Real-Time Electronic Bycatch Reporting Pilot Project

A Proposal Prepared for the 2010 Sea Scallop Research Set-Aside

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By

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Project Summary

In order to better manage the limited access fleet during access to areas with a yellowtail flounder TAC, we are proposing development of a real-time electronic bycatch reporting system. The objective of this system is to have the fishermen report their yellowtail flounder and scallop meat weights real-time electronically to a database accessible by the Fisheries Survival Fund (FSF). Those data will then be made available to the entire fleet in order to alert the fishermen to hot-spot areas of high yellowtail flounder to scallop meat catch ratios. The fishermen can then make informed decisions regarding where to fish in order to avoid the yellowtail flounder bycatch, and possibly a premature closing of the access area. This is a pilot project, in the preliminary stages of conceptual and software development. The objective for this pilot project is to cover the opening of the Scallop Access Areas on Georges Bank starting in June 2010 in order to identify conceptual issues and potential usefulness to the fleet. Success with yellowtail may be the first step in using this real-time two-way communications and data system for dynamic area action programs for species such as loggerhead turtles.

Research Priority Addressed:

Priority 2: Evaluation of methods to reduce bycatch, specifically, identification and evaluation of methods to reduce groundfish, skate, and summer flounder bycatch.

Project Goals and Objectives

- To test the impact of near real time bycatch data in influencing fleet performance in remaining below allowable catch targets of yellowtail flounder in the 2010 Special Access Area fishery.

Project Management

Ronald Smolowitz, Matt Weeks	Project management, data analysis, reporting
Heidi Henninger	Software development
John Gauvin	Project consultant

All the participants will work closely with each other on all aspects of the project; the purpose of the above list is to indicate the key roles of the participants.

Project Duration March 1, 2010 to February 28, 2011

Background

Bycatch of yellowtail flounder in the scallop fishery is governed by a hard TAC when fishing occurs in the scallop special access areas on Georges Bank. On a number of occasions the bycatch TAC has been taken before the scallop TAC and the areas have been closed resulting in the loss of tens of millions of dollars in revenue to the fishery. As more fisheries are managed with hard TACs and/or Allowable Catch Limits (ACLs) similar problems will arise driven by the need for Accountability Measures (AMs) with summer flounder, winter flounder, and skates throughout the range of the fishery.

The Atlantic Sea Scallop fishery is managed through access to rotationally closed areas. These areas each produce high catch per unit effort of scallops, and are thus extremely valuable areas to fish. Three of these access areas, Closed Area I, Closed Area II and Nantucket Lightship are areas in which the scallop fishery is allocated a Total Allowable Catch (TAC) of yellowtail flounder, under the NE Multispecies Groundfish Fishery Management Plan. Once the yellowtail flounder TAC is caught, the area closes to scallop fishing. In three fishing years (FY 2006, 2008, 2009) NOAA's Northeast Regional Office has estimated that the yellowtail flounder bycatch TAC was reached before the vessels had completed their allocated trips. As a result, a total of 5,058,000 pounds of scallop meat worth approximately $35,406,000 were not harvested in the scallop access areas. In most cases these are larger scallops with higher natural mortality rates so a portion of this value is completely lost to the fishery.

In order to better manage the limited access fleet during access to areas with a yellowtail flounder TAC, we are proposing development of a real-time electronic bycatch reporting system. The objective of this system is to have the fishermen report their yellowtail flounder and scallop meat weights real-time electronically to a database accessible by the Fisheries Survival Fund (FSF). Those data will be processed and then be made available to the entire fleet in order to alert the fishermen to hot-spot areas of high yellowtail flounder to scallop meat catch ratios. The fishermen can then make informed decisions regarding where to fish in order to avoid the yellowtail flounder bycatch, and possibly a premature closing of the access area. There is great potential for a system of this nature that allows two way data communications with real-time processing. One can envision a system where oceanographic data is evaluated to identify loggerhead turtle hot spots, another bycatch species of concern, and a dynamic area management system utilized to re-direct scallop effort on almost a daily basis.

The primary contractor will be OLRAC. OLRAC was founded in 1989 by Dr Amos Barkai and Dr Mike Bergh specifically to provide support for the South African and international fishing industry. The company is composed of five sub- units covering a broad spectrum of varying expertise including: software development, data modeling, fishery science and stock assessment, and software marketing. OLRAC specializes in the implementation of sophisticated quantitative tools in fisheries science and management using a highly critical and pragmatic approach. In addition, OLRAC has rich experience in conducting logistically complex field operations involving large numbers of vessels. OLRAC adheres to strict timetables and deadlines in accordance with the needs and realities of the fishing industry.

OLRAC is a recognized global leader in electronic logging technology, with over ten years of elogging development experience. OLRAC has worked extensively with agencies, fishermen, and scientists around the world including; the United Kingdom, Holland, Poland,

South Africa, Namibia, Chile, Australia, the U.S. Northeast Offshore Lobster fishery, U.S. Gulf of Mexico reef fish commercial and charter fisheries represented by the Environmental Defense Fund, and the Canadian Department of Fisheries and Oceans. OLRAC was a partner in both the SHEEL (A Secure and Harmonized Electronic European fishery Logbook) and CEDAR projects in the European Union, and was recently selected by AFMA (Australian Fisheries Management Agency) to develop a data model and XML schema transmission protocol for the entire Australian Commonwealth fisheries.

Olfish-AOLA was established in June 2008 to market, sell, and provide technical services for the Olrac software suite called Olfish. Olfish-AOLA provides these services locally to U.S. and Canadian Markets. Olfish-AOLA is a subsidiary of the Atlantic Offshore Lobstermen's Association (AOLA). AOLA is a trade association of offshore Atlantic Ocean lobster fishermen, aimed at proactively addressing regulatory issues, with a focus on conservation, preservation and sustainability of the resource now and into the future. AOLA represents a large portion of the offshore lobster fleet and is a recognized leader and voice for the industry.

The Fisheries Survival Fund (FSF), which represents the vast majority of the limited access scallop fleet, and Cfarm have been and are continuing to explore multiple ways to reduce bycatch in the sea scallop fishery. Working with the NEFSC Fisheries Observer Program we have been exploring the near real-time use of observer data to inform fishermen of high bycatch areas. Due to a number of issues related to government privacy and data handling requirements this approach is not fast enough to get the type of data the fishermen need to make operational decisions on a real-time basis. Addendum A is a representation of an analysis the FSF had performed post-fishery for the 2009 CAII access area. This work leads us to believe that fishermen can make use of real-time data to reduce their bycatch of at least YT if not all species. A major component of this design effort is to work with industry from the very beginning to address questions of confidentiality between industry participants. We expect to pull together a diverse panel of FSF members to evaluate these issues to determine what data can be transmitted without generating concerns amongst industry participants.

System Components (see Addendum B for more detailed screen views**):**

Olfish Dynamic Data Logger (DDL): The DDL is a touch-screen ready application that captures data in real-time and/or after the fishing activity takes . The DDL can be linked to a GPS receiver and it incorporates a GIS utility for easy viewing of vessel movements and other operational fishing data, on a customizable chart display. The DDL is fully compliant with rigorous European Union reporting standards (EC doc 1566/2007).

There are three DDL versions: a vessel version, for use by vessels during fishing operations; a shore version that allows data from many vessels to be stored and visualized together, and a vessel lite version, for users seeking basic data logging and reporting capability only. The DDL uses numerous data entry forms and pre-populated, client specified, drop down lists to make data entry quick and reduce typos. The DDL is highly customizable and it can be easily modified to address vastly different data recording and reporting needs.

- An electronic logbook and reporting tool customized for each client
- Tracks fishing activities in real time using GPS/GIS technology

- Quick and accurate data entry via pre-populated drop down lists and data entry forms
- Great for any at sea data collection need - commercial fishing, recreational and charter fishing, fishery observers, scientists, and fishery managers
- Users can easily create and submit fishing reports required by fishing companies and compliance agents
- Securely transmit encrypted fishing reports via email, SatCom (VMS), or cellular technology. Works with many NOAA and DFO certified VMS providers, including: SkyMate, Boatracs, Faria and MetOcean systems
- Maintain fishing operation business records
- Easily query, organize, and display fishing records to track where and when fishing is best
- Modular, flexible system, with add on utilities that allow the user to do more with their data
- Built in feature ensure data integrity, authentication, and security
- Can run on rugged laptops and mini laptops (netbooks) - for data logging where you need it

Olfish Explorer: The Olfish Explorer enables users to view and analyze data stored in the Olfish database using a number of wizards and presentation platforms listed below. The Olfish Explorer is a powerful tool for conducting scientific analyses of collected data and for creating graphical representations and statistical models derived from the data set.

Table View

The Table View is a spreadsheet-like data matrix where data can be grouped, filtered and organized to create an infinite number of reports which can be printed and/or saved as an Olfish native file, an HTML document, CSV file, or Excel spreadsheet.

Graph View

The Graph Viewer provides tools to visualize selected data series from the dataset displayed in the Table View. Graph styles supported include bar, line, pie and scattered point graphs. The Graph View includes a graph wizard component which guides the user through the setup and configuration of the graphs. Using the Graph Viewer the user can save graphs and export them as digital images.

Chart View

The Chart View is a GIS component that plots selected data statistics from the table viewer onto a digital map. These coordinates are loaded automatically every time a table report is generated. The Chart View, like the Graph View, includes functionality to save charts, and to convert charts to bitmap images. With the chart view users can create different geographical charts based on filtering criteria set by the table viewer. Multiple charts can be saved and easily recalled and overlaid using the Chart Viewer layer mangers.

Olfish-ERS Web Application: The Olfish Web Application is a full featured shore based management system, which manages and stores reports from up to 1000 vessel DDLs. The Olfish Web Application also allows permitted user to log in to see data, summary statistics, and/or maps from anywhere in the world, if internet access is available. The Web Application can also forward reports to regulatory agencies or allow those agencies direct access to these data through the web portal. Additionally, the Web Application provides users a means to enter data directly, if so they wish, without the need for a DDL. The Web Application can be customized to allow for enumerable communication and data dissemination options.

Statement of Work

This is a pilot project, in the preliminary stages of development. The objective for this pilot project is to cover the opening of the Georges Bank Special Scallop Access Areas in 2010: access areas that have in the past closed to fishing due to the bycatch of yellowtail flounder. We are targeting the use of six Limited Access permitted scallop vessels during the pilot project which will be representative of the fleet fishing in the NLSA during the project period. The systems will be installed and tested on several trips prior to the opening of the access areas, in order to train the fishermen and to work out any system problems. Captains will be asked to log yellowtail flounder and scallop catch weights, on a tow by tow basis, and to report daily and possibly more frequently. The data will be transmitted via the VMS – Vessel Monitoring System to a database managed by the FSF. The FSF will be analyzing the data real-time during the pilot project, in order to provide feedback to the fishermen and fleet managers. The analysis will include the creation of maps that illustrate the hot-spot areas and transmitting those real-time to the fishermen at sea. If this pilot project is successful, the objective would be for the entire fleet to be operational with the system by 2012.

The objective of Olrac and Olfish-AOLA, in partnership with the Coonamessett Farm Foundation, is to develop and implement an Olfish based real-time electronic bycatch reporting system for the scallop fleet. The aim of this system is to have the fishermen utilize Olfish Vessel DDLs installed aboard their vessels to capture their yellowtail flounder and scallop meat weights electronically in real-time. The Olfish Vessel DDL will be linked to onboard VMS (vessel monitoring system) units, allowing for the near real-time transfer of catch data to a Shore DDL accessible by the Fisheries Survival Fund (FSF). Those data will then be made readily available to the entire fleet via communication of the Shore DDL with the Vessel DDL, in order to alert the fishermen to areas of high yellowtail flounder to scallop meat catch ratios. The fishermen can then make informed decisions regarding where to fish in order to avoid the yellowtail flounder bycatch, and possibly a premature closing of the access area. In conjunction with this initial phase of software design, industry members will meet and be polled to discuss data concerns regarding fleet wide dissemination of data that originates from a few vessels. This has been a major issue on the west coast but industry consensus was gained.

Olrac and Olfish-AOLA identified three different Olfish solutions to meet the needs of the scallop fishery. This proposal puts forth the third, most complete solution, but describes all three below for comparison purposes. The development period will be three months (March 2010 - May 2010) and the testing and installation period will be one month (June 2010).

1. The most simple of the three proposed solutions, this solution would utilize Olfish Vessel Dynamic Data Loggers (DDLs) with integrated satellite connectivity, and an Olfish Shore DDL to provide a data collection, transfer, and analysis solution. The Olfish Shore DDL will allow the manager to store and visualize data from all of the vessels in tandem. Analysis of these data to pinpoint high and low bycatch areas and to create and send charts of these areas to the fleet will be a manually driven process within the Shore DDL.

2. The moderate solution would utilize the Vessel and Shore DDL products as described above, as well as the Olfish Explorer. With the Olfish Explorer utility added to the Shore DDL, the manager will have access to more sophisticated data analysis and graphing tools and will be able to more rapidly and more automatically perform bycatch analyses. Using the Explorer's sophisticated predictive models; the manager will be able to create maps of not only known bycatch hot spots, but also predicted hot spots.

3. The most sophisticated of the offered solutions which we are proposing to utilize would utilize the Vessel and Shore DDLs and Olfish Explorer as outlined above, as well as the Olfish-ERS Web Application. The addition of the web application provides enhanced communication and data dissemination options. Access to the Olfish Web Application is controlled by user access settings, which allow permitted users to see all or a subset of the fleet's database and generated charts and reports. The Olfish Web Application also allows users to enter data directly, rather than use the DDL, when and if required, and can allow for party agencies to either log on to see certain data or be automatically forwarded specific reports. The Olfish Web Application will be a highly valuable data storage and communication tool when the entire scallop fleet implements real time bycatch reporting, and will provide an easy and secure means to report mandatory information to State and NMFS agents and to allow fishing companies to view and manager their vessels' efforts.

Should this proposal "**Real-Time Electronic Bycatch Reporting Pilot Project – Sea Scallop Industry RSA"** be successfully funded, the Coonamessett Farm Foundation will subcontract the services of Olrac/Olfish-AOLA for the period of March 1, 2010 to December 31, 2010 and will have licensed rights to customized Olfish products for the six month period of June 15, 2010 – December 15, 2010. This work will be overseen by Heidi Henninger. Ronald Smolowitz and Matt Weeks will be the primary interface with the scallop fleet and arrange for equipment installations and training. They will also oversee all the data processing. John Gauvin has been working with the west coast fleets addressing the same issues and will be utilized as a consultant to this project reviewing overall concepts and direction.

The largest problem we may face is the accuracy of the data entered by the fishermen into the system. Comparisons with observed trips show that scallop catch data is very accurate but bycatch data is very poor. We have found that even with trained observers, estimating fish bycatch in a pile of scallops does not work. The fish must be sorted out and counted. We have trained scallop crews to do this work on compensation trips where we have been doing gear comparisons. Once a crew is trained the process works very smoothly. We plan to train all participating crews on catch sorting and reporting.

A final report will be submitted upon completion of the project. Ronald Smolowitz is the Technical Advisor to the Fisheries Survival Fund (FSF), the primary industry organization for the vast majority of the limited access sea scallop fleet. The results of this

project will be disseminated to all members of the FSF. An article will be prepared for Commercial Fisheries News and a publication will be prepared for the peer reviewed literature as results warrant.

Vessels will be installed with the Olfish-DDL software which will allow for daily catch and effort reporting. This could be at the statistical area level or could included more detailed location information. This could include all species hauled or just scallop and yellowtail.

Currently, we are working on a pilot project to test electronic VTRs in the groundfish fleet. We could build the scallop DDL with the same functionality, which would position the fleet well for reporting eVTRs once they are certified by the RO. In essence, one data entry point to do mandatory reporting as well as bycatch reporting and other scientific reporting.

Shore - Olfish-RMS (previously the Olfish-ERS). The Olfish-RMS (report management system) will be able to automatically analyze individual vessel reports and merge them to create a daily fleet report of high and low bycatch areas. This report would be sent back to the vessels either to their VMS addresses or directly into the Olfish-DDL. The Olfish-RMS can also act as a independent database for fleet data, outside of NMFS. The Olfish-RMS also has a website application which will allow various user groups to access subsets of data, reports, and graphs.

In order to fully spec. out and develop the RMS and DDL we will likely need 6 months. That will leave us the rest of the year to field test in open waters. Once the product is fully developed and tested, the fleet will be able to purchase annual licenses for the shore and vessel solutions.

Vessels

We will select six vessels with FSF input that will be representative of the diversity of the fleet that will have trips into the NLSA in 2010 and are interested in testing this system. Currently, these trips can not be identified as they have not been set and are tradable. The vessels will follow all existing regulations on handling and reporting fish catch.

Specific Exemptions Requested: None

Sea Turtle Handling

Any sea turtles brought aboard that are comatose or inactive turtles shall be handled in accordance with Sea Turtle Resuscitation Regulations at 50 CFR 223.206(d)(1). Sea turtles that are actively moving shall be released by the crew of the vessel over the stern of the boat when gear is not deployed and engine gears are in neutral position, in areas where they are unlikely to be recaptured or injured by vessels. When possible live injured turtles will be transferred to a cooperating U.S. Coast Guard Vessel and delivered to an authorized rehabilitation facility. Loggerhead turtles injured within 36 hours of anticipated return will be brought in to the dock, unless arrangements can be made for a U.S. Coast Guard vessel to pick up the animal. All sea turtle interactions will be reported.

Addendum A

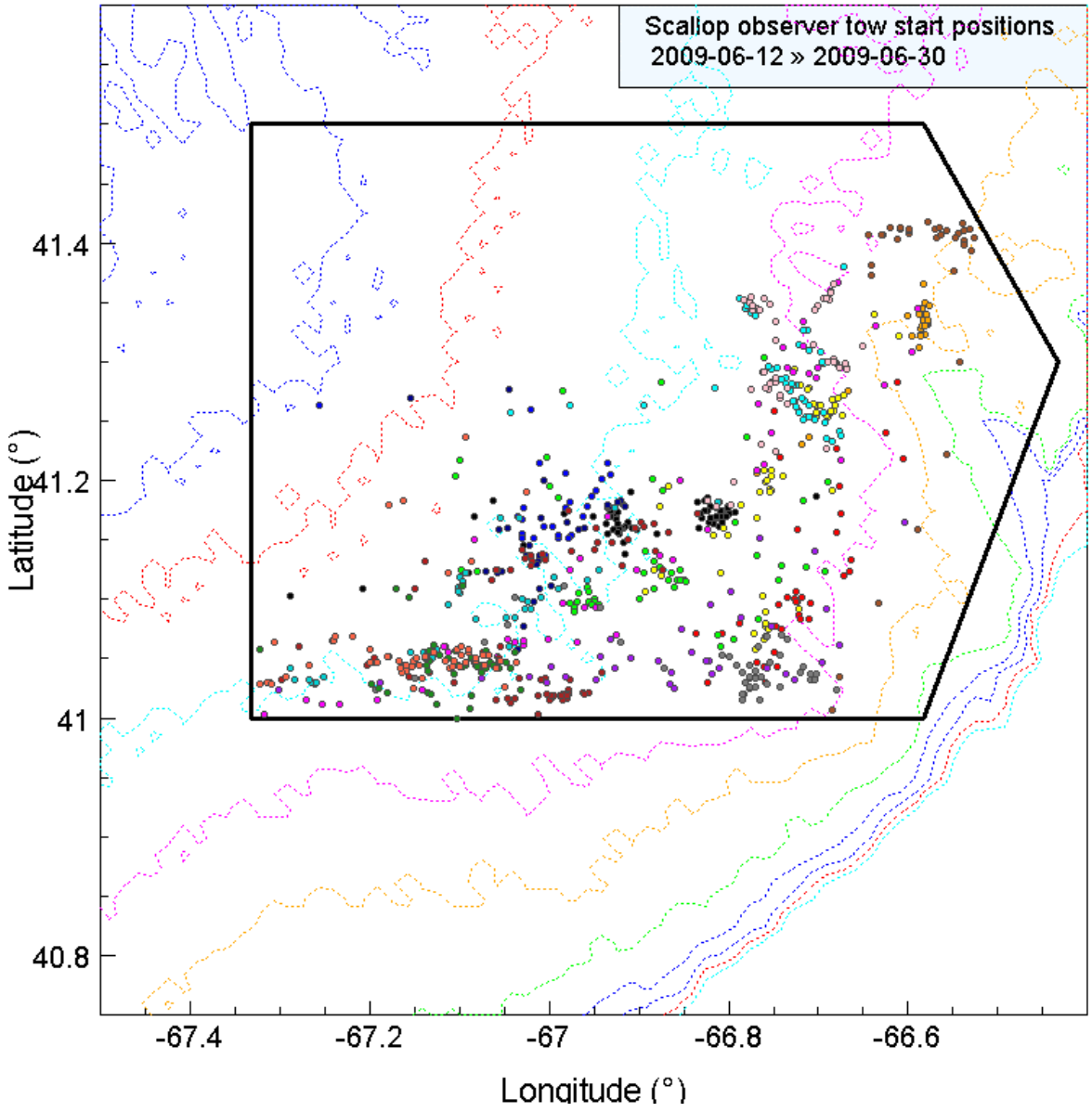

Figure 1. Locations of tows covered by the scallop observer program for 18 vessels in June 2009. The starting tow positions have been plotted and the contours represent the approximate bathymetry, ranging from 40 m depth in the upper left (northwest) corner to 140 m, the deepest contour on the lower right (southeast) corner.

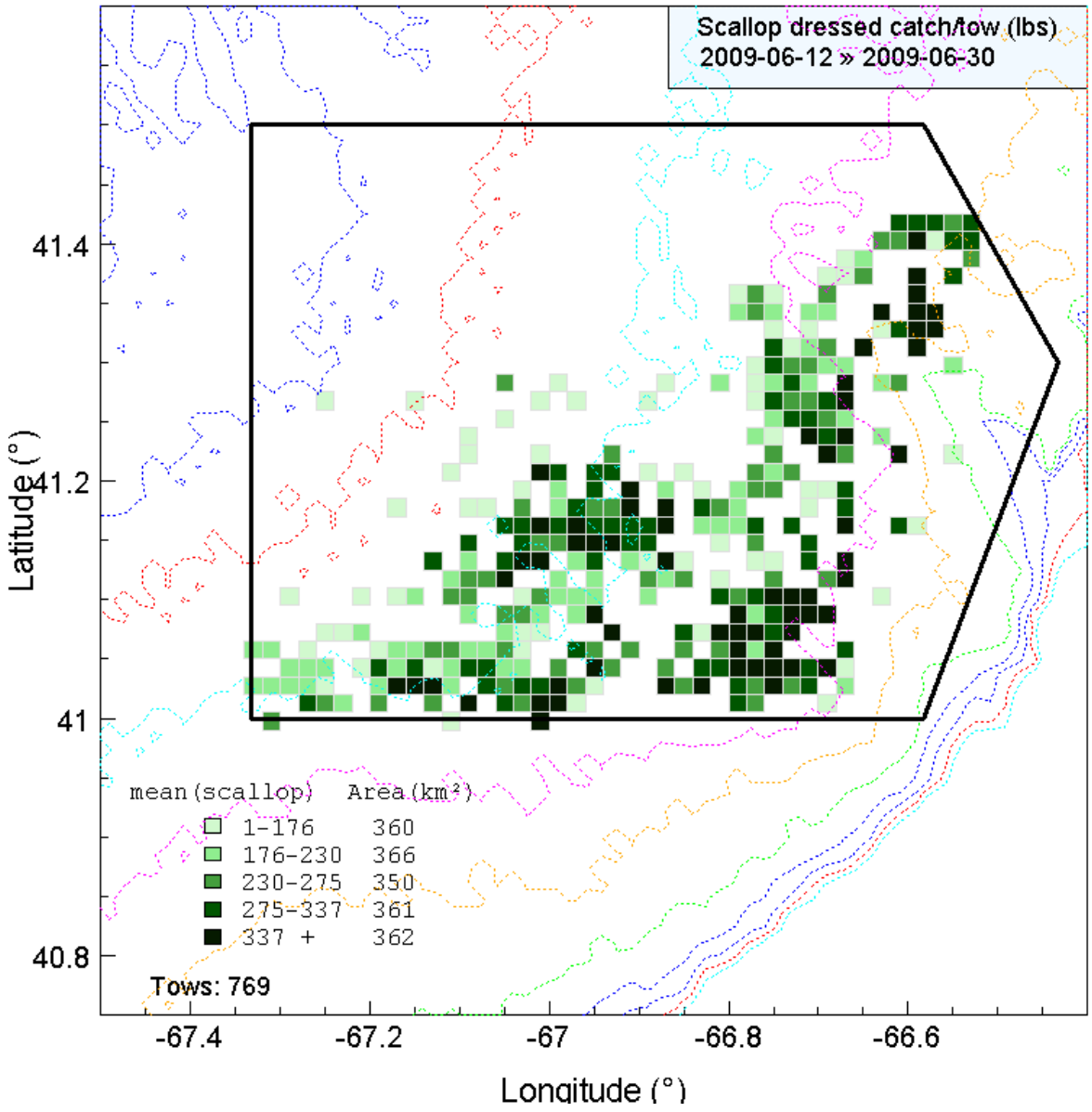

Figure 2. Density grid for dressed scallop catch from observed tows with valid latitude (Y) and longitude (X) positions. The depth contours are as described for Figure 1. The grid size is approximately 1.6 minutes of longitude by 1.2 minutes of latitude.

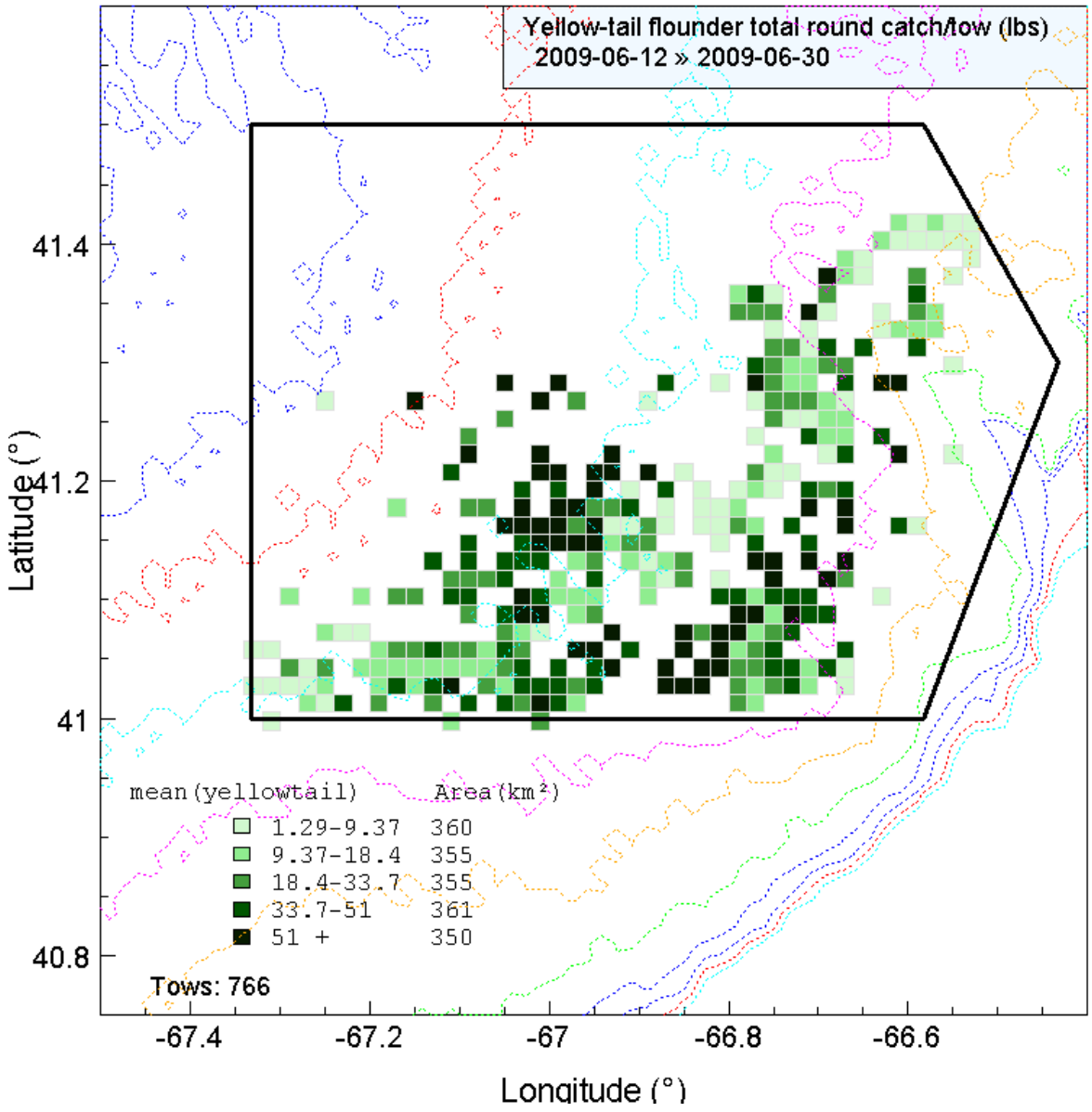

Figure 3. Density grid for round yellow-tail flounder catch (discard+landed) from observed tows with valid latitude (Y) and longitude (X) positions. The depth contours are as described for Figure 1. The grid size is approximately 1.6 minutes of longitude by 1.2 minutes of latitude.

Addendum B

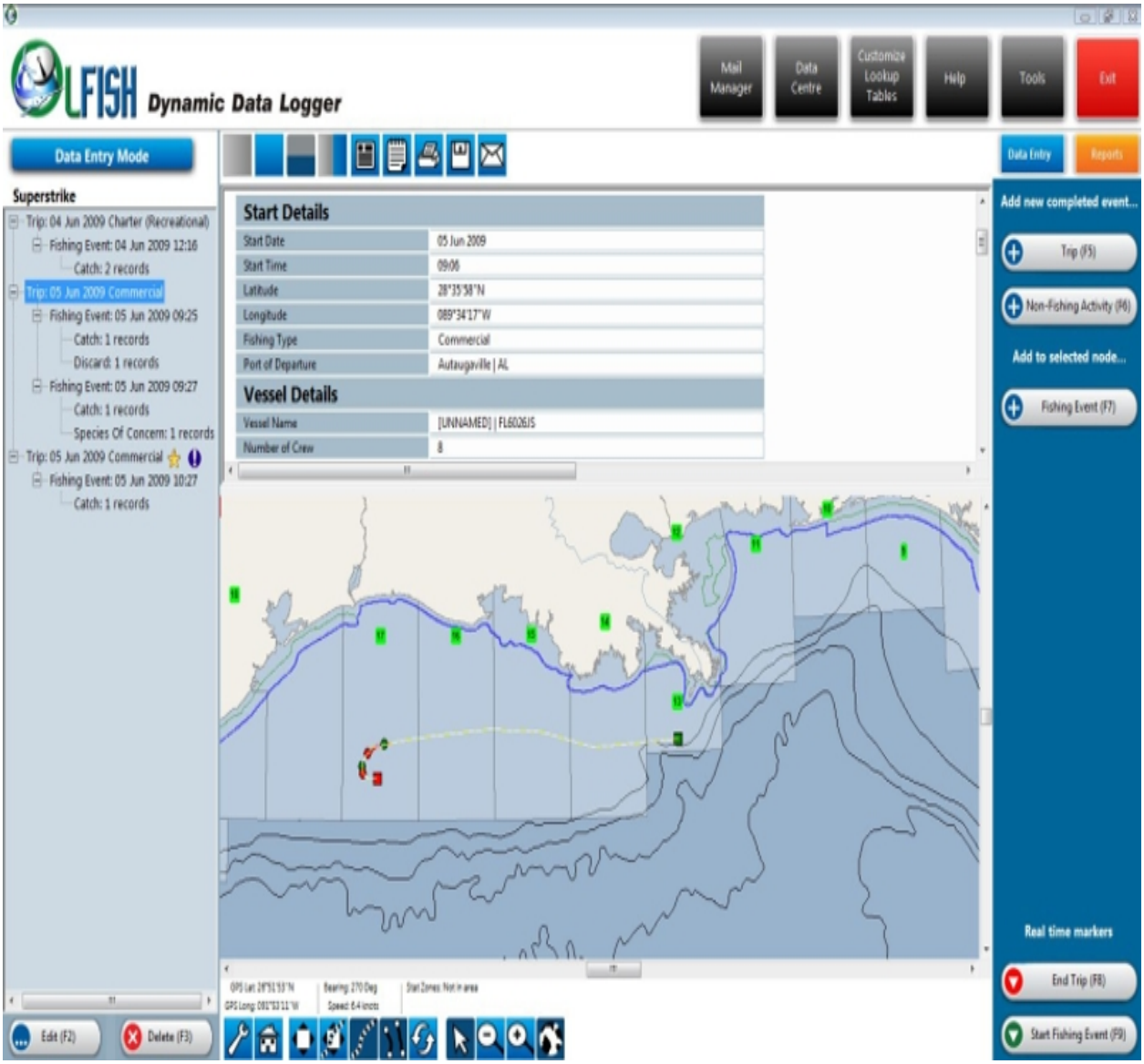

Figure 1. The Dynamic Data Logger's main user interface includes from left to right: A data tree, for quick access to prior and ongoing trip information; A browser/mapper window, which is linked to the data tree and displays and allows for editing of selected information textually and geospatially; and action buttons for data entry and data reporting. Access to further functionally is found in the top tool bar.

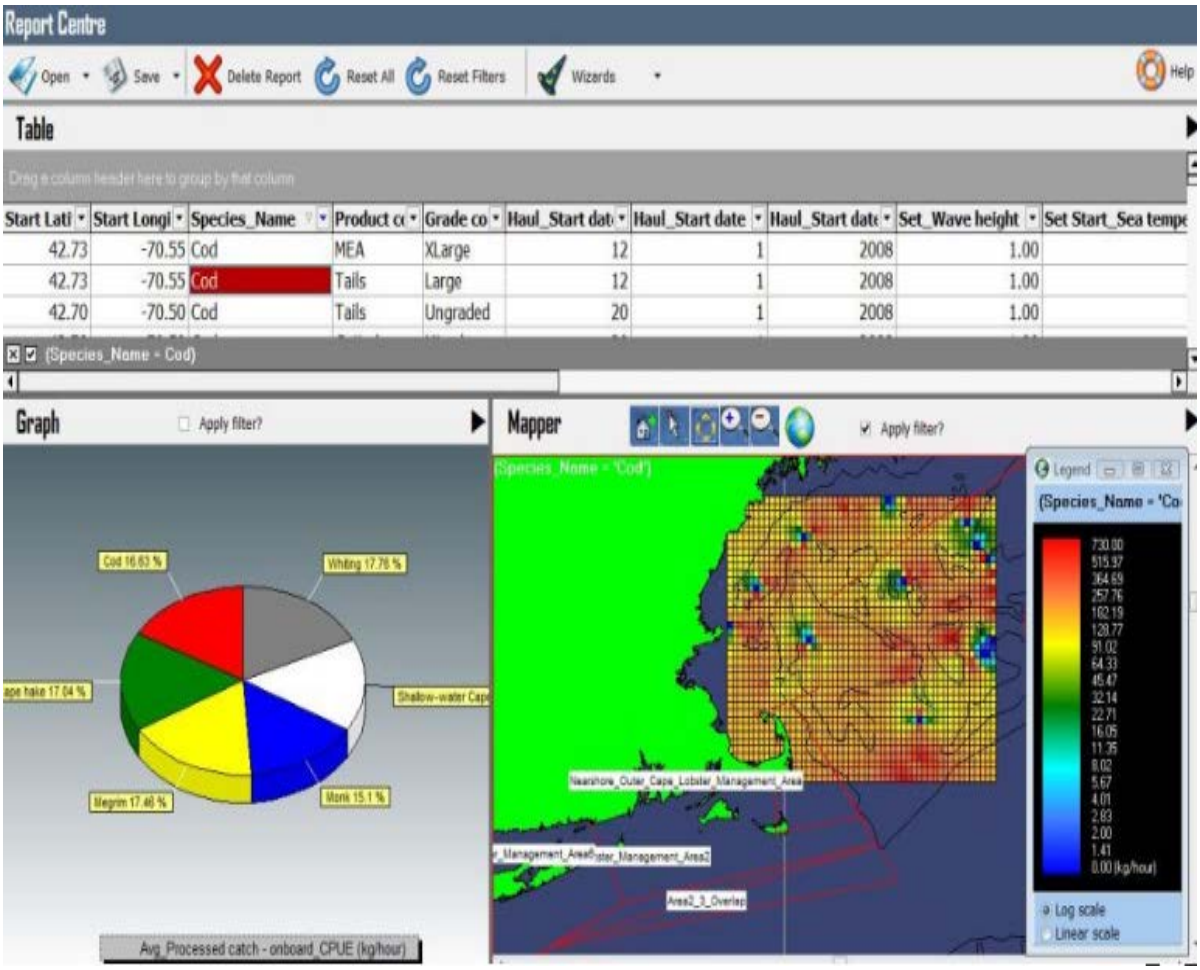

Figure 2. The Olfish Explorer allows the user to concurrently view data in table, graph, and chart format. All three displays are linked, such that filtering and sorting that occurs in the table display will automatically be reflected in the displayed charts and graphs.

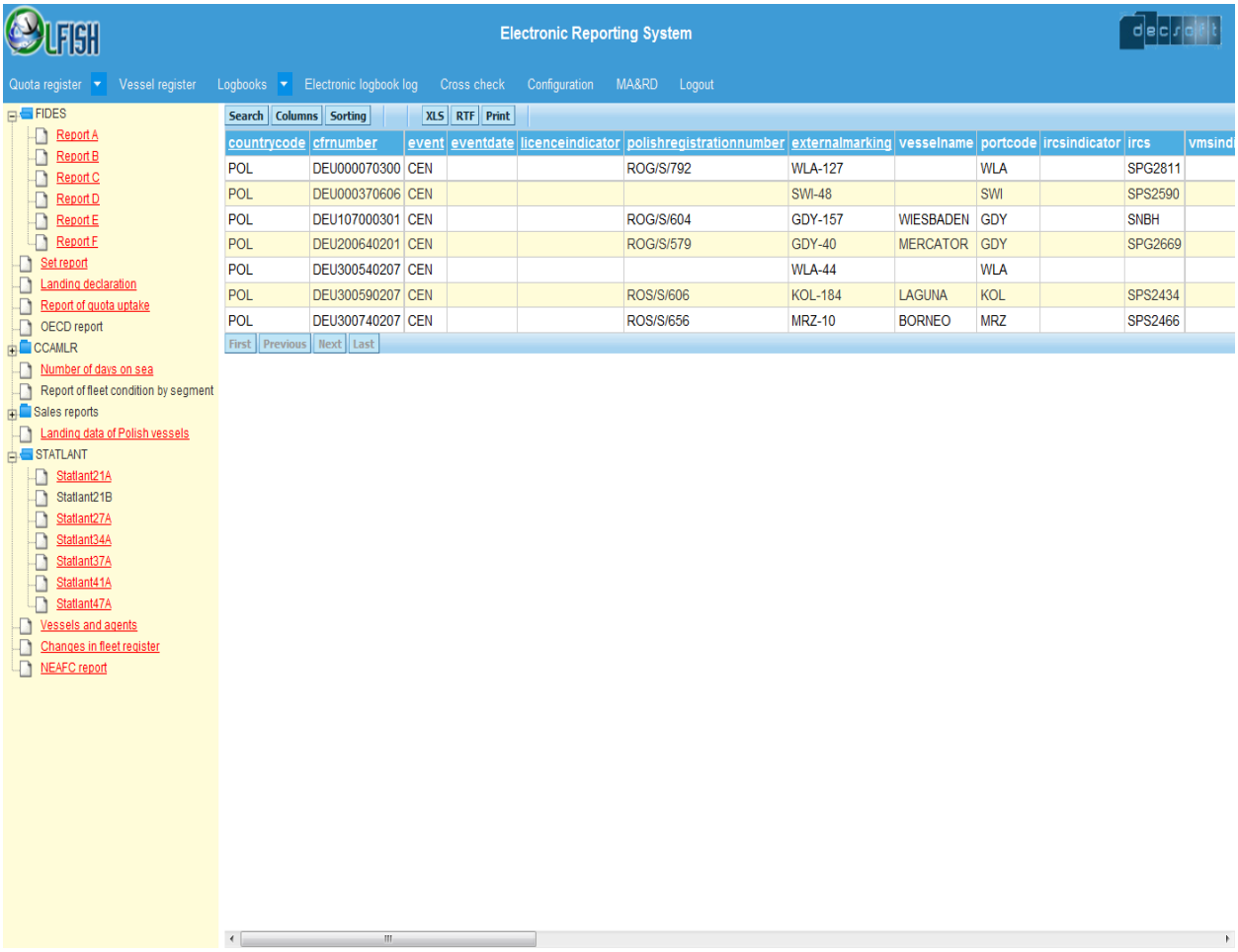

Figure 3. The Olfish-ERS Web Application allows for a sophisticated data storage, report management, viewing and analysis system accessible via the internet. The Olfish-ERS is designed to act as the central "hub" for complex electronic reporting systems.

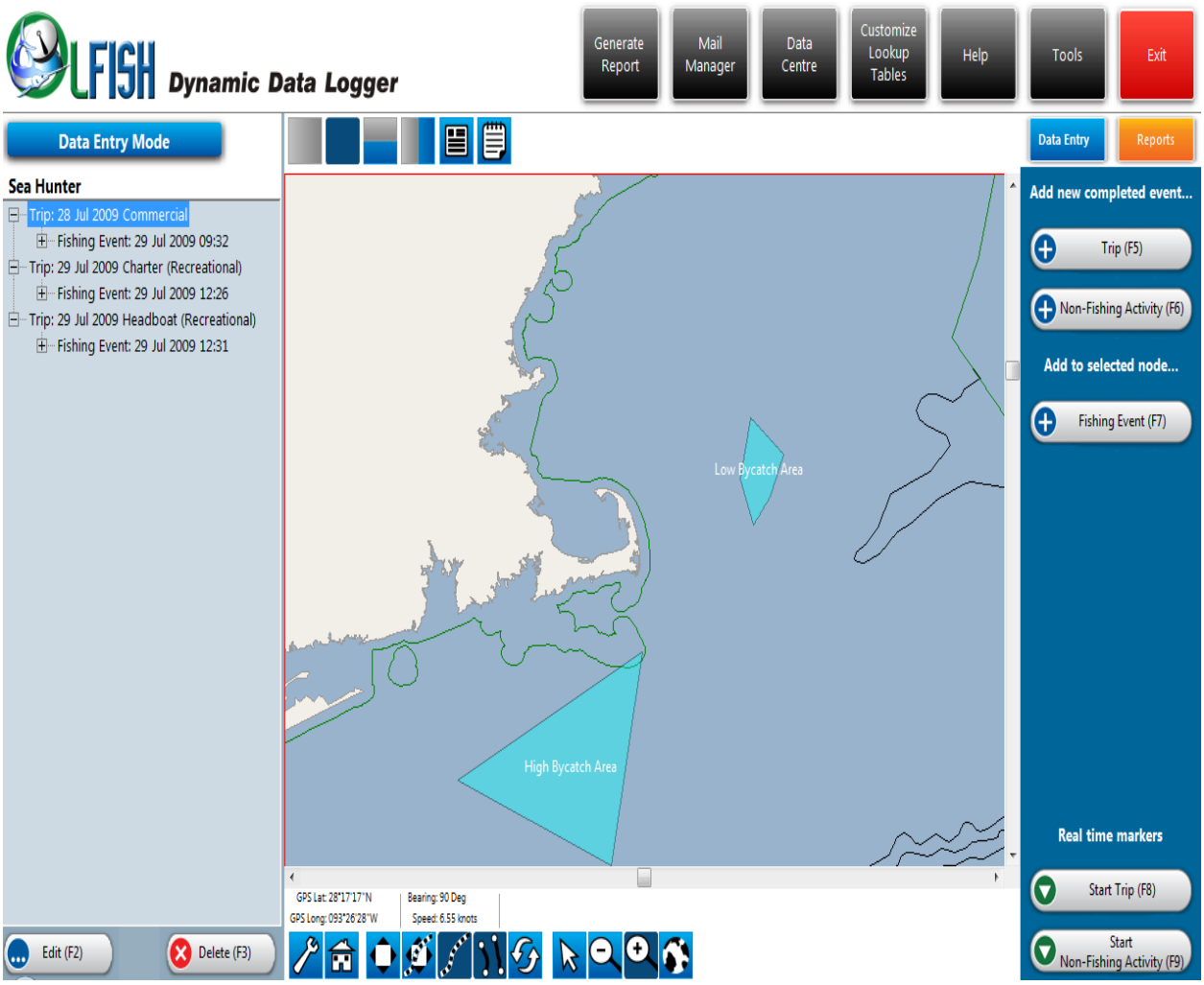

Figure 4. The Dynamic Data Logger allows users to create their own user defined areas and to display these areas on the DDL's Mapper. Areas created on the Shore DDL can be transmitted and viewed by the Vessel DDLs

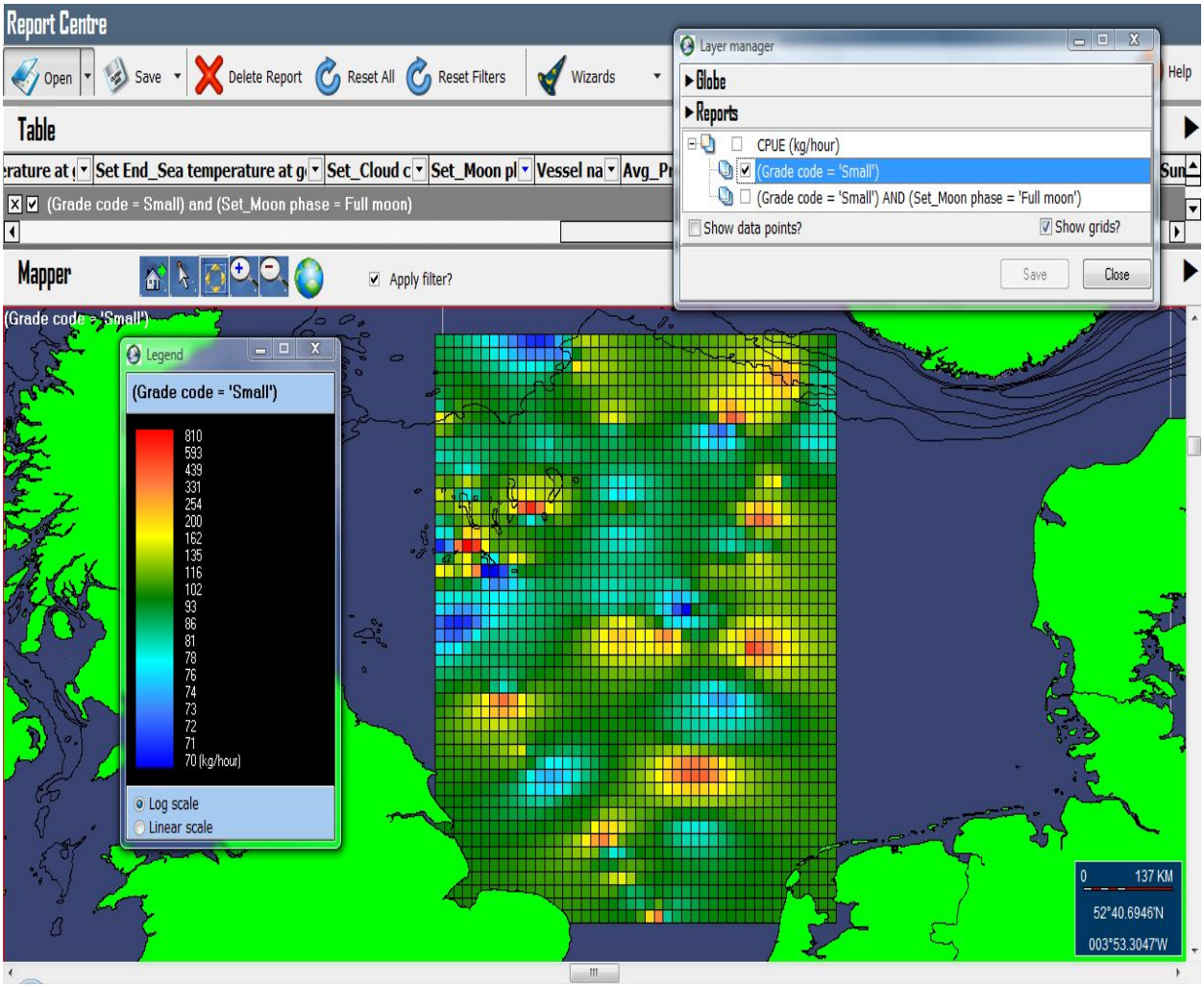

Figure 5. The Olfish Explorer uses statically based data models to extrapolate data to create graphs of both known and predicted catch and by-catch levels.

Figure 6. This figure shows the proposed data flow diagram for the scallop fleet. As it is presented it represents Solution 3 outlined above.