CleanAtlantic

Tackling Marine Litter
in the Atlantic Area

DELIVERABLE 5.1 Scientific and technical basis for data collection/ tools development in relation to needs
WP 5: Monitoring and data management

WP	5.1 MONITORING AND DATA MANAGEMENT
ACTION	1: DEVELOPMENT OF BESPOKE TOOLS
LAST UPDATED	19/04/2021
VERSION	1
AUTHORS	BRIONY SILBURN AND JOSIE RUSSELL
QUALITY CHECK	DAVE SIVYER (04/2021)
PARTICIPANTS	

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INDEX

ABBREVIATIONS:

- Cefas: Centre for Environment, Fisheries and Aquaculture Science
- Defra: Department for Environment, Food and Rural Affairs
- OSPAR: Regional Seas Convention (successor to the Oslo and Paris commissions)
- ICES: International Council for the Exploration of the Sea
- DATRAS: ICES database
- SLA: Service Level Agreement
- QC: Quality Control
- IBTS: International Beam Trawl Survey
- RV: Research Vessel
- AT: Applied Technology

Seafloor Litter App for Cefas Scientists

1. BACKGROUND

1.1. Seafloor litter monitoring at Cefas

Seafloor litter monitoring at Cefas dates back to 1992, when litter was noted as frequently present in the trawls collected as part of the annual established fish stock assessment surveys. All of the seafloor litter data collected on the RV Cefas Endeavour is opportunistically acquired during the scientific fishing activities already occurring and there is no dedicated trawling for the gathering of seafloor litter. As the catch is sorted into species for analysis, the litter is removed and logged following the OSPAR (Regional Sea Convention) and International Council for the Exploration of the Sea (ICES) guidelines. This includes categorising the litter type, describing and weighing each litter item, and identifying any attached organisms. Once the data has been recorded, the litter is disposed of using the ship-board waste stream.

Currently, Cefas has a Service Level Agreement (SLA) with Defra to lead on the reporting of seafloor litter in the UK (excluding Scotland). Seafloor litter is a marine litter indicator at both national and OSPAR level. Cefas lead the OSPAR Seafloor Litter Expert Group and use the data collected in the OSPAR region to assess seafloor litter. At Cefas we also contribute to the national assessments which feed information in for marine litter to the 25-year environmental plan for England.

An app to streamline the process of recording seafloor litter data was implemented 2019- 2021. The plan for the development of the app and the majority of the cost was funded by UK government, however Clean Atlantic also part-funded the project, in line with WP5 "development of tools to optimise data collection".

2. THE NEED FOR THE APP

2.1. Improving seafloor litter monitoring at Cefas

The primary focus for the seafloor litter app is to streamline the Cefas monitoring procedure. By reducing the burden on the survey scientists (to record the data on paper and then later input onto the database) data quality will be improved, the opportunity for transcription errors and ultimately, the time needed to QC the data is decreased. This will result in a stronger dataset for a reduced cost.

The reduced time and effort required due to the development of the app means that in future years more time can be spent on data quality improvements and compliance, national assessments of seafloor litter state and migrating the historical seafloor litter data into the DATRAS format currently being used.

The development of the app for Cefas scientists is seen as the first step, additional implementation beyond this are demonstrated in the 'Future uses, options and roadmap' section of this document.

2.2. ICES requirements for data submission

Annually, Cefas is required to submit the International Beam Trawl Survey (IBTS) fisheries and associated seafloor litter data to the ICES DATRAS portal. First the fisheries data must be uploaded, providing all the station metadata to the database. Consequently, the associated seafloor litter data can then also be uploaded and the database subsequently matches the datasets. As a result, the template for DATRAS data submission of seafloor litter has influenced the Cefas seafloor litter recording in recent years. In 2016, the standard Cefas template for the digitised seafloor litter data was changed to match the DATRAS template,

to enable easier data submission at the end of the sampling year. Moving forward, it is a key requirement of the ongoing seafloor litter monitoring at Cefas that all data be collected in compliance with ICES and DATRAS. The app will act as a tool, along with the associated database to make this possible.

3. APP SPECIFICATIONS

3.1. App requirements

The primary use for the app is for Cefas scientists on board the RV Cefas Endeavour to reduce the use of paper log sheets, streamline the data entry and reduce the time associated with data QC. Therefore, the main focus of the app requirements was based on the Cefas method of seafloor litter logging, which follows the ICES guideline for sampling and the OSPAR categories for seafloor litter, as much of the data is submitted annually to DATRAS.

The focus during development was on making the app simple for the user, reducing the number of times repetitive data was entered. e.g. station number and station code when entering multiple litter items form the same trawl. Another key requirement was integrating the photography of the items into the app as this currently happens separately during data logging. By integrating the image recording, utilising the built-in camera of the sampling phone or tablet, it is less likely that a user will miss label a photograph or forget to take it. Sample information boxes are mostly drop-down lists, forcing the user to conform to the required standard data recording format. All these functions will improve data QC and strengthen the database of seafloor litter.

Currently, after the seafloor litter is recorded on a paper log sheet, it must then be digitised by the sampler to allow for data QC and analysis. By entering the data directly into the app, the task of typing up the data is removed, reducing the risk of additional errors arising when transcribing the data. Additionally, this simplifies the data QC, as data exported from the app will be in a standard format with set headings and restricted cell content, making data compilation and manipulation simpler across surveys.

3.2. Implementation

The in-house applied technologies (AT) team at Cefas were tasked with the development of the app. Firstly, the app was storyboarded by the benthic marine litter monitoring programme lead, to ensure the order of data entry into the app matched the natural order of data logging by the sampler. A flowchart was also drawn up to demonstrate how the user needed to move between the pages of the app. This storyboard and flowchart were then provided to the AT department from which to build the primary version of the app.

3.3. App testing and modification

With each version release of the app, the benthic marine litter monitoring lead thoroughly tested the app for bugs, crash reports and ease of use. After each new release a test report was provided to the developers on what worked well and what needed improving. This was then discussed at a face-to-face meetings, before a new deadline was set for the next required release date, keeping in mind potential in-field testing opportunities.

4. CURRENT USABILITY

4.3. In-field testing

Once in a usable format, the app was tested in the field by the benthic marine litter monitoring lead on board the RV Cefas Endeavour in July 2019. The app was used on a waterproof tablet alongside the standard paper log sheets. This enabled a full assessment of usability, accessibility, ease of data input and image capture and, identify the immediate shortcomings. In addition, other survey staff unfamiliar with the app thus far were asked to attempt to enter a station of seafloor litter and provide user feedback.

A further field test was planned on board the RV Cefas Endeavour for September 2020, however, the survey was unfortunately delayed due to Covid-19 restrictions.

4.3. Current status (November 2020)

Currently, the app is in version 0.4.1 released at the end of August 2020. Test notes were returned to the AT department at Cefas and the next version release is being processed. This should be the final release, excluding bug fixes, with full functionality for the end user.
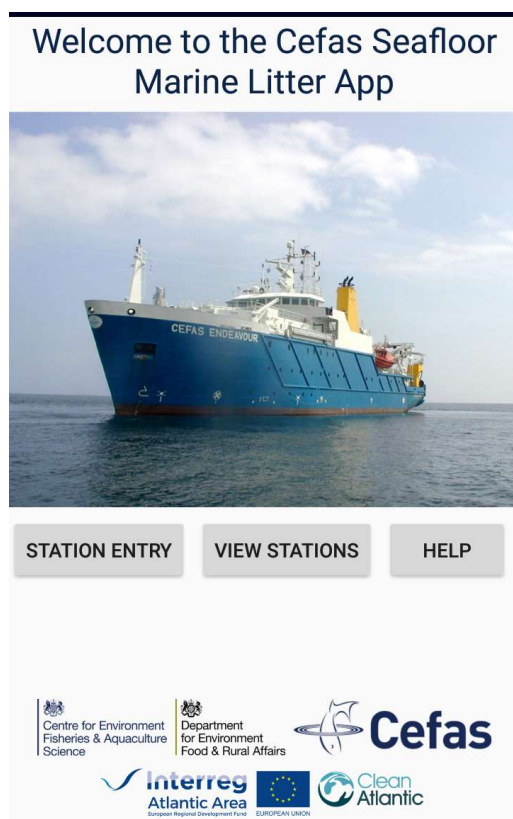

Figure 1: The opening screen to the Cefas Seafloor Litter app.

The design of an Cefas hosted database to upload data from the app and securely store data will allow for better data quality consistency, easier data exploration and inter-year comparisons. In addition, the database should be formatting in such a way that the data can easily be QC'ed, extracted and exported directly into the ICES DATRAS format for the annual submission. Development of the database is ongoing via the app will upload and store the seafloor litter data at the end of each survey. The database is multifunctional, allowing not only the upload of new data, but also the input of all historic seafloor litter data held at Cefas.

5. FUTURE USES, OPTIONS AND ROADMAP

5.3. Going forward

The plan for the next 12 months will see the seafloor litter app used on board the RV Cefas Endeavour on all fisheries surveys, alongside the standard paper log sheets. This will allow for litter recorders to get used to the app, but also not prevent data collection if it fails and allow them to report any user issues. It is hoped that after this transition period, we will move to solely using the app for all seafloor litter data collected on the RV Cefas Endeavour.

5.4. Future potential uses and development

Currently the app has been designed for Cefas staff and the data is uploaded to an internal database before it is QC'd and uploaded to DATRAS. There have been some discussions with Clean Atlantic partners and other OSPAR contracting parties about the possibility for the app to be adapted so it can be used external bodies as the protocol is harmonised e.g., partners of the OSPAR Coordinated Environmental Monitoring Programme. This may be possible, but it would need adapting, testing and discussions about the costs of maintaining the database and who is allowed access. Cefas could possibly share the building blocks of the app for others to use to develop their own, although this would also require resources to do so.

With some minor modifications, the app could be adapted for use by the Cefas fisheries observers, who regularly participate in trawling activities on onboard commercial vessels. Their primary role is to monitor the fishing activity for compliance in relation to species caught, species size, bycatch etc. However, with a simple and easy to use seafloor litter monitoring app, it could be requested that they additionally record the litter from the catches. This would require us to provide basic training, waterproof tablets for each participating observer for the recording of data and IT support for data download/submission once within range of an internet connection. Data QC would still need to take place by a marine litter expert.

A further extension of this could be to make the app available for use by the commercial fisheries community. This would, however, require some promotion, outreach and a call for volunteers. Training material and guidelines (such as the ICES seafloor litter manual) could be provided on request or linked within the app.