

Not to be cited without prior reference to Marine Scotland, Marine Laboratory, Aberdeen

MRV *Scotia*

Survey 1415S

## Report

5-16 October 2015

## Ports

**Loading:** Aberdeen, 2 October 2015

**Departure:** Aberdeen, 5 October 2015

**Arrival and unloading:** Aberdeen, 16 October 2015

**In setting the survey programme and specific objectives, etc the Scientist-in-Charge needs to be aware of the restrictions on working hours and the need to build in adequate rest days and rest breaks as set out in Marine Scotland's Working Time Policy (Notice 34/03). In addition, the Scientist-in-Charge must formally review the risk assessments for the survey with staff on-board before work is commenced.**

In the interest of efficient data management it is now mandatory to return the survey report, to I Gibb and the Survey Summary Report (old ROSCOP form) to M Geldart, within four weeks of a survey ending. In the case of the Survey Summary Report a nil return is required, if appropriate

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**Estimated days by project:** 12 days – SU02NP (20158)

## Sampling Gear

Midwater trawl PT160 x 2

Edgetech broadband towed system

Seabird 911 CTD

Go-pro camera system(s) with additional sensors (depth, temp, attitude etc)

Towed hydrophone array

Lowrance echosounder system

Simrad WBAT autonomous broad band sounder system

Rod and line systems.

Scanmar trawl eye sensor

## Overall Objectives

- To estimate mackerel density and abundance in the area of the Shetland Isles.
- To investigate the use of a broadband system as a means to determine mackerel size.

- To study distribution of cetaceans and their relationship to mackerel shoals.

### Specific Objectives

1. Calibration of Edgetech Broadband system.
2. Calibrate Sv and TS gains on the Simrad EK60.
3. Obtain acoustic data from mackerel using the Edgetech broadband system.
4. Obtain biological samples of mackerel from schools by trawling.
5. Trial deployment options for the Edgetech broadband system.
6. Obtain acoustic data from mackerel using the Simrad WBAT autonomous broadband system.
7. Compare the echo returns from a low cost portable sounder system with those from the calibrated Simrad EK60 echo-sounder system.
8. Deploy a lightweight AU Go-Pro camera system into the mackerel schools to observe behaviour.
9. Deploy MSS Go-Pro system on PT160 net
10. Deploy MSS Go-Pro lander system onto the sea bed to identify fish traces on un-trawlable ground.
11. Visually observe marine mammal distribution and activity during daylight hours.
12. Obtain towed hydrophone acoustic recordings of mammal vocalisation during survey transects.
13. Compare netsonde traces of mackerel in the net with those seen using the cable less Scanmar trawl eye system.

### Narrative

All gear was loaded in Aberdeen on 2nd October and the vessel departed Aberdeen on 5 October at 0900. Scotia made passage for Loch Erribol beginning calibration of drop keel mounted and broad band acoustic transducers at 0900 on the 6<sup>th</sup> October. Time allocated to calibration was extended due to poor weather conditions in the proposed survey area and lack of pelagic fishing vessels to indicate where fish aggregations might be located.

Scotia left L. Erribol at 1630 on 7<sup>th</sup> October and made her way overnight to St Magnus bay after calibrations had been completed. The towed hydrophone system was deployed on passage. Calibration of the broad band system continued in deep water with the vessel drifting. The Scotia's workboat was used to collect Aberdeen University's WBAT and sounder systems on the afternoon of 8<sup>th</sup> October. Trial deployments were made of the WBAT and Lowrance systems and handling the dhan buoy proved to be very simple.

Monitoring of the pelagic vessels suggested that a broad survey design consisting of parallel transects would be required to the East of Shetland (Figure 1). This survey track was started in the early morning of 9<sup>th</sup> October.

Acoustic data were collected at four frequencies (18, 38, 120 and 200 kHz) on a 24 hour basis. While transecting, a towed hydrophone array was deployed over the stern of the vessel and was recovered prior to any other acoustic deployments or fishing operations. Fish schools seen on the echosounder during 10<sup>th</sup> and 11<sup>th</sup> October were identified using the pelagic trawl as predominantly herring with a small number of mackerel and other species. Where traces were seen the towed broad band system was deployed and this proved to be capable of operating at speeds up to 10 knots when towed from the forward boom of the vessel. Manoeuvrability of the vessel was compromised only slightly as turns could still be made but only to starboard at a moderate turn rate. Fishing by rod and line proved to be successful at sampling schools, particularly those of low density or close to the surface. The Lowrance low cost echosounder system was deployed alongside on a pole on two occasions. Deployments of the AU camera

system onto the seabed was successful as was the use of the MSS net mounted camera system. On completion of the broad area survey track on 12<sup>th</sup> October an inshore zig-zag survey track was followed up the East side of Shetland. This showed no significant mackerel traces and the decision was made to go north east beyond the Norwegian line to where two Scottish vessels were thought to be fishing scattered mackerel traces and Norwegian vessels had caught mackerel. Fortunately adequate mackerel traces were found which allowed deployment of the Edgetech system as well as collection of trawl samples.

A vertical CTD dip was carried out immediately following each pelagic trawl and the ships thermo-salinograph was run continuously to obtain sea surface temperature and salinity throughout the survey area.

*Scotia* docked in Aberdeen at 2200 on 15<sup>th</sup> October and was unloaded of fishing and scientific gear the following day

## RESULTS

The overall objective of estimating mackerel density and abundance could not be achieved given the lack of fish in the area. The wide distribution of the mackerel and the limited information available from the fishing fleet meant that only a very small proportion of the stock could be surveyed. All other overall objectives were met.

Specific objectives. Calibration of the broadband system was carried out at anchor in L. Erribol where water depth was limited and on two further occasions at sea with the vessel drifting. The data collected requires further scrutiny and will be the subject of a separate technical report to the project partners and the system manufacturers. Indications are that although all 4 “frequency channels” are operating, the lowest frequency component (Shamu) has noise issues which may have to be addressed. The hull mounted EK60 echosounder system was calibrated using both lobe and on axis methods, according to newly published protocols: the results were very similar to those obtained over the last few calibrations.

Acoustic data on mackerel, herring and other fish species were collected throughout the cruise using Edgetech and EK60 systems with species confirmed by trawling or rod and line fishing. Six trawls were carried out with samples of herring, mackerel and myctophids being obtained. All catches were biologically sampled.

Towing trials with the Edgetech towed body demonstrated that the preferred option of forward tow boom and fixed tow length (30 m) allowed stable performance from 4 – 10 knots using a fixed towing bracket and tail fin configuration. Slow turns to starboard could be carried out at any speed with the body remaining clear of the vessels hull. Deployment depth was in the region of 10m.

Deployment of the WBAT autonomous sounder system took place and the use of a dhan buoy and pallet buoys worked well. However, the system supplied wasn’t capable of generating the broadband signals expected. The Lowrance™ sounder system was deployed on a pole alongside the vessel and data was collected for comparison with the EK60 system. Initial observation suggests that the system may prove quite useful. All deployments of camera systems, whether on net, into fish schools or onto seabed reliably produced high quality images. The towed hydrophone was deployed while the vessel was surveying and at times when speeds exceeded 5 knots. Aural recordings of various cetaceans were noted with sperm whales being seen visually as well as being recorded by the hydrophone.

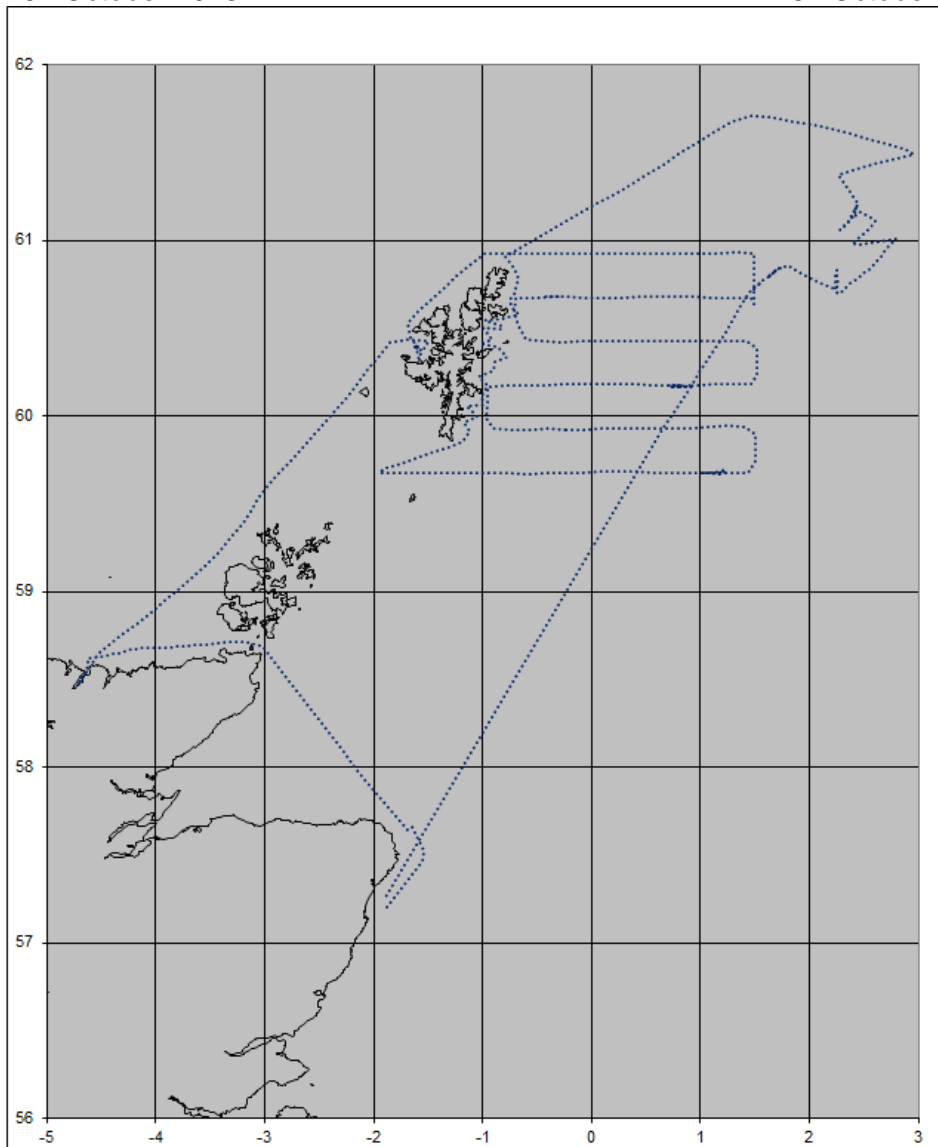
Unfortunately a problem with the Scanmar trawl eye did not allow comparison of the two systems to be made while trawling.

Submitted:  
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Seen in draft:  
D Smith (Captain)

15<sup>th</sup> October 2015.

15<sup>th</sup> October 2015



**Figure 1. Track of Survey 1415S**