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MRV *Scotia*

Survey 1119S

REPORT

Dates

03rd – 23rd August 2019

Half-landing: Aberdeen, 14th August 2019

Personnel

R. Gillespie-Mules (SIC)

Out-turn days: 21 days – RV1913 / 20538

Fishing Gear: GOV Trawl (BT 137) fitted with groundgear A or B.

Objectives

1. To complete an internationally coordinated demersal trawling survey in the North Sea in ICES area IV.
2. To obtain temperature and salinity data from the surface and seabed at each trawling station using a SEABIRD 19+ CTD.
3. To collect additional biological data in connection with the EU Data Collection Framework (DCF).
4. Opportunistic completion of trawls deeper than the 250m area limit to assess stocks outside of survey & index area.
5. Collect and quantify all marine litter encountered on the survey.
6. Collect Dissolved Oxygen measurements from bottom and top water samples at 50 stations throughout the survey.

Narrative

Scotia sailed from Aberdeen at 03:30 UTC on the 3rd of August in good sea conditions. Pre-sailing, groundgear A was attached to the GOV trawl to allow the completion of the southern half of the survey first. The first trawl station Southeast of Aberdeen in rectangle 43E8 doubled as a familiarisation tow and was completed successfully with the fishing gear, SCANMAR and bottom contact sensors performing well. During the second trawl, boulders were picked up and resulted in a significantly damaged net and invalid haul. Following replacement of the net, the station was successfully repeated and a further two stations were completed without issues.

The following three days passed largely without incident, with 15 stations completed successfully. Whilst towing on station S19_211, dense herring shoals were encountered near the end of the tow and resulted in the trawl being shortened.

Later on the 6th Aug, the SCANMAR wing sensors started to give intermittent readings. This continued on the 7th and 8th Aug despite changing units. After investigation it was concluded that whilst towing, the wing sensors, although being aligned straight along the wingtip, were not transmitting to each other due to the spread angle of the wings. Adjustment of the mounting of the wing sensors to account for the angle of the wingspread had an immediately positive effect and resulted in good wing sensor readings for the remainder of the survey. One invalid trawl occurred on the 8th Aug (S19_224), again encountering boulders that tore the net. This was thankfully repairable and the station was successfully repeated.

Freshening weather on the 09th and 10th Aug didn't hamper progress with 10 more stations completed successfully. Station S19_234 was cut short due to sticking on the seafloor, although damage was avoided on this occasion. The successful completion of S19_235 brought the southern half of the survey with groundgear A to a close, all stations being completed successfully. Groundgear B was swapped onto the GOV and passage made North of 57° 30N for the following day.

The morning of the 11th Aug started off with fairly poor weather however didn't hamper progress. 5 stations were completed successfully, the last 3 being reduced in duration due to quantity of fish observed to be entering the net, the bulk of which was made up of Herring and Norway Pout. The following two days passed without incident, 11 stations being completed. Station S19_244 was reduced in duration by 3 minutes due to a dense Herring shoal being encountered on the seafloor. Scotia proceeded to Aberdeen on the evening of the 13th Aug for the scheduled half landing.

Following the half landing and a partial staff changeover, Scotia sailed at 05:30 on the 15th Aug proceeding North to three trawl stations intentionally left to ensure best use of time. These were completed successfully, the final one S19_254 being cut short due to dense fish entering the trawl. Scotia then proceeded to the Northwest, West of the Pentland Firth for the following morning.

Before the start of trawling on the 16th Aug, Scotia was diverted off station following the CTD to assist a fishing vessel, the Ceol Na Mara, having lost all power off the West of Orkney. Upon arrival Scotia stood by until the RNLi lifeboat arrived on scene and took the Ceol Na Mara under tow. Scotia was relieved and proceeded back to the trawl station. 5 stations were completed successfully the rest of the day with the final two being cut short in duration due to dense NPO entering the net.

Surveying on the 17th Aug was hampered by trawl damage. The first tow caught on the seafloor resulting in a small hole in the trawl's starboard wing however the second and fifth trawl of the day were both invalid due to the trawl picking up boulders and catching on the seafloor resulting in substantial yet fixable damage. The third trawl was shortened due to the poor bottom to reduce the risk of the trawl catching. The fourth and sixth trawls were also reduced in duration due to dense fish marks observed entering the net.

The 18th and 19th passed largely without incident, with 10 stations being completed successfully however during the 11th trawl the net was damaged. The fish were sampled however the trawl was considered invalid and was successfully repeated the following day. Six stations were successfully completed on the 20th, this brought an end to the core sampling with all core stations being completed successfully. Norway, during the cruise, had offered to complete 6 of Scotland's allocated stations on the survey, this allowed Scotland some extra time to attempt to find the extent of the distribution of the core species in deeper water to the northwest of the survey area. This work was attempted on the 21st Aug however due to poor ground the net was irreparably torn on the first attempted trawl station. It was decided to not replace the net with a new one as the likelihood of damage occurring again was very high due to the poor sea floor conditions. Scotia having completed the survey successfully proceeded south to Aberdeen, docking at midday on the 22nd Aug. The majority of the staff, equipment and samples were unloaded later on the 22nd with the remaining equipment being unloaded on the 23rd.

Results

Trawl Survey

The locations used for the trawl stations were a combination of established trawl locations as well as completely new locations. The SCANMAR system was used to monitor headline height, wing spread, door spread, and distance covered during each trawl. The SCANMAR Trawleye was used to monitor bottom type and fish density entering the net. A bottom contact sensor was attached to the groundgear for each trawl to monitor ground contact as well as to validate touchdown and lift-off of the groundgear. Data was downloaded from the on-board EDC system and screened for errors following every successful haul. All trawls were undertaken during the daylight period.

Groundgear A was deployed on all stations south of 57°30 N with groundgear B being used on all stations north of that latitude. In all, 40 stations were completed successfully using groundgear A and 44 stations with groundgear B. All stations also used the West Coast GOV trawl design with strengthening strips to limit the damage that occurs on stations throughout the survey area.

The GOV was deployed on 90 occasions. A total of 84 valid trawls were achieved resulting in the coverage of 68 statistical rectangles. Of those rectangles where Scotland was the sole surveying nation (23), 16 were sampled twice (see Figure 1). There were 5 invalid core trawls during the survey and all were repeated successfully. 15 trawls were of a non-standard duration of ≥ 15 minutes due to dense fish marks or to prevent gear damage. One transect to map core species distribution beyond the index area was attempted however gear damage ended the experiment prematurely.

A total of 82 species were caught for an overall catch weight of 33,290 kg. Major components (tonnes) included: Herring (~8.43), Whiting (~3.67), Haddock (~5.63), Norway Pout (~6.07), Mackerel (~2.15) and Common Dab (~2.1). Catch per unit effort (CPUE) for major species is illustrated in Table 1. A total of 5160 fish were sampled for biological data, detailed in Table 2.

The full dataset from this as well as from the other surveys undertaken during the quarter 3 North Sea survey programme are uploaded to the ICES DATRAS trawl survey database. From this a set of international abundance indices is calculated for the target commercial species. This international combined survey index is provided to ICES Working Group on the Assessment of Demersal Stocks in the North Sea and Skagerrak (WGNSSK) where it is used as a tuning tool in the stock assessment models for several commercial species.

Hydrography

The CTD (Seabird 19+) was deployed at 85 trawling stations in order to obtain a temperature and salinity profile at each station. During the survey 170 water samples were collected for dissolved oxygen analysis from the sea surface and approximately 5 m above the sea floor. The dissolved oxygen data will assist addressing the spatial gaps identified in UK assessments for OSPAR and MSFD descriptor 5. In addition this data will be used to make an initial background assessment of the current dissolved oxygen status, with deoxygenation of seas being an area of concern under changing climate conditions.

Chlorophyll samples were also collected, for analysis, from 85 sites throughout the North Sea. The data from these samples will contribute towards OSPAR and MSFD descriptor 5 assessments.

Biological Sampling

Additional biological data were collected from species in support of EU Data Collection Framework (DCF). A summary of numbers collected by all species is displayed in Table 2.

Electronic Data Capture

All haul summary data, catch composition, length frequency data and biological data were entered into the FSS system at sea utilising the electronic data capture (EDC) system. This allowed error screening during and post capture, vastly increasing the quality of the data collected. All data was uploaded to the lab servers following final quality checks whilst Scotia was returning to port.

Miscellaneous

Marine litter:

- All litter picked up in the trawl was classified, quantified and recorded then retained for appropriate disposal ashore. Photographs of marine litter were taken for reference collection.

Seawater sampling:

- Low nutrient seawater samples were collected in square 43F0 for routine monitoring.

Non-indigenous Species:

- All catch, fish and benthos, were screened for the presence of 'Non-Indigenous Species'.

Ichthyophonus Sampling:

- All sampled Herring were checked for the presence of Ichthyophonus and coded accordingly.

Inter-vessel Variability:

- Additional deployment and retrieval parameters were recorded to better understand inter-vessel variability.

Fish CCTV:

- EM footage collected will be used to assist in the Machine Learning for an Automated Image Analysis system that has been developed through the University of East Anglia to identify fish, as well as being used to assist in the training of EM footage reviewers across the UK to aid in species ID and length measurement training.

Species Collection:

- A variety of fish and invertebrate species were collected for outreach activities for within the Marine Laboratory.
- A variety of fish and invertebrate species were also collected for the Aberdeen University MSc practical on fish diversity, form and function. Haddock were retained for the MSc course's practical on fish dissection.

Dipturus sp. Sampling:

- Additional biological parameters, photographs and DNA mucus swabs were collected from *Dipturus* sp. for a collaborative MSS PhD project.

Ruadhán Gillespie-Mules 09/09/2019

Scottish 2019 Q3 North Sea IBTS

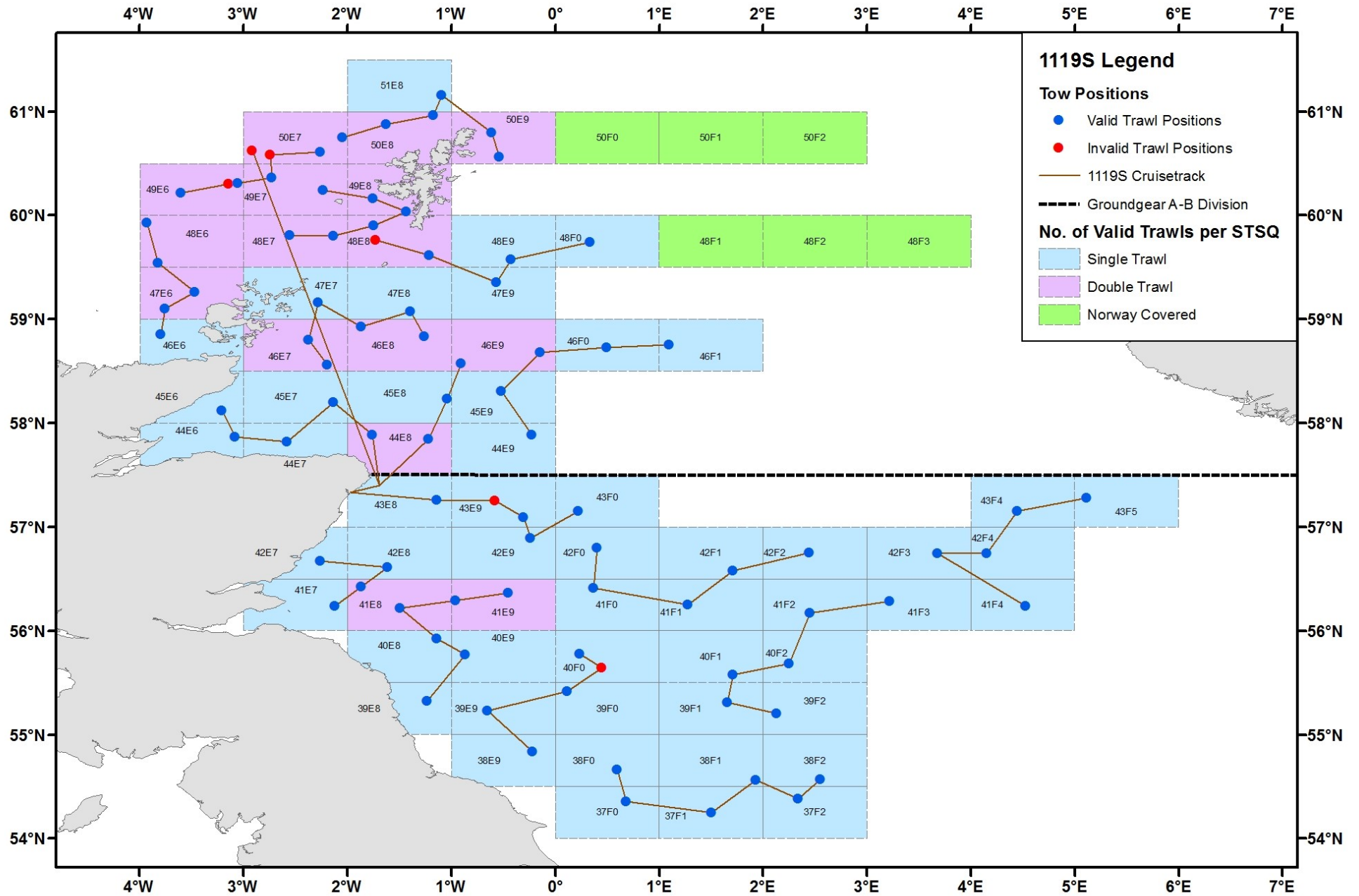


Figure 1: Survey map illustrating completed rectangles, valid hauls, invalid hauls and daily cruise track for 1119S.

Table 1: CPUE of major species observed during 1119S.

Species	CPUE no.s/h	CPUE kg/h
Herring (<i>Clupea harengus</i>)	1281	213.9
Norway Pout (<i>Trisopterus esmarkii</i>)	21684.4	153.8
Haddock (<i>Melanogrammus aeglefinus</i>)	2153.7	142.7
Whiting (<i>Merlangius merlangus</i>)	1357	93
Mackerel (<i>Scomber scombrus</i>)	187	54.4
Common Dab (<i>Limanda limanda</i>)	842.4	53.3
Grey Gurnard (<i>Eutrigla gurnardus</i>)	200.1	22
Blue Whiting (<i>Micromesistius poutassou</i>)	498.4	15.8
Cod (<i>Gadus morhua</i>)	14.2	11.9
Saithe (<i>Pollachius virens</i>)	6.2	9
Lesser Spotted Dogfish (<i>Scyliorhinus canicula</i>)	10.6	8.4
Lemon Sole (<i>Microstomus kitt</i>)	66.4	8.2
Plaice (<i>Pleuronectes platessa</i>)	48.9	8.2
Long Rough Dab (<i>Hippoglossoides platessoides</i>)	197.7	8.1
Lesser Argentine (<i>Argentina sphyraena</i>)	156.6	6.1
Poor Cod (<i>Trisopterus minutus</i>)	470.3	5.1
Horse Mackerel (Scad) (<i>Trachurus trachurus</i>)	15.6	4.1
Sprat (<i>Sprattus sprattus</i>)	227.8	3.7
Hake (<i>Merluccius merluccius</i>)	4.9	3.4

Table 2: Numbers of biological observations per species collected during 1119S (length, weight, sex & age, * length, weight, sex, maturity & age, ** length, weight and age, *** length, weight, sex & maturity (males only), **** length, weight, sex plus otoliths retained but not aged) ***** length & weight.

Species	No.
Haddock (<i>Melanogrammus aeglefinus</i>)	1331
Whiting (<i>Merlangius merlangus</i>)	1002
Herring (<i>Clupea harengus</i>) *	590
Cod (<i>Gadus morhua</i>)	474
Mackerel (<i>Scomber scombrus</i>) *	439
Plaice (<i>Pleuronectes platessa</i>)	393
Norway Pout (<i>Trisopterus esmarkii</i>)	338
Saithe (<i>Pollachius virens</i>)	160
Hake (<i>Merluccius merluccius</i>) ****	122
Sprat (<i>Sprattus sprattus</i>) **	104
Spotted Ray (<i>Raja montagui</i>) ***	62
Spurdog (<i>Squalus acanthias</i>) ***	45
Starry Ray (<i>Amblyraja radiata</i>) ***	40
Cuckoo Ray (<i>Leucoraja naevus</i>) ***	37
Striped Red Mullet (<i>Mullus surmuletus</i>)*****	10
Flapper Skate (<i>Dipturus intermedia</i>) ***	8
Thornback Ray (<i>Raja clavata</i>) ***	4
Lythe Pollack (<i>Pollachius pollachius</i>) *****	1