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MRV *Scotia*

Survey 0919S

REPORT

27 June - 19 July 2019

Ports

Departure: Aberdeen, 27 June
Half-landing: Lerwick, 09 July
Arrival and unloading: Aberdeen, 19 July

Personnel

S. Lusseau (SIC)
S. O'Connell
H. Holah
D. Copland
R. Kynoch
C. Altass
T. Buch
S. McAulay (Visitor, SFF)
O. Bienentreu (Student, Aberdeen University)
K. Brigden Part 2 (Visitor, NAFC)

Estimated days by project: 23 days – RV1912 (20537)

Sampling Gear
Midwater trawls PT160 x 3
Demersal trawl (BT237)
GoPro cameras x 2 with underwater housings and lights
Scanmar trawl eye sensor
SIMRAD FS70 net sonde x 2
RBR-Concerto CTD with Dissolved oxygen probe
Niskin bottle x 2

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.

- 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 biological samples and data for stock identity determination for herring. Photos and otoliths for morphometric stock ID analysis for herring caught west of 4 ºW; tissue samples for genetic analysis from herring throughout the survey area.

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

- Obtain dissolved oxygen vertical water column profiles for comparison with occurrence of prominent 38kHz scattering layer as part of Aberdeen University Hons student project.

- Collect near seabed dissolved oxygen measurements for MSS monitoring programme.

Narrative

Scotia departed Aberdeen at 0930 on 27th June and made passage for Scapa Flow, Orkney Islands, to commence calibration of acoustic systems. The calibration took place between 2100 on 27th June and 1300 28th June. Although the calibration was not optimal it confirmed that the default settings on the EK60 were appropriate for use during this survey.
The survey commenced at 1610 on the first eastwards transect as shown on the survey track map (Figure 1).

Scotia made her way into Lerwick at 0900 on 9th July to commence the 24 hour mid survey break and to change scientific staff. No staff left and K. Bridgen joined the vessel during this period.

Scotia left Lerwick on 10th July at 0900 to carry out a second calibration of the acoustic system at the northern end of Bressay. This calibration confirmed that the settings applied during the first half of the survey for all four frequencies were appropriate. Calibration concluded at 1600 and passage was made back to where the survey broke off on 9th July. Surveying was recommenced at 0200 on 11th July.

Surveying of the main area finished on 17th July at 2100 west of the Pentland Firth, due to time pressures and a need to carry out tests on the engine before the end of the trip, one transect had to be cancelled. Agreement was made with Irish colleagues to cover this transect. Passage was made to the Moray Firth where one transect that had been left uncovered by our Dutch colleagues was covered in the early hours of the 18th while waiting to pick up the engine test engineer from Peterhead.

The survey finished in the evening of 18th July in Aberdeen, with the vessel being unloaded and scientific crew disembarked on the 19th July.

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

Results

Scotia completed all planned survey track apart from 1 transect which was covered by Ireland. Acoustic data was collected from 2363 nmi of transects in total and the completed survey track (not counting passage at start and end of trip or half landing) was approximately 2600 nmi.

The distribution of herring was largely in agreement of the patterns seen historically on this survey. Significant amounts of herring were seen both east and west of northern Shetland, mainly aggregated high in the water column and in the southern area herring aggregations were concentrated between 0º and 2ºW (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 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. For the BT237 hauls a Scanmar trawl eye sensor were deployed and it was possible to monitor the capture of fish for demersal trawls.

A load shackle with remote readout was used initially to weigh catches from the PT160, whereas catches from the demersal net were weighed in the hopper. The load shackle malfunctioned after a few hauls and catches from the PT160 are visual estimates only for the majority of the hauls. This is in line with the methodology used during the surveys prior to acquiring the load shackle.

Herring catches were secured in most areas where significant herring schools were observed (Figure 2). In the area west of 4 degree only few herring schools were encountered but despite several attempts no herring samples were secured. This was due to a combination of poor seabed prohibiting fishing on some observed herring traced and schools being isolated and very flighty. A total of 38 hauls were carried out during the cruise, 22 of which contained significant numbers of herring (over 30 herring is considered minimum requirement for a sample in the coordinated survey).

The multipurpose doors were again successfully used with both the demersal and the pelagic net, not only facilitating a very quick change over between the two nets (app 45min), and 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.

A total of 9736 herring were sampled to obtain length frequency data and 2541 of these were further sampled for biological parameters such as weight, age, sex, maturity and inspected for presence of *Icthyophonus* infection. Only 2 fish spread over 2 different hauls were found to be infected with *Icthyophonus*.

Additionally tissue samples were taken from 1599 herring over 16 hauls for genetic analysis in an ongoing collaborative study to further our understanding of herring stock structure in the North Sea and to the west of the UK and Ireland.

As no herring catches were secured in VIa (West of 4º W), no herring morphology sampling or genetic sampling was carried out for stock discrimination analysis in this area.

The GoPro camera system and lights were deployed in the top part of the net tunnel on the PT160. A total of 32 deployments were made during the survey. Some fine adjustments could still be beneficial in terms of the field of view and the position in the net tunnel (further towards the net opening). The videos have proven useful in terms of informing the decision process for species composition of acoustic traces to some extent by matching the time of fish seen on the camera to the marks seen on the Echosounder (accounting for time lag between sounder and camera passing over schools). However, the original purpose to be able to inform species allocation on non-retained fish seen entering the net on the FS70 net-sonde (small fish) however seems futile. The speed of travel and resolution of the go-pro cameras make identification near impossible of anything that is not swimming along with the net in the location of the cameras.

34 vertical hydro dips were carried out over the survey area (Figure 3). Data collection parameters were conductivity, temperature, and oxygen. Water samples were collected at bottom and surface for all dips for calibration of salinities. In addition water samples from the bottom of each dip was collected and chemically preserved for calibrating the oxygen probe as well as providing independent measures of oxygen levels above the seabed.

The vessel thermosalinograph (TSG) was run continuously to obtain sea surface temperature and salinity throughout the survey area.

Submitted:
S. Lusseau
08 January 2020

Approved:
I. Gibb
17 January 2020

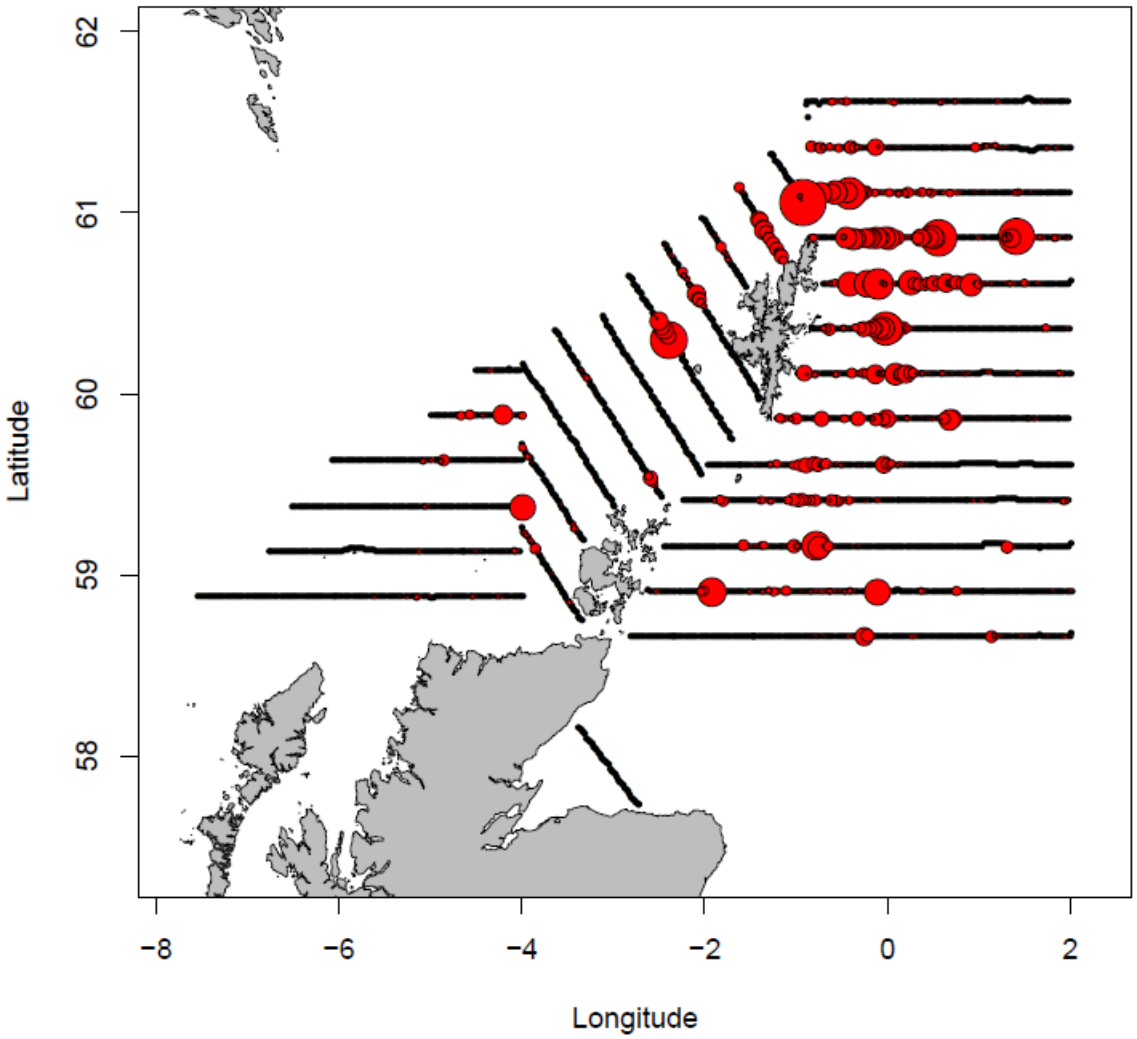

Figure 1. 0919S. Completed transects (black lines) and distribution of herring (red circles indicate position and size of aggregations).

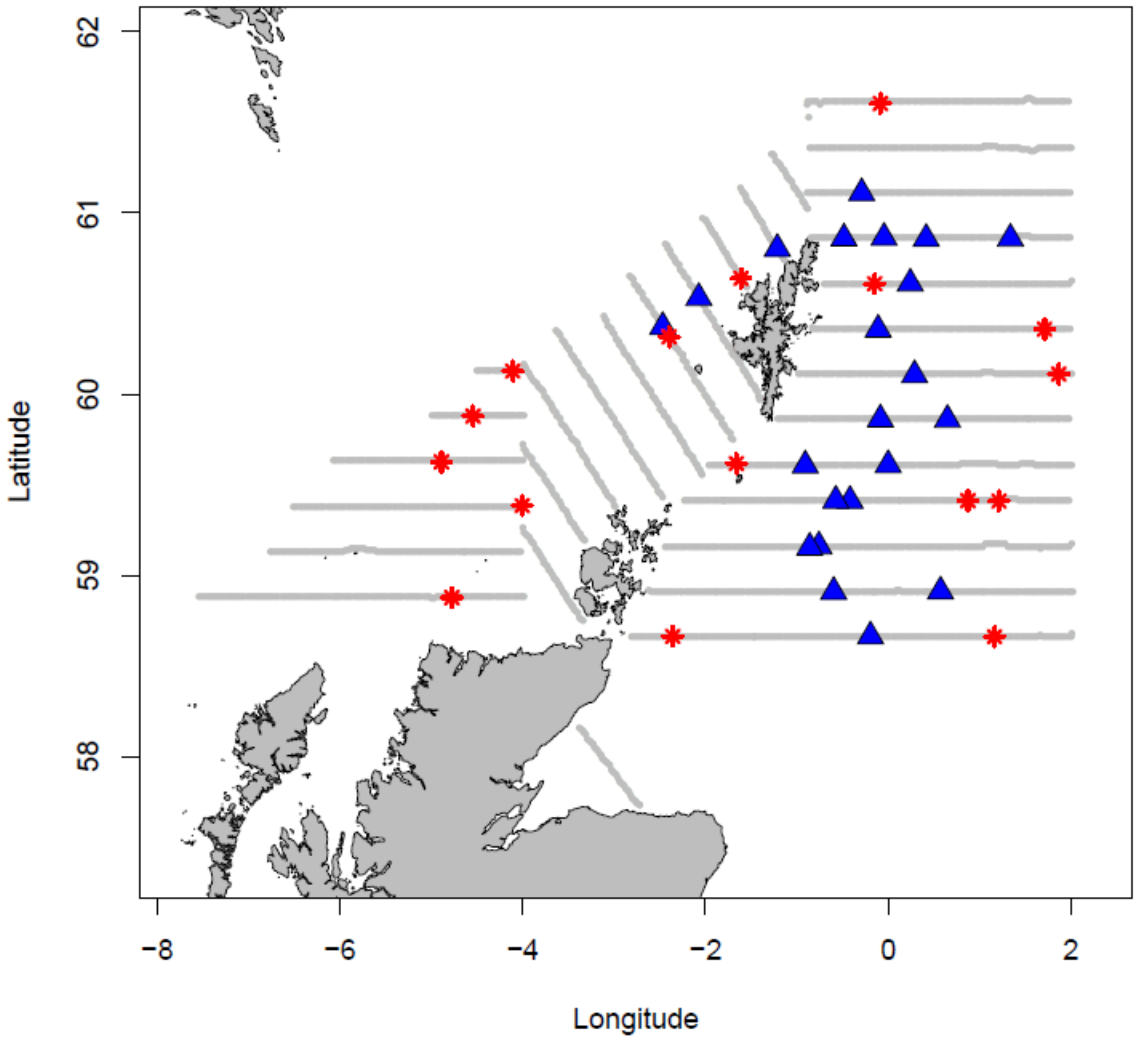

Figure 2. 0919S. Haul positions. Blue triangles represent positions where catches of more than 30 herring were secured, red asterisks' positions where less than 30 or no herring were caught.

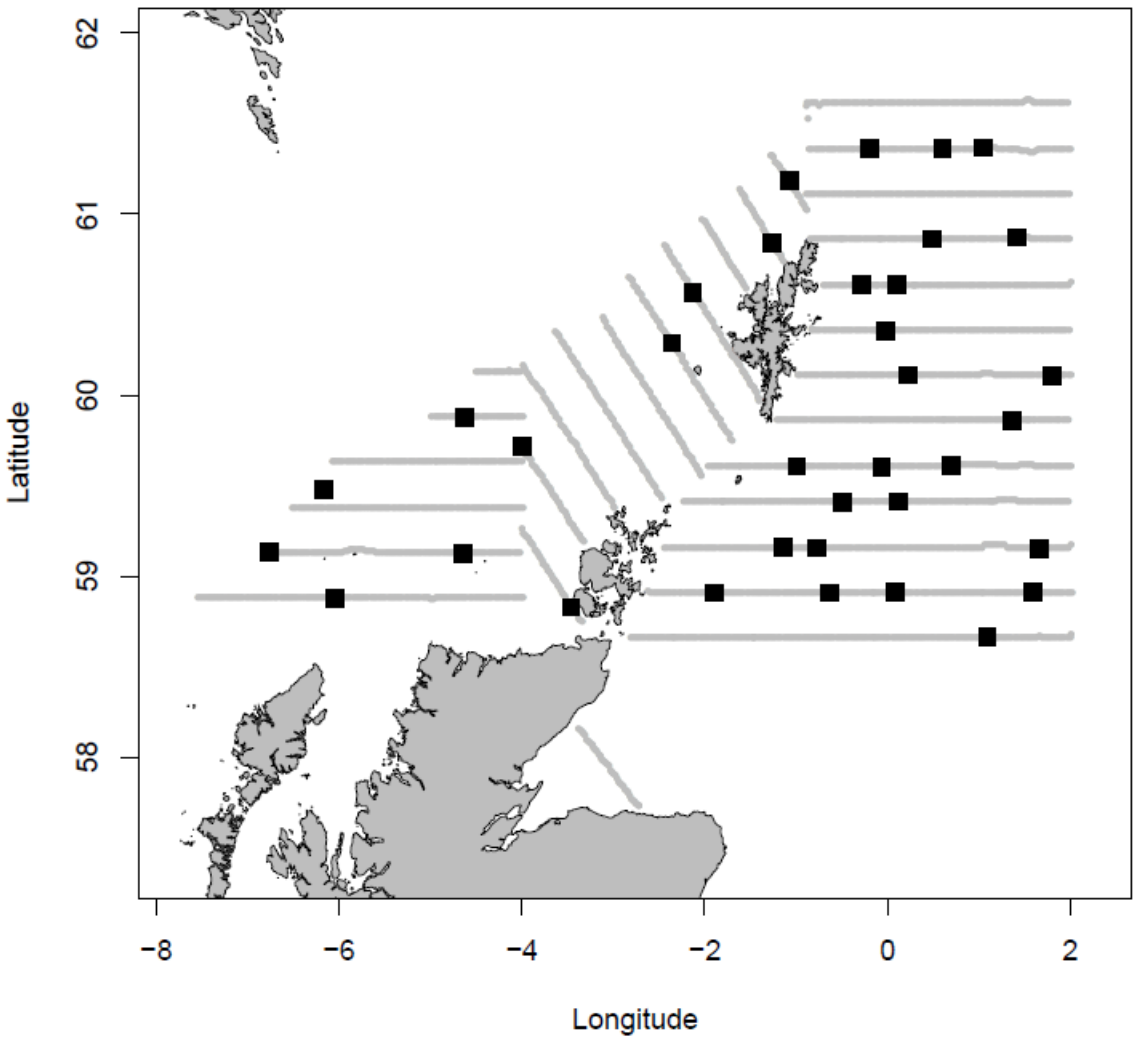

Figure 3. 0919S. Position of CTD stations.