EFFECTS OF DAM CONSTRUCTION AT VOLGA-CASPIAN BASIN ON STURGRON POPULATIONS STATUS

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Basing on literature and own data it was analyzed the influence of dam construction on migration roots, spawning migrations and natural reproduction of beluga *Huso huso,* Russian sturgeon Acipe*nser gueldenstaedtii*, stellate sturgeon *Acipenser stellatus* in the Volga River resulting dam construction. It was demonstrated that decline of sturgeon natural reproduction was recouped by follows compensatory measures: ban of target sturgeon fishing in the Caspian Sea in 1951, controlled sturgeon reproduction since 1954, ban of ordinary fish species fishery in the Caspian Sea by small-mesh nets since 1962. Attempts to restore natural reproduction of sturgeon by transporting of breeders upstream the dams were not efficient resulting the loss of spawning sites.

Keywords: beluga *Huso huso,* Russian sturgeon *Acipenser gueldenstaedtii*, stellate sturgeon *Acipenser stellatus*, dam construction, natural reproduction, Volga-Caspian basin.

VIEW ON SPATIAL AND FUNCTIONAL STRUCTURE OF THE OKHOTSK SEA SCHOOLMASTER SQUID *BERRYTEUTHIS MAGISTER* POPULATION

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The noncontradictory hypothesis on cheme of spatial and functional structure of the Okhotsk Sea schoolmaster squid offered on the base of available data. The migratory cirquit of schoolmaster squid in the Okhotsk Sea based on cyclonic circulation of waters in the Okhotsk Sea. Spawning grounds at Okhotsk Sea side of north Kurile Islands are known. Indirect data shows also possibility of spawning also off South Sakhalin and at Okhotsk Sea side of southern and central Kurile Islands. Northern and central parts of the Okhotsk Sea are the non-sterile zone of emigration of paralarvae and juveniles of schoolmaster squid. Spatial and functional structure of the Okhotsk Sea population organized by the same scheme like in the Bering Sea in general.

Keywords: the Okhotsk Sea, schoolmaster squid, spatial and functional structure of population.

THE EXPERIENCE OF THE RETROSPECTIVE VALUATION OF THE CRITICAL SIZE OF CASPIAN ROACH'S POPULATION *RUTILUS RUTILUS CASPICUS*

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We have showed the valuation of the critical size level of the Caspian roach' s population, calculated on basis of the retrospective analysis of the dynamics of generations' productivity and population fertility. A minimal permissible value of the roach's spawning shoal corresponds to the fish population level according to which the population fertility, under conditions of a good water content of the Volga, ensures long-term appearance of middle – productive and high-productive generations.

Keywords: Caspian roach, *Rutilus rutilus caspicus*, Volga–Caspian Basin, generation's productivity, population fertility, population level and biomass of the resource, critical resource level.

CURRENT STATUS OF THE AZOV POPULATIONS OF BREAM *ABRAMIS BRAMA* AND SEA ROACH *RUTILUS RUTILUS*

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In this paper, the state of populations of bream and sea roach of the Azov Sea in the period 2003–2015 is estimated. Based on the fishery statistics, the contribution of these objects to the total catch is considered. The long-term dynamics of the size-age structure of their populations is presented, as well as the proportion of sexually mature depending on linear dimensions. It has been established, that the first time ripening individuals are the basis of bream and sea roach populations, up to 60–70% of which are taken out by the fishery during the transition to the next age group. The conditions of bream and sea roach habitat in Taganrog Bay are estimated. As a result of the salinization of the Azov Sea and the shallowing of the river Don there is a regular deterioration in the conditions of feeding and reproduction of semi-migratory fish. With a view to preserving and restoring the number of bream and sea roach, restriction of their fishing for the period of low water in the Don and the salting of the Azov Sea are proposed.

Keywords: bream, sea roach, *Abramis brama*, *Rutilus rutilus,* Azov Sea, Taganrog bay, maturation, age structure, fishery.

STRUCTURE OF THE RUSSIAN COMMERCIAL BALTIC HERRING *CLUPEA HARENGUS MEMBRAS* CATCHES IN 26TH ICES SUBDIVISION OF THE BALTIC SEA IN 1992–2015

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The ecological structure of the Russian commercial Baltic herring *Clupea harengus membras* catches is reviewed within the exclusive economic zone and territorial waters of Russian Federation in the 26th ICES subdivision of the Baltic Sea in 1992–2015. The catches include three groups of herring: spring spawning coastal, spring spawning of the open sea and autumn spawning. Analysis of long-term ratio dynamics of these groups was provided. Also the seasonal and long-term differences in age-length, sex structure and distribution are represented.

Keywords: Baltic herring, *Clupea harengus membras,* ecological groups, fishery, the Baltic Sea, age, length, sex, distribution.

INTERANNUAL FLUCTUATIONS IN POPULATIONS OF INVERTEBRATES WITH A SHORT LIFE CYCLE IN THE CONTINENTAL WATERS OF WESTERN SIBERIA AND PROBLEMS WITH THE EARLY FORECAST OF THEIR CATCH

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The long-term data on commercial stocks of continental aquatic invertebrates: *Artemia* cysts and *Gammarus* are presented. The high variability of stocks in the inter-annual aspect were shown. It was found that mean annual productivity of reservoirs in the allocation of quotas of catch for a short life cycle invertebrates was inefficient due to the overestimation or underevaluation of the current state of the stocks of aquatic bioresources. Systematic error of this method expressed through the

coefficient of oscillations for *Artemia* cysts is 300% (in average for all lakes) and 349% – for *Gammarus*. The forecast of recommended catch which is issued for the year ahead can only be tentative and it must be supported by scientific justification of stocks and volumes of potential catch before harvesting in each lake. The recommended timing of survey of invertebrate stocks in the lakes of the South of Western Siberia before catch is provided in the article.
Keywords: *Artemia*, *Artemia* cysts, *Gammarus*, general and commercial stocks, the forecast of catch, a short life cycle invertebrates, the waters of the South of Western Siberia.

EXPERIMENTAL TRAP FISHERY FOR WHELK *BUCCINUM UNDATUM* (NEOGASTROPODA, BUCCINIDAE) IN THE SHALLOW WATERS IN BAYS OF THE WESTERN MURMAN

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Some results of the experimental fishery for the whelk *Buccinum undatum* performed in the Barents Sea off the coast of West Murman in the sublittoral zone of the Kislaya bay and the Ura bay are presented. Resulting the research conducted in 2012–2016 the composition of the whelk aggregations placed on stony and stony-sandy grounds predominantly in the depths from 2 to 10–12 m was estimated. The most productive trap fishery for the whelk was observed in the second half a year with traps baited by fresh or frozen fish and soaked for 2–3 days. The possibility of reducing the catch of whelk juveniles by using selective windows in traps and the success of combined trap fishing of whelk and sea urchin are shown.
Keywords: whelk *Buccinum undatum*, the Western Murman, traps, depth, soak time, bait, fishery efficiency, by-catch.

POLYFUNCTIONAL ESTIMATION OF SOME OF STURGEON SPECIES (ACIPENSERIDAE) CULTIVATED IN CONDITIONS OF COMMERCIAL FARMS OF THE LOWER VOLGA

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The article presents a multifunctional evaluation of some objects from sturgeon fishes cultivated of commodity farms of the Lower Volga. For this purpose, Russian sturgeon and hybrid forms with the Siberian species of the Lena population were used in the experiments. Survival of offspring, growth rate and physiological indicators at different age stages was investigated. Along with this, the reproductive indicators of the newly ripened females of the Russian sturgeon and hybrid forms were analyzed, as well as the economic indicators of the profitability of their cultivation with respect to this region.
Keywords: Russian and Siberian sturgeon, hybrid forms, embryonic and postembryonic stages of development, physiological status, reproductive indicators of the Russian sturgeon and hybrid forms, economic efficiency.

THE ISSUES OF FISHERY REGULATION: THE CASE OF ZANDER *SANDER LUCIOPERCA* FROM THE SOUTHERN PART OF LAKE LADOGA

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In the article indexes of zander abundance dynamics are regarded and the improved method of defining total allowable catch (TAC) of fish is elaborated. At first

experimental catch of fish is to be made for further detection of abundance, ichthyomass, recruit, indexes of size and weight of age classes, mortality rate and TAC. To define more accurately TAC via the proposed method the author suggests to find additionally production created by the survived fish, and by these indexes and ichthyomass to calculate allowable catch (AC). With consideration of selectivity, on the base of AC of commercial stock all the TAC, including share of industrial enterprises, recreational fishing and unaccounted fish, is to be calculated. Then ichthyomass and number of dead fish is to be found. On the base of production and fish mortality indicators TAC efficiency is to be defined and intensity of catch is to be estimated for further regulation of fishery.
Keywords: zander *Sander lucioperca*, fish abundance, ichthyomass, production of survived and dead fish, mortality rate, intensity and efficiency of fishery.

A RATIONAL APPROACH TO THE STATE OF EXPLOITATION OF THE RIGHT OF USE OF OBJECTS OF AQUATIC BIOLOGICAL RESOURCES

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The scarcity of natural resources and their significance for economic and social development mandate the need for solution of issues connected with sustainable development and rational use of aquatic biological resources. The main task of the state is to create rational conditions for the right to use resources.
Keywords: natural resources, exploitation of natural resources, rational use of natural resources.

FORMALIZATION OF METHODIC FOR EVALUATION OF COMMERCIAL RETURN AT ARTIFICIAL REPRODUCTION OF WATER BIO-RESOURCES

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The article describes a mathematical model for estimating of commercial return for artificial reproduction of water bio-resources. It base on modified version of Beverton-Hotl model. The dynamics of population number is calculated using three types of natural mortality – mortality of eggs, mortality of larvae and fingerlings, and mortality of older fish at the age more than one year. The last is determined by the Baranov's method using maximum fish age. The input parameters are maximal age, the individual fecundity, the age of maturity. Natural mortality in the first age plays a compensatory role to balance initial number of eggs with resulting population fecundity. Compensatory mortality at the first age is described by an exponential function, depending on the weight of juveniles. It is shown that the model gives a clear assessment of commercial return, similar to that in the literature, but it allows us to calculate it using standard biological parameters of fish population. The model can be applicable of any fish species and used both for decision making for planning of artificial restoration of stocks and calculation of measures for compensation of damage to water bio-resources cause by human activity.
Keywords: artificial breeding, water bio-resources, commercial return, natural mortality, mathematic model of fish population.