Northwest Atlantic Fisheries Organization

Serial No. N5862 **NAFO SCR Doc. 10/68**

NAFO/ICES *PANDALUS* ASSESSMENT GROUP – OCTOBER 2010

Results of Russian investigations of the northern shrimp in the Barents Sea in 2004-2010

by

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Abstract

In 2004-2010 Russian researches of the northern shrimp in the Barents Sea were conducted within the joint Russian-Norwegian ecosystem survey. During the survey in 2010 318 trawlings were made. Northern shrimp was found in catches of 237 trawls. Catches of shrimp varied from several grams to 93 kg per 15 minutes of trawlings. The total growth of the stock was 16% compared to the long-term annual average and 30% compared to 2009; the stock index comprised 545,3 thou t.

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 trawlings by the trawl Campelin-1800 used for the shrimp fishery.
The present document contains results of the survey 2010 compared to the results of preceding surveys.

Material and methods

The stock index of the northern shrimp was calculated according to the data of the ecosystem survey 2010 by the swept-area method. Mapping of the quantitative distribution and estimation of the total stock was made in the program «Golden software Surfer-8.01 (Golden software Inc.)» 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 2010 the stock assessment was conducted by three Norwegian and two Russian research vessels. During the survey 2010 318 trawlings were made (fig.1). The northern shrimp was found in catches of 237 trawls. Shrimp catches varied from several grams to 93 kg per 15 minutes of trawling (fig.2). The average shrimp catch comprised 9,2$\pm$0,9 kg per 15 minutes of trawling. 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 biomass index of the northern shrimp in 2010 increased in comparison to the previous year and comprised 455,2 thou t that is 39% higher than in 2009 (table 1). Thus surveys conducted in 2010 showed the growth of the total stock of the northern shrimp up to the maximum level over 7 years of the observation period.

Table 1. The biomass index of northern shrimp in 2004-2010 according to the data of joint Russian-Norwegian ecosystem surveys in the Barents Sea.

Year	Number of stations	Stock, thou t
2004	669	215,4
2005	756	363,0
2006	676	400,3
2007	753	285,6
2008	471	262,4
2009	378	326.5
2010	318	455,2
Average	574	390,9

Biological analysis of the northern shrimp stock was conducted in 2010 only by Russian specialists 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 2009 the length composition of males had two modal groups with length of 16-18 and 19-21mm while in 2010 males belonged to one modal group – 15-20 mm (fig.3). Sex ratio in beds of the northern shrimp was various in different trawling sites, but on the whole in the surveyed area females were predominant in catches, around 70% from the total abundance of shrimps. The portion of spawning females was 17%, those post-spawning - around 13% 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 420 individuals of the northern shrimp.

Conclusions

1. The survey of the northern shrimp in the Barents Sea showed a total increase of the stock in 16% compared to the long-term annual average data and 30% compared to 2009; the stock index comprised 455,2 thou t.
2. The bulk of population of the Barents Sea shrimp is made up of males from the modal group with a carapace length of 10-20 mm. No significant variations in the length frequency distribution were found.
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 2010 was evaluated as satisfactory.

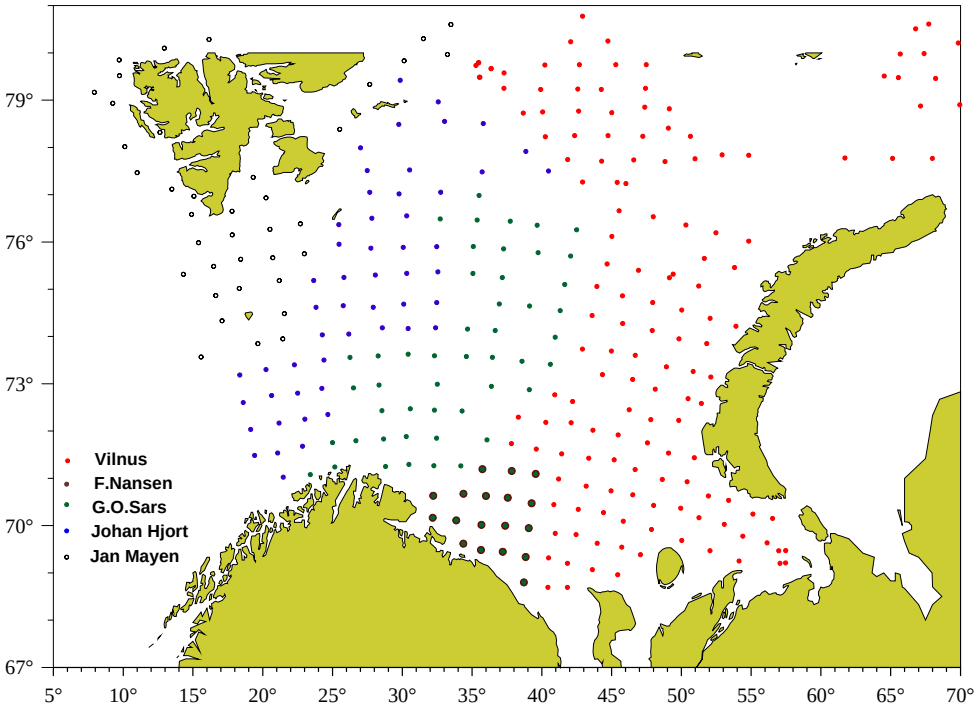

Fig.1. Location of stations in the joint Russian-Norwegian ecosystem survey in 2010.

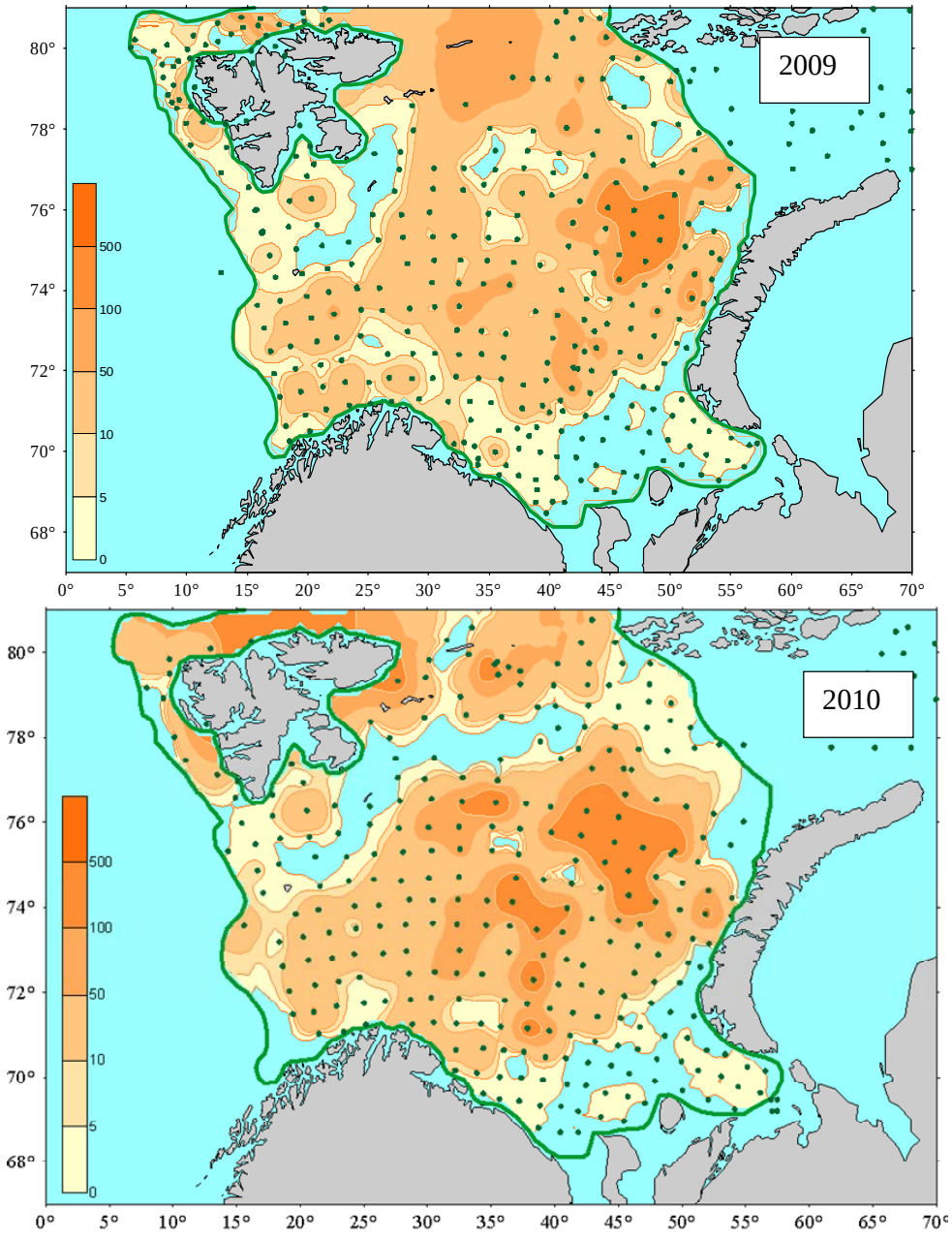

Fig.2. Distribution of *Pandalus borealis* in 2009-2010 according to the data of joint Russian-Norwegian ecosystem surveys in the Barents Sea (kg/ hour of trawling)

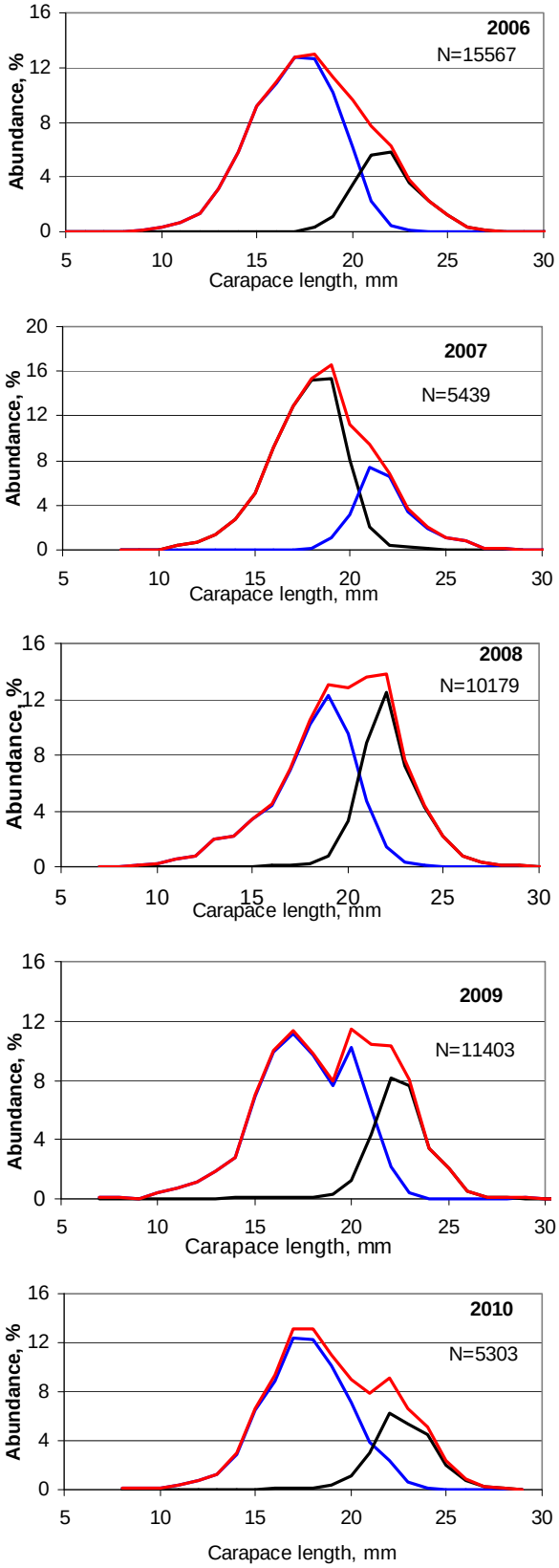

Fig.3. Length composition of catches of northern shrimp in the eastern part of the Barents Sea resulted from Russian-Norwegian surveys in 2006-2010