

Cruise Report

Cruise no. 2416

Faroese part of International Ecosystem Survey in the Norwegian Sea (IESNS) 2024

24 April – 4 May 2024

Jákup Sverri

Participants:

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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 Fríðriksson	Iceland
Dana	Denmark (EU)

In general, the cruise went as planned. Acoustic data were collected and judged along 1100 nm of cruise track. Herring was caught at 11 of 16 trawl stations, 1060 herring were length measured and 405 herring otoliths were sampled. Blue whiting was caught at 4 trawl stations, 434 blue whiting were length measured and 150 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-80 echo sounder (See acoustic settings in table below). 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 2.16.0 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 sub-sampling if the catch was more than ~50 kg. Stomachs were sampled from 5 individuals of herring and blue whiting. Otoliths were sampled from ~25-50 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-fractioned (2000µm,

1000 μ m and 200 μ m) and dried for biomass estimates. Salinity and temperature were sampled with CTD.

Acoustic instruments and settings on Jakup Sverri	
Echo sounder	Simrad EK80
Frequency (kHz)	18,38, 70, 120, 200, 333
Primary transducer	ES38-7
Transducer installation	Drop keel
Transducer depth (m)	6-9
Upper integration limit (m)	15
Absorption coeff. (dB/km)	10.5
Pulse length (ms)	1.024
Band width (kHz)	3.06
Transmitter power (W)	2000
Angle sensitivity (dB)	21.9
2-way beam angle (dB)	-20.7
Sv Transducer gain (dB)	
Ts Transducer gain (dB)	26.93
s _A correction (dB)	-0.05
3 dB beam width (dg)	
alongship:	6.52
athw. ship:	6.53
Maximum range (m)	750
Post processing software	LSSS

RESULTS

Norwegian spring spawning herring

The abundance of Norwegian spring spawning herring was generally low in the surveyed area. Two thirds of the herring seen on the southernmost transects were not Norwegian spring spawning herring, and it was only on the two northernmost transects that high abundances of Norwegian spring spawning was found (**Figure 3** and **4**). The herring showed a quite consistent diurnal pattern, residing at 300-400 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 0-7 °C (**Figure 4**).

The spring spawning herring caught in the trawl were on average 33 cm, 262 g and 8 years. 60% of the herring were from the 2016 year class (**Figure 6**).

In the southern part of the surveyed area, there was a significant part of the herring that were not NSSH. The majority of these herring were 5-7 years old, and the 2016 YC was the strongest YC (**Figure 7**).

Blue whiting

Blue whiting was observed in the southern and eastern part of the survey area (**Figure 3** and **5**). It resided at 200-400 m depths in 1-8°C.

It was caught at 4 trawl stations, and the majority of the caught fish were 3 years old. The average length of blue whiting was 26.6 cm, average weight was 121 g and average age was 3.2 years (**Figure 8**).

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 17 CTD stations are shown in **Figure 4-5**.

All 17 planned CTD-stations and zooplankton stations along the tracks were sampled. Dry weights of zooplankton from WP2 samples are shown in Figure 9. The highest abundances of zooplankton were found in the Iceland-Farøe frontal zone.

Survey effort for Jákup Sverri 24 April – 4 May 2024

Effective survey period	Length of cruise track (nm)	Trawl stations	CTD stations	Plankton sampling	Aged fish herring	Length-measured herring
24/4 – 2/5	1100	16 (11 with herring catch)	17	17	405	1060

Trawl specifications for the Jákup Sverri, MULTPELT 832 trawl

Circumference (m)	832
Vertical opening (m)	30-40
Mesh size in cod end (mm)	45
Typical towing speed (kn)	3.5–4.5

Sampling effort of individual fish

	Species	
Length measurements	Herring	100-150
	Blue Whiting	100-150
	Mackerel	100-150
	Other	30-100
Weighed, sexed and maturity determination	Herring	100-150*
	Blue Whiting	100-150*
	Mackerel	100-150*
	Other	30-100*
Otoliths/scales collected	Herring	25-50
	Blue Whiting	25-50
	Mackerel	25-50
	Other	0
Stomach sampling	Herring	5
	Blue Whiting	5
	Mackerel	5
	Other	0
Genetic samples	Herring	30

* Only fish that are aged are being sexed and maturity determined.

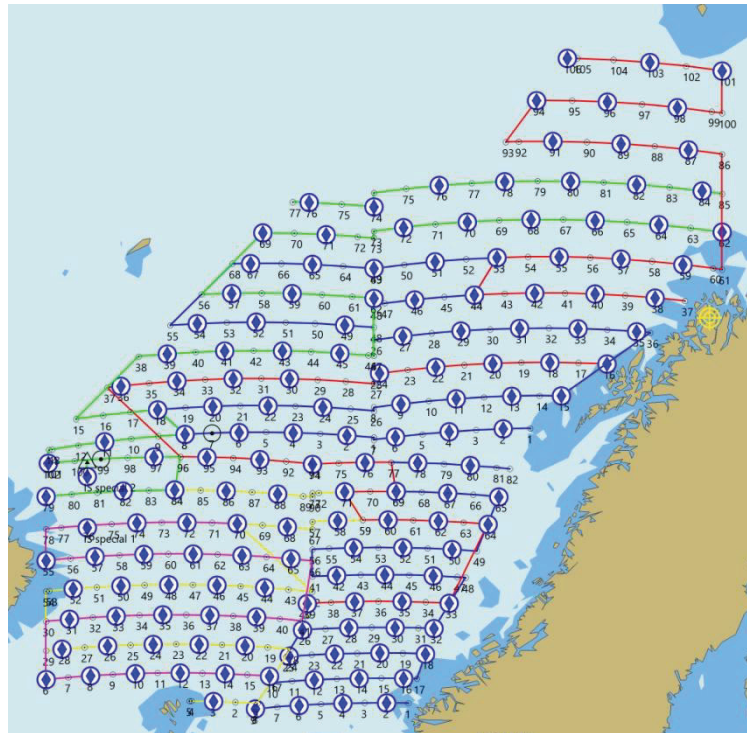


Figure 1. Cruiseplan for the International Ecosystem Survey in the Norwegian Sea in May-June 2024. The participating vessels were: Árni Friðriksson IS, G.O. Sars NO, Dana EU, Jákup Sverri FO and Resolute UK. Jákup Sverri covered the yellow transects in Icelandic and international waters.

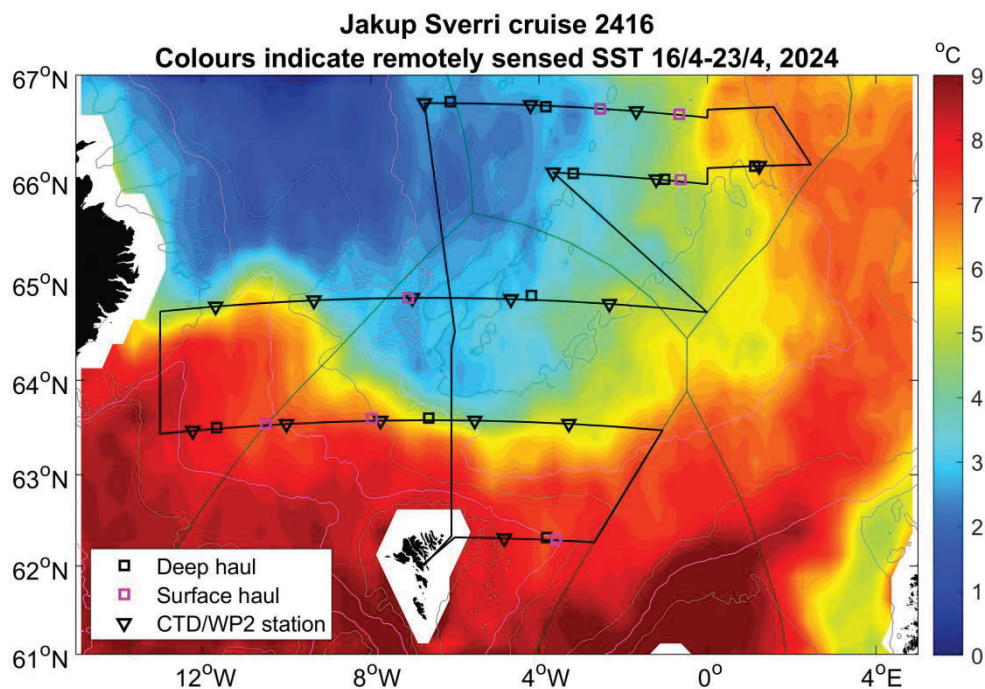
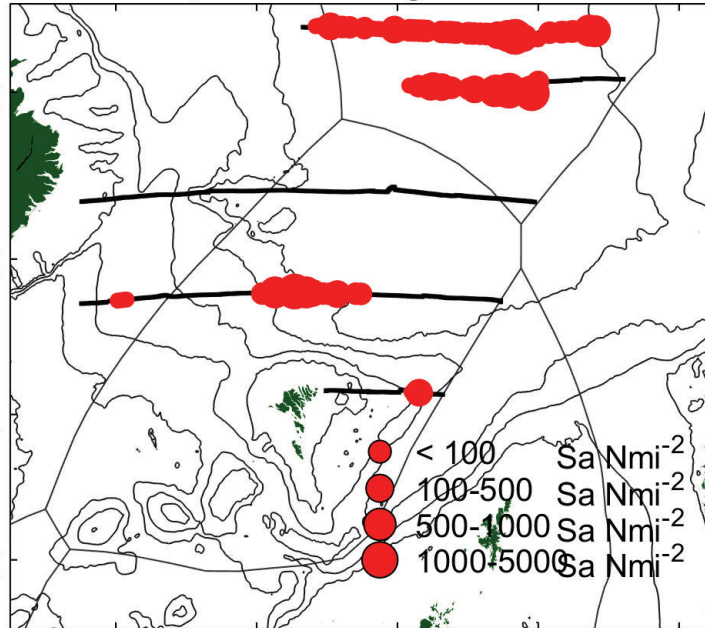


Figure 2. Cruise track, with 17 hydrographic stations (black triangles) and 16 trawl stations (black and pink squares) north of the Faroes, for Jákup Sverri cruise 2416, 24 April – 4 May 2024. The temperature observed by satellite observations of SST for the period 16–23 April 2024 is shown in colour. The total covered distance was 1750 nautical miles, of which acoustic registrations were logged and judged on 1100 nautical miles.

Cruise 2416, Acoustic registrations: Herring



Blue whiting

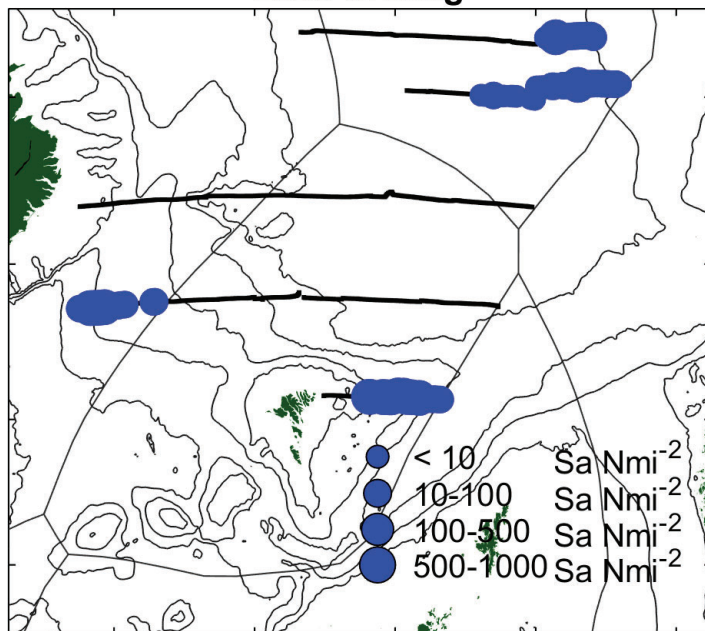


Figure 3. Integration values (sA/nm²) of Norwegian spring spawning herring (left) and blue whiting (right) along the cruise tracks. Further details of the here shown transects are found in **Figure 4-5**.

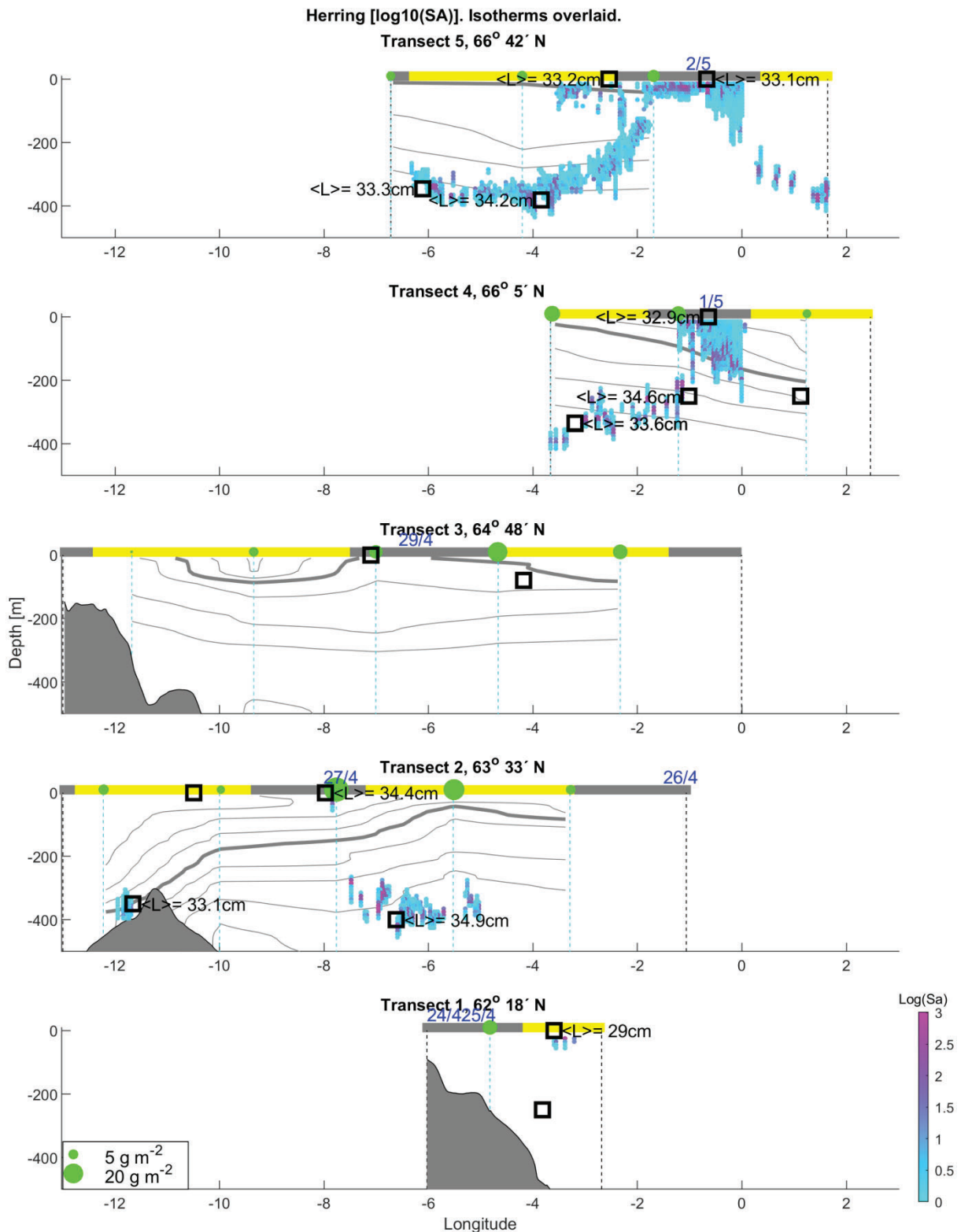


Figure 4. Vertical distribution of herring per each nm along the cruise tracks (See **Figure 3**). The gray contour lines are isotherms based on temperature casts with the 4° C isotherm marked with a bold line. Time of day is indicated at the top of each transect, showing the darkest hours in black. Trawl hauls are indicated by black squares, where those with “herring catch” are indicated with average weight of the fish. Green circles in the top of each panel indicate zooplankton dry weights.

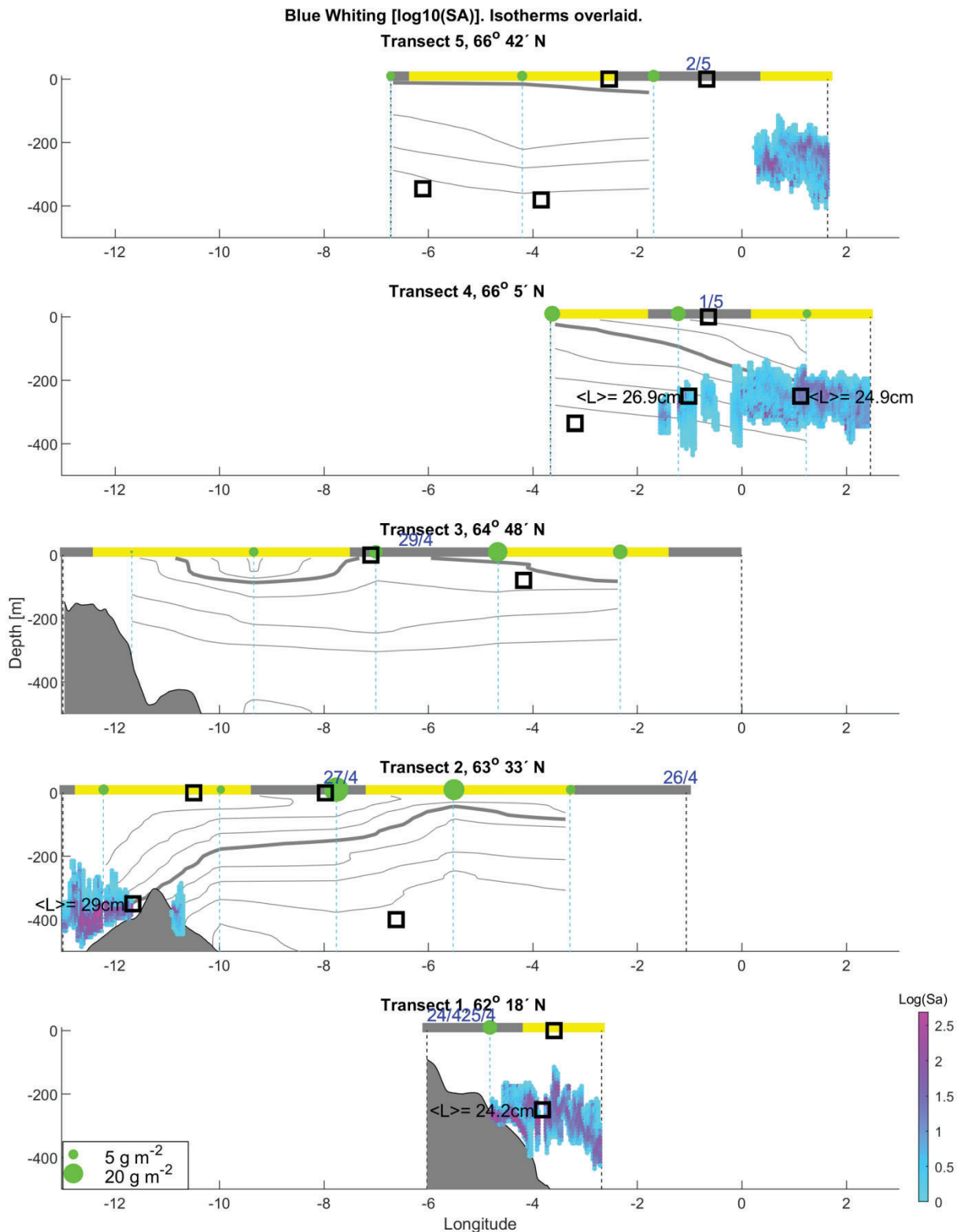


Figure 5. Vertical distribution of blue whiting per each nm along the cruise tracks (See **Figure 3**). The gray contour lines are isotherms based on temperature casts with the 4° C isotherm marked with a bold line. Time of day is indicated at the top of each transect, showing the darkest hours in black. Trawl hauls are indicated by black squares, where those with “blue whiting catch” are indicated with average weight of the fish. Green circles in the top of each panel indicate zooplankton dry weights.

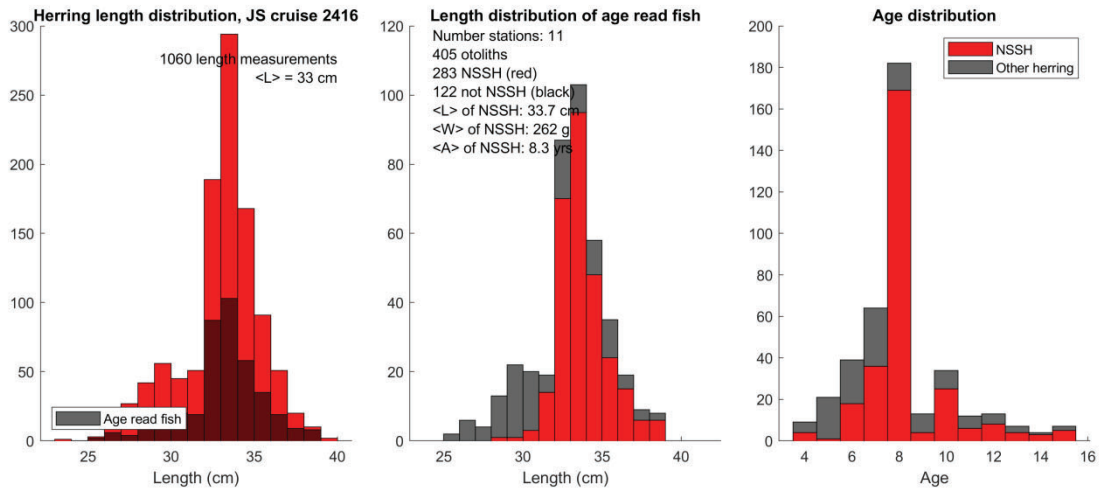


Figure 6. Length and age distribution of spring and autumn spawning herring, Jákup Sverri cruise 2416. Left panel: all length measured herring. Middle and right panels: only age read fish, i.e. it is possible to distinguish between spring and autumn spawners.

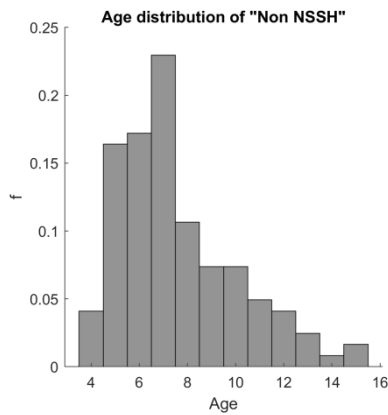


Figure 7. Age distribution "non NSSH", Jákup Sverri cruise 2416.

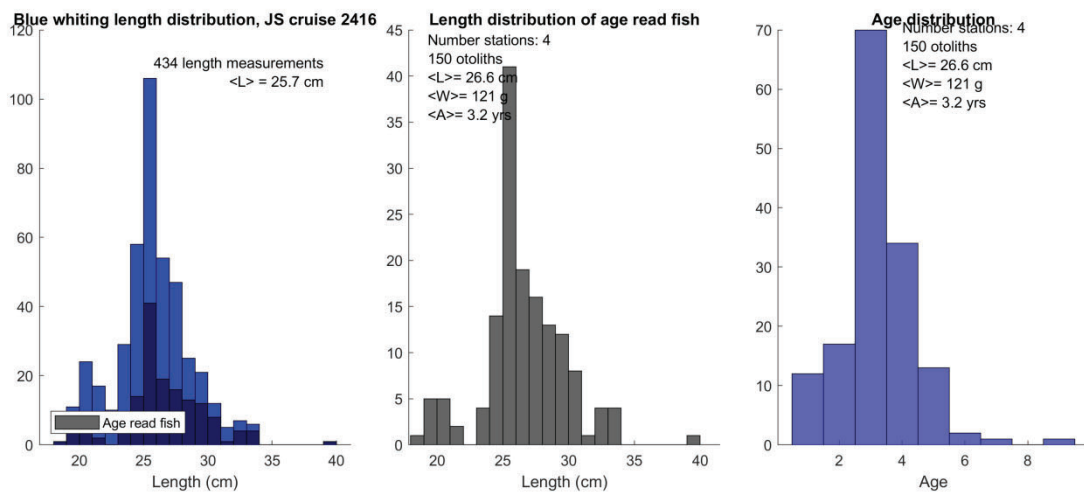


Figure 8. Length and age distribution of blue whiting, Jákup Sverri cruise 2416.

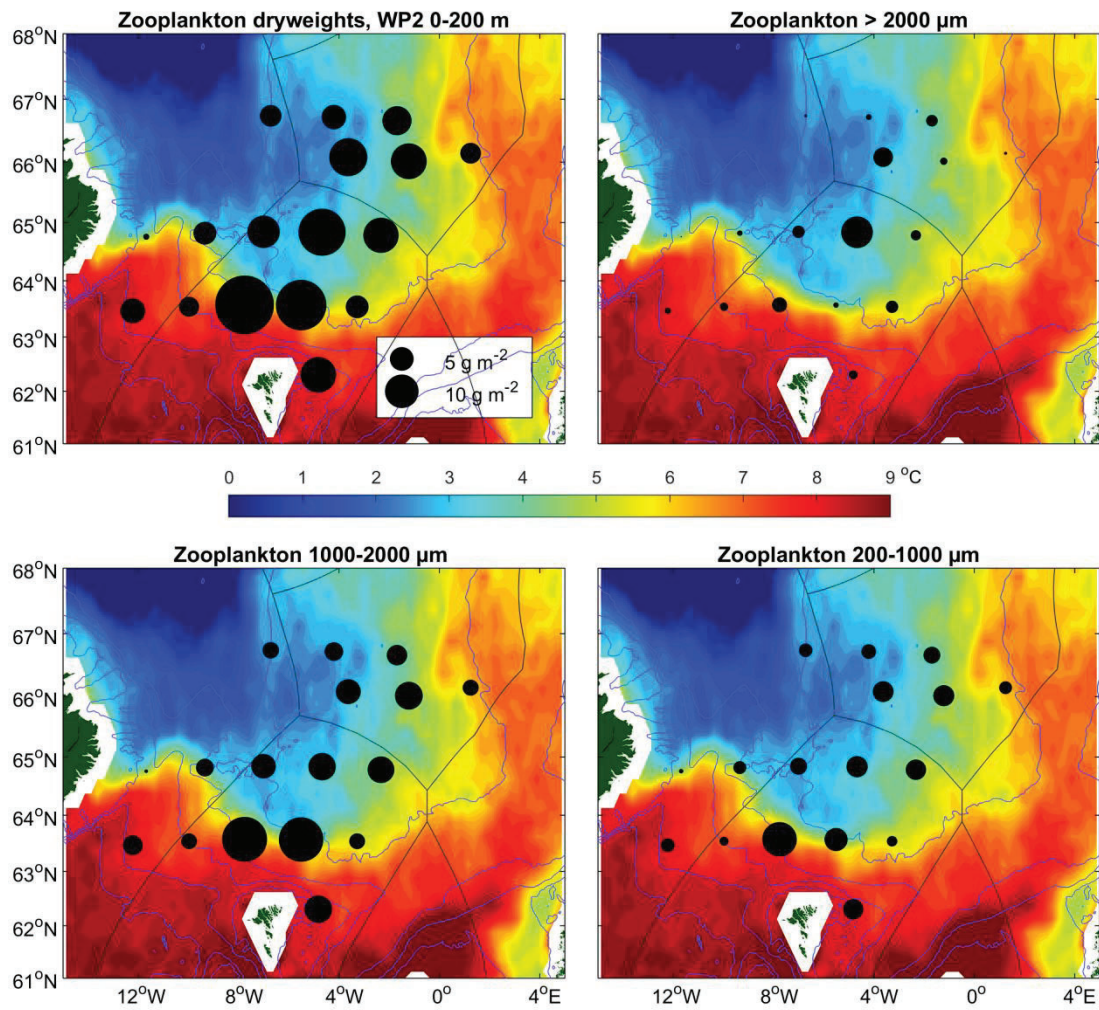


Figure 9. Distribution of zooplankton – WP2 samples dry weight, Jákup Sverri cruise 2416, black circles. SST for the period 16 April – 23 April 2024, based on satellite observations, is shown as well.