



MINOUW

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Science, Technology, and Society Initiative to Minimize Unwanted Catches in European Fisheries

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Deliverable 5.1 Stakeholder-based data collection
programmes**

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RESEARCH & INNOVATION

ID♦634495

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1. Introduction and objectives.

This document describes the complete information technological system (IT) developed and implemented to monitor catches and discards in the Minouw project by means of a smartphone application (herein after App) running on Android systems, backed up by a web-based application to host the necessary databases. The system was developed by QUADRALIA, an IT company specialised in software development, under contract to Beneficiary 4 (WWF).

The general objective of this App is to devise technological solutions to control and monitor compliance in the context of the landings obligation.

Though the use of this App, the obtained results will help increase the level of control, compliance and enforcement of rules by the fishermen. Further, it will incentivise self-monitoring. Self-monitoring will include community-based data collection programmes, designed and implemented in pilot studies, involving fishers, scientists, NGOs and administrations.

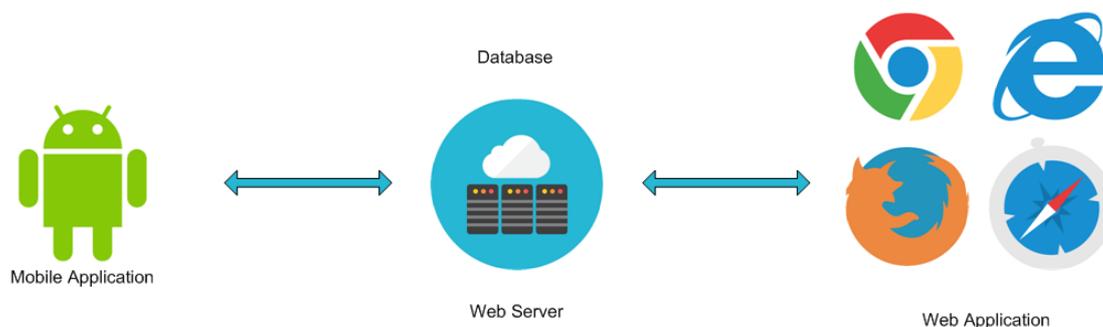
Involving fishers in self-monitoring will facilitate compliance in terms of effectiveness and policy costs.

2. Minouw project

2.1. Architecture

The system architecture is a model with centralized information in a database located in a data center. 2 main systems are distinguished:

- **Android application.** The purpose of the Android application is that the users can collect digitally relevant information from their fishing trips, including positioning information using the GPS mobile device.
- **Web application.** The purpose of the Web application is manage the master data that will be handled by the application.



2.2 Mobile application

The purpose of this application is that the users can collect digitally relevant information from their fishing trips, including positioning information using the GPS mobile device.

The application has been developed for devices with Android (Android 4.4 and upper) operating system and with GPS enabled.

2.2.1. Position

The Android devices, equipped with GPS, can store the sequence of positions automatically in the database of the device, after starting the application.

It is not possible directly to record the speed on the mobile device, because the device only takes a position on a temporary moment; but since the speed is the ratio of the distance and time it would be possible to compute the speed, since it is possible to calculate the distance between two points and the time that has elapsed for the ship to reach from one point to another.

2.2.2. Languages

The mobile application has been developed in the following languages: English, Spanish, Italian, Catalan, Portuguese and Greek. The translations has been provided by the coordinators of the countries belonging to the MINOUW project in Southern Europe waters.

2.2.3. Transmission of the information

Once the smartphone is in a coverage area (3G and/or Wi-Fi), the information managed by the mobile application can be sent to the server described in the chapter "2.4 2.4. Web and database server", where it is stored for later use. We have to force the transmission manually ("synchronization").

2.2.4. Usability

The interface is simple and intuitive, due the application is designed to allow fishermen to enter information on board and during the fishing day.

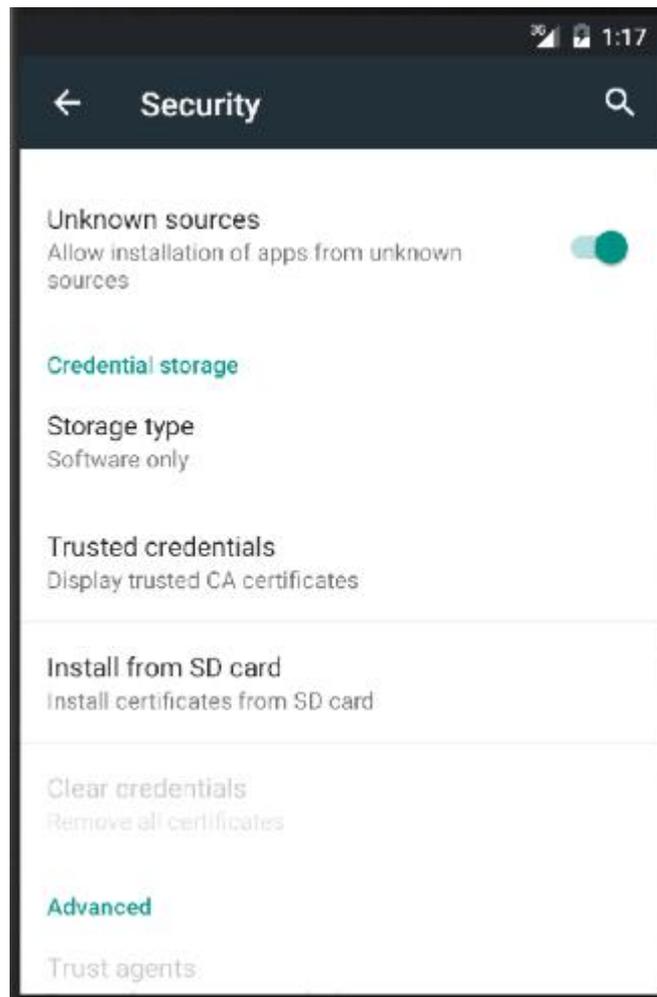
2.2.5. Installation

The Android App can be downloaded by individual users from the next link <https://minouw.com/download>.

2.2.5.1. How to install the Android application

The user needs to specifically instruct the Android device to be able to install unsigned / non-market apps, following the steps:

Settings > Security > Unknown Sources



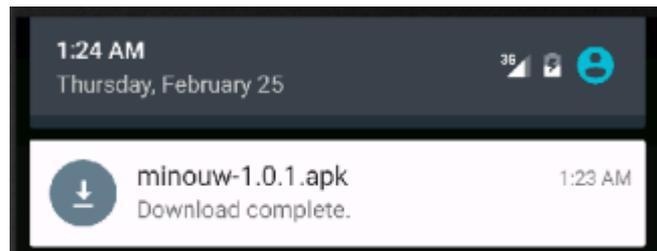
and checking "Allow installation of apps from unknown sources"

Then the Android App can be downloaded to the Android device from the previous link.

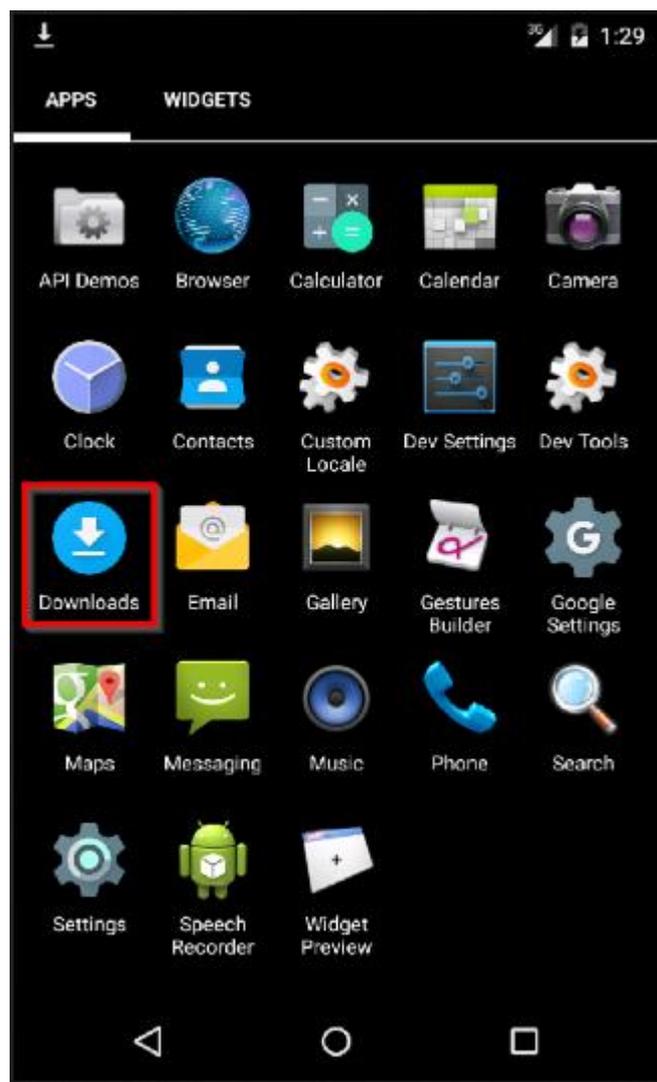
The download starts. The download status is shown in the top-left of the screen.



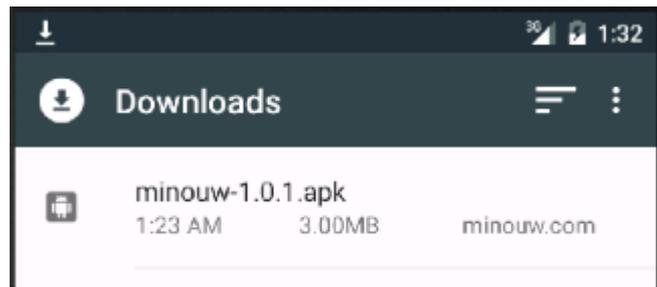
By touching in the arrow the status of the download process can be seen.



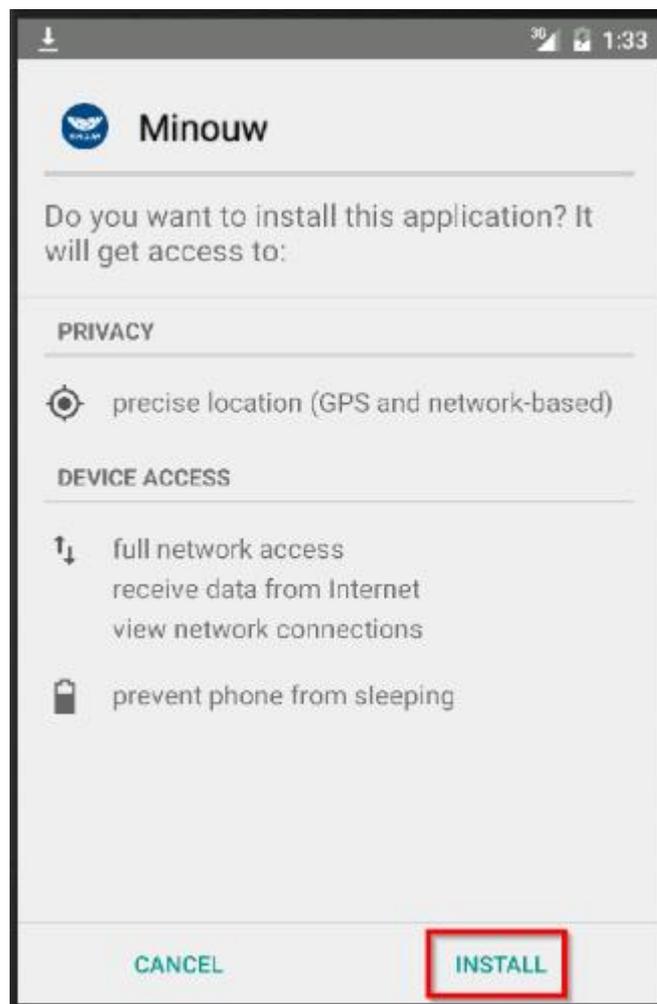
After the download has finished, to the MINOUW app can be found in the "Downloads" folder.



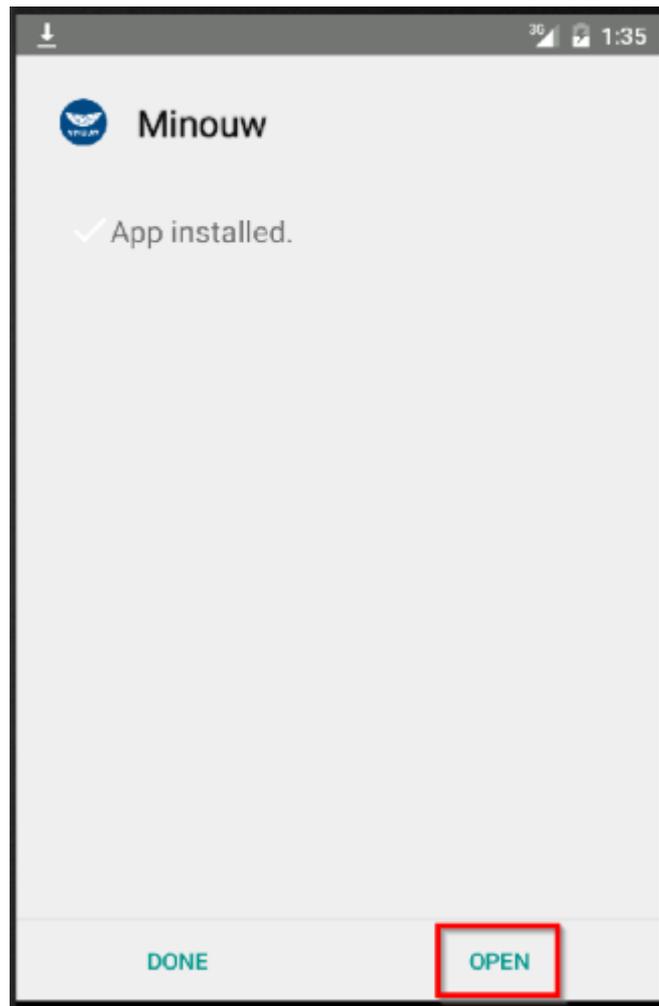
The installation is initiated by selecting the minouw-1.x.x.apk icon in the "Downloads" folder



and then touching the "Install" button



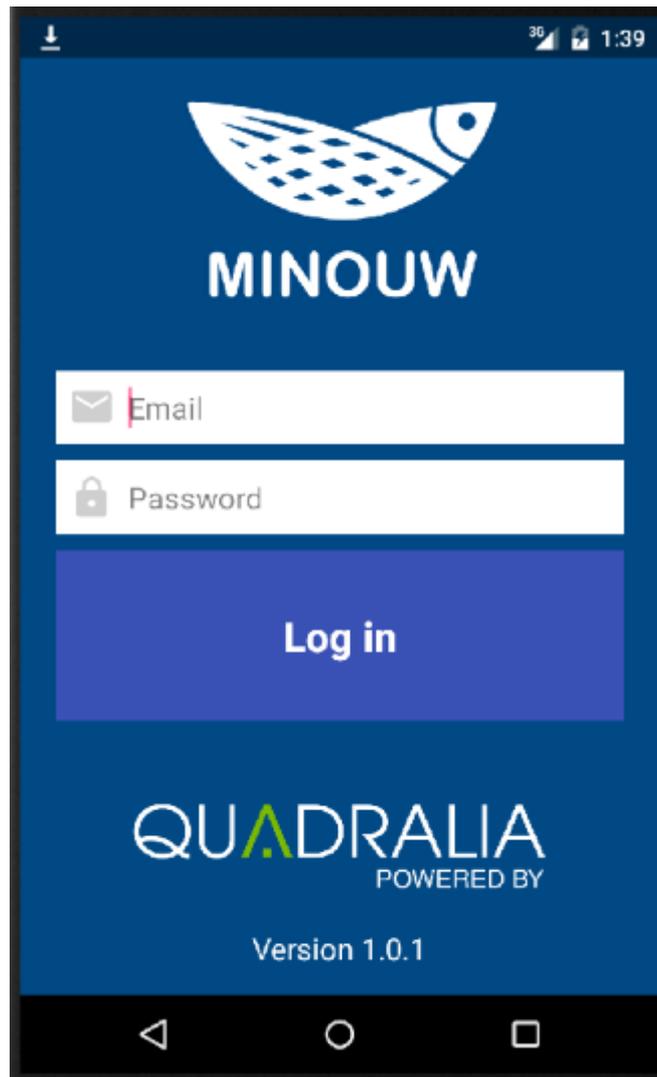
After the installation has finished, the Minouw app can be opened by touching the "Open" button



or touching the app icon in the launcher.



And the Minouw application starts.



After the app installation has finished, the installation of application from unknown sources should be disabled.

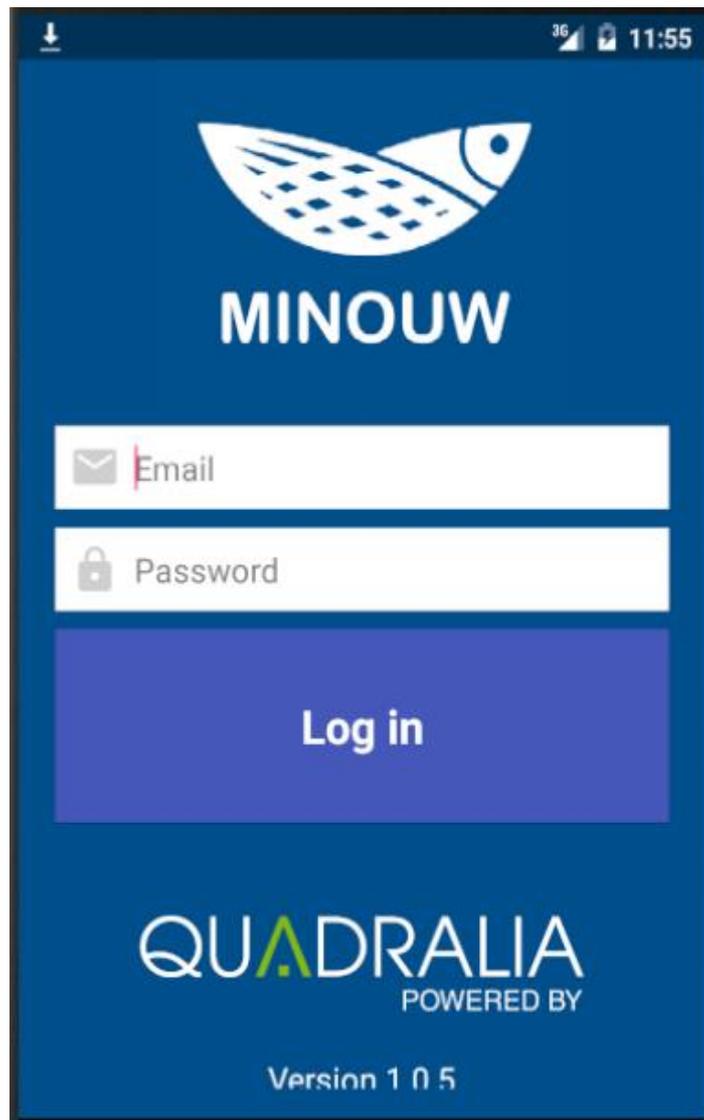
2.2.7 Access to the Android application

Each coordinator has to create and manage the users that can access the Android application.

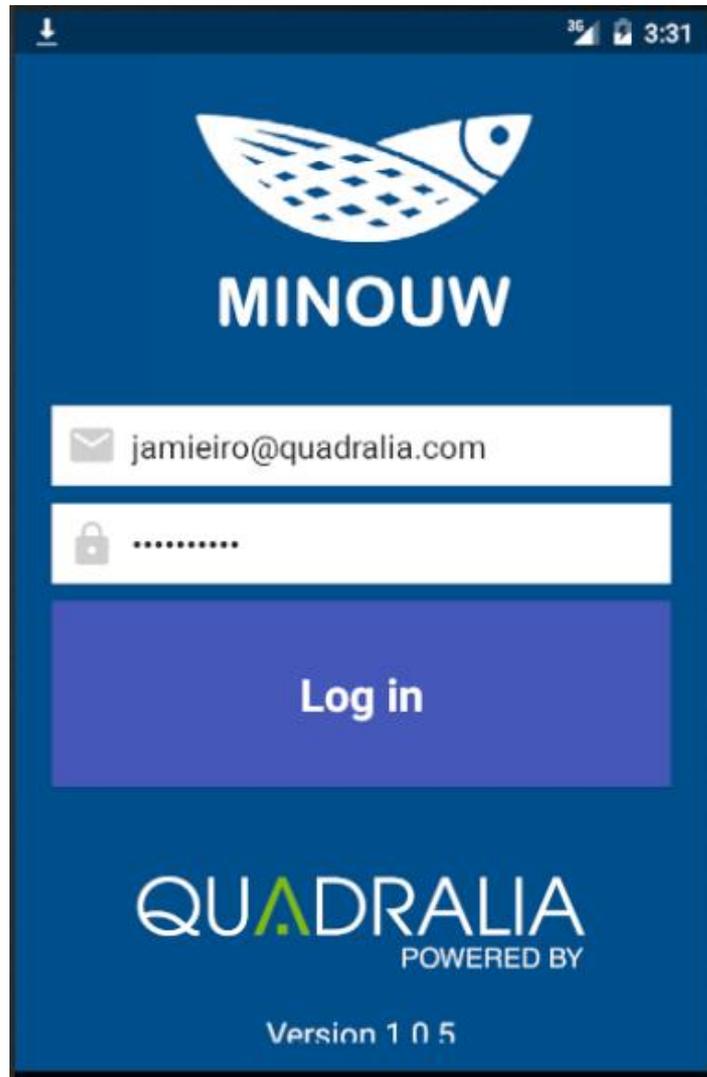
After installing and launching the Android application, the splash screen appears while the application is loading.



After the application has loaded, the user can log in.

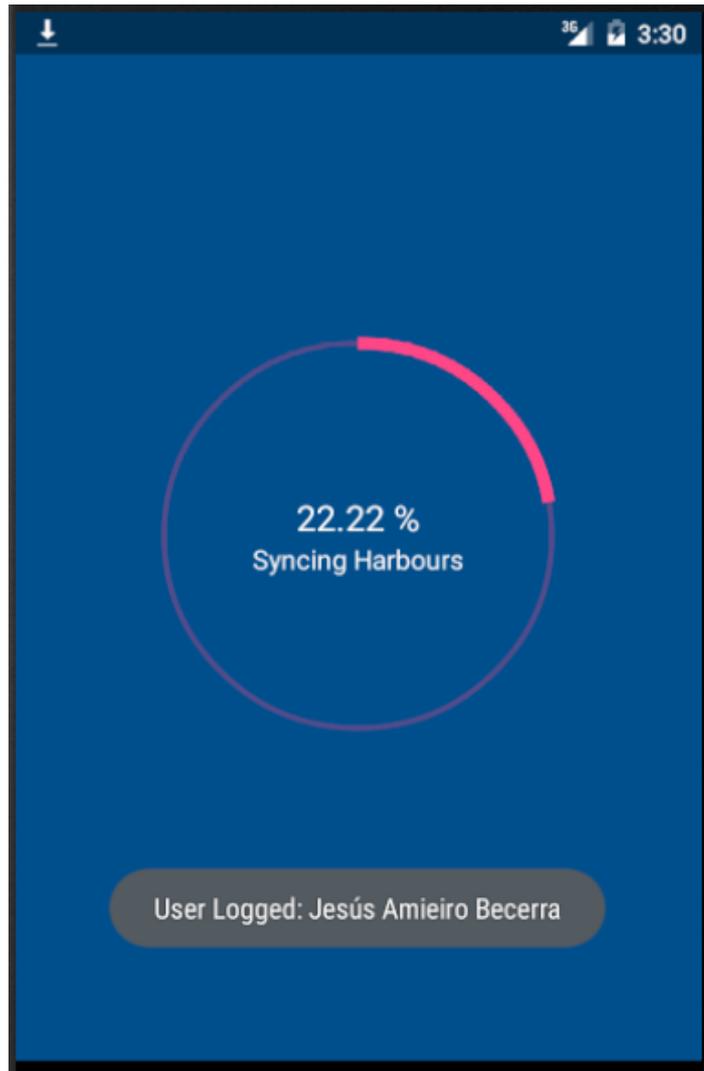


to the user needs to introduce the email and the password granted by the coordinator of the case study and touch the “Log in” button.

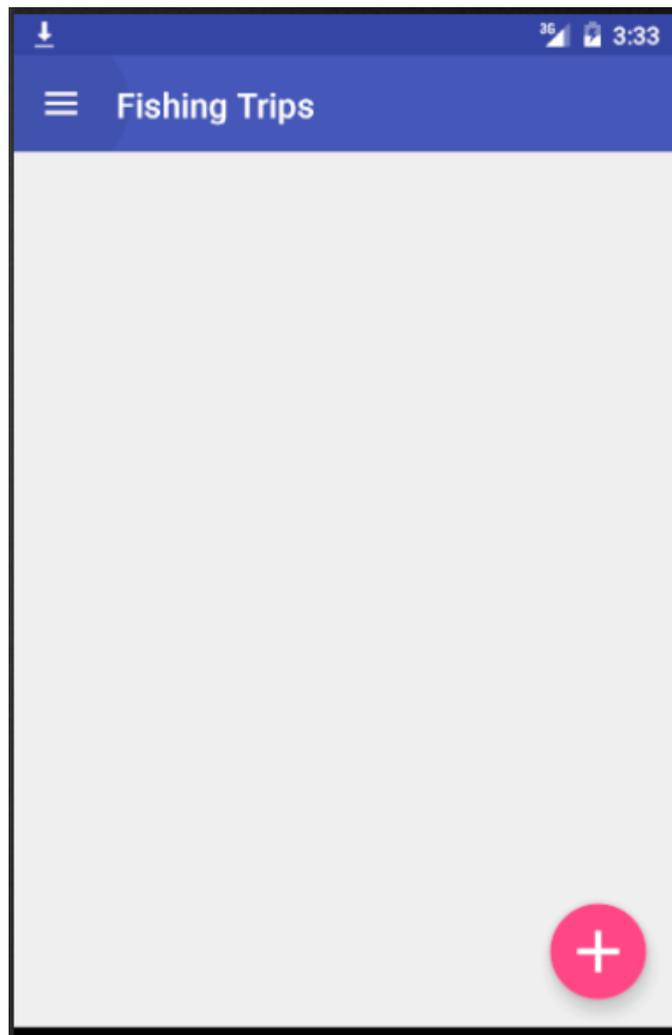


2.2.8. First steps

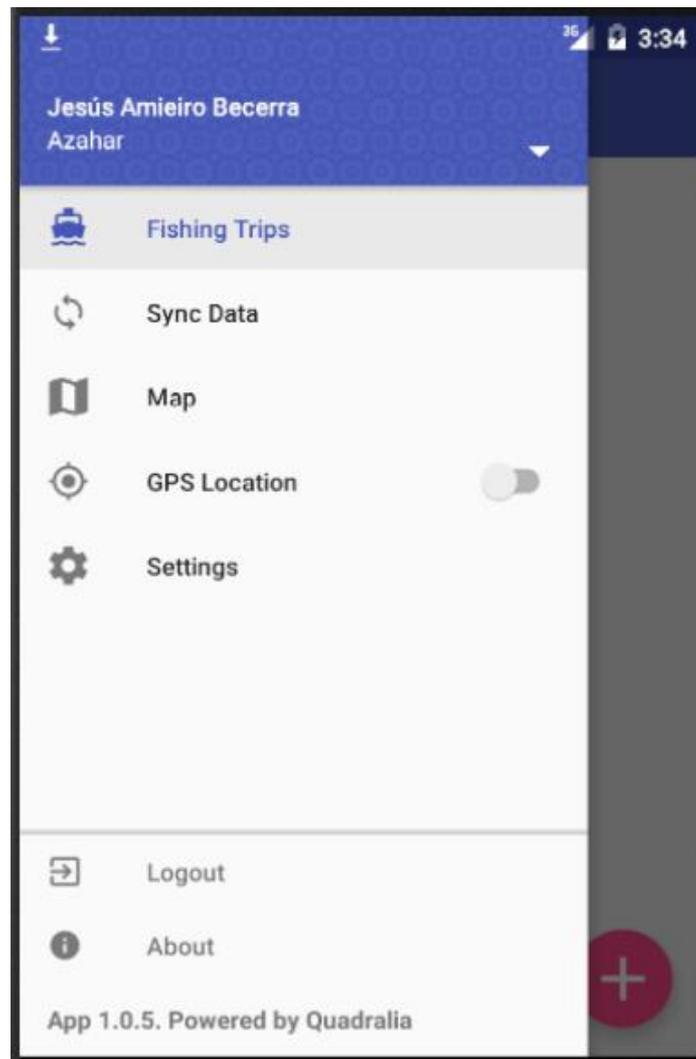
After logging into the application, the application automatically synchronizes the data (up to the database and down to the Android device) with the webserver through a REST API.



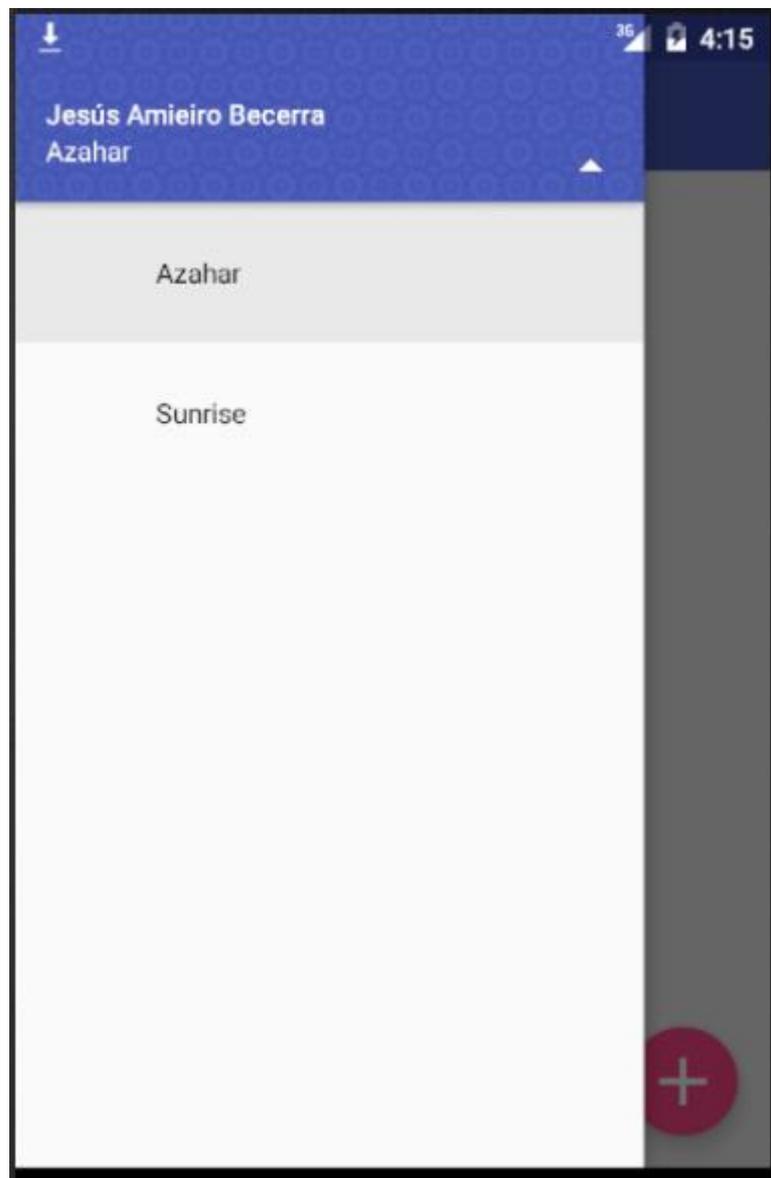
After synchronization, the user can start to insert new data.



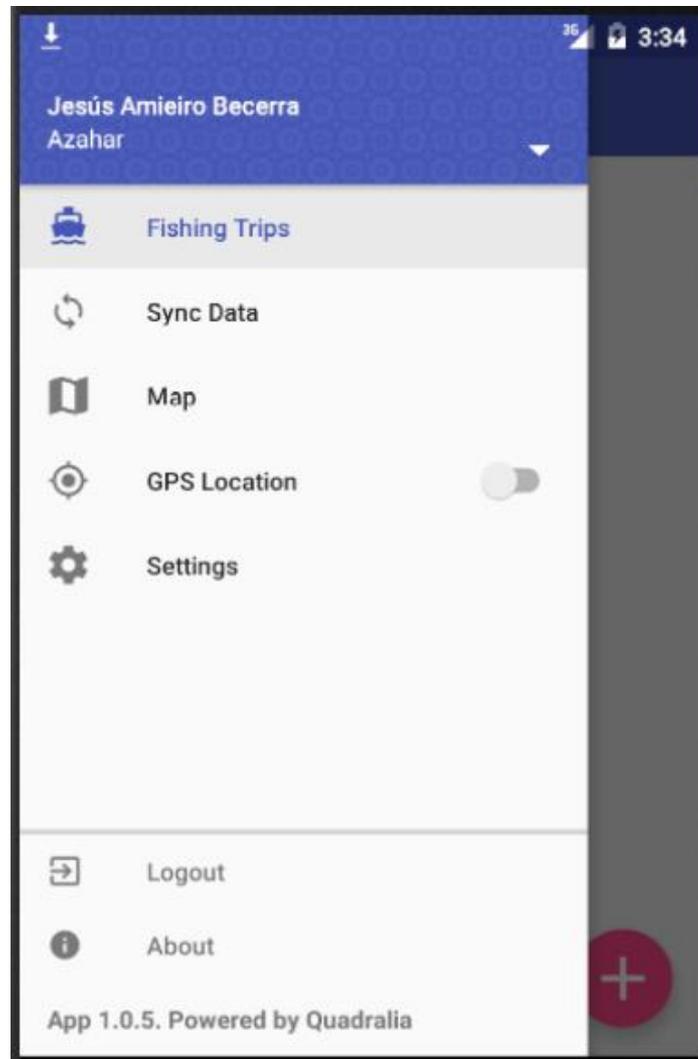
In the top left menu the user can adjust some parameters:



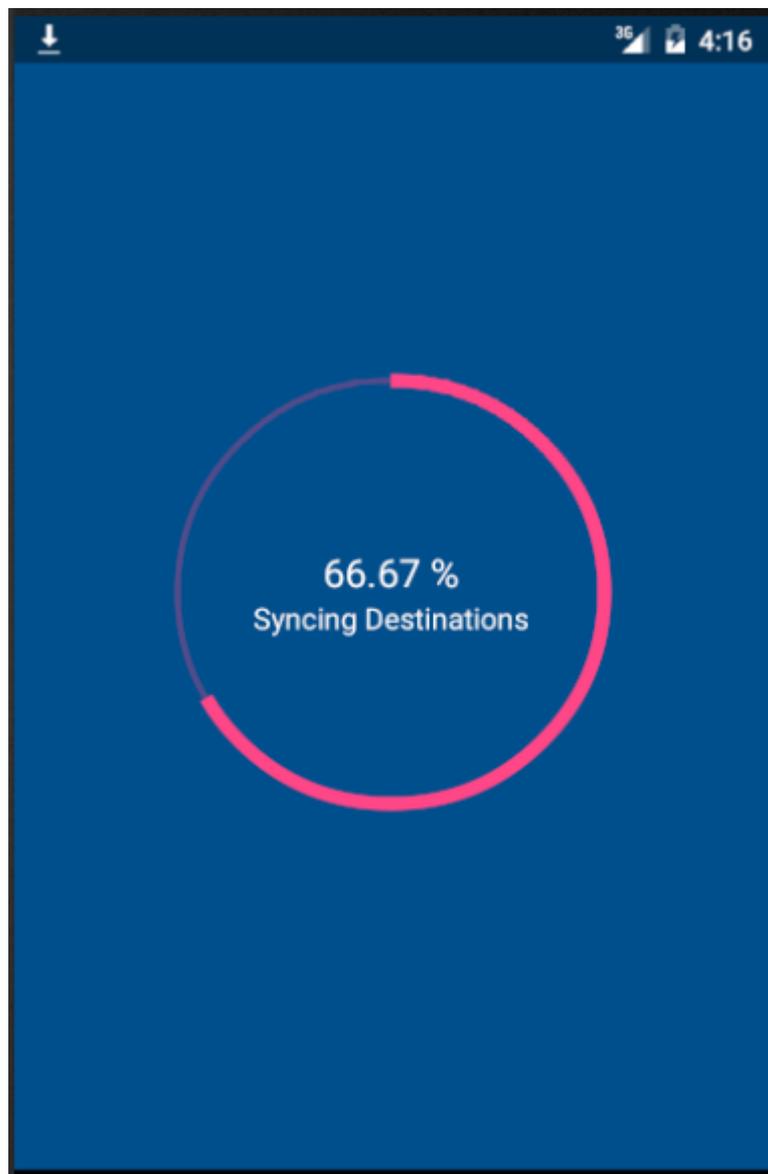
T Each user can select from 1 or more vessels allocated by the case-study coordinator corresponding to the current fishing vessel.



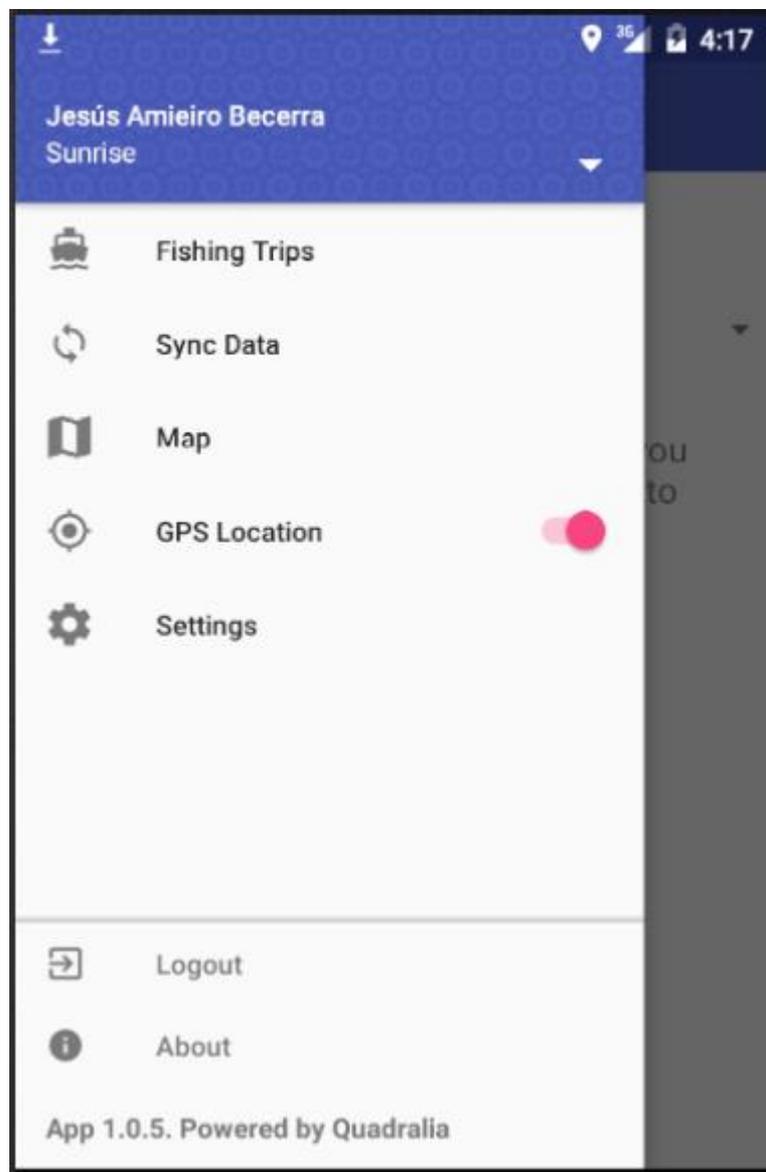
Touching the “Fishing Trips” option allows the user to manage the fishing trips. This option is described in more depth in section “2.2.8 2.2.9. Information managed by the mobile application”



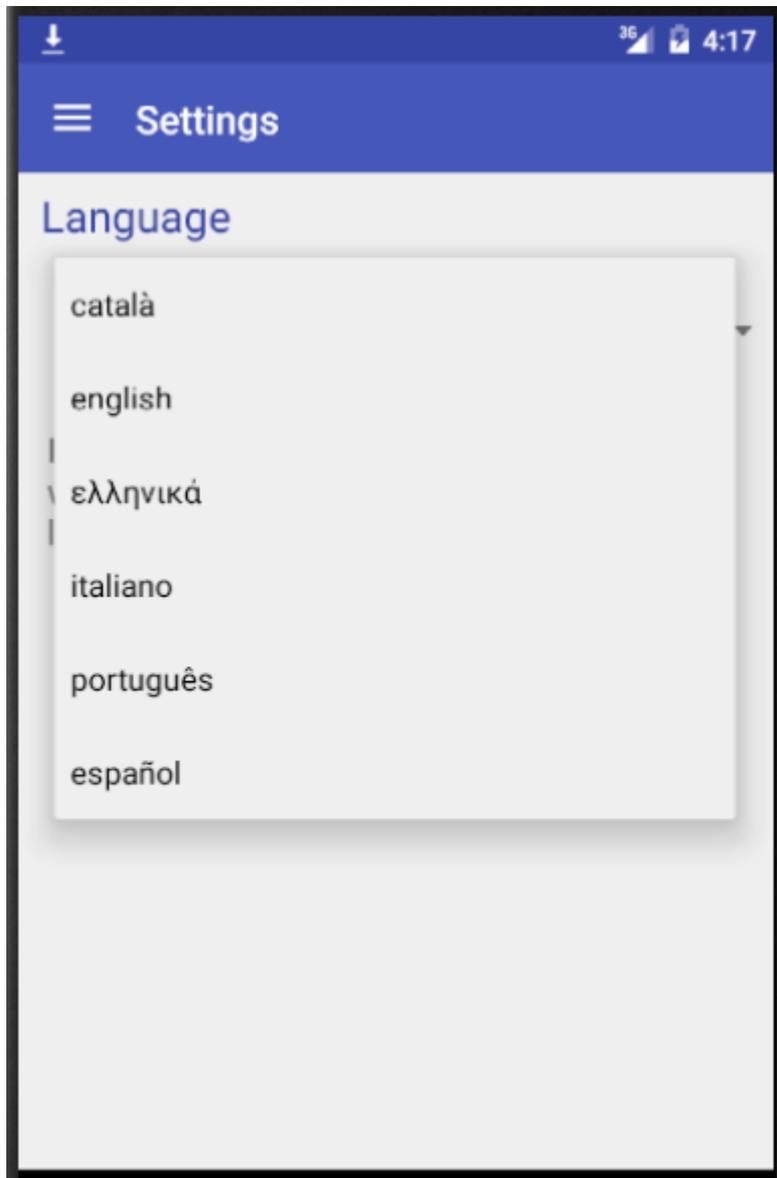
Touching in the “Sync data” option synchronization (up and down) of the mobile data with the webserver takes place.



Touching in the “GPS Location” enables GPS tracking.



Touching in the “Settings” option the mobile application language can be changed.



Touching in the “About” option shows the Research an Innovation Programme that has funded the Minouw project.



2.2.9. Information managed by the mobile application

The introduction of data in the mobile application has a nested structure:

- First, add a fishing trip, only once, at the beginning of the fishing journey.
- In this fishing trip, multiple hauls can be added.
- For each haul multiple catches can be introduced.

Below it is detailed the information managed.

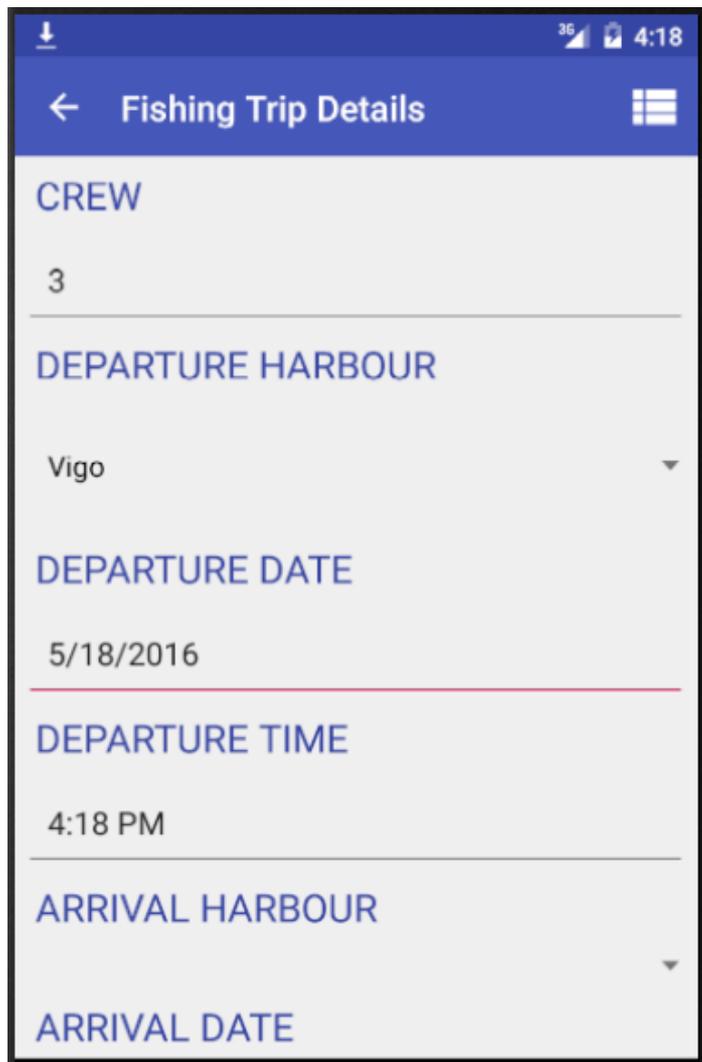
2.2.9.1. Fishing trip

Touching in the pink “Add button” placed at the bottom, a new fishing trip is added.



The data managed are:

- Crew number.
- Departure harbour (drop down).
- Departure date. By default selects the current day.
- Departure time. By default selects the current time.
- Arrival harbour (drop down).
- Arrival date.
- Arrival time.



The screenshot displays a mobile application interface for 'Fishing Trip Details'. The title bar is blue with a back arrow on the left and a menu icon on the right. The status bar at the top shows a signal strength indicator, '3G', a battery icon, and the time '4:18'. The main content area is light gray and contains several fields, each with a blue title and a value below it, separated by horizontal lines. The fields are: 'CREW' with the value '3'; 'DEPARTURE HARBOUR' with the value 'Vigo' and a downward arrow; 'DEPARTURE DATE' with the value '5/18/2016'; 'DEPARTURE TIME' with the value '4:18 PM'; 'ARRIVAL HARBOUR' with a downward arrow; and 'ARRIVAL DATE' with a downward arrow.

Field	Value
CREW	3
DEPARTURE HARBOUR	Vigo
DEPARTURE DATE	5/18/2016
DEPARTURE TIME	4:18 PM
ARRIVAL HARBOUR	
ARRIVAL DATE	

2.2.9.2. Hauls

Touching in the “List button” placed at the top right in the “Fish trip details” screen, the haul management can be accessed.

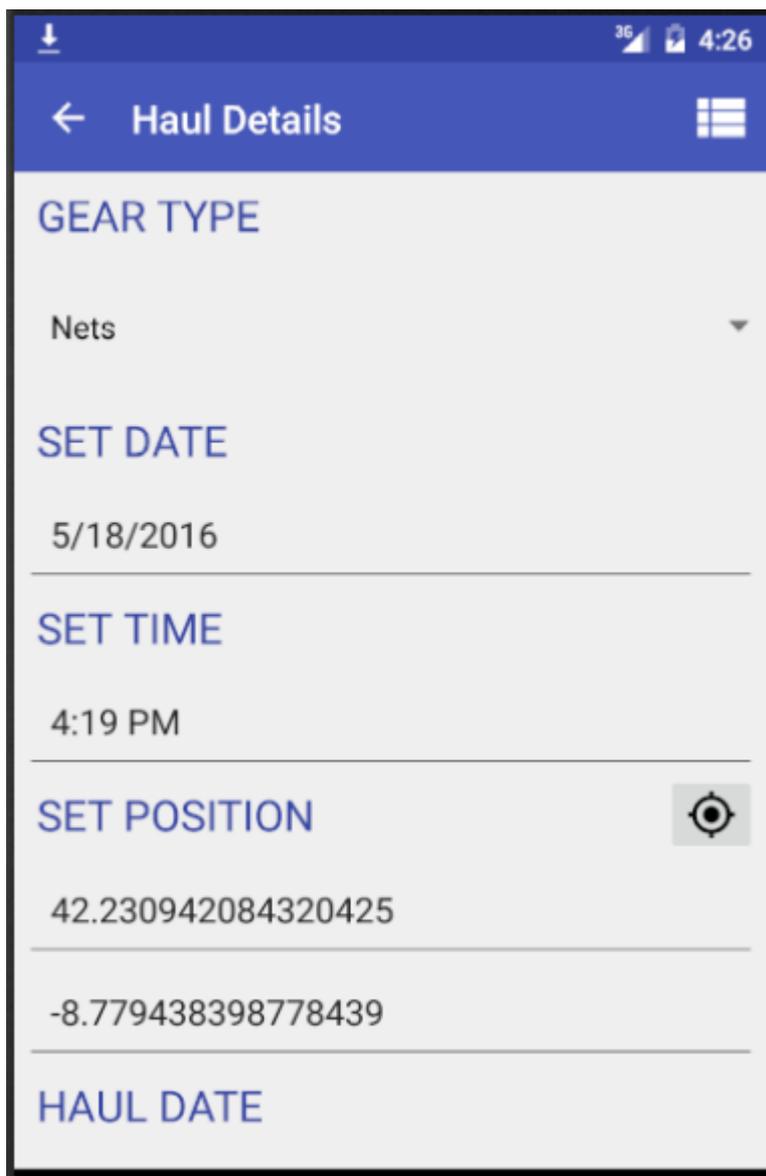
Touching in the pink “Add button” placed at the bottom, a new haul can be added.



The data managed are:

- Gear type (drop down).
- Set date. By default selects the current day.
- Set time. By default selects the current time.

- Set position.
- Haul date.
- Haul time.
- Haul position.
- Surface temperature (°C).
- Bottom type (drop down).
- Total catch estimation (Kg).
- Catch with commercial value (%).



↓ 3G 4:26

← Haul Details

GEAR TYPE

Nets

SET DATE

5/18/2016

SET TIME

4:19 PM

SET POSITION

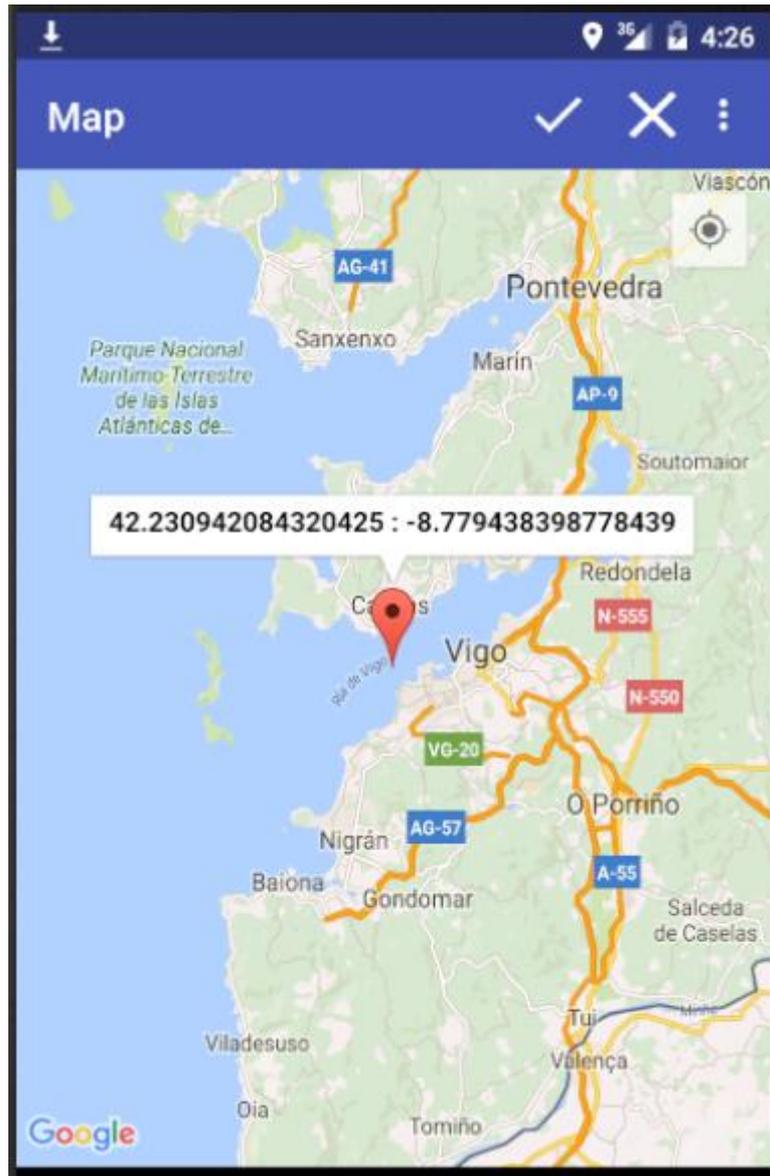
42.230942084320425

-8.779438398778439

HAUL DATE

The set position and haul position can be established with 2 methods:

- Entering the longitude and latitude with the numeric keyboard.
- Using the map showed in the next screenshot.



2.2.9.3. Catches

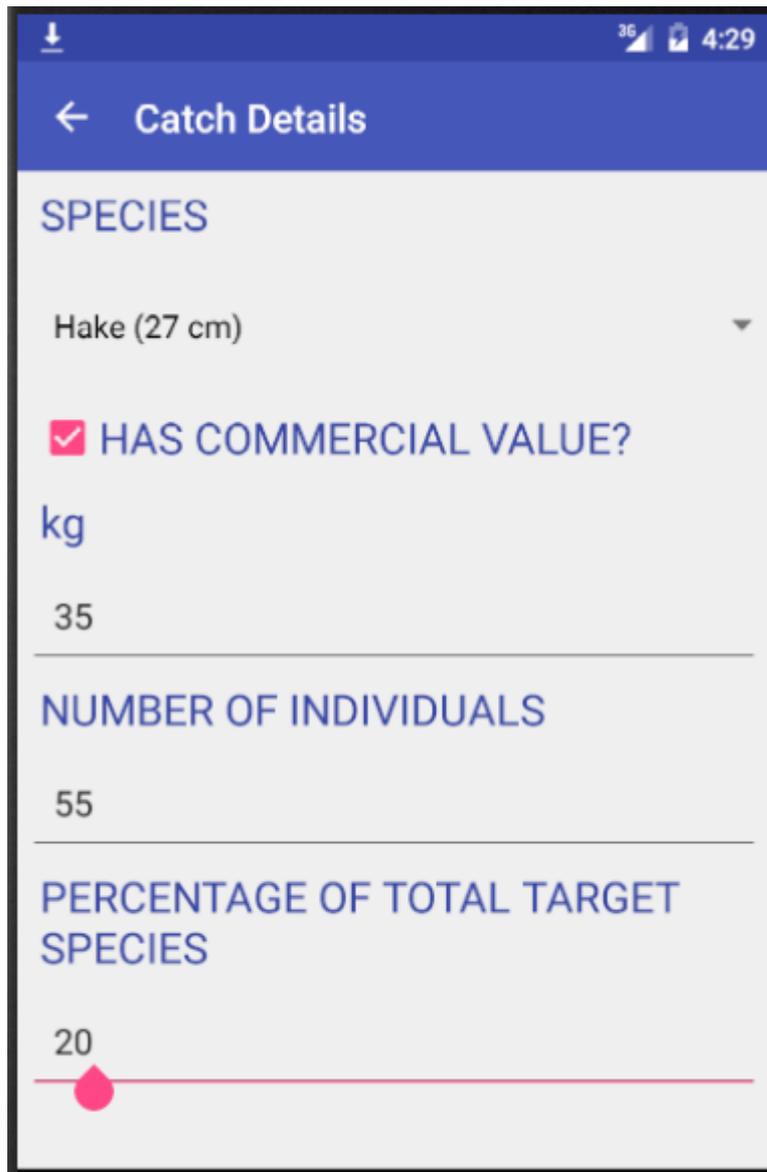
Touching in the “List button” placed at the top right in the “Haul details” screen, catches management can be accessed.

Touching in the pink “Add button” placed at the bottom a new catch category in the haul can be accessed.



The data managed are:

- Species.
- Its commercial value. It is a binary field: Yes / No.
- Reasons for discarding if it hasn't commercial value.
- Kg.
- Number of individuals.
- Percentage of total target species.



The screenshot shows a mobile application interface for 'Catch Details'. The status bar at the top indicates 3G connectivity, battery level, and the time 4:29. The app title is 'Catch Details' with a back arrow. The form contains the following fields:

- SPECIES**: Hake (27 cm)
- HAS COMMERCIAL VALUE?**
- kg**: 35
- NUMBER OF INDIVIDUALS**: 55
- PERCENTAGE OF TOTAL TARGET SPECIES**: 20

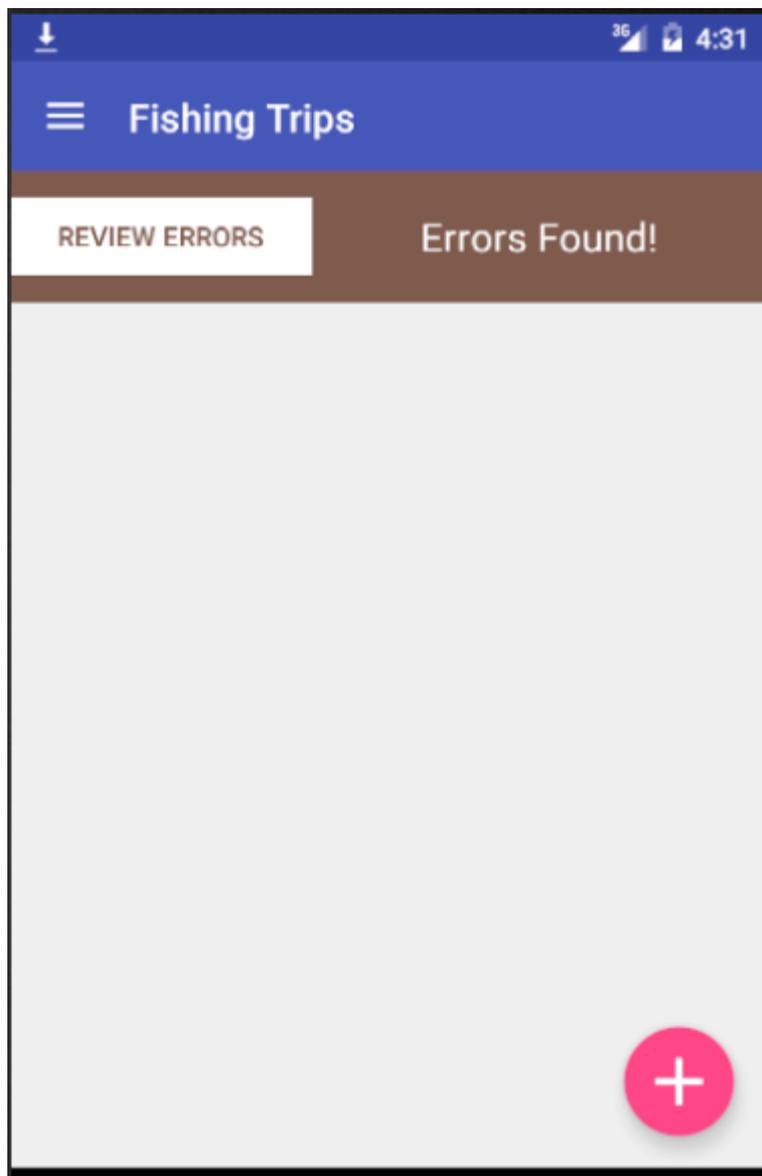
A red slider control is visible at the bottom of the 'PERCENTAGE OF TOTAL TARGET SPECIES' field, with a red dot indicating the current value of 20.

2.2.10. Syncing the data

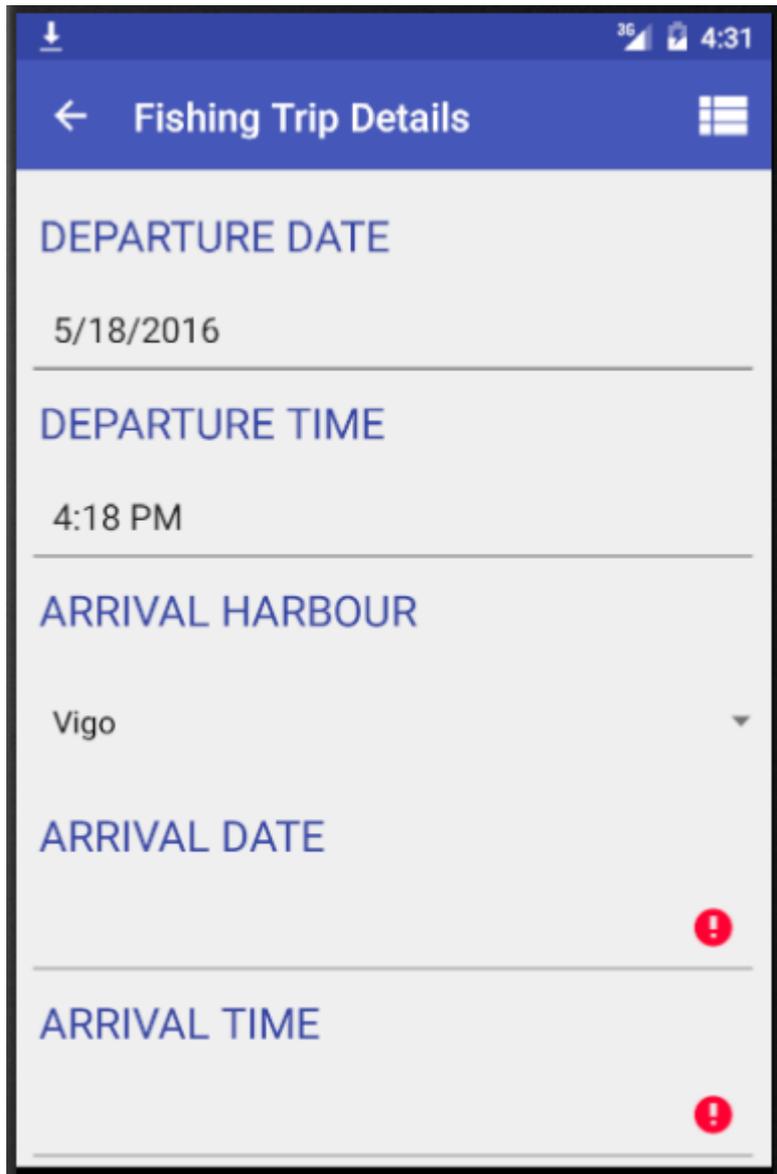
After the data has been acquired, the data can be sent to the webserver. Before, we have to review the “fishing trip” and close it.

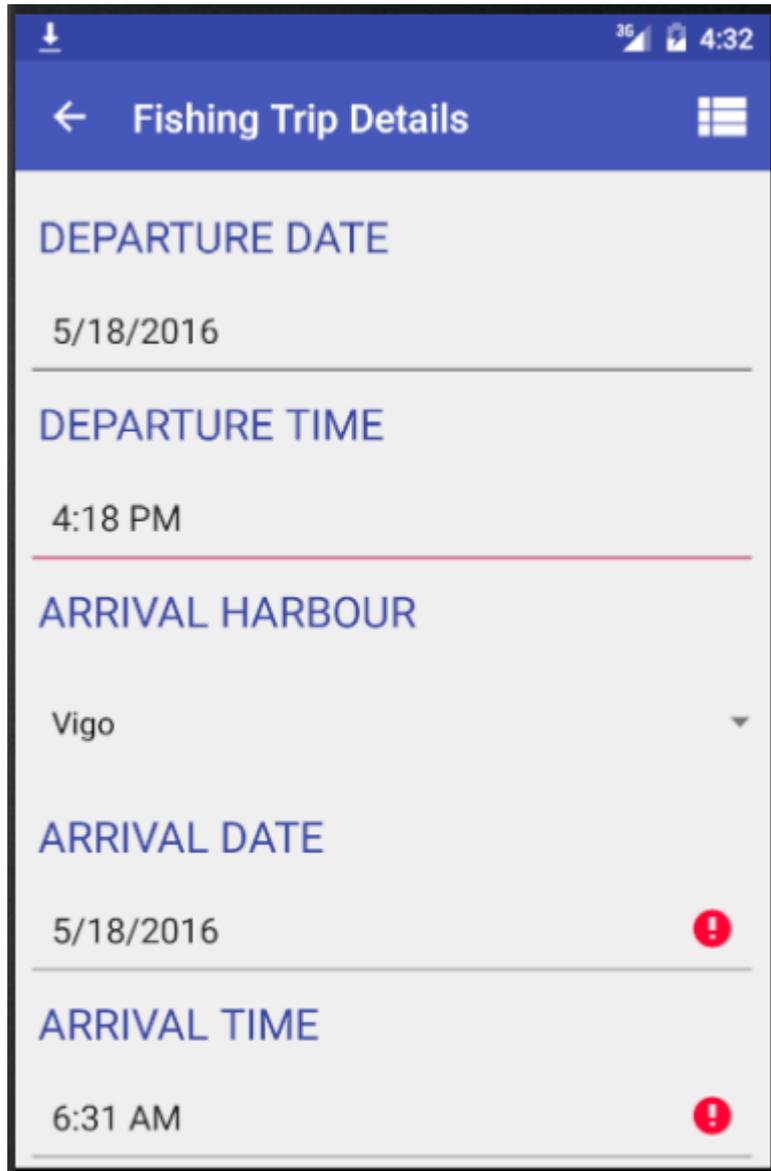


scrolling down the rows to the right allows to review the fishing trips entered. If the application found any error, the button “Review errors” allows to review the item.

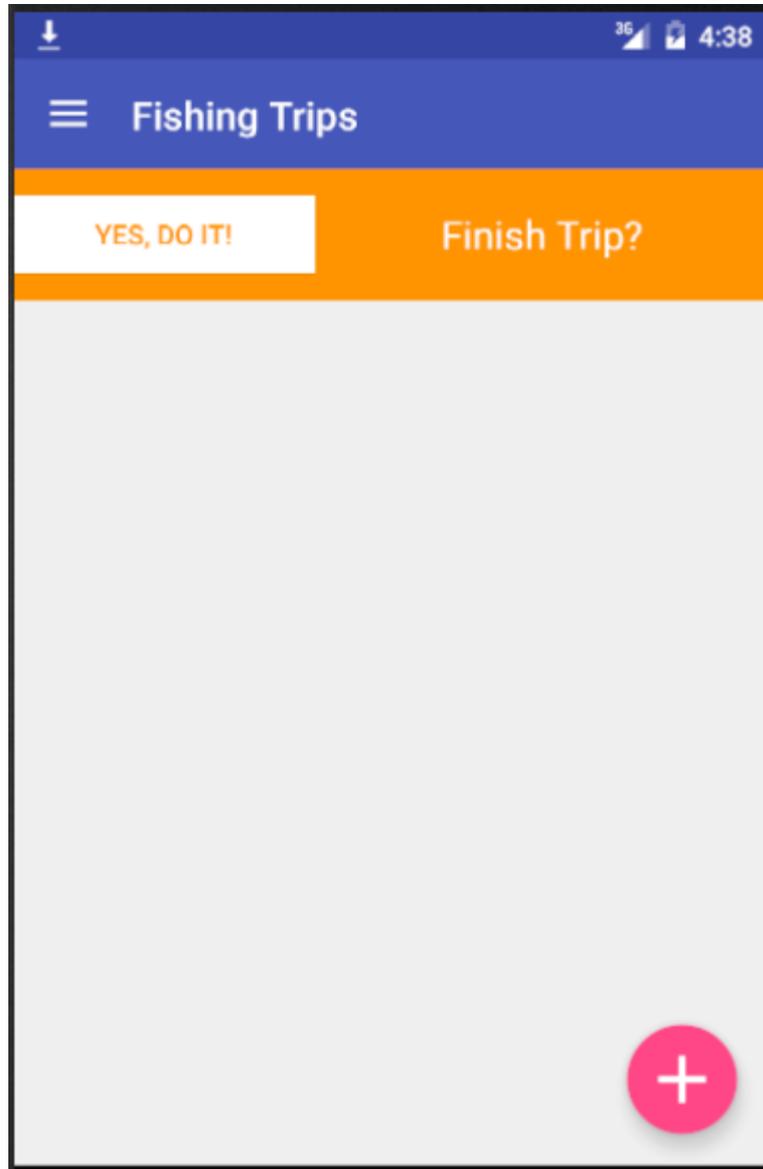


The mobile application opens the screen where the errors are placed.

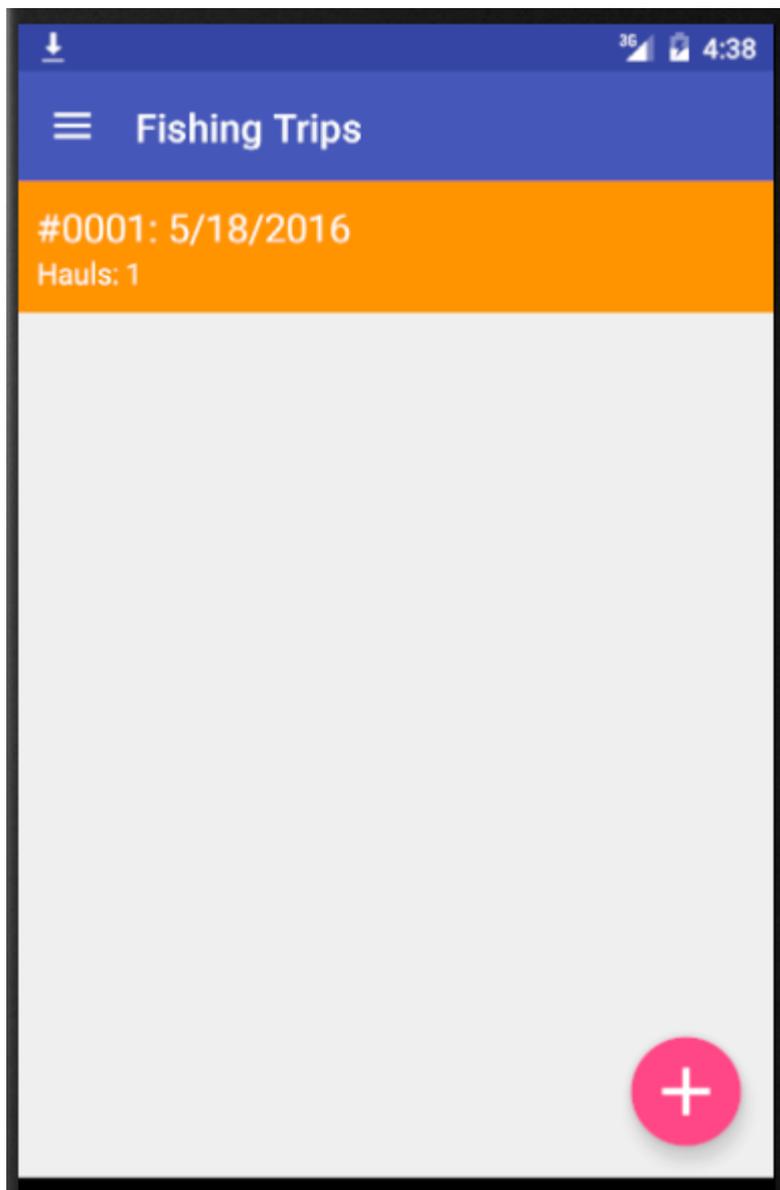




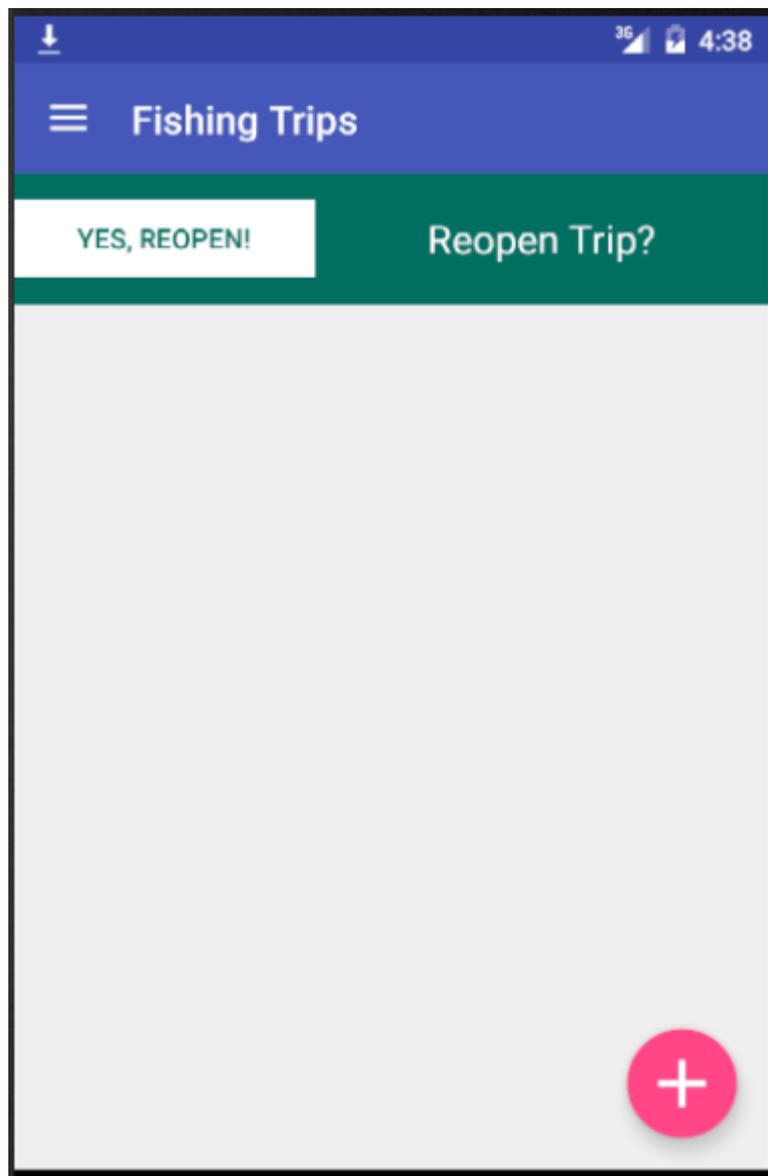
After we have corrected all errors, the fishing trip list can be examined and the corresponding trip closed, by scrolling down the row to the right and touching the “Yes, do it!” button.



After the trip has been closed, the background row changes from white to orange and the trip can't be edited.

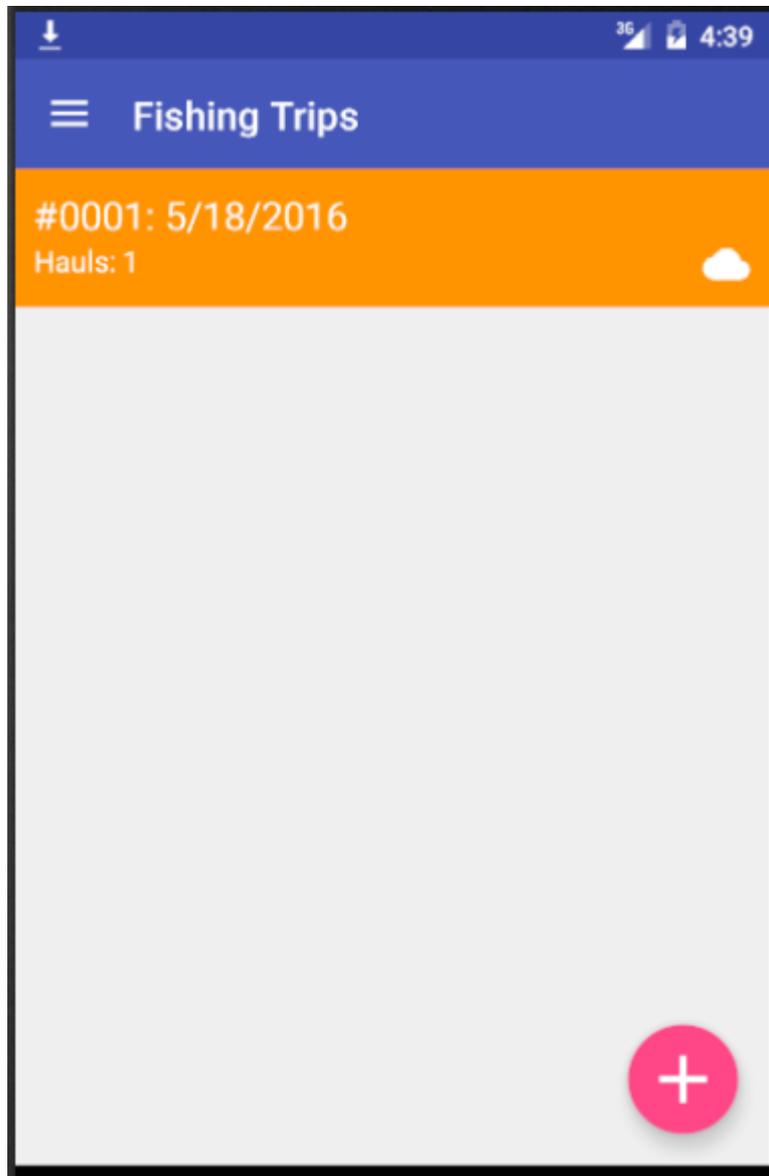


The fishing trip can be edited by reopening it. To this end, to the user will scroll down the row to the right and touch the “Yes, reopen!” button. Now the trip can be edited.



After the trip is closed and all the data has been synchronized, the row shows a cloud icon.

Now the information is in the server, and the trip can't be reopened or edited, but the data can be shown to the user.



2.3. Web application

The purpose of the Web application is to manage the master data that will be handled by the system:

- Users.

- Web users.
- Mobile users.
- Management units.
- Ships.
- Harbours.
- Fishing gears.
- Bottom types.
- Species.
- Destinations.
- Size type.
- Size units.
- Weight units.

The characteristics of master data are detailed below.

The web application allows to export all the data acquired using the mobile application.

The web application is accessible in the URL <https://minouw.com>

2.3.1. Languages

The web application has been developed in English.

2.3.2. Access

To access the web application an user name (email) and a password are allocated to the web application user.

Users are managed by an Administrator or by a Coordinator, following the rules showed in the section “2.3.3 2.3.3. Users”.

2.3.3. Users

Users can:

- Create.
- Show.
- Update.
- Delete.

There are three types of users:

- Administrators. These users can login into the web application.
- Coordinators. These users can login into the web application.

- Mobile users. These users can login into the mobile application.

The administrators and the coordinators must be managed by an administrator.

The mobile users must be managed by a coordinator.

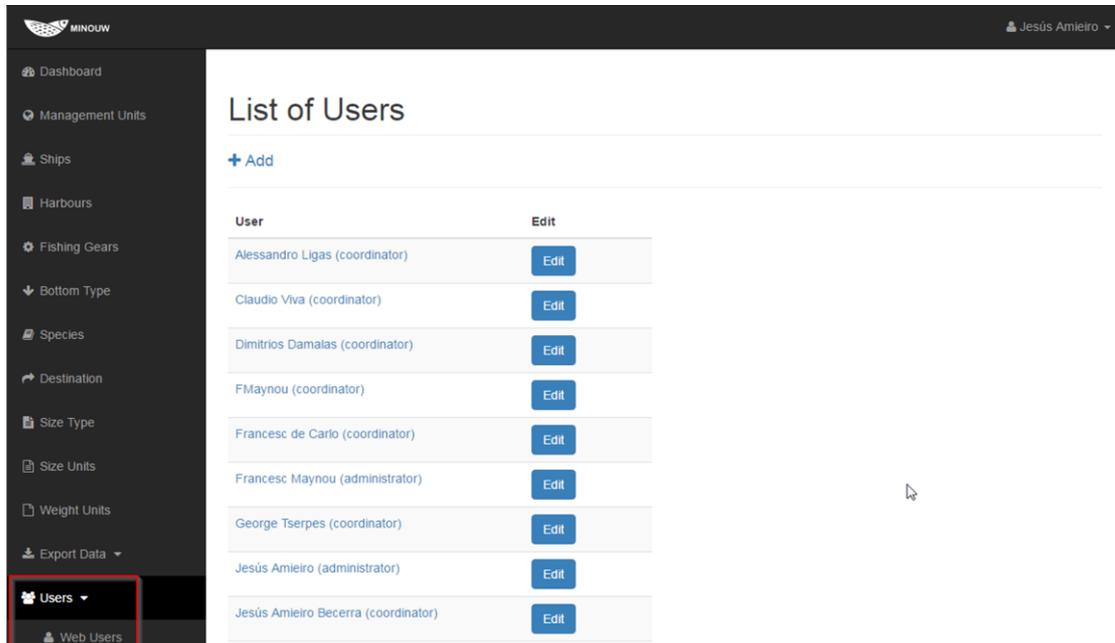


Figure 1: Managing web users.

The web users can access to the web application using a user name (email) and a password.

The data managed are:

- Name.
- Email (will be the user access to the web application).
- Password.
- Role: Manager or coordinator.

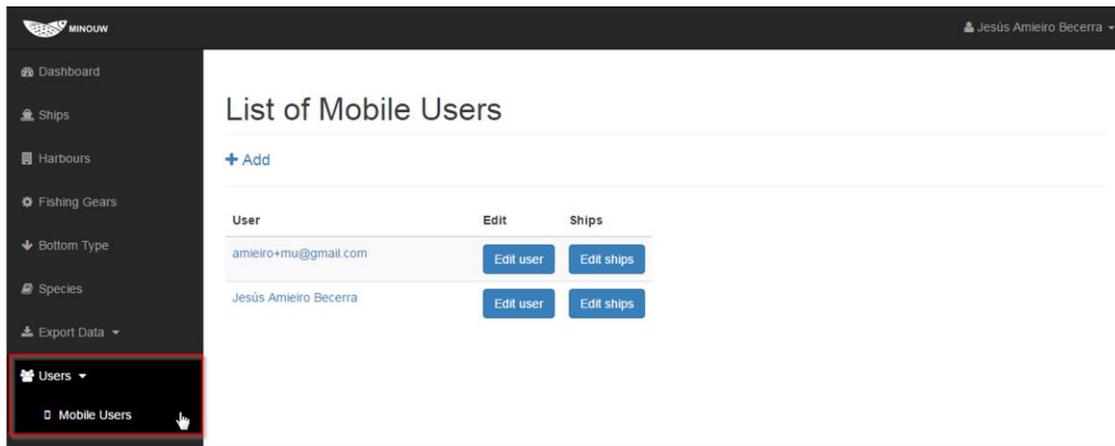


Figure 2: Managing mobile users.

The mobile users can access to the mobile application using a user name (email) and a password.

The data managed are:

- Name.
- Email (will be the user access to the mobile application).
- Password.

Management units

Management units can be:

- Created.
- Shown.
- Updated.
- Deleted.

This type of master data is managed by an Administrator.

Each management unit corresponds to a single case study.

The data managed are:

- Name.
- Coordinator.

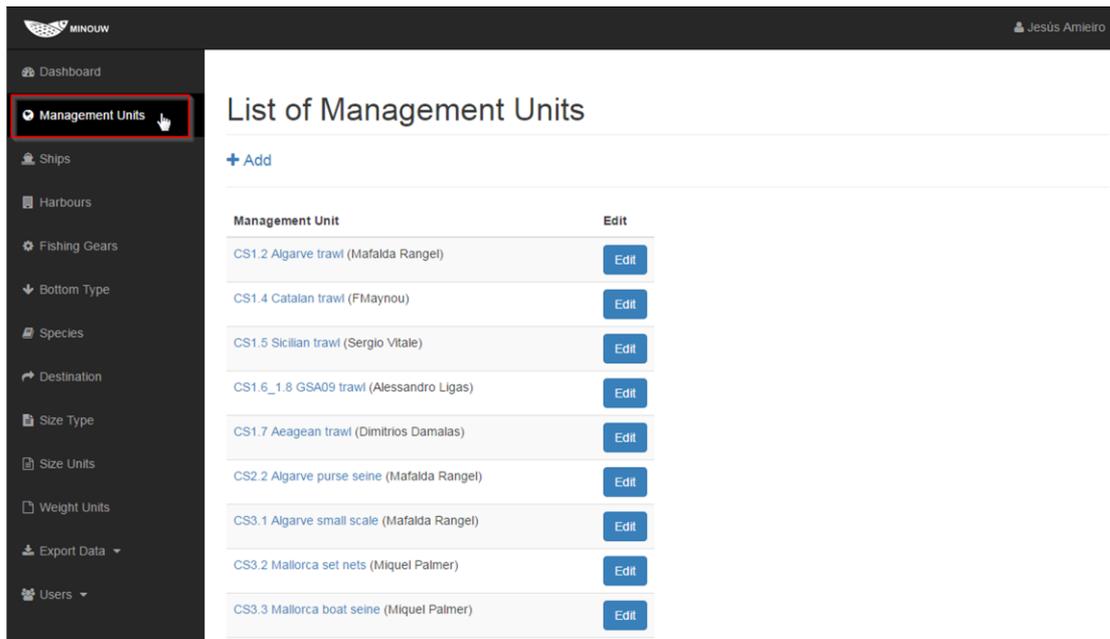


Figure 3: Managing "Management Units"

2.3.4. Ships

Ships can be:

- Created.
- Shown.
- Updated.
- Deleted.

This type of master data is managed by a Coordinator.

The data managed are:

- CFR (Code of Fleet Register).
- FSC (Fish Spektrum Code).
- Name: MARINER.
- Association or Cooperative.
- Harbour.
- Hull material.
- GRT.
- GT (t).
- Length (m).
- Year.

- Power (kW).
- Crew.
- Notes.
- Start Date of Collaboration.
- End Date of Collaboration.
- Has AIS?
- AIS Code.
- Coordinator.



Figure 4: Managing Ships.

2.3.5. Harbours

Harbours can be:

- Created.
- Shown.
- Updated.
- Deleted.

This type of master data is managed by a Coordinator.

The data managed are:

- Name.
- Population.
- Province.
- State.
- Notes.
- Deleted. It is a binary field: Yes / No.

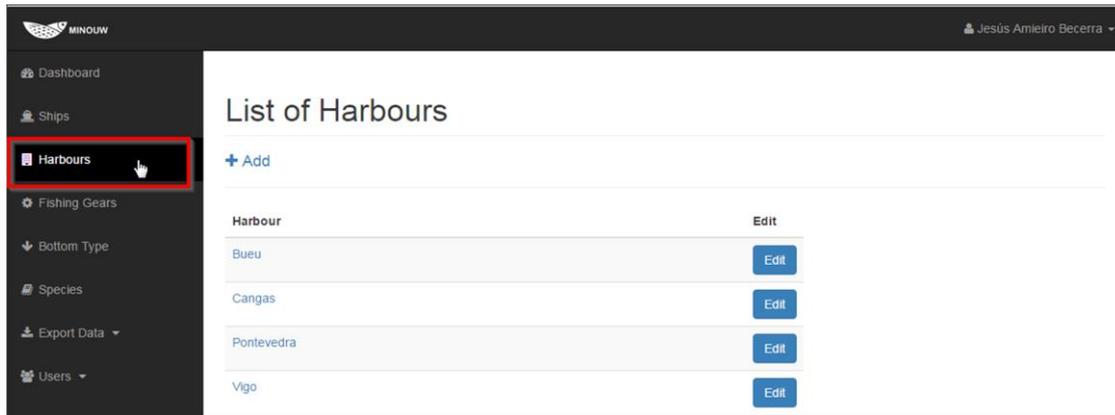


Figure 5: Managing harbours.

2.3.6. Fishing Gears

Fishing gears can be:

- Created.
- Shown.
- Updated.
- Deleted.

This type of master data is managed by a Coordinator.

The data managed are:

- Name.
- Notes.
- Deleted. It is a binary field: Yes / No.

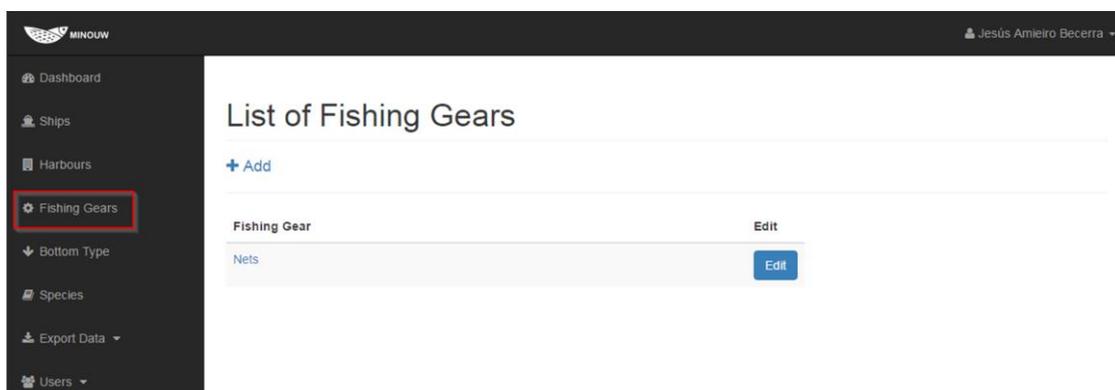


Figure 6: Managing Fishing Gears.

2.3.7. Bottom Types

Bottom types can be:

- Created.
- Shown.
- Updated.
- Deleted.

This type of master data is managed by a Coordinator.

The data managed are:

- Name.
- Notes.

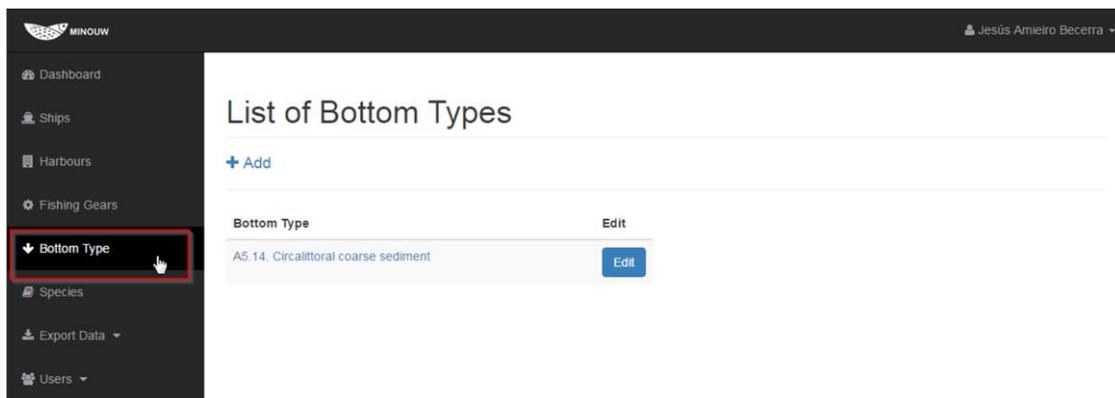


Figure 7: Managing Bottom Types.

- Deleted. It is a binary field: Yes / No.

2.3.8. Species

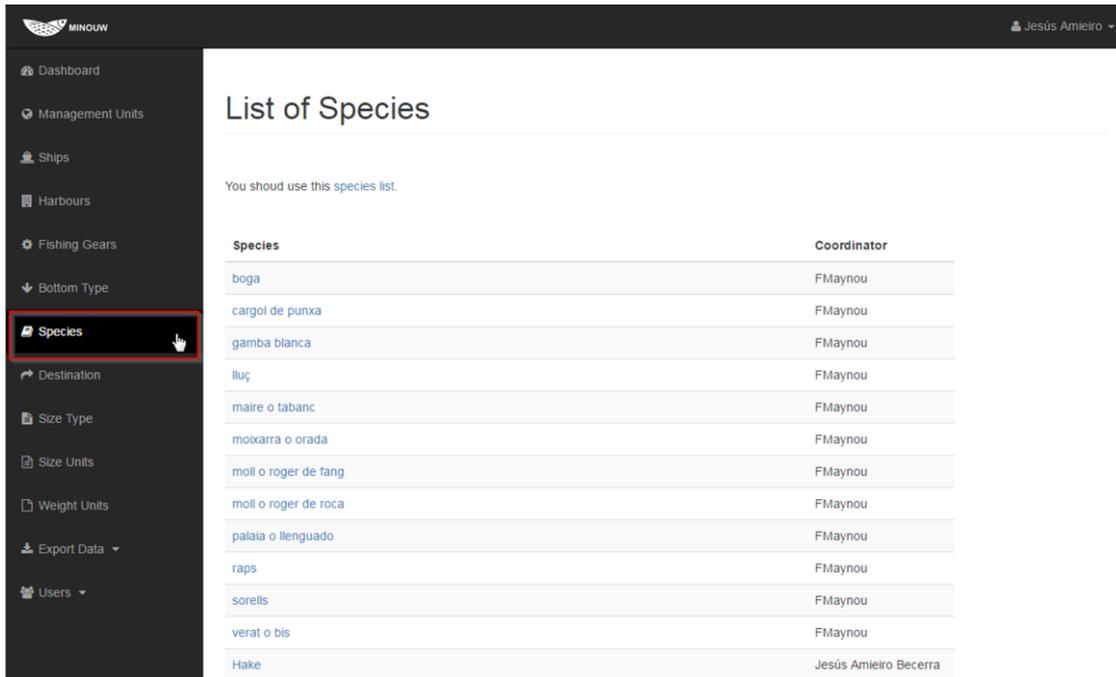
Species can be:

- Created.
- Shown.
- Updated.
- Deleted.

This type of master data is managed by a Coordinator.

The data managed are:

- Name.
- Scientific name.
- Local name.
- English name.
- Notes.
- Deleted. It is a binary field: Yes / No.



The screenshot shows the MINOUW web application interface. The left sidebar contains a navigation menu with the following items: Dashboard, Management Units, Ships, Harbours, Fishing Gears, Bottom Type, **Species** (highlighted with a red box), Destination, Size Type, Size Units, Weight Units, Export Data, and Users. The main content area is titled 'List of Species' and contains a table with the following data:

Species	Coordinator
boga	FMaynou
cargol de punxa	FMaynou
gamba blanca	FMaynou
lluç	FMaynou
maire o tabanc	FMaynou
moixarra o orada	FMaynou
moll o roger de fang	FMaynou
moll o roger de roca	FMaynou
palatia o llenguado	FMaynou
raps	FMaynou
sorells	FMaynou
verat o bis	FMaynou
Hake	Jesús Amieiro Becerra

Figure 8: Managing Species.

2.3.9. Destination

This option manages the available destinations of the discarded fish.

Destinations can be:

- Created.
- Shown.
- Updated.
- Deleted.

This type of master data is managed by an Administrator.

The data managed are:

- Name.
- Notes.

- Deleted. It is a binary field: Yes / No.

The actual destinations are:

- Bitten/damaged.
- Quota reached.
- Rotten.
- Species of no commercial value.

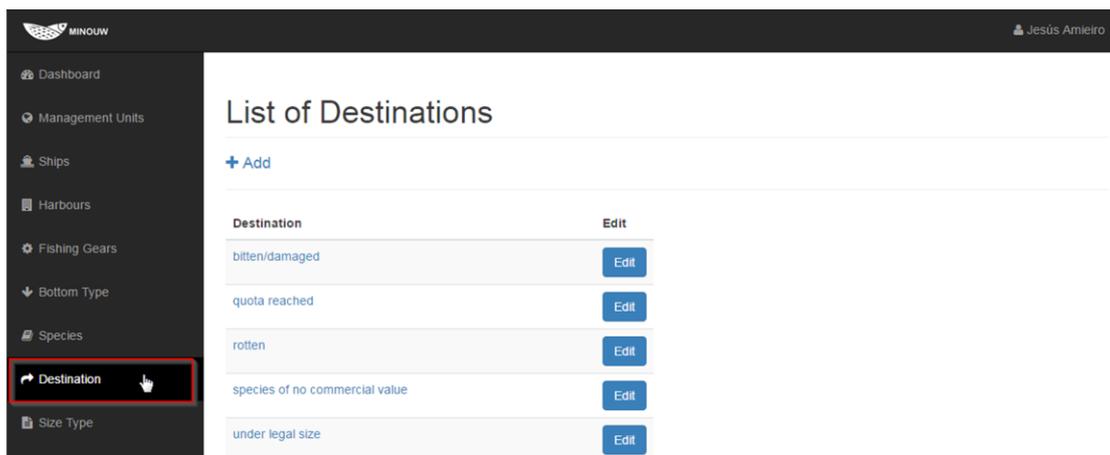


Figure 9: Managing Destinations.

- Under legal size.

2.3.10. Size Types

Size types can be:

- Created.
- Shown.
- Updated.
- Deleted.

This type of master data is managed by an Administrator.

The data managed are:

- Name.
- Notes.
- Deleted. It is a binary field: Yes / No.

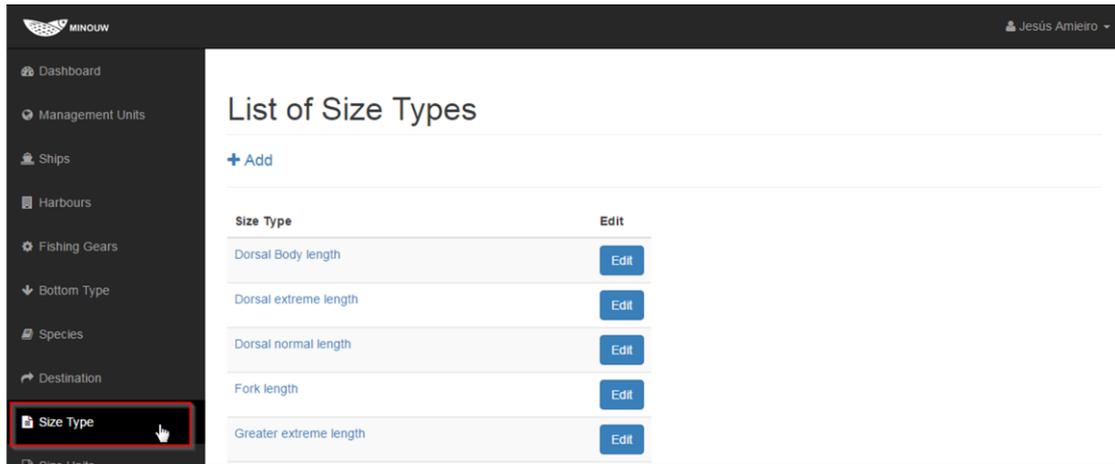


Figure 10: Managing Size Types.

2.3.11. Size Units

Size units We can be:

- Created.
- Shown.
- Updated.
- Deleted.

This type of master data is managed by an Administrator.

The data managed are:

- Name.
- Notes.
- Conversion factor.
- Deleted. It is a binary field: Yes / No.

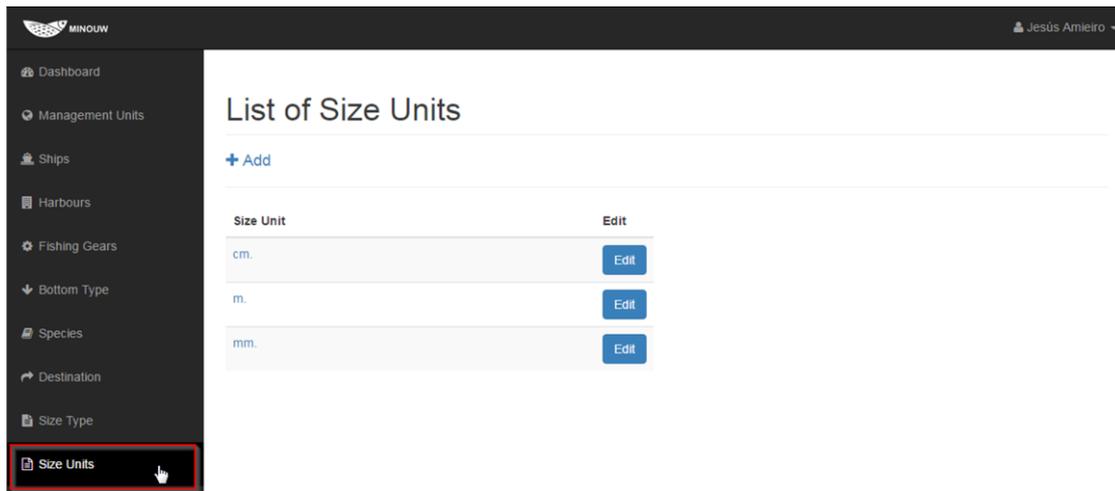


Figure 11: Managing Size Units.

2.3.12. Weight Units

Weight units can be:

- Created.
- Shown.
- Updated.
- Deleted.

This type of master data is managed by an Administrator.

The data managed are:

- Name.
- Notes.
- Conversion factor.
- Deleted. It is a binary field: Yes / No.

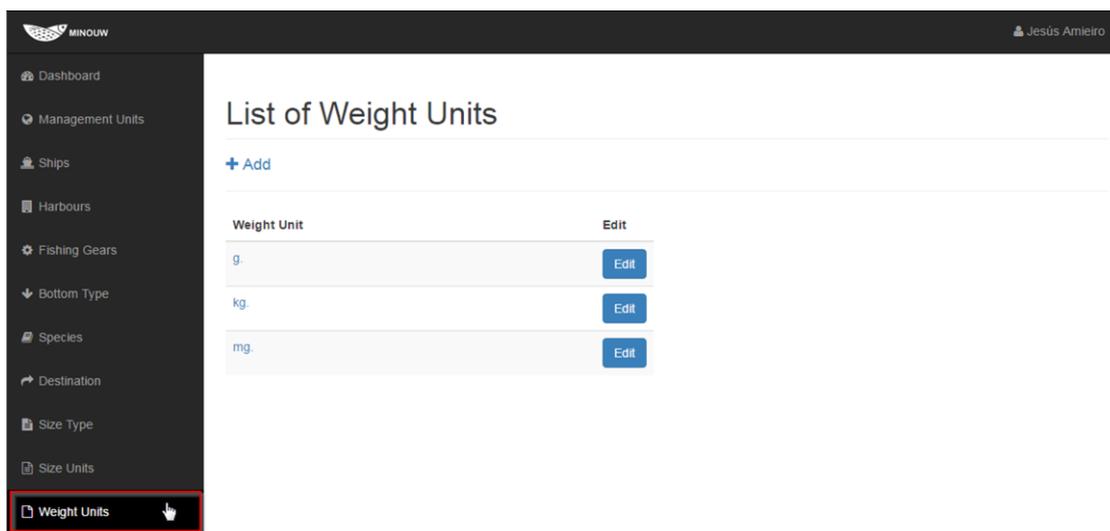


Figure 12: Managing Weight Units.

2.3.13. Data export

In this location, accessible from the same location as the previous sections, scientists and other personnel concerned can obtain information, in CSV format.

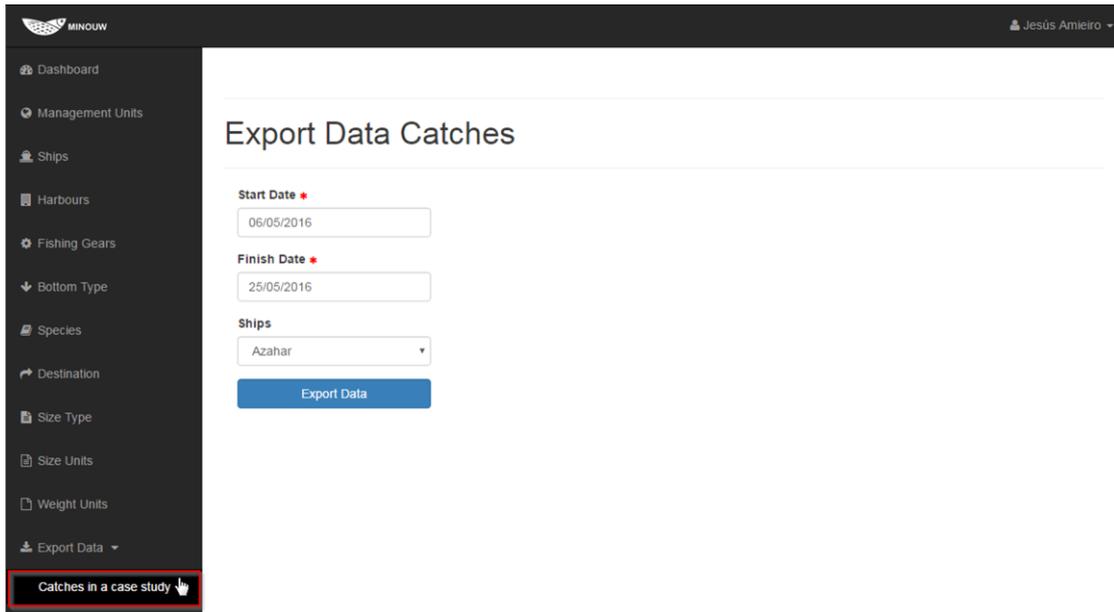
We have 2 data exports:

2.3.13.1. Catches in a case study

The user (administrator or coordinator) will get all catches, which can be filtered by:

- Start date.
- Finish date.
- Ship.

The data will be downloaded in a CSV file.



The screenshot shows the MINOUW web application interface. On the left is a dark sidebar with a navigation menu. The 'Export Data' option is highlighted with a red box and a mouse cursor. The main content area is titled 'Export Data Catches' and contains the following fields:

- Start Date**: A date input field with the value '06/05/2016'.
- Finish Date**: A date input field with the value '25/05/2016'.
- Ships**: A dropdown menu with the value 'Azahar'.
- Export Data**: A blue button.

Figure 13: Exporting Data Catches.

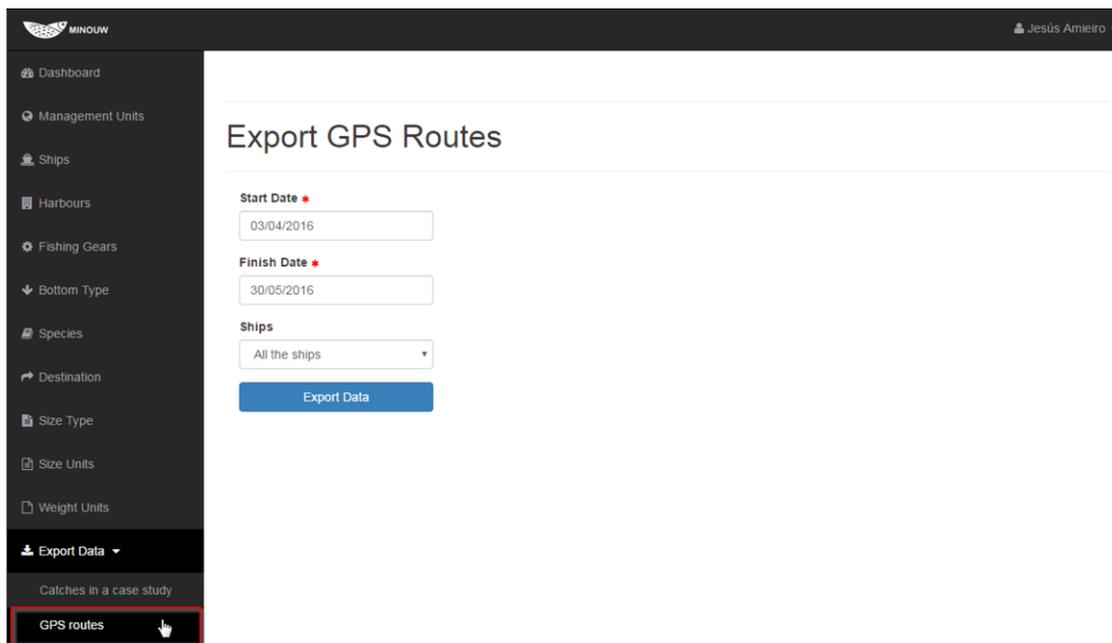
Users with an Administrator role will have access to all case studies, while users with a Coordinator role will only have access to their case studies.

2.3.13.2. GPS routes

The user (administrator or coordinator) will get all GPS points, which can be filtered by:

- Start date.
- Finish date.
- Ship.

The data will be downloaded in a CSV file.



The screenshot displays the MINOUW web application interface. On the left is a dark sidebar with a navigation menu. The 'Export Data' option is expanded, and 'GPS routes' is highlighted with a red box and a mouse cursor. The main content area is titled 'Export GPS Routes' and contains the following form elements:

- Start Date**: A date input field with the value '03/04/2016'.
- Finish Date**: A date input field with the value '30/05/2016'.
- Ships**: A dropdown menu with the selected option 'All the ships'.
- Export Data**: A blue button located below the form fields.

Figure 14: Exporting GPS Routes.

Users with an Administrator role will have access to all case studies, while users with a Coordinator role will only have access to their case studies.

2.4. Web and database server

All information is centralized in a MySQL database, which is in a data center with external access.

In addition, the web application is installed on an Apache web server in the same server.

The server features are:

- Dedicated server.
- 4 processor cores.
- Memory 16GB.
- Guaranteed bandwidth: 100 Mbps.
- Debian GNU/Linux operating system.
- Apache web server.
- Postfix mail server.
- MySQL database server.
- phpMyAdmin MySQL web manager.

These features may change depending of the traffic received by the portal.

2.4.1. Changing the information

In order to make specific changes in the information entered from the mobile application, we have installed and configured on the web server the phpMyAdmin tool, which allows manage a MySQL database. Among the features it supports is the modification of the information stored.

2.5. Technical Requirements

Below are the technical requirements that must meet the devices used by the mobile application users (fisherman, biologists and field technicians).

2.5.1. Mobile application

The mobile application has been developed for devices with Android operating system (Android 4.4 and upper) and GPS enabled.

2.5.2. Web application

To use the web application, the user will need to have a PC or a laptop with an updated browser:

- Mozilla Firefox.
- Google Chrome.
- Opera.
- Apple Safari.
- Microsoft Internet Explorer.

Since sets of information for further processing are to be downloaded, access with a tablet or a mobile phone is not recommended, although its use is feasible if the we have a modern web browser and the operating system has a management files tool.

2.6. Maintenance

As discussed in section 2.4, all information is centralized in a database, which is in a data center with external access.

To ensure an appropriate level of availability we provide a continuous server maintenance, which consists in:

- Daily system updates and security patches.
- Daily backups.

2.7. Languages

The Android application has been developed in the following languages:

- English.
- Spanish.

- Italian.
- Catalan.
- Portuguese.
- Greek.

The web application has been developed in English because it will be used only by scientists.

The system will allow the inclusion of new languages.

