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On the shrimp concentrations to the south of the Harrisson Bank in ICNAF Subarea 2

by

L. I. Serebrov
PINRO, Murmansk, USSR

A B S T R A C T

Dense concentrations of the shrimp Pandalus borealis Kr. were investigated to the south of the Harrison Bank in a gut at 200 - - 400 m depths. The mean concentration density was I.84 spec./m^2, the possible catch per hour trawling was 0.5 - 0.7 tons.

INTRODUCTION

The concentrations of the northern shrimp Pandalus borealis Kr. are often formed in the closed bottom degradations at 300 - 500 m depths. In December I977, an enough dense shrimp concentration was partially investigated from board the research scouting vessel "Persey - 3" in time of the fish counting trawl survey in a gut like the above mentioned one (Fig. I). A detailed study of the concentration was not envisaged by the program of the trip, therefore, it was not possible to study the limits of the shrimp concentrations, their vertical distribution and to collect the biological material to this species as well. Nevertheless, data on the absolute density of the shrimp concentrations were obtained as result of work conducted, they testified to the fact that this concentration may be of a certain interest for their fishery.

Materials obtained and the method used in time of investigations

The density of the shrimp concentration was estimated by the

photographs got with application of the automatic camera "Triton" installed on the upper rope of the bottom fish counting trawl. The distance between the camera and the bottom had been measured with application of a special stereoscopic model of the automatic camera "Triton 2 C" fixed also to the upper rope . some earlier the working process was started. It was determined that the distance between the camera and the bottom was 2.I m on the average, the mean error being $\pm$ 2,08% . The mean bottom area was correspondingly taken as I.2 m^2 on the picture. The density of the shrimp concentration $-\rho -$ was determined as a relationship of the summary number of individuals -- Σ n - pictured per one trawling to the total sum of all the bottom areas available on the photos, i.e. it was determined by the formula as follows:

$$\rho = \frac{\Sigma\ n}{\Sigma\ s} \quad (\text{I}).$$

In order to reveal the commercial meaning of the concentration, approximate calculations were made to determine the possible shrimp catches by a special trawl with the horizontal opening of 20-meter $\overline{\text{between the wings}}$/ netting and the factor of catchability being about 0.22. This factor was determined some earlier relating the Barents Sea shrimp. Besides, it was found that the shrimp form no concentrations with help pf cables and trains before the trawl netting, therefore, the area included into the catch process was expressed as product of the horizontal opening of the trawl $\overline{\text{between the wings}}$/ L_c by the way passed -- V. The total formula to be used for the estimation of the possible catch should be as follows: $V = L_c \cdot V \cdot S \cdot KuL$ (2), where Kul -- is the factor of catchability determined as the relationship of the number of individuals in a catch to their number in the area fished.

An approximate estimation of the shrimp number and biomass within the gut area was made with taking into account the peculiarities of the bathyography effecting greatly the shrimp concentration density.

Thus, particularly, the bottom areas lying between the isobaths 200 – 300 m, 300 – 400 m, 400 – 500 m and over 500 m were measured there (Fig. I). The values characterizing the density of the shrimp

concentrations determined within the same range of depths were extrapolated on these areas. The biomass was calculated basing on the assumption that the mean weight of one shrimp specimen was 9 - IO g.

The results of investigations

The density of the shrimp concentrations determined as result of four trawlings appeared to be quite different within the limits of the gut investigated (Table I). But, it was noticed a certain tendency to the increase in the shrimp density at greater depths. The maximum density of the shrimp concentrations as high as 4 spec./ $/m^2$ was registered at the depths over 400 m. The density of some local areas withim the concentrations reached an extremely high value or 8.8 spec./m^2. The trawlings were not conducted in the central part of the gut at depths over 500 m, but, one can suppose that the density of the shrimp concentrations is not less than that one registered at 400 - 500 m depth.

Table I. Density of the shrimp concentrations

Number of traw- lings	Depth (m)	Day time	Number of bot- tom shots	Area photo- grap- hed, m^2	Total number of shri- mps on shots made	Density spec./ $/m^2$	Possible catch, t/hour
I68	I60 - 250	13.50 15.00	32	39.8	5	0.I2	0.033
I69	420 - 440	19.25 20.25	74	92.I3	377	0.08	I.08
I70	360 - 420	23.50 00.50	54	67.7	64	0.94	0.25
I72	290 - 360	08.55 09.55	38	47.3	8	0.I7	0.044
Total			I98	246.9	454	I.84	0.49

The possible shrimp catches taken with a special trawl can be from some tens of kilograms up to one ton and even more per hour

trawling. The expecting catches may be about 0.7 tons/hour of trawling and the shrimp biomass may reach there 38 thousand tons on a small enogh area of 403 miles^2, at the range of depths from 400 m up to 500 m, where the mean density of the shrimp concentration is 2.76 spec./m^2 (Table 2).

Table 2. The calculated abundance and the biomass
of the shrimp

Depths	Areas between the isobaths in miles^2	Number of trawlings	Average density, spec./m^2	Abundance in mln. spec.	Biomass in tons
200 - 300	1872.0	168	0.125	802.6	7544
300 - 400	1296. 0	172	0.17	795.0	7473
400 - 500	403.2	169 170	2.76	4038.0	37957
over 500	259.2	-	-	-	-
Total				5635.6	52974

Discussion of results obtained.

The results obtained on the base a poor number of data can not give a complete understanding of the abundance, the biomass and the possible catches of the found shrimp concentration. The underwater shooting was performed mainly in dark time of the day, and the photos could be made only for those shrimp specimens that were keeping on the bottom.

Meantimes, observations conducted off the West Greenland showed that in the night time, the majority of the shrimp specimen can pass from the bottom into the water masses. Therefore, the estimation of the shrimp density, their abundance and their biomass given in the report can be much less than the real one.

Then, the estimation of the total biomass of the shrimp lying on the sea bottom is not full due to the absence of data

on the density of the shrimp concentrations into the central part
of the gut at depths over 500 m.

But, though the results obtained beared a fragmentory charac-
ter, they testify, surely, to the fact that the investigated
shrimp concentrations were of a great interest for the fishery,
thus, it is necessary to study them more thoroughly.
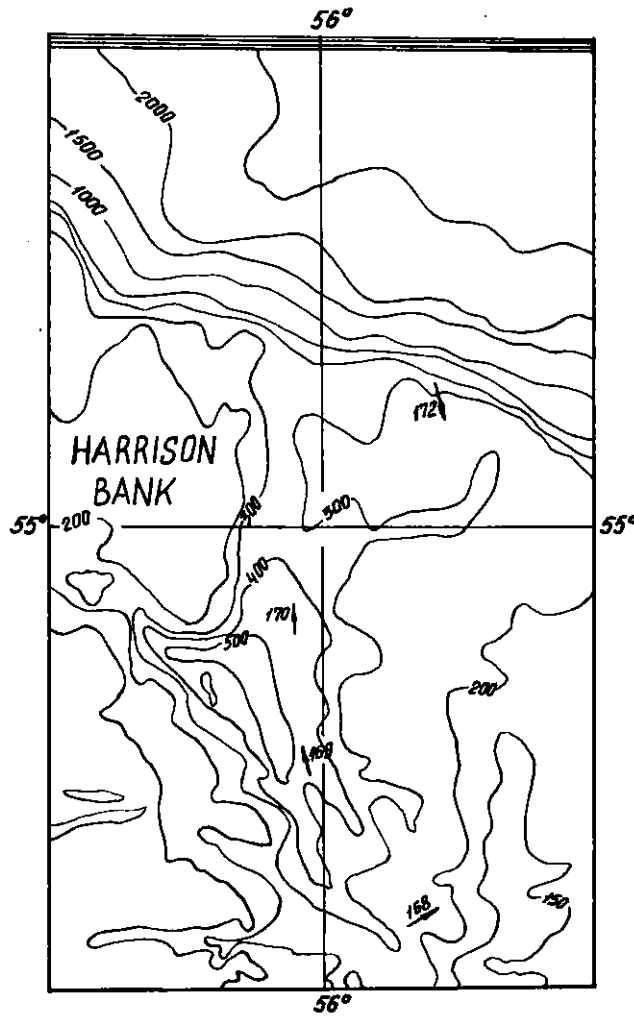

Fig. I.   Scheme of the area of observations.
            The way of the trawl movement is designated by
            arrows, the numbers of trawlings - by the figures
            near the number.