SEAFISH INSHORE FISHERIES PROJECT

WP2&3. Monitoring fishery catch to assist scientific stock assessments & Identifying catch composition using electronic technology to enable self reporting

Name of contractor: SeaScope Fisheries Research Ltd

Start date of project: 30th June 2014

End date of project: 30th September 2015

Aims and objectives:

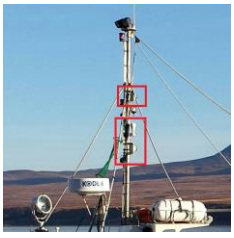
This project involved working with fishermen to develop innovative methods to collect data for use in stock assessments of data-deficient species (such as Crab and Lobster) on vessels under 10m. The main project goals were to:

- Train fishermen in methods of self-reporting fishing data,
- Install Electronic Monitoring (EM) systems on vessels (both cameras and sensors) to record data on catch, effort, fishing location and biology,
- Conduct four sub-projects to test the usage of:
  - Radio frequency identification (RFID) tags to collect fishing effort data;
  - Data storage tags for recording creel/pot soak time, temperature and depth;
  - Bluetooth calipers for measuring the length and sex of crab and lobster, and;
  - Automated discard chutes to obtain length and sex of discards using video analysis.
- Provide catch and effort estimates through video review and compare to self–reported data for verification purposes.
- Use EM data and self-reporting to help address the issue of data deficient stocks.

Approach:

Eleven fishing vessels participated in the trial; these comprised 9 creel vessels, 1 scallop dredger and a single *Nephrops* trawler. All vessels were west coast based, with a broad geographic distribution ranging, from the Isle of Whithorn (Solway area) in the south, up to Islay and Tiree in the north and from Skye and Lochalsh across to the Outer Hebrides.

All vessels were fitted with Electronic Monitoring systems (3 video cameras per vessel, plus rotation and hydraulic sensors). Training courses were run with skippers and crew on methods of self-reporting and stock assessments, and their input was obtained on the development of appropriate data-recording sheets. Data was collected via self-reporting and 'standard' EM technology for 8 months (up to end May 2015). Four vessels were involved in the additional sub-projects, and continued to collect data up to the end of June 2015. Scientific staff from Seascope joined skippers on 36 sea trips to test the performance of the electronic technology employed and obtain feedback from fishermen on its practicality and use.



Electronic Monitoring System: Location of video cameras on mast

EM video footage showing catch of brown crabs

Video still close-up of Lobsters

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Results / key conclusions and recommendation:

Electronic Monitoring (EM) systems and self-reporting (catch, effort and fishing location):
Participating vessels undertook 703 fishing trips - 85% of all fishing trips provided valid self-sampling data, whilst 96% of fishing trips produced valid Electronic Monitoring data. Of the valid trips, full analysis and video review was carried out on 12% of these. All sensor data were reviewed, and provided an excellent dataset on the location of fishing effort at 'string' or 'haul' level.

The majority of self-sampled data was of high-quality and comparison between self-sampling and Electronic Monitoring suggests that fishermen provided accurate data on retained catch, but less accurate data on discards (particularly when large numbers of certain species were involved). Catch Per Unit Effort (CPUE) was calculated from EM video estimates of catch plus the number of creels hauled, however, some biological information was more difficult to obtain from EM video footage, for example the sex ratios of lobster discards.

RFID Tags and Data Storage Tags (Effort and environmental data):
The number of creels deployed and their soak time (i.e. measures of fishing effort) can be difficult to determine from a 'standard' EM installation alone (cameras + sensors). The integrated RFID tags allow such data to be collected automatically with little or no requirement to vary catch-handling procedures. Combining effort data from RFID tags with catch data (determined through video analysis or self-reporting) can provide more accurate CPUE data. The stand-alone Data Storage Tag used in this trial also produced an accurate record of soak time (for each string of creels), with the added benefit of also recording temperature at depth.

Bluetooth Electronic Caliper (sex and length measurements - retained catch):
There is often a paucity of biological data (length/sex of species) for use in stock assessments. Bluetooth electronic calipers were utilised by fishers to quickly and efficiently record length and sex of *retained* target species (brown crab, lobster and velvet swimming crab), whilst steaming back to port. It proved possible to measure approximately 60 animals in around 5 minutes, with the data gathered automatically recorded on a waterproof tablet. Wider use of Bluetooth electronic calipers could address some of the current data deficiencies, and offer significant cost savings to conventional methods of collecting shellfish length/sex data using scientific observers.

Automated discard chutes (number, sex ratio and length of discards):
As it proved difficult to determine sex ratios and the size of discards from standard EM video footage, a modified discard chute fitted with 3 cameras and a scale was employed to estimate the number of discards (by species), sex (for brown crab, lobster and velvet swimming crab) and also length, on a sub-sample of animals passing down the chute. Further refinement of the 'discard chute' will be required to improve length estimates across all species and sex determination of lobsters in particular.

Conclusions:
These trials have proven that Electronic Monitoring systems can be successfully installed on small inshore vessels without impeding fishing activities. The EM systems employed are capable of providing valuable data for stock-assessment, and are one of the most effective methods of validating self-reported data. The training course and self-reporting process demonstrated that fishermen are able to provide valuable input to the interpretation of stock assessments. One of the recommendations arising from this project is the establishment of a working-group comprising fishers, researchers/scientists and fisheries managers to further develop realistic, standardised self-sampling protocols. A further recommendation is for the expansion of this trial, over several years, so that a time-series of data can be collected.

Fisherman recording length and sex of crab with Bluetooth Calipers - data automatically sent to waterproof touchpad

Crab on 'discard chute' with length calibration points, and camera below to obtain sex

Creels being hauled - RFID tags can accurately calculate fishing effort, and Data Storage Tags record soak-time, temp and depth.

Contact details

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