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Results of Soviet Investigations of Blue Whiting
in the Norwegian Sea in Summer and Autumn 1970

by
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Summary

This paper deals with the biology, behaviour and distribution of Blue Whiting concentrations in summer and autumn 1970.

It was found that Blue Whiting concentrations were distributed over a large area of the Norwegian Sea, the largest concentrations were observed in the western and southwestern Norwegian Sea, and also in the area of mixed waters of the "wedge" of the East-Icelandic Current at surface temperatures of 6-9°C.

In summer, Blue Whiting concentrations were the most dense at night, the fish were feeding intensively on plankton and they distributed in the upper water layer at a depth of 20 - 50m. In day-time, the concentrations were scattered, active and stayed deeper (40-80m).

The 24-hours amplitude of vertical migrations in October-November was considerably larger. At night the concentrations were observed at a depth of 40 - 100 m, depending on the light; in day-time, the fish moved down to a depth of 350 m.

The summer concentrations were composed by the 1966-1964 year classes at an age of 4+ to 6+ years, the predominating length being 24 - 29 cm. In autumn (October-November) Blue Whiting of the 1965-1961 year classes, 5+ to 9+ years old, and 27 - 31 cm long were the most important.

The analysis of the age composition in summer and autumn 1970 indicates that the 1966-1961 year classes are rich and that large stocks can be expected in the next few years.

It is known that the habitats of Blue Whiting in the Norwegian Sea are almost the same as those of herring and that their positions to a great extent are determined by hydrographical conditions (Andriyashev, 1954, Zilanov, 1966).

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Our investigations of Blue Whiting in the Norwegian Sea aimed at a clarification of the behaviour and distribution of the main concentrations in summer and autumn, to continue our study on the biology, and to determine the length and age composition.

Material and Methods

The data presented in this paper were collected in the Norwegian Sea. The work was carried out on board the PINRO research vessels "Akademik Knipovich" and "Fridtjof Nansen" in June-July and October-November 1970. Fishing for Blue Whiting concentrations was conducted by a mid-water trawl with a 12 mm mesh net inserted in the codend. The fish were measured from the tip of the snout to the end of the middle rays of the tail fin. During the period mentioned, 4 066 fish were measured. Age was determined by unbroken otoliths which were kept in alcohol for 7 - 10 days. Before examination, the otolith was placed on a darkened slide and its surface was wetted with glycerine. Year rings were counted under a binocular in reflected light. 434 Blue Whiting were aged.

Distribution and length-age composition of Blue Whiting in summer and autumn 1970

In June 1970 the surveys covered the area from 60°30'N to 71°10'N and between Iceland and Norway. Blue Whiting concentrations were distributed over a great area of the Norwegian Sea (Figure 1). The densest concentrations were observed in the western and southwestern parts of the Norwegian Sea and also in the area of mixed waters of the "wedge" of the East-Icelandic Current.

In June-July a group of large trawlers (BMRT) fished successfully for these concentrations by pelagic trawls. Dense concentrations of Blue Whiting were found in great patches within an area of 10-15 n². These concentrations were registered on an echogram as a dense layer with local concentrations and scatterings.

Dense Blue Whiting concentrations were mainly found when the surface temperature was 6-9°C. As to the diurnal vertical migrations of Blue Whiting, it should be noted that feeding concentrations were the densest at night; they were intensively feeding on plankton in the upper 20-50 m layer. In day-time Blue Whiting concentrations were more scattered, active and remained deeper (40-80m). An analysis of the catches of the fishing fleet from the summer concentrations of Blue Whiting in the Norwegian Sea showed that the observed fluctuations in catch size during a 24 hour period are closely connected with the behaviour of the fish and particularly with their diurnal vertical migrations. The greatest catches, about 20-25 tons per trawling were taken at night.

When the heating of the mixed waters of the East-Icelandic Current started, it resulted in an insignificant displacement of the densest concentrations of Blue Whiting in a northern and northeastern direction in the second half of June.

In June the concentrations of Blue Whiting consisted of fish of the 1968-1961 year classes at an age of 2+ to 9+ years and from 18 to 32 cm long (Figure 2). Specimens of the 1966-1964 year classes at an age of 4+ to 6+ years (70.0%) and 24-29 cm long (72.4%) predominated in the catches. In July no great horizontal migrations were undertaken by the Blue Whiting concentrations, but insignificant displacements in northern and northeastern directions was observed. As in June, fishing concentrations were mainly distributed in mixed waters of the East-Icelandic Current (Figure 1). No considerable changes in the behaviour of Blue Whiting were observed in July compared with June, but the amplitude of vertical migrations increased. In the day-time they migrated to 100 m depth.

Echometric and hydrographical micro-surveys carried out in fishing areas showed that the densest concentrations were distributed at a depth of 25-50 m, where the temperature was 3-6°C.

In July Blue Whiting concentrations consisted of fish of the 1969-1959 year classes, 1+ to 11+ years old and 20 - 33 cm long (Figure 2). Fish of the 1966 - 1963 year classes, 4+ to 7+ years old (69.0%) and 26 - 30 cm long (86.4%) dominated in trawl catches.

Investigations of Blue Whiting in October-November 1970 showed that their concentrations were distributed over a great area of the Norwegian Sea (Figure 3), as in summer. Echo-surveys showed that dense fishing concentrations were mainly observed in the frontal zone (east of Iceland) where the temperature in the surface layer was 4-5°C. When the water temperature decreased, the density and frequency of Blue Whiting also decreased markedly. Studies of the distribution of Blue Whiting concentrations in October-November in relation to temperature conditions showed that the cooling of water masses resulted in migrations of the densest concentrations in a southern and southeastern direction.

The amplitude of the diurnal vertical migrations was greater in October-November than in summer. In day-time the fish went down to 350 m; at night the concentrations were found at a depth from 40 to 100 m depending on the light.

The length and age composition of Blue Whiting in October-November is shown in Figure 2 which shows that in October-November 1970 the concentrations in the Norwegian Sea consisted mainly of the 1968-1959 year classes, 23-34 cm long and 2+ to 11+ years old. Specimens of the 1965 to 1961 year classes, 27-31 cm long (82.5%) and 5+ to 9+ years old (80.1%) were predominant in the concentrations.

Conclusions

Investigations of Blue Whiting carried out by the Polar Research Institute in 1970 showed that the fishing concentrations in summer and autumn were mainly found in the southwestern part of the Norwegian Sea, in the area of interaction of the cold East-Icelandic Current with the warm Norwegian Current.

Fish of the 1966-1964 year-classes, 24-29 cm long and 4+ to 6+ years old dominated the summer concentrations. In autumn (October-November) Blue Whiting of the 1965-1961 year classes, 27-31 cm long and 5+ to 9+ years old were predominant. Examination of the age composition in the samples collected in summer and autumn 1970 shows that the 1961-1966 year classes are rich and large stocks of Blue Whiting can be expected in the next few years.

References

- ANDRIYASHEV, A.N., 1954. Fish of the northern seas of the USSR. Izdatel'stvo AN SSSR.
- ZILANOV, V.K., 1966. The biology and prospects of fishery of the gadoid fish (Micronesistius poutassou Risso) in the northern Atlantic Ocean. Material. sessii uchenogo soveta PINRO.

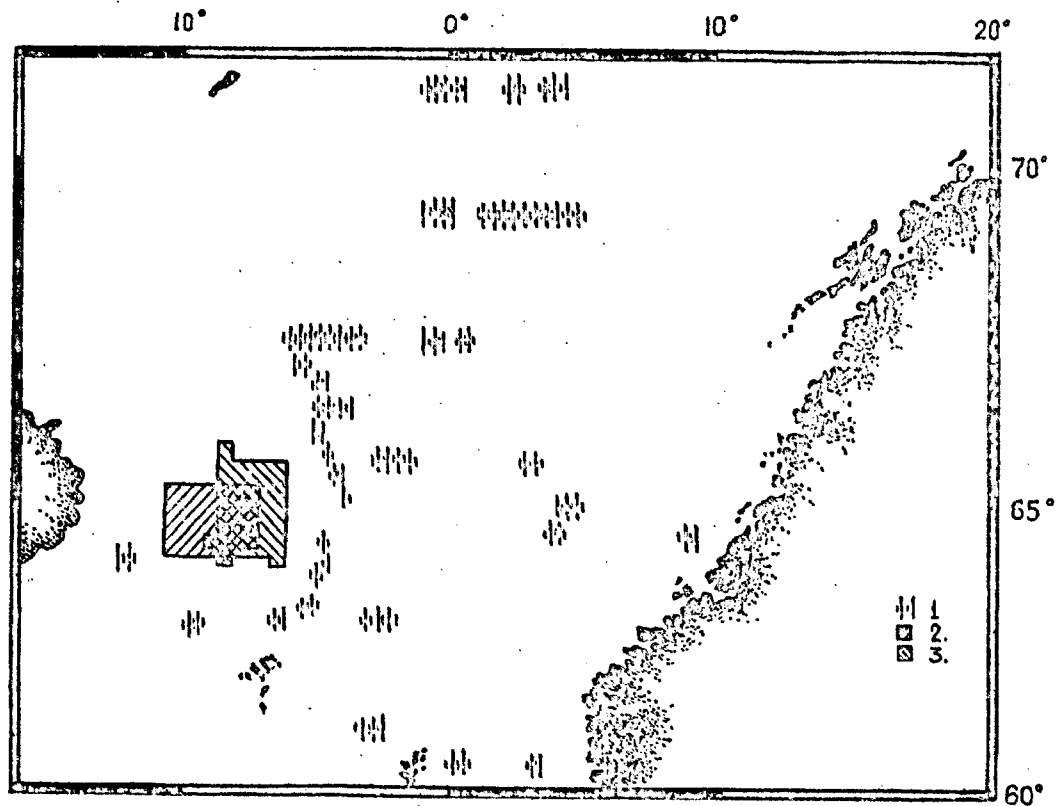


Figure 1. Distribution of Blue Whiting concentrations in the Norwegian Sea in 1970; in June (1) according to echo-surveys; in June (2) and July (3) according to the dispersion of the fishing fleet.

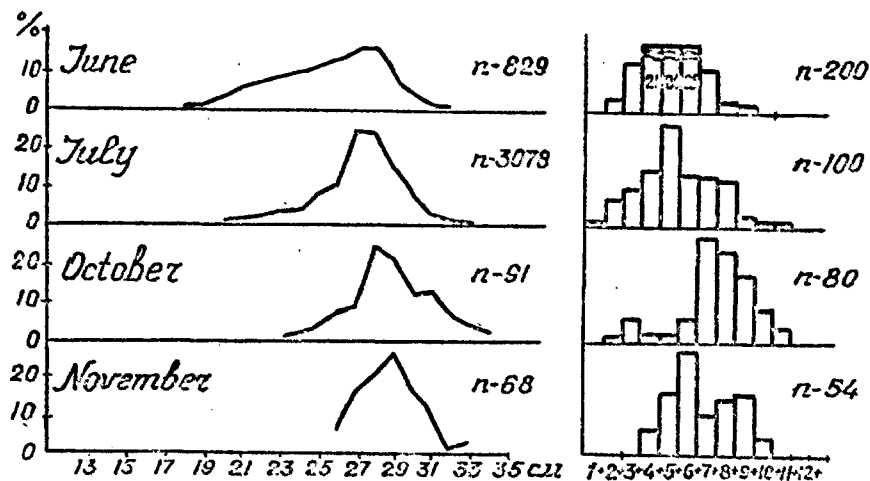


Figure 2. Length and age composition of Blue Whiting in summer and autumn 1970.

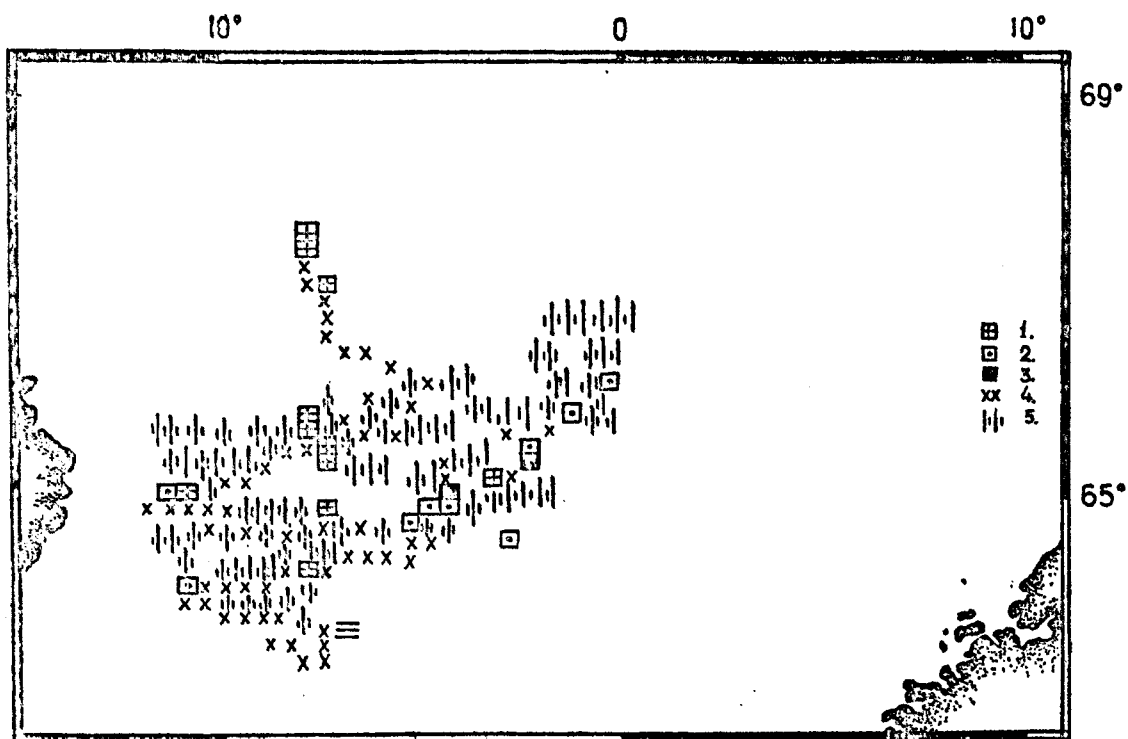


Figure 3. Distribution of Blue Whiting concentrations in the Norwegian Sea in 1970.

In October (1) and November (2) according to experimental trawlings, in October (3) and November (4) according to echo-surveys.