

Not to be cited without reference to the Marine Laboratory, Aberdeen

MFV *Audacious*

Cruise 0623H

Report

Dates

24 April – 05 May 2023

Out-turn days: 12 days – MONKRV/20702

Fishing Gear: Anglerfish Trawl BT 195 (Supplied by Jackson Trawls)

Objectives

1. To undertake the Scottish Irish Anglerfish Megrin Industry Science Survey (SIAMISS). An annual nationally coordinated demersal trawling survey of Anglerfish (*Lophius piscatorius* and *Lophius budegassa*), Megrin (*Lepidorhombus whiffiagonis*) and Four-Spot Megrin (*Lepidorhombus boscii*) in the West of Scotland (ICES area VIa) and the North Sea (ICES area IVa).
2. To collect species distribution, length frequency and biological data of Anglerfish (*Lophius piscatorius* and *Lophius budegassa*), Megrin (*Lepidorhombus whiffiagonis*), Four-Spot Megrin (*Lepidorhombus boscii*) Cod (*Gadus morhua*), Blue Skate (*Dipturus batis*) and Flapper Skate (*Dipturus intermedius*).
3. To collect additional species distribution, length frequency and biological data in connection with the EU Data Collection Framework (DCF).

Narrative

With *Scotia* out of action due to her retention in drydock following the MRV *Petrel* incident, it was decided to proceed with the plan to complete the entire survey of ICES areas IVa, VIa and VIb using chartered fishing vessels reimbursed using scientific quota. For 0623H, a survey of IVa, the vessel chartered for the survey was the MFV *Audacious*, the survey to follow on from 0523H on the same vessel. The duration of the charter included ten days at sea and one day each side to allow for mobilisation/demobilisation that often cut prescribed survey time on previous charters.

The vessel and scientific staff conducted trawl operations up to a maximum of 18 hours a day with adequate breaks for WTR compliance. As the weather forecast for the survey looked positive bar the first day, the preliminary plan was for MFV *Audacious* to work north in UK waters of the North Sea before an overnight landing in Lerwick. Following that, MFV *Audacious* was to continue working north to the shelf edge before working south in Norwegian waters.

With a large survey area, effort was to be increased by utilising alternative tows to reduce steaming distances between survey stations and to ensure full use of available survey time to maximise the data collected during the survey.

On 24 of April, a vessel familiarisation and a risk assessment review were undertaken with the new scientific staff joining. As the vessel was previously used for 0523H, all survey equipment including the BT195 survey trawl, was already loaded on-board. The survey trawl, net monitoring sensors and scientific equipment were looked over and prepared for use pre-sailing. Due to poor weather, *MFV Audacious* sailed as late as possible to ensure arrival at the first trawl station for work to commence at 06:00 hours the next morning.

Despite poor weather, survey progress was not hampered, and four stations were completed successfully. The tunnel and cod end of the trawl whilst hauling the second tow twisted up, however, the trawl was still able to retain catch with no damage occurring, so the catch was processed. With weather improving, five stations were completed successfully the following day, the final station having intermittent wing readings due to the sensor flipping over. Five stations were completed on 27 April before *MFV Audacious* made for Lerwick to land the catch retained.

MFV Audacious sailed from Lerwick to resume surveying at 06:00 hours on 28 April. The weather had freshened but did not hamper survey progress with five stations completed successfully. Unfortunately, the weather worsened the following day. Five stations were undertaken and valid, however, stations 20 and 24 had intermittent wing readings due to the sensor fouling whilst shooting and station 21 was cut short due to the trawl sticking on the seafloor at 49 minutes. No damage occurred to the trawl with only the tickler chain parting which was quickly rectified.

Whilst the swell remained on 30 April, the survey continued unhampered with five stations successfully completed. With fairing weather, six stations were successfully completed the next day with a further six on 2 May. During the tow on station 38, the port trawl door tipped over, reducing the spread. Trawl warp was retrieved until the door righted and the tow was continued.

In fine weather, five stations were successfully completed on 3 May with four stations completed the following day whilst working West towards Peterhead. After the final station, no. 50, *MFV Audacious* made for Peterhead, docking ~ 0530 on 5 May. As the *MFV Audacious* was selected to undertake the third SIAMISS charter (0723H), five days later, all equipment was packed and stored on-board whilst the vessel conducted a short commercial fishing trip. All staff departed the vessel following equipment storage.

Results

Trawl Survey

The SIAMISS survey series, utilising a semi-random-stratified survey design, resulted in station positions being generated by distributing effort based on area and anglerfish catch variability within four predefined strata within ICES area IVa. A total of thirty primary station positions and sixty alternative station positions were generated for

0623H. The priority was to survey primary stations initially with alternative stations being utilised to increase effort or to replace primary stations where surveying was not suitable. A 5 nm buffer was applied to the positions and trawling was undertaken within this 5nm buffer with the intention of transecting the centre of the position during the tow where possible.

Trawl locations were selected within the 5 nm buffer of the provided positions using a combination of established trawl locations along with new locations, undertaken for reasons including avoidance of protected and sensitive marine habitats, inability to trawl due to static fishing gear, presence of commercial trawlers operating in the station area or unsuitable ground. The good survey progress due to fair weather conditions and lack of surveying or mechanical issues, allowed for an increase in the number of alternative stations to be undertaken in each stratum during the survey.

The SCANMAR net monitoring system was used to monitor trawl headline height, wingspread, door-spread, and distance covered during each tow. The vessel's own SCANMAR SS4 door units and Trawleye along with a receiver unit rented by the vessel, were used throughout to reduce the burden on equipment supplied by Marine Directorate (MD). The SCANMAR Trawleye was used to monitor bottom type and fish density entering the net to reduce the likelihood of trawl damage and excessive fish catches.

An MSS built bespoke bottom contact sensor was attached to the trawl's groundgear during each tow to monitor ground contact as well as to validate record of touch-down (TD) and lift-off (LO) of the groundgear. This was downloaded and analysed after every haul to verify and cross-check trawl TD and LO times against the SCANMAR data recorded. The SCANMAR sensors for all but four of the trawl stations worked well, with the only issue encountered being intermittent wing readings (H9, H20 and H24).

Trawl duration at each station was typically of 60 minutes duration however the duration of H21 was reduced by 11 minutes due to the net sticking on the seafloor. The net was retrieved and due to the duration being >50% and no damage to the trawl apart from a broken tickler chain the station was marked as valid, and the catch worked up.

The same trawl gear (BT195) was used throughout the survey, deployed at fifty stations. No stations were invalid resulting in the final number of valid stations at fifty. All thirty primary stations were completed. In addition, due to fine weather, lack of gear damage and good survey progress, twenty additional alternative stations were completed to increase survey resolution throughout each of the four strata.

The trawl gear performed well during the survey, having recently been overhauled with very little damage occurring during the survey. A chart of the survey area is included below illustrating valid primary and alternative completed trawl stations, SIAMISS strata and cruise track (Figure 1.). Table 1. details the number of stations completed and percentage coverage per stratum.

As the survey was undertaken on a chartered commercial vessel, the entire catch was not observed due to vessel limitations and staffing with only the target species being

observed on the survey. All target species were identified, weighed, and measured to generate a length frequency. Individual biological data were collected from the target species according to the pre-set survey sampling targets as detailed in Table 2.

Observations from the catch data from the survey identifies the catch per unit effort (CPUE) for Anglerfish (*L. piscatorius*) as 25.6 kg/h, a total of 392 individuals caught and biologically sampled on the survey. Of Black-bellied Anglerfish (*L. budegassa*), 23 individuals were caught and sampled, resulting in a CPUE of 1.4 kg/h. A total of 344 Megrims (*L. whiffiagonis*) were observed of which 205 were biologically sampled resulting in a CPUE of 3.9 kg/h. A substantially greater number of Four-spot Megrims (*L. bosci*) was encountered during the survey (122 individuals) compared to 0523H where only one individual was observed. Of the 122 individuals, 80 were biologically sampled. Cod (*G. morhua*) were encountered regularly with 1348 individuals being observed, of which 732 were biologically sampled. This resulted in a CPUE of 46 kg/h, substantially less than the CPUE of 108.9 kg/h observed on 0523H. This was mainly due to the size of individuals observed, 0623H catches made up of primarily smaller individuals. The target skates and rays observed were Arctic Skate (*Amblyraja hyperborea*) (20), Fylla's Ray (*Rajella fyllae*) (45), Long Nosed Skate (*Dipturus oxyrinchus*) (11), Shagreen Ray (*Leucoraja fullonica*) (1), Starry Ray (*Amblyraja radiata*) (203), Blue Skate (*D. batis*) (1) and Flapper Skate (*D. intermedius*) (6). Biological sampling was done on all but two Flapper Skate, one Arctic Skate and seven Long Nosed Skate as due to their large size, they were removed from the remaining catch on deck before being measured and released. Of rays, 39 of 45 Fylla's Ray, 175 of 203 Starry Ray and all Blue Skate and Shagreen Rays were sampled. The numbers of biological observations per species are detailed in Table 3. All otoliths collected from biological sampling will be aged upon return to the marine laboratory.

The full dataset from this survey is available on the MSS FSS database. From this a set of abundance indices is calculated for the target commercial species.

Electronic Data Capture

All SCANMAR net monitoring data were collected electronically. Haul summary data, catch composition, length frequency data and biological data were entered into the FSS system at sea using the electronic data capture (EDC) system. This allowed error screening during and post capture, vastly increasing efficiency and quality of the data collected. All data was uploaded to the lab servers following final quality checks post survey.

As was the case in 0523H, the *Audacious*' Skipper and crew must be thanked for their help and assistance, as that along with their experience resulted in the survey running extremely smoothly with any issues being rectified promptly. The MD scientists on board appreciated the good working relationship with SFF observers leading to completion of the survey with high quality data collected.

Ruadhán Gillespie-Mules
28/06/2023

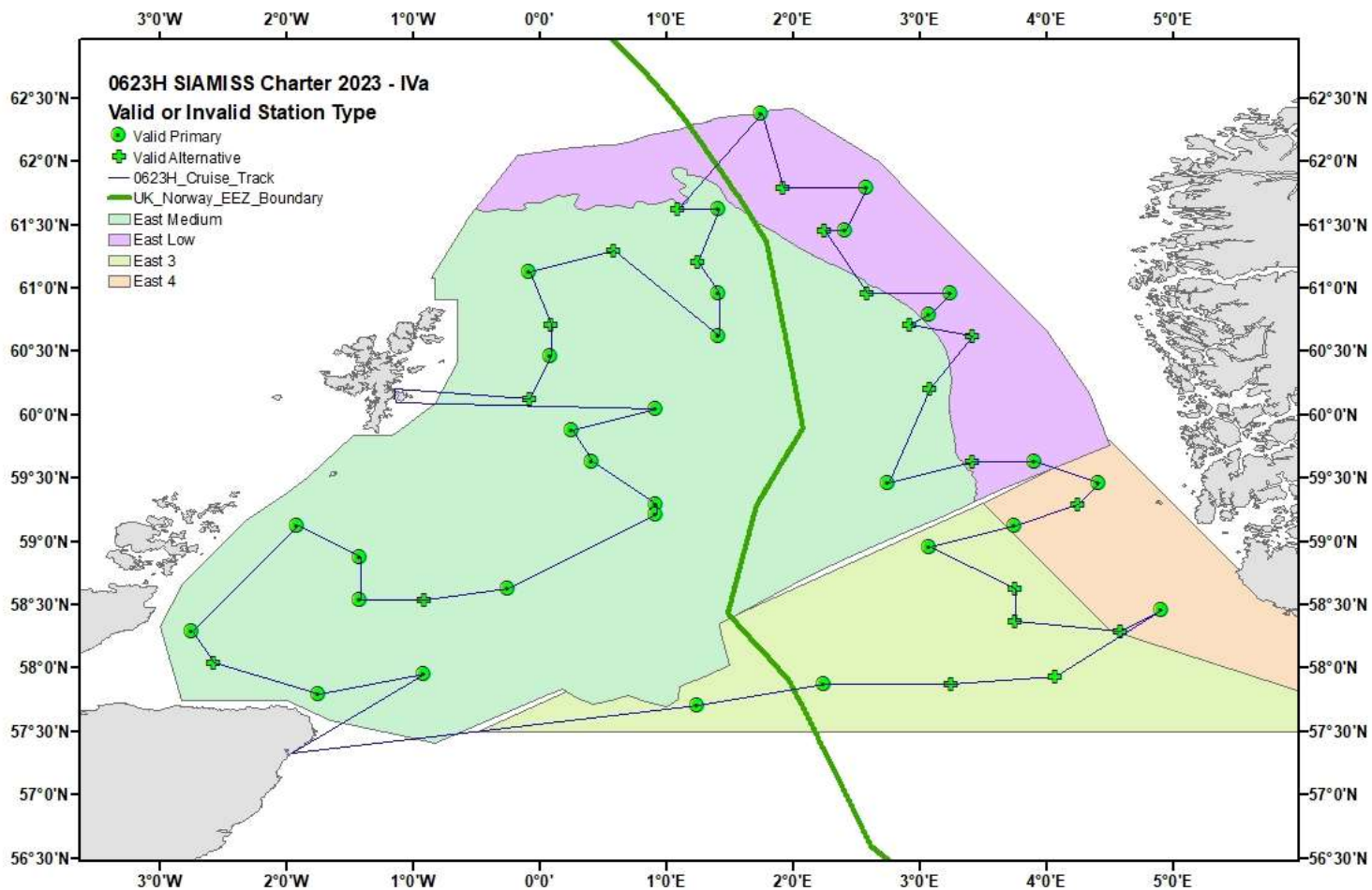


Figure 1: Survey chart illustrating, valid primary and alternative stations, SIAMISS strata and cruise track in IVa for 0623H.

Table 1: Number of programmed, valid and percentage completion of stations per stratum for 0623H.

Table 1: 0623H Trawl Stations per Stratum					
Stratum	Programmed No. of Stations	No. of Valid Core Stations	No. of Valid Alternative Stations	Total No. of Valid Stations	Percentage Completion
East Medium	18	18	10	28	155
East Low	6	6	4	10	166
East 3	3	3	4	7	233
East 4	3	3	2	5	166

Table 2: Biological sampling targets for 0623H. (* Individual weight, gutted weight, sex, maturity and age; ** Individual weight, gutted weight, sex and maturity; *** Individual weight, sex and maturity – males only)

Table 2: 0623H Biological Sampling Targets	
Species	Target
<i>L. piscatorius</i> (ANG) *	All
<i>L. budegassa</i> (BAN) *	All
<i>L. whiffiagonis</i> (MEG) **	1 / cm
<i>L. boscii</i> (FME) **	1 / cm
<i>G. morhua</i> (COD) *	1 / cm
<i>A. radiata</i> (STY) ***	1 / cm
All other skates and rays ***	All - except CRA, SPY and TRA

Table 3: CPUE of target species observed during 0623H.

Table 3: 0623H CPUE of Target Species		
Name (Species)	CPUE nos./h	CPUE kg/h
Cod (<i>Gadus morhua</i>)	27.1	49
Angler (<i>Lophius piscatorius</i>)	7.9	25.6
Megrim (<i>Lepidorhombus whiffiagonis</i>)	6.9	3.9
Arctic Skate (<i>Amblyraja hyperborea</i>)	0.4	1.8
Long Nosed Skate (<i>Dipturus oxyrinchus</i>)	0.2	1.7
Flapper Skate (<i>Dipturus intermedius</i>)	0.1	1.5
Black-bellied Angler (<i>Lophius budegassa</i>)	0.5	1.4
Starry Ray (<i>Amblyraja radiata</i>)	4.1	1.4
Four-spot Megrim (<i>Lepidorhombus boscii</i>)	2.4	0.9
Fylla's Ray (<i>Rajella fyllae</i>)	0.9	0.3
Shagreen Ray (<i>Leucoraja fullonica</i>)	<0.05	0.1
Blue Skate (<i>Dipturus batis</i>)	<0.05	<0.05

Table 4: Numbers of biological observations per species collected during 0623H (length, weight, sex, maturity & age; * length, weight, sex & maturity (males only); ** length, weight, sex & maturity).

Table 4: Number of Biological Observations per Species	
Name (Species)	No.
Cod (<i>Gadus morhua</i>)	732
Angler (<i>Lophius piscatorius</i>)	392
Megrim (<i>Lepidorhombus whiffiagonis</i>) **	205
Arctic Skate (<i>Amblyraja hyperborea</i>) *	19
Long Nosed Skate (<i>Dipturus oxyrinchus</i>) *	4
Flapper Skate (<i>Dipturus intermedius</i>) *	4
Black-bellied Angler (<i>Lophius budegassa</i>)	23
Starry Ray (<i>Amblyraja radiata</i>) *	175
Four-spot Megrim (<i>Lepidorhombus boscii</i>) **	80
Fylla's Ray (<i>Rajella fyllae</i>) *	39
Shagreen Ray (<i>Leucoraja fullonica</i>) *	1
Blue Skate (<i>Dipturus batis</i>) *	1