A novel, spatially based, real-time software solution for the avoidance of "choke" bycatch species

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Background

In order to collect higher quality fishery-dependant data, the Northeast US limited access scallop fleet needed to develop a real-time electronic bycatch monitoring and reporting system. The objective of this system is to have the fishers report their bycatch and scallop catch real-time electronically to a central database. These data will then be anonymized and made available to the entire fleet in order to alert the fishers to areas of high bycatch CPUE areas. This would allow fishers to make informed decisions regarding where to fish in order to avoid or reduce the yellowtail flounder bycatch, and possibly a premature closing of the access area.

The Approach

In collaboration with The Coonamessett Farm Foundation Inc. (CFF), OLSPS was contracted to develop and customise its existing Olrac eLog technology to create a real-time electronic bycatch reporting system for needs of the US Scallop fleet. The Bycatch Avoidance solution was designed to change the way stakeholders collect fishery data in order to maximize catch and minimize bycatch, while increasing productivity throughout the industry. The software developed was designed to allow for data collection at sea, real-time data transfer to shore, and subsequent data transfer back to the vessel to notify fishermen of bycatch rates.

The Bycatch Avoidance solution was comprised of two software components. These were:

1. Olrac–Dynamic Data Logger (OlracDDL) – an on-board, GIS-based, vessel unit which is used to record catch and effort data and send reports to the shore.
2. Olrac–Dynamic Data Manager (OlracDDM) – A web-based reports management database, used to aggregate and analyse reports sent from the OlracDDL and transmit bycatch reports back to the fleet.

The system was designed so that fishers would only need to manually input a minimal amount of catch information in order to determine discard rates and total catch volume. Data collected by fishers on the OlracDDL included scallop catch weights, discards of several commercially important species, dredge specifications, as well as weather and tow information. In addition to these data collected, the Bycatch Avoidance solution allows for easy data collection of many other related data including of operational, biological and environmental fishing data.

After receiving data from the vessels via the OlracDDL, the OlracDDM analysed and extracted bycatch ratios for different periods of time (i.e high bycatch areas for the past day, week, or month). These ratios produced a collection of coloured boxes identifying bycatch hot spots. These data were then anonymized and made available to the entire fleet in the form of high density CPUE bycatch maps, alerting fishers to areas of high CPUE for bycatch species (Figure 1.). This allowed fishers to make informed decisions on future fishing operations in order to avoid or reduce the occurrence of yellowtail flounder bycatch, and possibly a premature closure of the fishing areas.

Additionally, as part of the OlracDDM, a web-based interface was provided, which permitted designated users to view data sent to shore from the fishing vessels. Scientists, fishermen, regulators

and other users of scallop fishery data could log in remotely to the server at CFF and access the collected data at any time.

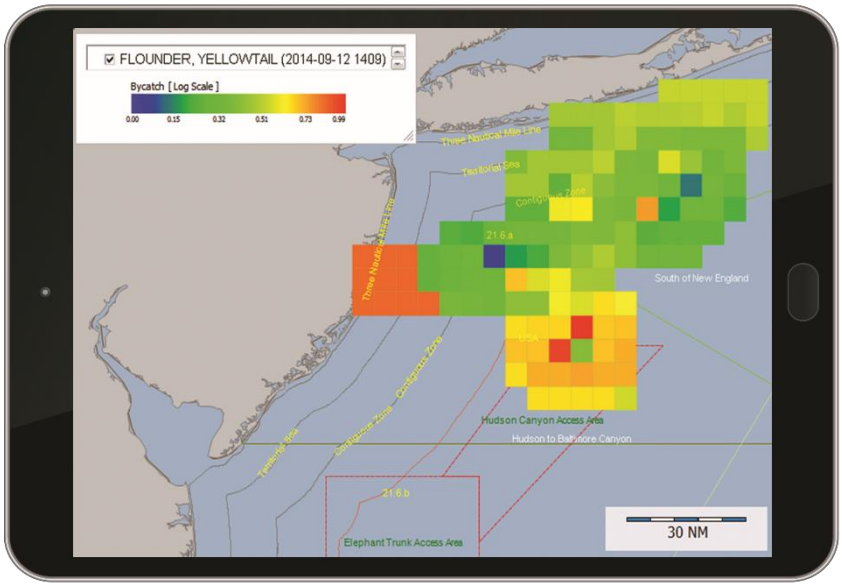

Figure 1: Example of bycatch map sent to the vessels at sea to inform fishermen of areas of low to high bycatch for all areas of scallop fishing activity

Implementation

The Olrac software was successfully installed on fifteen pilot-program vessels. Before embarking on a fishing trip, the captain and mate of each vessel were trained on how to use the software. Data for over 1095 tows was successfully recorded. Following the initial trip, CFF researchers met with the captains to debrief and receive insights on how better to optimize the software, how best to train future captains, and address issues that arose while at sea collecting data.

While the data collected and transmitted by the fifteen vessels does not accurately represent the fishing behaviour of the entire fleet, analysing the incoming data successfully demonstrated the potential for this program for both industry and management.

The Olrac bycatch avoidance system passed all field tests and is now ready for large scale deployment across the entire scallop fleet.