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| УДК 620.197: 629.5.023D.A. Archibisov, V.A. Shvetsov **MATERIAL AND WORK CONTROL DURING REPAIR OF MEANS  OF ANTICORROSIVE PROTECTION FOR HULLS ON SMALL VESSELS**  Possibility and feasibility to use small size vessels as the natural stand for research is proved. Necessity of quality control of protectors and paint materials used for vessel repair is shown. A simple algorithm of quality control strategy for repair works and materials used for hull antirust protection is formulated and submitted as recommendations for ship owners.  **Key words:** small vessels, navigation season, steel hulls, corrosion, fouling, paint coating, sacrificial protection, visual inspection, recommendations for ship owners.  *DOI: 10.17217/2079-0333-2018-44-6-13*  **Information about the authors**  **Archibisov Dmitry Aleksandrovich** – Kamchatka State Technical University; 683003, Russia, Petropavlovsk-Kamchatskу; Postgraduate; Kamchatka’s Directorate for Technical Supply of Sea Supervision; 683031, Russia, Petropavlovsk-Kamchatskу; Head of Information and Analytical Work and Planning Department; [d.a.archibisov@mail.ru](mailto:d.a.archibisov@mail.ru)  **Shvetsov Vladimir Alekseevich** – Kamchatka State Technical University; 683003, Russia, Petropavlovsk-Kamchatskу; Doctor of Chemical Sciences, Docent, Professor of Power Plants and Electrical Equipment of Ships Chair, Kamchatka State Technical University |
| УДК 556.38(571.66) B.A. Opryshko, Y.N. Fironov, V.A. Shvetsov, O.A. Belavina, M.P. GuzON SUPPLYING THE POPULATION OF MILKOVO VILLAGE **IN KAMCHATKA KRAI WITH DRINKING WATER**  The article explores the reasons for the decrease in the flow rate of the exploration and production wells of the “Amshariksky-1” area of the Milkovo drinking groundwater deposit. This area is used for water supply for Milkovo village in Kamchatka Krai. The rationale for selecting the “Amsharik” area of the Milkovo drinking groundwater deposit as a source of water supply for Milkovo village is presented. A telemetric system for remote monitoring of groundwater levels in “Amsharik” is proposed.  **Key words:** water supply, exploration well, production rate, pump, aquifer complex, water field, monitoring, sensors-recorders, telemetry system  *DOI: 10.17217/2079-0333-2018-44-14-20*  **Information about the authors**  **Opryshko Boris Alekseevich** – Kamchatsky Vodokanal; 683009, Russia, Petropavlovsk-Kamchatskу; Chief Water Process Engineer; [BAOpryshko@pkvoda.ru](mailto:BAOpryshko@pkvoda.ru)  **Fironov Yury Nikolaevich** – Kamchatsky Vodokanal; 683009, Russia, Petropavlovsk-Kamchatskу; Leading Hydrogeologist; [UNFironov@pkvoda.ru](mailto:UNFironov@pkvoda.ru)  **Shvetsov Vladimir Alekseevich** – Kamchatka State Technical University; 683003, Russia, Petropavlovsk-Kamchatskу; Doctor of Chemical Sciences, Docent, Professor of Power Plants and Electrical Equipment of Ships Chair, Kamchatka State Technical University  **Belavina Olga Aleksandrovna** – Kamchatka State Technical University; 683003, Russia, Petropavlovsk-Kamchatsky; Specialist in Technical and Scientific Information of Science and Innovation Department  **Guz Marina Pavlovna** – Kamchatka State Technical University; 683003, Russia, Petropavlovsk-Kamchatsky; Specialist in Technical and Scientific Information of Science and Innovation Department |
| УДК 681.5+519.87 G.A. Pyukke **ABOUT DEGRADATION MODELS OF MULTICOMPONENT SYSTEMS  OF VARIOUS PHYSICAL NATURE**  Models describing degradation of the arbitrary system of physical nature, under the influence of constituent ageing of its components, with various probability of non-failure operation are considered. The proposed method assumes construction of a system matrix on the basis of the logic analysis of system evolution, by consideration the column of degradation process. Tables of probabilities of non-failure operation for the various periods of operation time are made. On the basis of these tables the time diagrams of ageing process are constructed. The degradation model estimates the system behavior eventually and enables to predict a technical condition of the system in different intervals of operation time that is to determine the amount of components, having various probability of serviceability in various intervals of operation time.  The model of degradation-restoration of the system is constructed. The constructed models of evolution estimate the system behavior eventually and enable to predict the system condition in different intervals of operation time. It enables to determine the amount of components, having various probability of serviceability in various intervals of operation time that opens new opportunities, expanding a circle of engineering tasks on maintenance of an efficient condition of systems and prevention of emergencies at their operation.  **Key words**: Matrix, degradation model, system evolution, constituent of a component, model of degradation-restoration, columns of process, time diagrams.  *DOI: 10.17217/2079-0333-2018-44-21-29*  **Information about the author**  **Pyukke Georgy Aleksandrovich** –Kamchatka State Technical University; 683003, Russia, Petropavlovsk-Kamchatskу; Doctor of Technical Sciences, Docent, Professor of Control Systems Chair; [geopyukke@yandex.ru](mailto:geopyukke@yandex.ru) |
| УДК 621.3+519.87 S.Y. Trudnev, N.N. Portnyagin **COMPUTER MODELING OF START-UP PROCESS OF DIRECT CURRENT MOTOR**  In the article the peculiarities of start of direct current motor are presented. The widely applied starting systems, such as across-the-line, rheostatic and supply voltage change starting are analyzed. Starting processes are described mathematically. Taking into account the peculiarities of each start-up procedure, the computer model of direct starting, rheostatic and starting of the engine with a change in the supply voltage has been developed in the program Matlab. Each computer model has been tested with a number of experiments. The processing of electric signal variations of angular and mechanical moments has been carried out. The conclusions are drawn by the results of experiments.  **Key words:** DC motor starting circuit, computer model, armature current, computer experiment, virtual laboratory workshop.  *DOI: 10.17217/2079-0333-2018-44-30-37*  **Information about the authors**  **Trudnev Sergey Yurevich** – Kamchatka State Technical University; 683003, Russia, Petropavlovsk-Kamchatskу; Candidate of Technical Sciences, Dean of Maritime Department; [Trudnev@mail.ru](mailto:Trudnev@mail.ru)  **Portnyagin Nikolay Nikolaevich** – Gubkin Russian State University of Oil and Gas (National Research University) 119991, Russia, Moscow; Doctor of Technical Sciences, Docent, Professor of Theoretical Electrical Engineering and Electrification of Oil and Gas Industry Chair |
| УДК 663/664 N.V. Makarova, D.F. Valiulina, A.S. Dancheva **RESEARCH OF CHEMICAL COMPOSITION AND ANTIOXIDANT PROPERTIES  OF FUNCTIONAL FOODSTUFFS FROM THE TRADING NETWORK**  The problem of the production of food products with functional properties has become increasingly urgent in recent years. This is explained by the deterioration of the overall ecological situation, the decline in the quality of life, the emergence of a large number of chronic and widespread diseases. An increasing number of doctors and nutritionists are of the opinion that it is nutrition that can prevent many types of diseases. And it is functional foods that can function as a prophylaxis for many diseases: diabetes, cardiovascular changes, oncology, atherosclerosis, etc. Deterioration of the human body is associated with an increase in the amount of free radicals in the body, a decrease in the number of antioxidants inside cells of various organs, i.e. absence or deterioration of its own antioxidant defense system. Many functional products are positioned as products containing vitamins and antioxidants. This paper describes the study results of the chemical composition (total phenols, flavonoids, anthocyanins), antiradical activity with the 2,2'-diphenyl-1-picrylhydrazyl reagent, the reducing force (FRAP), antioxidant activity in the linoleic acid system for a number of functional products purchased in pharmacy and retail chains in the departments "Products for health": bars, marmalade, juices, drinks, syrups, sweets. A number of the products examined have a high and average content of the studied indicators: blueberry drink, vegetable mix, fruit bars, whereas marmalade, candy, syrup, nut bars can not act as suppliers of antioxidant substances.  **Key words:** functional products, drink, bar, marmalade, phenols, flavonoids, anthocyanins, antiradical ability, antioxidant activity.  *DOI: 10.17217/2079-0333-2018-44-38-49*  **Information about the authors**  **Makarova Nadezhda Viktorovna** – Samara State Technical University; 443100, Russia, Samara; Doctor of Chemical Sciences; Head of Technology and Organization of Public Catering Chair; [makarovanv1969@yandex.ru](mailto:makarovanv1969@yandex.ru)  **Valiulina Dinara Fanisovna** – Samara State Technical University; 443100, Russia, Samara; Candidate of Technical Sciences; Assistant Professor of Technology and Organization of Public Catering Chair; dinara-bakieva@mail.ru  **Dancheva Alena Sergeevna** – Samara State Technical University; 443100, Russia, Samara; Undergraduate of Science of Technology of Food Production and Biotechnology Chair; [daalenas@gmail.com](mailto:daalenas@gmail.com) |
| УДК 637.1 A.L. Novokshanova, E.V. Topnikova, D.B. NikitjukMINERAL COMPOSITION OF MILK IN SPORTS DRINKS The aqueous phase is the predominant component of whey; it concentrates all hydrophilic compounds of milk, the most important of which are lactose, free amino acids, vitamins and mineral compounds. Practically all mineral compounds belong to biogenic elements with established mechanism of action and recommended daily requirement. It is advisable to use an advantageous combination – a large water content and soluble natural ingredients of whey in the production of sports drinks to eliminate dehydration. Physicochemical characteristics of whey were studied by standard methods. The specific conductivity was determined by the conductometric method, the potentiometric method was used to study the mineral component. The osmotic concentration of permeate was determined by a cryoscope-osmometer. Technologically significant whey parameters met the standard requirements and were consistent with the literature data. It was established that on average the share of mineral substances in dry whey material is up to 12%. The average value of K content in curd whey is 128,01 mg/100 g, Na – 44,97 mg/100 g, Ca – 54,25 mg/100 g and Mg – 6,26 mg/100 g. The specific conductivity averaged 8,189 mS/cm3, osmolality – 361,07 mmol/kg. Mathematical data processing showed that there is no reliable dependency between the concentration of the analyzed mineral elements and whey osmolality, but a close correlation of the K, Na, Ca and Mg content with the specific conductivity index was established. On the basis of the mathematical models, with a probability of not less than 95%, it can be stated that the increase in the specific conductivity by 1 mS/cm3 is due to an increase in the sodium content by 7,45 mg%, potassium – by 1,78 mg%, calcium – by 3,71 mg% and magnesium – by 0,96 mg%.  **Key words:** curd whey, specific conductivity, sodium, potassium, calcium, magnesium.  *DOI: 10.17217/2079-0333-2018-44-50-55*  **Information about the authors**  **Novokshanova Alla Lvovna** – FSBEI HE Vologda State Dairy Farming Academy; 160555, Russia, Vologda; Candidate of Technical Sciences Associate, Docent; Associate Professor of Milk Technology and Dairy Products Chair; [alnovokshanova@gmail.com](mailto:alnovokshanova@gmail.com)  **Topnikova Elena Vasilevna** – All-Russian Research Institute of Butter and Cheese Making – Branch of V. M. Gorbatov Federal Research Center for Food Systems of RAS; 152613, Russia, Uglich; Doctor of Technical Sciences, Deputy Director; [topnikova.l@yandex.ru](mailto:topnikova.l@yandex.ru)  **Nikitjuk Dmitry Borisovich** – Federal Research Centre of Nutrition and Biotechnology; 109240, Moscow, Russia; Corresponding Member of RAS, Head of Sports Anthropology and Nutrition Laboratory, Doctor of Medical Sciences, Professor, Director of Federal Research Centre of Nutrition, Biotechnology and Food Safety; [nikitjuk@ion.ru](mailto:nikitjuk@ion.ru) |
| УДК 664.8.022.3 E.V. Pastushkova **STUDY ON EXTRACTION OF BIOLOGICALLY ACTIVE SUBSTANCES FROM  MEDICINAL-TECHNICAL RAW MATERIALS BY HIGH PRESSURE**  Recently the enrichment of food products with biologically active substances, including antioxidants, has become popular. One of the promising directions in the food industry can be called the use of natural medicinal and technical raw materials. This problem is acute for the population exposed to anthropogenic impact. Among the modern methods to preserve nutrients, it is possible to note the treatment of food products with high pressure. Studies of well-known scientists confirm that treatment of meat and meat products with high pressure allows increasing the shelf life of the product by reducing spores that contribute to decomposition and spoilage. The advantage of this method is the use of pressure in the range from 100 MPa to 3000 MPa at low temperatures (about 20ºС). In food processing industry, high pressure treatment is applied in dairy, fish and meat processing industries, while high pressure treatment of plant products is in the process of studying. The research aims to study the effect of treatment of medicinal and technical raw materials with high pressure under conditions of comprehensive compression, affecting the yield of biologically active substances during the extraction. The article presents the data of establishing the optimal parameters of treatment of medicinal and technical raw materials subjected to non-thermal processing by high pressure. The treatment of medicinal and technical raw materials was performed for 60 and 90 s at the pressure of 100 MPa, 150 MPa and 200 MPa. The results of the content of biologically active substances and antioxidant activity of medicinal and technical raw materials have served as the basis for determining the optimal treatment regimes. It is found that using the barometric effects on medicinal and technical raw materials the optimum parameters are 150 MPa for 90 s and 200 MPa for 60 s. The efficiency of using this method on the yield of biologically active substances in the extract of medicinal and technical raw materials is shown.  **Key words:** high-pressure treatment method, barometric effect, antioxidant activity, biologically active substances.  *DOI: 10.17217/2079-0333-2018-44-56-62*  **Information about authors**  **Pastushkova Ekaterina Vladimirovna** – Ural State University of Economics; 620144, Russia, Yekaterinburg; Candidate of Technical Sciences, Associate Professor of Commodity Science and Expertise Chair; pas- [ekaterina@yandex.ru](mailto:ekaterina@yandex.ru) |
| УДК664.956 A.A. Yashonkov **THEORETICAL AND EXPERIMENTAL STUDIES OF THE DRYING PROCESS  KINETICS IN THE OUTPUT OF DRIED FISH PRODUCTS**  The current state of the fishing industry in the Russian Federation requires industrial enterprises to use waste- free and energy-efficient methods for processing raw fish. The drying process is one of the most energy-intensive ones. It was hypothesized that the preliminary pore formation in the raw fish would increase the surface area of moisture evaporation, and, as a consequence, increase the rate of drying. At the same time, to increase the preservation of vitamins of the raw fish, a reduction in the heat treatment temperature is required, which can be achieved by using vacuum drying. The paper presents the results of theoretical calculations of the change in the moisture content of the raw fish during the process of pore formation and drying. In order to take into account the effect of working pressure, a correction factor was introduced into the criterial equation for free heat exchange. Experimental research has confirmed the adequacy of theoretical calculations. The functional dependence of the introduced correction factor on the working pressure is determined graphically by successive approximation of the theoretical and experimental curves for drying process. Empirical dependences of moisture content of raw fish in the process of pore formation and drying are obtained.  **Key words:** raw fish, drying, pore formation, kinetics for the drying process, curve of the drying process, criterial heat transfer equation.  *DOI: 10.17217/2079-0333-2018-44-63-69*  **Information about the author**  **Yashonkov Aleksander Anatolevich** –Kerch State Maritime Technological University; 298309, Russia, Kerch; Candidate of Technical Sciences, Head of Food Processing Machinery and Equipment Chair; [jashonkov@rambler.ru](mailto:jashonkov@rambler.ru) |
| УДК 597.552.511 K.I. Aitukaev, V.I. Karpenko, O.V. Zikunova **GROWTH RATE FEATURES OF CHINOOK SALMON IN THE KAMCHATKA RIVER**  The article describes length-age composition and growth rate characteristics of Chinook salmon in the Kamchatka river. Similar growth rate of fish was identified with observed and calculated data, except 1.1+ age group. Despite this lack of results, we can use the data for calculating stock and catch.  **Key words:** Chinook salmon, length – age composition, observed and calculated data, growth-rate, length- weight relation.  *DOI: 10.17217/2079-0333-2018-44-70-75*  **Information about the authors**  **Aitukaev Kerim Isaevich** – Kamchatka State Technical University, 683003, Russia, Petropavlovsk-Kamchatsky; Undergraduate; [mr.fade@mail.ru](mailto:mr.fade@mail.ru)  **Karpenko Vladimir Illarionovich** – Kamchatka State Technical University; 683603, Russia, Petropavlovsk-Kamchatsky; Doctor of Biological Sciences, Professor, Professor of Water Bioresources, Fisheries and Aquaculture Chair; [karpenko\_vi@kamchatgtu.ru](mailto:karpenko_vi@kamchatgtu.ru)  **Zikunova Olga Vladimirovna** – Kamchatka Research Institute of Fisheries and Oceanography; 683000, Russia, Petropavlovsk-Kamchatsky; Senior Researcher of Abundance Dynamics and Forecast Improvement for Salmons Laboratory; [zikunova@kamniro.ru](mailto:zikunova@kamniro.ru) |
| УДК.595.384.12(265.51+265.52) S.S. Grigorev, N.A. Sedova **MORPHOLOGICAL FEATURES OF LARVAE OF *PANDALUS EOUS*, *PANDALUS  GONIURUS AND PANDALUS TRIDENS* (DECAPODA, PANDALIDAE) FROM THE WATERS  SURROUNDING KAMCHATKA PENINSULA**  Description of larvae of three species: *Pandalus eous*, *P. goniurus* and *P. tridens* (family Pandalidae) from the Okhotsk and the Bering Sea is given. Morphological features of larvae for the purpose of their identification in planktonic samples are compared. The main morphological distinctions of larvae of the corresponding stages are revealed. Value of morphology of a maxilla for division of larvae into separate stages is shown. The most reliable and convenient signs for specific identification of pandalids are discussed. Drawings of larvae structure are given.  **Key words:** larvae, stages of development, features, carapace, abdomen, telson, segment, spines, setae.  *DOI: 10.17217/2079-0333-2018-44 -76-87*  **Information about the authors**  **Grigorev Sergey Sergeevich** – Kamchatka Branch of Pacific Institute of Geography FEB RAS; 683000, Russia, Petropavlovsk-Kamchatskу; Candidate of Biological Sciences, Docent, Senior Researcher of Hydrobiology Laboratory; [sgri@inbox.ru](mailto:sgri@inbox.ru)  **Sedova Nina Anatolevna** – Kamchatka State Technical University; 683003, Russia, Petropavlovsk-Kamchatskу; Candidate of Biological Sciences, Docent, Associate Professor of Water Bioresources, Fishery and Aquaculture Chair; [sedova67@bk.ru](mailto:sedova67@bk.ru) |
| УДК 551.467.3:582.272.7(265.52) A.N. Kashutin, A.V. Klimova, T.A. Klochkova **IMPACT OF SEA ICE COVER ON INTERANNUAL CHANGES OF THE LITTORAL  VEGETATION OF THE BROWN ALGA *FUCUS DISTICHUS* SUBSP. *EVANESCENS* IN THE AVACHA BAY (SOUTH-EASTERN KAMCHATKA)**  Based on field observations conducted in 2016–2018, we analysed the formation of fast ice in the eastern part of the Avacha Bay and its influence on the distribution of the brown algae, *Fucus distichus* subsp. *evanesces*, in the littoral zone. Significant interannual changes in the size and shape of the bottom areas occupied by this species were found. Their fluctuation largely depends on the formation and melting of fast ice, and also on the character of the bottom relief and ground. The negative impact of ice on the *Fucus* beds is expressed by blocking the access of seawater to the plants growing in the upper horizons of the littoral zone during their freezing into ice, their damage by breaking off branches or completely breaking off from the substratum during movements of fast ice. Study of the development and maturation of sexual products and formation and escape of zygotes from the plants collected at observation sites helped us to understand causes of changes in the quantitative development of *Fucus* and the size and age structure of its populations, and also to explain the mechanisms of degradation of its beds during the cold half of the year and participation of floating ice in distribution of stones and boulders which have frozen in ice with the *Fucus* attached to them. Thus ice promotes resettlement of the species and formation of new settlements on the neighboring coastal area.  **Key words**: *Fucus distichus* subsp. *evanescens*, distribution of zygotes, reproduction, formation of ice cover, negative and positive impact of ice on *Fucus.*  *DOI: 10.17217/2079-0333-2018-44-88-99*  **Information about the authors**  **Kashutin Aleksandr Nikolaevich** – Kamchatka State Technical University; 683003, Petropavlovsk-Kamchatskу, Russia, 683003; Postgraduate; [Kashutin-an@yandex.ru](mailto:Kashutin-an@yandex.ru)  **Klimova Anna Valerevna** – Kamchatka State Technical University; 683003, Russia, Petropavlovsk-Kamchatskу; Researcher of Science and Innovation Department;  **Klochkova Tatyana Andreevna** – Kamchatka State Technical University; 683003, Russia, Petropavlovsk-Kamchatskу; Doctor of Biological Sciences; Doctor of Philosophy in Biology (Ph.D.); Рrofessor of Ecology and Nature Management Chair; [tatyana\_algae@mail.ru](mailto:tatyana_algae@mail.ru) |
| УДК 595.384.12(265.51+265.52) E.M. Nenasheva, V.E. Kirichenko **SPIDERS (ARACHNIDA: ARANEI) – INHABITANTS OF THE SOIL LAYER  OF BYSTRINSKY NATURE PARK**  The paper considers the fauna of spiders – inhabitants of various biotopes of the ground level of the Bystrinsky Nature Park. As a result of the analysis of the collection of spiders collected during the field season of 2015, the taxonomic composition and spatial structure of the herpetobiont araneocomplexes of the given territory has been described for the first time. 66 species from 8 families have been identified; their habitat is largely related to the ground level. The ecological explanation of the observed faunistic composition of spiders is given.  **Key words:** spiders, soil level, Bystrinsky Nature Park, habitats, faunal similarities.  *DOI: 10.17217/2079-0333-2018-44-100-108*  **Information about the authors**  **Nenasheva Elena Mikhailovna** – Kamchatka State Technical University; 683003, Russia, Petropavlovsk-Kamchatskу; Postgraduate; [siuakoatl@gmail.com](mailto:siuakoatl@gmail.com)  **Kirichenko Vadim Evgenevich** – Kamchatka branch of Pacific Institute of Geography FEB RAS; 68300, Russia, Petropavlovsk-Kamchatsky; Researcher; [vadim\_kir@inbox.ru](mailto:vadim_kir@inbox.ru) |
| УДК 639.2.053.7 A.M. Tokranov **POTENTIAL OBJECTS OF COASTAL FISHERY IN THE NEAR KAMCHATKA WATERS  OF SEA OF OKHOTSK AND PROBLEMS OF ITS RESOURCES EXPLOITATION**  The survey of some potential objects of coastal fishery in the near Kamchatka waters of Sea of Okhotsk (great and plain sculpins, Sakhalin sole, gray rockfish and whitespotted greenling) is given. Resources of these fishes today are not used completely or are not used in general. The problems limiting the exploitation of these fish resources are analyzed.  **Key words:** great and plain sculpins, Sakhalin sole, gray rockfish, whitespotted greenling, biomass, problems of exploitation.  *DOI: 10.17217/2079-0333-2018-44-109-113*  **Information about the author**  **Tokranov Alexey Mikhailovich** – Kamchatka Branch of Pacific Geographical Institute FEB RAS; 683000, Russia, Petropavlovsk-Kamchatsky; Doctor of Biological Sciences, Senior Researcher, Director, Head of Hydrobiology Laboratory; [tok\_50@mail.ru](mailto:tok_50@mail.ru) |
| УДК [597.552.511:591.543.43](265.53+265.54)"2001-2017" V.A. Tsareva, G.P. Vanyushin, M.Y. Kruzhalov, E.V. SapunovaTEMPERATURE CONDITIONS IN THE COASTAL WATERS OF EASTERN SAKHALIN **AND ITURUP ISLAND DURING THE APPROACH OF PINK SALMON AND CHUM  SALMON FOR SPAWNING IN 2001–2017 YEARS (ODD YEARS)**  The paper presents the results of the analysis values of SST in the waters of the Okhotsk sea off the coasts of northeastern and southeastern Sakhalin and Iturup island during the approach of pink salmon (Oncorhynchus gorbuscha) and chum salmon (Oncorhynchus keta) for spawning from July to September, 2001–2017, odd years on the basis of satellite information and SST data "in situ". Comparative analysis of the temperature conditions of the surface water obtained in 2017 with climate data and the values of SST other odd years for the same months of the period 2001–2015.  **Key words:** satellite data, sea surface temperature (SST), anomalies of SST, the Okhotsk sea, coastal waters of Eastern Sakhalin and Iturup island, the spawning of pink salmon (Oncorhynchus gorbuscha) and chum salmon (Oncorhynchus keta).  *DOI: 10.17217/2079-0333-2018-44-114-119*  **Information about the authors**  **Tsareva Vera Anatolevna** – Russian Federal Research Institute of Fisheries and Oceanography (VNIRO); 107140; Russia, Moscow; Researcher; [ladimon@mail.ru](mailto:ladimon@mail.ru)  **Vanyushin Georgy Petrovich** – Russian Federal Research Institute of Fisheries and Oceanography (VNIRO); 107140; Russia, Moscow; Group Leader  **Kruzhalov Mikhail Yurevich** – Russian Federal Research Institute of Fisheries and Oceanography (VNIRO); 107140; Russia, Moscow; Senior Researcher  **Sapunova Elena Vasilevna** – Russian Federal Research Institute of Fisheries and Oceanography (VNIRO); 107140; Russia, Moscow; Senior Engineer |