

Cruise Report

Cruise no. 2320

Faroese part of International Ecosystem Survey in the Norwegian Sea (IESNS) 2023

5 May – 16 May 2023

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INTRODUCTION

The main aim of this cruise was to investigate the distribution and abundance of Norwegian spring spawning herring and blue whiting in the Norwegian Sea north of the Faroe Islands (yellow transects in **Figure 1**). Zooplankton and hydrographic data were collected for each 60 nm along the cruise tracks.

The cruise was part of the joint International Ecosystem Survey in the Norwegian Sea (IESNS). Five parties and research vessels (see text table below) took part in the survey, coordinated by the “Working Group of International Pelagic Surveys” (WGIPS) in ICES. The combined results from all five vessels will be used in the assessment of Norwegian spring spawning herring by the “Working Group on Widely Distributed Stocks” (WGWIDE) in September 2020.

Ship	Nation
Jákup Sverri	Faroes
G.O. Sars	Norway
Resolute	Great Britain
Árni Friðriksson	Iceland
Dana	Denmark (EU)

In general, the cruise went as planned. Acoustic data were collected and judged along 1300 nm of cruise track. Herring was caught at 11 trawl stations, 1468 herring were length measured and 576 herring otoliths were sampled. Blue whiting was caught at 5 trawl stations, 481 blue whiting were length measured and 215 blue whiting otoliths were sampled. The present survey report is based on data from Jákup Sverri only. Therefore no estimate of abundance of Norwegian spring spawning herring is given due to incomplete coverage of the area.

MATERIAL AND METHODS

Cruise tracks with pre-planned hydrographic stations (CTD and WP2 net), and opportunistic pelagic trawl stations in the surveyed area are shown in **Figure 2**. Acoustic data were recorded with a Simrad EK-60 echo sounder. Data from the hull mounted 38 kHz transducer were logged at sea and used in the fish abundance estimation. The area backscattering recordings (sA) per nautical mile were averaged by each nautical mile and the recordings were scrutinised on a daily basis with the LSSS 2.14.1 software and allocated to primarily herring or blue whiting, and to some extent also to other fish (e.g. capelin) based on pelagic trawling aimed at the various acoustic recordings. The 38 kHz echo sounder was calibrated prior to this year’s surveys with a standard copper sphere.

Biological data were sampled from the trawl hauls. The catch was sorted to species – by subsampling if the catch was more than ~50 kg. Stomachs were sampled from 5 individuals of herring and blue whiting. Otoliths were sampled from ~15-50 individuals, for which sex and maturity stage was also registered. Length and weight were measured for up to additionally 150 individuals. For non-target species, length and weight was measured.

Zooplankton was sampled by WP2 net (0.25m² - 200µm mesh size). The samples were split in half – one part was preserved in 4% formalin for taxonomic studies and the other size-fractionated (2000µm, 1000µm and 200µm) and dried for biomass estimates. Salinity and temperature were sampled with CTD.

RESULTS

Norwegian spring spawning herring

Generally the abundance of spring spawning herring was lowest close to the Icelandic shelf, as well as in the northwestern and southeastern part of the survey area (**Figure 3** and **4**). The herring showed a quite consistent diurnal pattern, residing at 200-400 m depths during the day time and in the surface during night time (**Figure 4**). The herring was found in water masses with temperatures within the range 1 °C – 5 °C (**Figure 4**). The smallest and youngest herring was found in the eastern part of the survey area while the largest and oldest herring was found in the western part of the survey area.

The spring spawning herring caught in the trawl were on average 33.3 cm, 262 g and 8 years. 60% of the herring were from the 2016 year class, and 12% were from the 2013 year class (**Figure 6**).

Blue whiting

Blue whiting was observed in the eastern part of the survey area (**Figure 3** and **5**). It resided at 200-400 m depths in 1-5°C.

It was caught at 5 trawl stations, and the majority of the caught fish were 2 and 3 years old. The average length of blue whiting was 26cm, average weight was 116g and average age was 3.4 years (**Figure 7**).

Plankton and hydrography

Temperature and salinity casts down to 1000 m if possible were taken along the track. The surface temperature is shown in **Figure 2** and the isotherms down to 500 m, based on 22 CTD stations are shown in **Figure 4**.

All 22 planned CTD-stations and zooplankton stations along the tracks were sampled. Dry weights of zooplankton from WP2 samples are shown in **Figure 8**. The highest abundances of zooplankton were found in the cold water masses in the northernmost part of the surveyed area.

Survey effort for Jákup Sverri 5 May – 16 May 2023:

Effective survey period	Length of cruise track (nm)	Trawl stations	CTD stations	Plankton sampling	Aged fish herring	Length-measured herring
6/5 – 14/5	1300	17	22	22	569	1468

Trawl specifications for the Jákup Sverri, MULTPELT 832 trawl:

Circumference (m)	832
Vertical opening (m)	45–55
Mesh size in cod end (mm)	45
Typical towing speed (kn)	3.5–4.5

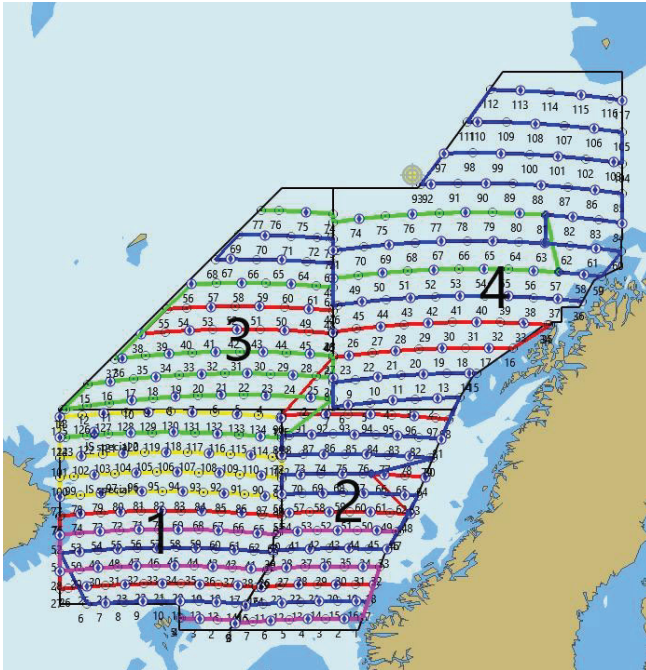


Figure 1. Cruiseplan for the International Ecosystem Survey in the Norwegian Sea in May-June 2023. The participating vessels were: Árni Friðriksson IS, G.O. Sars NO, Dana EU, Jákup Sverri FO and Resolute UK. Jákup Sverri covered the yellow transects in Icelandic and international waters.

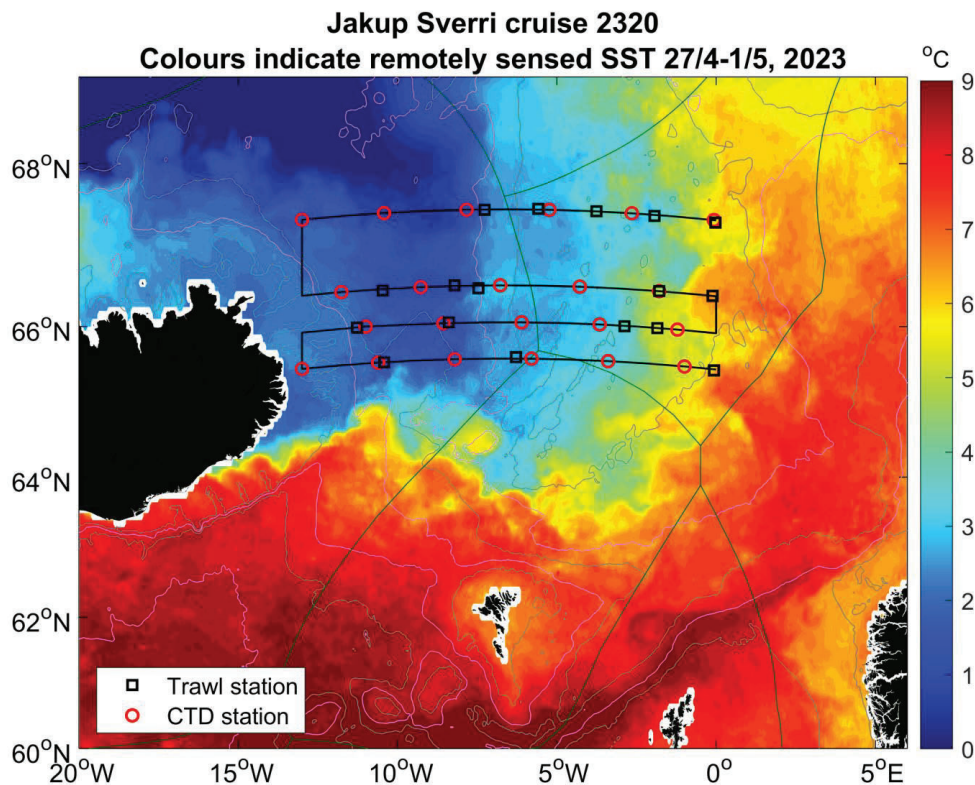


Figure 2. Cruise track, with 22 hydrographic stations (pink circles) and 17 trawl stations (black squares) north of the Faroes, for Jákup Sverri cruise 2320, 5 May – 16 May 2023. The temperature observed by satellite observations of SST for the period 27 April – 1 May April 2023 is shown in colour. The total covered distance was 2050 nautical miles, of which acoustic registrations were logged and judged on 1300 nautical miles.

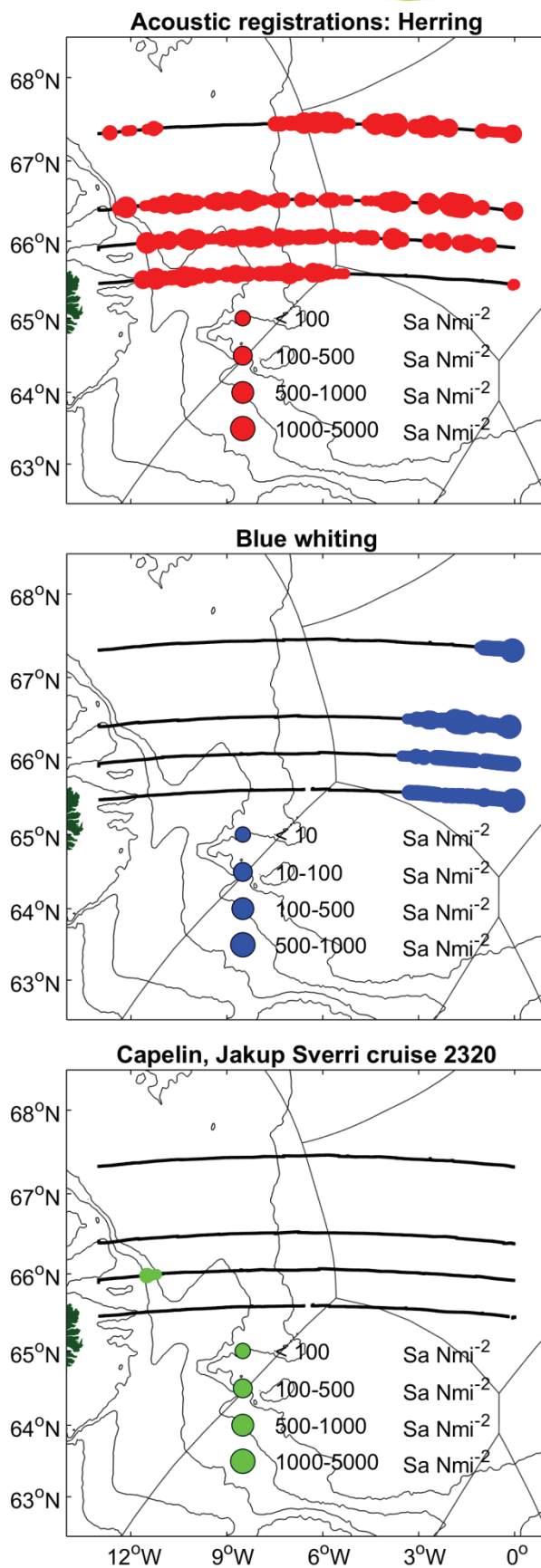


Figure 3. Integration values (sA/nm^2) of Norwegian spring spawning herring (top), blue whiting (middle) and capelin (bottom) along the cruise tracks.

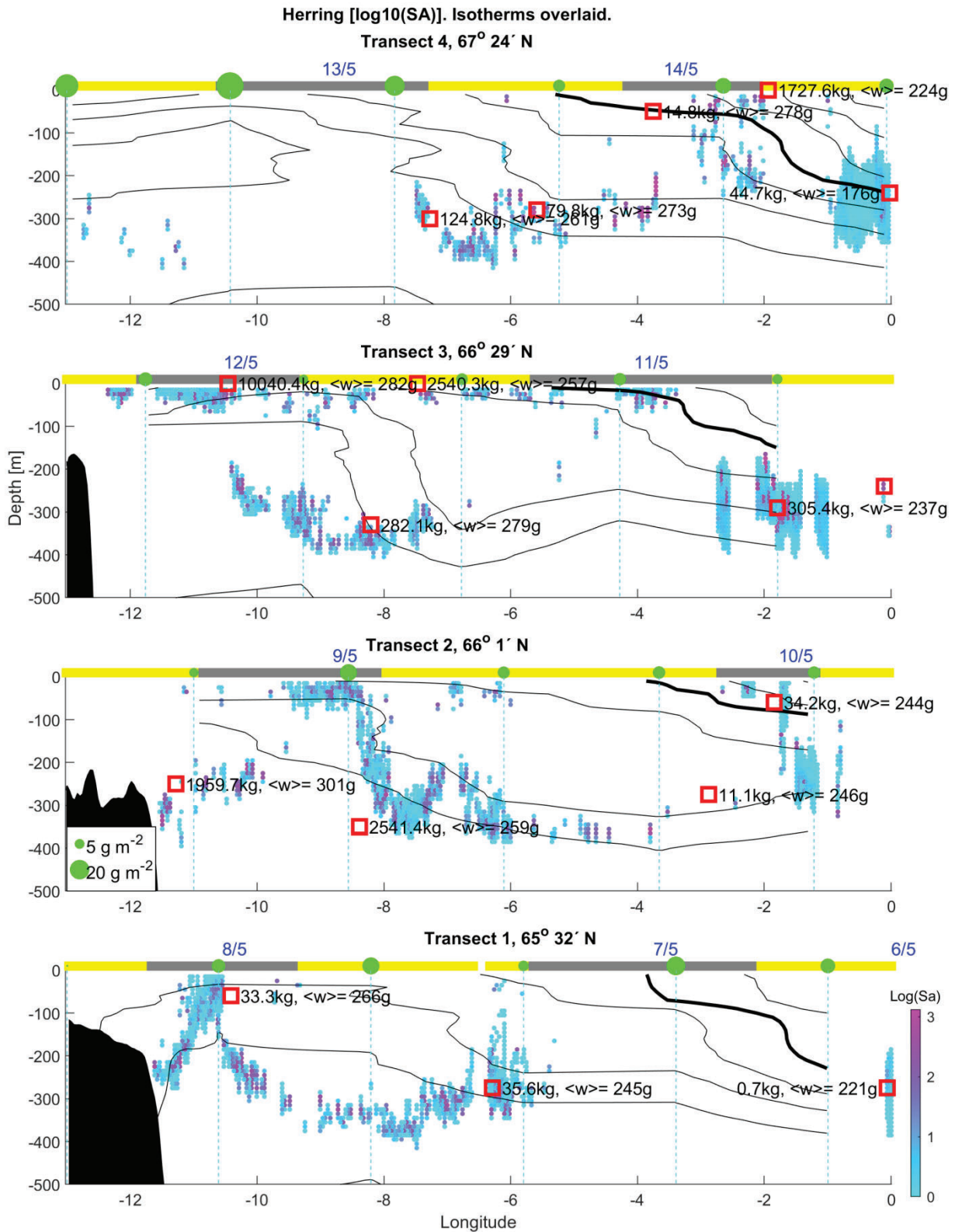


Figure 4. Vertical distribution of herring per each nm along the cruise tracks. The black contour lines are isotherms based on temperature casts with the 4° C isotherm marked with a bold line. Time of day is indicated at the top of each transect, showing the darkest hours in black. Trawl hauls are indicated by red squares, where those with “herring catch” are indicated with total catch of herring and average weight of the fish. Green circles indicate zooplankton dry weights.

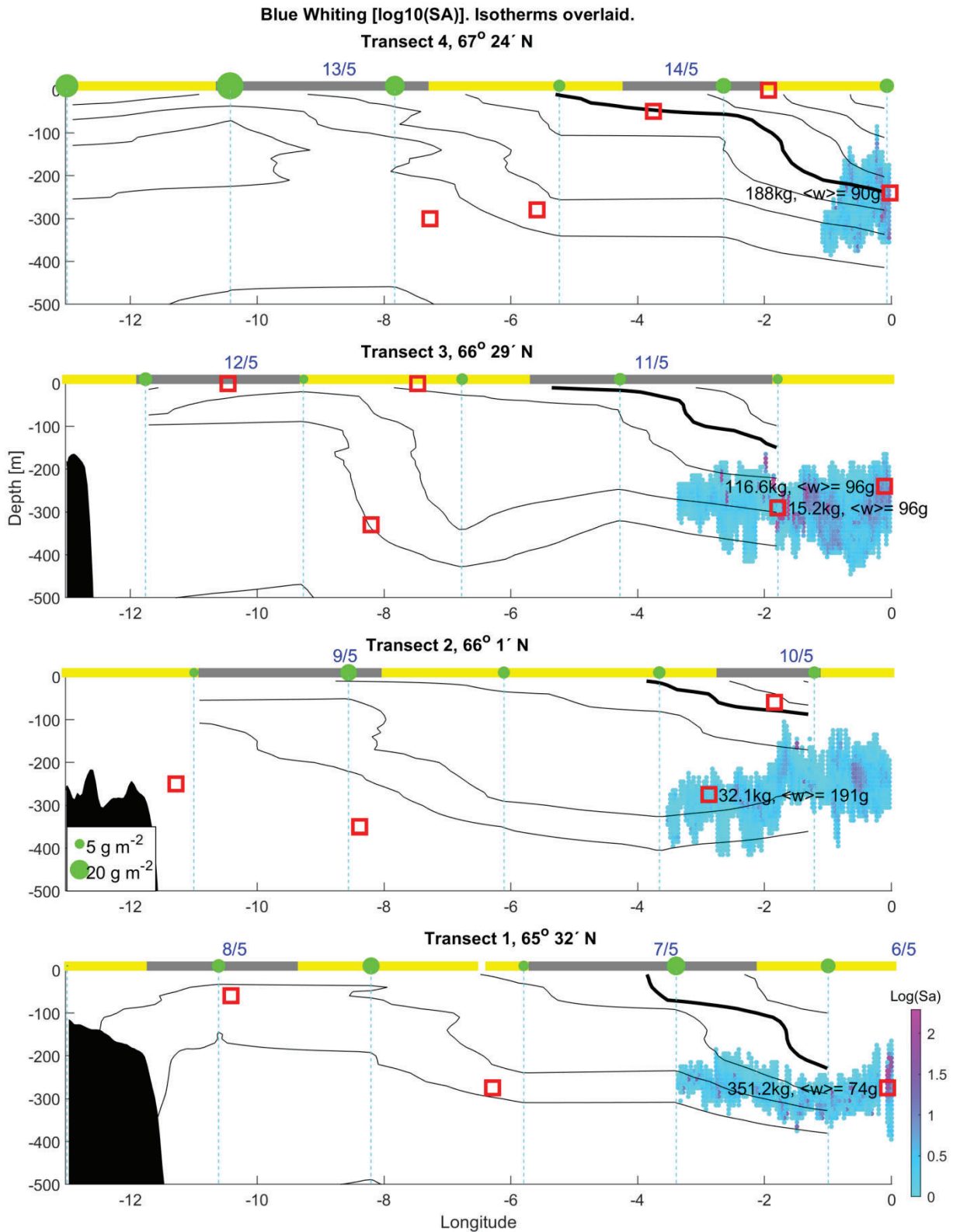


Figure 5. Vertical distribution of blue whiting per each nm along the cruise tracks. The black contour lines are isotherms based on temperature casts with the 4° C isotherm marked with a bold line. Time of day is indicated at the top of each transect, showing the darkest hours in black. Trawl hauls are indicated by red squares, where those with “blue whiting catch” are indicated with total catch of blue whiting and average weight of the fish. Green circles indicate zooplankton dry weights.

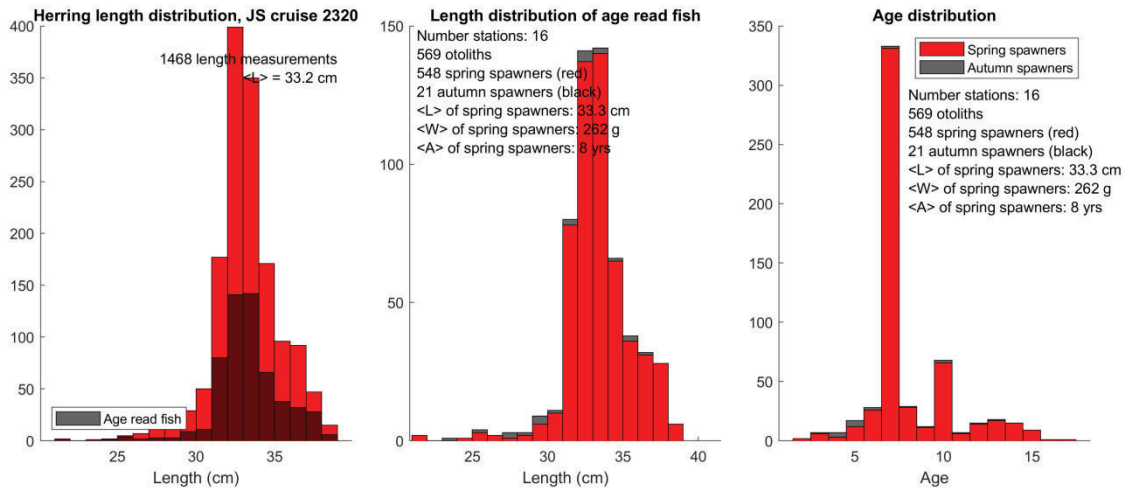


Figure 6. Length and age distribution of spring and autumn spawning herring, Jákup Sverri cruise 2320. Left panel: all length measured herring. Middle and right panels: only age read fish, i.e. it is possible to distinguish between spring and autumn spawners.

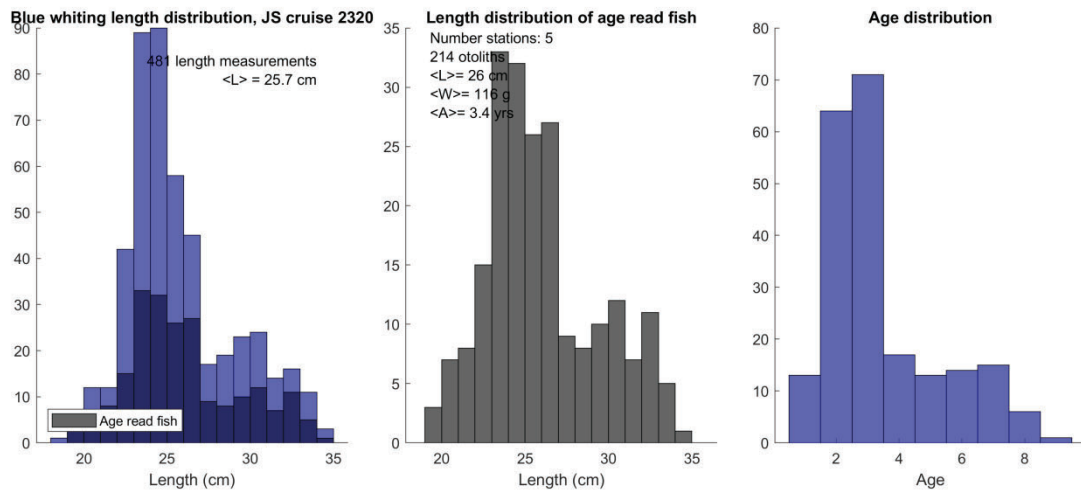


Figure 7. Length and age distribution of blue whiting, Jákup Sverri cruise 2320.

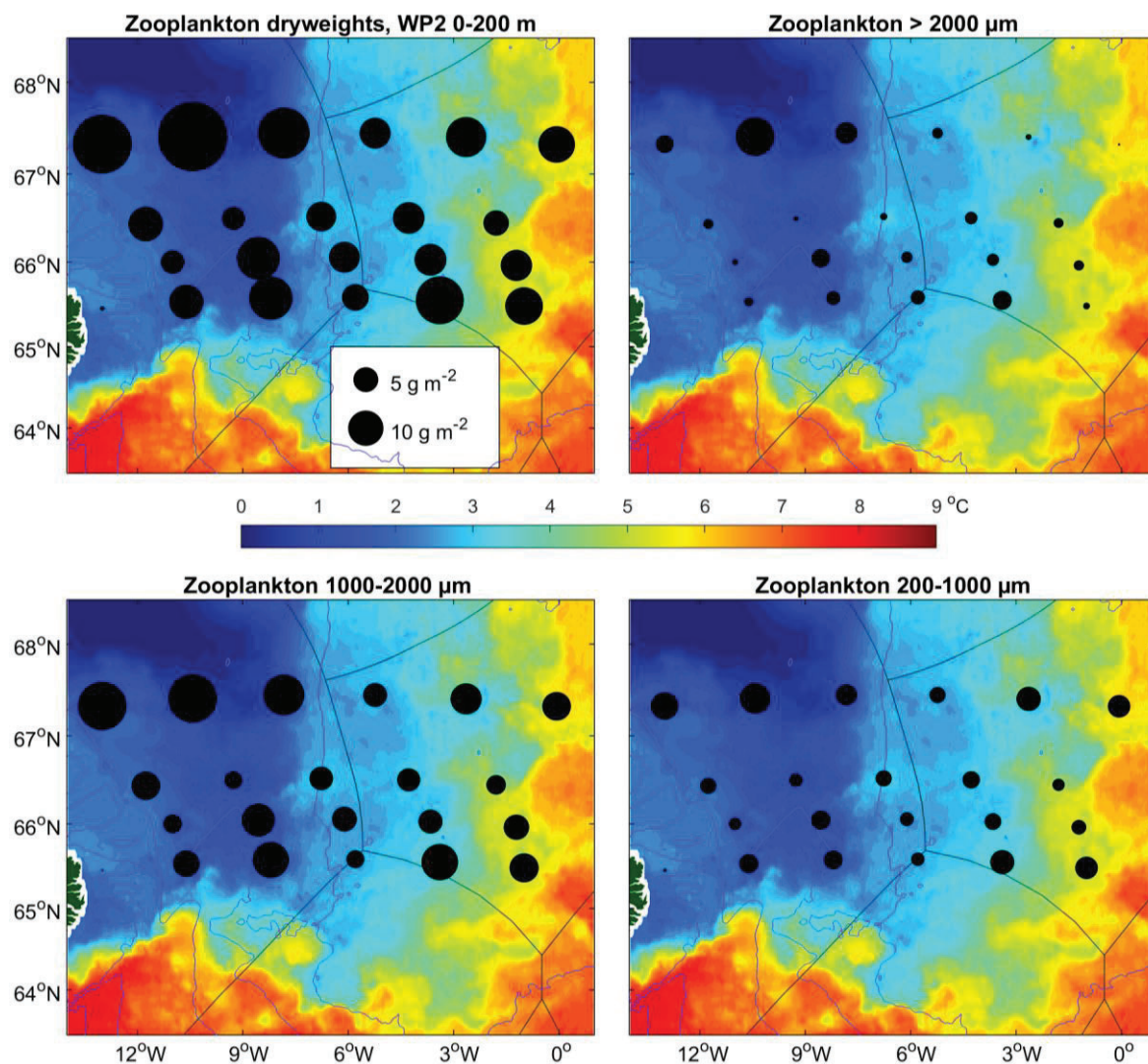


Figure 8. Distribution of zooplankton – WP2 samples dry weight, Jákup Sverri cruise 2320, black circles. SST for the period 27 April – 1 May 2023, based on satellite observations, is shown as well.