FIS024 PROJECT UPDATE

SMARTRAWL: Technology for trawl selectivity

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Unwanted by-catch and discards of fish are a global concern, threatening the sustainability of fisheries through economic, biological and ecological losses. Fisheries across the world must reduce the catch of unwanted fish species or sizes as part of sustainable fishing practices. Consequently, a key objective of the EU's Common Fisheries Policy is the elimination of discards in all EU fisheries, termed the Landing Obligation - all vessels are required to land all catches of all quota species unless an exemption applies. A policy against discarding will likely be retained under Brexit, not least due to market expectations for sustainable fish products.

Profound changes in Scottish fishing practices are required at the vessel level to reduce catching unwanted species and/or certain sizes of fish in mixed fisheries. The Scottish fishing industry needs practical, effective solutions to prevent unwanted bycatch, such as using selective gear to better match catch composition with available quota.

Since 2016, the University of Aberdeen and Fisheries Innovation Scotland have been developing technology solutions to allow in-water identification and grading of fish. The latest project took the next steps in developing and testing at sea this highly innovative gear to allow skippers to select species and size in the trawl.

The Smartrawl system uses a stereo camera with lighting in the trawl extension to obtain high quality images of fish traversing into the cod-end through the trawl net. These images will be analysed by an onboard computer to determine the size and species of the fish. A signal is then sent to a "gate" located in the trawl extension to catch or release the fish: if an unwanted fish is identified, a signal is sent to open the gate and the fish is released back into the wild; if the fish is wanted, a signal is sent to close the gate and the fish passes into the cod end to be captured.

The project team has now built the essential first components of the Smartrawl: an autonomous underwater stereo camera incorporated into a frame to deploy it into a trawl, and a prototype gate. Scale models of the gate were deployed in flume tanks to test different aspects of the gate design and operation. The gate is subject to a patent application to ensure that the Smartrawl system can be accessible by Scottish fishers, and so limited details can be divulged at this time.

Ultimately, the objective of the Smartrawl is to develop a highly selective device which allows fishers to not only comply with the Landing Obligation, but also to protect vulnerable species such as sharks and rays and, vitally, to allow fishers to retain commercially valuable and legally permitted species.

The steps towards Smartrawl

Phase 1 FIS011 introduced the Smartrawl concept of an innovative trawl design with a stereo camera to identify and size fish in the trawl extension, and a gate to release unwanted catch. The report was completed in 2017 and is available on the FIS website.

Phase 2 FIS024 developed the stereo camera system and gate prototype, and began collecting stereoscopic images to understand how fish appear in the trawl. This phase ran from June 2018 to Spring 2020.

Phase 2.5 FIS received Scottish Government grant funding to progress specific components of Smartrawl by acquiring, adapting and testing a second stereo camera and the underwater modem to transfer data from the camera to the bridge of a trawler. This project will complete in Autumn 2020.

Phase 3 FIS034, beginning now and completing in December 2021, will bring the component pieces of the Smartrawl system together.

Phase 4 The final phase of the Smartrawl project will seek to complete image analysis and make iterative improvements to the system based on extensive field testing.

Photo 1 The unique camera system was tested at sea on the Scottish fishing vessel Sparkling Star, a mixed demersal trawler typically targeting whitefish, prawns and squid.

Photo 2: Skipper of the Sparkling Star tying the camera frame to the inside of the trawl extension
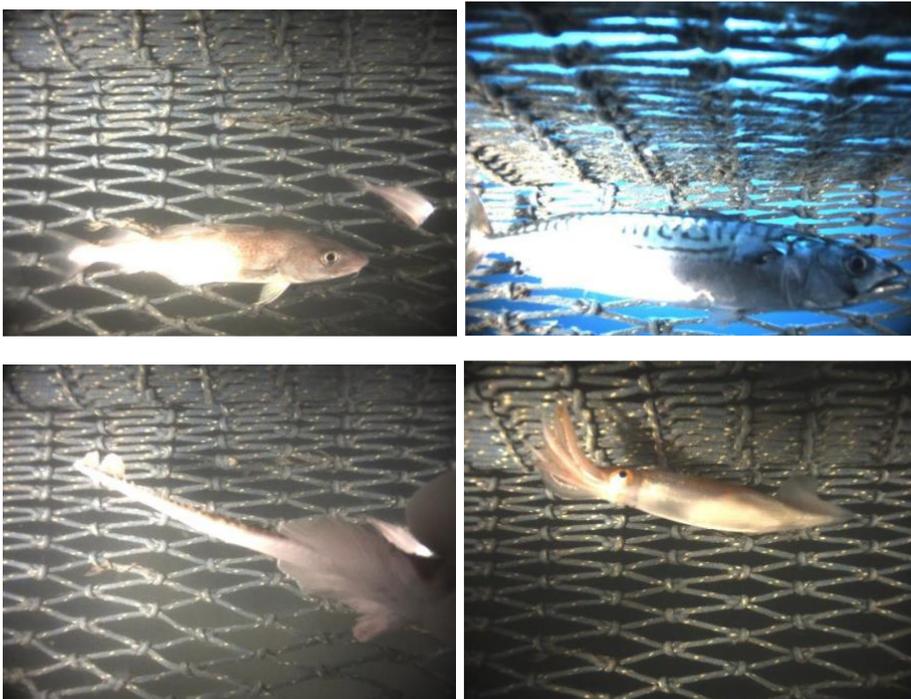
Example images from the trials of the Smartrawl stereo camera system