

# **INTERNATIONAL COOPERATION BETWEEN RUSSIA AND THE EUROPEAN UNION IN THE FIELD OF FISHERIES IN THE BALTIC SEA**

**I. V. Karpushevskiy, V. A. Belyaev**

*Atlantic branch of Russian Federal Research Institute of Fisheries and Oceanography, Kaliningrad, 236022*

*Russian Federal Research Institute of Fisheries and Oceanography, Moscow, 107140*

In the modern period, the development of international cooperation in the field of fisheries in the Baltic Sea is based on the interaction of two equal partners – the Russian Federation and the European Union. The geopolitical situation in the region largely depends on the results of this interaction. In the framework of the Agreement between the European Community and the Government of the Russian Federation on cooperation in fisheries and the conservation of the living marine resources in the Baltic Sea took place eleven sessions of the Baltic Sea Fishery Commission in the period from 2009 to 2018. These sessions addressed a whole range of issues related to the rational use of the biological resources of the Baltic Sea, fishing, prospects for the use of shared fish stocks.

*Keywords:* Baltic Sea, international cooperation, bays of the Baltic Sea.

## **LONGLINE FISHING IN THE BARENTS SEA AND THE POSSIBILITY OF ITS USE IN THE COD (*GADUS MORHUA MORHUA*) STOCKS MANAGEMENT**

**© 2019 V. M. Borisov, A. K. Chumakov<sup>1</sup>, and V. A. Ulchenko**

*Russian Federal Research Institute of Fisheries and Oceanography, Moscow, 107140  
1– «Persey» Co. Ltd, Murmansk, 183038*

Based on the data of the industry monitoring system of Rosrybolovstvo, the Ministry of Trade, Industry and Fisheries of Norway, the materials of the ICES Working Group on Arctic Fishing (AFWG) and the protocols of the Joint Russian-Norwegian Fishery Commission (JRNFC), as well as data collected by the scientific observers of VNIRO on longline vessels of the «Persei» Company in 2013–2018, the current state of Russian and Norwegian fishing in the Barents Sea, carried out by bottom fishing gears, especially longline fishing, is analyzed. Since longline fishing is much more focused on large, older fish, it is suggested that this specificity of longline fishing is used to reduce the increased cannibalism in the cod population in recent years. In our opinion, the phenomenon of cannibalism against the relatively favorable hydrological conditions may be the main reason for the observed next reduction in the cod stock. Measures aimed at expanding the scale of longline fishing, especially domestic fishing, which currently accounts for no more than 6%, would moderate the negative impact of cannibalism on cod stocks.

*Keywords:* cod, longline fishing, predation, stock dynamics, cannibalism, stock management, TAC.

## **PARASITOFUNA OF VARIOUS AGE GROUPS OF CARP FISHES (CYPRINIDAE) OF THE NORTHERN PART OF THE CASPIAN SEA**

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*Russian Federal Research Institute of Fisheries and Oceanography*

The Caspian Sea is of great fishery importance for the country, as in the northern part of it there are reserves of valuable commercial fish species, in particular, roach (*Rutilus rutilus caspicus*) and bream (*Abramis brama orientalis*). It should be noted that the data of parasitological monitoring inform about the parasitic purity of the examined fish and can be used in assessing the ecological situation of the reservoir due to the fact that the parasites are environmental indicators. This paper presents long-term data on the occurrence of parasitic organisms in roach and bream (juveniles and mature individuals) in the marine period of life. In the sexually mature part of the carp fish, the qualitative composition of parasites was more varied compared with the younger age groups (20 species in mature fish versus 10 species in juvenile). In general, the parasitic fauna of fish was formed by parasites with a high epizootic and epidemiological potential, as well as worsening the quality and presentation of fish. It was established that parasitic communities of roach and bream showed annual and seasonal variability. The dynamics of infection of juvenile carp fish is aimed at the accumulation of parasitic organisms, and of its mature part of the population – at reducing the extensiveness of the invasion. The annual presence and low numerical indices of infestation of parasites indicate a balance of parasite – host relations in the parasitic system of carp fish, but the presence of potential pathogens of invasive diseases indicate the preservation of natural foci of helminth infections in the northern part of the Caspian Sea.

*Key words:* parasite fauna, roach, bream, parasitic carrier, invasion, Caspian Sea.

**CHANGES OF BIOLOGICAL AND MORPHOMETRIC PARAMETERS OF ASIAN  
SMELT (OSMERUS DENTEX) THE GULF OF TAUISK  
(NORTHERN PART THE SEA OF OKHOTSK) IN 1983 AND 2015  
IN THE RESULT OF HUMAN IMPACT**

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*Magadan research Institute of the Russian Federal  
Research Institute of Fisheries and Oceanography, Magadan 685000;  
Northeastern state University, Magadan, 68500;  
Mariiski state University, Yoshkar Ola, 424000  
E-mail: andrsmir@mail.ru*

The article comparison of age, size-weight, sex structure and morphology of Asian toothy smelt *Osmerus dentex* of the Gulf of Taiui Bay in 1981–1984 and 2015 Shows what happened to the changing age and sex structure of the population, came the rejuvenation of the spawning part of the population, decreased the proportion of females. Changes of morphological parameters remained within the variation of specific features.

*Key words:* smelt (*Osmerus dentex*), age, body weight, body length, signs.

**BIOLOGY AND PROSPECTS FISHING NAVAGA  
(ELIGINUS NAVAGA) IN THE BASIN OF THE OB BAY**

© 2019 A.K. Matkovsky<sup>1</sup>, V.E. Tunev<sup>1,2</sup>, S.I. Stepanov<sup>1</sup>, P.Y. Savchuk<sup>1</sup>, A.S. Taskaev<sup>1</sup>

<sup>1</sup>*Tyumen branch Russian Federal Research Institute of Fisheries and Oceanography, Tyumen,  
625023*

<sup>2</sup>*Northern trans-Ural state agricultural university, Tyumen, 625003*

The article discusses the features of the biology of navaga in the basin of the Ob Bay. The short-cycle, annual spawning, low level of cannibalism were established. There has been a significant increase in the number of navaga due to the launch of fishing and the improvement of its habitat conditions, including due to climate warming. Recommendations on the industrial development of its reserves are given. It is noted that with the increase in the number of navaga is the expansion of its range.

*Key words:* navaga, short-cycle, nutrition, growth, distribution, number, fishing.

**DISTRIBUTION AND NUTRITION OF RUSSIAN STURGEON JUVENILES  
(*ACIPENSER GUELLENSTAEDTII*, ACIPENSERIDAE)  
IN THE NORTH-WESTERN PART OF THE CASPIAN SEA**

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*Volga-Caspian branch of Institute Russian Federal Research Institute of Fisheries and Oceanography VNIRO (CaspNIRKH), Astrachan, 414056*

*E-mail: lepilina-irina@mail.ru*

The article presents study results of the first stage of the Working group Project on measures implementations 2015–2018 of the sub-program № 8 «Development of sturgeon management», in terms of which there has been received preliminary information on Russian sturgeon fingerlings, caught during the period of the trawl survey in the Northern part of the Caspian Sea by common efforts of employees of the Volga-Caspian branch of VNIRO (CaspNIRKH). There were determined main areas of juvenile concentration depending on understratum, forage organisms and biological indicators of juvenile. The work shows food spectrum of different weight group. You can see the data on the appending with due regard to available coefficient of commercial return.

*Key words:* north-western part of the Caspian Sea, Russian sturgeon fingerlings *Acipenser gueldenstaedtii*, nutrition, forage organisms, zoobenthos, number of juvenile, large-sized fish sample.

**ISSUES OF CURRENT ANTARCTIC AND PATAGONIAN TOOTHFISH  
(*DISSOSTICHUS SPP.*) FISHERIES IN THE WATERS OF ANTARCTIC**

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*Azov Sea Kerch Branch Institute Russian Federal Research Institute of Fisheries and Oceanography («AzNIIRKH»), Kerch, 298300*

The issues of distribution and fishery of Patagonian and Antarctic toothfish were reconsidered in the present paper. It was distinguished that commercial stock of the first fishspecies was mainly concentrated within the limits of 200-miles economic zones of the coastal land states of the Southern hemisphere and regulated by the legislation of the coastal countries. Outside 200-miles economic zones the resource consists of not numerous small units of the stock dispersed almost throughout the CCAMLR zone. The Antarctic toothfish commercial stock is concentrated within the limits CCAMLR zone. It was distinguished that the formation of MPA, in the Ross Sea in particular, is not conducive to the development of this species fishery. Formation of the protected areas, including their borders, aims and tasks, should be provided by scientific information base allowing objective data on their formation. Antarctic bioresources should remain generally accessible, but not isolated because of

MPA formation. Otherwise the enormous biological productivity of the Antarctic and its biological resources can become actually inaccessible for that part of the humanity that inhabits members-states of the Antarctic Commission.

*Keywords:* Antarctic, toothfish, (*Dissostichus eleginoides*), (*Dissostichus mawsoni*), fishery, CCAMLR, marine protected area (MPA).

## **CHARACTERISTICS OF FISHERY OF ATKA MACKEREL (*PLEUROGRAMMUS MONOPTERYGIUS*, HEXAGRAMMIDAE) IN EASTERN KAMCHATKA AND KURIL ISLANDS WATERS IN 2010–2018**

**Y. K. Kurbanov**

*Kamchatka branch of the Russian Federal Research Institute of Fisheries and Oceanography  
(KamchatNIRO), Petropavlovsk-Kamchatsky, 683000*

Based on fishing statistics in 2010–2018 and the size-age composition of the atka mackerel catches we analyzed the current state of the fishery of this species in the water area of eastern Kamchatka and the Kuril Islands. The catches reduction by more than 4 times in the Petropavlovsko-Commander subzone, and 3 times in the northern and middle Kuril Islands was revealed. The similar situation was observed in Karaginsky subzone: catch was decreased by 4 times. A decrease in the proportion of high-yielding fish generations in 2009–2011 was revealed, and the analysis of the size-age composition, indicates the emergence of new generations of high numbers – 2013–2014 years of birth. However, fish of these generations were the basis of catches, amounting to almost two-thirds of the total catch in the last two years. For this reason, in the near future there will be some stagnation in the replenishment and it is not necessary to expect the growth of Atka mackerel catch in the near future.

*Key words:* atka mackerel *Pleurogrammus monoptyerygius*, fishing, size-age composition, Kuril Islands, eastern Kamchatka.

## **STANDARDIZATION OF THE RED KING CRAB FISHERY EFFICIENCY IN THE RUSSIAN PART IN THE BARENTS SEA IN 2010–2018 USING GENERALIZED LINEAR MODEL**

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*Polar branch of The Russian Research Institute of Fisheries and Oceanography (PINRO Murmansk),  
183038*

A generalized linear model (GLM) was used to assess the factors affecting the red king crab fishery efficiency in the Russian EEZ in the Barents Sea in 2010–2018. It was found that the efficiency dynamics mostly depend on production factors (type of trap and vessel), rather than environmental factors (depth, temperature, salinity, bottom type, distance from the coast). Step-by-step inclusion of factors in the standardization model has shown that the annual fishery efficiency dynamics in addition to the year effect (40% of the explained variance) are mostly influenced by the following factors: vessel, trap type, number of traps in order, month (or week). It is possible that the temperature factor significance will be increased with an increase in the fishing season, whereas now, subject to the short fishing seasons in 2014–2018, its contribution is insignificant.

*Key words:* the red king crab, the Barents Sea, fishery production, generalized linear model, environmental factors

# **MULTI-MODEL APPROACH TO SOME MARINE BIOLOGICAL RESOURCES STOCK FORECAST IN SAKHALIN-KURIL REGION**

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*Pacific Ocean Branch of Russian Federal Research Institute of Fisheries and Oceanography  
(TINRO), Vladivostok, 690091*

The use of modern methods of estimation and forecast of marine biological resources stocks is required due to the needs of domestic economy and the demands of international agreements for fisheries. These reasons lead to the increasing use of math modeling for practical estimations of total allowable catch (TAC). From one hand some specialists face difficulties choosing a correct math model and its parameters evaluation methods. From the other hand, after choosing one specific model they reject the other ones, though they still can have some advantages. Moreover different business entities can use seemingly equal models to manage the fishery while those models give significantly different results. Therefore, it is important to take various scenarios into consideration while managing the fisheries. The given paper studies some aspects of choosing a model and of multi-model outcomes on examples of some marine biological resources stock of Sakhalin-Kuril region.

*Key words:* Modelling, surplus models, model selection, multi-model approach.