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MRV *Scotia*

Survey 0817S

## **PROGRAMME**

29 June – 20 July 2017

### **Ports**

**Loading:** Aberdeen, 26 June 2017

**Half-landing:** Kirkwall, 10 July 2017 (TBC)

**Arrival and unloading:** Aberdeen, 20 July 2017

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 (Lab 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

### **Personnel**

S Lusseau	(Part 1, SIC)
E Armstrong	(Part 2, SIC)
M Stewart	
S O'Connell	
L Ritchie	
H Holah	
R Kynoch	(Part 1)
D Copland	(Part 2)
S Sweeting	(Part 1)
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 58°30'-62°N and from the shelf edge to 2°E, 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, ichthyophonous infection throughout the survey area.
- Collect samples and data for stock identity determination for herring caught west of 4 °W (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.

## Procedure

All fishing gear and scientific equipment will be loaded onto the vessel on 26 June in Aberdeen. The vessel will depart from Aberdeen on 29 June and, after required vessel drills, make passage to Scapa Flow, Orkney Islands, where calibration of all echosounders will take place (approximately 8-12 hours at anchor). Crew training and trial deployments of fishing gear will take place on the way as required by the fishing master.

After calibration the vessel will make passage to the start of the first transect to the east and follow a pattern of parallel transects running east/west, at normal steaming speed (10.5 knots), progressing northwards. The whole survey area is bounded by 58°30'-62°N and 04°W - 02°E to the 200 m contour. Transect spacing is 15 nm. This may be adapted during the survey to maximize area coverage given the time available. The proposed survey design is shown in Figure 1. *Scotia* and a chartered vessel will cover the allocated transects east of 4°W between them and will need to stay in close contact to facilitate close temporal and spatial proximity.

A 24 hour mid survey break will take place on 10 July in Kirkwall (TBC) to allow for the transfer of staff and to comply with the WTD policy. A scientific crew change will take place with E Armstrong, D Copland, M Campbell and M Dziejdzicka joining the vessel and S Lusseau, R Kynoch, and S Sweeting leaving. A calibration will be conducted around the mid survey break in a suitable location or Orkney at the end of the survey if time permits.

Acoustic data will be collected at four frequencies (18, 38, 120 and 200 kHz) between 03:00 and 23:00 hours. Fish shoals seen on the echosounder will be identified using either a pelagic trawl

(PT160) or the new demersal trawl (BT237). Survey trawling operations will be carried out between two and four times per day at any time between 03:00 and 23:00 hours. Samples of all species caught will be measured for length to partition the echo integral amongst species and size classes for target strength functions. Individual herring, sprat and mackerel will also be weighed to establish a length-weight relationship. Otoliths will be collected from a sub-sample of the herring according to the following length stratified scheme to determine age; two per 0.5 cm class below 22 cm, five per 0.5 cm class from 22.5-27.5 cm and ten per 0.5 cm class for 28.0 cm and above. For each herring in the subsample the state of maturity, gonad weight, liver weight, whole and gutted weight, presence of food in the stomach as well as the presence of *Ichthyophonus* infection will be recorded. The maturity scale used throughout the survey will be the Scottish 8 stage scale. Where sprat is encountered five per 0.5cm length class will be sampled for age, weight, sex and maturity.

In the area west of 4°W, in addition to the above described sampling, random sampling of 120 fish above 24 cm length will be carried out for each haul with photographs taken for morphometric stock identification analysis and a tissue sample taken for genetic analysis. Otoliths from these fish will, subsequent to aging, be made available for morphometric analysis. After photographing them, and where possible, these randomly sampled fish will make up part of the standard sampling for herring. Additional fish will be collected to ensure the relevant numbers of fish are collected per strata for acoustic data analysis.

During the second part of the survey trials will be conducted to establish optimal deployment of the Edgetech broadband system. The system will also be deployed when opportunities arise either during the survey or prior to return to Aberdeen.

A GoPro camera and underwater lights will be mounted in the trawl as required to aid in species identification in the echogram scrutiny process by delivering additional information on time of capture of and composition of the catch. A GoPro camera may also be deployed manually on a small drop frame on echotraces to investigate the feasibility of using this technique to verify species composition of echosounder traces in untrawlable areas. This exercise will be conducted with the vessel in DP.

Where required, a vertical hydro dip will be carried out immediately following a trawl; this will require the vessel to use its DP system to remain on station. The decision to carry out vertical dips will be based on the requirement to achieve one station in each ICES rectangle.

The ships thermosalinograph will be run continuously to obtain sea surface temperature and salinity throughout the survey area, pending availability.

Normal contact will be maintained with the Marine Laboratory. Radio and e-mail contact will also be maintained with the other vessels taking part in the coordinated survey.

Submitted:  
S Lusseau and E Armstrong  
22 June 2017

Approved:  
I Gibb  
22 June 2017

**Figure 1:** Area to be covered and proposed preliminary survey track *Scotia 0817S* (approximately half of the transects east of 4°W to be covered by chartered vessel) and others might be added depending on available survey time.

