

**RESEARCHES OF THE RED SNOW CRAB *CHIONOECETES JAPONICUS* (DECAPODA, MAJIDAE) IN THE SEA OF JAPAN. 4. DIVISION OF THE AREA BY SIZE STRUCTURE VARIABILITY ANALYSIS**

© 2016 y. A.I. Buyanovsky, V.V.Miroshnikov\*

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

*\*Pacific Fisheries Research Center, Vladivostok, 690950*

Application of original methods of size structure comparison allowed to divide the area occupied by red snow crab in the Russian part of the Sea of Japan into 28 polygons. The spatial differences in size structures of the samples got within a polygon are proposed to be insignificant. The absolute majority of samples (94%) were collected on 10 polygons which are situated on the Kita-Yamata Bank and the continental slope. The upper and lower isobaths which limit the main polygons vary from 400 to 600 and from 1300 to 1800 m respectively. The polygon with the largest catches of males and females with CW 70–90 mm is situated deeper than 1700 m to the north of 45°N. Nine main types of size distribution differed by modal size classes were defined. It is suggested that males aggregations are formed presumably by one (rarely two) age group. Also 4 seasons which may be considered as “temporary polygons” were defined.

*Keywords: Chionoecetes japonicus, Sea of Japan, size structure, spatial distribution, density index.*

**RESEARCHES OF THE RED SNOW CRAB *CHIONOECETES JAPONICUS* (DECAPODA, MAJIDAE) IN THE SEA OF JAPAN. 5. FUNCTIONAL STRUCTURE OF THE POPULATION FROM THE NORTH-EAST PART OF THE SEA OF JAPAN**

© 2016 y. A.I. Buyanovsky, V.V.Miroshnikov\*

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

*\*Pacific Fisheries Research Center, Vladivostok, 690950*

By the methods described earlier the functional structure of the red snow crab population from the Russian part of the Sea of Japan was researched. Antagonism in spatial distribution of small (CW less than 100 mm) and large (more than 120 mm) males was defined. In spatial distribution of size groups 2 periods may be distinguished. In 1992–2000 the mean size of prevailing groups increased in northern direction, and in 2001–2010 the prevailing groups were the same in different regions. Size structure comparison suggests the possibility of both vertical and horizontal age related migrations. It is suggested that the main reproductive area is in the northern part of the Sea deeper than 1700 m.

*Keywords: Chionoecetes japonicus, Sea of Japan, size structure, spatial distribution, reproduction.*

**THE BIOLOGICAL OF SUBSTANTIATION FISHING MEASURE OF THE BREAM *ABRAMIS BRAMA* IN THE KUIBYSHEV RESERVOIR**

© 2016 y. Yu.A. Severov, F.M. Shakirova, R.G. Tairov, O.K. Anokhina

*Tatarstan department State Research Institute of Lake and River Fisheries, Kazan, 420111*

Fishing measure of the bream in the Kuibyshev reservoir is justified on the materials of own researches. It is shown that fishing of bream cannot be considered as sustainable fishery at the fishing length of the bream installed at present time by the Rules of fishing. That's why it is recommended to increase the minimum cell of seine for production bream in the Kuibyshev reservoir.

*Keywords:* bream *Abramis brama*, fishing measure, the Kuibyshev reservoir, the Rules of fishing, ration fishing, ichthyomass.

## **REPRODUCTIVE FEATURES OF PACIFIC SALMON GENUS *ONCORHYNCHUS* OF THE CONTINENTAL COAST OF THE OKHOTSK SEA**

© 2016 y. V. V. Volobuev, V. V. Ovchinnikov, M. V. Volobuev

*Magadan Scientific Research Institute of Fishery and Oceanography, Magadan, 685000*

Data on features of reproductive ecology of four species of the Pacific salmon which are reproduced in reservoirs of continental coast of the sea of Okhotsk are presented. Their preferences concerning terms and a choice of places for spawning are shown. The data about the basic characteristics of water currents in spawning and incubation embryos of salmon is cited.

*Keywords:* Pacific salmon, reproduction, ecology, intraspecific and biological structure, continental coast of the sea of Okhotsk.

## **INFLUENCE OF PCBs CONSUMED WITH FOOD ON PHYSIOLOGICAL PARAMETERS OF BREAM *ABRAMIS BRAMA***

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*I. D. Papanin Institute of the Biology of Inland Waters Russian Academy of Sciences, Borok, Yaroslavl region, 152742*

The article provides the results of the experimental study on the influence of PCB-containing feeding material, where PCB concentration is comparable to that of natural feeding objects, on a number of indicators of physiological status of bream from the Rybinsk reservoir. After 14 days since the start of exposure the following changes in blood parameters took place: decrease in levels of total protein and hemoglobin, and increase in concentration of circulating immune complexes and glucose, which indicates the decrease in an overall resistance and adaptive capability of fish. The dynamics of immune complex concentration in tissues supports the assumption that the consumed xenobiotic subjects to biotransformation, and the side products are processed and eliminated in other immunocompetent organs.

*Keywords:* bream, PCBs, total protein, glucose, hemoglobin, immune complexes.

## **ON THE USAGE ALIVE FORAGES IN THE GROWING OF INCONNU LARVAE *STENODUS LEUCICHTHYS NELMA* (SALMONIFORMES: COREGONIDAE)**

© 2016 y. A. A. Lyutikov

*L.V. Berg State Research Institute on Lake and River Fisheries, St. Petersburg, 199053*

Various techniques for inconnu *Stenodus leucichthys nelma* feeding by Biomar dry artificial feed and by nauplii of *Artemia* were investigated. The optimum period for use of living feed in ration was also determined. It was shown that the growth of the early fry of inconnu depended on the duration of *Artemia* usage while the feeding technique had no significant effect on the growth. The duration of the usage of *Artemia* nauplii in the ration is efficient and biologically

substantiated only in the first 30 days after the inconnu begin feeding on external feed i.e. up to 75 mg weight. According to such technique the larvae had the greatest weight during all experiment and their transition to completely artificial feed did not result in the decrease in the growth as it was noted when the living feed was withdrawn earlier.

*Keywords:* larvae, inconnu, *Stenodus leucichthys nelma*, feeding, *Artemia* nauplii, artificial feed.

## **DEVELOPING PHYSIOLOGICALLY VALUABLE FEEDS FOR FRY OF WHITEFISHES (COREGONIDAE) AND THEIR COMPARATIVE ASSESSMENT WITH IMPORTED FEEDS**

© 2016 y. I.N. Ostroumova, V.V. Kostyunichev, A.A. Lyutikov, V.A. Bogdanova, A.K. Shumilina, T. P. Danilova, A.V. Koz'mina, T.A. Filatova, M. S. Mel'nikova

*L.V. Berg State Research Institute for Lake and River Fisheries, Saint-Petersburg, 199053*

Variants of experimental feeds have been developed in compliance with food demands of fry of whitefishes. Description of their nutritional value is given, quality of lipids by peroxide values and acid numbers is studied in the course of feed storage. Results of rearing of whitefish larva on them in tanks. Comparable results on growth rate of fish, survival rate, variability of sizes, food coefficients have been obtained under normal state of blood values and liver in comparative trials of new feeds with imported ones. Based on conducted investigations a feed for carrying out a production test with fry of whitefishes has been chosen.

*Keywords:* fry of whitefishes Coregonidae, Leningrad Region, tanks, experimental feeds, oxidation rate, imported feeds, fry growth, survival rate, blood morphology, liver histophysiology.

## **ESTIMATE OF «TARGET STRENGTH» FOR BIGEYE KILKA *CLUPEONELLA GRIMMI* IN THE CASPIAN SEA**

© 2016 y. P. Zare1, S.V. Shibaev1, S.M. Kasatkina2, H. Fazli3

*1Kaliningrad State Technical University, Kaliningrad, 236022 2Atlantic Research Institute of Marine Fisheries and Oceanography, Kaliningrad, 236022 3Caspian Sea Ecology Research Center, Sari, Iran, 961*

Bigeeye kilka *Clupeonella grimmi* is commercially and ecologically important fish species in Iranian waters of Caspian Sea. Abundance indices based on the data of acoustic surveys are the most important information to assess stock status and spatial distribution of this fish. The accuracy of the acoustical estimates depends on the knowledge of fish «target strength» (TS), which has so far been little-studied for Bigeye kilka. The article presents in situ data on TS from Bigeye kilka, collected using a calibrated 38 kHz scientific split-beam echosounder system. Deriving TS–length relationships from in situ measurements regardless of other variables is complicated because of the very large variability in TS from individual biological parameters of fish of similar length. Understanding the relationship between fish biological parameters and target strength potentially improves the accuracy of acoustic assessments. In present study, the effects of individual biological factors (length, weight, maturity stage, and condition factor) on target strength were examined. The results showed that the percentage of mature females was significantly negatively related to TS. Our  $B_{20} = -75.1$  dB value for bigeye kilka was 3.5 dB lower than that reported in previous studies for this species.

*Keywords:* bigeye kilka *Clupeonella grimmi*, acoustic surveys, «target strength», Caspian Sea, Iran.

## **FISH STOCK COLLAPSE AND ITS DYNAMICAL MODEL**

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*St. Petersburg Institute for Informatics and Automation of RAS, 199178*

The negative scenarios for fishing are often implemented in a similar way. We discussed the situation sharp reduction in commercial stocks of larger fish: Atlantic cod and whitefish of Lake Ontario. In modern literature, such phenomena are defined as a collapse of stocks. It identifies a number of features of the degradation of fish in terms of nonlinear dynamics. Computational model of the process, culminating in the collapse, based on the formalization of changing generations survival. In equation implicitly specified mortality factor relies a cannibalism of cod. A discrete-continuous dynamic system describes the long non-smooth transition prosperous population of the steady state with a high number of withdrawals after the increase in fishing for aperiodic fluctuations at low fish abundance. In the future, with considerable fluctuation amplitude pass quickly to the stage of biological resources degradation. The collapse is realized in the computing scenarios as a phenomenon of the boundary crisis interval attractor, since the boundary region of attraction slightly removed from the critical point.

*Keywords:* nonlinear model of populations, depletion of fish stocks, northern cod collapse.

## **FINDING THE COEFFICIENTS OF CATCH LIMITS FOR THE FISH POPULATIONS, REACHED THE CRITICAL VALUES OF STOCK BIOMASS**

© 2016 y. E.V. Kulikov, K.B. Isbekov, S.Gh. Assylbekova

*Kazakh Research Institute of Fisheries, Almaty, Republic of Kazakhstan, 050016*

The article is devoted to finding the coefficients for the withdrawal of fish populations undermined stocks or when approaching the population to the critical values of biomass. Used the recommendations of the Food and Agriculture Organization of the United Nations (FAO), the modernized known methods of finding withdrawal rates. Examples of calculation of the withdrawal coefficients of fish in different ways.

*Keywords:* fishing, critical values of biomass, the precautionary approach, withdrawal rates, the total allowable catch.

## **SPECIES COMPOSITION OF RECREATIONAL CATCHES AND EPIZOOTIC CONDITION OF FISH AROUND THE CITY OF KHABAROVSK**

© 2016 y. E.V. Mlynar, G.M. Truskova, A.Yu. Nemchenko\*

*The Far Eastern State Medical University, Khabarovsk, 680000 \* Khabarovsk Branch of Pacific Research Fisheries Center, Khabarovsk, 680000*

The species composition of fish catches amateur is considered in the vicinity of the city of Khabarovsk. The results of parasitological studies of ichthyofauna are given. It is noted that the quantitative and qualitative composition of the infected fish fauna is different from the data of previous years. . The resulting information can be used to determine the epizootic situation in the region, as well as to assess the current state and forecast changes in the fish population.

*Keywords:* Amur River, monitoring, fish fauna, species composition, parasites, flukes, metacercariae.

**CONSIDERABLE ADVANCES IN RESEARCHES ON DIFFERENTIATION OF  
PACIFIC SALMON STOCKS DURING MARINE PERIOD OF THEIR LIFE**

(The review of A.V. Bugaev's book «Prespawning migrations of the Pacific salmon in the exclusive economic zone of Russia», Petropavlovsk-Kamchatsky: Kamchat-NIRO, 2015. 416 p.)

*V. P. Shuntov, Pacific Research Fisheries Center, Vladivostok, 690091*