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MRV Scotia

Survey 0222S

REPORT

22 January – 02 (11) February 2022

Personnel

Jim Drewery (SIC)
Louisa Sinclair (Deck)
Hannah Holah (MIK)
Gerald McAllister
Adrian Tait
Sarah Mackinnon
Campbell Pert
Nicholas Carey

Objectives

1. To complete Scotland's commitments to the Quarter 1 International Bottom Trawl Survey (Q1 IBTS) 2022 in the North Sea in ICES area IV.

2. To collect additional biological data in connection with the EU Data Collection Framework (DCF) and as per request from IBTS members.

3. To sample the water column using circular-frame plankton (MIK) net for pre-metamorphosed herring and sprat larvae during the hours of darkness within the trawl survey area. During selected MIK deployments to deploy additional small subsidiary ring nets on the MIK frame itself to target eggs and sandeel larvae.

4. To obtain temperature and salinity data from the surface and seabed at each trawling station.

5. To collect samples of surface and near seabed water for nutrient analysis (nitrates, silicates and phosphates).

6. To record marine litter at each trawl station for MSFD.

Out-turn days: 21 days, RV2101 / 20590

Survey Gear:
- GOV Trawl (BT 137) rigged with 47m sweeps and ground gears A and B.
- Midwater Ring Net (MIK) with attached subsidiary ring nets (MIKey-M).
- CTD (RBR Concerto^3).
- Scanmar net geometry and catch sensors
- Bottom contact (BC) sensors (in-house design)

Narrative

Scotia sailed from Aberdeen at 1150 on 22 January with vessel familiarisations, drills, and safety briefings (including updated covid-19 measures) taking place shortly afterwards. Scotia sailed having isolated hydro winches 1 and 2 (CTD winches) from the hydraulic system due to a localised fault. This precluded any use of reverser bottles for collection of near-seabed water due to the thickness of the wire on the single winch remaining for CTD deployments. With ground gear B on the net the vessel steamed north to undertake a shakedown haul in rectangle 44E8.

On reaching station around 1500, deployment of the trawl was delayed by a hydraulic fault which developed just after the trawl doors had been shot. Ensuing repairs were completed swiftly however with daylight hours short the opportunity for completing the trawl station was lost and Scotia continued with MIK familiarisation for scientists and crew, following which a set of calibration runs were completed, further followed overnight by 2 valid MIK deployments in each of squares 44E8, 45E9 and 45E8.

On 23 Jan the first haul (19) was undertaken successfully in 45E8. Immediately following this one of the scientific staff was taken ill, and following discussions with onshore medical experts Scotia paused survey to enable airlift to Aberdeen. A further two hauls were managed the same day following which four MIK deployments were completed working back towards the NE coast to be close at hand for collection of replacement staff the next day. On the morning of 24 Jan Scotia undertook a haul just north of Fraserburgh while arrangements were made for staff transfer by chartered small craft. After it became apparent that transfer was only possible from Macduff harbour Scotia streamed the 15 miles to the east and had a replacement staff member aboard at 1130 with no issues. With the forecast ahead for very strong winds from the west in the decision was made to leave the Moray Firth stations for later and taking advantage of the prevailing fine conditions to pick up some of the more exposed stations west of Orkney. A trawl station in 45E7 was completed and Scotia made passage through the Pentland Firth with a favourable tide to undertake MIK deployments in 46E6 (4 deployments) and 47E6 (3 deployments) after dark along with further calibration tows.

After a single valid haul in each of 46E6 and 47E6 a plan to steam through Westray Sound for a third haul east of Orkney was shelved due to daylight limitations and Scotia took the only available option of seeking a new grounds north of Orkney in the same square. Reasonable-looking grounds to the north of Pappa Westray were located. Fishing however was against both wind and a strong tide with attempts to maintain suitable speed over ground resulting in intermittent contact with the seabed. A split down the belly panel observed on hauling settled the matter and the haul was scored as invalid, despite a reasonable catch in the codend. The download from BC sensor corroborated poor contact with the seabed.

A total of 7 MIK deployments were made to the east of Orkney overnight with 4 hauls following in the same area as the wind increased in accordance with the forecast. One CTD deployment was dropped to give time for four daylight hauls. Scotia steamed into the Moray Firth for MIK stations however with gusts to nearly 60 kts on occasion overnight only four MIK stations were completed. Trawling continued in moderate conditions throughout daylight on 27 Jan however subsequent to the third haul of the day the ships Chief Engineer reported signs of mechanical issues serious enough to require immediate return to port for engine immobilisation and inspection. The IBTS Q1 coordinator was informed of events and Scotia, cautioned against proceeding at high speed, made passage back to Aberdeen overnight being docked at 0900 on 28 Jan and was officially in immobilised status shortly afterwards. Ships engineers made their investigations over the next few days revealing damage to the

bearings and housings associated with the thrust box. On 1 Feb, following assessment from parts manufacturers it was confirmed that repairs would be in excess of 4 weeks and that continuation of cruise 0222S was not in any way possible. The IBTS coordinator was again updated. All scientific staff departed the vessel by 02 Feb with unloading of the fishing gear and other equipment being postponed for logistical reasons

RESULTS

1. Demersal Trawl Survey

Demersal trawling was undertaken with the GOV trawl incorporating ground gear B on all stations as these were all north of 57.5°. The Scanmar system was used throughout the survey to monitor headline height, wing spread and door spread in real time. Scotia's own navigation system provided data on vessel speed over the ground and distance covered during each haul. A self-recording bottom contact sensor was attached to the ground gear with the data being downloaded and checked after each tow to monitor contact with the seabed throughout the duration of the haul. All trawls were undertaken during the pre-defined hours of daylight.

Unexpected termination of the survey due to mechanical breakdown on 28 Jan led to only 15 hauls out of a potential 59 being undertaken. Of these, 14 were considered valid (Figure 1). Of the 48 rectangles in the Scottish survey area 14 had one valid haul including the two rectangles assigned for double effort that were covered which were limited to 1 haul for logistical reasons. There was a single occurrence of a foul haul (station 26).

As only part of the survey area was covered catches will not be compared with those of previous years in this report. However a total of 8103 kg was caught for 6.9 hours fishing with 59 different species observed.

2. Biological Sampling / Age determination / Additional DCF sampling

In total of 1305 biological samples (Table 3) were collected as part of the routine biological sampling programme on a broad range of mainly commercial species. Otoliths from cod, haddock, whiting, saithe, norway pout, plaice, herring, mackerel and sprat were collected for immediate ageing back at Marine Lab. Hake otoliths were also retained from the survey, a subset of which will be aged at a later date.

Table 3. *Numbers of biological samples collected as part of routine sampling.*

Species	No. Sampled	No. Aged
Angler (*Lophius piscatorius*)*	9	0
Blonde Ray (*Raja brachyura*)	2	0
Cod (*Gadus morhua*)*	75	75
Cuckoo Ray (*Leucoraja naevus*)	4	0
Flapper Skate (*Dipturus intermedia*)	7	0
Haddock (*Melanogrammus aeglefinus*)*	345	345
Hake (*Merluccius merluccius*)	11	tba
Herring (*Clupea harengus*)	196	196
Lemon Sole (*Microstomus kitt*)	18	0
Mackerel (*Scomber scombrus*)	16	16
Norway Pout (*Trisopterus esmarkii*)	125	125
Plaice (*Pleuronectes platessa*)	108	108

Saithe (*Pollachius virens*)	3	3
Shagreen Ray (*Leucoraja fullonica*)	3	0
Spotted Ray (*Raja montagui*)	33	0
Sprat (*Sprattus sprattus*)	175	175
Whiting (*Merlangius merlangus*)*	174	174
Witch (*Glyptocephalus cynoglossus*)	1	1
Total	**1305**	

* species subject to additional biological sampling (see below)

Additional biological data and preserved stomachs (whiting/angler/megrim) were collected:

Additional biological sampling

- **Cod liver parasites:** Biodata from all cod caught was expanded to include infection categories (from pre-defined protocol) of 'cod liver worm' according to visual inspection along with individual liver weights. This data was collected from a total of 75 individuals covering all hauls.
- **Lernaeocera infection of whiting**: As logistics allowed collection of whiting biodata during the final haul of each day was expanded to include a count of the numbers of the ectoparasite *Lernaeocera branchialis* observed on each individual that was otolithed. This data was collected from a total of 61 individuals covering 4 hauls (S22027, 030, 031 and 033). Only a single parasite was observed.
- **Extra haddock data:** As logistics allowed collection of haddock biodata during the final haul of each day was expanded to include the length (to the mm below), a count of *L. branchialis* as above along with incidence of obvious skeletal defects. This data was collected from a total of 302 individuals covering 2 hauls (S22023, and S22030). A total of 98 *L. branchialis* were recorded of which 30 were observed to be dead or calcified.
- **Stomach collection**: Intact stomachs were collected from all anglerfish (5 individuals), all megrim (zero occurrences) and otolithed whiting from the last haul of each day as logistics allowed (37 individuals). Stomachs are labelled and frozen at Marlab pending further analysis.

Post processing of haul 32 the weights for sprat and norway pout (both measured on the same balance) stood out as varying significantly from the range of values obtained for these species thus far. It was suspected that the balance had developed a calibration issue and the weight data (for sprat and norway pout only) was therefore deleted from MSS database for this haul and thus will not be included in the upload to Datras.

Commercial species age 1.
Plots of CPUE and distribution for commercial species age 1 using provisional data are shown in Figure 2.

3. MIK Survey

A total of 29 MIK hauls were undertaken over the course of the survey, of which 1 was considered unusable due to being hauled shortly after deployment as a response to rapidly worsening weather conditions. On top of this a further 6 deployments were carried out with an open net for calibration of the flowmeters. The 28 valid deployments covered 14 of the programmed 48 rectangles each with at least 1 sample, including 1 square which contained 3 deployments and 1 square which contained 4. Both squares containing greater >2 MIK deployments were those where extra Scottish effort was programmed. Due to mechanical

faults as outlined above the cruise returned to Aberdeen early, and was unable to continue sampling thereafter.

Pre-metamorphosed herring larvae were found in 22 of the 28 deployments with the highest counts found in ICES rectangles 44E8, 44E9, and 43E9. A total of 121 herring larvae were identified. The total counts of each species identified and the number of hauls they were present in are summarised below. Catches of herring larvae were notably lower than in 2021 when compared by ices rectangle, and no sprat or sardine larvae were found during the survey.

Table 2. *Number of hauls where species were observed and total count of individuals*

Species	No. Hauls	Total Count
Ammodytes marinus	2	4
Anguilla anguilla	2	2
Clupea harengus	22	121
Clupeidae	3	3
Maurolicus muelleri	3	5
	Total	135

Identification and measurement of the clupeid and other target larval species were undertaken at sea. Non target larvae were preserved for later processing and identification at the Marine Laboratory.

MIK Marine Litter – see below.

MIKey-M
MIKey-M sampling on behalf of WGEGGS2/WGSINS was carried out during 19 of the 28 MIK hauls, with at least 1 MIKey-M sample taken in each of the 14 ICES rectangles sampled. Squares with high potential for the presence of sandeel spp larvae were targeted for repeat MIKey-M deployments. MIKey-M samples were preserved at sea for analysis at the Marine Laboratory.

4. Hydrographic Data

The RBR Concerto^3 CTD was deployed at 13 out of a possible 14 valid trawl stations in order to obtain vertical dip temperature-salinity data. A software issue prevented recording of salinity at one station (19), however all other parameters were collected. The CTD was dropped from one station to make time for daylight trawling.

5. Nutrient samples

Surface water samples were collected from all CTD deployments for analysis of nitrate, silicate and phosphate content back in the lab. Unfortunately reverser bottles could not be deployed (see narrative) and it was not possible to collect near-seabed water samples during this cruise.

6. Marine Litter
Demersal trawl - All marine litter picked up in the GOV trawl was classified, quantified and recorded then retained on board for appropriate disposal ashore**.**
MIK trawl - All marine litter collected from the MIK codends were individually stored and labelled and will be categorised and recorded at the Marine Laboratory.

7. Other

Non-indigenous Species

All catch, fish and benthos were screened as far as possible for the presence of non-indigenous species, with none evident.

Additional Samples and Miscellaneous Requests

- All shelled molluscs were retained frozen for identification and distribution mapping by D. Mackay.

The full dataset from this survey is available from DATRAS online database.

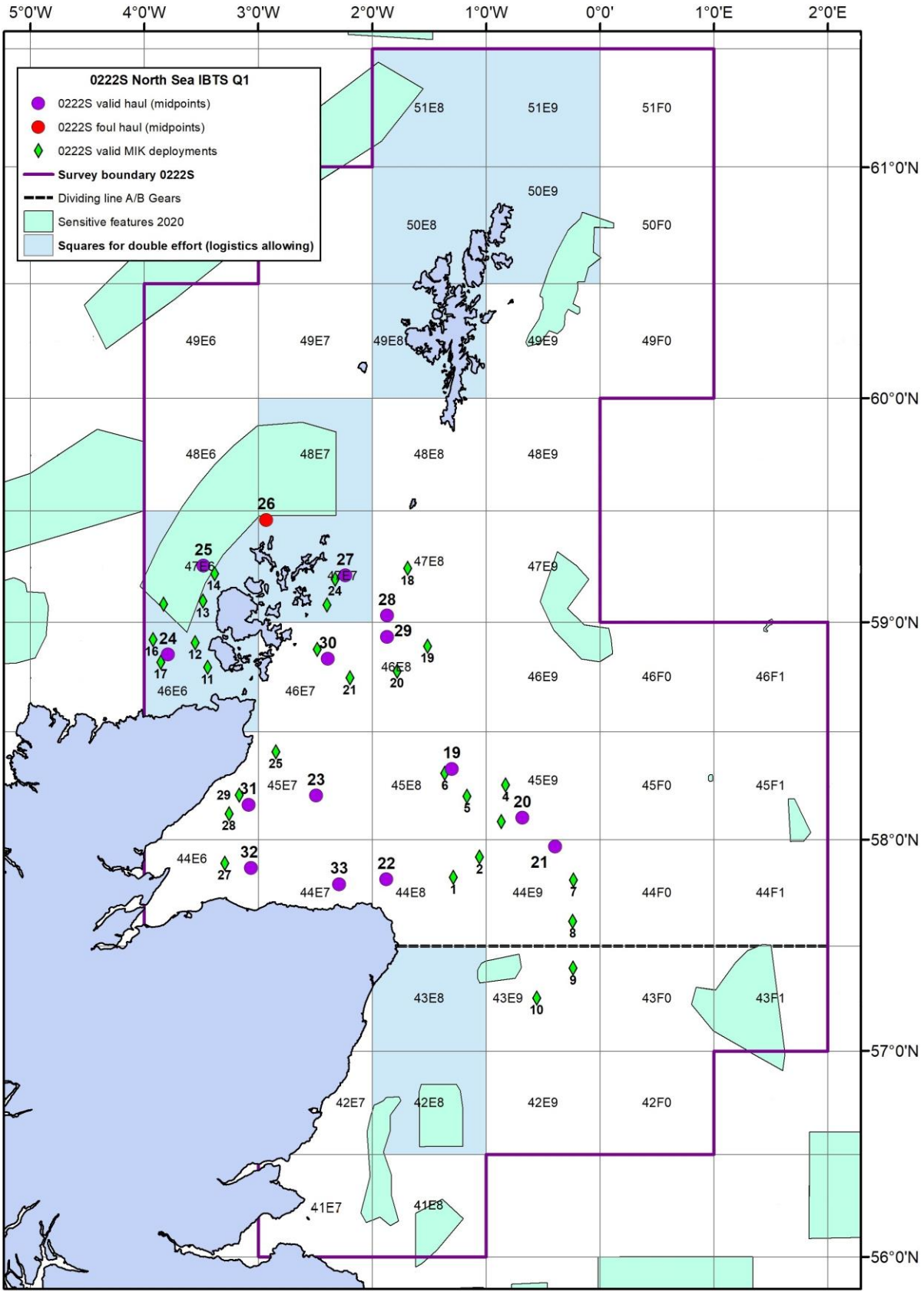

Figure 1. *Scottish North Sea Q1 IBTS survey area along with completed trawl stations, station numbers and MIK deployments for 2022.*

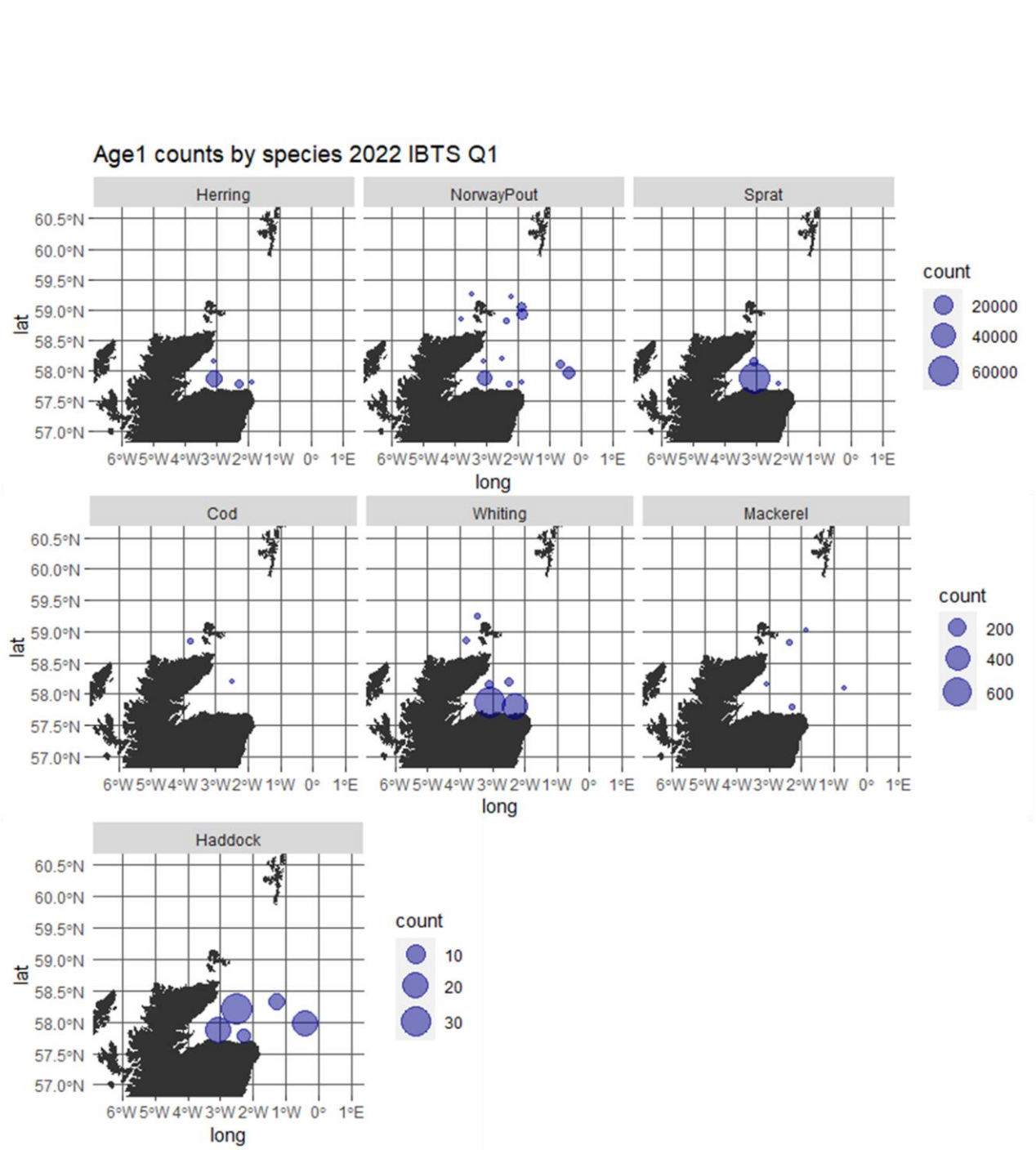

Figure 2: Preliminary distributions and CPUE (no./hr) of age 1 herring, norway pout, sprat, cod, whiting, mackerel, and haddock during the Scottish North Sea Q1 IBTS. Note: abundance scale varies between rows of plots.

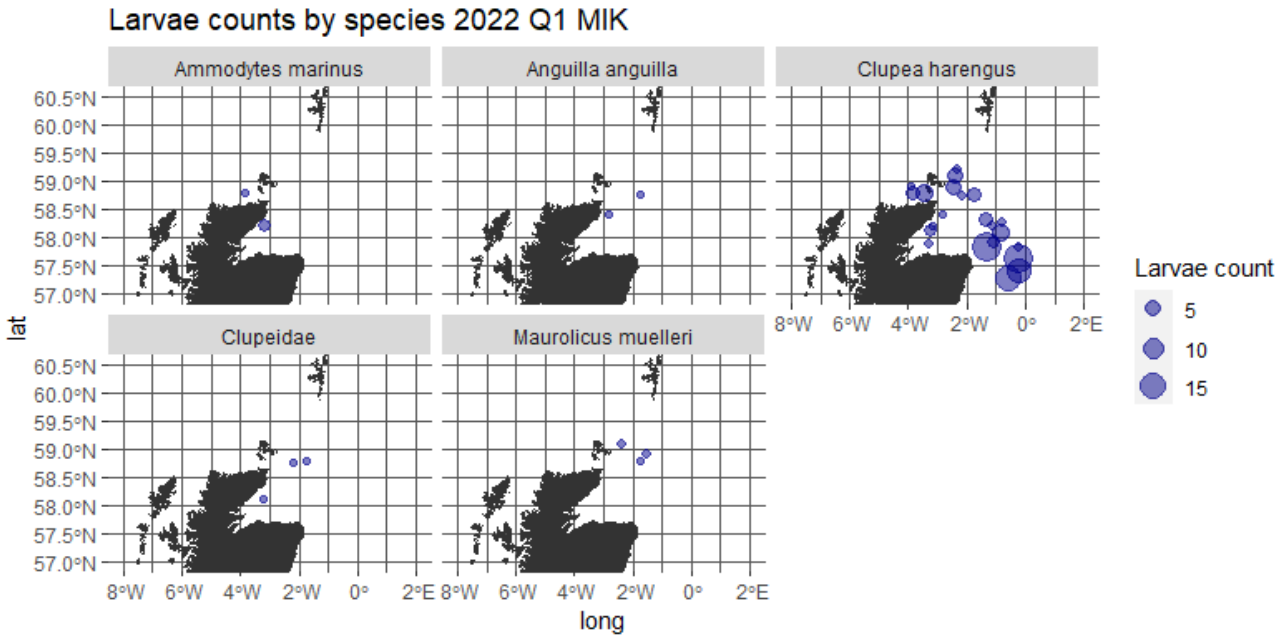

Figure 3: Species distribution plots for target species; Clupeidae is used where individual clupeid larvae were unable to be identified to species level due to damage.

Submitted:
J Drewery
16 March 2022

Many thanks must go to the officers and crew of Scotia and to the ships engineers for the great efforts made in seeking the cause of mechanical faults during 0222S. Thanks also to Hannah Holah for distribution and abundance plots comprising Figures 2 and 3.