

# Mofi

## Mobile Fisheries Log



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## 1. Mofi – Mobile fisheries log

Mofi is a multilingual App for registering track, fishing operations, and logbook information - this includes registration of bycatch (endangered) species. The App is built upon a scheme structure, where each country or project has its own scheme defining which fields are present in the app UI, whether the fisher is required to start/stop a trip, what frequencies the GPS should be logged at (if at all), what species are available, which extra fields are required when registering a catch or starting a trip, what bycatch species should be there to choose from, etc. Each country and/or project administrator can log in on a Mofi management site, and define which species should be available for their scheme and upload images for each species (if wanted). Mofi is therefore very flexible in terms of what should be present in the UI, by customizing the scheme, and should therefore fit most monitoring strategies for the different countries and/or research projects.

From the Fishers perspective, they can create a Mofi user in the app and add the vessels they are captains for. An administrator then needs to log in on the management site, and approve the user for those vessels and assign which schemes the user should be able to fish under. Once the fisher is approved for one or more vessels, they can start using the app for registering the wanted information. The fishers simply select a vessel and a scheme from a drop down list in the app where after the UI changes according to the selected scheme and the fisher can start interacting with the app, registering the various information throughout the fishing trip. Once the trip is done, the user sends the data to shore, by selecting one or more endpoints to send the data too. Which endpoints are available and whether some are mandatory is again defined by the selected scheme. At shore, the data lands in the same database as Anchor Labs other hardware monitoring solutions and can be reviewed by the Black Box Analyzer Client software, as soon as the fisher has uploaded the data (typically when ending a trip).

Since it can be difficult for the Fisher to grab the phone to indicate when fishing operations take place, while on the deck, the app also includes Bluetooth support, so it's possible to use external hardware to indicate when fishing operations take place. This could be a waterproof Bluetooth unit installed on the vessel close to the gear handling that has buttons for setting and heaving the gear. By using that, the Fisher would not need to get his/her phone up for registering when the gear is deployed/hailed but could simply hit a button on the Bluetooth hardware instead, that would communicate it automatically to the phone. Prototypes for the remote hardware has been developed by Anchor Lab but none are in production as of this point and would need further development to get production ready.

A production use case for Mofi, has been for German fishers for the cod spawning closure period in the Baltic running typically through February and March each year. A scheme in Mofi was created that required the fishers to start a trip, fill out which gear type and mesh size was used, and to stop the trip once they were back in harbour again. When the trip started, the app automatically logged a position every minute and revealed buttons in the UI for the fisher to specify when gear was put in the water and when it was hauled. For net gears, the scheme defined buttons for start and stop setting gear and for start and stop hauling gear. For trawl gear, only buttons for setting and hauling gear were visible. The scheme also defined a shapefile that was visible on the map in Mofi, showing the whole fishing area within 20 meters depth as a green polygon, indicating where the fishers were allowed to fish, so they could easily make sure they did not fish in waters deeper than 20 meters. When the fisher ended the trip when back in harbour, the scheme dictated the data to be sent to a dedicated German BLE Black Box Analyzer server. Using the Black Box Analyzer client,

BLE could monitor whether the fishers were fishing according to the rules and take proper actions if not. The German scheme also had a live position feature enabled, meaning the app reported a position over the mobile network at scheme defined intervals, making it possible for the control authority to use Live Map in the Analyzer client to see where all the different vessels were in real-time and whether they were fishing. This made it possible for the control vessels at sea to directly sail over to a fishers vessel, if there were indications of a violation taking place.


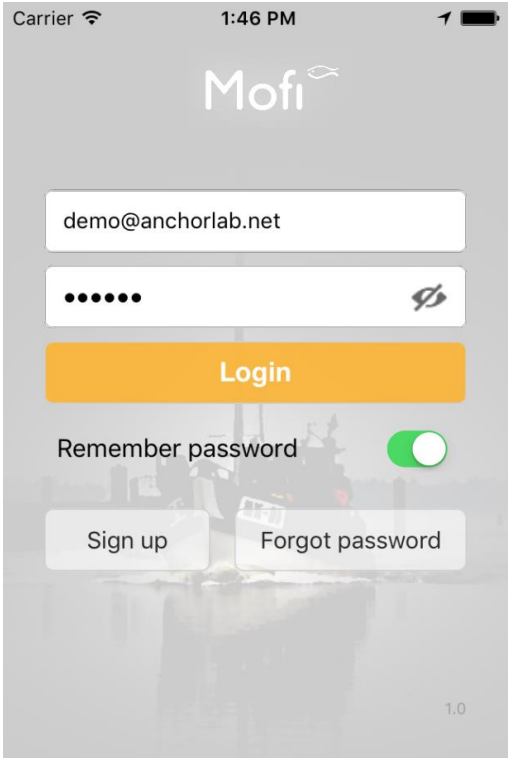
Mofi also has the capabilities of registering logbook data and endangered species. The endangered species feature was developed in collaboration with MSC and different PO's from Germany, Sweden, Denmark, and Netherlands. By registering the endangered species through Mofi instead of pen and paper, makes it a lot easier for the PO's when reporting the catches back to MSC in order for the fishers to uphold their MSC certifications.

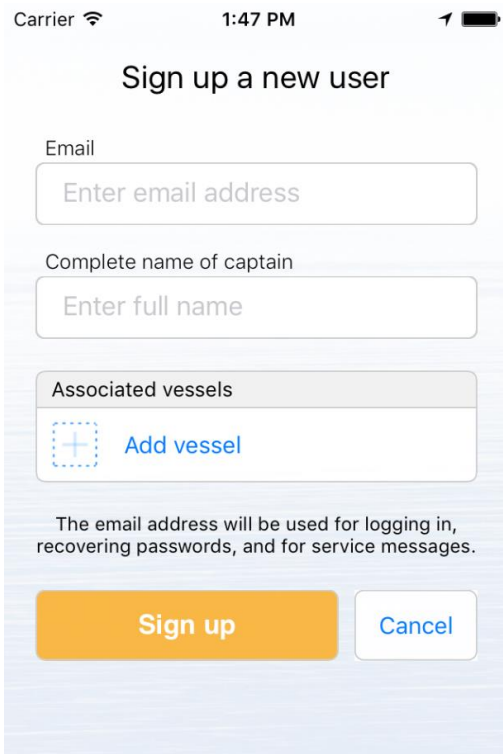
In terms of data security and policies, all fishers need to be approved by a country administrator and also approved in terms of which vessels a fisher can report data for. When the fishers open the App, it is also required for them to log in, so unintended access is avoided (in case of lost phones, etc). Any data transmitted from the phone to shore is done over an encrypted connection. Each scheme has its own privacy policy, to ensure the app complies with GDPR and each fisher needs to accept the policy before data can be registered by the fisher via the app. It is up to the different country administrators to define the privacy policy for their scheme so it complies with GDPR. It should therefore include what type of data is collected, what it is used for, where it is sent to, and how the fisher can delete their data if wanted.

The next sections of the document goes through various different screens in that app explaining the overall functionality.

## 2. Version 1.0 – first version

Version 1.0 is the first version of the App containing following features.

	<p>App splash screen</p>
	<p>After the splash screen, the user is met with the login screen. An email address and password is used to log in.</p> <p>If the user has no account yet, he/she can sign up.</p> <p>If the user has forgotten his/her password, they can click the Forgot password button, where after an autogenerated password is sent to the registered email address.</p> <p>Once the users enters their login information for the first time, he/she is met with the terms and conditions of the app. If they are not accepted, the user cannot use the app.</p>



Carrier 1:47 PM

## Sign up a new user

Email

Enter email address

Complete name of captain

Enter full name

Associated vessels

Add vessel

The email address will be used for logging in, recovering passwords, and for service messages.

Sign up Cancel

If the sign up button is clicked on the previous screen, the following screen is shown.

The users enter his/her email address and complete name.

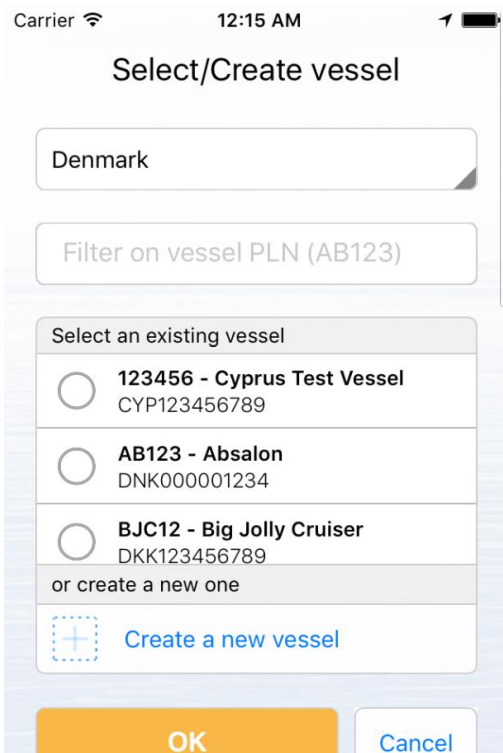
Finally, one or more vessels can be added to the user.

All the information entered on this screen can be modified later after a successful login.

Email address, name and which vessels are associated to the entered email address, is stored in a database at Anchor Lab.

The data is communicated over a webservice using HTTPS.

When clicking sign up, the apps privacy policy is presented and needs to be accepted. If the user declines to accept the privacy policy, he/she cannot create a user.



Carrier 12:15 AM

## Select/Create vessel

Denmark

Filter on vessel PLN (AB123)

Select an existing vessel

123456 - Cyprus Test Vessel  
CYP123456789

AB123 - Absalon  
DNK000001234

BJC12 - Big Jolly Cruiser  
DKK123456789

or create a new one

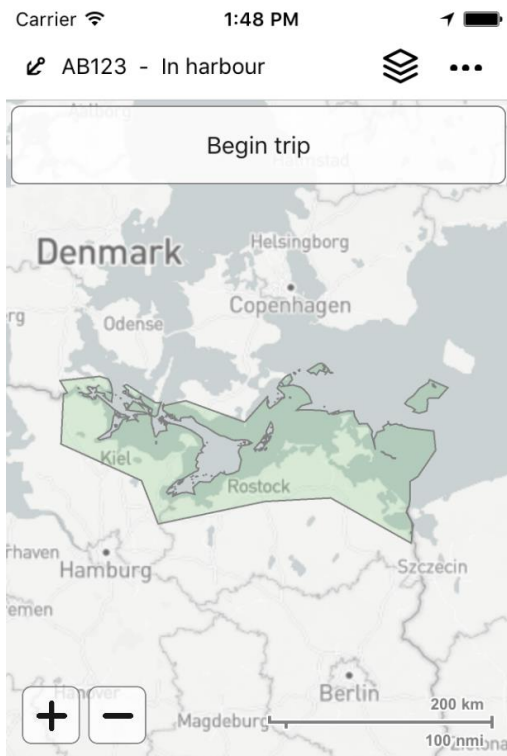
Create a new vessel

OK Cancel

When the user clicks the Add vessel button on previous screen, the following is shown.

The user has the possibility of filtering a list of vessels by country and by vessel PLN (registration number). Once the user has found his/her vessel, the user clicks ok to assign it to his/her user.

If the vessel does not exist, the user can add a new one by clicking the "Create a new vessel" button showing vessel PLN, EU identifier, vessel name and country which needs to be entered.



After a successful login, the user is brought directly to the map where it is possible to start a new trip.

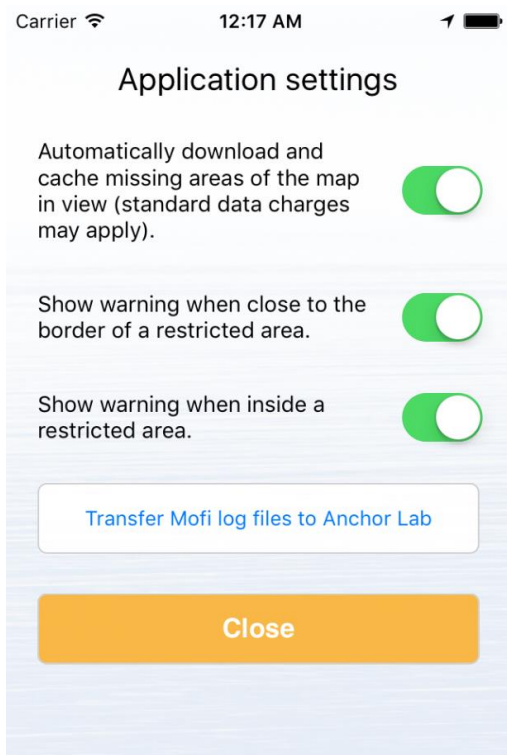
The green area on the map, depicts the area in German waters with a water depth less than 20 meters. The purpose of the app is for the fishers to prove, they are fishing within the green area.

If the user clicks the top right button, a menu is shown, where the user can open a settings page, update his/her details, see a transfer list of all his/her trips and log out.

If the user clicks the button next to the menu button, the layers list is shown, where it is possible to download and show offline tile layers or shapefile polygons, as the green area shown on the map.

The button "Begin trip" starts a new fishing trip.

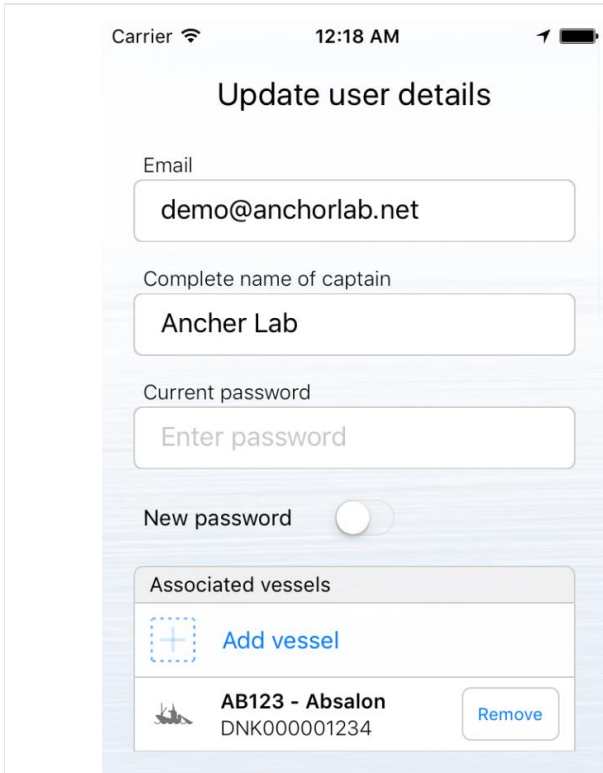
The +/- button in the bottom left corner zooms in/out on the map.



When clicking the top right corner on the map view and selecting "Settings", the application settings is shown.

Here it is possible to specify whether missing parts of the map should be downloaded and cached automatically and whether alarms should be given, if the fisher sails too close to or crosses the border of the green area on the map.

There is also a button, to send the apps log files to Anchor Lab, in order for Anchor Lab to help the user with any problems they might have with the app.



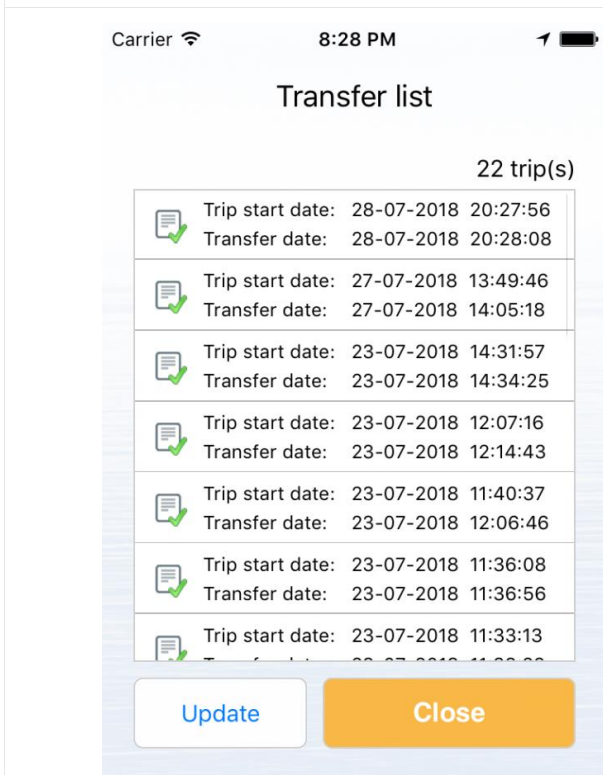
When clicking the top right corner on the map view and selecting "Update user details", the view for updating user settings is shown.

Here it is possible to alter the users email address, captain name, password and associated vessels.

In order to change anything, the user needs to re-enter his/her current password.

Not show on the screen shot, is that when scrolling down past the associated vessels, links to the apps privacy policy and terms and conditions are shown.

The button to close or update the details are shown after the links to the terms and privacy policy.

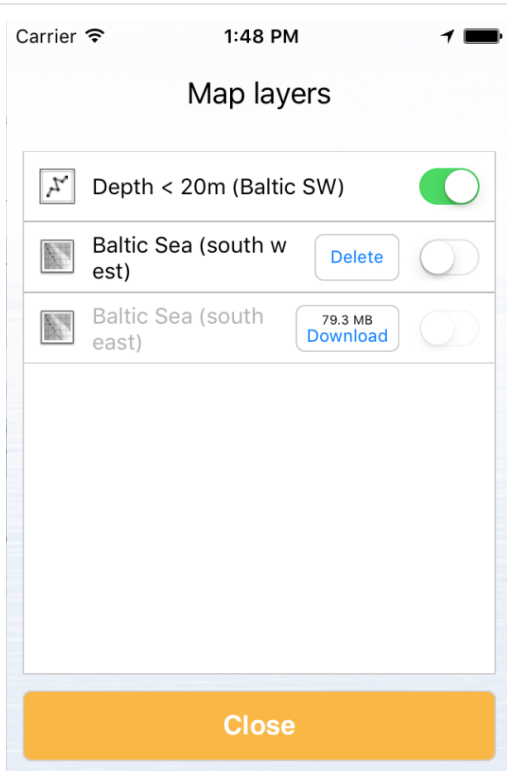


When clicking the top right corner on the map view and selecting "View transfer list", the view containing the transfer list is shown.

This basically shows a list of all the trips a fisher has been on using the app and whether the trip data has been sent to shore. The green check mark icon beside a row in the list, indicates a successful transfer.

If one or more rows are categorized as not sent, the user can hit the "Update" button to try and send in the missing data and refresh the transfer list.



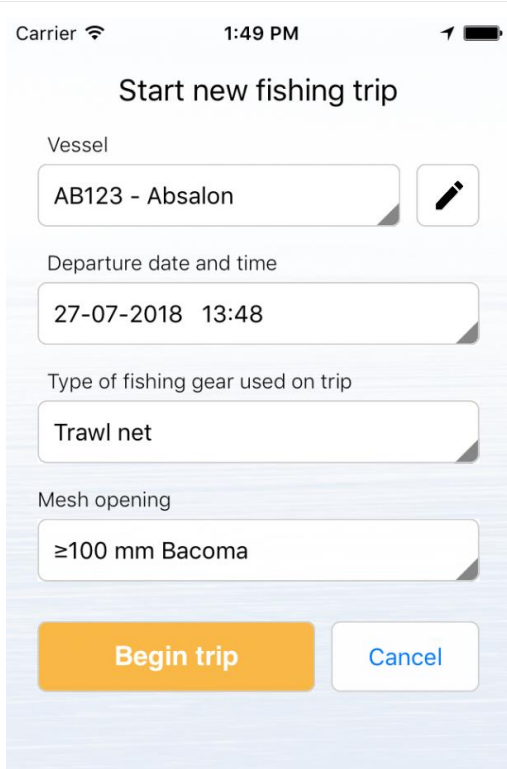


When clicking the layers button on the top right corner of the map, next to the more settings icon, the Map layers view is shown.

From here it is possible to select which layers to show on the map, and to download/delete any non-mandatory layers from the phones memory (such as offline tiles).

On the current screen shot, there is one mandatory shapefile layer present shown on the map and two offline tile layers, where only one has been downloaded, but is not active/shown.

You can see the shapefile layer is mandatory to have, due to the fact that you cannot delete it.



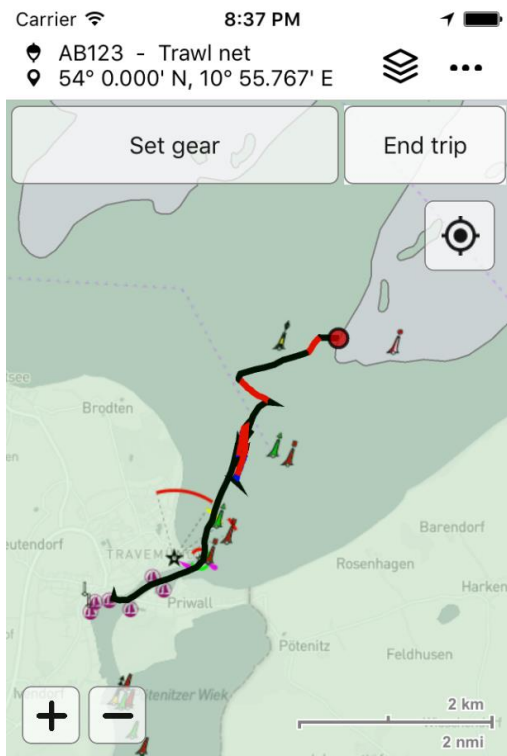
When the users click "Begin trip" on the map view, the following view is shown.

From here the user can select which of his/her vessels the user is currently sailing on, what the departure date/time is (defaulting to now), which type of gear is used and the mesh size of the gear.

Once the user is satisfied with his/her selection, the trip can be initiated.

If the small edit button in top right corner is selected, the "Update user details" view is shown, enabling the user to add a new vessel, if it is not present in the list.





After starting the trip, the GPS starts logging every minute. When the user selects "Set gear" the button goes orange and shows the text "Get gear". While the button is in this state, the track is drawn with a red color.

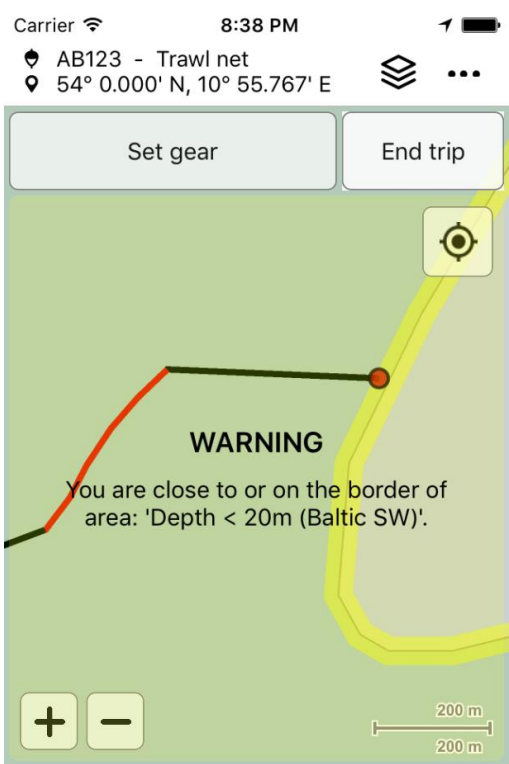
When the user then selects "Get gear", the red track stops and is now back to being black again.

By showing the track in two different colors, enables the fisher to see where his fishing operations took place.

Besides position, course, and speed being logged every minute, the app also sends in a ping to land every 15 minutes, giving the position of the vessel in near real-time. This enables the control authority to see all vessels currently out fishing on a map on land and take proper action, if they are violated anything.

If the user selects the small crosshair on the top right corner of the map, his current position (the red circle) will be centered at the screen.

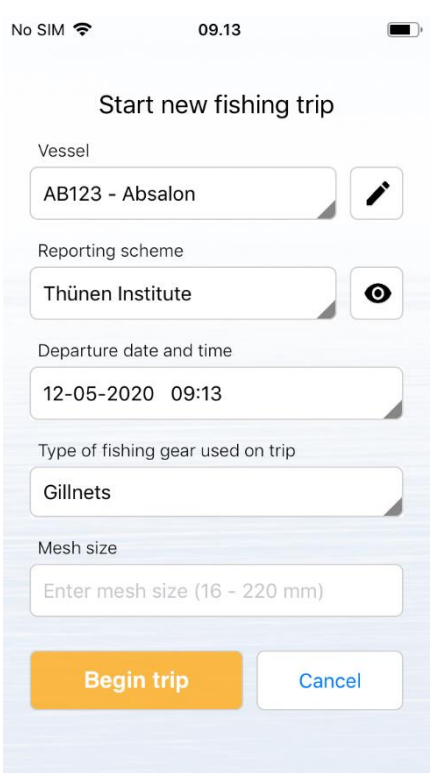
If the user selects the "End trip" button, the user is asked whether he/she wishes to end the trip. If the fishers answers yes, the transfer view is shown, so the user can see whether his/her data was successfully transferred to land.

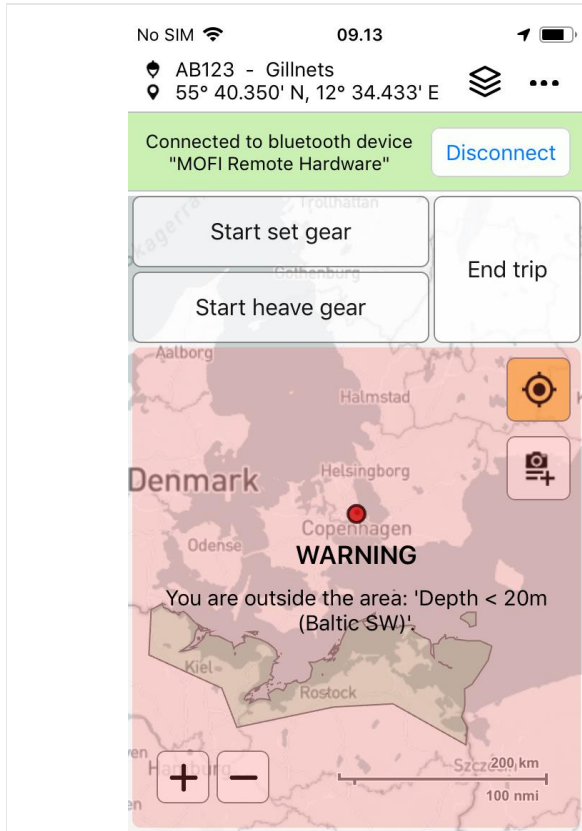
	<p>If the user comes too close to the border of the green area (where fishing is allowed), a yellow warning is shown on the screen.</p> <p>If the fisher crosses the line to the green area, basically rendering the vessel outside the allowed area, a red full screen message is shown instead, stating the user is now outside the area.</p>
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This gave a quick overview of the different views in version 1.0 of the app and how the workflow is stitched together. Small details were left out, for example, depending on what fishing gear the user selects on the "Start trip" view, an extra button is shown on the map beneath "Set gear".

### 3. Version 1.1 – Schemes, Bluetooth and POI

In version 1.1 of the App, a new schemes feature, Bluetooth support, and photos are added.

	<p>The schemes feature enables different UI fields to be shown based on which country the vessel is from and which scheme has been selected by the user when starting a trip. By having this feature, different countries can have/show different fields, based on their requirements.</p> <p>On the image to the left, the vessel is first selected, which filters which schemes can be selected by the user. The user can view details about the selected scheme by clicking the eye button next to the drop down list.</p> <p>When a scheme has been selected, the UI fields below are changed based on what is necessary to fill out for that scheme.</p>
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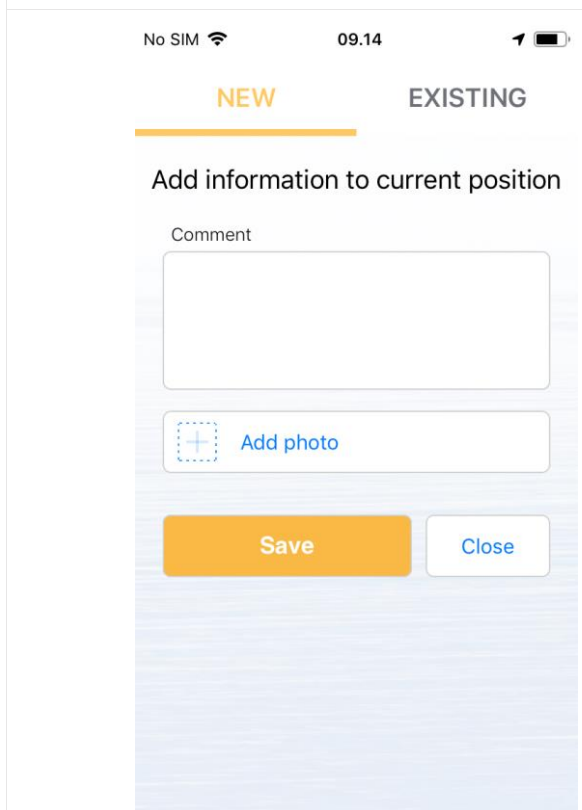
Bluetooth support has been added in order for the App to connect to external Bluetooth hardware, for indicating when fishing operations take place. We have developed a small ruggedized Bluetooth remote with 2 buttons, that can be mounted on the deck of the fishing vessel and used to indicate when the gear is put in the water and when it is hauled.

In the image to the left, the map overview shows which Bluetooth device it is currently connected. The user can then disconnect or and connect to another device if wanted.

It is important that the Bluetooth communication works when the screen is off as well, since it will be off during most of the trip.

When a Fisher push a button on the external Bluetooth hardware, the "Start set gear" or "Start heave gear" is enabled in the App, depending on which button the user pressed.

The user also have the possibility of creating points of interests during a trip. If the camera button with the small plus on the map is pressed (see previous image of the map overview). The view depicted to the left, is shown when pressing the button.

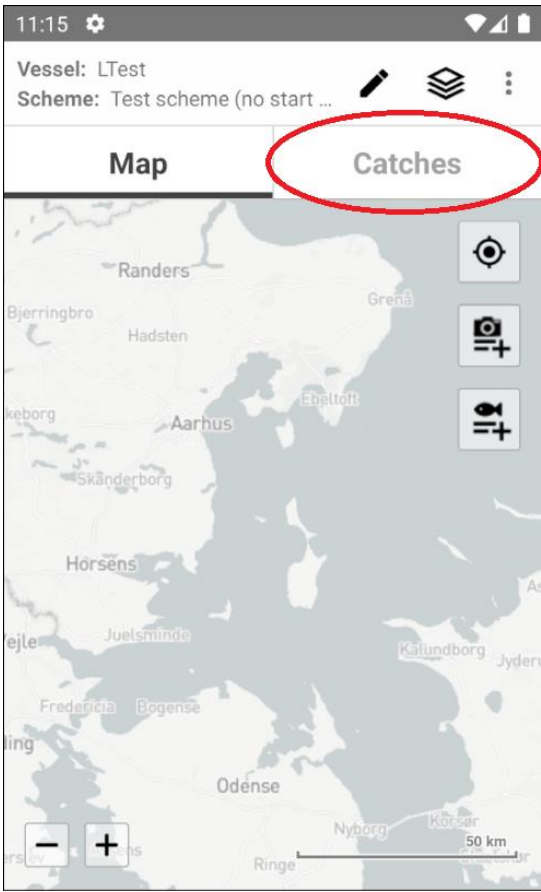


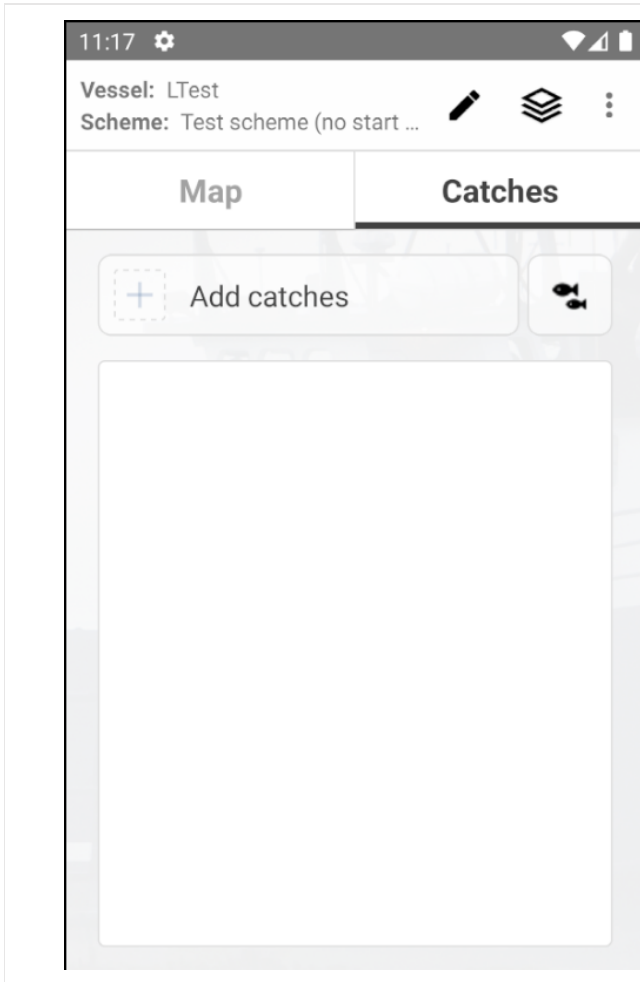
Here the Fisher can enter an optional comment and add one or more photos.

These 3 features are the main new features of the new release 1.1. A new “End trip” has also been added, where the user can select who to send their data to, depending on the scheme they selected. They can now also view images from past trips in the list of the historical trips view.

## 4. Version 1.2 – Catch registration

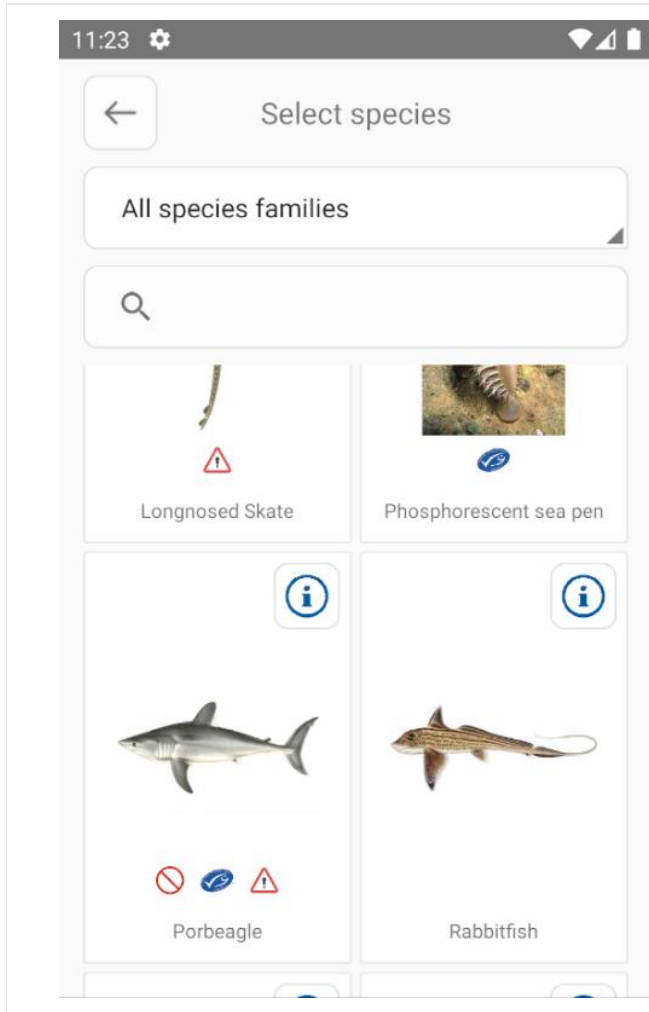
In version 1.2 of the App, catch and bycatch registration was added.

 <p>The screenshot shows the app's main interface. At the top, the status bar displays the time 11:15 and various icons. Below that, the 'Vessel' is identified as 'LTest' and the 'Scheme' as 'Test scheme (no start ...)'. A navigation bar contains two tabs: 'Map' and 'Catches'. The 'Catches' tab is highlighted with a red oval. The main area is a map of Denmark with various regions labeled, including Randers, Aarhus, and Odense. On the right side of the map, there are three icons: a location pin, a camera, and a magnifying glass. At the bottom left, there are zoom in (+) and zoom out (-) buttons. A scale bar at the bottom right indicates 50 km.</p>	<p>When selecting a scheme that supports catch or bycatch, a new tab above the map shown to enter into the catches area.</p>
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When no catches have been entered the list is empty and it's only possible to add a catch or to see the list of bycatch endangered species (the button with the fish icon on).






Opening the bycatch endangered species list view, displays all the endangered species available the scheme. From here the fishers can search for species, identify them from the images and select a species to get more information about it.

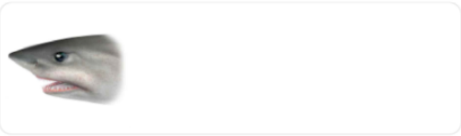
Each species has different icons shown to indicate whether catching such a species must be reported to MSC, whether it is prohibited to land, or if it has other special warnings.

11:26 [Settings] [Signal] [Battery]

# Porbeagle





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### Names and codes

**Code:** *sh1*  
**FAO Code:** -  
**Scientific Name:** *Lamna nasus*  
**Species Group:** *Shark*

 Prohibited to land  
 Must report to MSC


### Warnings

 Must release unharmed immediately

### General information and identification

First dorsal fin has an obvious white tip at the lower back.  
**Red list category:** *Critically Endangered*

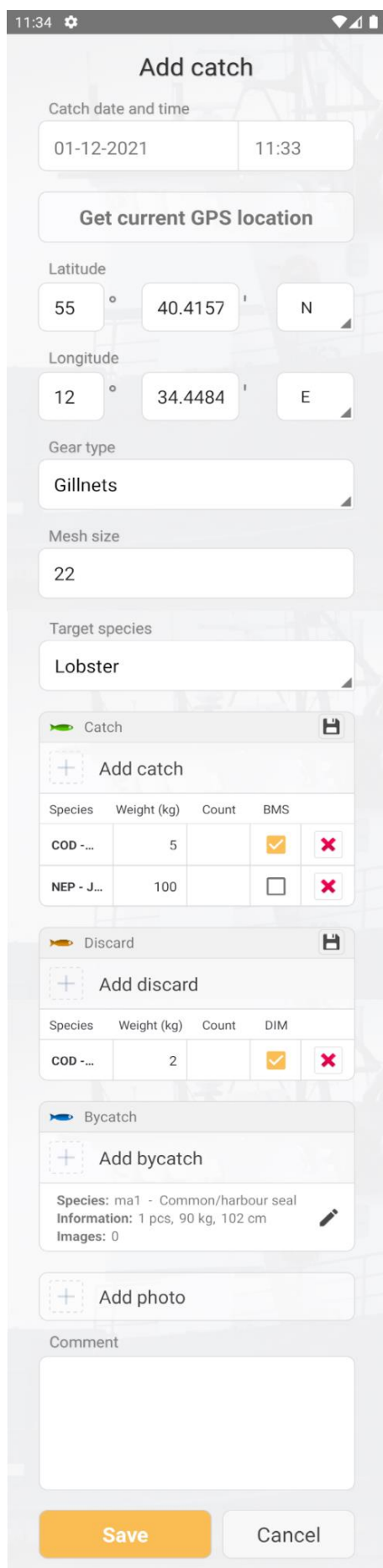
### Handling information

 Handle with care, powerful shark.

**Close**

Select a bycatch species shows more detailed information about it and also more images if available.

This screen gives the fisher all the information needed in order to determine what to do with such as species if the fisher catches it.



**Add catch**

Catch date and time  
01-12-2021 11:33

**Get current GPS location**

Latitude  
55 ° 40.4157 ' N

Longitude  
12 ° 34.4484 ' E

Gear type  
Gillnets

Mesh size  
22

Target species  
Lobster

**Catch**

+ Add catch

Species	Weight (kg)	Count	BMS
COD -...	5		<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
NEP - J...	100		<input type="checkbox"/> <input checked="" type="checkbox"/>

**Discard**

+ Add discard

Species	Weight (kg)	Count	DIM
COD -...	2		<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>

**Bycatch**

+ Add bycatch

Species: ma1 - Common/harbour seal  
Information: 1 pcs, 90 kg, 102 cm  
Images: 0

+ Add photo

Comment

**Save** **Cancel**

When adding a new catch the view to left is shown. From here the catch date and time, the position of the catch, and the catch details can be entered.

Which drop down lists are available to choose from and whether or not catch, discard or bycatch should be able to be entered, can all be customized by the scheme.

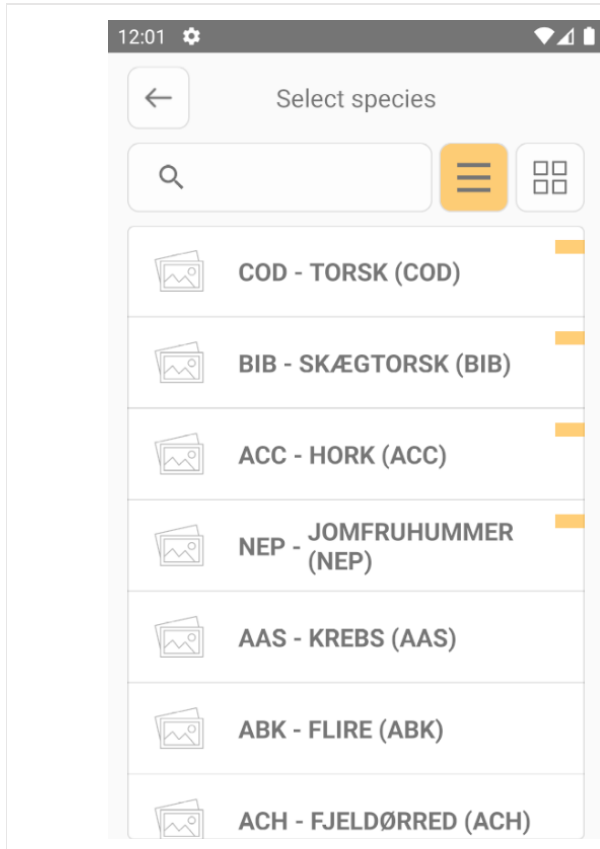
This means that if more drop down lists are required, some mandatory some not, these can easily be added.

The species list under Catch and Discard can be customized by the fisher to show the preferred species. This is done by pressing the "Add catch" or "Add discard" button to adding their desired species and pressing the small save button (the button with the disk icon) in the Catch or Discard header, to save the layout of the grid as default, for next catch registration.

Only one position is shown in the view to left. This is also determined by the scheme. A second position can therefore be configured, so registrations with a start and stop position is available.

At the very bottom of the view, one or more photos can be added (videos are also supported) and a comment given.

When adding bycatch (endangered) species, how many, their weight and the condition of the species can be entered.



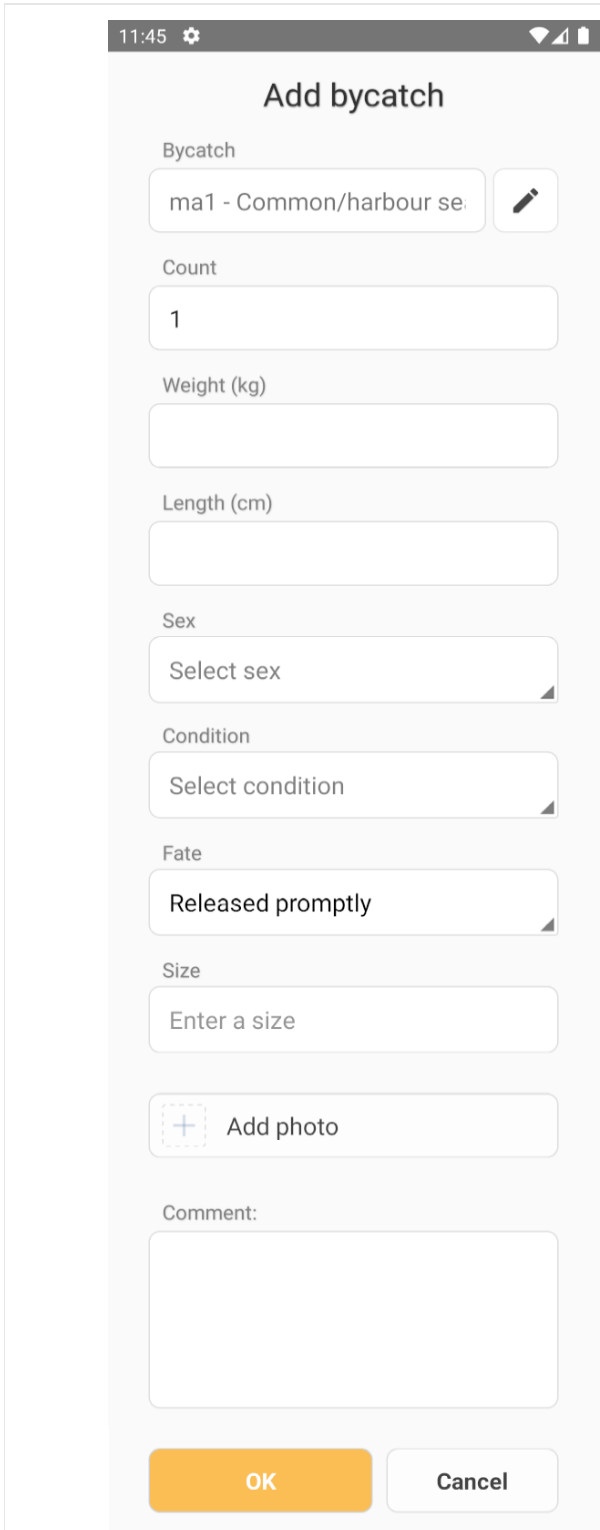
When adding a new species to the Catch or Discard table, the fisher selects from a list of species defined by the scheme.

The species that has an orange flag shown to the right of it, are the most used species, previously selected. This is so the fisher does not have to search through list to find his/her most used species, every time a new species is wanted added.

The species under the flagged ones are sorted in alphabetical order.

It's possible to search or code and name from the search textbox.

If an image has been defined for a species in the scheme, it will also be visible in the list.

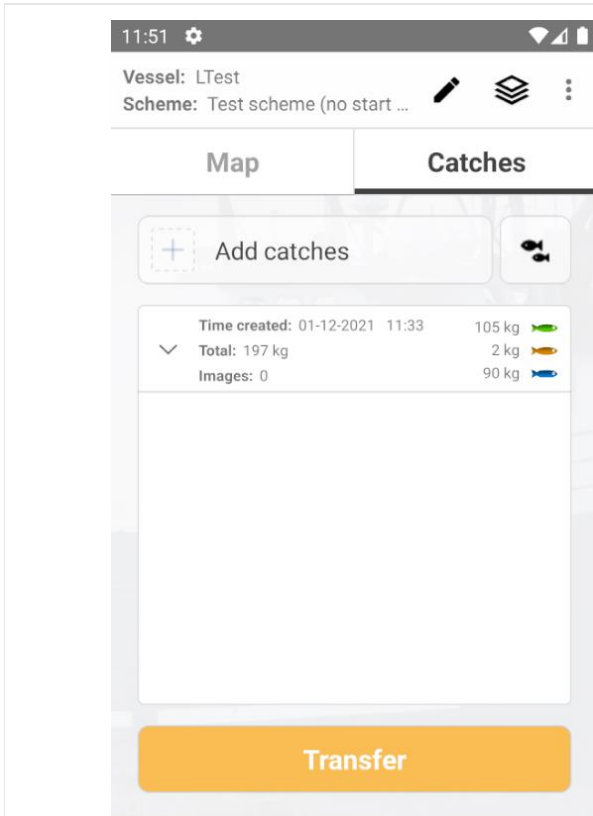


The screenshot shows a mobile application interface for adding a bycatch. At the top, the status bar displays the time 11:45, a settings gear icon, and signal/battery icons. The title 'Add bycatch' is centered at the top of the form. Below the title, there are several input fields: 'Bycatch' with a text box containing 'ma1 - Common/harbour se' and an edit icon; 'Count' with a text box containing '1'; 'Weight (kg)' with an empty text box; 'Length (cm)' with an empty text box; 'Sex' with a dropdown menu showing 'Select sex'; 'Condition' with a dropdown menu showing 'Select condition'; 'Fate' with a dropdown menu showing 'Released promptly'; and 'Size' with a text box containing 'Enter a size'. Below these fields is an 'Add photo' button with a plus icon in a dashed box. At the bottom, there is a 'Comment:' label above a large text area, and two buttons: 'OK' (orange) and 'Cancel' (white with grey border).

When the fisher adds a bycatch, the earlier shown screen where the bycatch species are listed is first shown. From that the fisher selects which species to add, which is then selected as shown in the view to the left (Common/harbor seal).

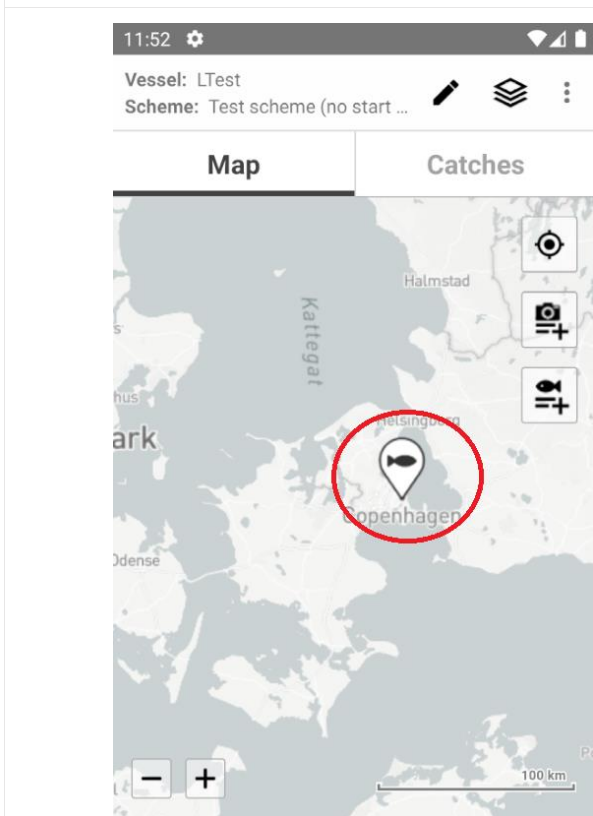
The fisher can then type in various information about the bycatch, add any photos wanted and a comment.

All the drop down lists and textboxes besides Count, Weight and Length, can be removed, redefined or more added determined by the selected scheme.



When the new catch is saved, it is available in the catches list, as shown on this view. It displays the kilos of the catch, discard, and bycatch and when it was created.

Pressing the item in the list, expands it to reveal more information about the catch and enables the user to edit or delete it.



Going back to the map view, the fisher can now see where the catches have been caught based on the position that was entered, when registering the catch.

The three map buttons in the top right corner of the map has the following functionality:

Button 1 – crosshair: Center the phones current position on the map.

Button 2 – camera with a plus: Add a point of interest (POI) at the current position with one or more photos or just a comment.

Button 3 – fish with a plus: Shortcut for adding a new catch instead of pressing the “Catches” tab and hereafter the “Add catch” button.