

**Cruise Report**  
Cruise no. 0932

**Joint investigations on Norwegian spring-spawning herring and  
blue whiting north of the Faroes**

29 April – 13 May 2009

R/V Magnus Heinason OW2252



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## INTRODUCTION

The main aim of this survey was to investigate the distribution and abundance of Norwegian spring-spawning herring and immature blue whiting in the areas north of the Faroes and in the Norwegian Sea. Hydrographic data and zooplankton abundance measurement were collected at specific intervals along the cruise tracks.

The cruise was part of a joint international survey (Faroes, Norway, Russia, EU (Denmark), and Iceland) coordinated by the ICES “Planning Group on Northeast Atlantic Pelagic Ecosystem Surveys” (PGNAPES). Five vessels participated in the cooperative investigations, R/V *Magnus Heinason* (FO), RV *G.O.Sars* (NO), R/V *Árni Friðriksson* (IC), RV *Dana* (DK), and RV *Smolensk* (RU). Combined abundance estimates of Norwegian spring spawning herring and blue whiting with data from all participating vessels will be calculated during the meeting of the PGNAPES in August 2007, and reported to the ICES WG of the “Widely Distributed Stocks” WGWDS (formerly the Working Group of the “Northern Pelagic and Blue Whiting Fisheries”, WGNPBW) in early September 2009.

## MATERIAL AND METHODS

Acoustic data were recorded with a Simrad EK-500 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 ( $S_A$ ) per nautical mile were averaged by each nautical mile and the recordings were scrutinised on a daily basis with the EchoView 4.4 software and allocated to herring, blue whiting, mackerel, plankton or other fish (e.g. pearlside and lantern fish) based on regular pelagic trawling aimed at the various acoustic recordings and to a limited extent on the characteristics of the echo recordings.

The hull mounted 38 kHz echo sounder was operating with settings obtained from a copper sphere calibration at 24/3 2009. Biological samples of the acoustic recordings were obtained with a pelagic 640 m trawl from Vónin.

Hydrographic data (temperature and conductivity/salinity) were collected along the cruise tracks at every 50-60 nm with a CTD cast down to 1000 m depth or to the bottom (**Fig. 1**). Water samples were taken from each station, and samples for chlorophyll analysis were collected from the upper 100m. Zooplankton samples were taken at each hydrographic station from vertical hauls 0-200m depth with a standard WP-2 net. A detailed description of the configuration of the sampling gears is given in **Appendix 1**.

## RESULTS

The cruise tracks and hydrographic stations in the surveyed area are shown in **Fig. 1**. The weather was rather poor during the cruise and the survey coverage had to be reduced a bit in the north in relation to the survey plans to accommodate the time loss. A total of 13 trawl hauls and 38 CTD casts/WP2 plankton samples were taken during the survey. Biological samples were taken from every trawl haul, usually 150-200 fish were measured and weighted, and of these otoliths and stomachs were taken of the first 15-20 fish. At the end of the survey the hydrographic standard section “Stannardskurðir norður”, i.e. a hydrographic section along 6°W from 66°N southwards towards the shelf north of the Faroes (**Fig. 1**).

### Norwegian spring spawning herring

Herring was distributed along the entire cruise track (**Fig. 2**). In the southeastern area mostly as a layer between 30-100 m depth while in the northeastern area as a stronger layer between 250-300 m depth. The herring approached the surface during night.

The biomass estimate in the covered area was about 2.4 million tonnes (**Fig. 2 and 3**), about 2 million tonnes less than last year, however it should be noted that the area covered this year was smaller than last year, and also the recordings were hampered by bad weather. In such cases are the recordings always less than in good weather.

In the last couple of years a mixture of two types of herring have been registered in the southeastern part of the surveyed area, i.e. eastern part of the Faroese area and in EU waters. Herring of the autumn-spawning type, either from the Faroese plateau or from the northern North Sea and Norwegian spring-spawning herring. But this year only a few individuals of the autumn-spawning type were found in this area. In 2008 approximately half of the herring was judged to be autumn-spawners from the maturation stage and shape/appearance of the type of nucleus in the otoliths.

The total abundance of herring from all the participating vessels will be available in late August in a joint report to ICES Working Group on "Widely Distributed Stocks" (WIDE) in September 2009.

The mean length of Norwegian spring spawning herring in the area north of the Faroes was 33 cm (mean weight 250 g) which is the same as last year, and the total length distribution is shown in **Fig. 4**. Most of the herring was 7 and 6 years old (the 2002 and 2003 year-classes, respectively) with age 5, 8 and 96 also present (**Fig. 5**). As in previous years the largest herring was in the western areas (**Fig. 12**).

#### Blue whiting

The amount of blue whiting was very low in the surveyed area (**Fig 6**). They were found just north of the Faroese plateau and some recordings in the eastern part of the surveyed area. This is a continuation of a worrying trend the last four years. The mean length of blue whiting in the Faroese area was 30 cm (198 g). The length distribution of blue whiting is shown in **Fig. 7**, and only blue whiting aged 4-7 years (the 2002-2005 year-classes) was found in the area (**Fig. 8**), and therefore no juveniles were present.

#### Mackerel

Large amounts of mackerel were recorded in the area in 2009 (**Fig. 9**). Last year mackerel was found in the southeastern corner of the surveyed area, but this year mackerel was found in the whole southern part of the covered area (i.e. in the Faroe zone west to at least 9°W and north to 64°N (Fig. 9). According to reports from the Icelandic R/V *Arni Friðriksson*, mackerel was distributed further to the west in that area. The mackerel was distributed very close to the surface and in many cases above the transducer and therefore not recorded. The mackerel of about 33.5 cm length (269 g) (**Fig. 10**). The mackerel were from 3-6 years old with most being 4 years old, the 2005 year class (**Fig. 11**).

In recent years mackerel has migrated further north and west in such quantities that the Faroese vessels targeting herring had to abandon the southern part of the Faroese area in order to avoid by-catches of herring.

#### Salmon

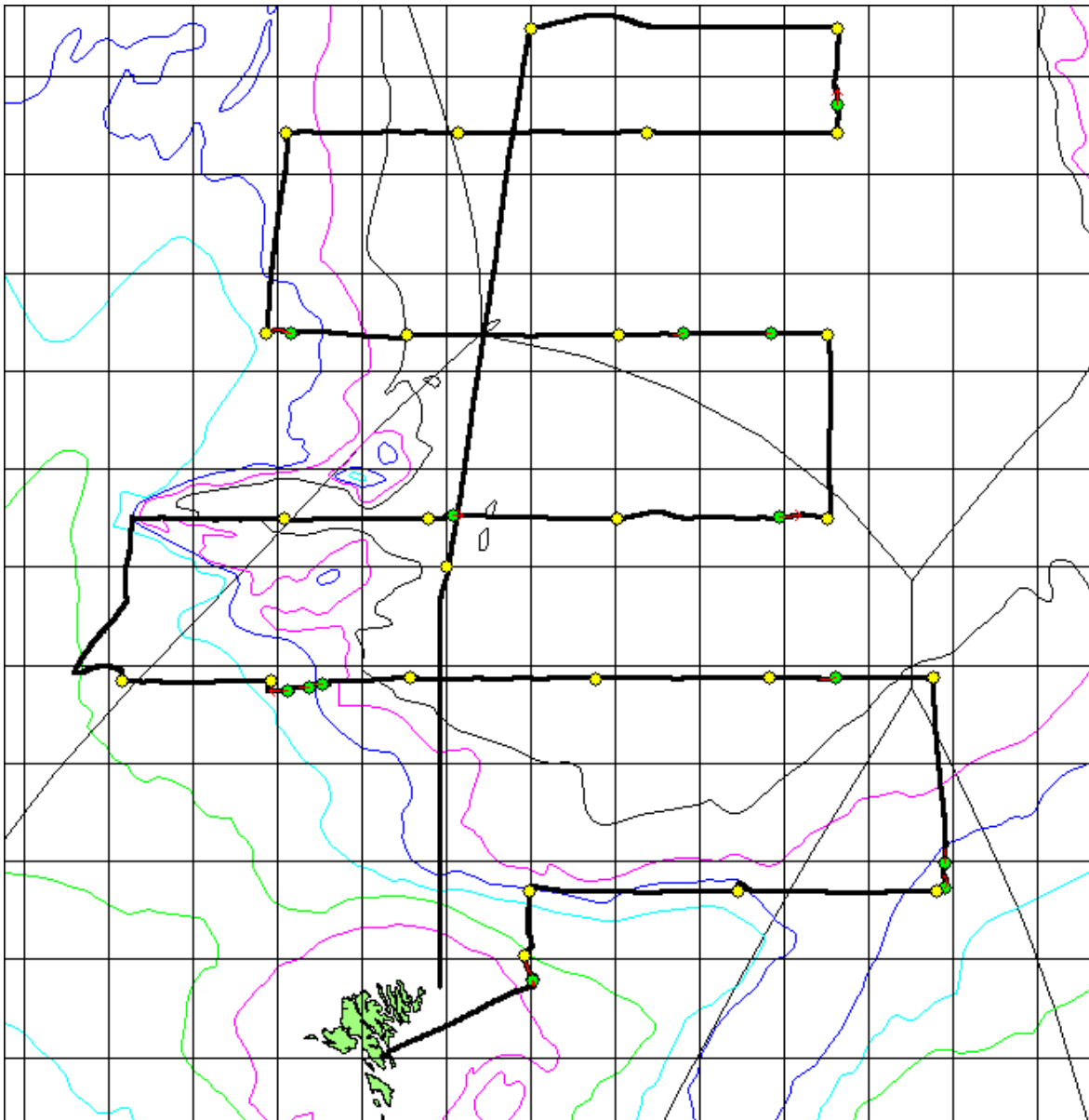
Salmon (3 specimens) were caught in two hauls with the salmon trawl, the size was between 40-60 cm (0.8-1.5 kg) and these fish were probably 1 SW non-maturing salmon feeding in the area.

### Zooplankton

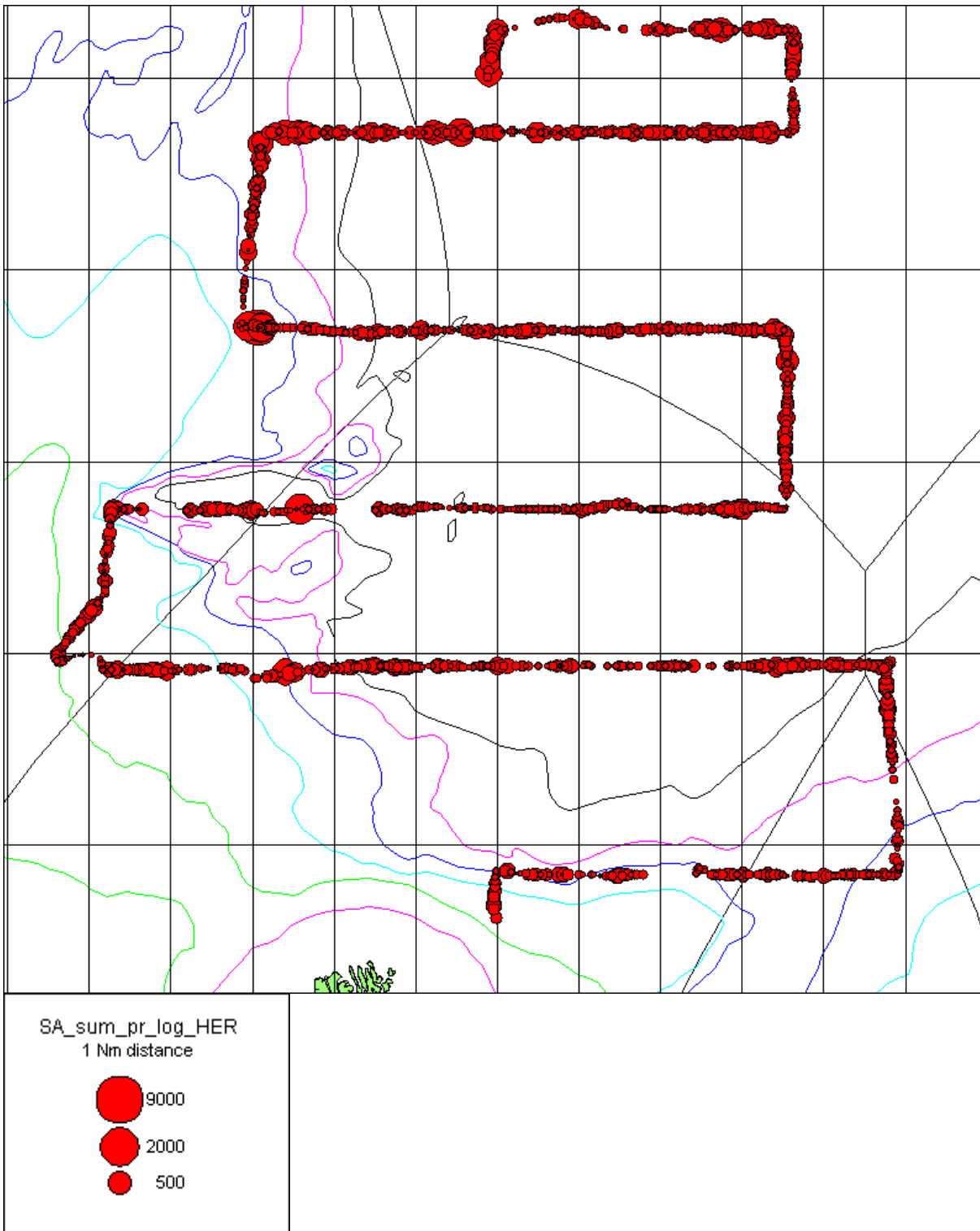
Krill (*Meganyctiphanes norvegica*) was found at depths in the whole area.

### Environment

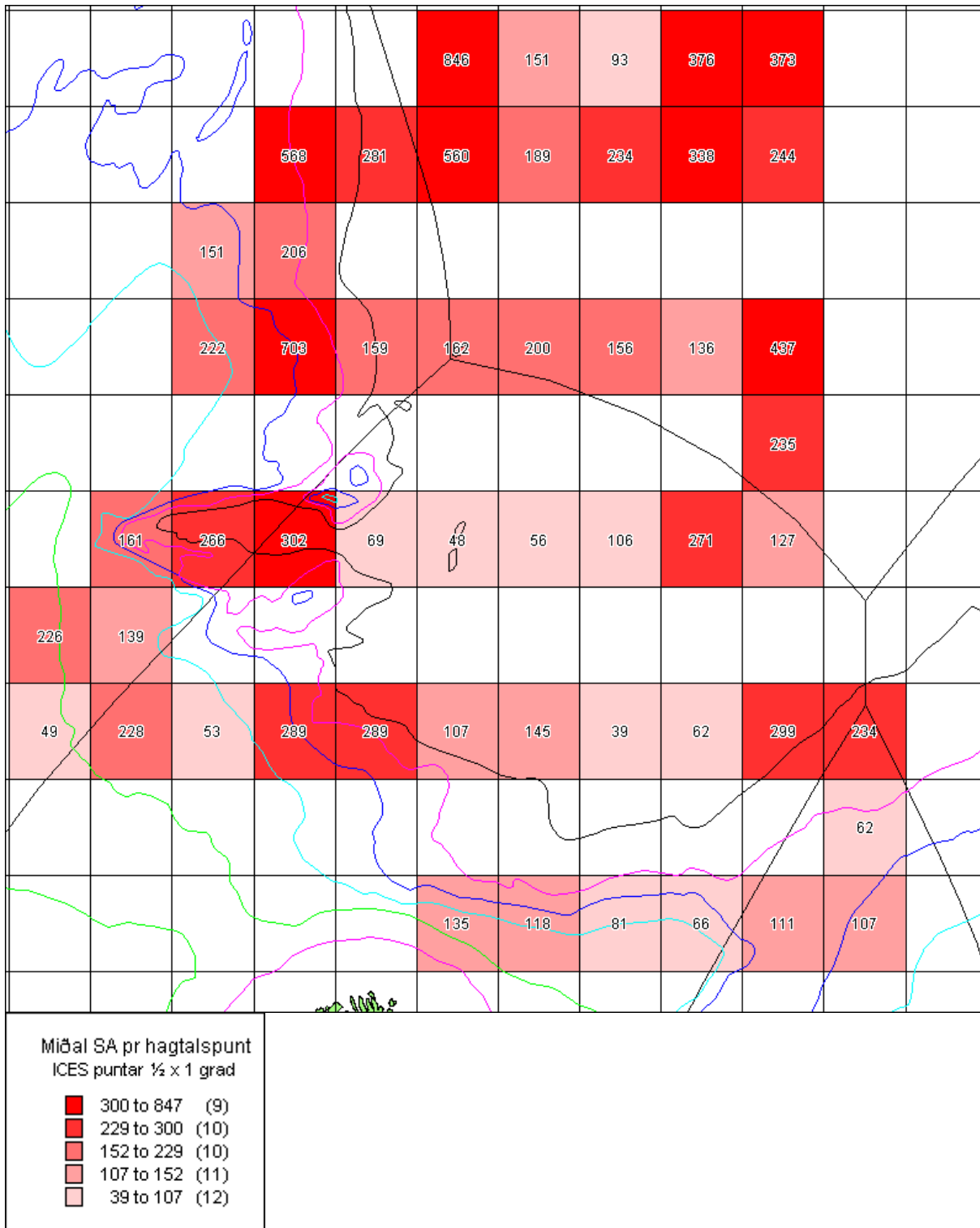
The sea-surface temperature along the cruise track is shown in **Fig. 12**. The influence of the East-Icelandic current seems to be very strong in 2009, leading to relatively cold water north and northeast of the Faroes. The temperature at 300 m depth is shown in **Fig. 13**.



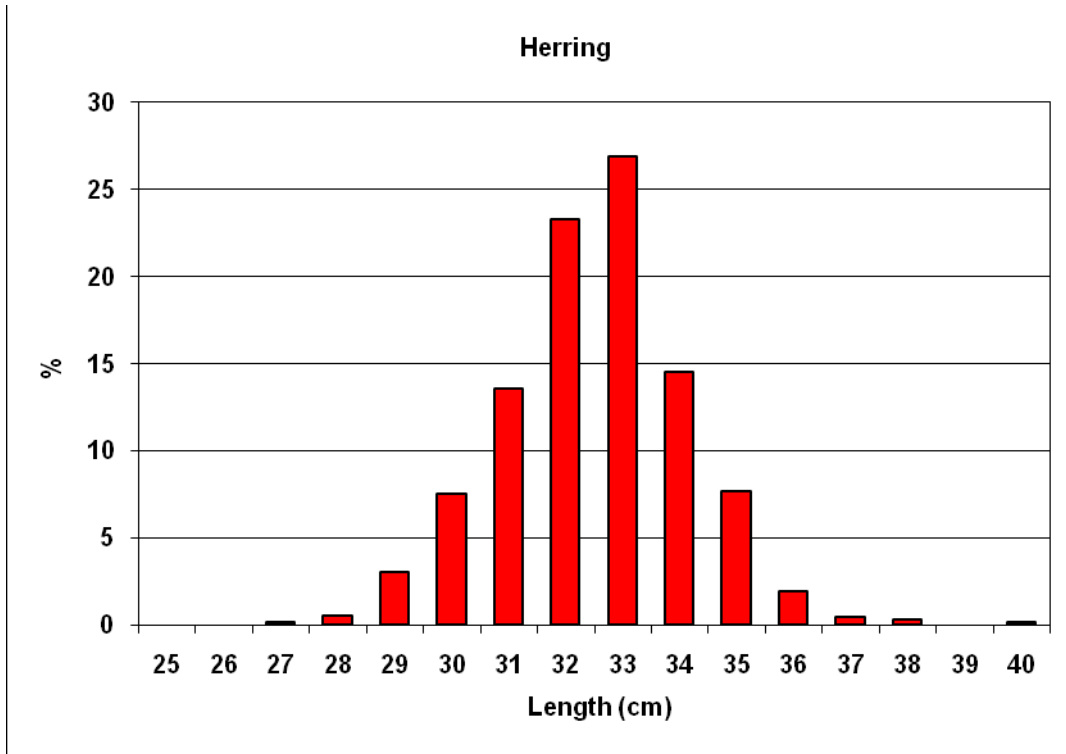
**Figure 1.** Cruise tracks (red line) with hydrographic stations (light yellow circles) north of the Faroes, *Magnus Heinason* cruise 0932, 29/4-13/5 2009.



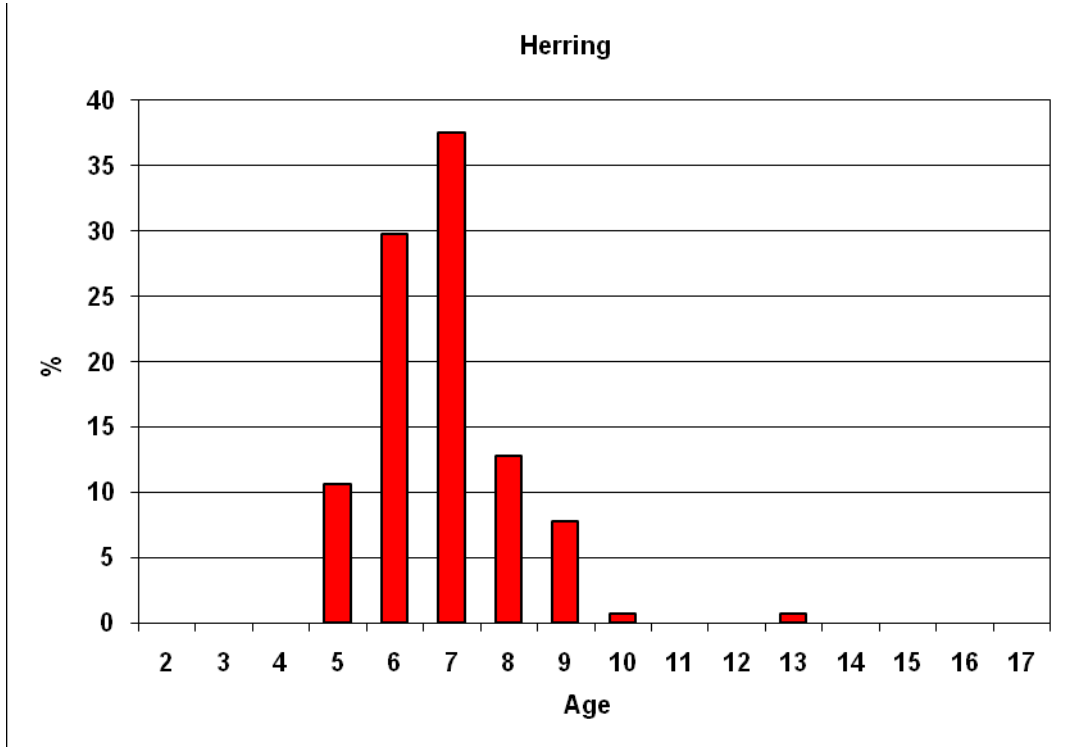
**Figure 2.** Integration values ( $s_A$ ,  $m^2/nm^2$ ) of Norwegian spring spawning herring per 1 nm along the cruise tracks, *Magnus Heinason* cruise 0932, 29/4-13/5 2009.



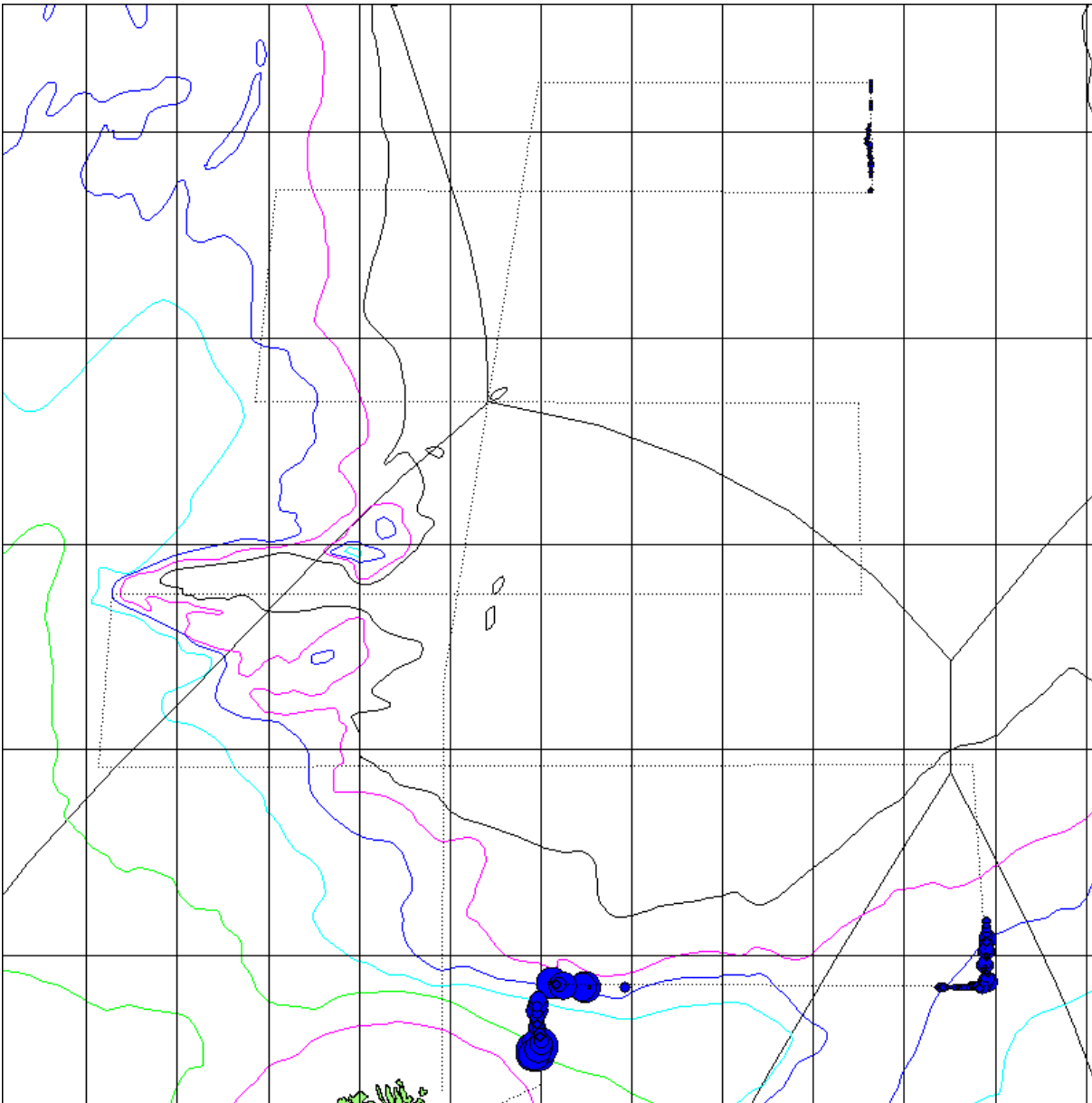
**Figure 3.** Mean integration values ( $s_A$ ,  $m^2/nm^2$ ) of Norwegian spring spawning herring per statistical square ( $1 \times 2$  degrees), *Magnus Heinason* cruise 0932, 29/4-13/5 2009.



**Figure 4.** Length distribution of Norwegian spring spawning herring north of the Faroes, *Magnus Heinason* cruise 0932, 29/4-13/5 2009.

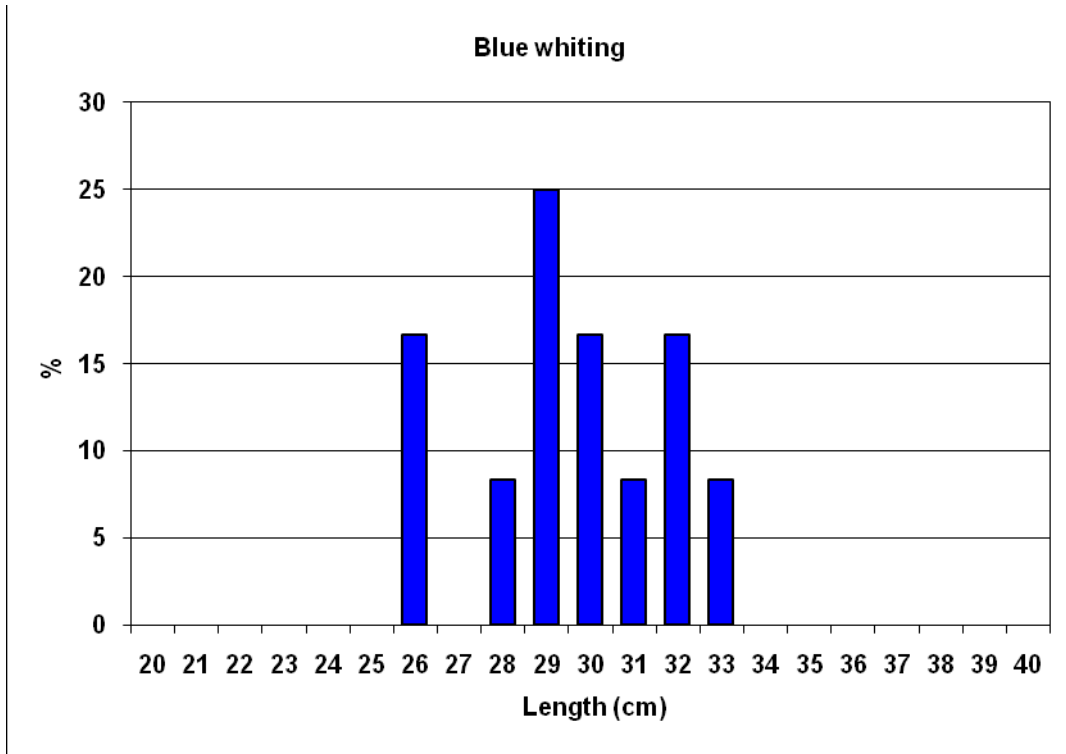


**Figure 5.** Age distribution of Norwegian spring spawning herring north of the Faroes, *Magnus Heinason* cruise 0932, 29/4-13/5 2009.

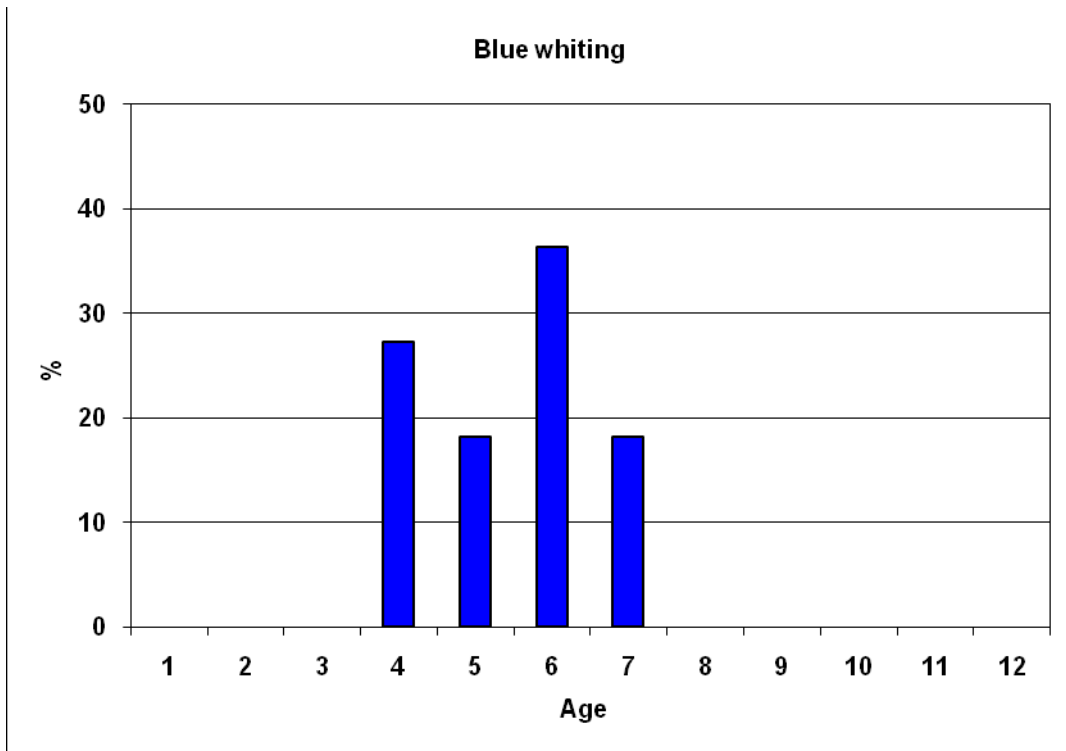


**Figure 6.** Integration values ( $s_A$ ,  $m^2/nm^2$ ) of blue whiting per 1 nm along the cruise tracks, *Magnus Heinason* cruise 0932, 29/4-13/5 2009.

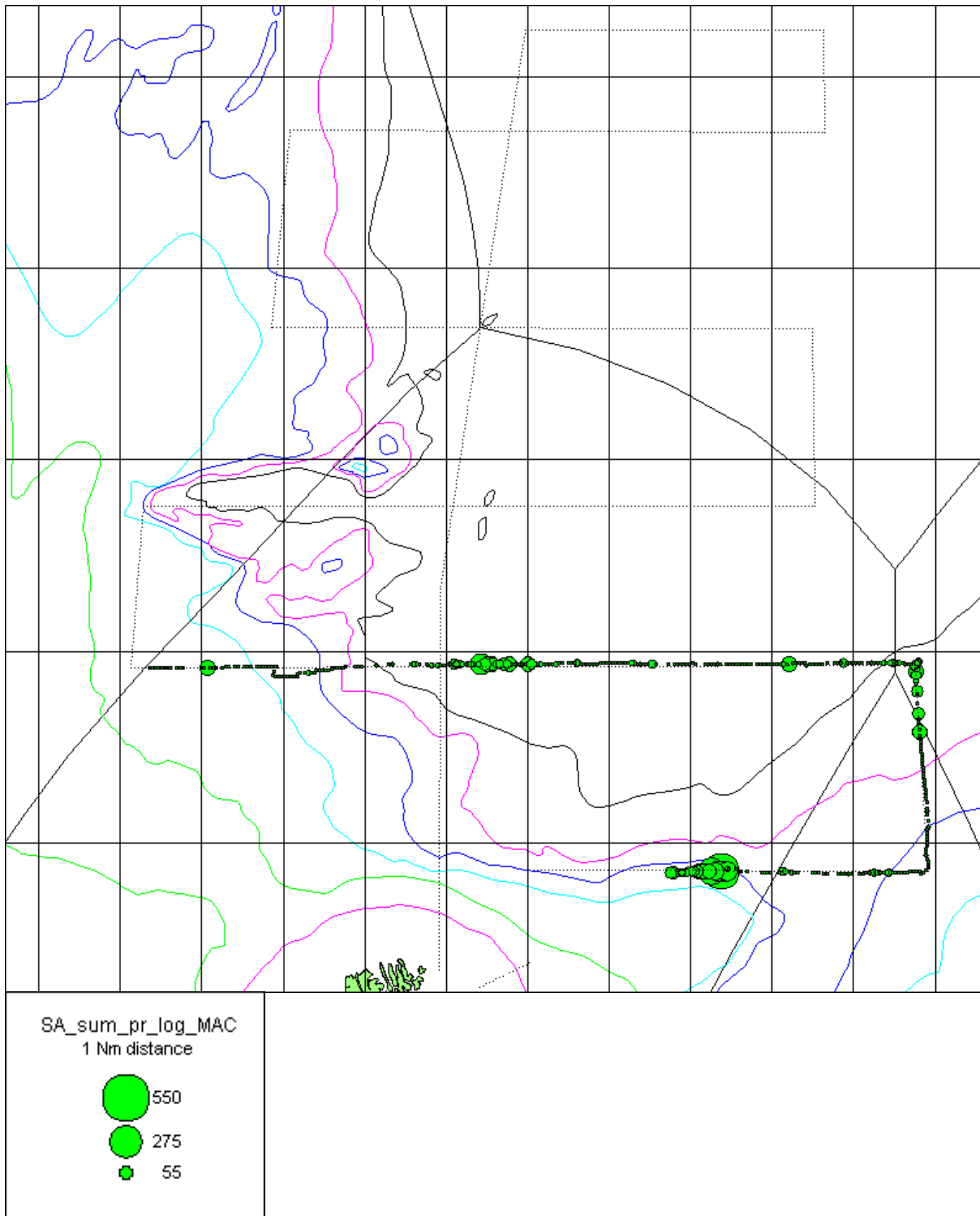




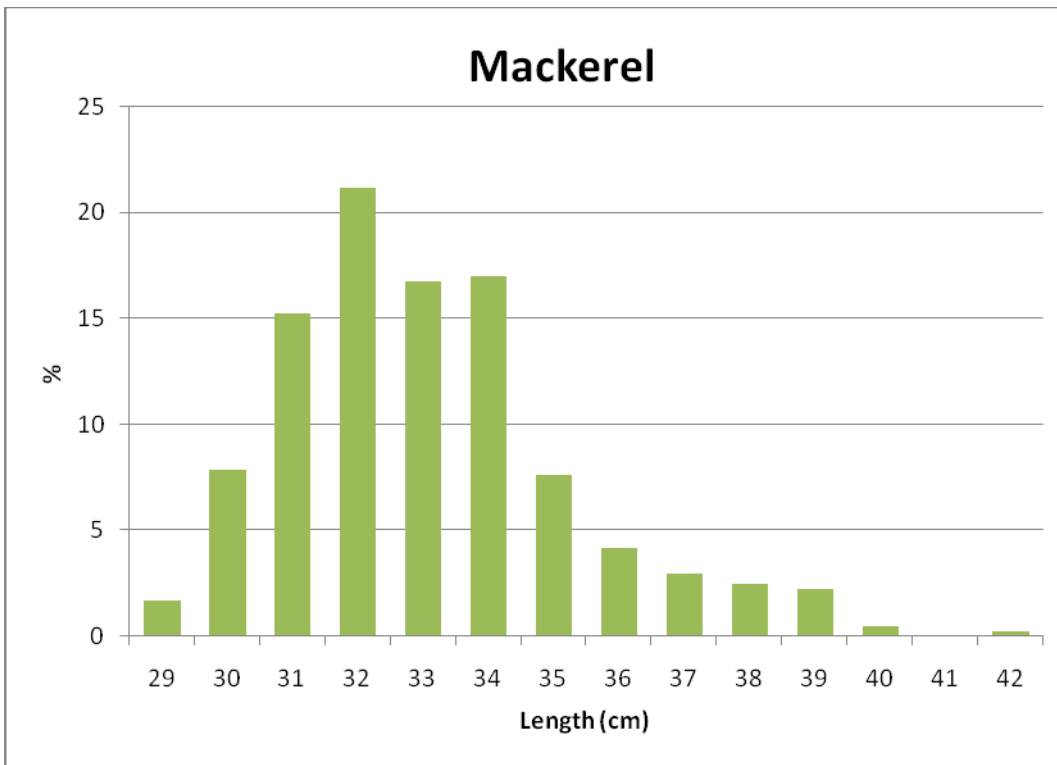
**Figure 7.** Length distribution of blue whiting north of the Faroes, *Magnus Heinason* cruise 0932, 29/4-13/5 2009. It should be noted that very few blue whiting were caught.



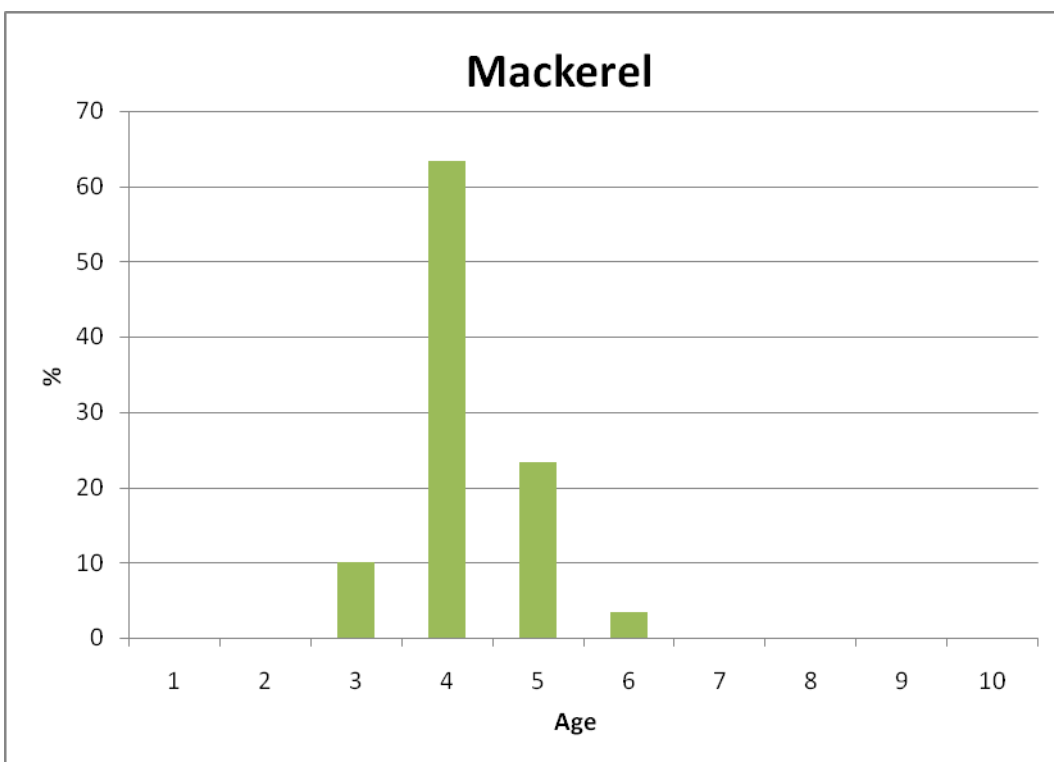
**Figure 8.** Age distribution of blue whiting north of the Faroes, *Magnus Heinason* cruise 0932, 29/4-13/5 2009. Only 4-7 years old fish (the 2002-2005 year-classes).



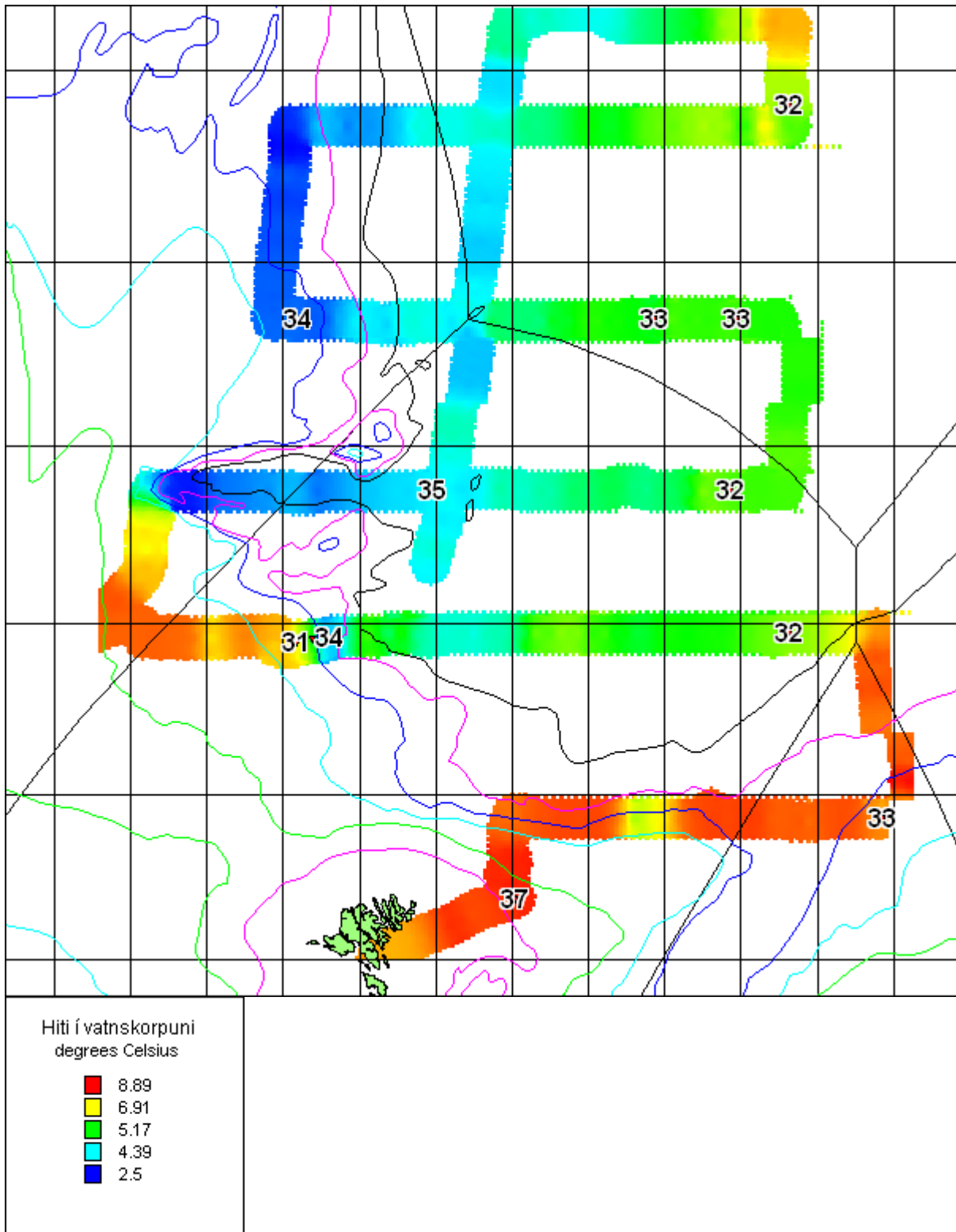
**Figure 9.** Integration values ( $s_A$ ,  $m^2/nm^2$ ) of mackerel per 1 nm along the cruise tracks, 29/4-13/5 2009.



**Figure 10.** Length distribution of mackerel (mean length 34.3 cm) north of the Faroes, *Magnus Heinason* cruise 0932, 29/4-13/5 2009.



**Figure 11.** Age distribution of mackerel north of the Faroes (mostly the 2005 year-class), *Magnus Heinason* cruise 0932, 29/4-13/5 2009.



**Figure 12.** Sea-surface temperature along the cruise track with the mean length of herring at each trawl station superimposed on the map, *Magnus Heinason* cruise 0932, 29/4-13/5 2009.

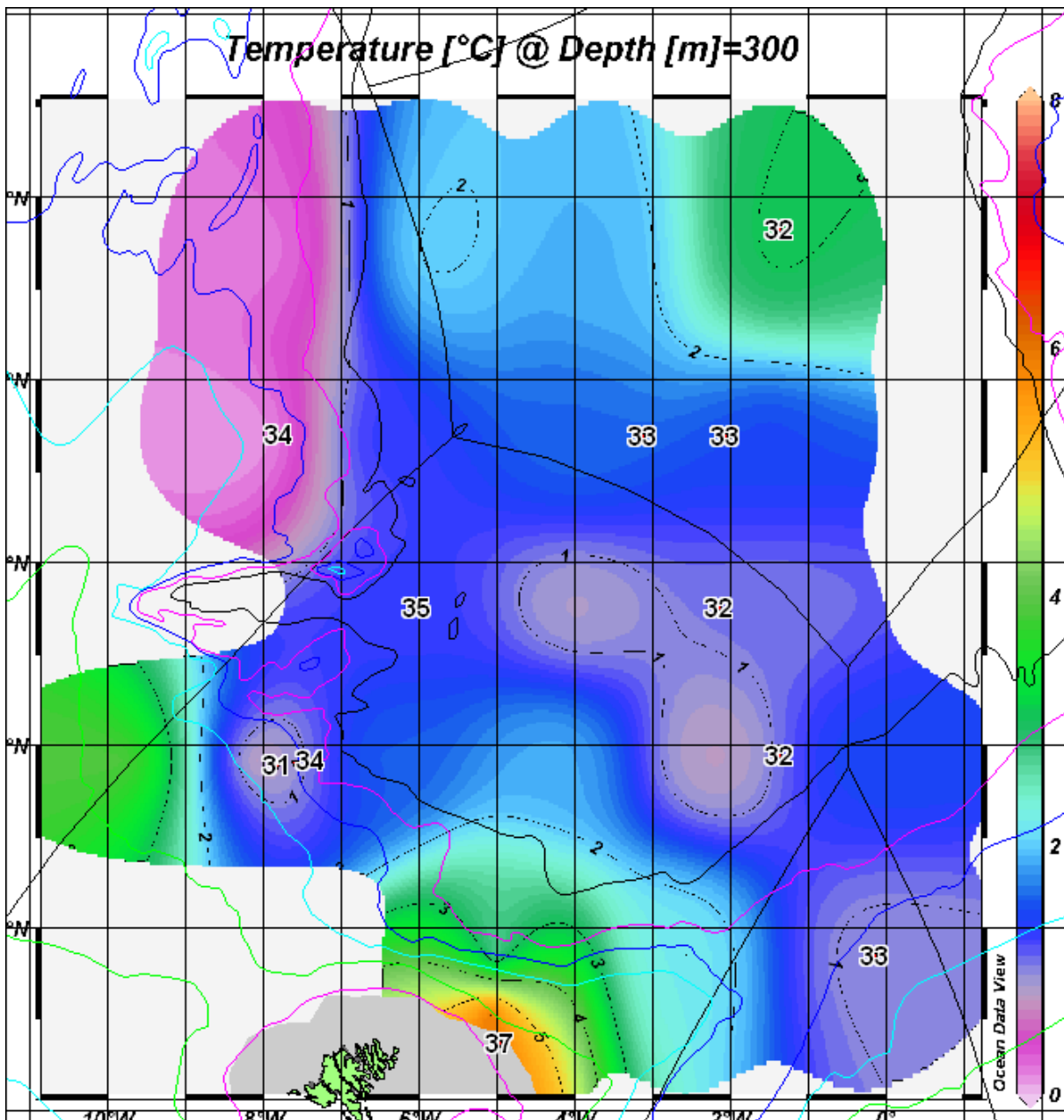


Figure 13. Temperature (°C) at 300 m depth, cruise 0932, 29/4-13/5 2009.

## **APPENDIX 1: Configuration of sampling gears**

### Pelagic trawl used to collect the biological samples during the survey:

Type: “Vónin”, 640 m circumference

Vertical opening 45-55 m (average 47 m)

Horizontal opening 58-62 (average 60 m)

Mesh size in the mouth is 16 m, gradually decreasing to 40 mm in the cod-end

Towing speed 3.0-4.0 knots (average 3.5 knots)

Weights on each side on lower bridles 800 kg.

Trawl doors: Faroese “Vágslemmar” injector type 750 kg, 5.5 m<sup>2</sup>

### WP2 net

A WP2 plankton net (0.5 m diameter and 180 µm mesh size) was hauled vertically from 200 m up to the surface

### CTD

CTD rigged with a rosette for water sample bottles and a fluorometer