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MRV *Alba na Mara*

Survey 0723A

PROGRAMME

18-30 May 2023

Ports

Loading: Fraserburgh, 15 May 2023

Sailing: Fraserburgh, 18 May 2023

Unloading: Fraserburgh, 30 May 2023

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.

Costs to Project: 20749 (SU0170) - 13 days.

Equipment:

BT 201 - rigged with SELTRA sorting box and 300 mm SMP
Trawl doors, sweeps, bridles, backstrops and pennants
Spare netting and twine
Photosynergy PSL-5000 light unit x 2 (green lights)
Photosynergy SLS-2500 light unit x 2 (green lights)
Photosynergy SLS-2500 light unit x 4 (white lights)
Photosynergy SLS-2500 light unit x 3 (blue lights)
Photosynergy SLS-2500 light unit x 2 (red lights)
Photosynergy SBS-5000 subsea battery unit x 4
10 x 20 m Fibre optic side emitting light cables
MS 12 V Battery pods
LI-COR LI-192SA Underwater Quantum Sensors x 3
LI-COR LI-250A Light Meter
LI-COR LI-1500 Light Sensor Logger & U/W Housing
LI-COR 2222UWB Underwater cables 1 x 3 m, 2 x 10 m, 1 x 100 m
LI-COR LI-180 Spectrometer & U/W Housing
RBR Solo³ Turbidity logger & sensor x 2
Aquatec Turbidity logger & sensor
GoPro, Bowtech, Navigator Video Cameras & Lights
Flashback recorders and housing
Pyramid camera frames
Scanmar units – door, headline, wing, depth

Objectives

- Investigate whether artificial light can influence fish behaviour and enhance escape through a square mesh panel (SMP) in the extension of the trawl;
- examine if the mounting configuration of the fibre optic cable on the panel has an effect; and
- Obtain video footage of fish behaviour when passing through the illuminated bottom panel of a SELTRA box fitted with 300 mm SMP on the top panel.

Procedure

Equipment will be loaded onto MRV *Alba na Mara* at Fraserburgh on 15 May 2023, where the trawl will be rigged onto the net drum. Three scientific staff will join *Alba na Mara* around 0830 on 18 May and will then leave harbour once all drills and familiarisation have been completed. The vessel will sail thereafter and travel, weather permitting, to fishing grounds near the Shetland islands (Figure1), approximately 200 miles North of Aberdeen (exact position will be weather dependent). During the transit, rigging of instrumentation on the net will be finalised. Once at the survey location and following a shakedown tow of the gear, trials will commence.



Figure 1: Map highlighting the location of the Shetland Islands where the trials are scheduled to take place.

The intention is for *Alba* to work daily from anchorages around the Shetland islands depending on weather conditions and fish species composition on the grounds. On the evening of 24 May a crew change will take place at a suitable port. The EK60 38kHz transducer calibration will take place on a suitable evening during the trip. *Alba* will return to Fraserburgh by the evening of 29 May to unload equipment and scientific personnel on 30 May.

Fish Behaviour Trials

The BT201 trawl will be fitted with a SELTRA box that has a 300 mm SMP on the top panel, situated 9 m from the codline. The bottom panel will be rigged with a 20 meter fibre optic (FO) cable illuminated by two Photosynergy SLS2500 LED light pod units (one attached on each end to produce uniform intensity output throughout the fibre length), powered by 12 V battery packs made in house by MS. The FO cable net-mounting configuration tested is illustrated in Figure 2.

The Photosynergy SBS5000 subsea battery packs, developed for the purposes of this project, will also be trialled on suitable occasions to check viability to substitute the MS battery packs. The SLS2500 LED light pod units will emit blue light (460 nm) and hauls will be conducted either with lights OFF (control) or ON (test). All trial configurations could potentially evolve during the length of the cruise depending on observations.

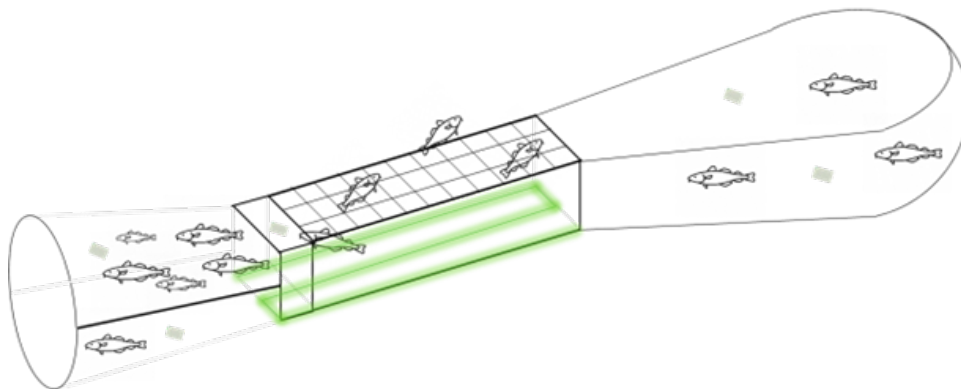


Figure 2: SELTRA box with 300 mm SMP and the net-mounting configuration of illuminated bottom panel. The configuration utilises a 20 m Lightpath fibre optic cable and two SLS2500 units in order to produce uniform intensity output throughout the fibre. Green colour for light is for illustration purposes only.

Ambient light and turbidity conditions as well as light spectrum changes from the artificial light source will be recorded in real time during fishing operations. Two LI-COR LI-192SA underwater quantum sensors, coupled on a LI-COR LI-1500 light sensor logger (in a custom made underwater housing by the MS engineering team), will be rigged to collect real time ambient and artificial light data, while turbidity will be recorded by an RBR Solo³ logger equipped with a Seapoint turbidity sensor. A second turbidity sensor and logger will be available as a backup or if additional data collection is required. A LI-COR LI-180 spectrometer will record the light spectrum emitted by the artificial light source. The LI-180 will be positioned at various distances from the artificial light to examine how light spectrum might be altered through water and therefore the perception of light colour from fish as they approach the light source. The exact positions of all sensors will be determined during the trip. These data will provide information on the environmental conditions that might affect light propagation and how fish might perceive their surroundings during trawling (Figure3).

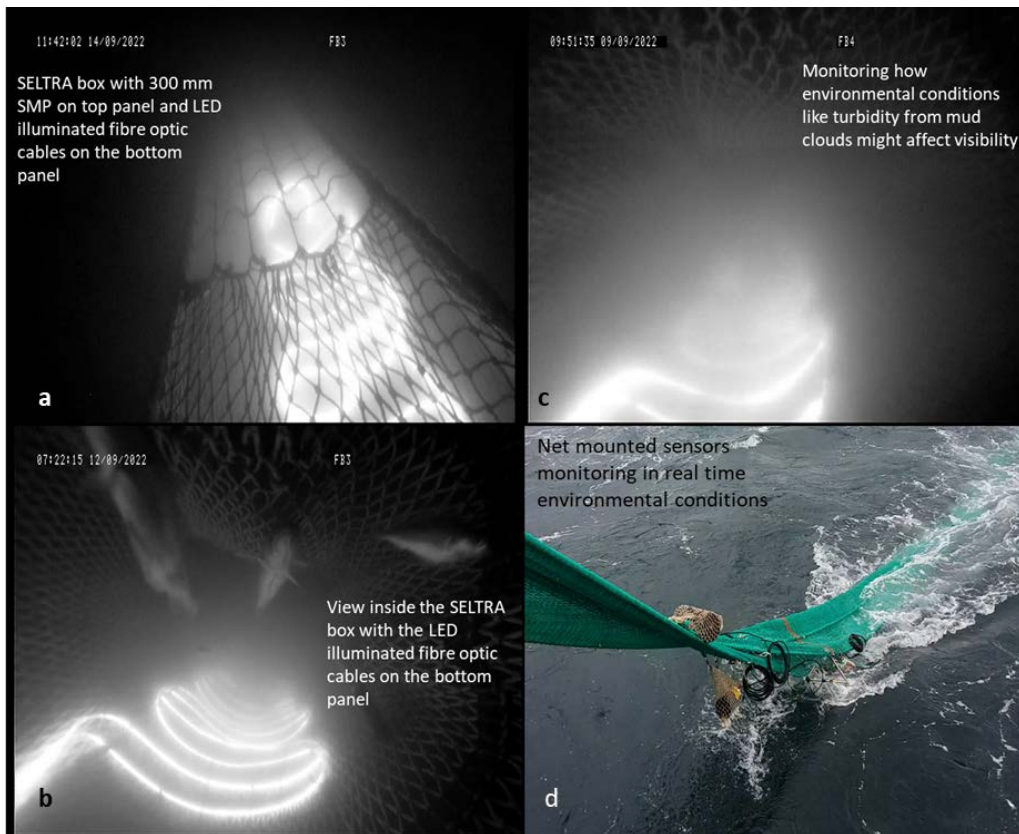


Figure 3: Photos from 1322A, a pilot trip prior to the commencement of CodSElect project, showing the (a) SELTRA box, (b) illuminated fibre optic cables, (c) how environmental conditions like turbidity can affect light propagation and (d) net mounted instrumentation.

The light units cannot be wound onto the net drum as it could damage the equipment. During hauling the net will be wound onto the drum up to the SELTRA, then the power block will be used to bring the codend aboard. Large bins will be used on deck to receive and store the catch from the codend. The catch will be sorted into key species, weighed and individual total length measurements recorded.

The vessel 12 hour period of operation will be provisionally 0700 to 1900 hours for the behaviour trials, so that all hauls will be conducted in daylight (Figure4).

2023	Sunrise/Sunset	
May	Sunrise	Sunset
18	04:19	21:44
19	04:17	21:46
20	04:15	21:48
21	04:13	21:50
22	04:11	21:53
23	04:08	21:55
24	04:06	21:57
25	04:04	21:59
26	04:03	22:01
27	04:01	22:03
28	03:59	22:05
29	03:57	22:07
30	03:56	22:09

Figure 4: Daylight hours for the Shetland Islands for the period of the trials (source www.timeanddate.com).

It is expected that a minimum of four fishing hauls will be carried out each day, with the last haul being heaved up at 1700-1730 hours. Hauls will be 30 minutes long initially, with the potential to be adjusted depending on the catch volume. The net will be towed at three knots with Scanmar units monitoring door and wing spread and headline height during each haul. Depending on the fishing grounds, hauls will be conducted at a depth of approximately 100 meters. A provisional breakdown of the trip schedule and hauls during the survey is provided in Table 1.

DATE	Schedule			
15/05/2023	Loading Alba			
18/05/2023	Travel to Shetland			
19/05/2023	Test gear	Control gear	Control gear	Test gear
20/05/2023	Control gear	Test gear	Test gear	Control gear
21/05/2023	Test gear	Control gear	Control gear	Test gear
22/05/2023	Control gear	Test gear	Test gear	Control gear
23/05/2023	Test gear	Control gear	Control gear	Test gear
24/05/2023	Control gear	Test gear	Test gear	Control gear
25/05/2023	Test gear	Control gear	Control gear	Test gear
26/05/2023	Control gear	Test gear	Test gear	Control gear
27/05/2023	Test gear	Control gear	Control gear	Test gear
28/05/2023	Control gear	Test gear	Test gear	Control gear
29/05/2023	Return to Aberdeen			
30/05/2023	Unloading Alba			

Table 1. Provisional schedule of trip and hauls.

General

There is no need for any night hauls during this survey and work patterns will be arranged around the normal working hours/practices of the vessel. The survey will end in Fraserburgh on 30 May with all staff, fishing gear and scientific equipment returning to the Marine Laboratory in Aberdeen.

Normal contacts will be maintained with the laboratory.

Submitted:
Alex Edridge
02 May 2023

Approved:
I Gibb
11 May 2023