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Preliminary report on an Icelandic survey as part of the coordinated ecosystem survey in the Norwegian Sea and adjacent waters with R/V Arni Fridriksson 11 July-08 August 2013

Cruise report: Survey number A7-2013 (Arni Fridriksson)

Period:

Arni Fridriksson; 11 July - 08 August

Area: Icelandic and eastern Greenland.EEZ west of Iceland.

Scientific staff:

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Main objective: To study the abundance, spatial and temporal distribution and feeding ecology of the Northeast Atlantic mackerel, Norwegian spring-spawning herring, blue whiting and other pelagic species in relation to hydrographic conditions, plankton and other prey communities.

Material and Methods.

Calibration of echo sounder transducers

The echo sounder transducers of R/V Arni Fridriksson were calibrated according to standard hydro-acoustic procedure for the operating frequencies of 18, 38, 120 and 200 kHz (Foote, 1987).

Cruise tracks

In general a predetermined survey lines with a preselected pelagic trawl stations, hydrographic stations and plankton stations were followed. This predetermined plan was modified somewhat according to the distribution of mackerel and time constraint.

The cruising speed was generally between 10.5 – 11.5 knots. The survey started at north Iceland and progressed clockwise around Iceland.

Biological sampling

Trawling was done with a standardized sampling trawl (Mulpelt 832) specially designed for this type of survey. The trawl opening was on average 34-35 meters and the spread 66-68 meters using 352 m warp length. A kite was used to keep the headline at the surface and two floats on the wing ends. Towing speed was generally 4.8-5.2 knots and towing time was always set at 30 min. One targeted trawl for blue whiting was done at the slope off southeast Iceland. The catch was sorted and the catch weighed at each station and full biological sampling of otoliths of up to 25 mackerel, 50 blue whiting and 50 scales of herring. In addition up to 100 length measurements of mackerel, 50 of blue whiting, 150 of herring and 50 of other non target species were done. The otoliths of mackerel and herring scales were read onboard. Up to 50 hearts from Icelandic summer spawning herring were sampled per station for estimation of *Ichtyophonus* infestation. Length and weight were measured for all other non-target species and the catch of mackerel, herring and blue whiting was weighed in cases where all the fish were not sampled and weighed. Salmon were caught at 3 stations and were labelled and stored immediately in a freezer for later examination.

DNA samples from 150 mackerels were collected and frozen. Stomachs from 10 mackerel, 10 herring and 10 blue whiting were collected at each station where possible and frozen for later analyses of the contents. A total of 109 trawl stations were worked, including 8 calibration tows with the Faeroese vessel Finnur Fridi.

Hydrography

Hydrographic stations were worked on the transect at the same position as the trawl stations down to 500 m using SEABIRD CTD sensor with a water bottle rosette. A total of 96 CTD stations were worked.

Plankton sampling

Zooplankton sampling was performed at 93 stations, usually immediately prior to a trawl station. A WP-2 net with a 180 µm mesh size was used and towed at 0.5 m/sec. At each station two hauls from 50-0 m were taken and one from 200-0 m. Samples were treated according to working standards described in “ Cruise report from the coordinated ecosystem survey with M/V “Libas” and M/V “Brennholm”, M/V Finnur Fridur and R/V “Arni Fridriksson” in the Norwegian Sea and surrounding waters, 9 July-20 August 2010” .

Acoustics

Sonars

Kaijo Denki survey sonar and high frequency sonar were run throughout the survey.

Echo sounders

Continuous data logging and raw data recording from 18, 38, 120 and 200 kHz drop keel mounted Simrad EK60 echo sounder were done down to 500 m depth. The quantitative acoustic analyses and NASC species analyses were done with the software program Large Scale Survey System (LSSS).

Results

Hydrography

A cursory inspection of the temperature at 10 m depth 2013 showed that the upper layers was considerably colder all around Iceland than in 2010-2012 and the surface temperatures were generally 1-3° C lower than in last 3 years. This may have directed the mackerel migration to some extent away from the eastern areas to towards the south and west of Iceland.

More detailed interpretation of hydrographic data will be done later at a meeting in August 2013 in a common report of scientists of the participating countries (Faeroes, Iceland and Norway).

Plankton

The samples were preserved frozen and in formaldehyde for later analyses at the Marine Research Institute.

Biomass estimations of target species

As this is a joint international survey and Iceland covers only part of the surveyed area no total biomass estimates from both acoustic and trawl data are possible at this time. A preliminary index estimate (biomass) based on trawl data for mackerel indicate a similar or a little lower biomass in 2013 than the estimate in the record year of 2012 for the Icelandic area (around 1.4 million tonnes). This was the first time that the survey was extended into Greenland waters. A preliminary estimate for that area was about 460 thous. tonnes. Preliminary acoustic estimate of Norwegian spring spawning herring in Icelandic waters was over 4 million tonnes. As the biomass of the NSSH has not been estimated before for the Icelandic area alone in those surveys a comparison with previous years is not possible at the moment but this estimate must be considered quite high in comparison with previous total estimates.

Length and spatial distribution of mackerel

Mackerel was caught in the majority of tows except for areas off Northwest, North and NE-Iceland and colder coastal waters at east Iceland. In Figure 2 is shown the surveyed area, the tows and the catch and distribution of mackerel. The mackerel distribution is similar to that observed in previous years and the highest trawl catches were to the southwest/west of Iceland as has been the trend the last three years, whereas the largest catches were taken south-east of Iceland in 2010. In Figure 3 is shown the total length distribution of mackerel in all tows. The mean length of mackerel in the surveyed area was 35 cm. The length distribution was from 5-45 cm with the most common length frequencies 34-38 cm (63%). In Figure 4 is shown the mean length in all tows with mackerel. Only a few 0-group mackerel were caught in 2

hauls mixed with older fish at south-east Iceland.

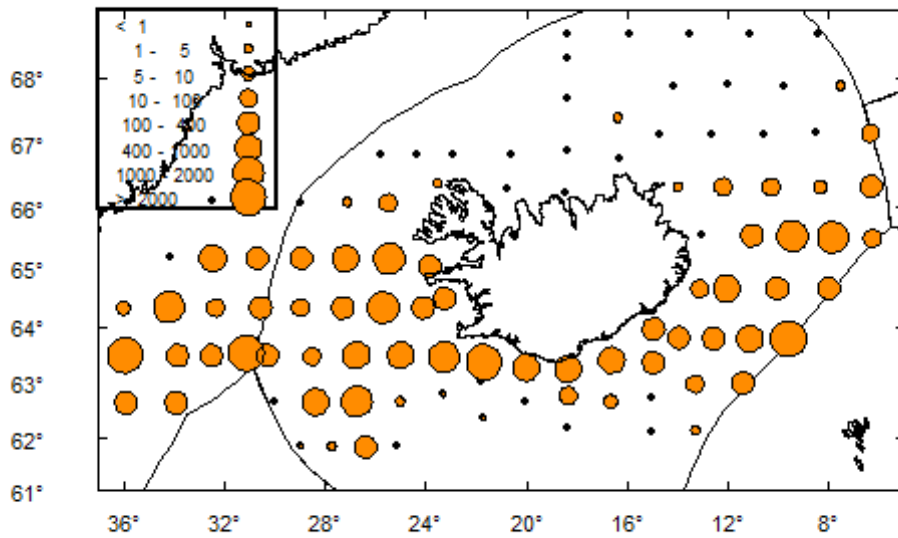


Figure 2. Catch (kg/nm) of mackerel in August 2013. Black dots represent tows without catch.

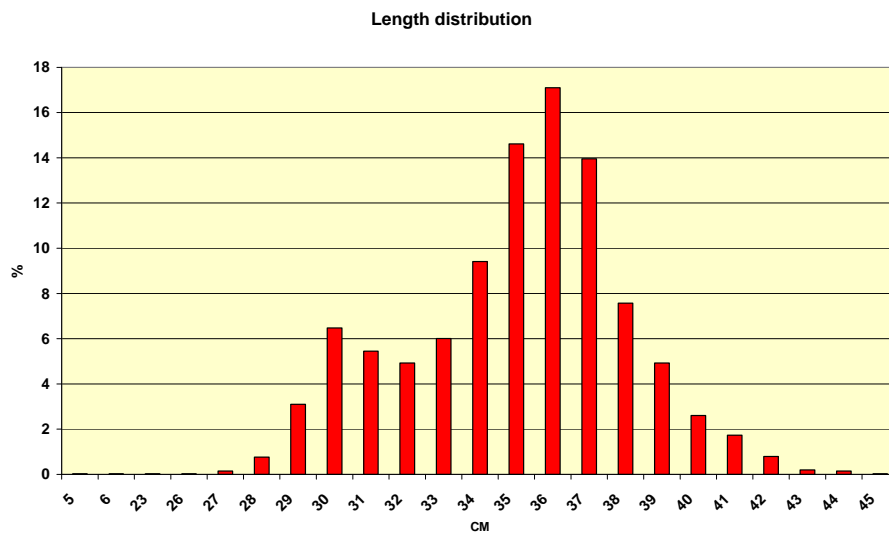


Figure 3. Total length distribution of mackerel.

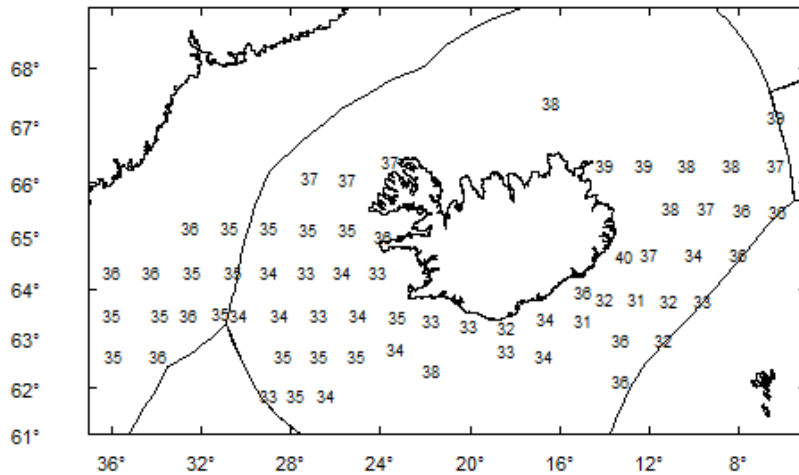


Figure 4. Mean length of mackerel in trawl catches.

Length and spatial distribution of herring

In figure 5 is shown the distribution of the Icelandic summer spawning herring (ISSH) and the Norwegian spring spawning herring (NSSH) and the catch per nm towed. The ISSH is mainly distributed to the west and south of Iceland mostly over the shelf whereas the NSSH has more oceanic distribution off southeast, east and the northeast Iceland. No mixing of the species was observed.

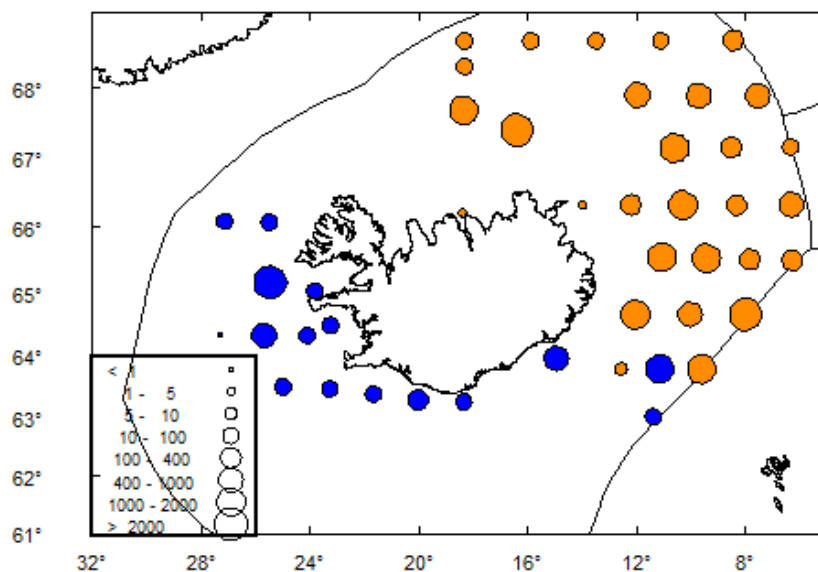


Figure 5. Distribution of ISSH (blue circles) and NSSH (red circles) and catch in kg per nm towed.

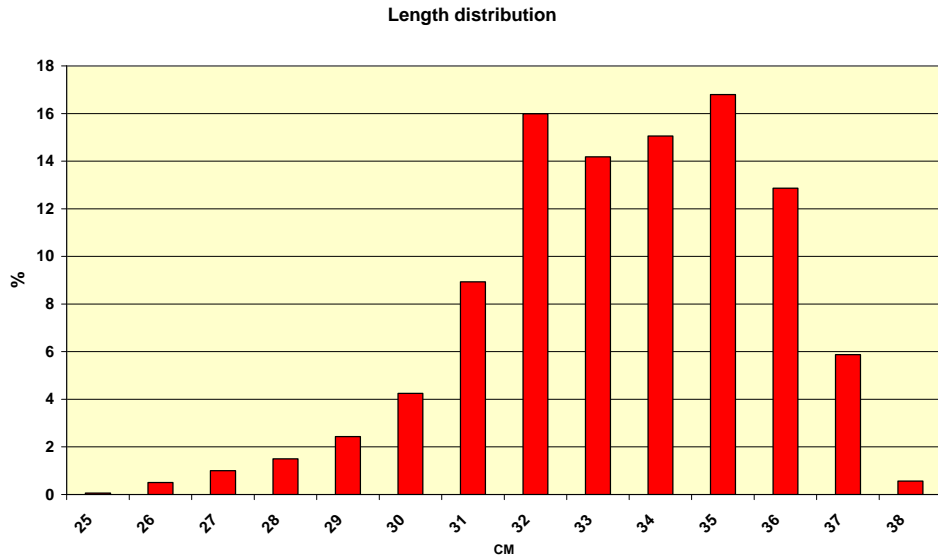


Figure 6. Total length distribution of ISSH

The length range of the ISSH was from 20 – 38 cm. In Figure 6 is shown the length distribution of the ISSH. As seen from the length frequencies the greatest numbers ranged in length from 32-36 cm.

The length distribution of the NSSH is shown in Fig. 7. The length ranged from 23-39 cm. The most common length frequencies were from 34-36 cm.

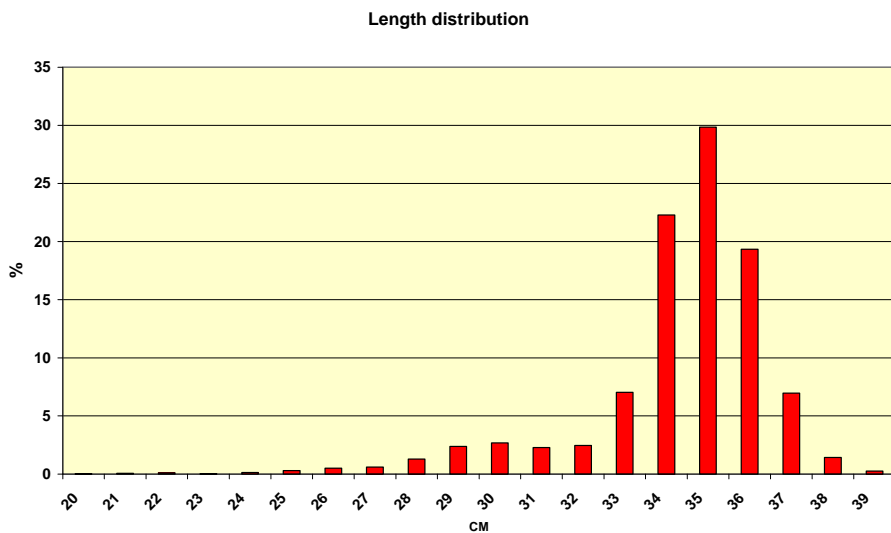


Figure 7. Total length distribution of NSSH

Length and spatial distribution of blue whiting

In figure 8 is shown the distribution of blue whiting. The distribution of blue whiting was very restricted in the Icelandic area as measured by the trawl catches but as blue

whiting is usually staying in deeper waters than herring and especially mackerel and only surface tows were worked that affected greatly the distribution as represented in the tows. The distribution as measured by acoustic methods will be analysed at a later time.

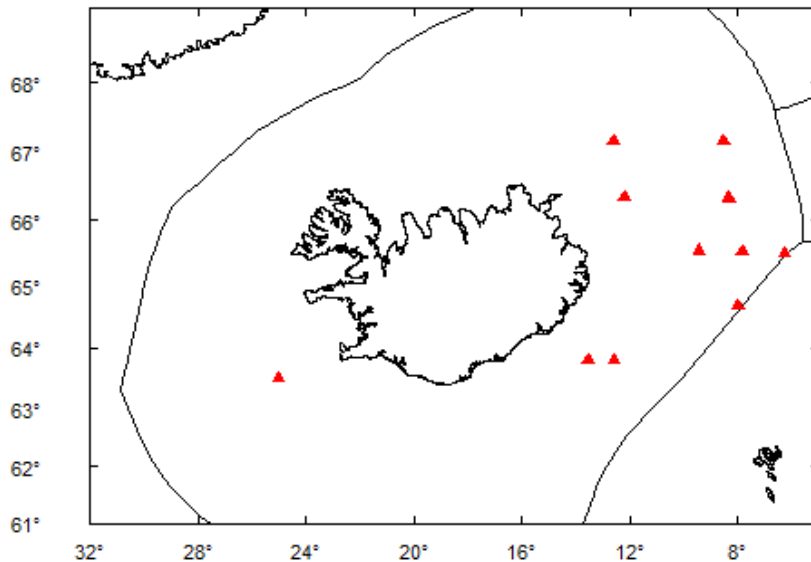


Figure 8. Distribution of blue whiting. Red triangles show tows with catch

The blue whiting caught in the survey ranged from 11-36 cm. As can be seen from the length distribution (figure 9) two age groups of young fish, 0-group and 2-group are predominant in numbers in the length distribution. The 0-group fish were mostly caught in one directed tow at about 50 m depth off the shelf at southeast Iceland where schools of 0-group blue whiting were observed.

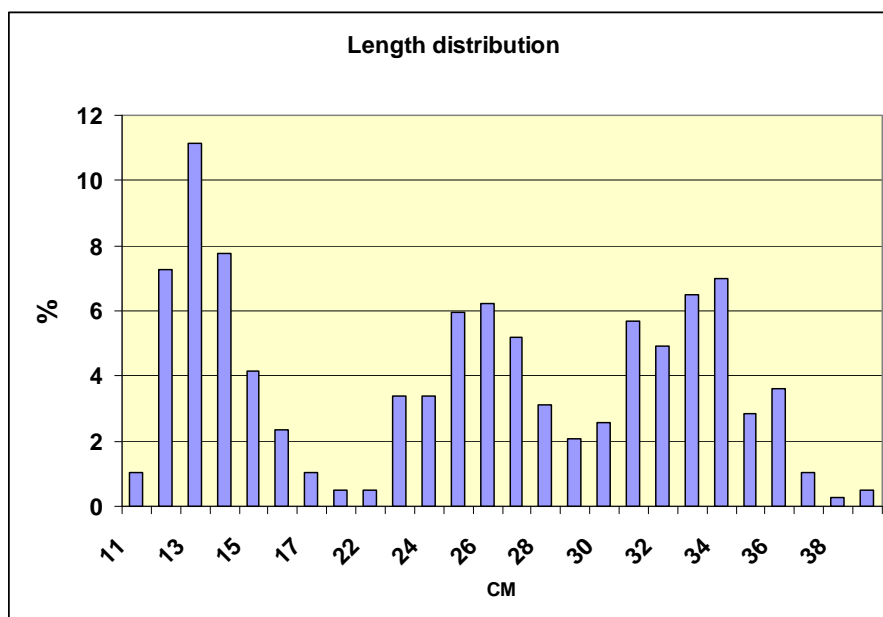


Figure 9. Total length distribution of blue whiting

Other species

Twenty other fish species were caught in the survey. The most common of which were capelin, lumpsuckers, lantern fishes, polar cod, lancet fish and grey gurnard.