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MRV *Scotia*

Survey 1514/1614S

Cruise Report

11-23 October 2014

Personnel

P Copland	(SIC)
E Armstrong	
L Ritchie	
R Gillespie-Mules	
M O'Malley	(15 – 23rd October)
P Fernandes	(Aberdeen University)
N Fallon	(Aberdeen University)
J Lawrence	(St. Andrews University)

Estimated days by project: 13 days – SU02NP (20158)

Sampling Gear

Midwater trawl PT160 x 2
Edgetech broadband towed system
Seabird 911 CTD
Go-pro camera system with additional sensors (depth, temp, attitude etc)
Towed hydrophone array

Overall Objectives

- To investigate the use of a broadband system as a means to determine mackerel size.
- To estimate mackerel density and abundance.
- To study distribution of cetaceans and their relationship to mackerel shoals.

Specific Objectives

1. Calibration of Broadband system.
2. Obtain acoustic data from mackerel using the broadband system.
3. Obtain echosounder recordings of mackerel schools and map their distribution.
4. Obtain biological samples of mackerel from schools by trawling.
5. Calibrate Sv and TS gains on the Simrad EK60.
6. Deploy a Go-Pro camera system with additional sensors into the mackerel schools to observe behaviour.
7. Observe marine mammal distribution and activity during daylight hours.
8. Obtain towed hydrophone recordings of mammal vocalisation during survey transects.

Narrative

MRV Scotia sailed from Aberdeen at 1230 on 11th October. En route to L. Erribol a trial deployment of the pelagic trawl was undertaken. This resulted in damage to the netsonde cable caused primarily by surging of the cable winch and damage to the block wheel.

Calibration of the acoustic systems commenced at 0900 on 12th October in L. Erribol in perfect weather conditions. Deployment of the broadband system and calibration target took place after completion of the EK 60 calibration. The deployment and recovery techniques worked very well and no difficulties were encountered in positioning the 40 Kg target under the broad band towed body or in recovering it after the calibration. *Scotia* left L. Erribol at 2100 and made passage to the survey start position west of Fair Isle. The towed hydrophone system was deployed throughout the cruise as fishing and surveying operations allowed. The parallel transect survey continued with pelagic trawling and rod and line fishing taking place as mackerel schools were encountered. On completion of the parallel transects to the East of Shetland on the 15th October a small boat transfer was made to collect a scientist from Lerwick. Surveying continued with a “zig-zag” survey around the rest of Shetland with fishing being carried out opportunistically by trawl or rod and line where appropriate. Deployments of a self recording Go-Pro camera and light system into mackerel schools were made using rod and line. Similarly, where aggregations of fish on or close to seabed in rocky areas were observed, a Go-Pro with a benthic lander rig attached was deployed for species identification. Gale force winds forced the abandonment of surveying west of Fair Isle in the early hours of 18th October. *Scotia* returned to the Scalloway deeps and continued inshore fishing and camera deployments until the weather abated. The acoustic survey was completed around 1200 on the 19th October. The planned survey track is shown in Figure 1. Work on deployments of camera systems and towing and target observations using the broadband system continued on the more sheltered east side of Shetland until a severe westerly gale forced the abandonment of work in the afternoon of 21st October. *Scotia* made passage for Aberdeen after the storm had abated arriving in Aberdeen at 2200 on 22nd October. All equipment was unloaded and all scientists disembarked on the morning of the 23rd October in Aberdeen as scheduled.

Results. After initial damage to the netsonde cable on the trial tow, the aft netsonde block was replaced and the netsonde winch bled of air.

The good weather conditions at L. Erribol allowed lobe (beam shape) and on axis sensitivity calibrations to be completed on all four frequencies of the EK 60 scientific sounder system. In the case of the broad band system, the results of the attempted calibration confirmed suspicions that there were problems with the two lower frequency channels as observed in tank tests previously. The limited water depth made separation of target from seabed a little difficult but data was collected on all channels for presentation to the system manufacturers.

Although 6 pelagic tows were carried out during the survey only 1 produced mackerel in significant quantities (10 tonnes). In general, rod and line sampling was more productive than trawling. This was probably due to the high light levels encountered and the small catching area of the PT160 sampling trawl. In addition, schools were often encountered close inshore in confined areas where trawling was not feasible. It was observed that mackerel schools encountered in open water were moving quickly, particularly in daylight. Eight rod and line “hauls” were made and this sampling technique was invaluable in restricted areas in particular. VMS and AIS data was available to inform fishing throughout the survey area. In addition, some vessels volunteered information on the VHF as to their activities, catches and the likely location of schools. Mackerel schools of various sizes were seen across the whole survey area.

The tow trials of the broadband system showed that it could be deployed easily from *Scotia* using the starboard towing boom. The system is stable under tow although turning is possible only to starboard. This should be carried out using a slow turn rate as the body tends to move towards the ships side. Speed trials suggest that the system could be used at up to 6 knots without any alteration to the towed body towing bracket. (At 5 knots the towed body is at 5.5m depth decreasing to 3 m at 6 knots). The broad band system was deployed for periods in stationary and towed modes and the two higher frequency channels were used to observe aggregations of fish which had been identified by camera systems or rod and line fishing. Unfortunately fewer mackerel schools were encountered during towed operations than might have been hoped for. A second calibration was made in deeper water, >70m, to observe the calibration target while it was well clear of the seabed. The information recorded will be useful to both the engineers at Edgetech and collaborating scientists at the Woods Hole Institute. The Go-Pro camera deployments proved very successful and numerous observations from within schools and on ground fish were made. During deployments additional data on the camera depth and attitude were made using a tri-axial sensor fitted to the system. A deployment of the camera system with an underwater light source on the pelagic trawl proved promising.

The repaired SH80 sonar was operated through the cruise but interpretation of the display is difficult particularly as the speed input has to be altered manually.

The towed hydrophone for monitoring of cetacean vocalization was deployed throughout the cruise. There were few sightings of mammals but Pilot, Minke and killer whales were observed in small numbers during surveying. Detailed analysis of the audio recordings will be made after the cruise.

A number of CTD dips were carried out during the cruise and the hull mounted thermosalinograph was run throughout the cruise to observe sea surface temperature, fluorescence and salinity. In addition the self recoding PCO2 system was run continuously to provide information as part of the ocean acidification program.

Biological sampling was carried out as per the protocol for pelagic species using the Electronic data collection system. Data was entered into the FSS access data base. Analysis of otoliths retained for aging will be carried out after the cruise.

Submitted:
P Copland
21 October 2014.

Seen in draft:
Captain D Smith
21 October 2014.

Figure 1: Survey track 1514/1614S.

