of data in NMEA format generated by on-board instruments. The application is configurable to be able to adapt to the existing connection type and to work with different instrumentation equipment.

The data coming from the iObserver system is received through a network connection.

If the ship has satellite equipment for data transmission, it can also be connected to the RedBox. If there is no satellite router available, a cellular network router with WiFi connection can be used to carry out transmissions in coverage areas near the coast.

In a typical trip, the software will be operational as long as the trip lasts or, at least, during the time the ship is in the fishing zone. This is so that the software can collect the GPS position data at any time and then automatically locate the hauls when the operator records them.

The RedBox is based on the .NET Framework 4.0 work environment and the Entity Framework 6 data access API to enable the use of geographic data.

The application is available in English and Spanish and its functionality is detailed in two manuals in both languages.

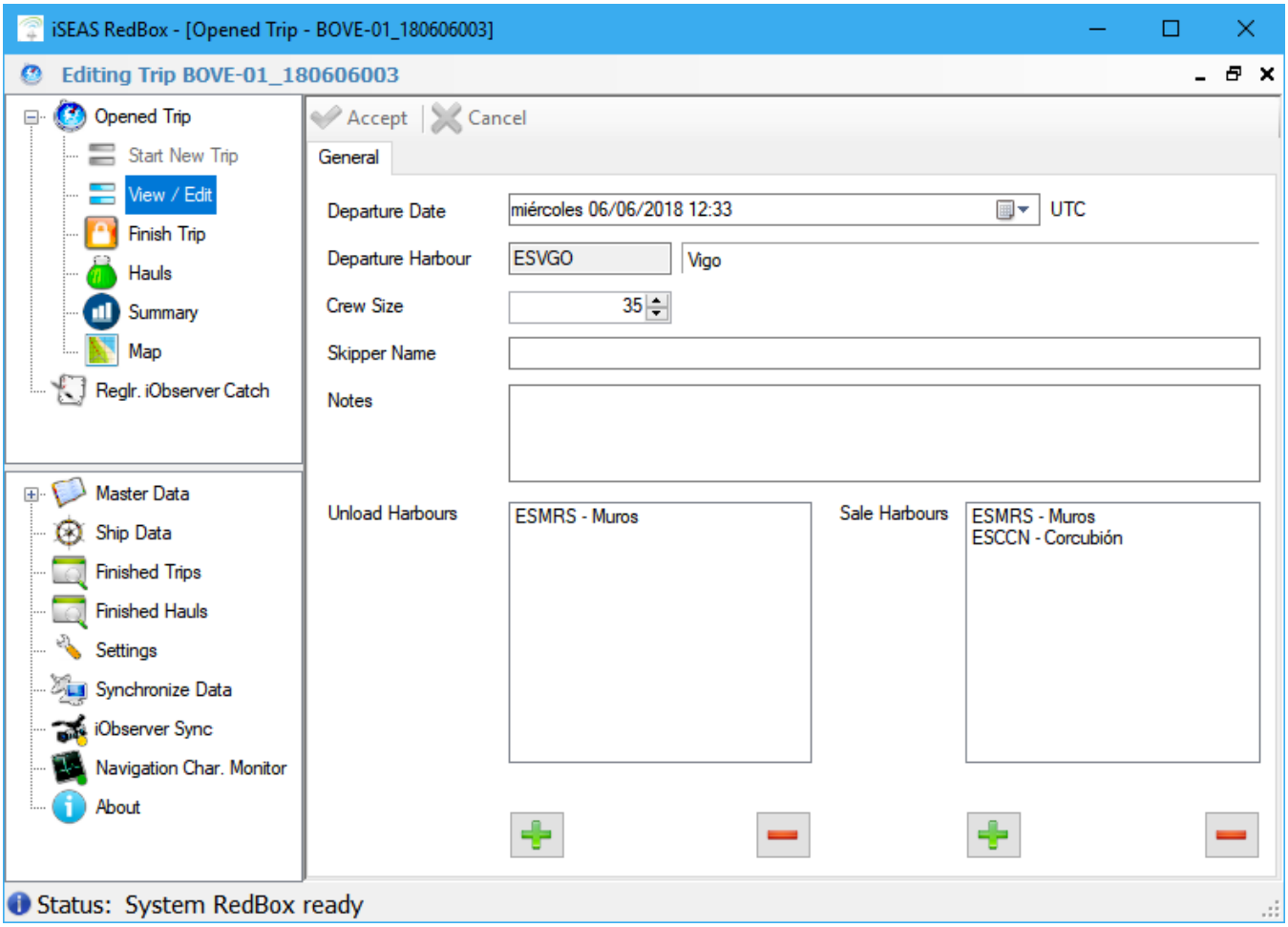
It has an installation program for the application to facilitate its installation on board.

4.2. Main functionalities

4.2.1. Trip

It allows to enter the general data of the trip as the date of beginning and end of the trip, departure harbour, crew, sale and unload harbours, etc.

While the trip remains open, all data relating to this trip can be modified and synchronized with the central server. Once closed and synchronized it can no longer be synchronized in order to maintain consistency with the data hosted on the central server.



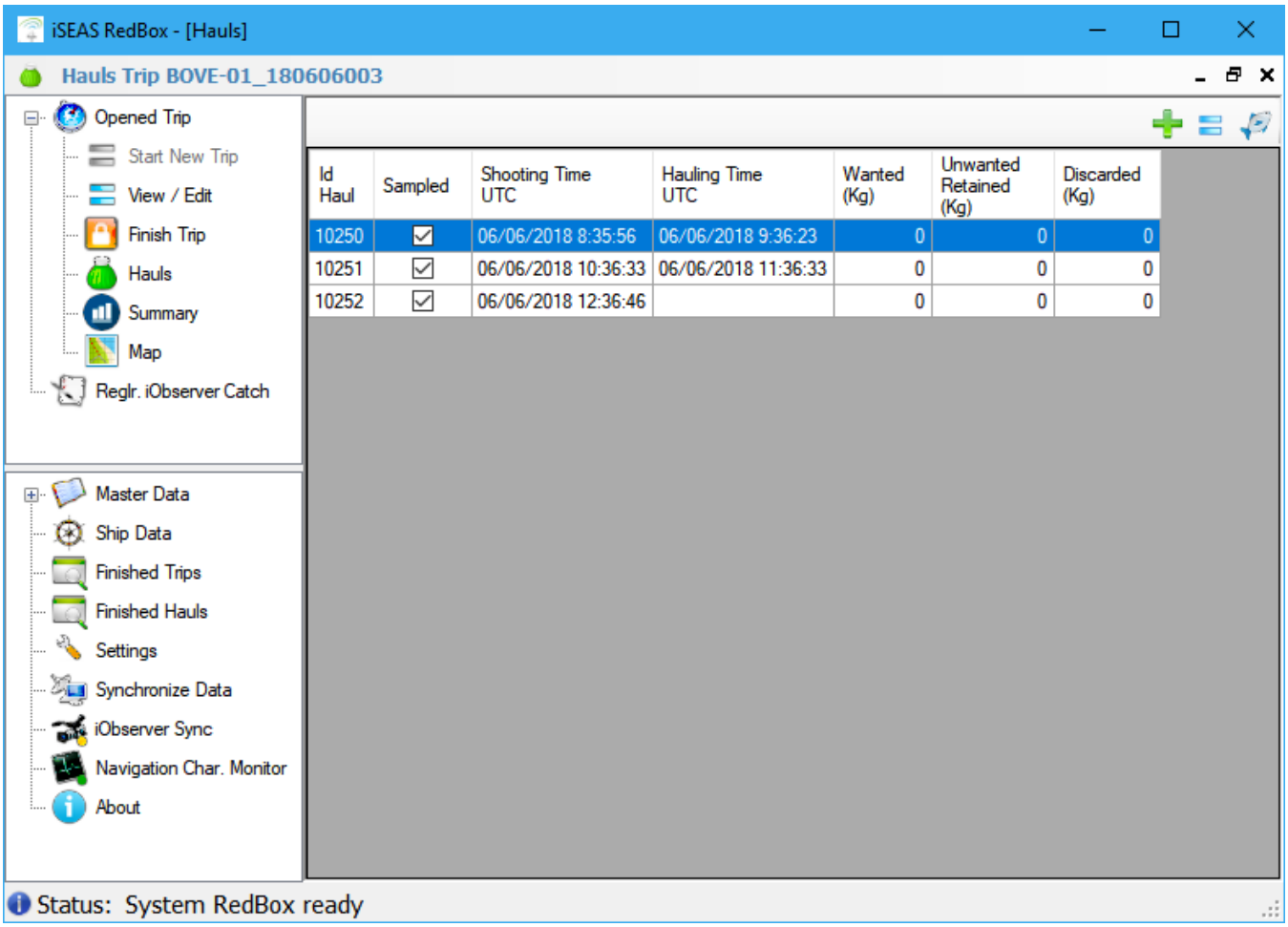
Open Trip screen

4.2.2. Hauls

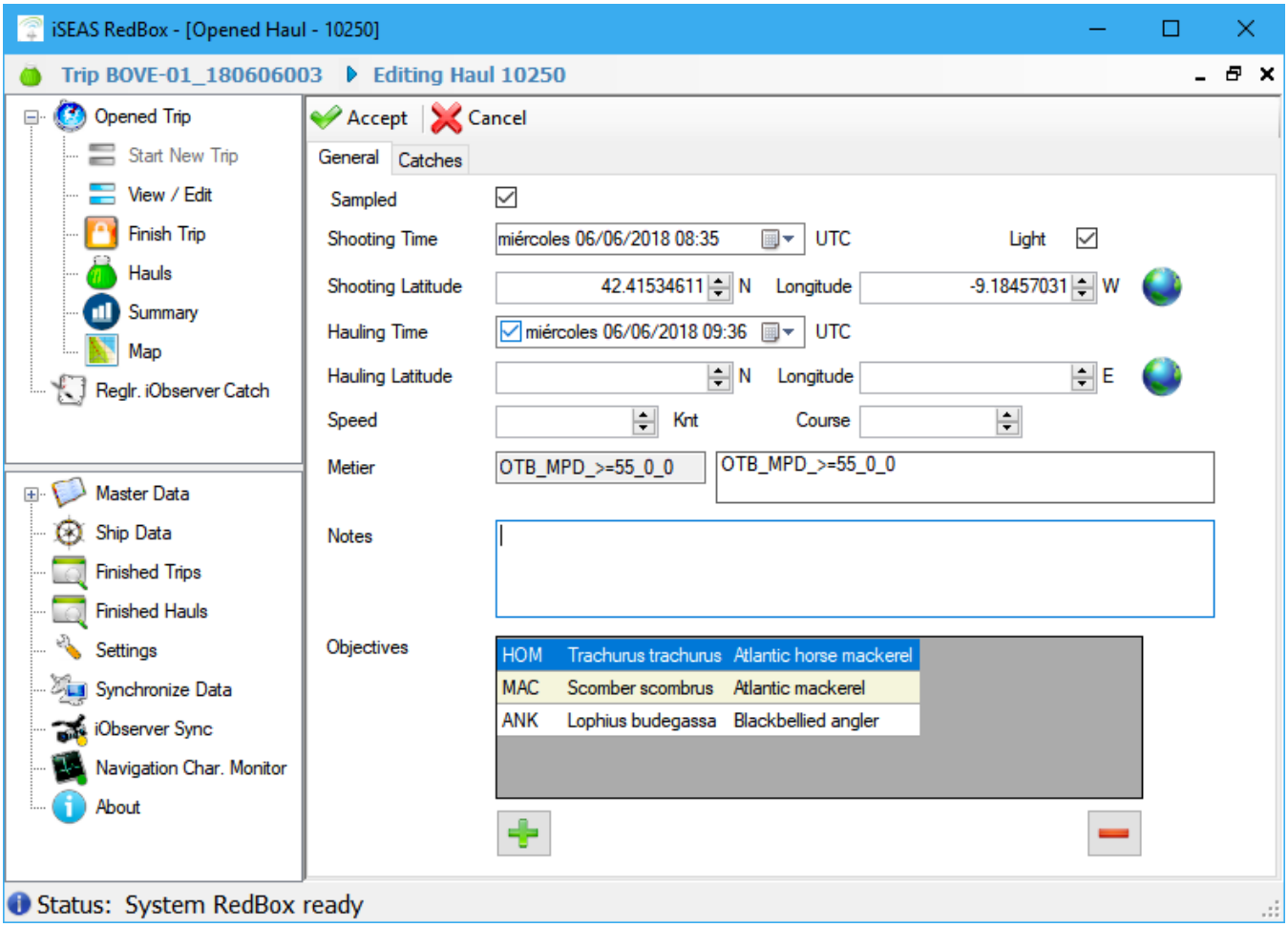
Hauls are the main entity in the application and, in an environment in which catch data is supplied by the iObserver system, those that require greater attention by the operator. For this reason data entry is optimized and automated to the maximum; in a typical haul the user will only have to enter the shooting and hauling times, the rest of the fields are automatically filled:

- The navigation data is obtained from the navigation instruments recorded data.
- The fishing area for a haul in RedBox is calculated from the geographical coordinates of the shooting point.
- The metier is recovered from the one registered in previous hauls. The metier will also serve to determine other data such as fishing grounds or fishing gear used.
- The selection of target species is obtained from the selected haul area and metier.
- The calculation of light conditions is made based on the geographical position and the shooting and hauling times of the haul.
- The calculation of the speed is estimated at the midpoint of the haul.

All this information can be entered manually, yet the system makes the necessary checks to ensure the validity of the data.



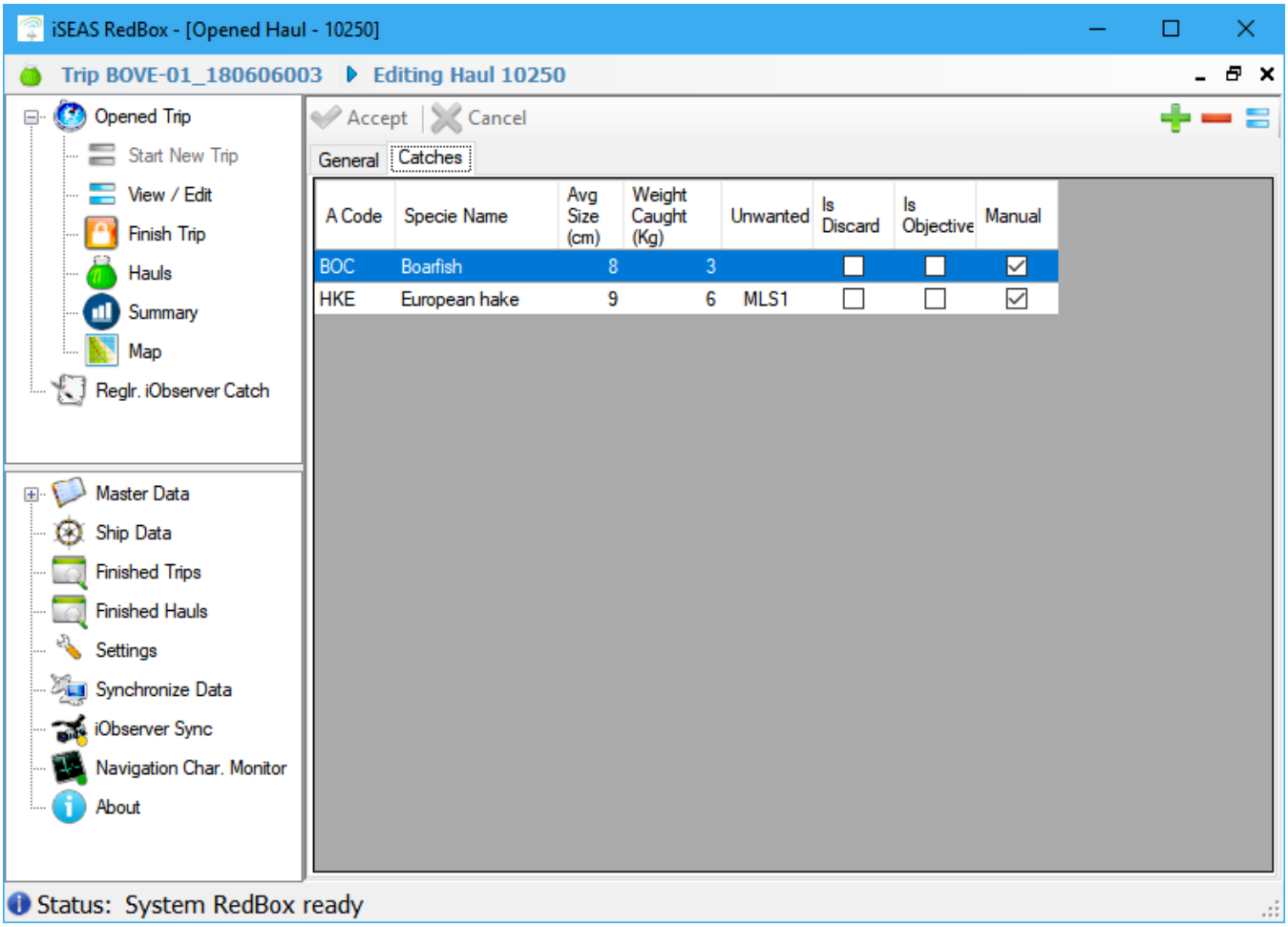
Hauls screen



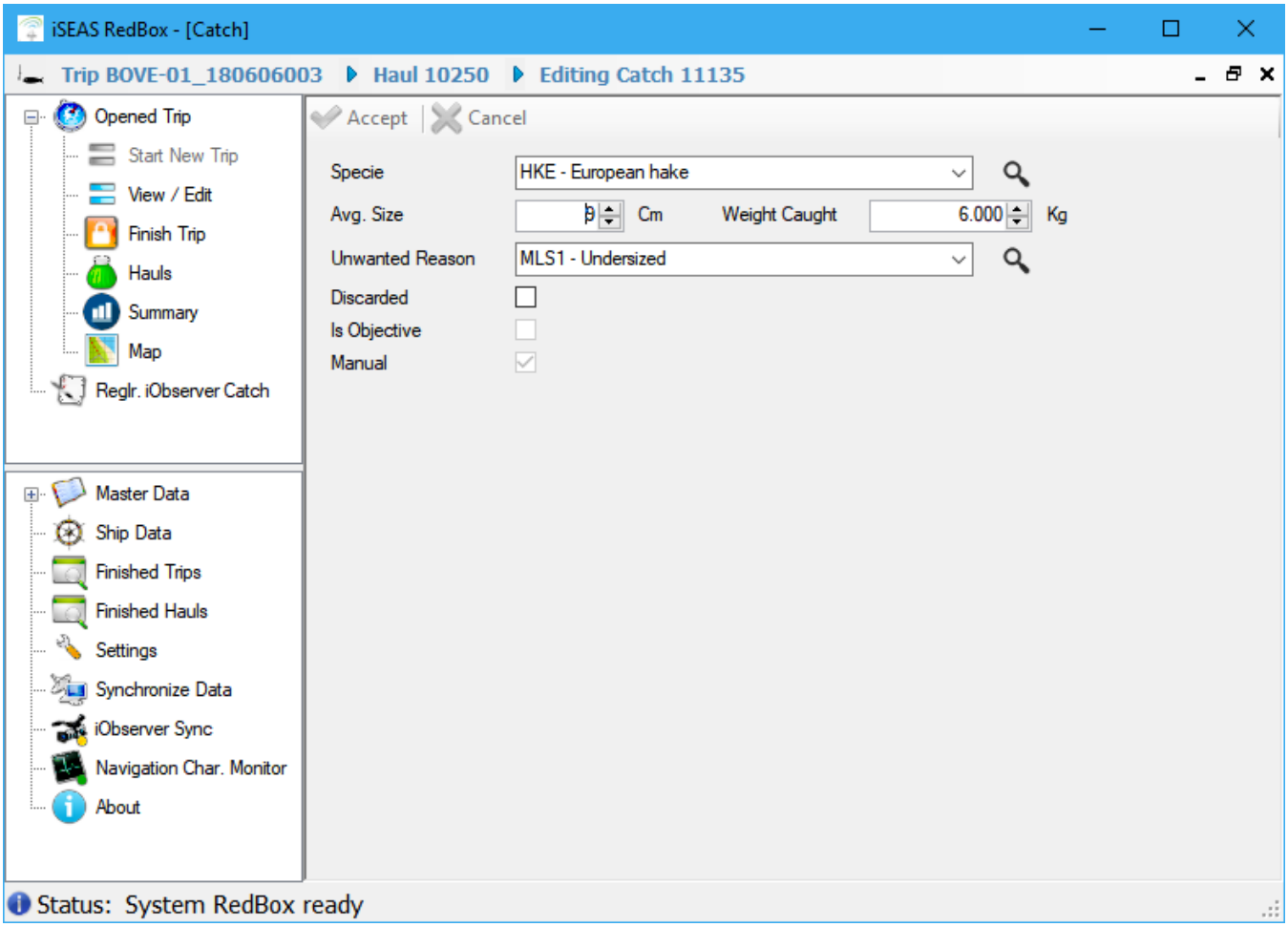
Edit Haul screen

4.2.3. Catch

Catches can be edited manually or captured automatically from the data provided by the iObserver system. The main recorded data are: species, average size of the lot, weight of the lot and, in case of being unwanted, reason for being unwanted and if it is discarded or retained.



Catches screen

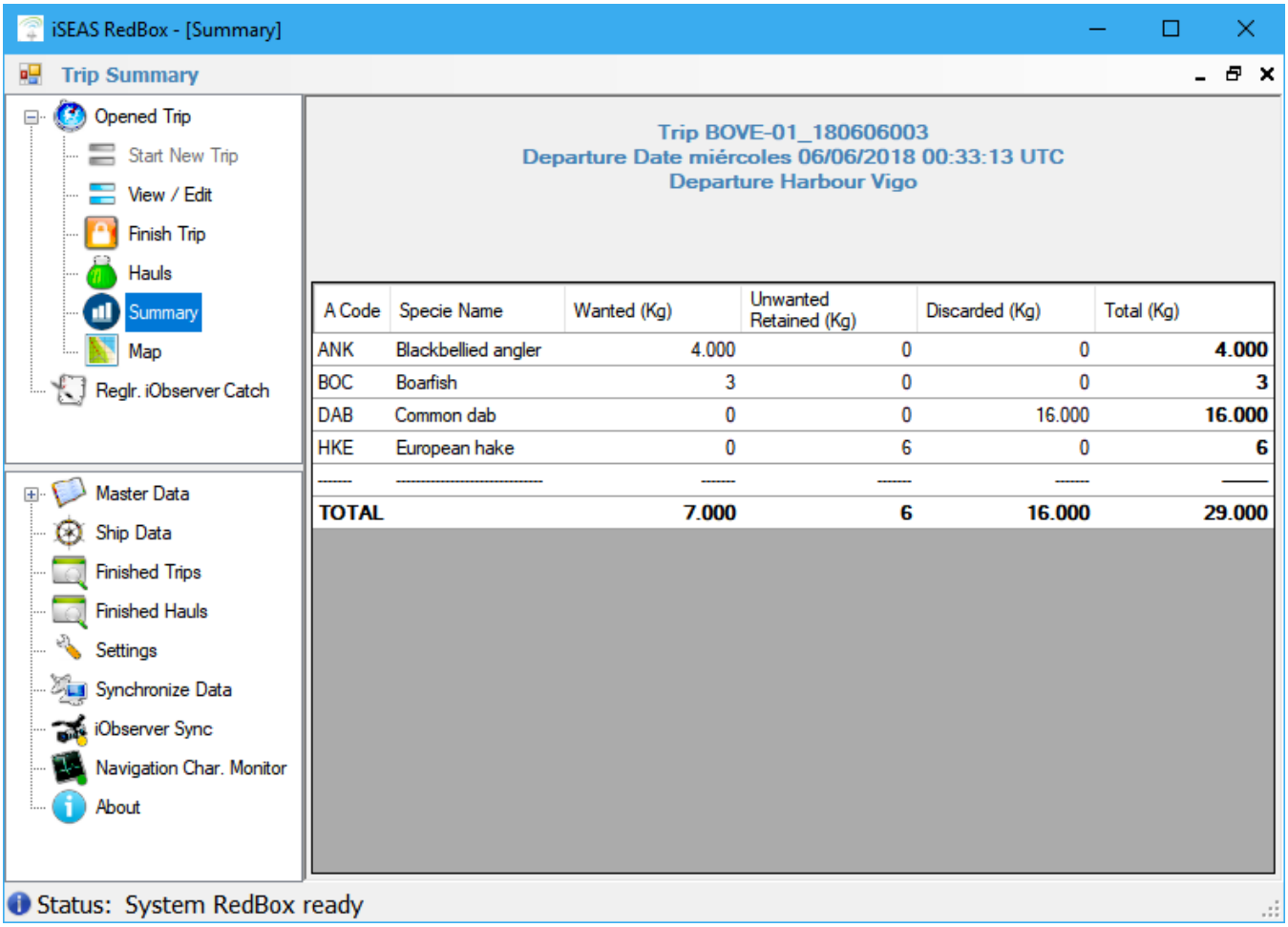


Edit Catch screen

4.2.4. Summary and Trip Map

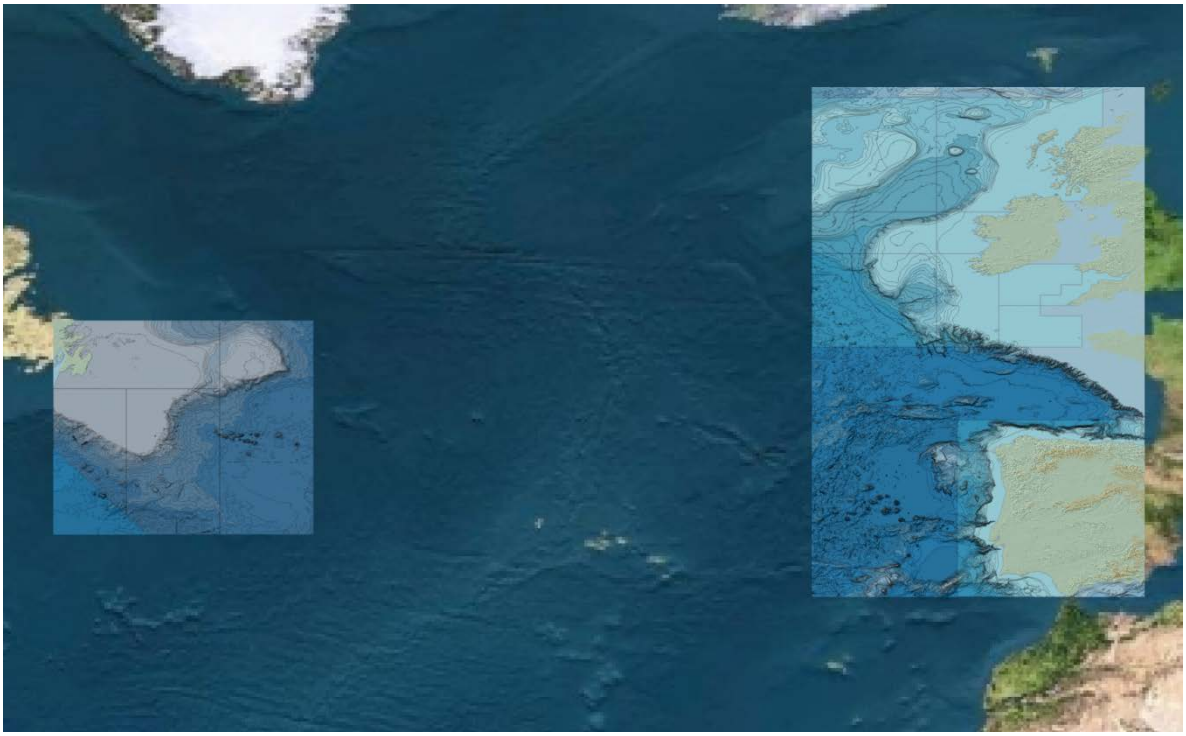
To provide the operator with the visualization of the data, a summary screen of the catches is available and another one that shows the hauls for the open trip on a map.

The summary screen of the catches for the open trip shows catch data grouped by species and totalizing wanted catch weight, retained unwanted catch and discarded unwanted catch.

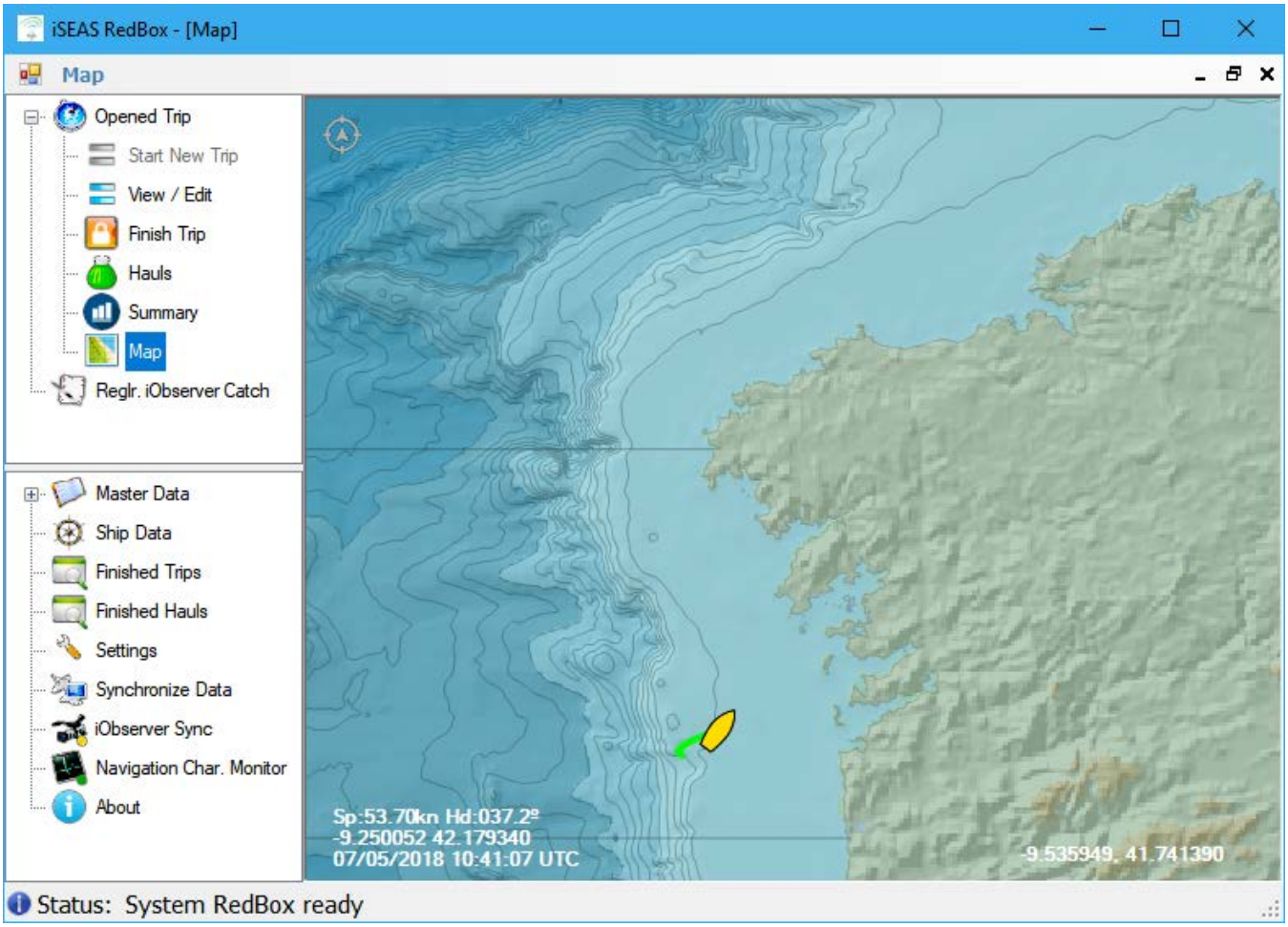


Trip Summary screen

The map screen shows the data of the active trip in real time on a georeferenced map. From the bathymetry "General Bathymetric Chart of the Oceans (GEBCO)", with a resolution of 30", a hillshade map with isobats every 200 meters was rendered for the fishing areas with which the project works in order to use it as background layer.

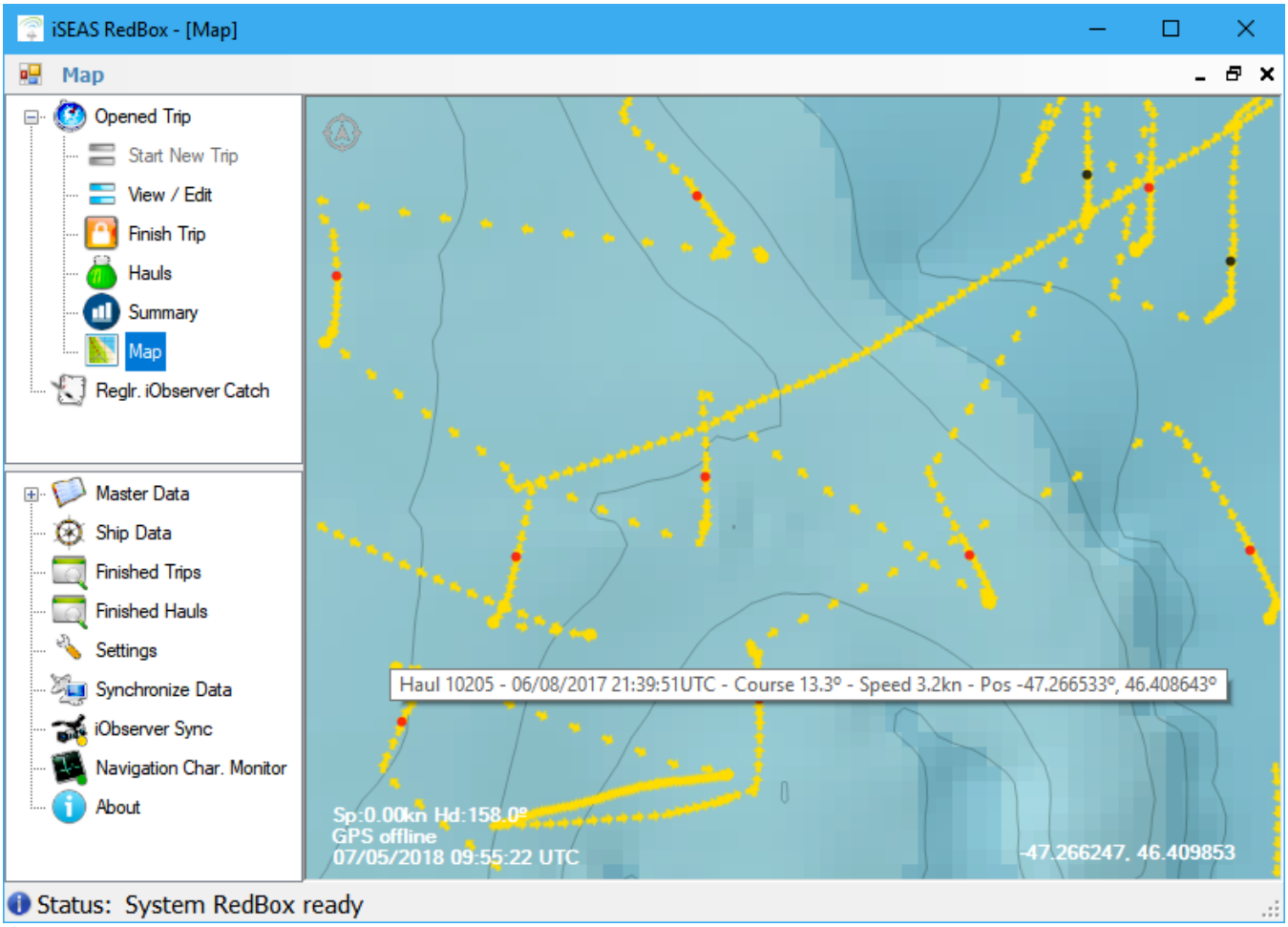


GEBCO bathymetry rendered areas



Map screen in RedBox

Every 5 seconds the ship's navigation data is updated on the map. The yellow arrows show the position and heading of the ship at periodic intervals, typically between 1 and 5 minutes. The red points show the shooting positions of a haul. Black points are hauls not sampled. Passing the mouse over the navigation or haul points, a popup appears with the associated information. Clicking on a haul opens the corresponding screen of the haul.



"Fletán Negro 2017" **trip detail**

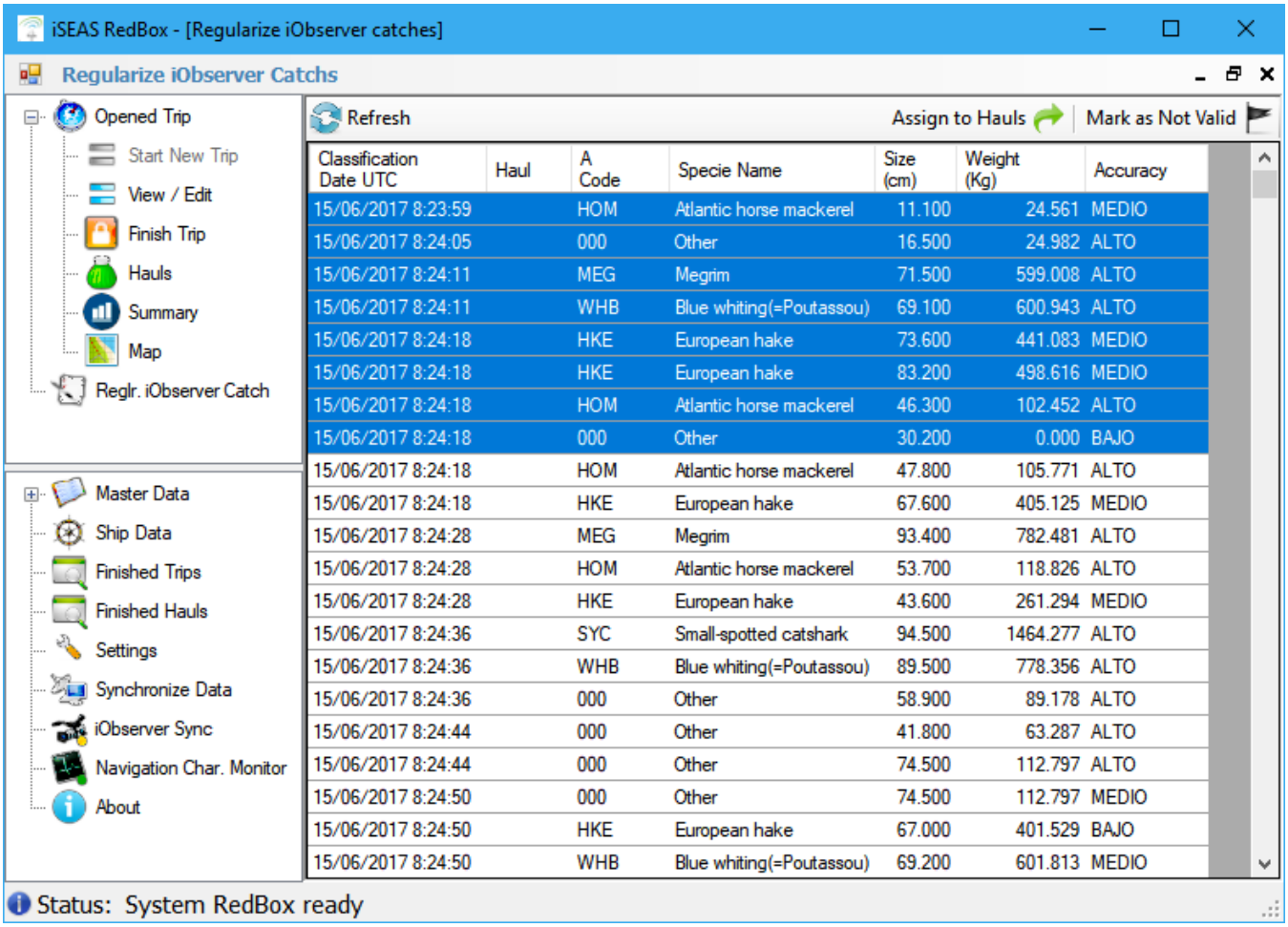
4.2.5. iObserver catches regularization

The RedBox software periodically analyzes and stores in its database the catch data recorded in the files that come from the iObserver system as it processes the fishes that pass through the conveyor belt.

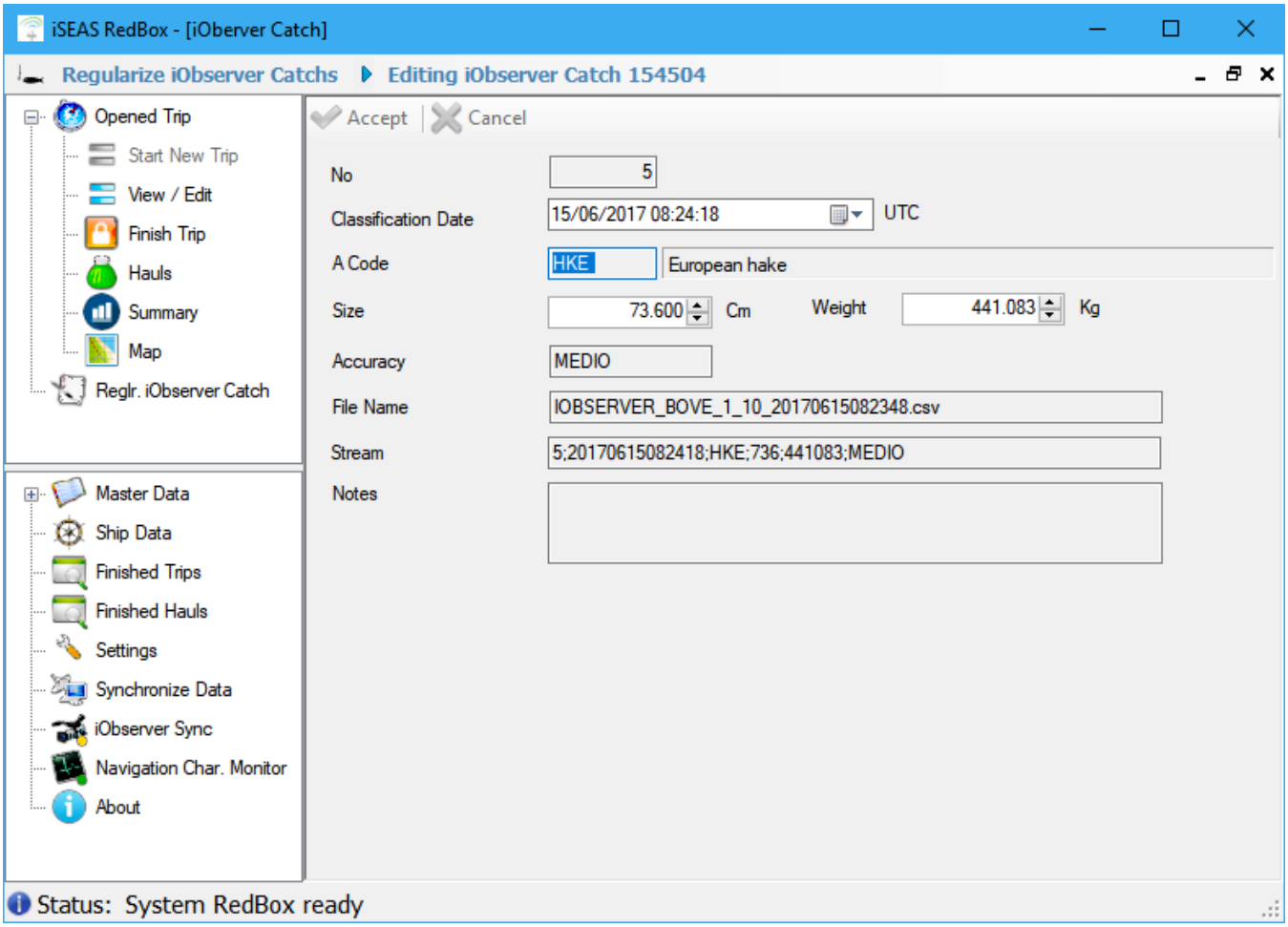
The "Regularize iObserver Catch" screen displays the catch data that has arrived from this system and that has not yet been assigned to the hauls so that the operator can review them.

Once reviewed, the operator can instruct the application to assign the captures to the hauls calculated from the time stamp of the camera and the periods defined by the shooting and hauling times of the hauls recorded in RedBox. For each haul, the catch data will be grouped in batches according to the species, on the one hand the desired catches and on the other the unwanted catches, and according to the motive of non-desirability.

There is the possibility that the regularization is carried out automatically without the need for intervention by the operator.



Regularize iObserver Catch screen



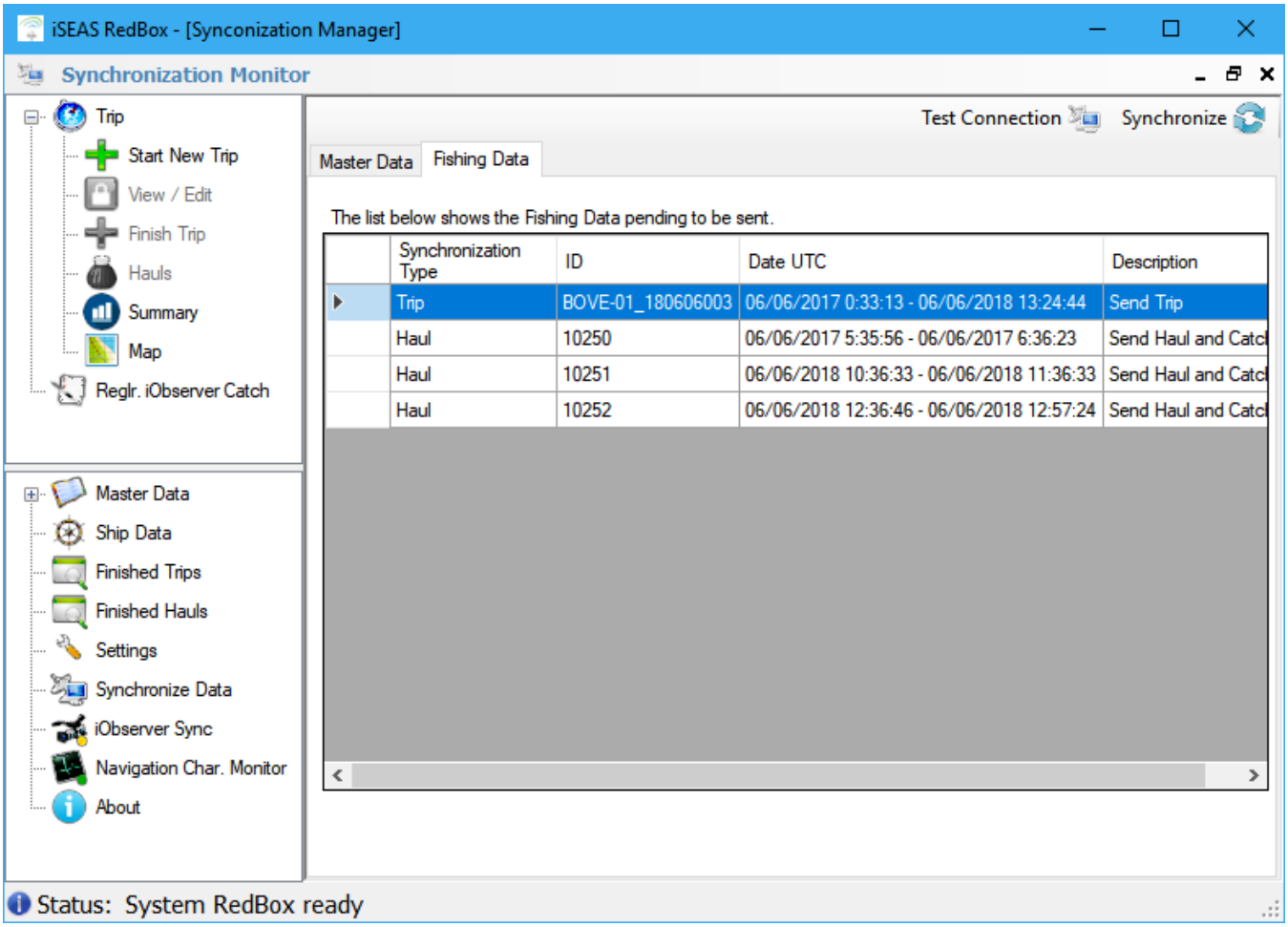
iObserver Catch Edit screen

4.2.6. Data synchronization

It allows the user to see and perform the pending synchronizations with the central system as well as to download the master data.

The software synchronizes fishing data with the central iSEAS server through a web service that provides access to the project database.

While the current trip is not closing, the information already synchronized with the server can be updated.



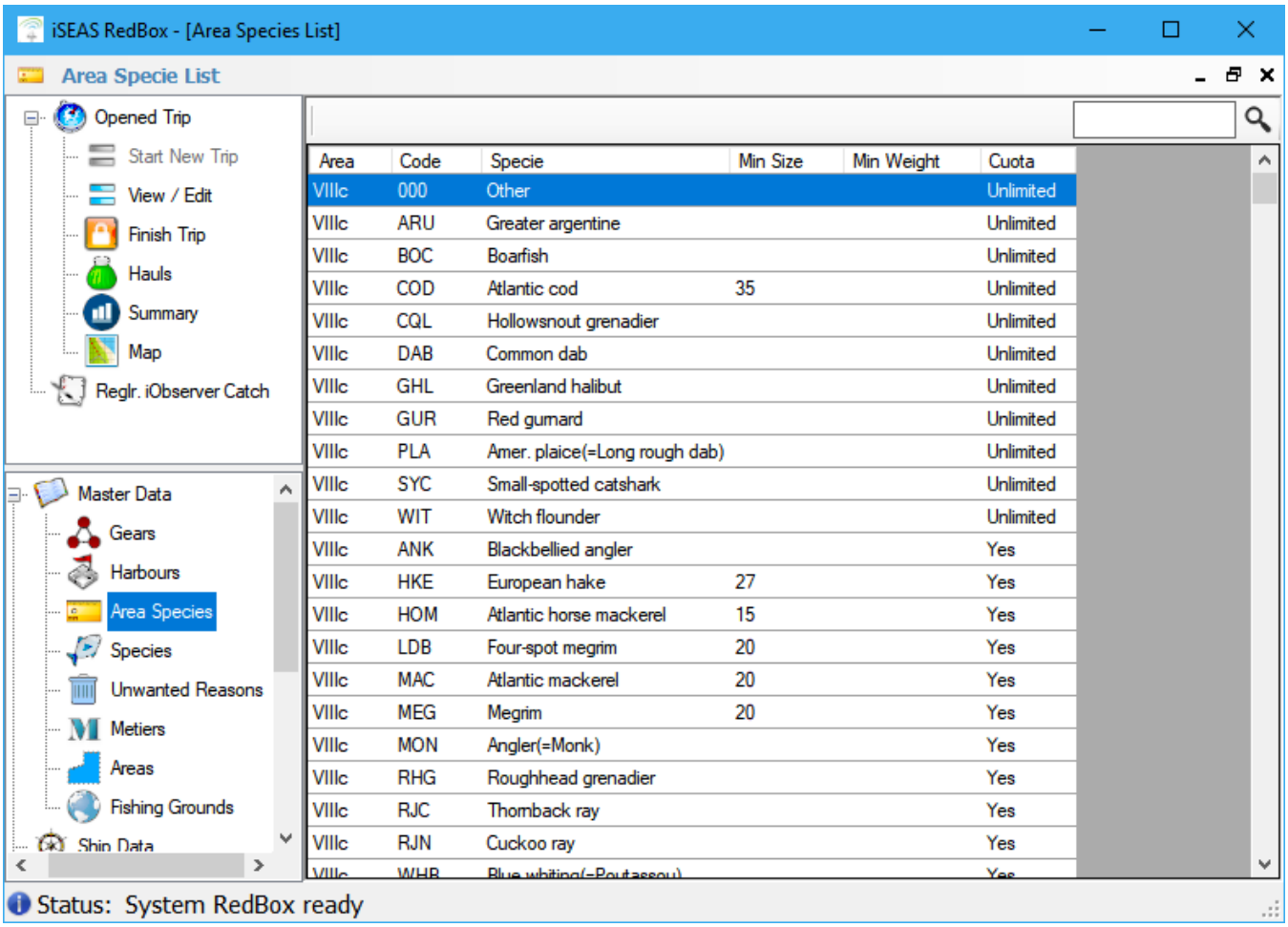
Synchronization screen

4.2.7. Other functionalities

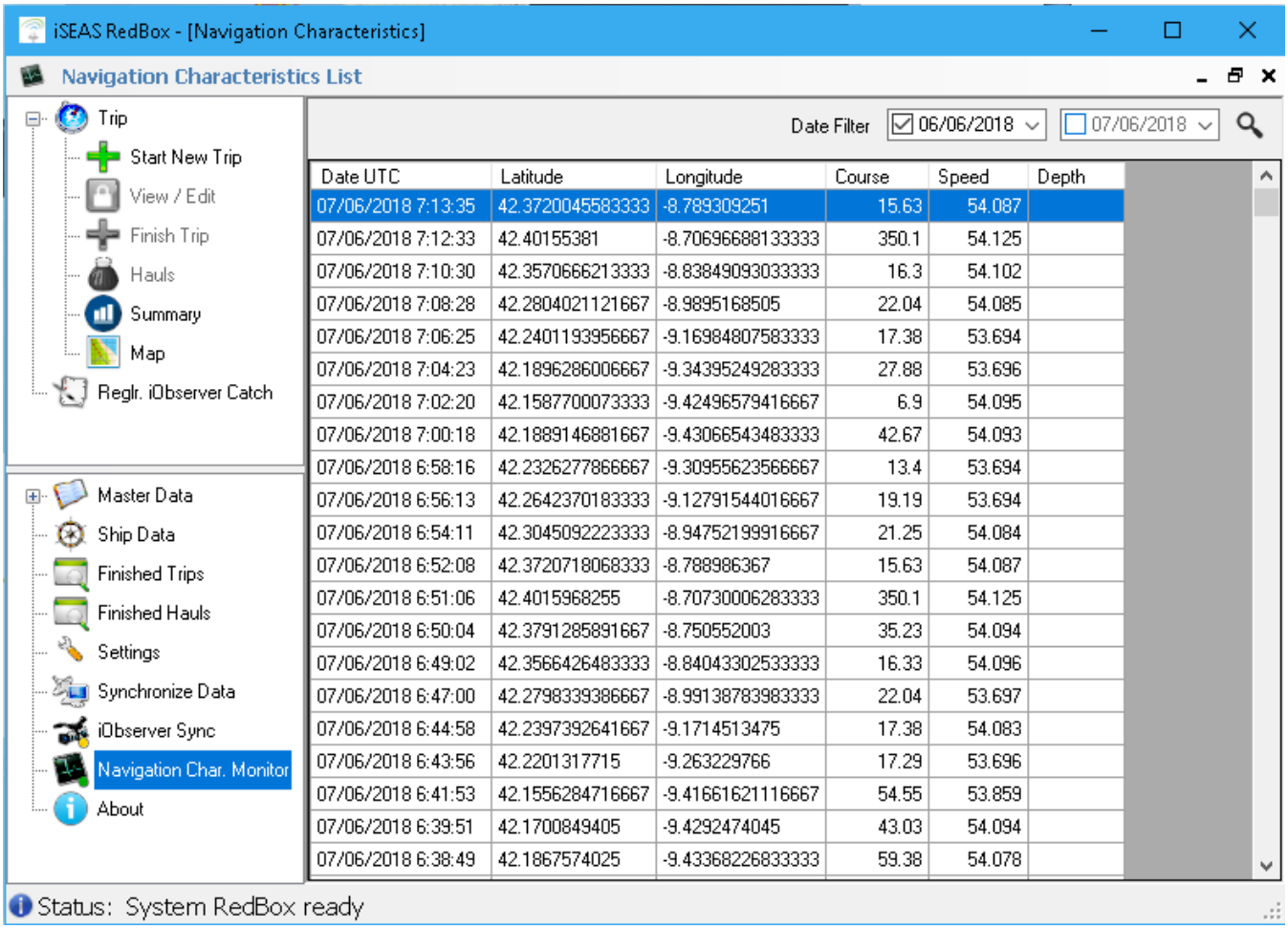
In addition to those already mentioned, the application offers various features such as:

- Master Data: The master data includes all the information that is downloaded from the central system and stored in the local database of the application. It is data that RedBox uses to simplify the usability of the system and help the user in recording data. There are 8 categories: Gears, areas, species, ports, areas-species, unwanted reasons, metiers and fishing grounds.
- Ship data: allows to establish the name of the ship and its main characteristics as well as to review the history of changes.
- Finished trip and hauls data: allows the operator to search for completed trips and hauls stored in the local database and access all the data related to them.
- Settings: it presents several configuration parameters related to the operation of the application and allows its modification.
- iObserver synchronization service: allows the user to check the status of the synchronization service with the iObserver system.
- Navigation characteristics monitor: allows checking the status of the ship's instruments navigation data capture service and displays a list of the latest recorded navigation data.

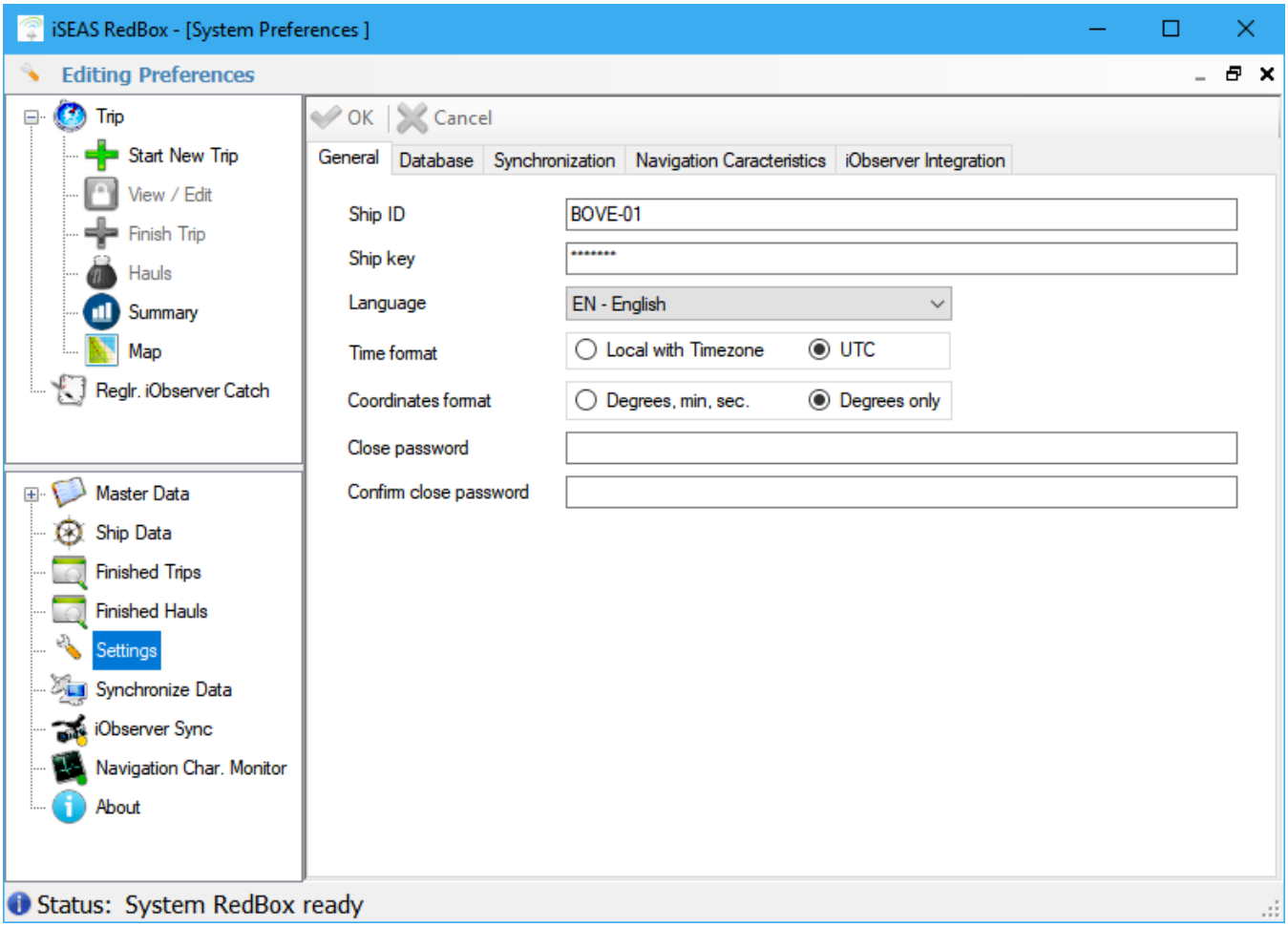
- Information screen about the application.



Master Data: Areas Species



Navigation Characteristics screen



Settings screen

4.3. RedBox tests

4.3.1. Installation tests

In addition to the integration tests with the iObserver system software at the IIM facilities, several visits were made to both oceanographic and commercial vessels in order to analyze the working environment, instrumentation technologies and existing communications on board and for the realization of the installation tests of the RedBox software and its connection to the navigation and satellite transmission instruments as well as the iObserver system. Based on the experience gained, the software was developed and extended to make it adaptable to the different hardware configurations of each ship.

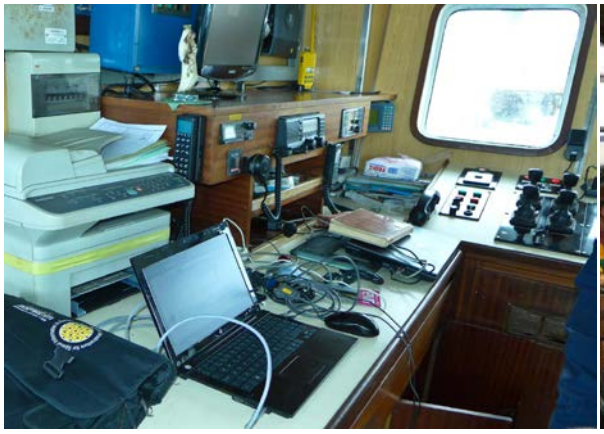
iObserver system

The installation tests on oceanographic vessels were carried out on two vessels of the Secretaría General de Pesca: the *Miguel Oliver* and the *Vizconde de Eza*. The RedBox application was installed on a laptop PC that was placed in different locations, from the bridge to a room adjacent to the fishing processing room. The data of the navigation instruments were received by the ship's data network, UDP protocol. This network also provided connectivity to the central server in CESGA.

B/O Miguel Oliver* and *B/O Vizconde de Eza

The installation tests of the RedBox in commercial ships were carried out in three ships of Marín: *Portosanto*, *Nuevo San Cibrán* and *Ría de Marín*. The tests were performed with the RedBox application installed on a laptop PC located on the ship's bridge. Despite differences in format, it was possible to capture the data of the GPS installed on board in the three ships. No data could be obtained from the depth probe, generally the probes did not have NMEA output. Regarding the data transmission equipment, in the *Portosanto* it was possible to establish a connection with the installed Inmarsat satellite equipment. In the *Nuevo San Cibrán* and in the *Ría de Marín* the connection was made through mobile network routers available in the ships.

Portosanto, Nuevo San Cibrán and *Ría de Marín*




1.- RedBox system on the bridge of *Portosanto* 2.- Equipment and wiring of *Nuevo San Cibrán*

4.3.2. Test trips

Several test campaigns have been completed with the RedBox software on board both oceanographic and commercial vessels. The tests allowed debugging the operation of the software and, in collaboration with the observers in charge of its operation, improvements were detected and agreed upon in its use in a real work environment, especially in regard to the interaction between the software and the operator that is in charge of its management, automate the processes of data capture to the maximum and speed up its management. Observers from the IEO were in charge of operating the RedBox software in the oceanographic campaigns and from the IIM in the commercial trips.

Oceanographic campaigns carried out:

- "***Pelacus***" from April 16 to 31. *B/O Miguel Oliver*. ICES VIIIc and IXaN areas.
- "***Flemish Cap***" from June 23 to July 22. *B/O Vizconde de Eza*. NAFO 3M area.
- "***Fletán Negro***" from July 28 to August 17. *B/O Vizconde de Eza*. NAFO 3L area.
- "***Porcupine 2016***" from September 10 to October 11. *B/O Vizconde de Eza*. ICES VIIb, VIIc2 and VIIk2 areas.
- "***Demersales 2016***" from September 17 to October 23. *B/O Miguel Oliver*. ICES VIIIc and IXaN areas.
- "***Platuxa 2017***",from May 15 to June 16. *B/O Vizconde de Eza*. NAFO 3NO areas.
- "***Fletán Negro 2017***",from July 20 to August 9. *B/O Vizconde de Eza*. NAFO 3L area.
- "***Porcupine 2017***",from August 24 to September 22. *B/O Vizconde de Eza*. ICES VIIb, VIIc2 and VIIk2 areas.
- "***Descarsel 2017***",from August 30 to September 10. *B/O Miguel Oliver*. ICES VIIIc and IXaN areas.
- "***Demersales 2017***",from October 3 to 23. *B/O Miguel Oliver*. ICES VIIIc area.

Commercial trips made:

- *Portosanto* trawler: four trips in June and July of 2017 and February and March of 2018. Area ICES IXaC, near Portugal.
- *Ría de Marín* trawler: eight trips between February and June 2018. Areas ICES IXaN and VIIIc, Atlantic area of Galicia.

Ship	Trip	Hauls	Catch lines (manual)	Catch lines iObserver	Specims. iObserver	Total weight (kg)	Navigat. lines	GPS (%)	Depth Probe (%)
Miguel Oliver	*Pelacus 2016*	15	19	-	-	12540	5419	99	99
Vizconde de Eza	Flemish Cap 16	182	400	-	-	15179	7963	29	67
Vizconde de Eza	Fletán Negro 16	105	286	-	-	7333	3611	39	33
Vizconde de Eza	Porcupine'16	85	702	-	-	42260	7328	86	25
Miguel Oliver	Demersales'16	130	94	-	-	39096	9819	100	100

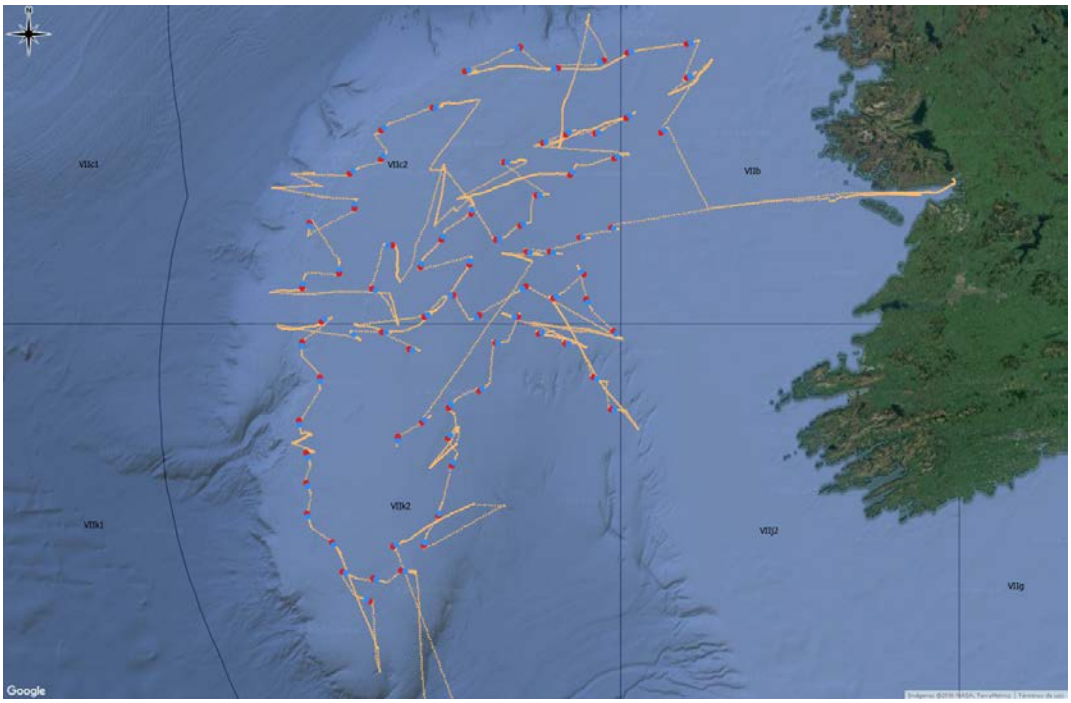
Portosanto	13/6/17-19/6/17	28	159	0	0	19800	0	0	0
Portosanto	17/7/17-25/7/17	31	0	270	25408	893196	1802	79	0
Vizconde de Eza	*Platuxa'17*	109	22	2	1202	78	3175	39	39
Vizconde de Eza	*Fletán Negro'17*	103	0	157	54693	333444	2616	46	3
Vizconde de Eza	*Porcupine'17*	88	0	208	369181	151868	1413	17	0
Miguel Oliver	*Descarsel'17*	1	1	0	0	230000	393	12	12
Miguel Oliver	*Demersales'17*	67	0	363	40854	21133	3996	70	0
Portosanto	30/1/18-6/2/18	27	0	19	6511	27030	1999	99	-
Portosanto	*6/3/18-9/3/18*	13	-	-	-	-	739	99	-
Ría de Marín	21/2/18-22/2/18	4	0	15	3146	3861	117	45	-
Ría de Marín	25/2/18-27/2/18	4	0	15	2466	2982	196	65	-
Ría de Marín	13/3/18-14/3/18	6	0	42	20889	7054	388	100	-
Ría de Marín	22/3/18-23/3/18	4	0	-	-	-	280	100	-
Ría de Marín	1/4/18-2/4-18	4	0	-	-	-	308	100	-
Ría de Marín	15/4/18-16/4/18	4	0	-	-	-	293	100	-
Ría de Marín	6/5/18-7/5/18	4	0	22	22356	8318	301	99	-
Ría de Marín	10/6/18-11/6/18	4	0	-	-	-	299	99	-

Recorded data summary

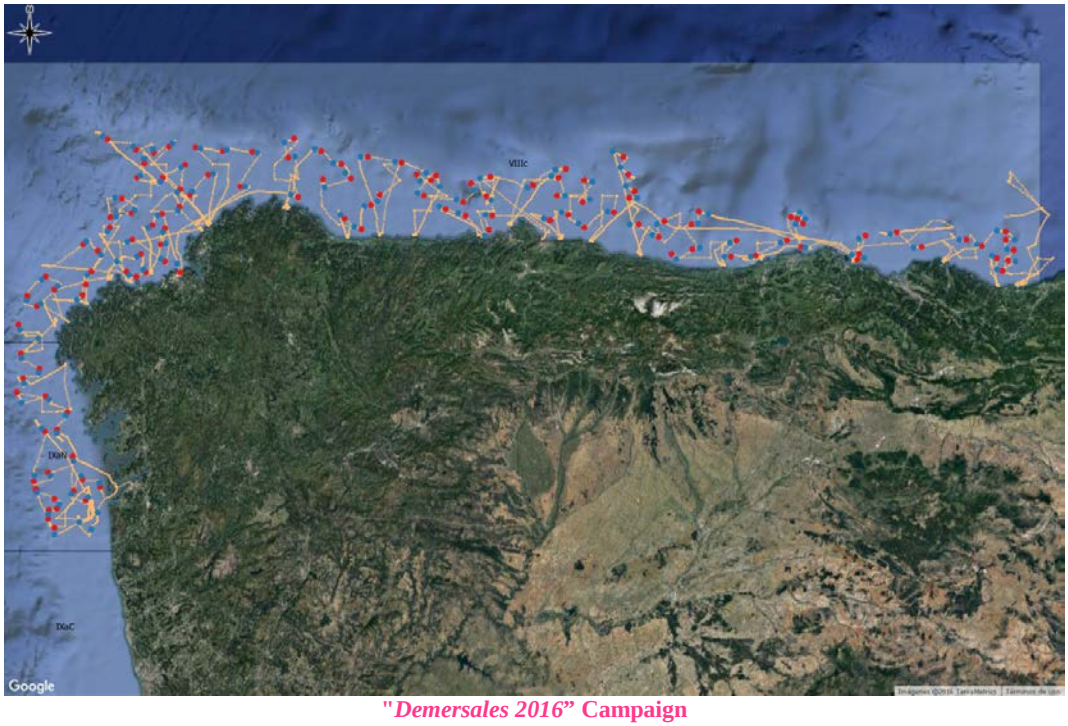
The software was able to operate 24 hours a day during all the trips except the campaign "***Descarsel 2017***" in which there were some problems of inadvertent closures due to application errors that prevented data capture. This problem was solved in the following versions. The tests of manual data entry went smoothly, some improvement possibilities were detected to speed up the process that were applied in successive versions. The iObserver data capture tests were positive in terms of processing the data received by the RedBox, although there were problems in receiving the data, not being able to receive the information in several trips (see attached table). Regarding navigation instruments, GPS data was received in general terms although there were temporary losses in reception. The processing of GPS signals was refined and improved to minimize losses, although often these losses had an external cause: in the case of oceanographic vessels due to problems with the origin of the signal and, in the case of commercial ones, to problems easily solvable as disconnected or defective cables. The depth probe data was generally poor or non-existent. Regarding the transmission of data to the central server, there were some occasional connection losses due to maintenance tasks of the server or due to lack of coverage, especially in the trips in remote areas such as the *Vizconde de Eza* campaigns in NAFO areas, but the transmission of all the data for all the trips was achieved.

In conclusion, the test trips were very useful for the achievement of the objective of obtaining a fully operational and efficient RedBox application despite the difficulty of having a precarious contact line,

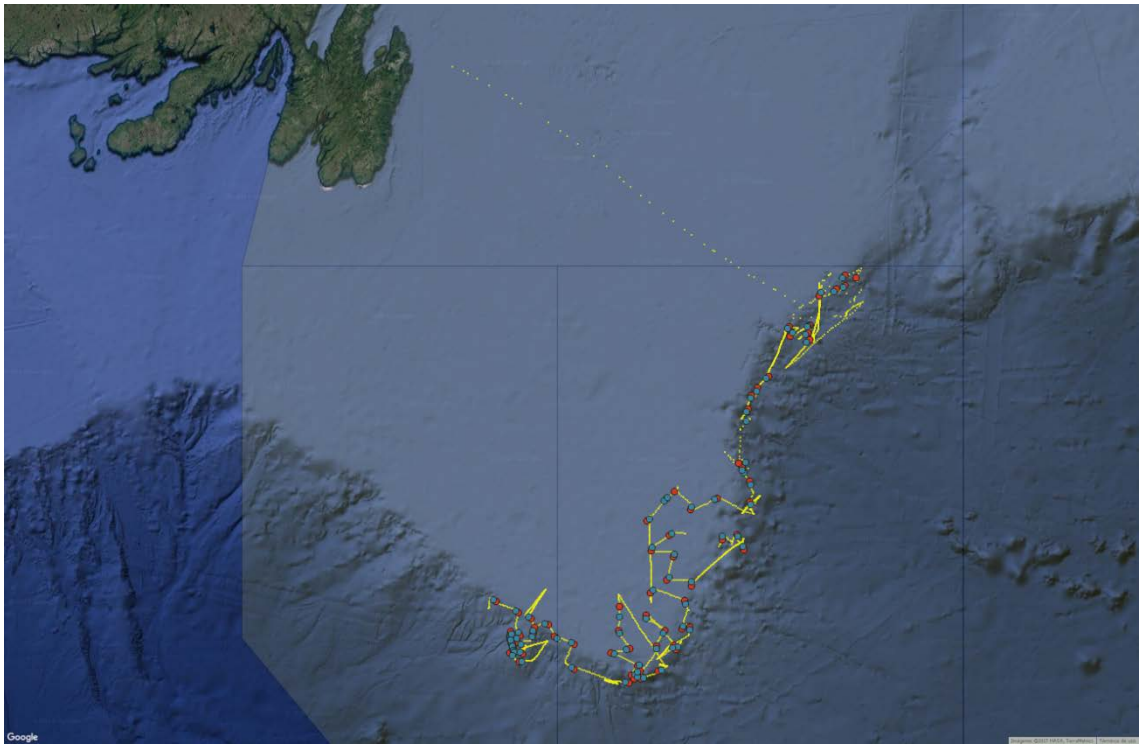
not to mention that nonexistent at times, with the ships on high seas and the 24 hour/7 day schedules that do not always allow to solve a problem at the moment it happens.



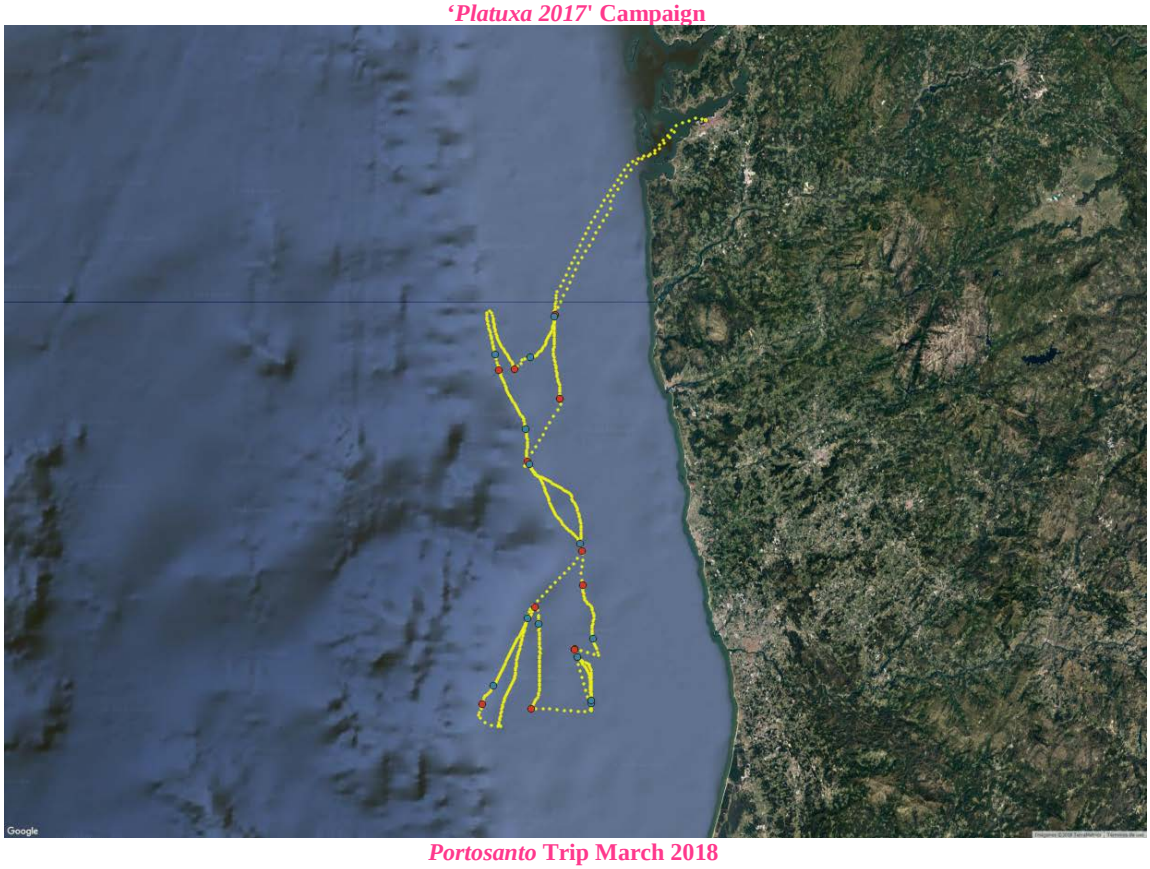
"*Porcupine 2016*" Campaign



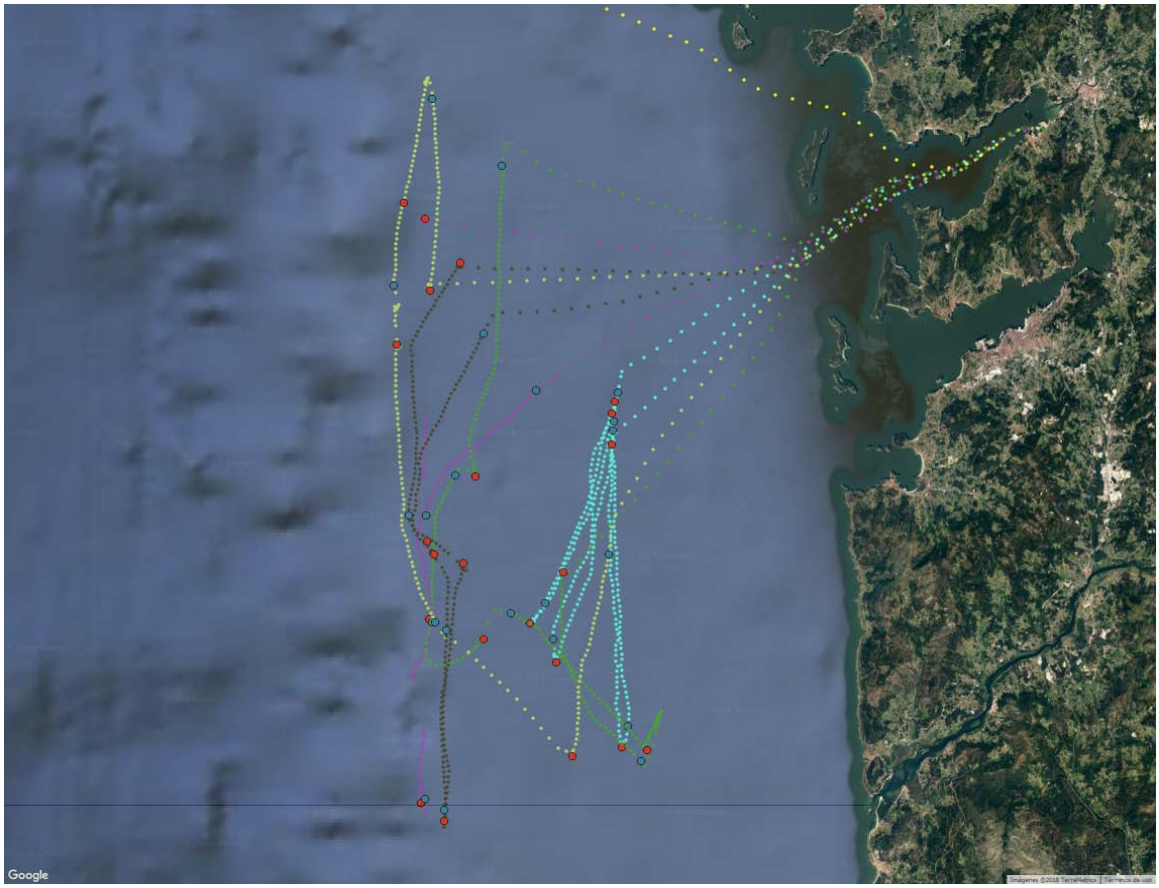
"*Demersales 2016*" Campaign



***'Platuxa 2017'* Campaign**



***Portosanto* Trip March 2018**



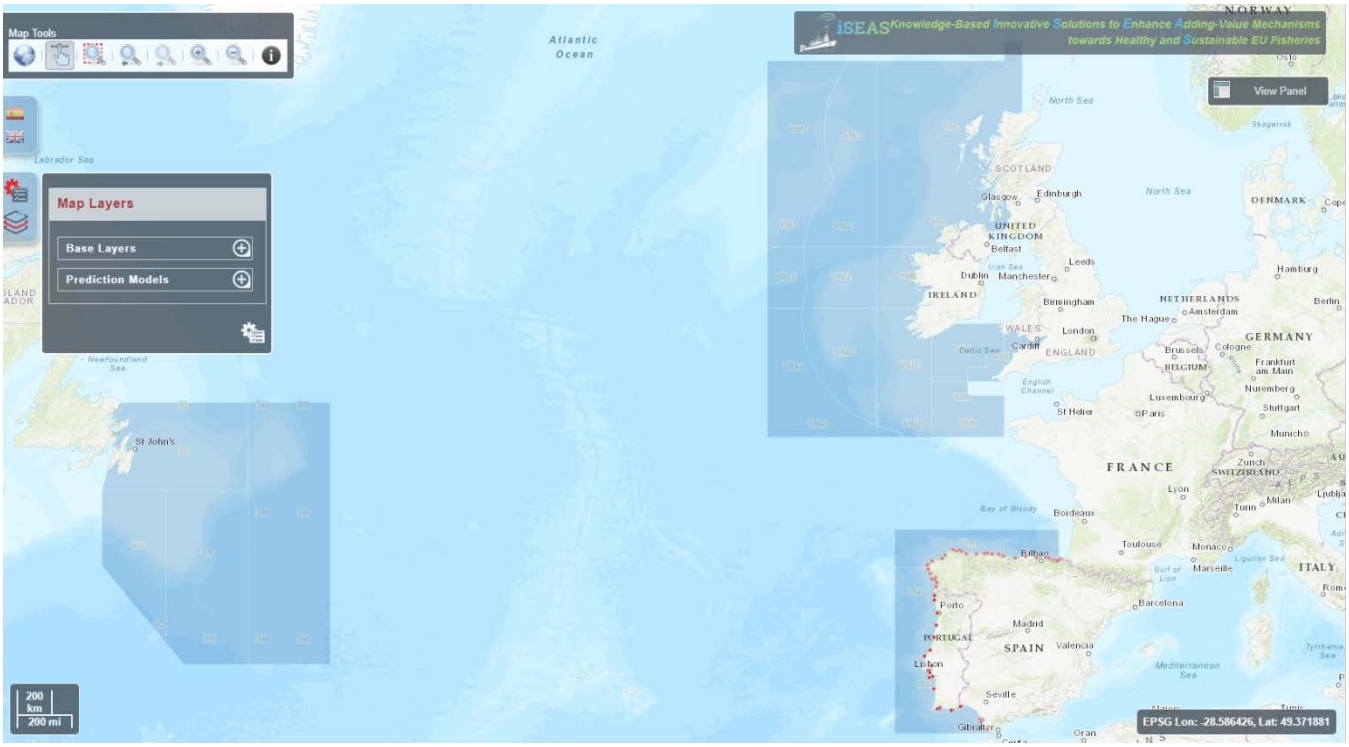
***Ría de Marín* Trips 2018**

5. Geoportal

5.1. Map Viewer

The Geoportal is built with the map viewer as the main component. The viewer presents a reference background map with bathymetry, several toolbars for navigation and control of the available information layers such as ports and reference areas. It is available in English and Spanish.

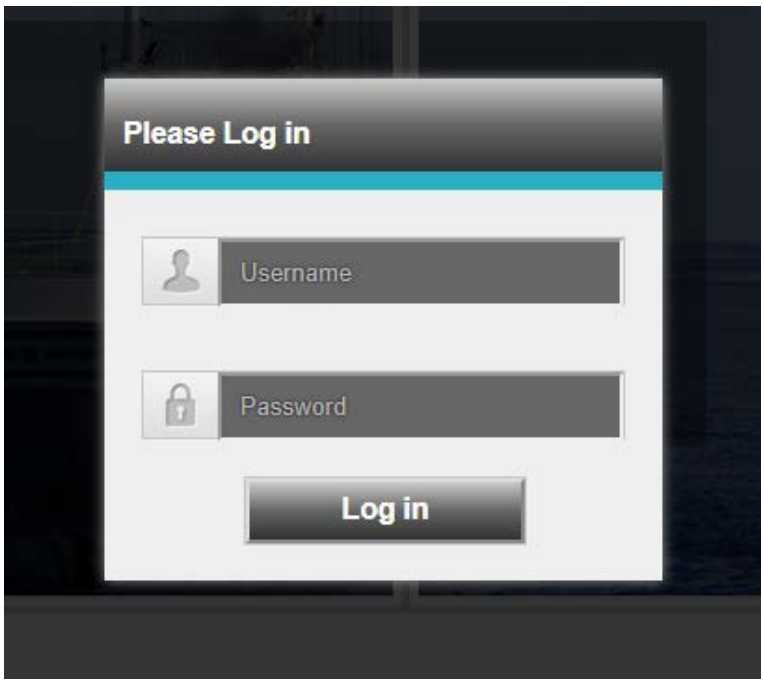
The geographic areas used in the project include the ICES VIIIc, and IXa areas in the Atlantic and Cantabrian peninsula, the ICES areas VIa, VIb1, VIb2, VIIb, VIIf, VIIg, VIIh, VIIc1, VIIc2, VIIj1, VIIj2, VIIk1 and VIIk2, close to Ireland and the NAFO 3L, 3M, 3N and 3NO areas to the southwest of Newfoundland. The subdivision of the ICES IXa area in areas IXaN, IXaC and IXaS was agreed with the IEO.



Geoportal Viewer

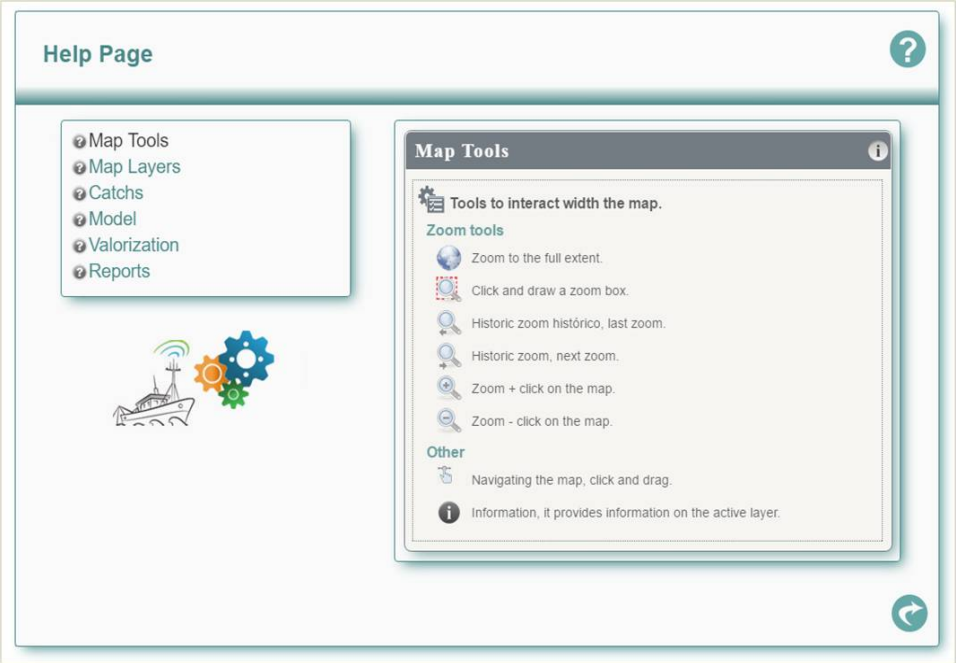
The Geoportal has two versions: a public, free access one with generic information and layers with the results of some static models and a private one that, in addition to the information offered in the public, allows access to the fishing data, filtered according to the user access permissions, and dynamic prediction models. An access portal to the viewer allows the user to choose between the public or private part, which requires the identification of the user and, depending on his role, filters the information to which he can access. The portal is accessible from the address http://iseas.cesga.es

Viewer Access portal



Access control form

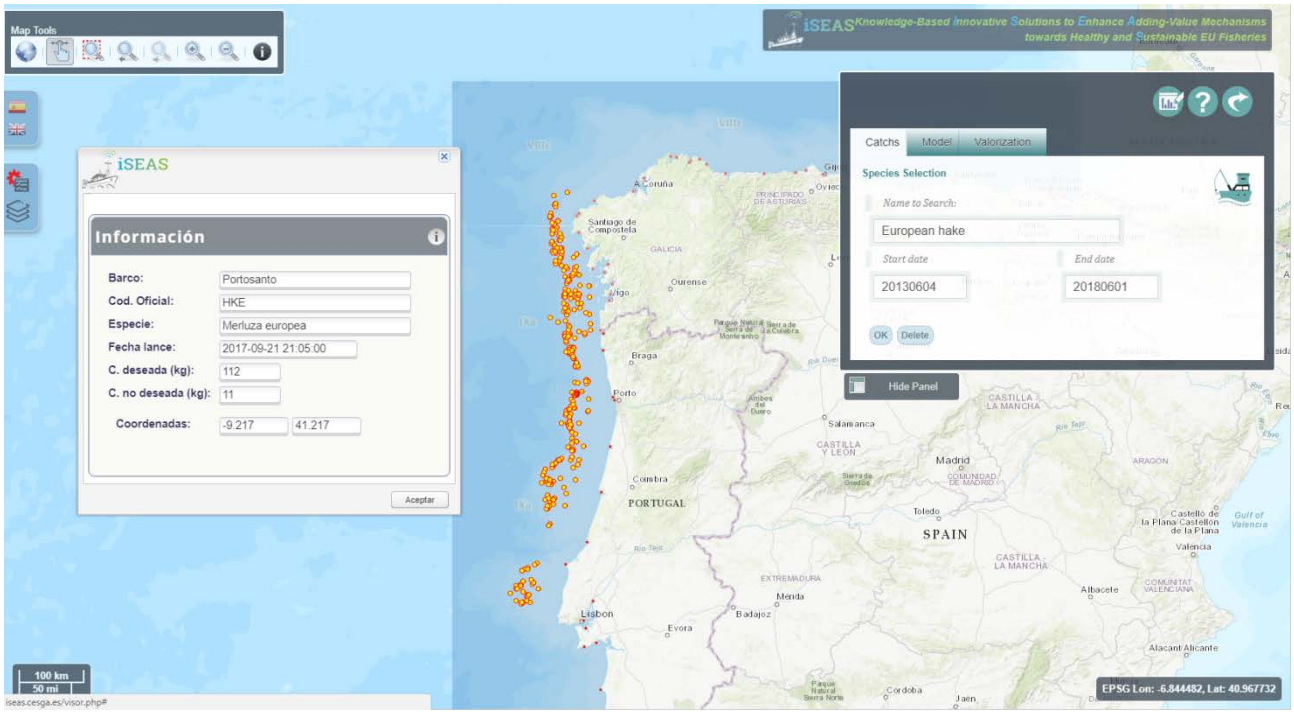
The viewer has a help section with the description of its functionalities.



Help

5.2. Catch

By means of a drop-down panel the user can access the catch search form which, for a species and a period of time, shows on the map the hauls for the selected species. Clicking on each haul a window with detailed information is displayed: name of the ship, date, species, wanted catch weight and unwanted catch weight. A user with the shipowner role can see the catch data of his ships in the viewer. A partner of the project will enter with the role of partner and will be able to access the data of all the ships.



'Partner' role catch view

5.3. Models

There are three types of models available, all developed by the IEO: Fishing Suitability Index Model (FSI), Fuel Efficiency Model and the vulnerable species hotspots models. The first two are generated dynamically with the catch data existing in the project database. Those of vulnerable species are static and have been pre-calculated with the IEO data.

5.3.1. Fishing Suitability Index Model (FSI)

The FSI model of fishing suitability provided by the IEO is incorporated into the model section of the viewer.

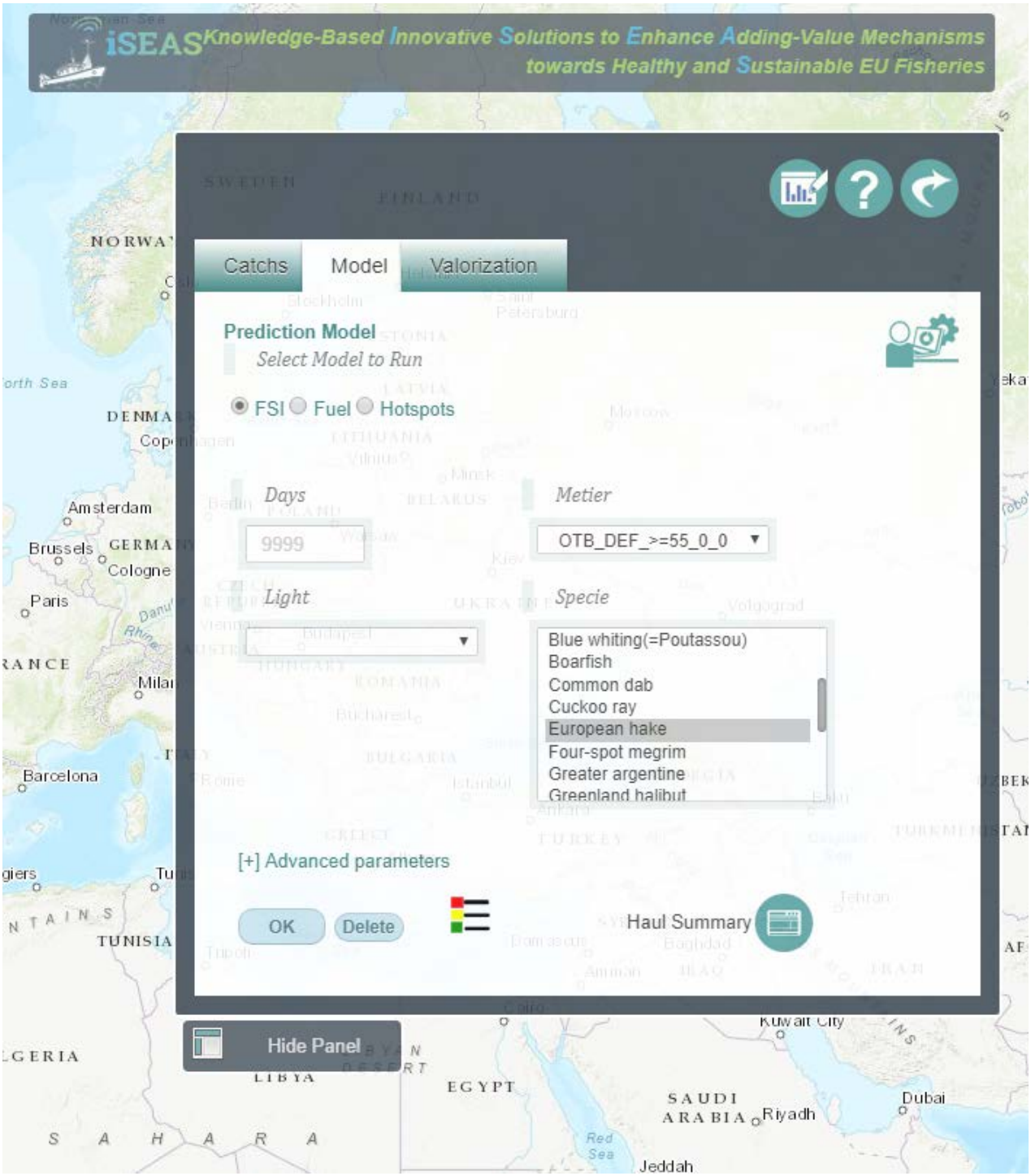
For an objective species, the FSI index indicates the probability that a site will maintain discards below a permissible discard rate given the environmental characteristics and previous fishing data for a given period of time. The FSI concept offers information on the best areas suitable for fishing activities, minimizing discards.

In the form parameters for the model it must be specified the metier, which will determine the fishing areas for which the modeling will be done, one or several target species, a time interval (the shorter, the more relevant the modeling by temporary closeness, but less will be the number of samples available to

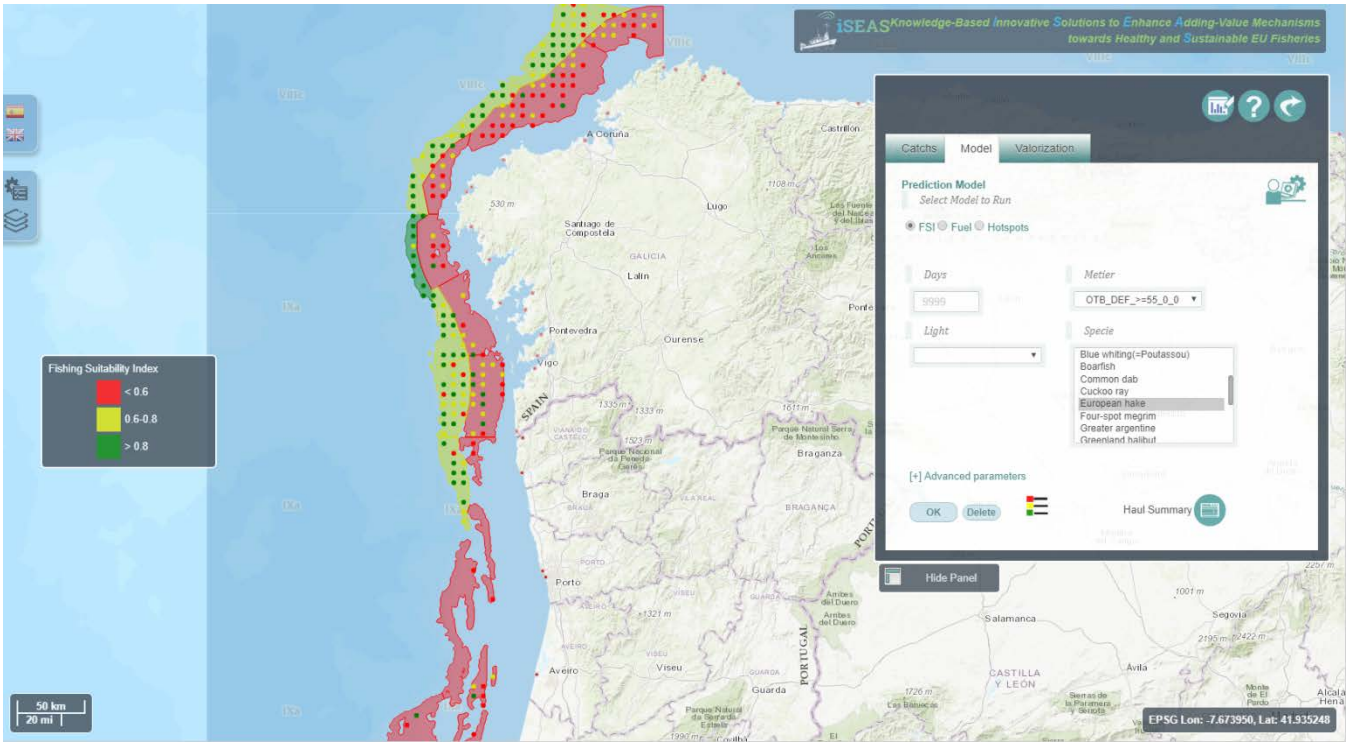
feed the model), optional filtering by day or night hauls and, as advanced parameters, minimum desired catch and maximum unwanted capture percentage.

From the input parameters, the capture data that feeds the model is filtered and the R language script that calculates the FSI is executed.

The results are presented in a layer in the viewer as a dotted grid with a color code that represents the value of the FSI index for each point and in a second layer with the average result of the FSI index for the fishing areas delimited by the IEO from Vessel Monitoring System (VMS) data.

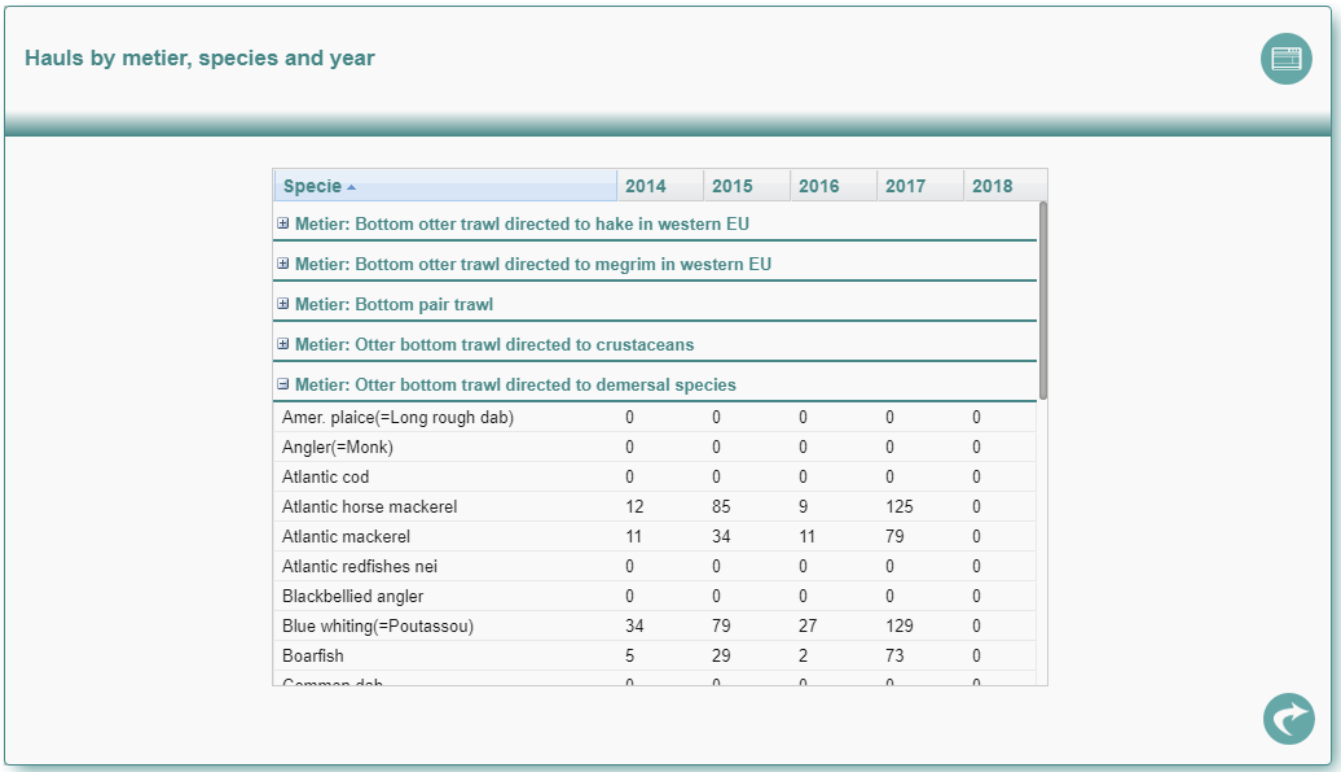


FSI model form



FSI model result

Within the form there is a button to open a summary screen of the hauls available in the project database to serve as a guide in the execution of the models.



Specie	2014	2015	2016	2017	2018
⊞ Metier: Bottom otter trawl directed to hake in western EU					
⊞ Metier: Bottom otter trawl directed to megrim in western EU					
⊞ Metier: Bottom pair trawl					
⊞ Metier: Otter bottom trawl directed to crustaceans					
⊟ Metier: Otter bottom trawl directed to demersal species					
Amer. plaice(=Long rough dab)	0	0	0	0	0
Angler(=Monk)	0	0	0	0	0
Atlantic cod	0	0	0	0	0
Atlantic horse mackerel	12	85	9	125	0
Atlantic mackerel	11	34	11	79	0
Atlantic redfishes nei	0	0	0	0	0
Blackbellied angler	0	0	0	0	0
Blue whiting(=Poutassou)	34	79	27	129	0
Boarfish	5	29	2	73	0
Common dab	0	0	0	0	0

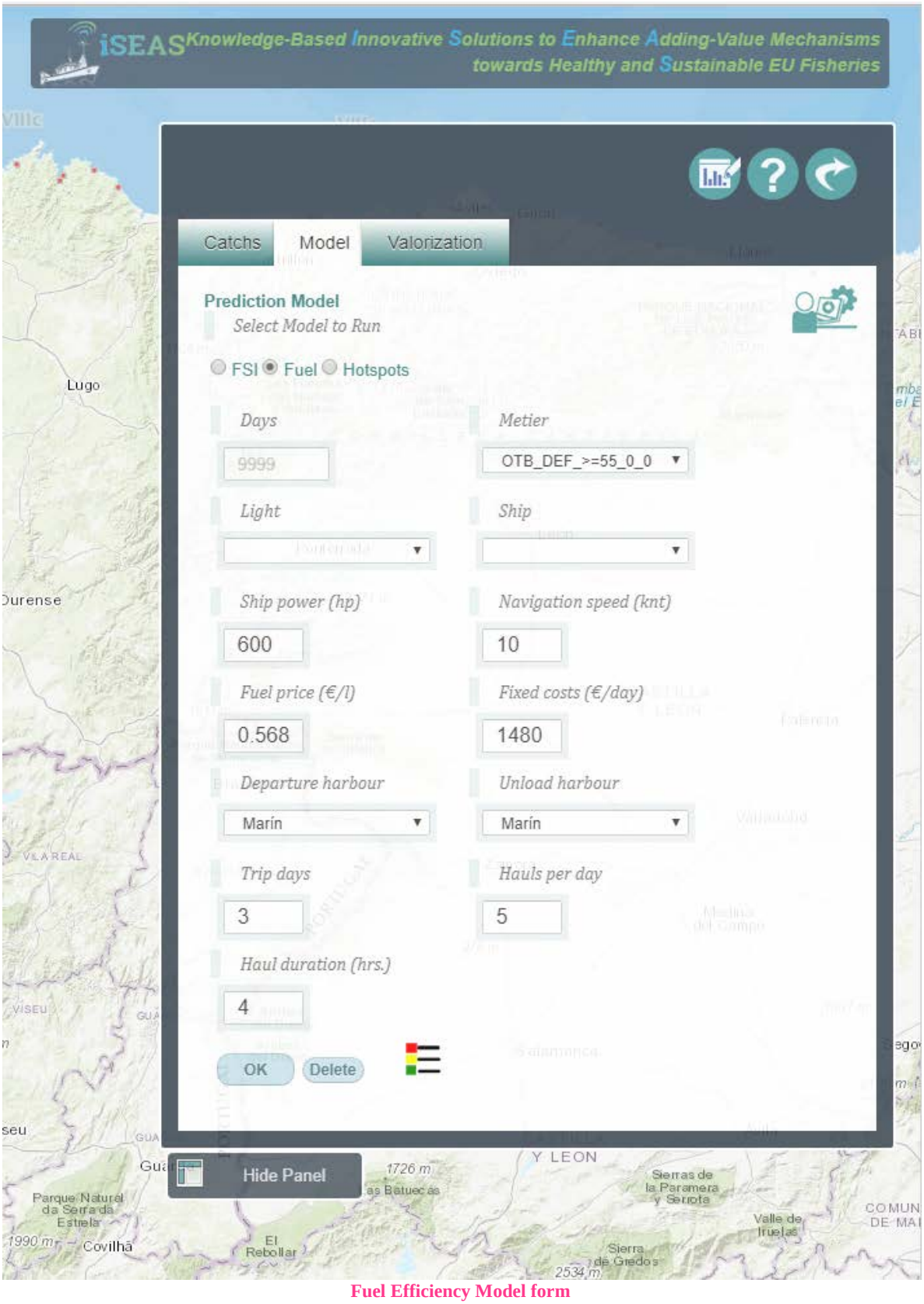
Hauls summary

5.3.2. Fuel Efficiency Model

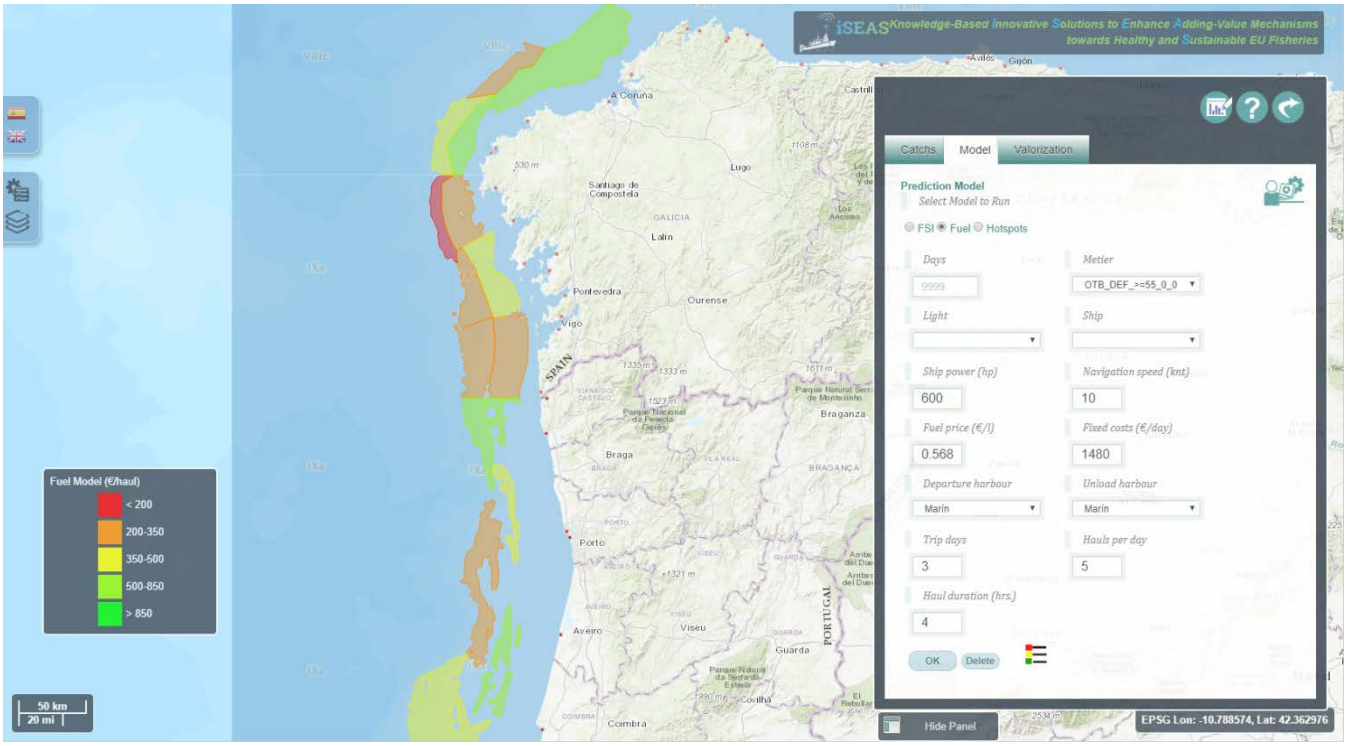
The second model of the Viewer is the Fuel Efficiency model. This model adds to the FSI model the economic part and estimates the expected income from the catch and the expenses associated to the fishing activity.

To execute the model there are a series of parameters to filter the fishing data that feed it as in the FSI model: metier, time interval in days until the current date and optional filtering by day or night sets. Additionally there are some parameters to configure the characteristics of the ship and its activity, these parameters include: ship power, average navigation speed, fuel price, fixed costs per day, ports of departure and unload, number of days of the trip, number of hauls per day and duration of each haul. It can be selected a specific ship already registered so that the parameters of past trips and / or model executions can be loaded.

The result obtained shows an estimate of the benefit per haul for each fishing zone.



Fuel Efficiency Model form



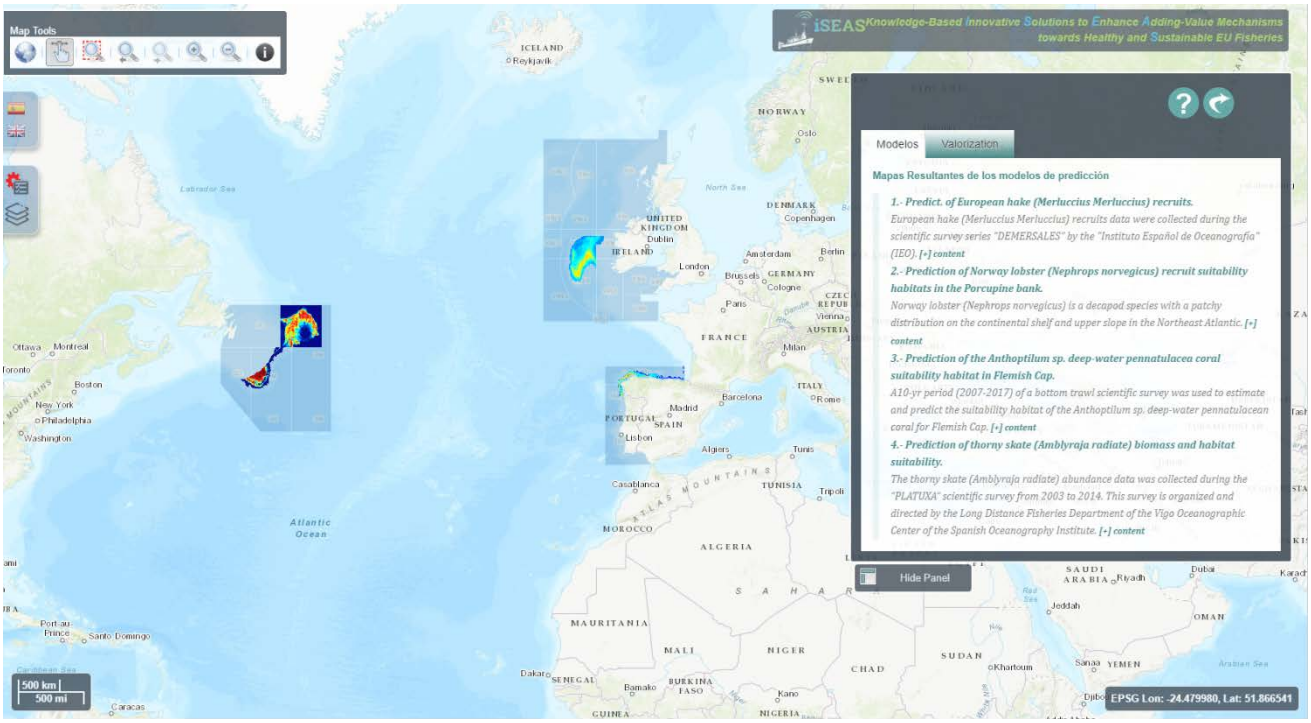
Fuel Efficiency Model result

5.3.3. Models of concentration of vulnerable species

The vulnerable species concentration models are accessible from both the public part of the Viewer and the private part.

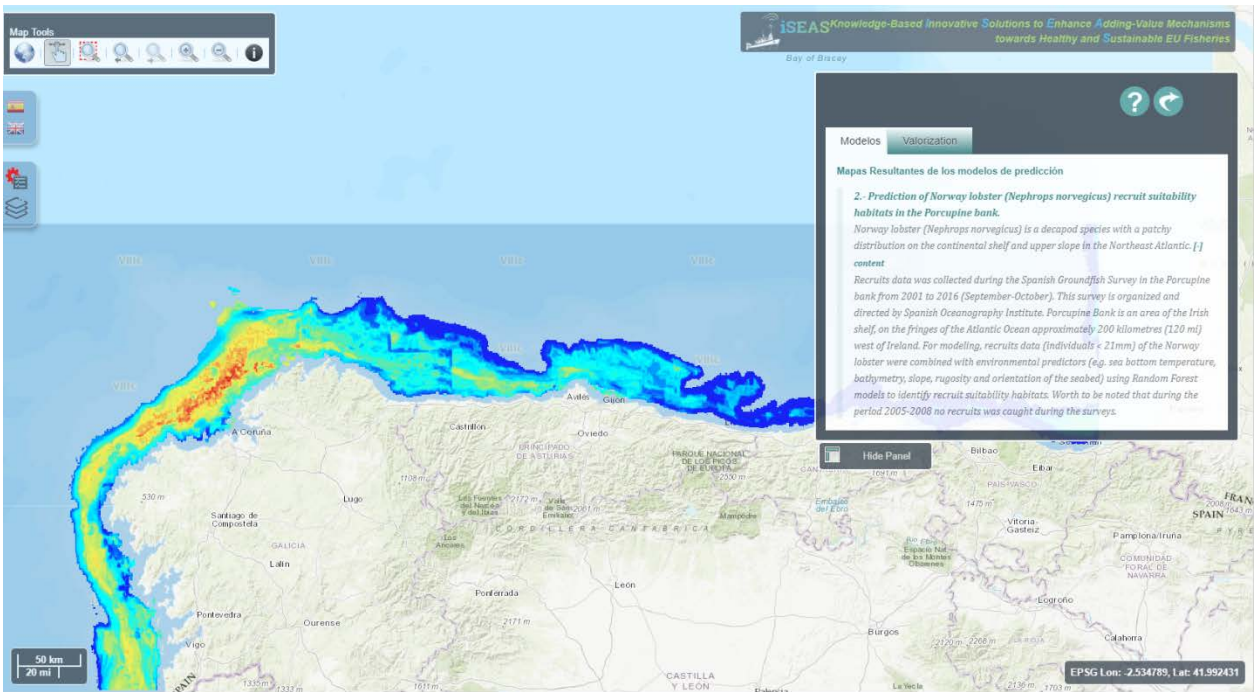
These models identify the areas where a higher concentration of certain protected species such as the pennatulaceous and the thorny skate or recruits of commercial species such as european hake and Norway lobster are expected from data collected in scientific campaigns of the IEO. One species was chosen per reference area of the project.

These models are static; they are pre-calculated for specific years.



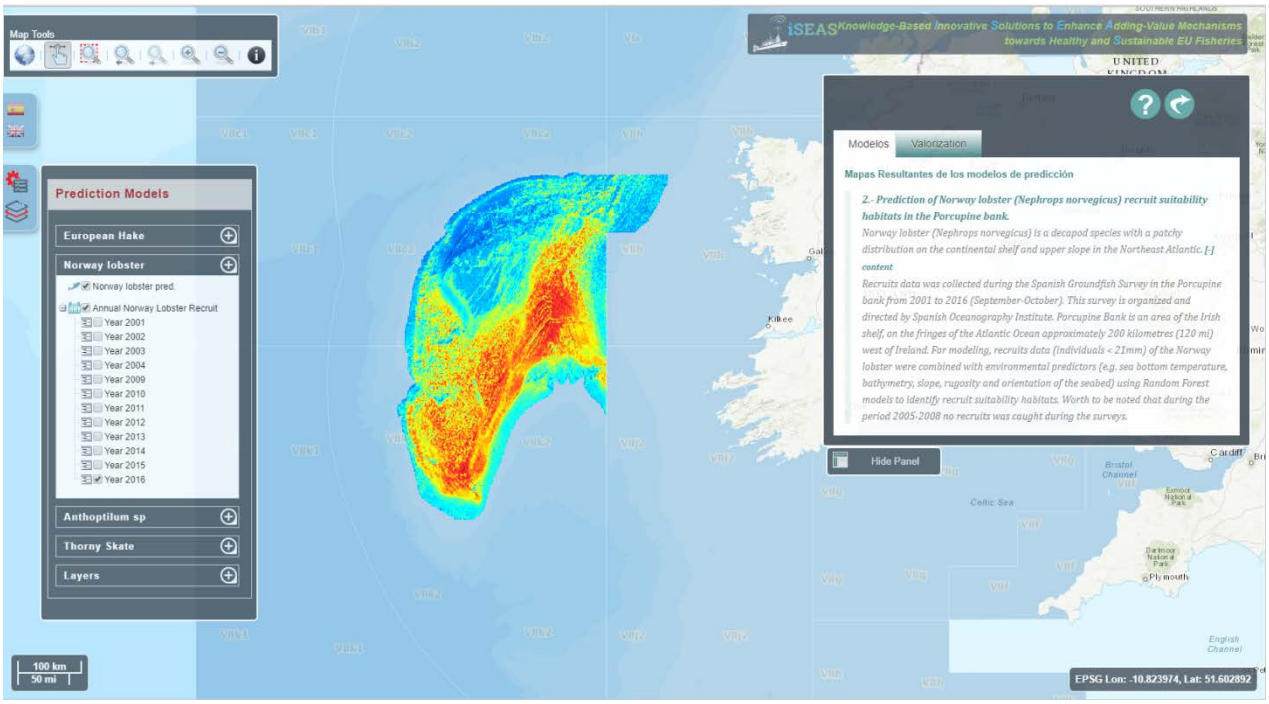
Public Viewer and Models of concentration of vulnerable species

Hake Recruitment Model: The prediction model of the European hake recruit is calculated from data collected in scientific campaigns of the IEO between 1997 and 2016 for the northwest and Cantabrian area.



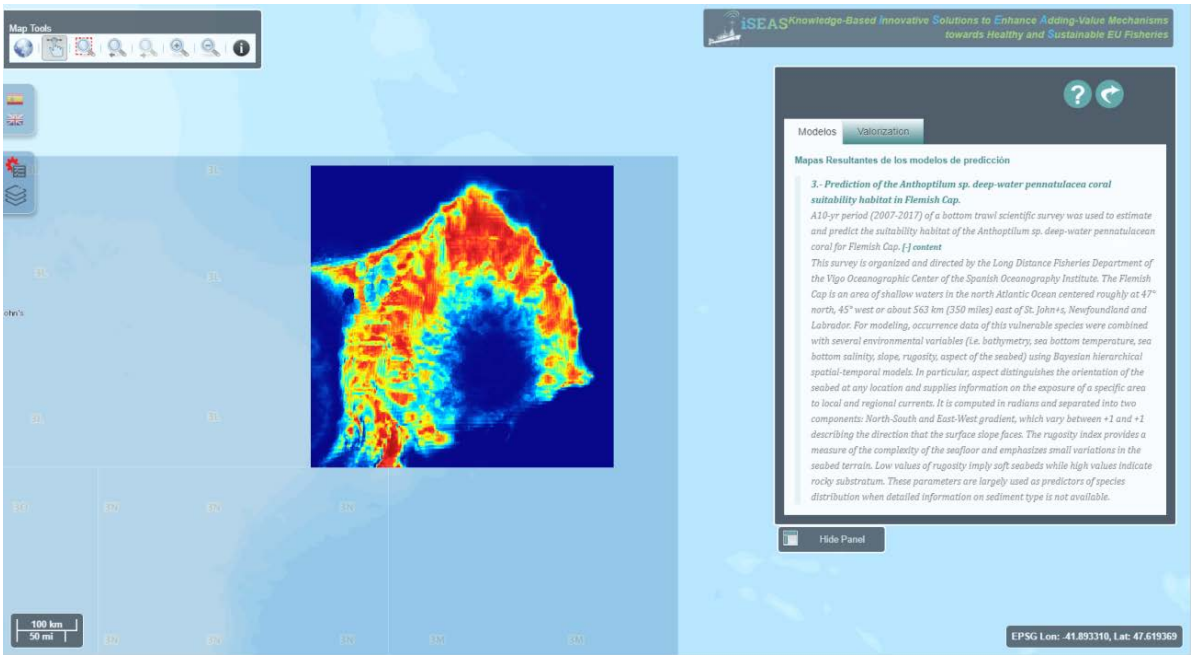
European hake recruit model

Nephrops Recruitment Model: The prediction model of suitable habitat for Norway lobster recruits (Nephrops norvegicus) is calculated from data collected during the IEO trawl scientific campaigns at the Porcupine bank during the period 2001-2016. A layer selection tree was included to choose the desired annual model.



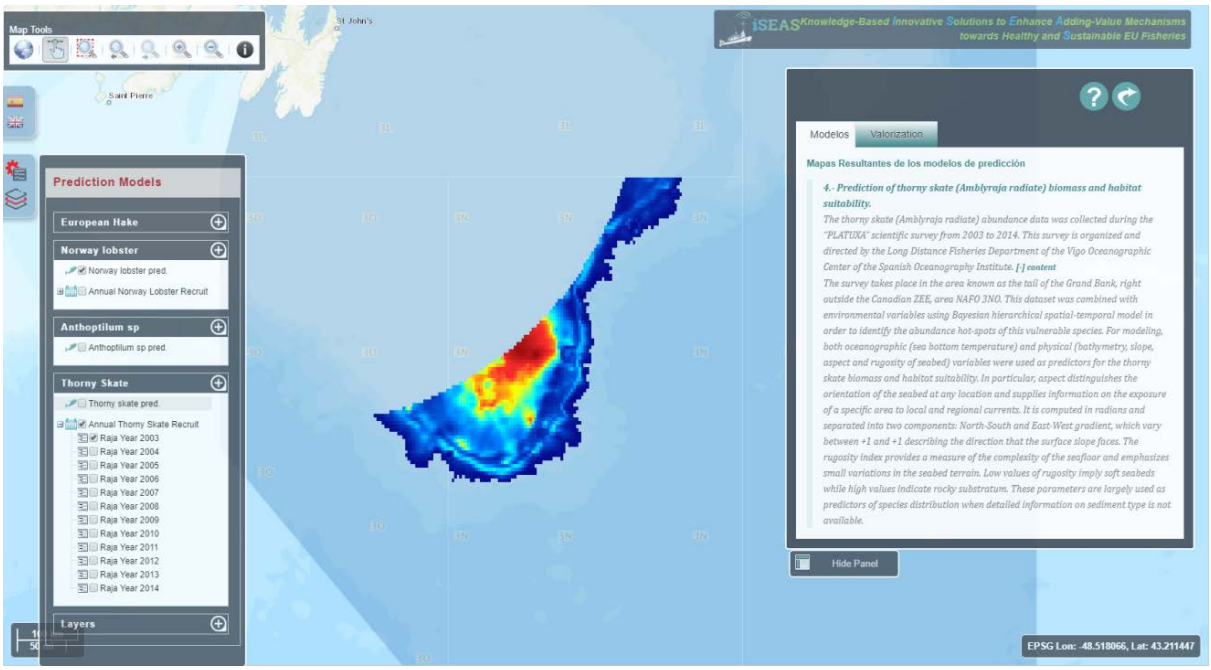
Norway lobster recruit model

Model of the Pennatulacean: The prediction model of the Anthoptilum sp. deep-water pennatulacea coral suitability habitat is calculated from data collected in scientific bottom trawling campaigns of the IEO between 2007 and 2017 for the Flemish Cap area.



Pennatulacea coral suitability habitat model

Thorny Skate Model: The prediction model of the biomass and the ideal habitats of the thorny skate (Amblyraja radiate) is calculated from data collected in the "Platuxa" scientific campaigns of the IEO between 2003 and 2014 for the tail of the Grand Bank in the NAFO 3NO divisions. A layer selection tree was included to choose the desired annual model.



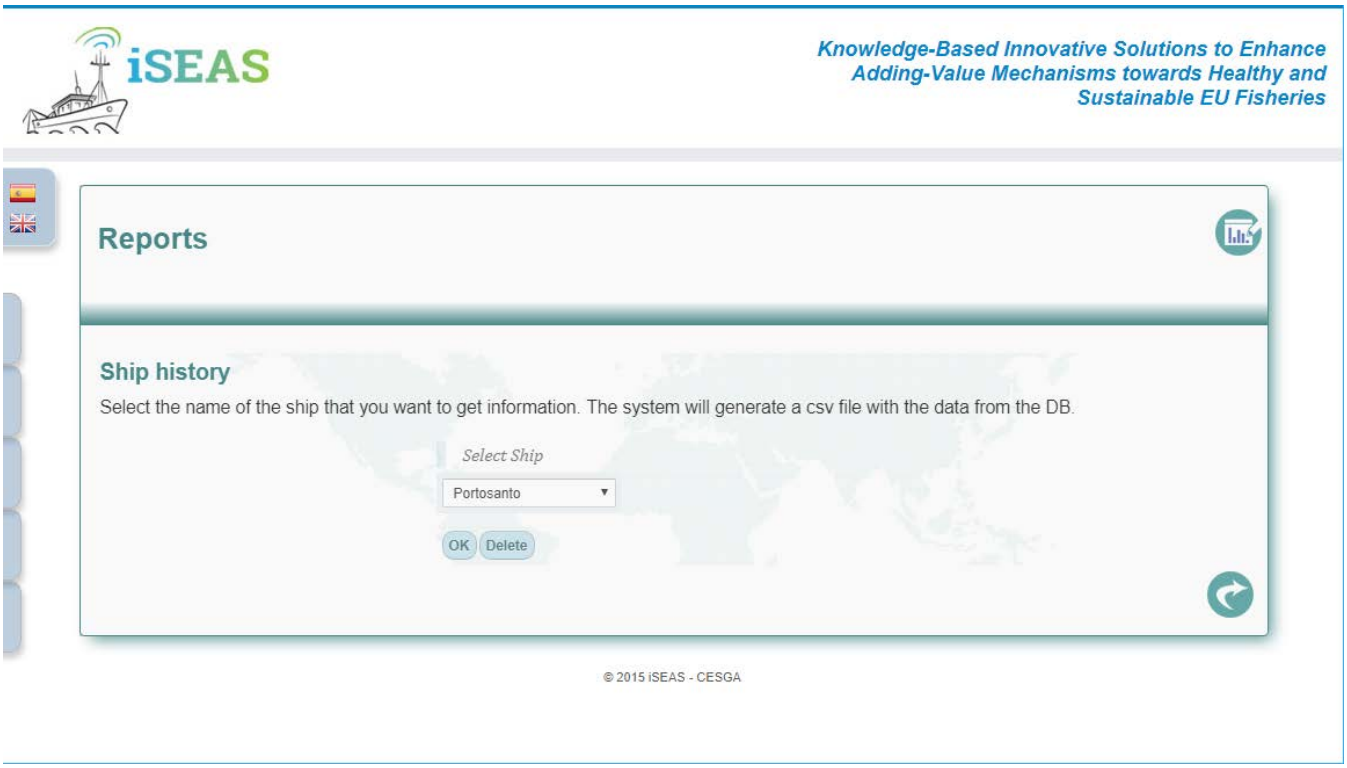
Thorny Skate suitability habitat model

5.4. Reports

5 types of downloadable reports in spreadsheet format can be generated in the Geoportal, with the data from the database. Each report has a form with various parameters to filter the data obtained. These data are also filtered according to the user and their role.

5.4.1. Ship history

Provides general ship information with the change history.



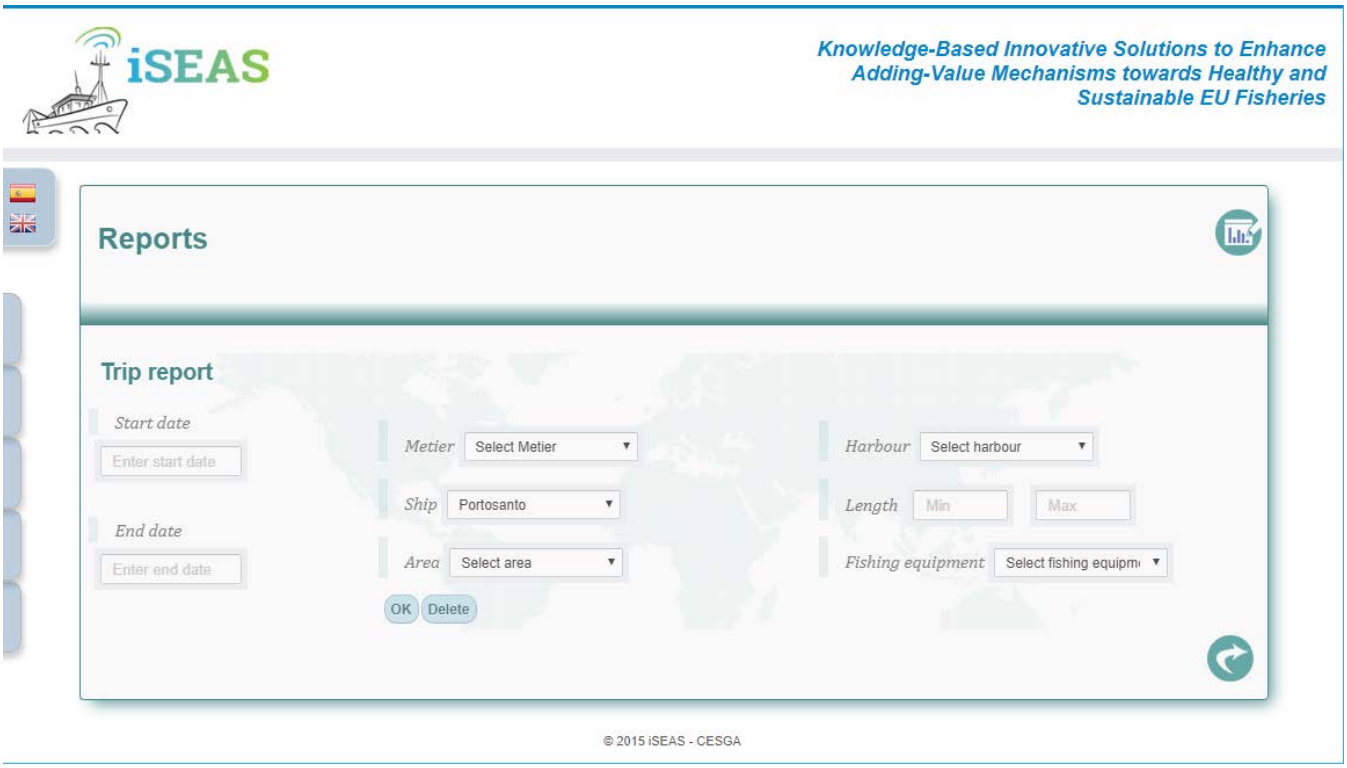
Ship History report form

	A	B	C	D	E	F	G	H	I	J	K
1	ship_name	hp	grt	gt	length_over	harbour	max_crew_s	date	id_ship	shipowner_name	
2	Portosanto		167	167		Vigo	9	2016-12-09	VI-2-4-00	Armador de prueba	
3											
4											
5											
6											
7											
8											
9											

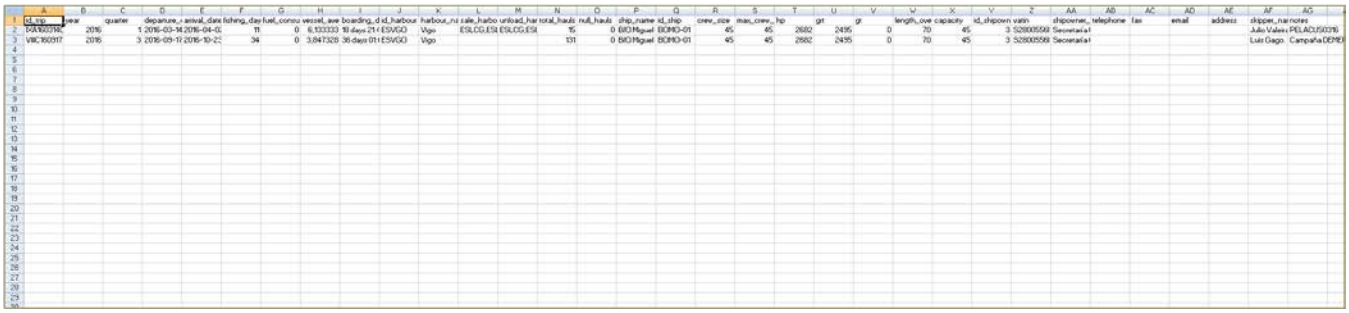
Ship History report

5.4.2. Trip report

General information about trips.



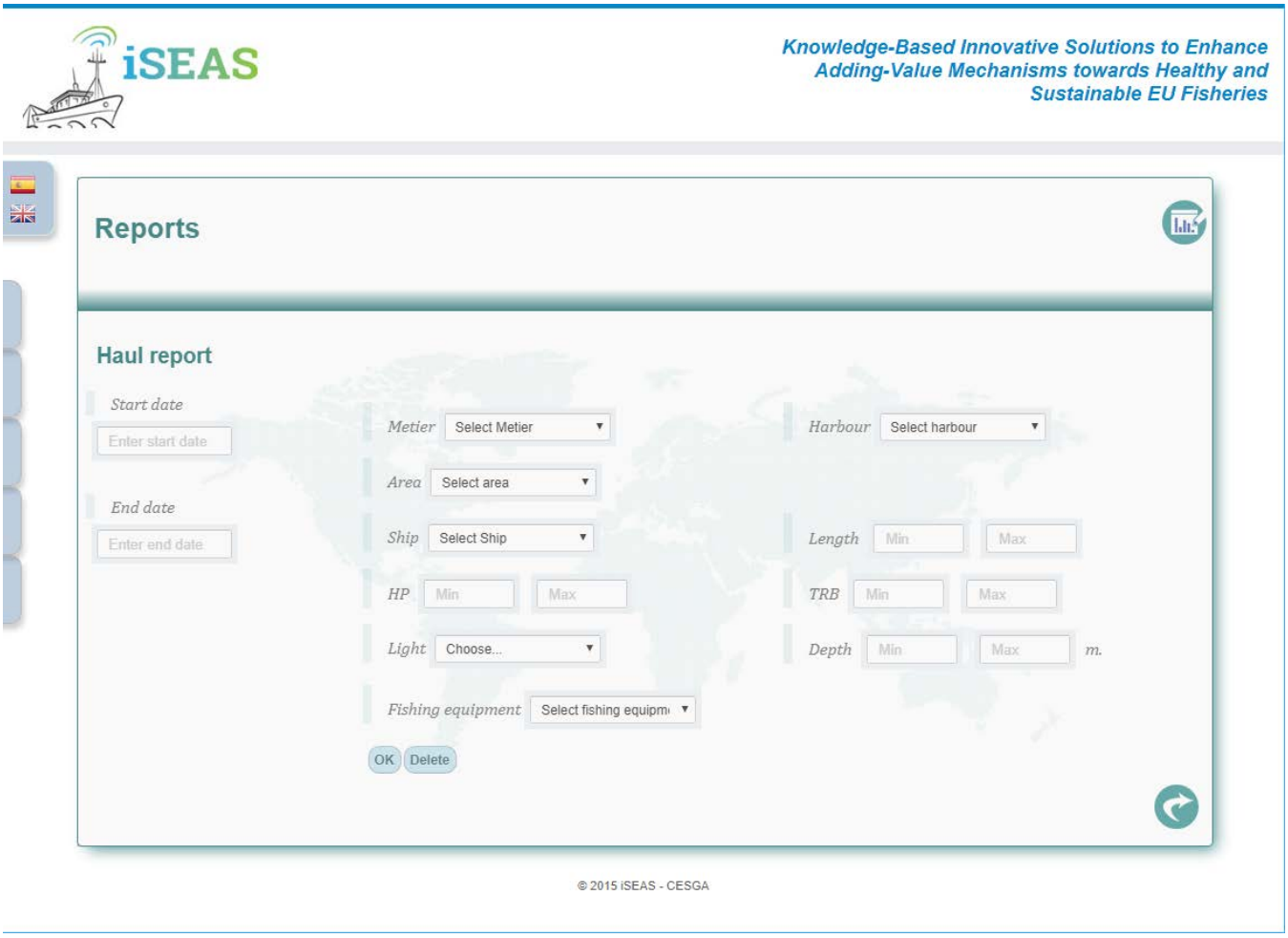
Trip report form



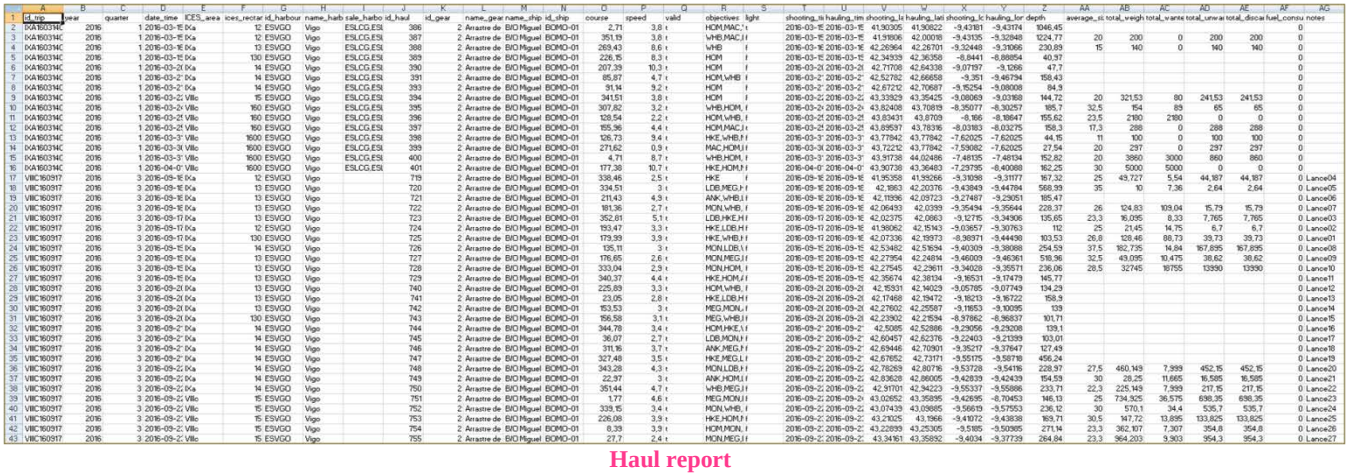
Trip report

5.4.3. Haul report

Information about hauls with a summary of the catches.



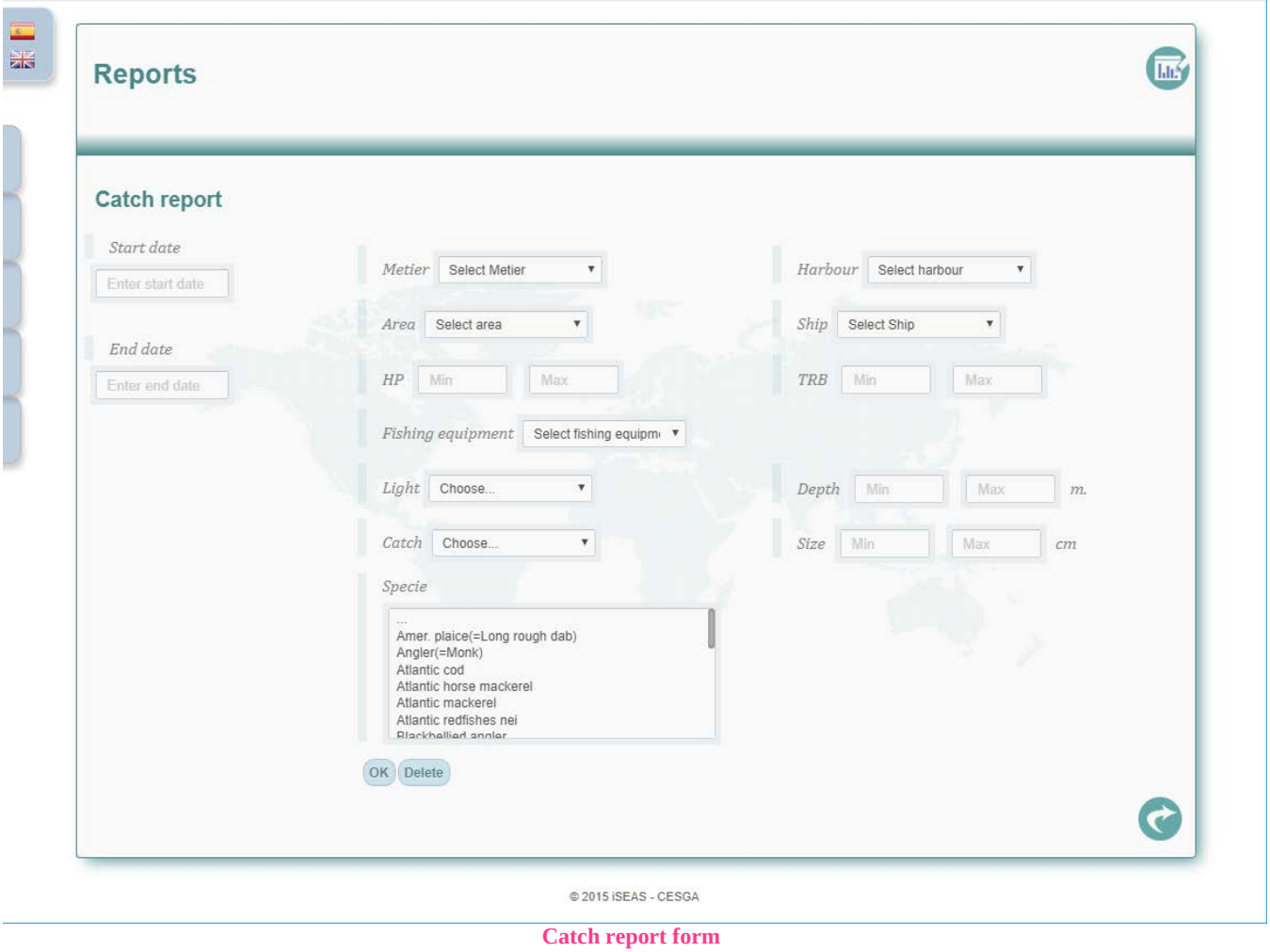
Haul report form



Haul report

5.4.4. Catch report

Detailed information about catches.



Catch report form

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	id_trip	year	quarter	date_time	ICES_area	ices_rectang	id_ship	id_departure	id_haul	id_gear	scientific_na	a_code	spanish_nam	english_nam	weight	unwanted	ls_discard	manual	notes
2	IXA1603140(	2016	1	2016-03-15 (	IXa	12	BOMO-01	ESVGO	387	2	Trachurus tr	HOM	Jurel	Atlantic hors	200	QUO1	t	t	
3	IXA1603140(	2016	1	2016-03-16 (	IXa	13	BOMO-01	ESVGO	388	2	Micromesisti	WHB	Bacaladilla	Blue whiting(	50	MLS1	t	t	
4	IXA1603140(	2016	1	2016-03-16 (	IXa	13	BOMO-01	ESVGO	388	2	Micromesisti	WHB	Bacaladilla	Blue whiting(	90	MAR1	t	t	
5	VIIIC160917(	2016	3	2016-09-18 (	IXa	12	BOMO-01	ESVGO	719	2	Capros aper	BOC	Ochavo	Boarfish	0,112	MAR1	t	t	Lance04
6	VIIIC160917(	2016	3	2016-09-18 (	IXa	12	BOMO-01	ESVGO	719	2	Lepidorhomt	LDB	Gallo de cua	Four-spot m	5,155		f	t	Lance04
7	VIIIC160917(	2016	3	2016-09-18 (	IXa	12	BOMO-01	ESVGO	719	2	Lepidorhomt	MEG	Gallo del No	Megrim	0,385		f	t	Lance04
8	VIIIC160917(	2016	3	2016-09-18 (	IXa	12	BOMO-01	ESVGO	719	2	Merluccius n	HKE	Merluza eur	European ha	11,15	CAC2	t	t	Lance04
9	VIIIC160917(	2016	3	2016-09-18 (	IXa	12	BOMO-01	ESVGO	719	2	Micromesisti	WHB	Bacaladilla	Blue whiting(	7,025	QAL1	t	t	Lance04
10	VIIIC160917(	2016	3	2016-09-18 (	IXa	12	BOMO-01	ESVGO	719	2	Scomber sco	MAC	Caballa del A	Atlantic mac	9,15	MLS1	t	t	Lance04
11	VIIIC160917(	2016	3	2016-09-18 (	IXa	12	BOMO-01	ESVGO	719	2	Scyliorhinus	SYC	Pintarroja	Small-spotte	16,75	MAR1	t	t	Lance04
12	VIIIC160917(	2016	3	2016-09-18 (	IXa	13	BOMO-01	ESVGO	720	2	Lepidorhomt	LDB	Gallo de cua	Four-spot m	0,31		f	t	Lance05
13	VIIIC160917(	2016	3	2016-09-18 (	IXa	13	BOMO-01	ESVGO	720	2	Lophius pisc	MON	Rape blanco	Angler(=Mor	3,13		f	t	Lance05
14	VIIIC160917(	2016	3	2016-09-18 (	IXa	13	BOMO-01	ESVGO	720	2	Merluccius n	HKE	Merluza eur	European ha	3,92		f	t	Lance05
15	VIIIC160917(	2016	3	2016-09-18 (	IXa	13	BOMO-01	ESVGO	720	2	Micromesisti	WHB	Bacaladilla	Blue whiting(	2,64	QAL1	t	t	Lance05
16	VIIIC160917(	2016	3	2016-09-18 (	IXa	13	BOMO-01	ESVGO	722	2	Lepidorhomt	LDB	Gallo de cua	Four-spot m	2,74	DAM1	t	t	Lance07
17	VIIIC160917(	2016	3	2016-09-18 (	IXa	13	BOMO-01	ESVGO	722	2	Merluccius n	HKE	Merluza eur	European ha	17,53		f	t	Lance07
18	VIIIC160917(	2016	3	2016-09-18 (	IXa	13	BOMO-01	ESVGO	722	2	Micromesisti	WHB	Bacaladilla	Blue whiting(	13,05	MAR1	t	t	Lance07
19	VIIIC160917(	2016	3	2016-09-18 (	IXa	13	BOMO-01	ESVGO	722	2	Scomber sco	MAC	Caballa del A	Atlantic mac	87,43		f	t	Lance07
20	VIIIC160917(	2016	3	2016-09-18 (	IXa	13	BOMO-01	ESVGO	722	2	Trachurus tr	HOM	Jurel	Atlantic hors	4,08		f	t	Lance07
21	VIIIC160917(	2016	3	2016-09-17 (	IXa	13	BOMO-01	ESVGO	723	2	Lepidorhomt	LDB	Gallo de cua	Four-spot m	8,33		f	t	Lance03
22	VIIIC160917(	2016	3	2016-09-17 (	IXa	13	BOMO-01	ESVGO	723	2	Merluccius n	HKE	Merluza eur	European ha	6,44	MLS1	t	t	Lance03
23	VIIIC160917(	2016	3	2016-09-17 (	IXa	13	BOMO-01	ESVGO	723	2	Micromesisti	WHB	Bacaladilla	Blue whiting(	1,325	QAL1	t	t	Lance03
24	VIIIC160917(	2016	3	2016-09-17 (	IXa	12	BOMO-01	ESVGO	724	2	Merluccius n	HKE	Merluza eur	European ha	14,75		f	t	Lance02
25	VIIIC160917(	2016	3	2016-09-17 (	IXa	12	BOMO-01	ESVGO	724	2	Trachurus tr	HOM	Jurel	Atlantic hors	6,7	MLS1	t	t	Lance02
26	VIIIC160917(	2016	3	2016-09-17 (	IXa	130	BOMO-01	ESVGO	725	2	Lepidorhomt	LDB	Gallo de cua	Four-spot m	1,48	MLS1	t	t	Lance01

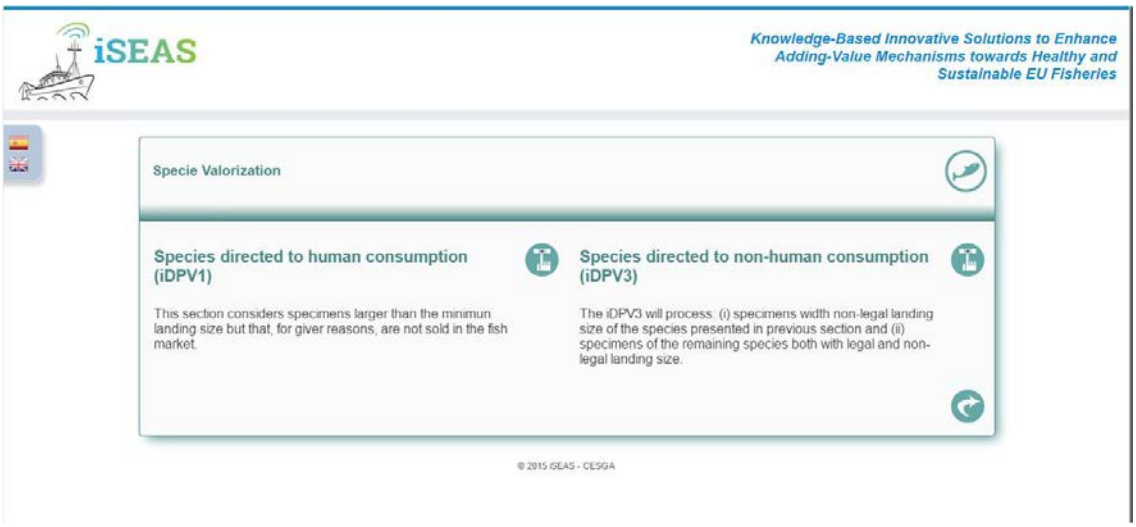
Catch report

5.4.5. Sizes report

Similar to the catch report, in this case with detailed information on the sizes of the catches.

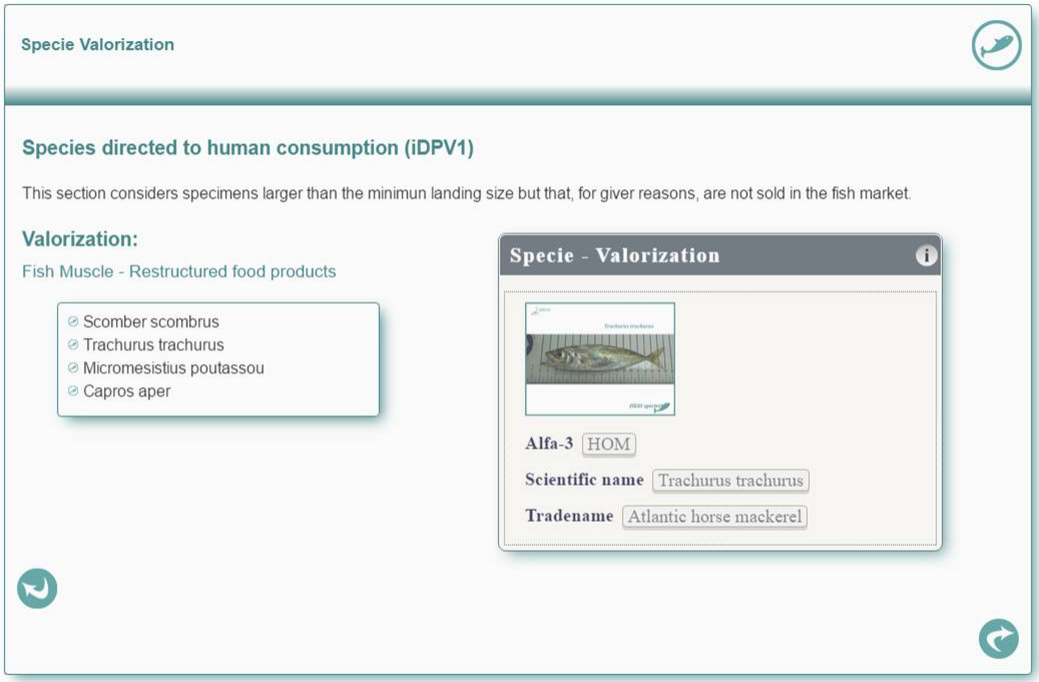
5.5. Valorization

Geoportal screen with valorization information by species. It includes two sections: one with valorization information for direct human consumption (iDPV1) and another with valorization information for non-human consumption (iDPV3).

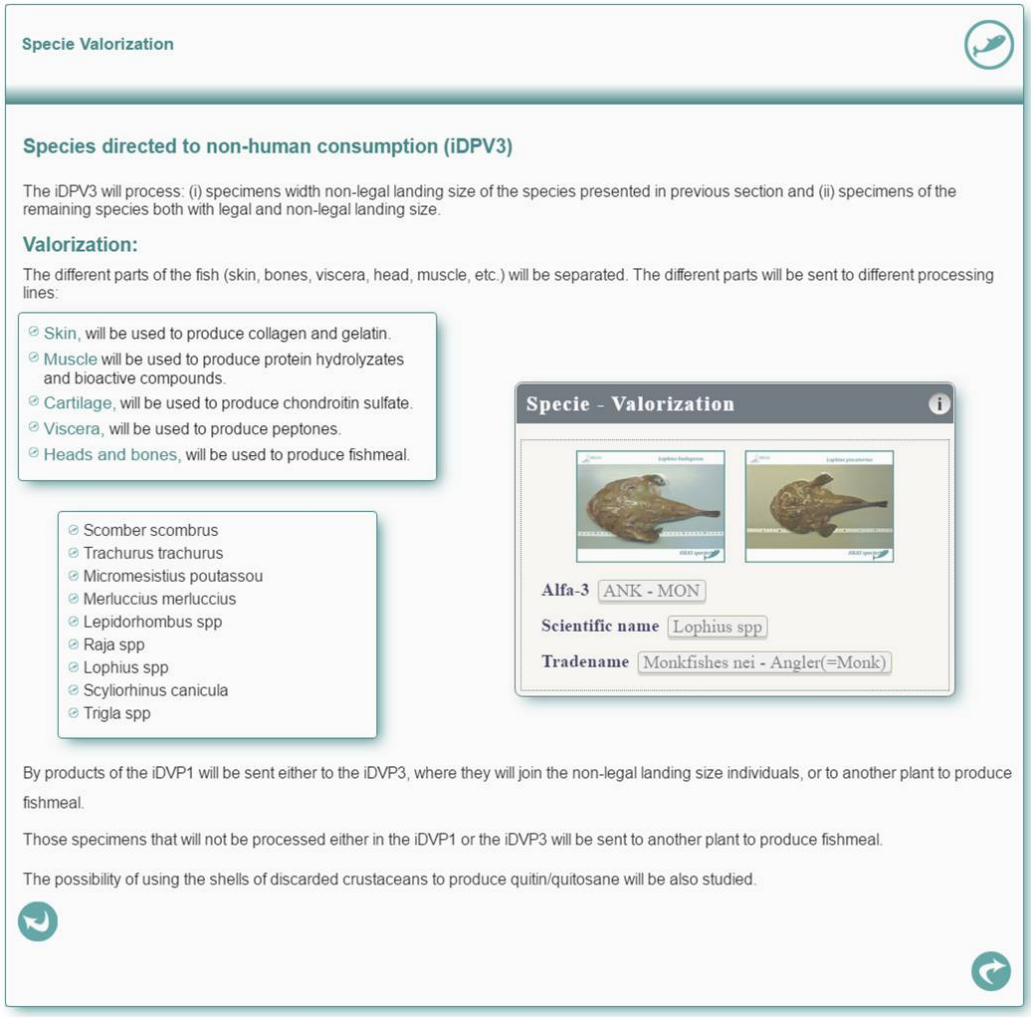


Valorization section

The species are presented and a small description is shown along with a photo of a specimen.


Specie Valorization
Species directed to human consumption (iDPV1)
This section considers specimens larger than the minimun landing size but that, for giver reasons, are not sold in the fish market.
Valorization:
Fish Muscle - Restructured food products
Scomber scombrus
Trachurus trachurus
Micromesistius poutassou
Capros aper
Specie - Valorization
Alfa-3 HOM
Scientific name Trachurus trachurus
Tradename Atlantic horse mackerel

iDPV1


Specie Valorization
Species directed to non-human consumption (iDPV3)
The iDPV3 will process: (i) specimens width non-legal landing size of the species presented in previous section and (ii) specimens of the remaining species both with legal and non-legal landing size.
Valorization:
The different parts of the fish (skin, bones, viscera, head, muscle, etc.) will be separated. The different parts will be sent to different processing lines:
Skin, will be used to produce collagen and gelatin.
Muscle will be used to produce protein hydrolyzates and bioactive compounds.
Cartilage, will be used to produce chondroitin sulfate.
Viscera, will be used to produce peptones.
Heads and bones, will be used to produce fishmeal.
Scomber scombrus
Trachurus trachurus
Micromesistius poutassou
Merluccius merluccius
Lepidorhombus spp
Raja spp
Lophius spp
Scyliorhinus canicula
Trigla spp
Specie - Valorization
Alfa-3 ANK - MON
Scientific name Lophius spp
Tradename Monkfishes nei - Angler(=Monk)
By products of the iDVP1 will be sent either to the iDVP3, where they will join the non-legal landing size individuals, or to another plant to produce fishmeal.
Those specimens that will not be processed either in the iDVP1 or the iDVP3 will be sent to another plant to produce fishmeal.
The possibility of using the shells of discarded crustaceans to produce quitin/quitosane will be also studied.

iDPV3

6. SDI services

6.1. WMS service

Service WMS

WMS or Web Map Service is an international standard that defines a "map" as a representation of geographic information in the form of a digital image file. The maps produced by WMS are usually generated in an image format and can be invoked by any corporate platform or software capable of displaying this type of services, such as desktop GIS.

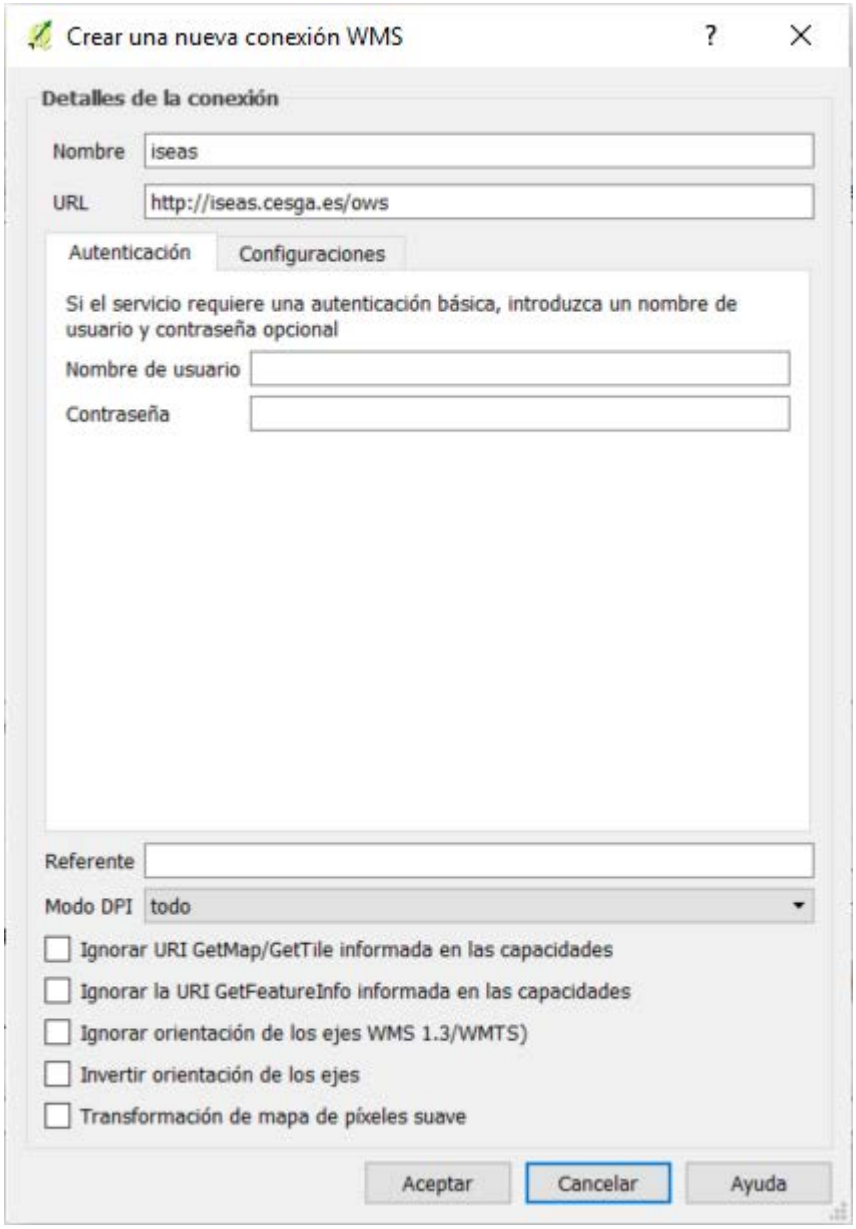
Within the ISEAS project, two levels of WMS services have been defined, one open to the general public where general data can be accessed, such as the location of ports and ICE areas or the results of the models generated in the prediction project. Radiata ray species, of the Pennatulaceous Anthoptilum sp. in Flemish Cap., and of the ideal habitats for Nephrops conscripts. These models correspond to general models and calculations for different years. Other services will be restricted access served by user control and password, to allow access to private data. This is done with the Geoserver open source geospatial data server through the establishment of a policy of users, groups and roles.

As an example of implementation, a general access service is shown that allows access to layers of information about invocations of a WMS service. The connection address on the WMS service is:

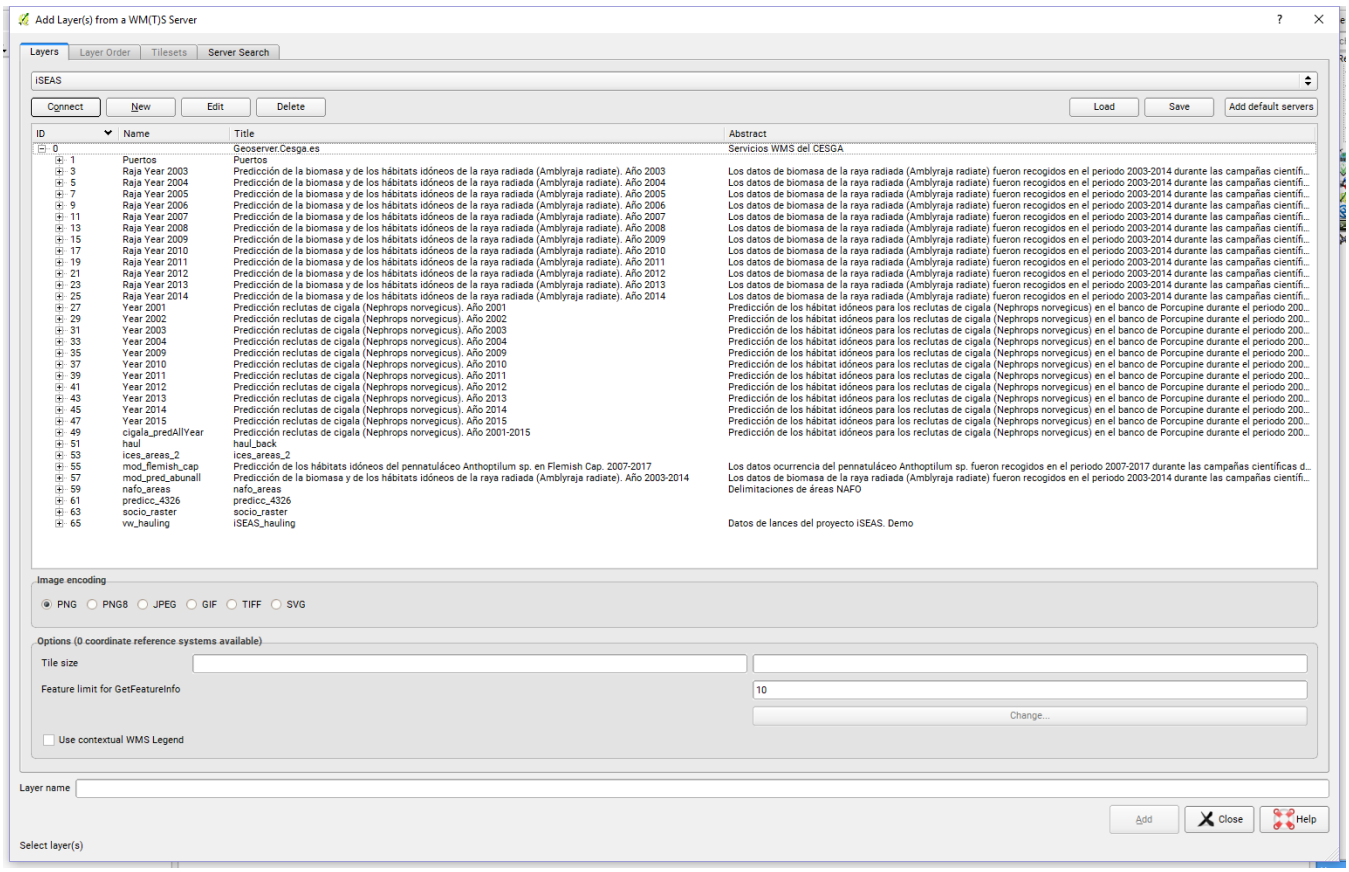
http://iseas.cesga.es/ows

This is the address that should be invoked on any desktop GIS. The connection from the QGIS program is shown below.

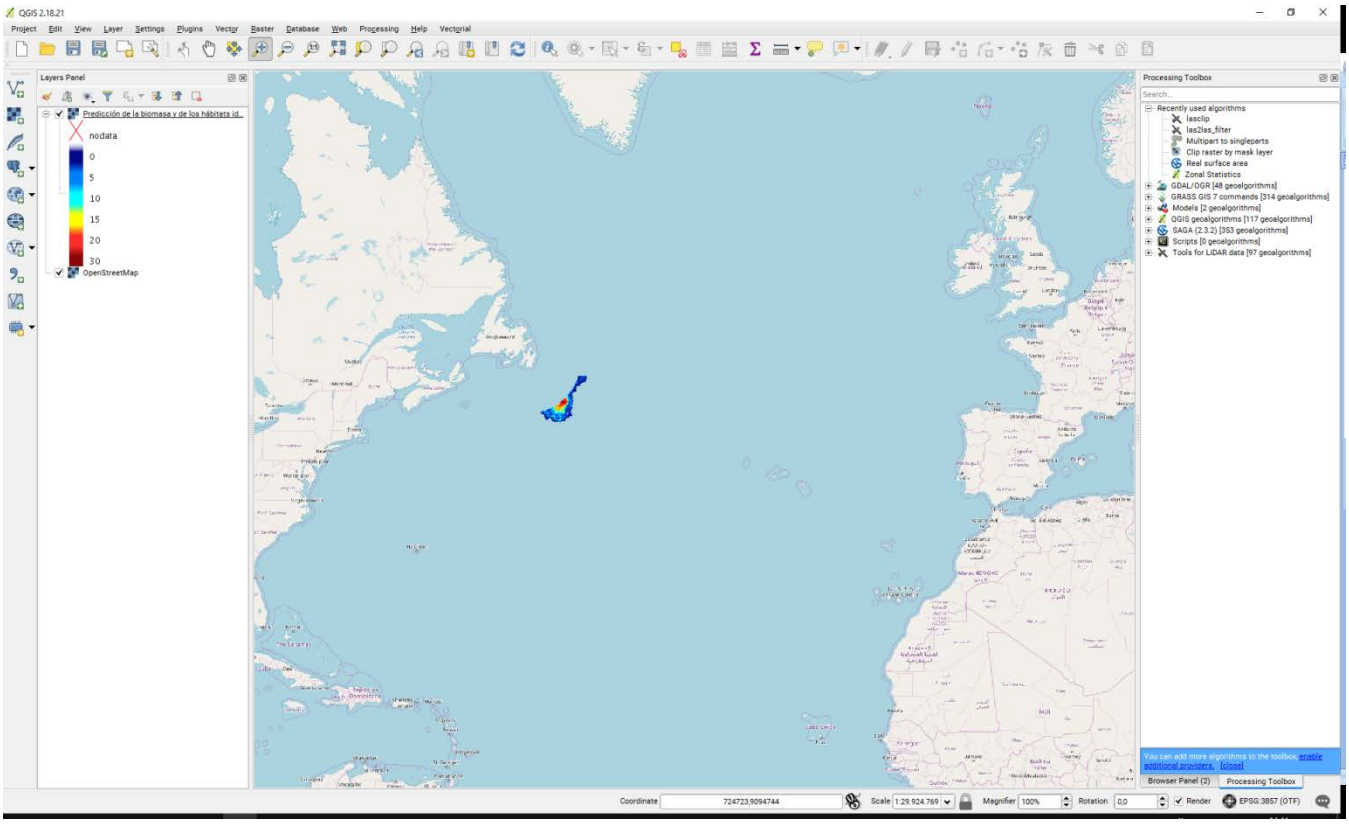
A WMS connection is created



We connect with the service created



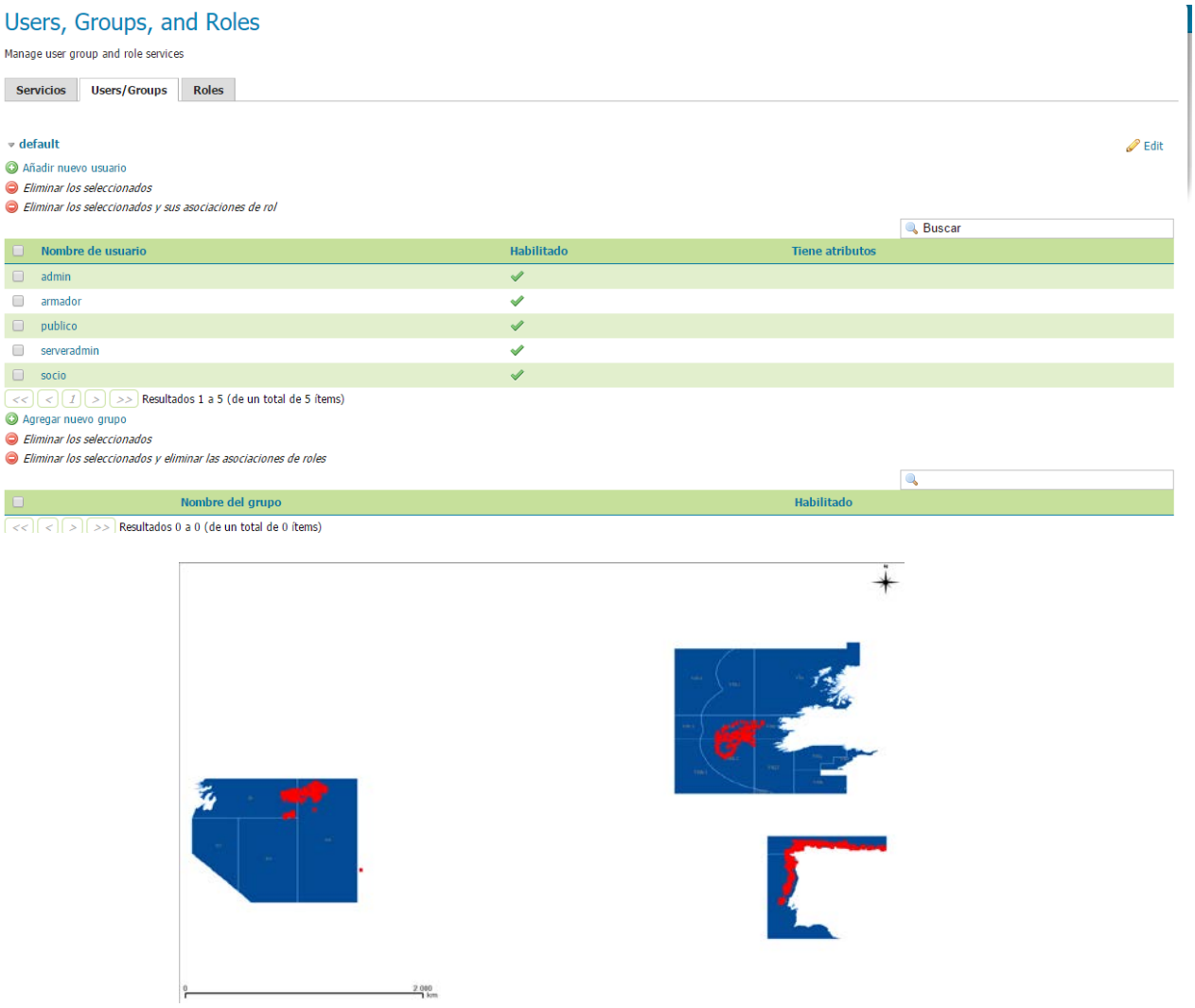
The information layers that are enabled for the connection from QGIS are available. We select the information layers and add them to a QGIS map.



In this example, the prediction of biomass and suitable habitats of the radiata ray (Amblyraia radiate) was loaded for the year 2003.

As an example of access to restricted data through the user and role access policy, we have the following link, through which we can access private data of specific captures:

http://iseas.cesga.es:8080/geoserver/ISEAS/wms

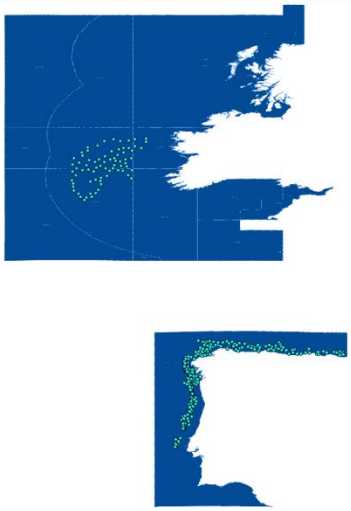


6.2. WFS service

- The Web Feature Service (WFS) service allows access to a web service of phenomena and remote access and editing of geographical data. It is done at the geographic object level, that is obtaining the elements one by one, being able to access its information. This standard allows remote access to the attributes of a specific geographic object. Within the LIFE ISEAS project, WFS services have been implemented to securely query the vector data of hauls with user and

password control, in the same way that we can do it with WMS services. The link to which we can access the WFS services is

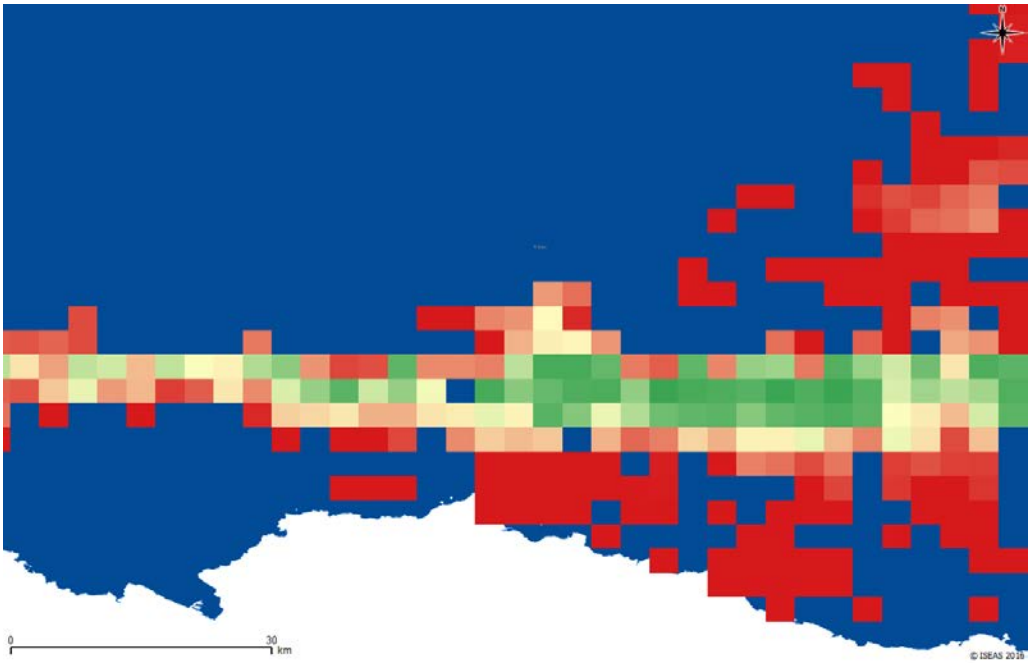
- http://iseas.cesga.es:8080/geoserver/ISEAS/wfs



6.3. WCS service

The Web Service Coverage Service (WCS) allows the obtaining of geospatial data in the form of coverage or raster, which has access to the thematic attribute of the pixels that do not have to be RGB colors as in the case of the WMS standard, but any value thematic. In the case of the LIFE iSEAS project, a WCS service has been implemented that will allow access to the results of the models. While waiting for these results, tests have been carried out with results of the models obtained with data from the iSEAS Faros project. They will be used with the iSEAS data when they are available from task B3.

http://iseas.cesga.es/ows?



6.4. WPS service

Implementation of the WPS service

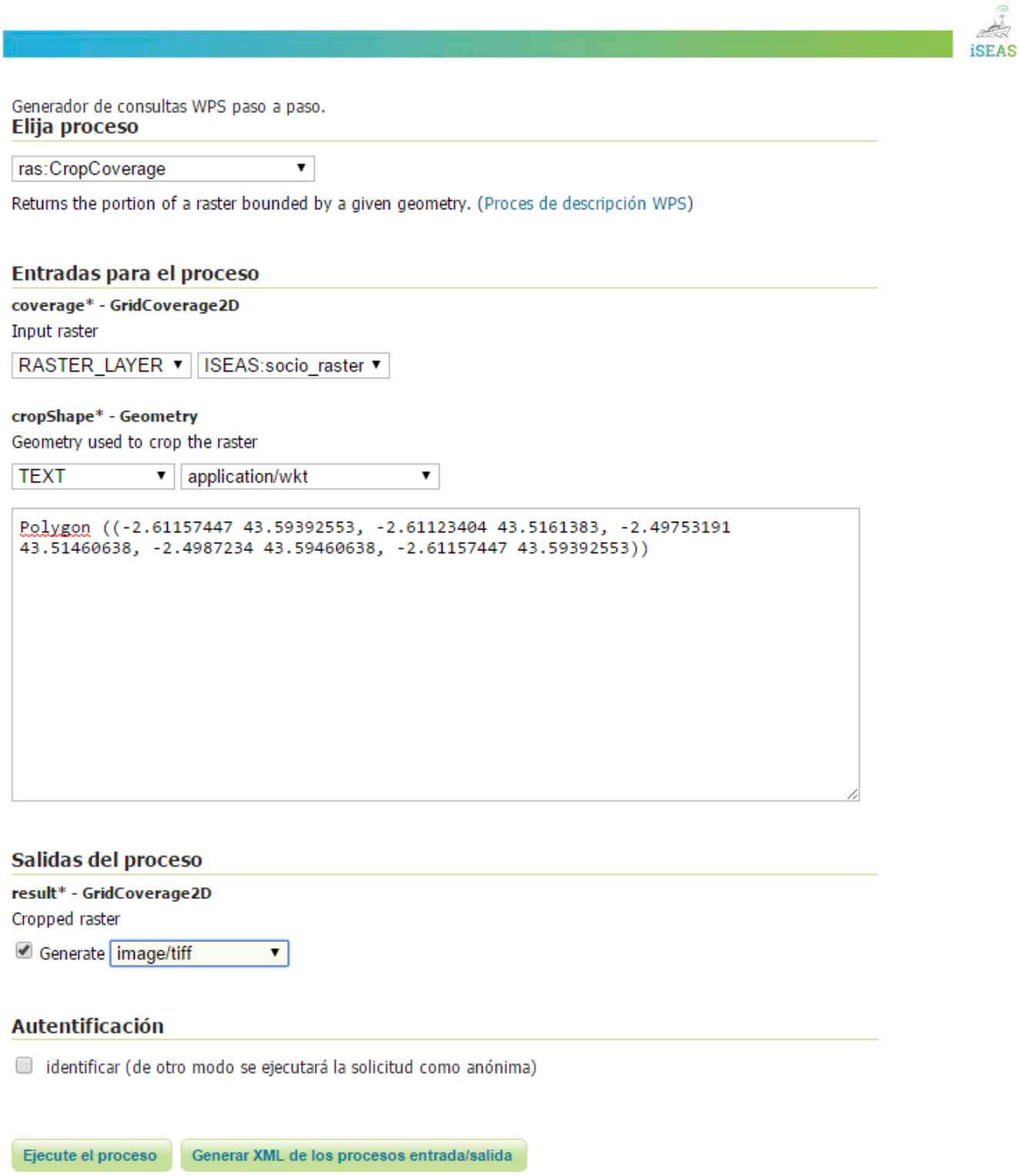
The WPS standard provides rules for the standardization of input and output (requests and responses) for geospatial processing services.

The OGC® Web Processing Service (WPS) standard describes how to access geospatial processes from a Web interface. The processes cover any algorithm, calculation or model that operate on georeferenced raster or vector data. A WPS can present calculations as simple as a subtraction between two sets of georeferenced numbers, subtracting one from another (e.g., determining the difference in the results of a model at two different times).

The WPS processes are divided into three categories: vector, raster and geometry; making reference to the type of geospatial content used as input to the process. These categories are broad, since they can take multiple types of entry.

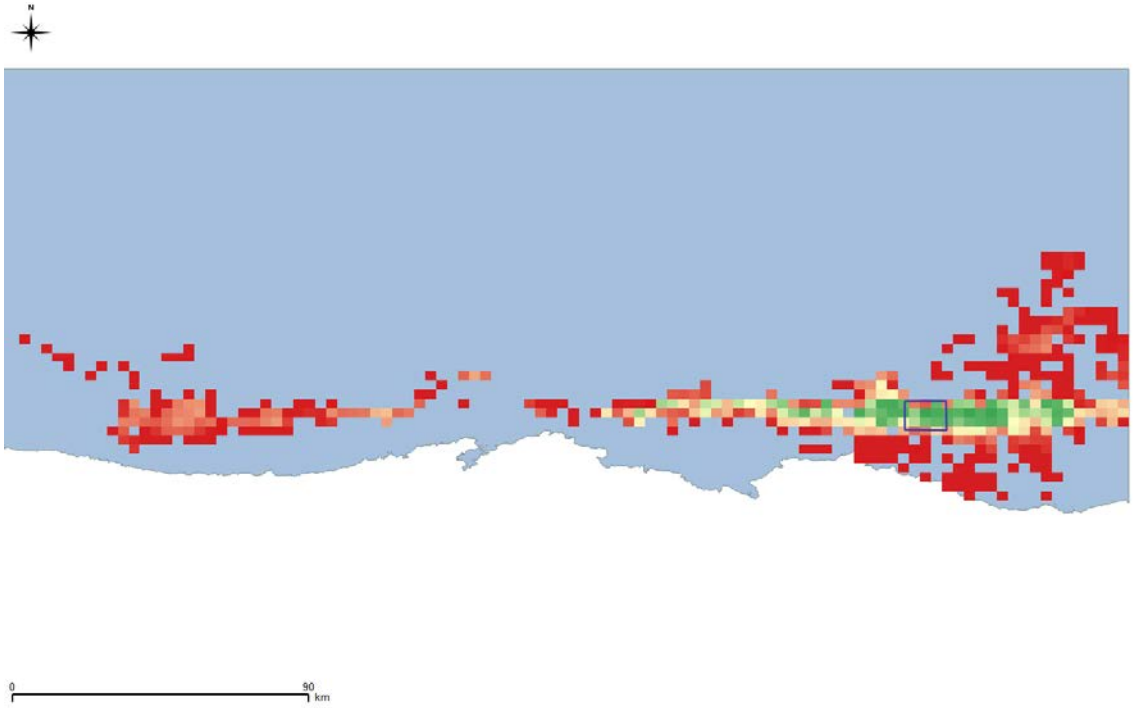
As proof we have proposed the cutout of the model that we have served as WCS that indicates the suitability of the fishing zones, with polygons of known coordinates in WKT format.

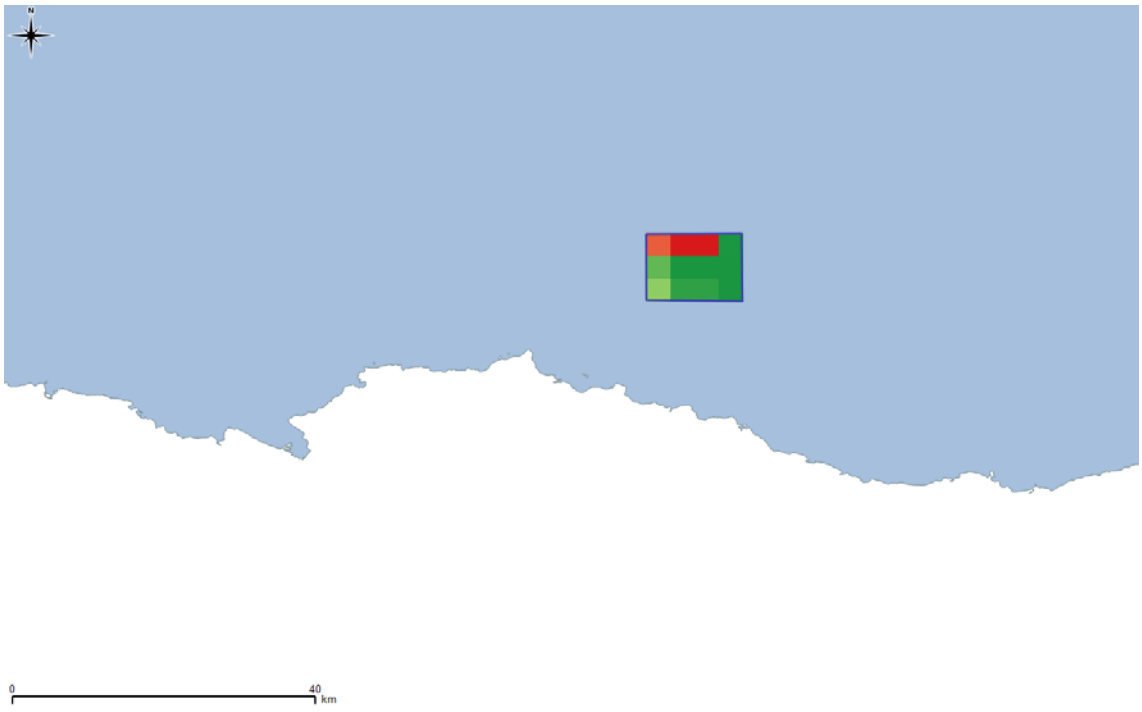
Within the processes available in Geoserver we have one available that is ras: cropCoverage, which allows us to cut a raster using a geometry as a cut layer. The configuration of the process in Geoserver is as follows:



This type of processing can be controlled by user selection and password.

The result in this case is a layer in raster format (tiff image) with the result of the cut made by those coordinates.



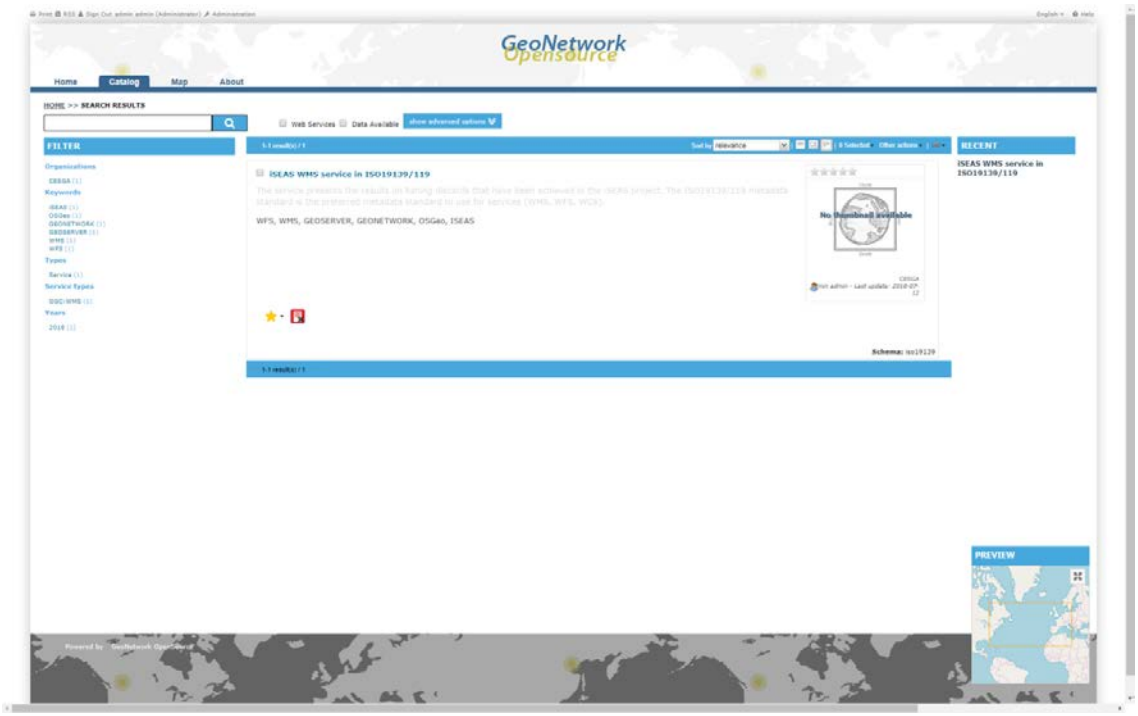


The process executes the trim of the result of the model that we have used that indicates the suitability of the fishing zones, with polygons of known coordinates in WKT format. The result of the WPS process is an image in geotiff format that can be downloaded in the client part.

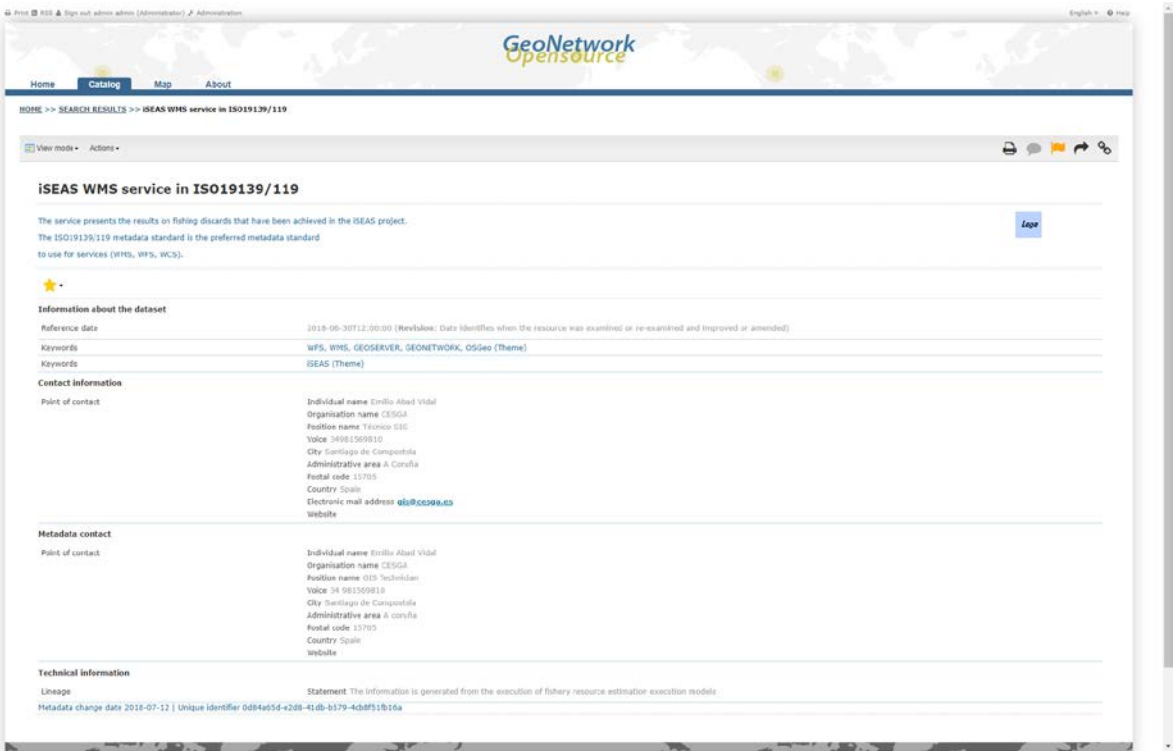
6.5. CSW service

Implementation of the CSW catalog service

The catalog service (CSW) allows the publication and search of the description (metadata) of data and web services, through a standard interoperable communication protocol that transmits the requests between client and server. Through this service it is possible to access and consult all available geographic resources.



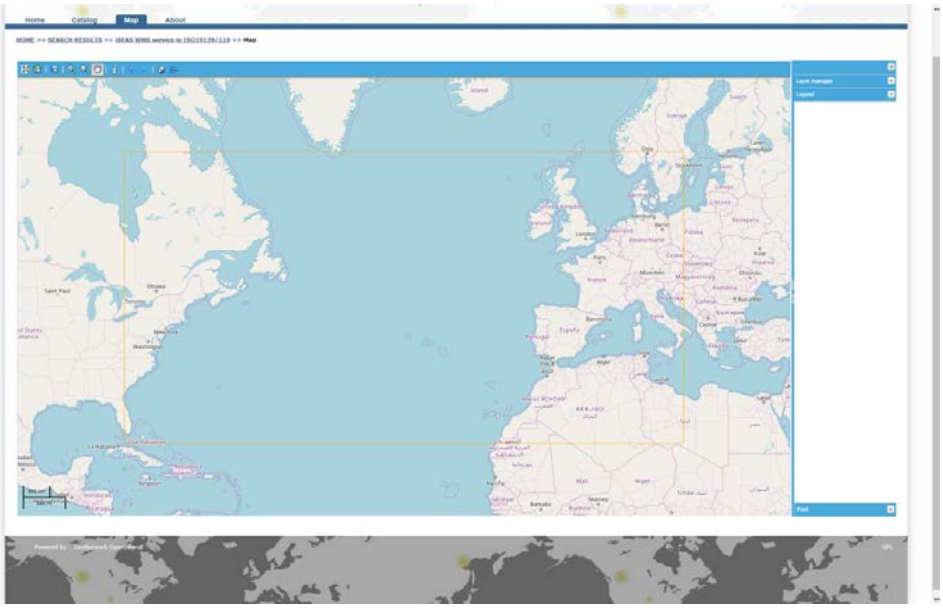
Metadata catalog

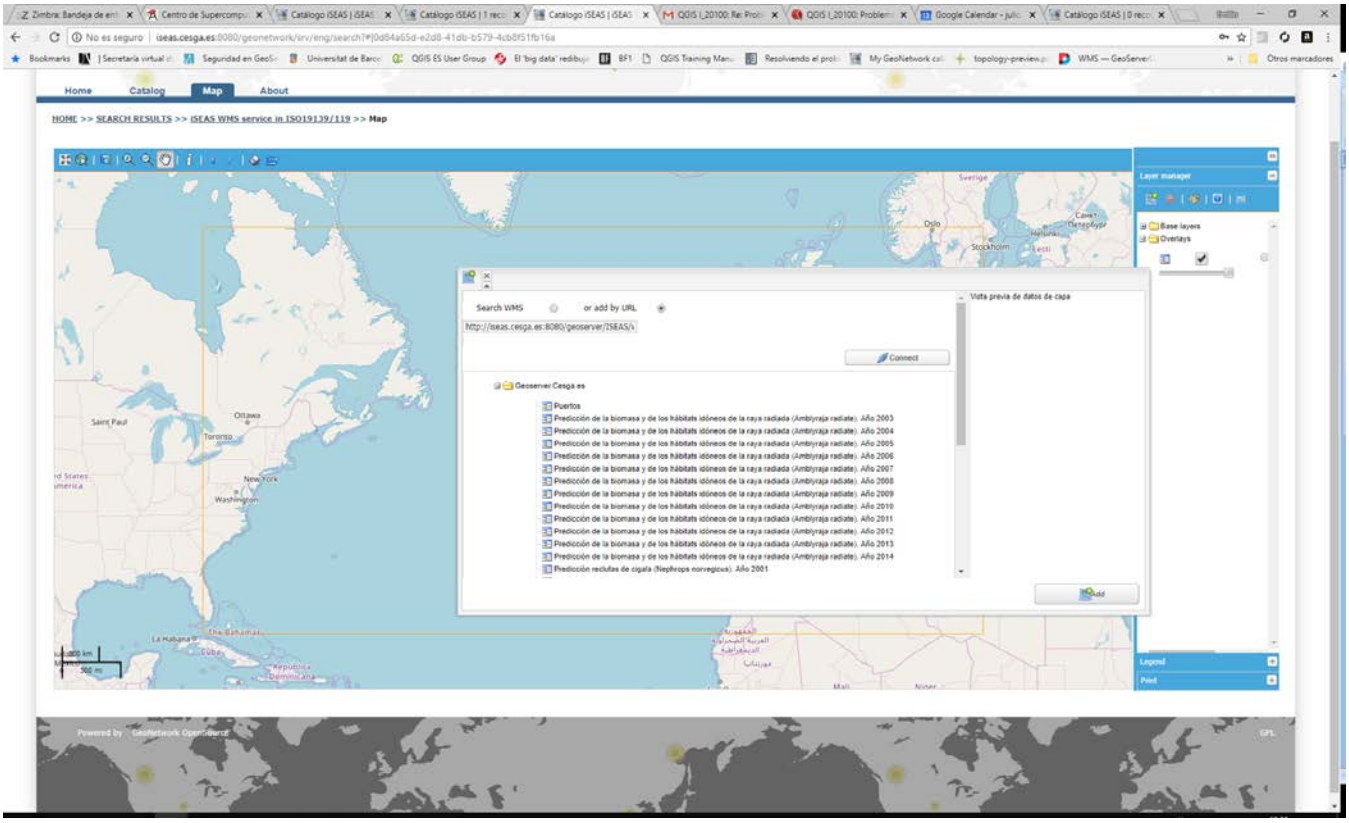


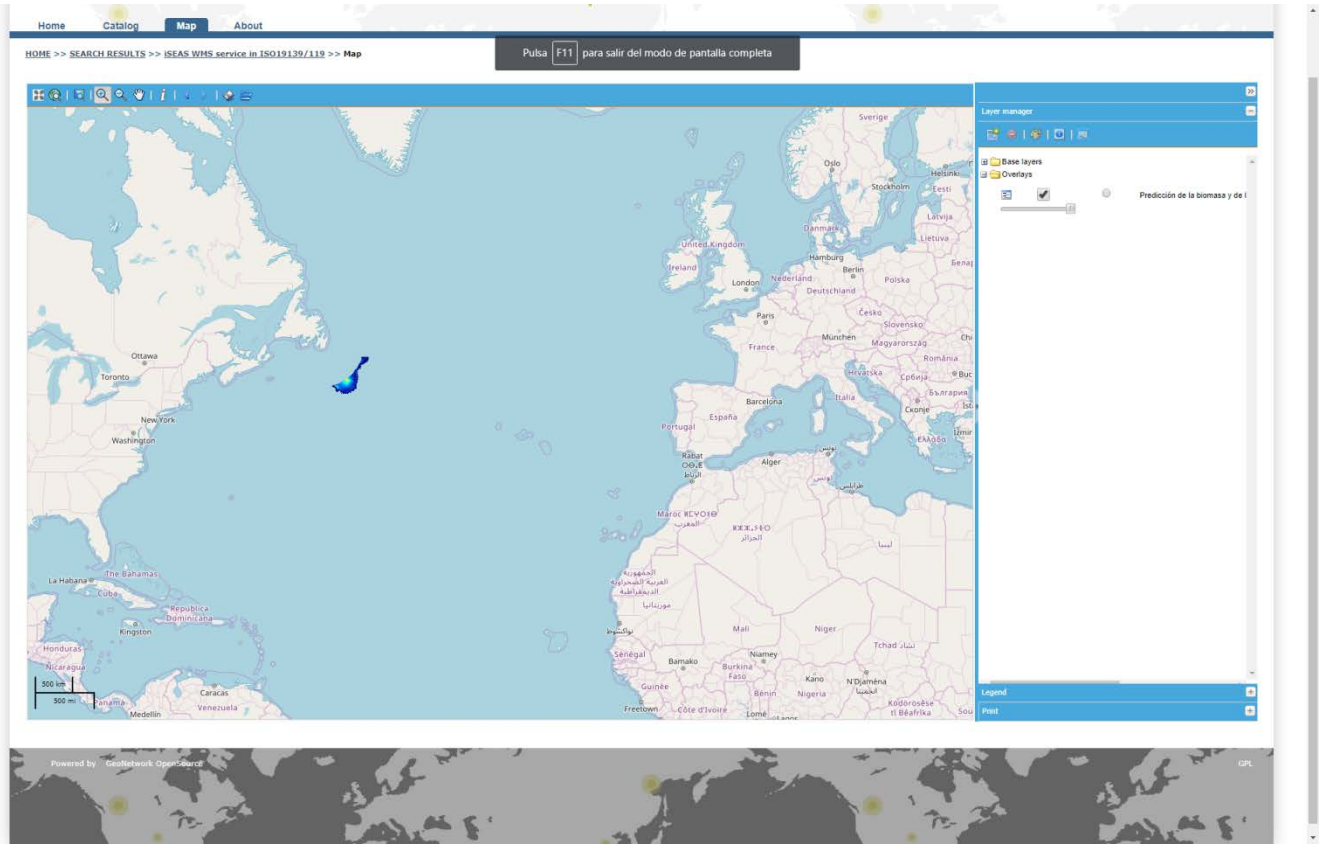
Metadata of iSEAS services

In the catalog service we find the metadata of the services displayed with the contact information, metadata and reference of the technical information

From the catalog itself you can access a webmap, from which you can load the services displayed.

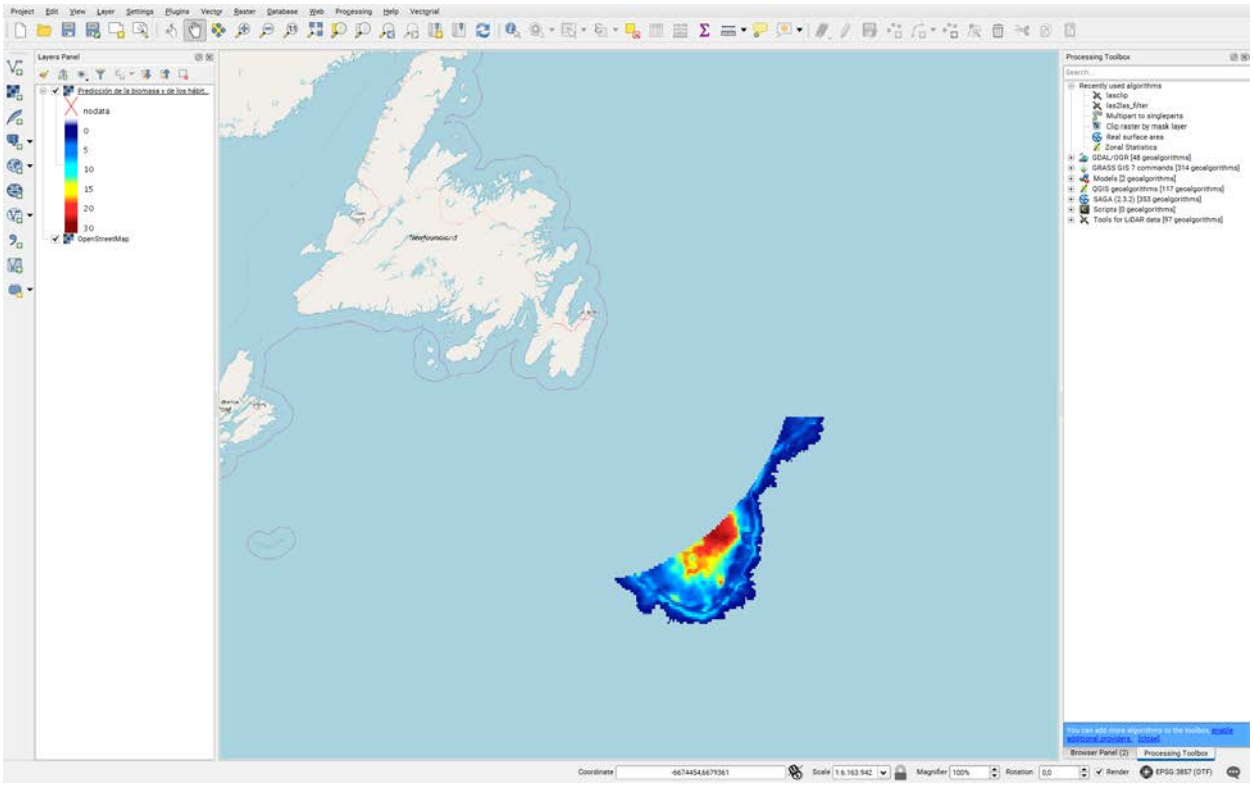



Home
Catalog
Map
About
HOME >> SEARCH RESULTS >> iSEAS WMS service in ISO19139/119 >> Map
Search WMS
or add by URL
Connect
Vista previa de datos de capa
Geoserver Cesga.es
Puertos
Predicción de la biomasa y de los hábitats idóneos de la raya radiada (Amblyraja radiate). Año 2003
Predicción de la biomasa y de los hábitats idóneos de la raya radiada (Amblyraja radiate). Año 2004
Predicción de la biomasa y de los hábitats idóneos de la raya radiada (Amblyraja radiate). Año 2005
Predicción de la biomasa y de los hábitats idóneos de la raya radiada (Amblyraja radiate). Año 2006
Predicción de la biomasa y de los hábitats idóneos de la raya radiada (Amblyraja radiate). Año 2007
Predicción de la biomasa y de los hábitats idóneos de la raya radiada (Amblyraja radiate). Año 2008
Predicción de la biomasa y de los hábitats idóneos de la raya radiada (Amblyraja radiate). Año 2009
Predicción de la biomasa y de los hábitats idóneos de la raya radiada (Amblyraja radiate). Año 2010
Predicción de la biomasa y de los hábitats idóneos de la raya radiada (Amblyraja radiate). Año 2011
Predicción de la biomasa y de los hábitats idóneos de la raya radiada (Amblyraja radiate). Año 2012
Predicción de la biomasa y de los hábitats idóneos de la raya radiada (Amblyraja radiate). Año 2013
Predicción de la biomasa y de los hábitats idóneos de la raya radiada (Amblyraja radiate). Año 2014
Predicción reclutas de cigala (Nephrops norvegicus). Año 2001
Add
Layer manager
Base layers
Overlays
Legend
Print
Powered by GeoNetwork OpenSource
GPL


Home
Catalog
Map
About
HOME >> SEARCH RESULTS >> iSEAS WMS service in ISO19139/119 >> Map
Pulsa F11 para salir del modo de pantalla completa
Layer manager
Base layers
Overlays
Predicción de la biomasa y de l
Legend
Print
Powered by GeoNetwork OpenSource
GPL

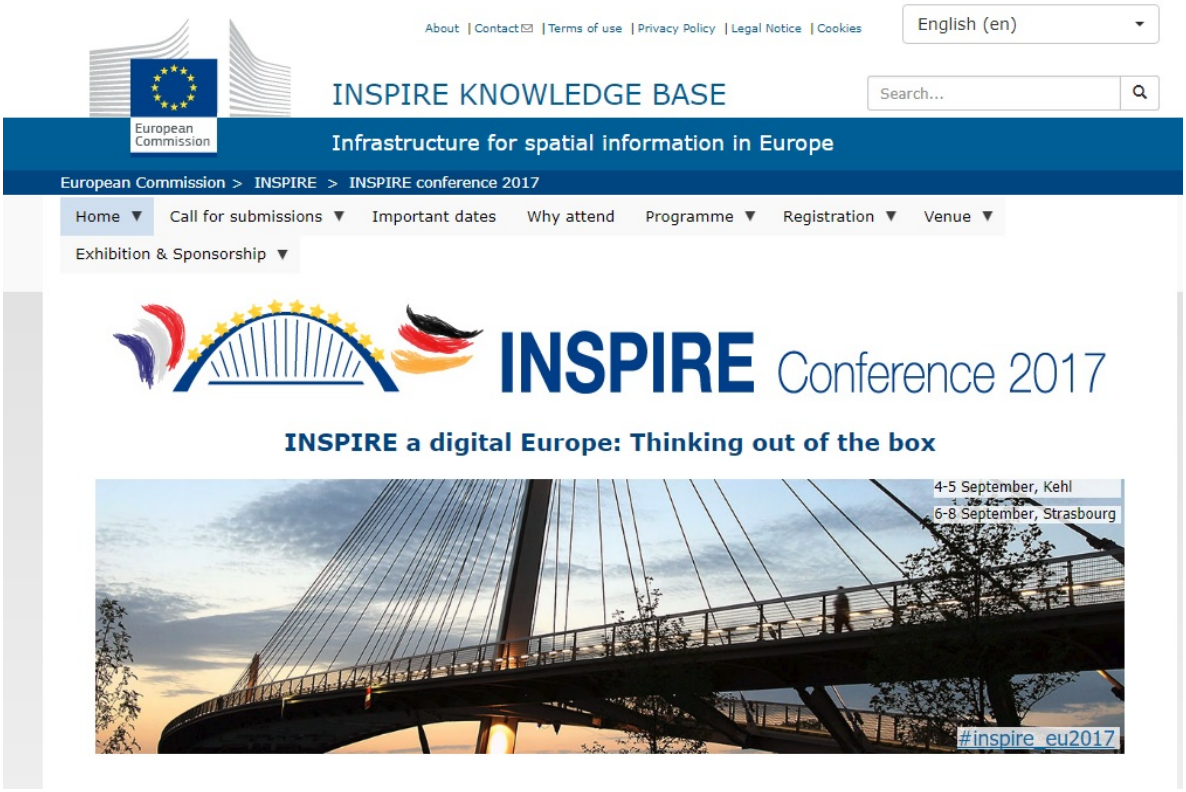
The different services are also accessible from a Geographical Information System, in the following example we can see the load of one of the services, for which the following tasks were necessary:

- The results of the prediction models of the radiata ray species, of the Pennatulacean Anthoptilum sp. in Flemish Cap., and of the ideal habitats for Nephrops conscripts. These models correspond to general models and calculations for different years. These layers have been prepared for inclusion within geoserver and served through the WMS geovisor and public services.
- The layers of information have been optimized to achieve greater performance in the availability of the layers, by creating pyramids and layering the layers at different levels.
- They have also created their own symbologies for each of the species, taking into account their inter-annual graduation and each year independently.



7. Presentations and congresses

"SDI to improve Efficiente Fishing: LIFE iSEAS Project". Presentation at the INSPIRE 2017 conference. September 2017 Strasbourg, France



INSPIRE 2017

"Implementation of an SDI in the LIFE iSEAS project". VIII Iberian Conference on Spatial Data Infrastructures. November 2017. Lisbon, Portugal

VIII Iberian SDI 2017

"Innovative tools for the management and reduction of Fishing Discards". Presentation at CESGA. February 2018.

Proyecto iSEAS

iSEAS

HERRAMIENTAS INNOVADORAS PARA LA GESTIÓN Y REDUCCIÓN DE DESCARTES PESQUEROS

Proyecto iSEAS: El objetivo principal del proyecto LIFE iSEAS es demostrar que, en términos de indicadores biológicos y socioeconómicos, es posible un escenario sostenible en las pesquerías de la UE. Este objetivo podrá conseguirse mejorando la implantación de los conocimientos existentes y las soluciones innovadoras para la reducción y gestión de los descartes pesqueros. *http://lifeiseas.eu/*

Objetivo de la Jornada:

- Presentación de la herramienta RED-BOX para la obtención a bordo de datos espacio-temporales sobre descartes en las áreas pesqueras de interés.
- Presentación del Geoportal de gestión de datos de descartes para la optimización de la actividad pesquera y la gestión de los recursos marinos.

Fecha: 08.02.18

Lugar de celebración:

Centro Tecnolóxico de Supercomputación de Galicia (CESGA)
Avenida de Vigo, s/n -Campus Sur-
15705 Santiago de Compostela
https://goo.gl/maps/wqN6DQ5EueH2

Inscripción: Asistencia gratuita por riguroso orden de inscripción vía web, indicando nombre e institución en el siguiente enlace:

http://www.cetmar.org/seminarios/iSEAS2018/

CSIC CESGA opromar INSTITUTO ESPAÑOL DE OCEANOGRAFÍA USC GRUPO JOSMAR CETMAR

CESGA Presentation

“Spatial Data Infraestructure technologies applied in LIFE iSEAS project to improve Efficient Fishing”. MARTEC18, May 2018.

MARTEC18