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On the state of short-finned squid (*Illex illecebrosus*) stocks
in some areas of the Northwest Atlantic in 1977

by

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Short-finned squids are distributed in the Northwest Atlantic area from the Cumberland Peninsula to the Caribbean Sea and Gulf of Mexico occurring on the shelf and continental slope. The feeding stocks are mainly based on the Grand Newfoundland Bank, the Nova Scotia shelf, on Georges Bank and on the northern part of the USA shelf (75-69°W). The largest recorded *Illex* aggregations there are from the depths of 15 to 400 m, however, the maximum catches of short-finned squids fall on the period of June-August and are taken along the external margin of the Emerald and Georges Bank shelf from the depth of 100-200 m at near-bottom temperatures of 8 to 12°C. The mean catch per hauling hour taken by a bottom trawl in the given period was 3.1 tons.

The life cycle of *Illex* is understudied, which is confirmed by the fact that to date 3 models are known. In 1957 Squires suggested that the life cycle of a squid lasts one year, however, in 1967 he abandoned this model and suggested another one, according to which squids live 2 years. Mesnil (1976) suggested that squids live 1.5 years. According to this author the squid stock can be subdivided into 2 groups: one spawns in winter, and the other in summer at depths inaccessible for observations. Both authors agree that squids die after spawning. That is why in the draft project for the short-and long-finned squid fishery management developed by a number of USA Institutions (translated in TsNIITEIRKh, 1977) it is noted that at present it is impossible to determine the age of squids and hence the stock size assessment cannot be done.

We agree to this statement, however, we suggest to make an attempt and to estimate the stock size of *Illex* by means of comparing its minimum biomass at the beginning and at the end of the feeding period in two regions of its distribution area. The following material is available for determination of the minimum biomass:

1. June 1973, Emerald Bank.

The results of 28 haulings by one ship of the BMRT type, which operated at depths 110 to 140 m among a group of other ships fishing for squids.

2. June 1977, Emerald Bank.

The results of 278 haulings by 13 ships of the BMRT type, which operated at depths 105 to 185 m.

3. December 1977. The results of a quantitative micro-survey of squids, which covered the oceanic slope of Georges Bank bordered by 67 and 69°W. 18 haulings within the depth range of 60 to 400 m.

In all cases a trawl of the "Hake-M" type was used with a vertical opening of 8 m. The volume of filtered water per hauling hour was 396698.4 m^3 at the average towing speed of 3.4 knots. The trawl catchability was assumed to be 1. The squid biomass in one cubic meter of the water layer fished by a bottom trawl "Hake-M" was determined.

During the day the *Illex* aggregations are redistributed by depth. The analysis of the results of the diurnal trawling stations indicated that at daytime *Illex* keep to the bottom, rising in the water column at night. Therefore, the results of haulings in the light hours of the day are more representative.

Emerald Bank

In 1973 the fleet was fishing for squids on the Emerald Bank slopes in the area of 59°30 W to 61°50 W. In 1977 the fleet was operating there on the squid aggregation in the area of 60°30 W to 63° W.

The square with a squid aggregation was determined by the positions of commercial ships fishing for squids in this area (fig. 1).

Both in 1973 and 1977 the average squid biomass per m^3 was 0.005 kg. Thus, the minimum squid biomass on Emerald Bank in June remained practically unchanged for 5 years, namely, about 60000 tons.

If short-finned squids are about evenly distributed within the area from the southern slopes of the Grand Newfoundland Bank to the northern part of the USA shelf in summer, then the minimum biomass of the species at the depth of 100 to 200 m is approximately 500000 tons.

Georges Bank

As stated above, the range of depths studied at day time (7 a.m. - 3 p.m.) was 60 to 400 m. The highest density of the squid concentrations was observed at depths 250 to 300 m. The average squid biomass per m^3 amounted to 0.011 kg at these depths, and to 0.004 kg at depths 60 to 250 m and 300 to 400 m. So, it was determined that the minimum biomass on the oceanic slope of Georges Bank in the area bordered by 67 and 69° W is about 130000 tons at depths 250 to 300 m. At other depths - 60 to 400 m - the minimum squid biomass is about 30000 tons.

The studies of the squid oogenesis (Burukovsky et al., 1977) indicated that the maturation process of the female ovaries, that is the period of trophoplasmic growth undergone by the oocytes, is momentary and lasts less than a month. Therefore, a discovery on the slopes of Georges Bank of *Illex* females with the ovaries containing the oocytes in the condition prior to trophoplasmic growth made it possible to determine these aggregations as pre-spawning ones. Moreover, one female in the catches had matured ovary and the reproductive system of the bulk of males was ready for coupling.

It can be suggested that we were dealing with the aggregations that were to spawn soon and then to cease their life history.

At this time of the year *Illex* migrate from the Grand Newfoundland Bank and Nova Scotia shelf areas south-westward and are distributed along the continental slope from Georges Bank to Cape Hatteras. The calculated minimum biomass value in the given area is of the order of 450000 tons.

Practically, no difference exists between the minimum squid biomass in the feeding period and at the end of its life cycle.

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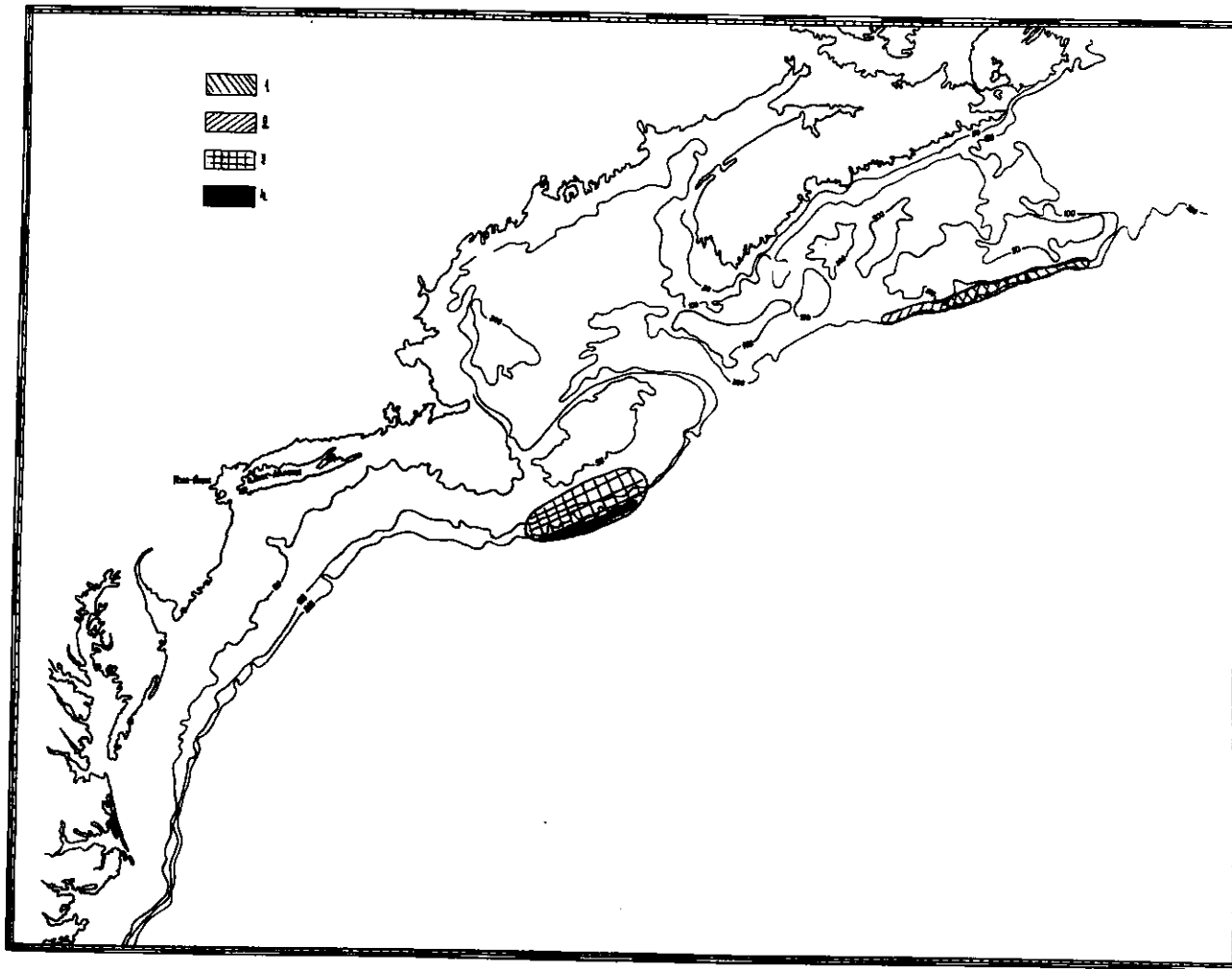


Fig. 1. The areas of the minimum squid biomass. 1 - June 1973; 2 - June 1977; 3 - December 1977;
4 - the area of most dense aggregations in the period under investigation.

