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MRV *Scotia*

Survey 0919S

Programme

27 June – 19 July 2019

Ports

Loading: Aberdeen, 24 June 2019

Departure: Aberdeen, 27 June 2019

Half-landing: Lerwick, 10 July 2019

Arrival and unloading: Aberdeen, 19 July 2019

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

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

Sampling Gear

Midwater trawls PT160 x 3

Demersal trawl (BT237)

Scanmar trawl eye sensor

SIMRAD FS70 net sonde x 2

RBR-Concerto CTD with Dissolved Oxygen probe

Water sampler for collecting water samples from bottom of CTD dips

GoPro cameras x 2 with underwater housings and lights and frame

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.

- 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 and ichthyophonous infection throughout the survey area.

- Collect samples and data for stock identity determination of herring. Photos and otoliths for morphometric stock ID analysis for herring caught west of 4 °W; tissue samples for genetic analysis from herring throughout the survey area.
- Use GoPro cameras mounted in the net and on a drop frame 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.
- 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 sea bed dissolved oxygen measurements for MSS monitoring programme.

Procedure

All fishing gear and scientific equipment will be loaded onto the vessel on 24 June in Aberdeen. The vessel will depart from Aberdeen on 27 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 and net monitoring equipment will take place on the way as required by the fishing master.

After finishing the 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 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.

One member of the scientific crew will have to be collected from Kirkwall via small boat transfer late 30 June or 1 July weather permitting and fitting in with survey progress.

A 24 hour mid survey break will take place on 10 July in Lerwick (TBC) to allow for the transfer of staff and to comply with the WTD policy.

A second confirmatory calibration will be conducted around the mid survey break in a suitable location or in 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 (BST). Fish shoals seen on the echosounder will be identified using either a pelagic (PT160) or the demersal trawl (BT237) in consultation between fishing master and scientific staff. Survey trawling operations will be carried out between two and four times per day at any time between 03:00 and 23:00.

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.

Genetic sampling of herring for stock discrimination purposes will be carried out on selected hauls throughout the survey area.

Where sprat is encountered 5 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.

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.

A vertical hydro dip to collect temperature, salinity and dissolved oxygen measurements will be carried out immediately following trawls, this will require the vessel to use its DP system to remain on station. The decision to carry out additional vertical dips will be based on the requirement to achieve one station in each ICES rectangle.

Bottom water samples for calibrating salinity sensors will be collected using water sampler attached to the CTD wire and surface water samples will be collected from continuous flow tap in Fish house.

Water samples will also be collected separately for calibrating the dissolved oxygen probe at selected stations.

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

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

Submitted:
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17 June 2019

Approved:
I. Gibb
19 June 2019.

Figure 1: Transects to be completed by Scotia 0919S. Additional transects may be added depending on available survey time.

