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Results of Russian investigations of the northern shrimp in the Barents Sea in 2004-2011

by

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Abstract

In 2004-2011 Russian researches of the northern shrimp in the Barents Sea were conducted within the joint Russian-Norwegian ecosystem survey. During the survey in 2011 401 trawls were made. Northern shrimp was found in catches of 304 trawls. Catches of shrimp varied from several grams to 102 kg per 15 minutes of trawls. The total index of the stock was 12% higher than the long-term annual average and 17% less compared to 2010; the stock index comprised 377.5 thousand tons.

Introduction

Since 2004 the studies of the northern shrimp stock were carried out within the Russian-Norwegian ecosystem survey from August to September. The survey area covers the Barents Sea area and adjacent area of the Svalbard. During the survey 3-5 vessels conducted 300-700 trawls by the trawl Campelin-1800 used for the shrimp fishery.
The present document contains results of the survey 2011 compared to the results of preceding surveys.

Material and methods

The stock index of the northern shrimp was calculated applying the Kriging method (Cressie, N. A. C.,1990) wherefore catch data were recalculated into the reference area equal to 1 degree of latitude and 1 degree of longitude in view of the meridional narrowing.
Individuals with weight of 1 kg selected accidentally were subjected to a biological analysis, which included the following operations: length measuring and determination of a sex and stages of gonads' maturity (Aschan et al., 1993).
Carapace lengths (CL) for length frequency information were measured from the posterior margin of the eyestalk to the posterior mid dorsal edge of the carapace. Sex of the northern shrimp was determined by the shape of the endopodite of the first pair of pleopods,

distribution of sternal spines on the first segment of abdomen and by the presence of roe (Rasmussen, 1953; McCrary, 1971).

Results

In 2011 the stock assessment was conducted by three Norwegian and one Russian research vessels. During the survey 2011 401 trawls were made (fig.1). The northern shrimp was found in catches of 237 trawls. Shrimp catches varied from several grams to 102 kg per 15 minutes of trawling (fig.2). The largest catches of the northern shrimp were found in the eastern and northern parts of the Barents Sea (Central Bank, Novaya Zemlya Bank, Franz-Victoria Trough) and to the north of the Svalbard Archipelago. In the south-eastern part of the Barents Sea and the Spitsbergen Bank no northern shrimp was observed.

The total index of the northern shrimp in 2011 decreased in comparison to the previous year and comprised 378 thousand tons that is 17% less than in 2010 (table 1). Thus survey conducted in 2011 showed the decreasing of the recruitment index of the northern shrimp (abundance of shrimp at size 13–16 mm CL) to the average level over 6 years of the observation period.

Table 1.

The number of station, total and recruitment (abundance of shrimp at size 13–16 mm CL) index of northern shrimp in 2004-2011according to the data of joint Russian-Norwegian ecosystem surveys in the Barents Sea.

Year	Number of stations	Total index	Recruitment index
2004	669	215	
2005	756	363	
2006	676	400	29
2007	753	286	13
2008	471	262	14
2009	378	327	18
2010	318	455	23
2011	401	378	18
Average	553	336	19

Biological analysis of the northern shrimp stock was conducted in 2011 by Russian scientists in the eastern part of the survey area. Likewise in the previous year the bulk of population of the Barents Sea shrimp was made up of individuals of smaller age groups – males with carapace length of 10-20 mm and females with carapace length of 19-24 mm. However in 2010 the length composition of shrimp had two modal groups with length of 16-18 and 22-24mm while in 2011 males belonged to one modal group – 15-20 mm (fig.3). Sex ratio of the northern shrimp was various in different trawling sites, but on the whole in the surveyed area males were predominant in catches, around 77% from the total abundance of shrimps. The portion of spawning females was 12%, those post-spawning - around 11% from the total abundance of shrimps in the catch. The ratio of individuals from large older age groups to those from smaller age groups is well described by the number of individuals in 1 kg of catch. Thus in the largest part of the surveyed area 170-220 individuals occurred in 1 kg of the catch. The higher portion of large individuals was found in the south-eastern part of the Coastal area where one kg of the catch accounted for less than 120 individuals. The highest

portion of small individuals was found in the eastern area of the Goose Bank where one kg of the catch numbered over 410 individuals of the northern shrimp.

Conclusions

1. The total index of the stock was 12% higher than the long-term annual average and 17% less compared to 2010; the stock index comprised 377.5 thousand tons.
2. Recruitment index was at the average level since 2006.
3. Frequency distribution of shrimp in the surveyed areas corresponded to the traditional one with high concentrations in the eastern areas of the Central Bank and Novaya Zemlya Bank. On the whole, the state of the northern shrimp stock in 2011 was evaluated as satisfactory.

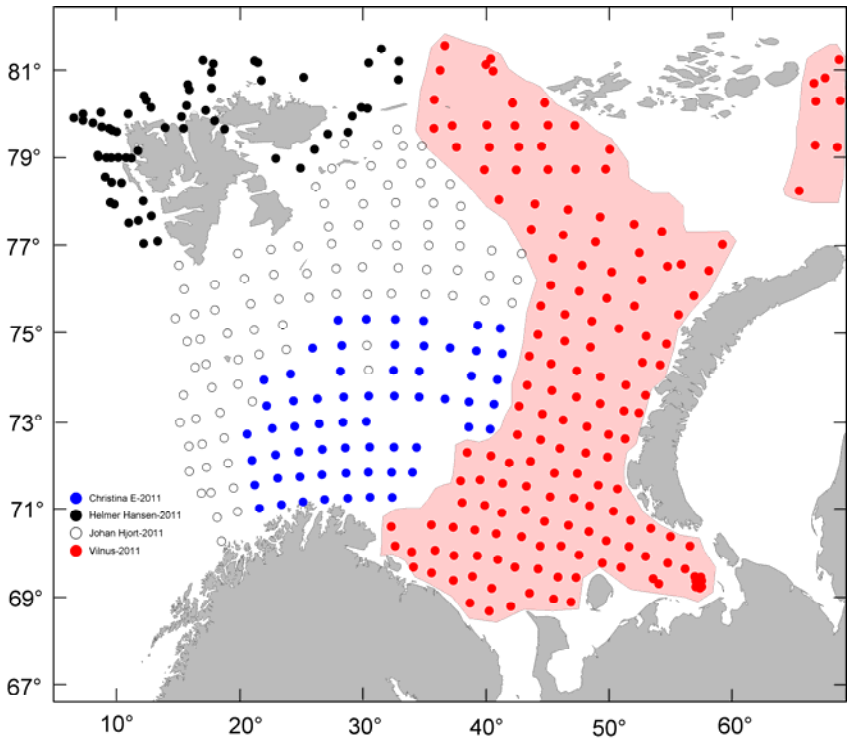

Fig.1. Location of stations in the joint Russian-Norwegian ecosystem survey in 2011 (pink shows the area where shrimp sampled).

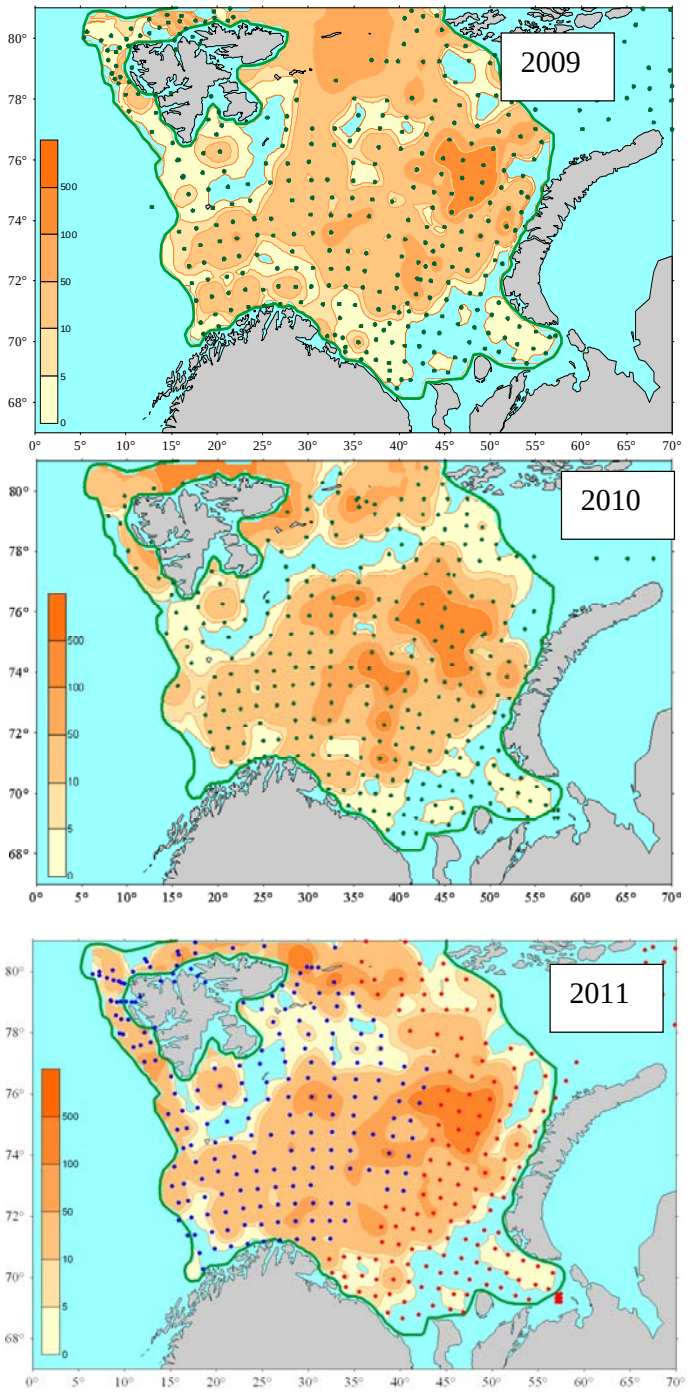

Fig.2. Distribution of *Pandalus borealis* in 2009-2011according to the data of joint Russian-Norwegian ecosystem surveys in the Barents Sea (kg/ hour of trawl)

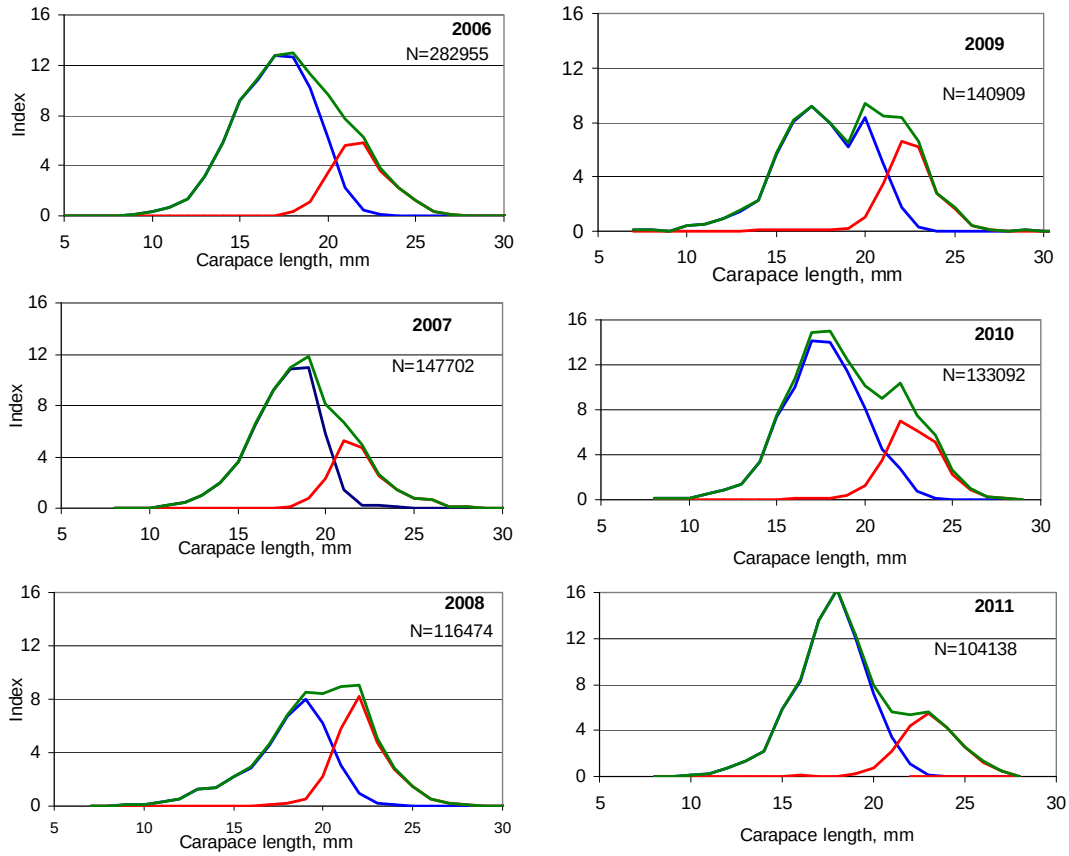

Fig.3. Length composition of catches of northern shrimp in the eastern part of the Barents Sea resulted from Russian-Norwegian surveys in 2006-2011