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FRV *Scotia*

Cruise 0815S

Cruise Report

25th June - 14th July

Ports

Departure: Aberdeen, 25th June

Half-landing: Lerwick, 4th July

Arrival and unloading: Aberdeen, 14th July

Personnel

S. Lusseau	(SIC)
P. Copland	
J. Hunter	
L. Ritchie	
M. Stewart	
M. Inglis	(Part 1)
R. Catarino	(Part 2)
J. Dunn	(Part 2)
E. Carlson	(Part 1, MSc student, University of Aberdeen,)
J. Lawrence	(Part 2, Phd student, University of Aberdeen)

Estimated days by project: 20 days – RV1509 (20289)

Sampling Gear

Midwater trawls PT160
Multisampling pelagic cod-end with one fine mesh cod-end.
Seabird 19plus CTD
GoPro cameras x 2 with underwater housings and lights
Scanmar trawl eye sensor
Towed Hydrophone array

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 58°30'-62°N and from 4°W to 2°E.
- To obtain biological samples for echosounder trace identification using a pelagic trawl.

- 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 samples of herring for biological analysis, including age, length, weight, sex, maturity and ichthyophonous infection.
- To obtain hydrographic data for comparison with the horizontal and vertical distribution of herring.
- To obtain acoustic recordings of cetaceans during the survey using a towed hydrophone system.

Narrative

Scotia departed Aberdeen at 0800 on 25th June and made passage for Scapa Flow, Orkney Islands, to commence calibration of acoustic systems. A successful calibration took place between 2000 on 25th June and 0200 on 26th June.

The survey commenced at 0700 on the first eastwards transect as shown on the cruise track map (Figure 1). Fishing took place on an opportunistic basis. Only after the first trawl was the Scanmar fitted. Initially both the Simrad FS70 scanning netsonde and a Scanmar trawl eye sensor were deployed on each trawl. Damage was done to the top panel during one of the early tows necessitating a change of net.

The steel wire armored cable was used for the scanning netsonde throughout the cruise. This proved to be reliable and failed on only two occasions.

On one occasion the cable was pulled out of the transducer head when the transducer was deployed on the PT160 trawl fitted with the multisampler codend. This was due to an overly long strain relief bridal on the net. The cable was re-terminated onboard, but the transducer head failed on the subsequent deployment and was sent for repair during the mid cruise break. The spare transducer was used for the remainder of the trip.

Although herring catches were secured in most areas where significant herring schools were observed there were a significant number of occasions where catches couldn't be secured. This was possibly due to the schools being in transit as well as being more sparsely distributed on the seabed (Figure 2 and 3).

A load shackle with remote readout was used throughout the cruise to weigh catches and a digital storage tag (DST) was mounted on the headline of the gear to monitor trawl depth and water temperature.

A second calibration of the acoustic system was carried out at the northern end of Bressay between 2200 on 3rd July and 0200 on the 4th. The calibration confirmed that the settings applied during the first half of the cruise for all four frequencies were appropriate.

Scotia made her way into Lerwick at 0800 on 4th July to commence the 24 hour mid cruise break and to change scientific staff. M Inglis and E Carlson left and J Dunn, R Catarino and J Lawrence joined the vessel during this period.

Surveying recommenced at 1230 on 5th July. Throughout the northern and western area herring was predominantly distributed in the top 50-60 meters. Successful tows on herring marks were

carried out to a headline depth of 40m. Most hauls where herring was expected to be caught were successful. On the 5th July two pelagic weights were lost during shooting of the trawl, one on each of two consecutive hauls. On each occasion a pelagic weight and chain was lost. Stretching of G-clips were suspected as the cause. These were replaced with a set of Viking clips for the remainder of the trip. The steel casing on one of the replacement weights was discovered to have cracked along a welded seam after a number of deployments and a temporary repair was effected on board.

The multisampler cod end system was successfully deployed for testing and this confirmed that the electronic and acoustic systems were operating correctly. However, the distribution of acoustic traces during the cruise did not offer the opportunity to use the system for sampling.

Throughout the second half a 200m hydroacoustic cable was towed whenever Scotia was transecting. This collected information on cetacean presence throughout the survey area. In addition a visual watch for cetaceans was carried out during daylight hours. This is part of an Aberdeen University Phd study.

The GoPro camera system and lights were deployed in the top part of the net tunnel on 7 occasions. The images were clear and fish could be seen swimming with the net on several occasions, but further work is needed to adjust the mounting system to afford a more reliable view of the whole width of the tunnel.

Deploying the GoPro camera vertically on a small drop frame onto fish concentrations on the seabed to aid identification in un-trawable areas was also tested several times with limited success. Due to problems with the vessels dynamic positioning system it was difficult to maintain station above features of interest. Also, some further modifications are needed to the GoPro frame to minimize drag and improve deployment speed.

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

The survey transect lines were completed on the west side of the Pentland Firth at 0855 on Monday 13th July and Scotia docked in Aberdeen at 2330 on 13th July for unloading 0800 on 14th July.

Results

Scotia completed the entire planned survey track and the opportunity was taken to add a further 50nm of track to augment that planned in rectangles 46E6 and 47E6. Acoustic data was collected from 926 Elementary Distance Sampling Units (EDSU) and the completed survey track was approximately 2350 nmi.

As in previous years, the largest fish traces were mainly seen in the southern half of the eastern area between 0° and 2°W (Figure 3). Significant amounts of herring were seen both east and west of northern Shetland, mainly aggregated high in the water column. Large aggregations were also encountered in 48E6. Although these areas are historically high density areas, it seemed that the densities in these areas were even higher than in previous years. In both these areas pelagic trawlers were observed fishing herring. As in previous surveys herring traces were largely absent from the northern most transects.

During the survey 33 hauls were completed and herring was caught in adequate numbers in 20 of these (Figure 2). In contrast to recent years Scotia did not survey in area VIa (West of 4° W) and therefore no herring morphology sampling was carried out for stock discrimination analysis.

A total of 7934 herring were sampled to obtain length frequency data and 1840 of these were further sampled for biological parameters such as weight, age, sex, maturity and inspected for presence of *Icthyophonus* infection. Seven fish in 6 different hauls were found to be infected with *Icthyophonus*.

In addition to the scheduled activities, a total of 20 photographs were collected of gonad development in mackerel for use in a mackerel maturity workshop later this year.

32 vertical hydro dips were carried out ensuring one station in each ICES rectangle apart from 51E9 which was missed due to inclement weather (Figure 4). 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. Data from the hydro dips were uploaded on a daily basis to the METOCEAN site.

Observations.

The higher densities observed to the east and west of Shetland may be due to the earlier timing of the survey compared to recent years and the herring not having migrated quite as far south yet. In stark contrast to last years survey where the majority of herring was found in smaller aggregations tight to the sea bed, this year a large amount of herring was seen in the top 50m of the water column. It is possible that this may also be linked to the timing of the survey if herring tend to settle in schools closer to the bottom as they get closer to spawning time. Trawling in the top 50m is limited using the PT160 in its present configuration. It is suggested that consideration be given to investigating how the net might be rigged to sample more effectively in this area.

This survey also differed from other years in the large numbers of immature herring that were encountered throughout the survey area. Historically, immature herring are encountered only in the furthest south of the survey area, north of the Moray Firth. The mean sizes were also generally lower, mainly caused by large amounts of small herring in the catches rather than an absence of larger herring. A larger than expected number of larger herring (25-31cm) were also found to be immature this year, but until these fish have been aged it is not possible to confirm whether this is simply due to younger herring being larger this year or older herring maturing later.

The survey successfully met all stated objectives.

Submitted:
S. Lusseau
14 July 2015

Seen in draft:
P. Weychan
14 July 2015

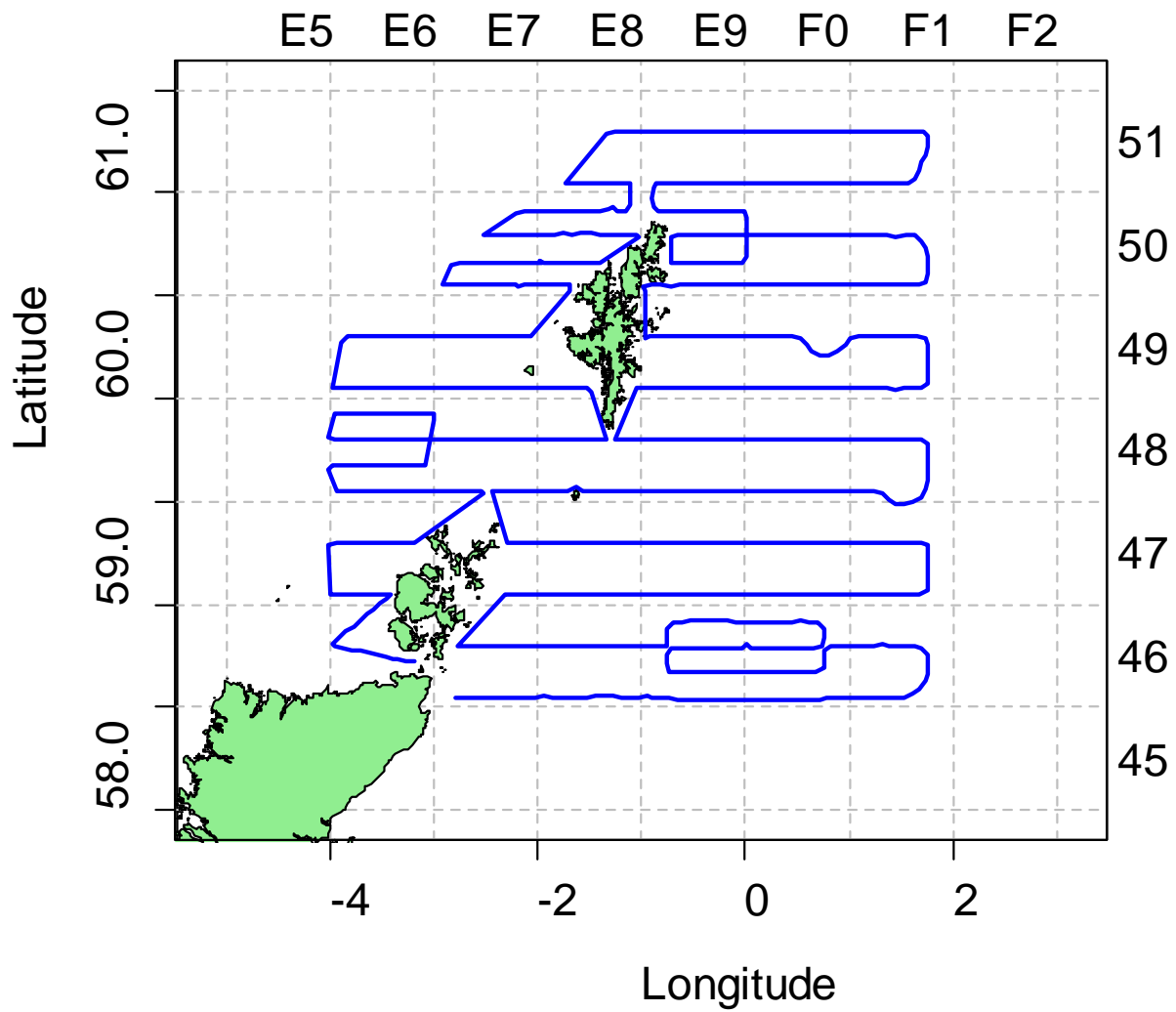


Figure 1. Cruise 0815S. Completed survey track.

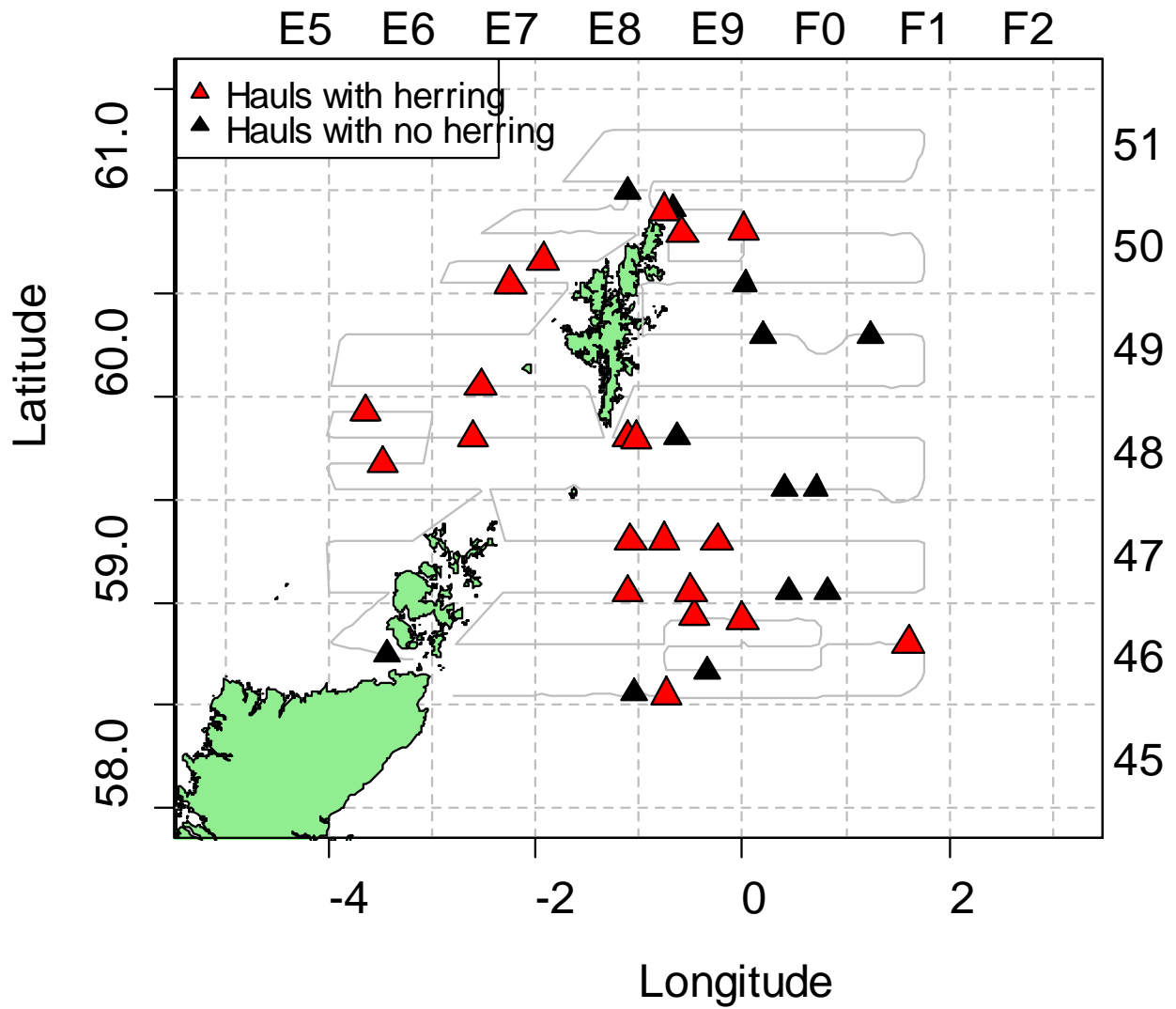


Figure 2. Cruise 0815S. Haul positions.

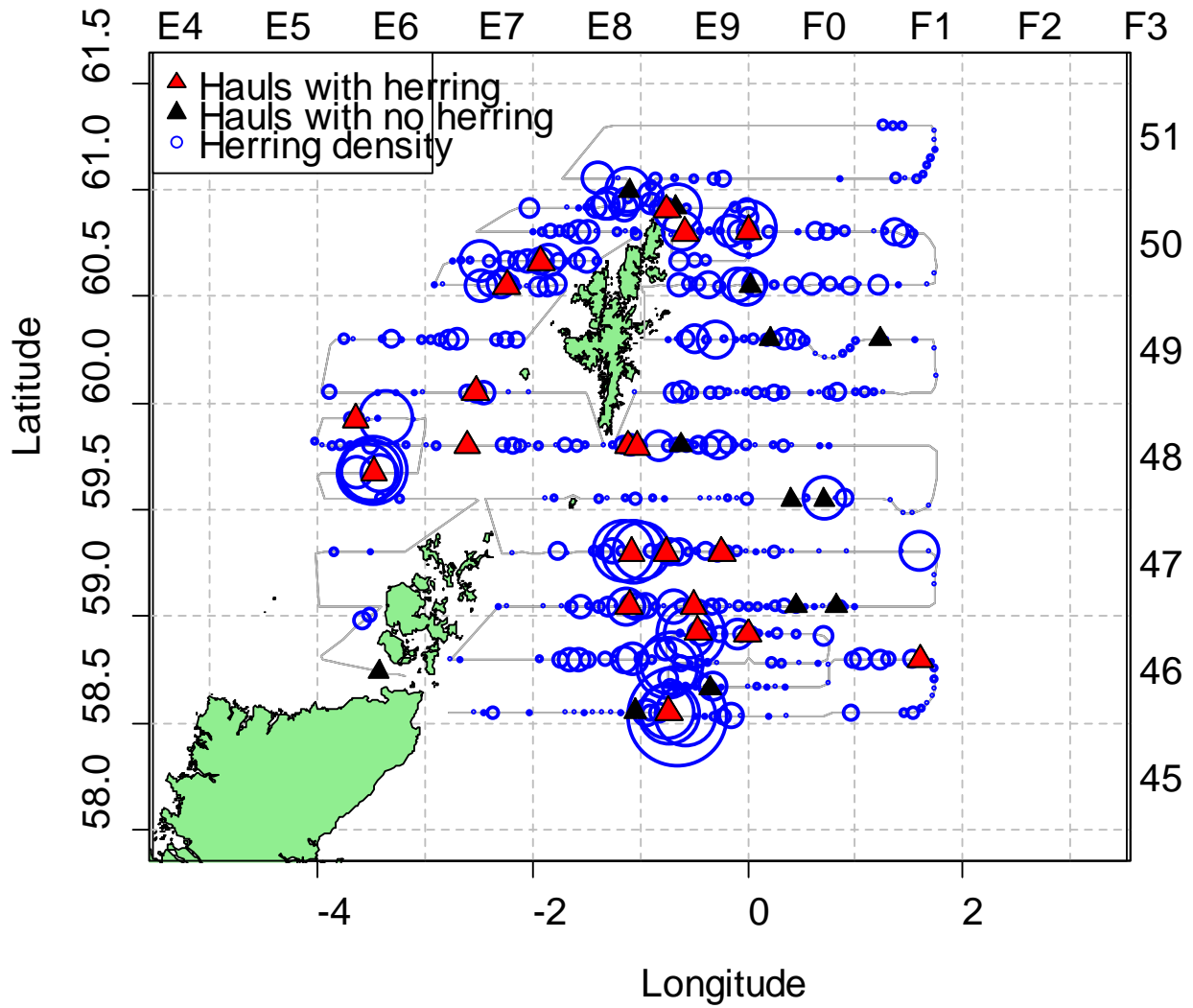


Figure 3. Cruise 0815S. Herring densities along cruise track and haul positions.

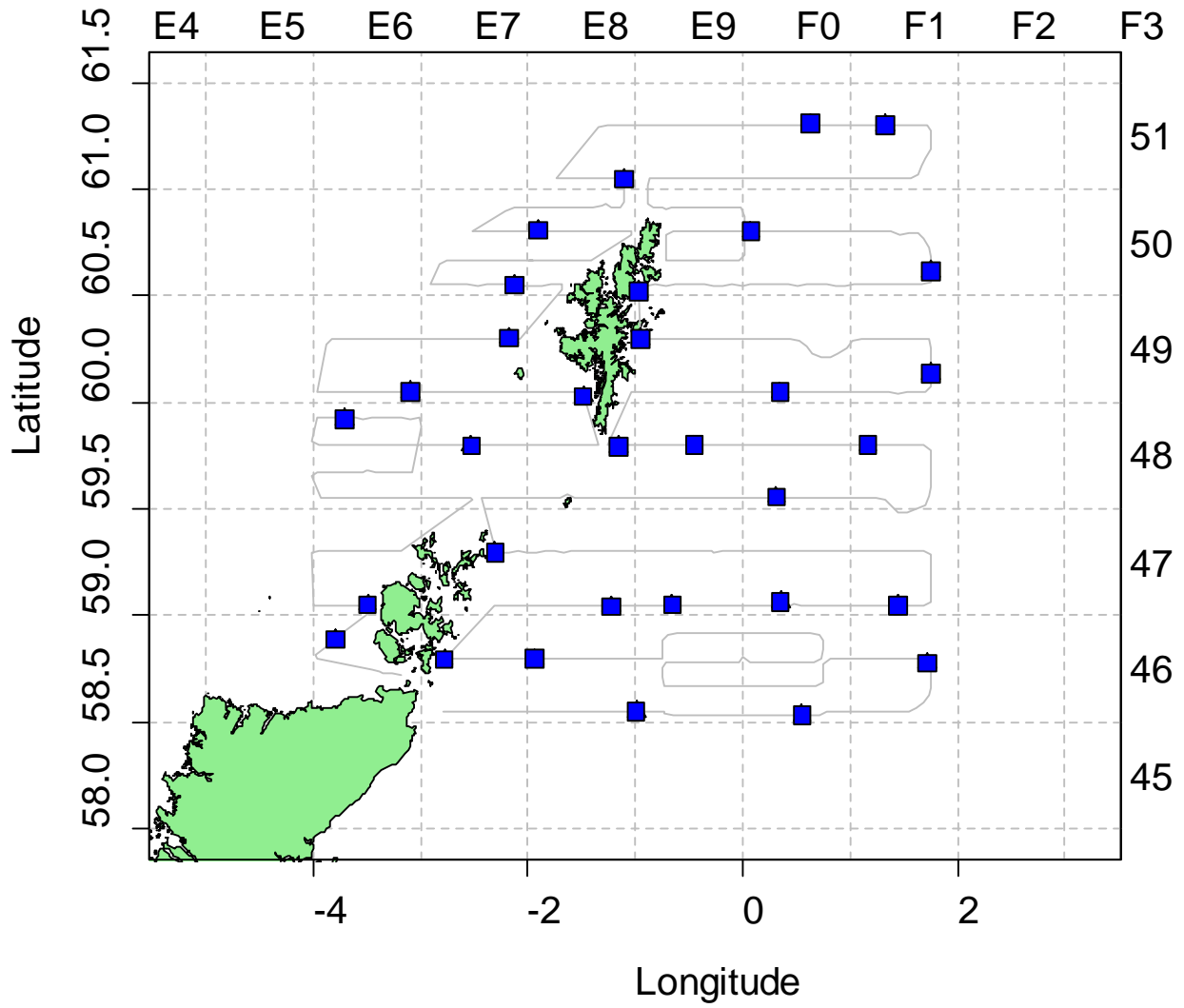


Figure 4. Cruise 0815S. Position of CTD stations.