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FRV *Scotia*

Survey 0817S

Report

29 June - 20 July 2017

Ports

Departure: Aberdeen, 29th June
Half-landing: Kirkwall, 10th July
Arrival and unloading: Aberdeen, 20th July

Personnel

S Lusseau	(Part 1, SIC)
E Armstrong	(Part 2, SIC)
M Stewart	
S O'Connell	
L Ritchie	(Part 1)
H Holah	
R Kynoch	(Part 1)
D Copland	(Part 2)
S Sweeting	(Part1)
M Campbell	(Part 2)
M Dziedzicka	(Part 2, PhD student, Aberdeen University)

Estimated days by project: 22 days – RV1709 (20438)

Sampling Gear
Midwater trawls PT160 x 3
Demersal trawl (BT237)
Seabird 19plus CTD
GoPro cameras x 2 with underwater housings and lights
Edgetech broadband system
Scanmar trawl eye sensor

Objectives

- To conduct an acoustic survey to estimate the abundance and distribution of herring in the north western North Sea and north of Scotland between 58º30'-62ºN and from the shelf edge to 2ºE, excluding Faroese waters. In addition acoustic transects will be carried out in Moray Firth to estimate abundance of herring and sprat.

- To obtain biological samples by trawling with pelagic and demersal trawl for echosounder trace identification.

- To obtain samples of herring and sprat for biological analysis, including age, length, weight, sex, maturity, ichthyophonus infection throughout the survey area.

- Collect samples and data for stock identity determinationfor herring caught west of 4 ºW (photos and otoliths for morphometric stock ID analysis and tissue samples for genetic analysis).

- To test feasibility of using GoPro cameras mounted in the net and on a dropframe to further aid in species identification in the echogram scrutiny process.

- To obtain hydrographic data for comparison with the horizontal and vertical distribution of herring and sprat.

- To test different deployment scenarios for the Edgetech broadband system with the aim of minimizing noise and use the system to collect data on fish schools for ongoing collaborative work with University of Aberdeen.

Narrative

Scotia departed Aberdeen at 0800 on 29th June and made passage for Scapa Flow, Orkney Islands, to commence calibration of acoustic systems. A successful calibration took place between 2100 on 29th June and 0400 on 30th June.
The survey commenced at 0900 on the first eastwards transect as shown on the cruise track map (Figure 1).

Fishing took place on an opportunistic basis with the aim of verifying species and size composition of echotraces encountered. The PT160 midwater trawl was used for the majority of hauls with the BT237 demersal trawl being used on a few occasions where the targeted assemblages were tight to the bottom. Hauls carried out with the PT160 were monitored using the Simrad FS70 scanning netsonde connected with the steel wire armored cable. Headline depth was recorded with the EK60 RAW data as well as being visualized in real time on the EK60 echogram greatly aiding the fishing operations. During the very first haul it was found that the FS70 head mounted at the start was faulty and was replaced with the back up head. This worked reliably until a kink in the steel cable between the unit and the strain relief warranted cutting out app. 8 meters of the steel cable and re-terminating the head. For the BT237 hauls a Scanmar trawl eye sensor were deployed, however the sensor was found to not be working from the first deployment and it was not possible to monitor the capture of fish for demersal trawls during the first part of the survey.

In previous years there has been concern regarding the ability to fish on the increasing number of schools observed high in the water between the surface and 50m depth. This year new multipurpose doors were used with both the demersal and the pelagic net, not only facilitating a very quick change over between the two nets (app 45min), but also providing greater stability and lift to the pelagic net allowing it to be fished in a stable and reliable manner as shallow as 20m depth. Throughout the first half of the cruise different scenarios of net configuration (mainly weights and headline length) and operation were trialed and the operation of the net was optimized significantly. In conclusion, the new multipurpose doors is a significant improvement and it would be beneficial to be able to adjust the weights depending on where in the

watercolumn the net is deployed. A lighter weight load is beneficial in the surface tows, although too light weights combined with high towing speeds resulted in doors lifting out of the water. The optimal configuration for towing high in the water column was ~750kg weight each side, warp length of ~100m and speeds between 4.5 to 5kn. For bottom towing a larger weight is still beneficial. It would be beneficial to continue work on optimizing this setup, potentially setting aside a few days for this purpose prior to the next pelagic survey.

The new demersal net proved to be very efficient at catching both herring and everything else necessitating the use of the hopper and sorting tables. It is a valuable addition to the survey and will allow verification of echotraces close to the seabed that would cause problems for the pelagic net.

Herring catches were secured in most areas where significant herring schools were observed apart from the area south-west of Shetland where a combination of poor weather and poor seabed prohibited fishing on some observed herring traced. A total of 23 hauls were carried out during the first part of the cruise, 16 of which contained significant numbers of herring.

A load shackle with remote readout was used throughout the cruise to weigh catches.

The GoPro camera system and lights were deployed in the top part of the net tunnel on 6 occasions during the first part of the survey. The images were clear and fish could be seen swimming with the net on several occasions, work to adjust the mounting system has been successful in providing a better view of the whole width of the tunnel.

Scotia made her way into Kirkwall at 0900 on 10th July to commence the 24 hour mid cruise break and to change scientific staff. R Kynoch, S Sweeting, L Ritchie and S Lusseau left and E Armstrong, M Campbell, M Dziedzicka and D Copland joined the vessel during this period.

A second calibration of the acoustic system was carried out in Scapa Flow between 1300 and 2300 on 11th July. The calibration confirmed that the settings applied during the first half of the cruise for all four frequencies were appropriate.

Surveying recommenced at 0300 on 12th July. Three transects were left to be completed west of 4°W. No significant traces were detected until late in the last, most northerly track, which yielded a haul of 600Kg. West of 4°W, schools of herring were encountered along the northern shelf edge. Trawling on the first of these produced a catch of over 5 Tonnes. The subsequent trawl was estimated to be in the region of 20 Tonnes, but this quantity proved to be too much for the net to handle, and the net parted, resulting in the loss of the cod end. Up to this point the broadband system had been deployed just after shooting the net and recovered just prior to its recovery. The fishing mates expressed concern that the time taken to take in the towed body was affecting the ability to recover the net, when it was perceived that enough had been caught for a sample, and that most of the fish taken on the second haul had been taken while the crew were occupied in recovering the towed body. To prevent putting the remaining net at risk from a similar fate, it was decided to not deploy the broadband system during subsequent hauls.
Due to a bad weather forecast prior to commencing the last two most westerly transects, the opportunity was taken to do some work with the broadband system in the north Minch area on the 16th July.

Some fish aggregations were located and transects executed with the broadband system deployed, followed by a trawl to identify the marks encountered.

Deploying the GoPro camera vertically on a small drop frame onto fish concentrations on the seabed to aid identification in un-trawable areas was not tested during this cruise.

The survey transect lines were completed on the west side of the Pentland Firth at 0755 on Tuesday 18th July. Scotia then made passage through the Pentland Firth to survey the Moray Firth.
Scotia docked in Aberdeen at 2200 on 19th July for unloading 0800 on 20th July.

Normal contact was maintained with the Marine Laboratory and other vessels taking part in the internationally co-ordinated survey.

Results
Scotia completed the entire planned survey track. Acoustic data was collected from 1671 Elementary Distance Sampling Units (EDSU) and the completed survey track was approximately 2452 nmi. The survey design incorporated coverage from a Scottish Charter vessel (Cruise 0717H) interlaced with the Scotia track in Figure 1 giving an effective transect spacing of 15nmi in the entire area to the East of Orkney-Shetland in line with the effort in this area in previous years.

As in previous years, the largest fish traces were mainly seen in the southern half of the eastern area between 0º and 2ºW. Significant amounts of herring were seen both east and west of northern Shetland, mainly aggregated high in the water column. Although these areas are historically high density areas, it seemed that the densities in these areas were even higher than in previous years.

During the survey 30 hauls were completed and herring was caught in adequate numbers in 20 of these (Figure 2). 3 hauls were collected in VIa (West of 4º W) and herring morphology sampling was carried out for stock discrimination analysis.
A total of 5392 herring were sampled to obtain length frequency data and 1748 of these were further sampled for biological parameters such as weight, age, sex, maturity and inspected for presence of *Icthyophonus* infection. 12 fish in 7 different hauls were found to be infected with *Icthyophonus*.

27 vertical hydro dips were carried out over the survey area (Figure 3). Data collection parameters were conductivity, temperature, depth and fluorescence. The vessel thermosalinograph (TSG) was run continuously to obtain sea surface temperature and salinity throughout the survey area.

The survey successfully met all stated objectives.

Submitted:
S. Lusseau and E. Armstrong
23 February 2018

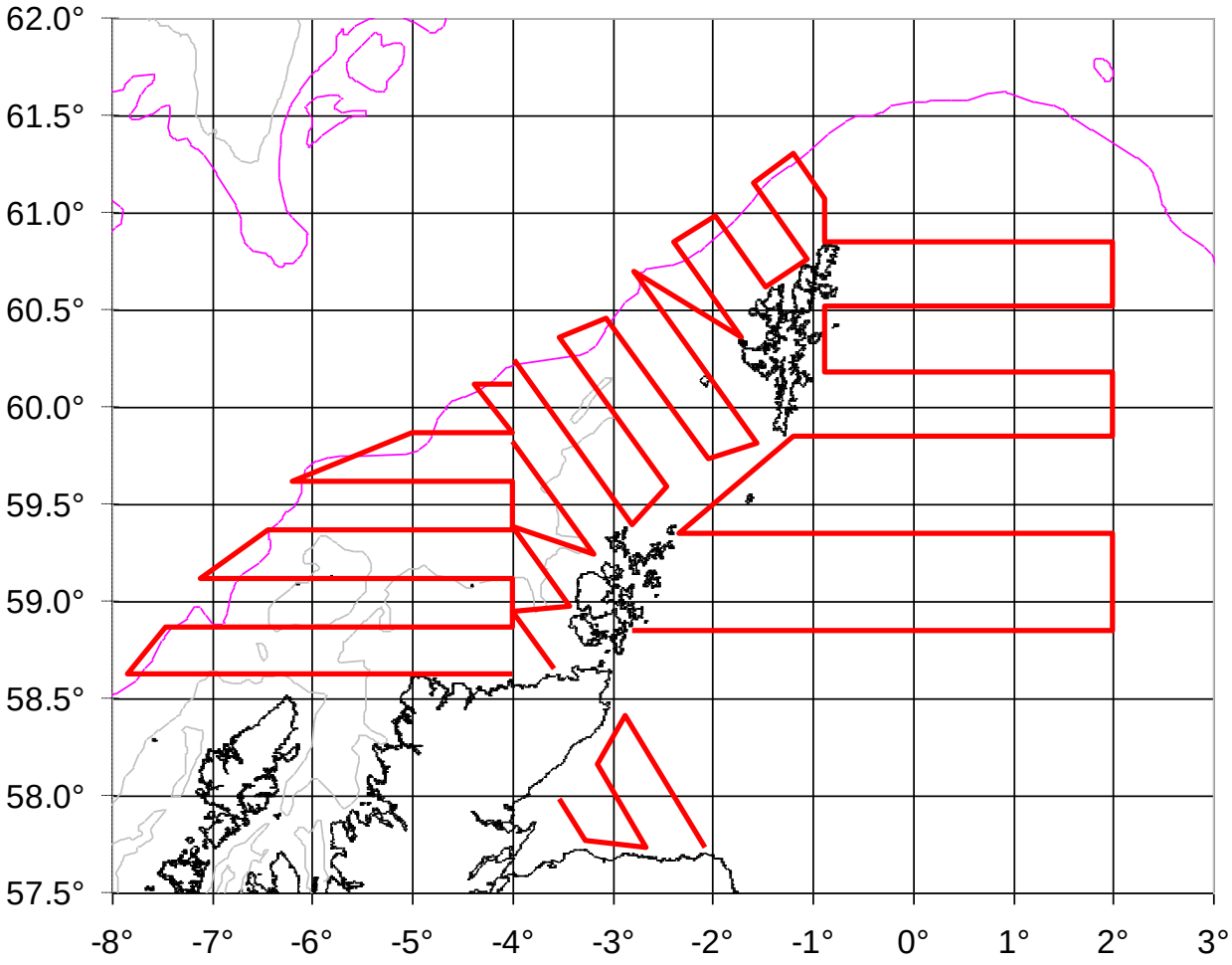

Figure 1. Cruise 0817S. Completed survey track.

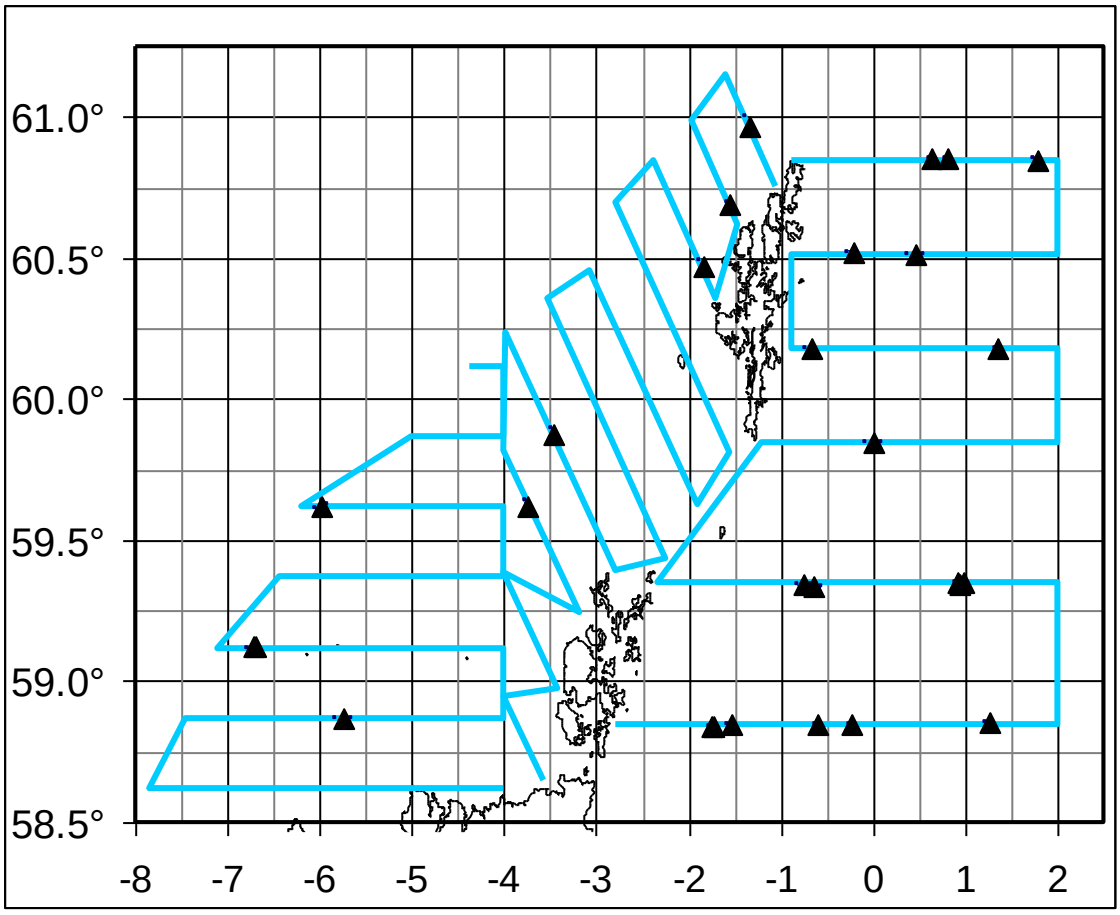

Figure 2. Cruise 0817S. Haul positions.

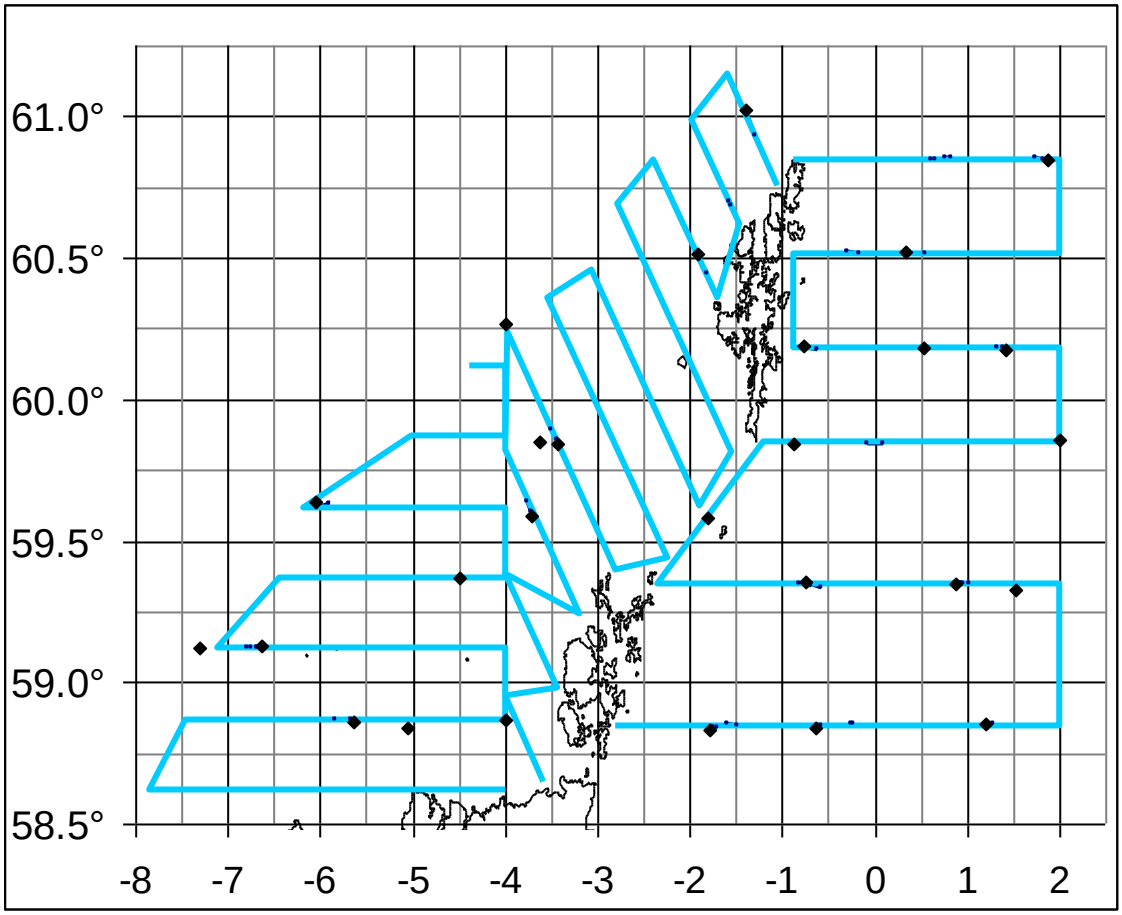

Figure 3. Cruise 0817S. Position of CTD stations.