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**ON THE QUESTION OF SCIENTIFIC SUPPORT
FOR THE DEVELOPMENT OF STURGEON FARMING
IN UKRAINE AGAINST THE BACKDROP
OF THE CORONAVIRUS PANDEMIC AND FULL-SCALE WAR**

**ДО ПИТАННЯ НАУКОВОГО ЗАБЕЗПЕЧЕННЯ РОЗВИТКУ
ОСЕТРИВНИЦТВА В УКРАЇНІ НА ТЛІ ПАНДЕМІЇ
КОРОНАВІРУСУ ТА ПОВНОМАСШТАБНОЇ ВІЙНИ**

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Sturgeon species of fish belong to the subclass of cartilaginous ganoids (*Chondrostei*), whose fossil forms date back to the end of the Silurian period. There is only one still existing order of the 13 currently known orders of this subclass, namely —sturgeon (*Acipenseriformes*), which

encompasses 28 species of fish. The vast majority of them are considered to be of great economic value due to their dietary meat and caviar, which are delicious and have good nutritional properties. In addition, it should be noted that all other components of their carcasses are also in stable demand in the food, cosmetic and pharmaceutical industries of light industry. During the last century, sturgeon species of fish have steadily attracted the attention of scientists and producers of fishery products all over the world. First of all, this is related to the constant demand for fish farming products against the backdrop of a decrease in natural populations of these fish and transformations of the resource base for their reproduction. In particular, there arises a need to create new and improve already existing resource-saving technologies that are used at all stages of implementation of the concept "from a reservoir to the table" [1].

Out of the 27 species of the aforementioned sturgeon fish, there only 6 that are native to Ukraine, namely: common beluga (*Huso huso* Linnaeus, 1758), Atlantic sturgeon (*Acipenser sturio* L. 1758), Russian sturgeon also known as the diamond sturgeon (*Acipenser gueldenstaedtii* Brandt & Ratzeburg, 1833), bastard sturgeon also known as the fringebarbel sturgeon (*Acipenser nudiiventris* Lovetsky, 1828), starry sturgeon also known as stellate sturgeon (*Acipenser stellatus* Pallas, 1771) and sterlet (*Acipenser ruthenus* Linnaeus, 1758). Since ancient times, they formed stable populations in the basins of large rivers (Danube, Dniester, Dnipro) and the Azov and Black Seas. However, starting from the 1950s, their numbers began to rapidly decrease due to the negative impact of numerous hydro-ecological and socio-economic factors. Therefore, since 2009, these species have been included in the Red Book of Ukraine, that is, their commercial fishing is prohibited. At the same time, beluga and sterlet, as well as various species of sturgeon, have gained considerable popularity as products of aquaculture in Ukraine. In addition, introduced species and hybrids are widely used in the Ukrainian sturgeon breeding. Examples of such include American paddlefish (*Polyodon spathula* Walbaum, 1792), Siberian sturgeon (*Acipenser baerii* Brandt 1869) or bester, a hybrid of beluga and starlet [1]. Since 1991, sturgeon fisheries in Ukraine have been constantly developing, adopting best global practices and creating its own know-hows, adapted to the specific business conditions. First of all, Ukraine can boast of one of the largest areas of the pond fund in Europe (over 1.3 million ha) but this advantage is nullified by the absence of domestic manufacturers of certified specialized feeds for sturgeon species of fish. So, along with the work of state institutions, whose activities were primarily aimed at reproduction and preservation of natural populations of these fish, the number of private farms also grew. The latter steadily increased the volume and quality of their products. It was predominantly achieved through the use of recirculating water supply technologies (also known as RAS –

recirculation aquaculture systems) and the creation of strictly controlled growing conditions. The measures taken were proven effective as evidenced by numerous international quality certificates for sturgeon fish farming products. Thus, the Ukrainian companies were able to enter the international market as important exporters of caviar. The above-mentioned development of sturgeon farming is not possible without the appropriate scientific support [1, 2, 3].

Scientific and methodological support of the fish farming industry in Ukraine is carried out by state institutions, the leading one being the Institute of Fisheries of the National Academy of Agrarian Sciences (NAAS). Founded at the end of the 1930s, it currently has modern certified laboratories and is engaged in topical fundamental and applied research. Thus, the Institute's research is carried out in accordance with the scientific and technical programs of the National Academy of Sciences of Ukraine. Furthermore, a significant portion of scientific research is carried out annually by order of the State Agency of Ukraine for the Development of Land Reclamation, Fisheries and Food Programs, the Ministry of Agrarian Policy and Food of Ukraine, other ministries and agencies, fisheries organizations and enterprises, as well as in accordance with international agreements and programs [2, 3].

In constant cooperation with other higher educational institutions, the Institute provides the needed support to the sturgeon industry of Ukraine, inter alia, by training highly qualified personnel. In particular, a number of employees of the National University of Bioresources and Nature Management of Ukraine used to work for the Institute. Also, graduates of postgraduate and doctoral studies of the Institute have built successful careers in scientific, industrial and administrative institutions. Thus, despite the COVID-19 pandemic and the full-scale invasion of Russia, 5 people have defended their theses and were awarded the scientific degree of "candidate of agricultural sciences" since 2019 alone, namely: E. M. Alkhimov, on the topic "Peculiarities of sturgeons fish cultivation in modern farm conditions of southern Ukraine"; G. V. Kulikova, on the topic "Improving the technology of raising Russian sturgeon fry (*Acipenser gueldenstaedtii* Brandt et Ratzeburg) and starlet juveniles (*Acipenser ruthenus* Linnaeus) in the conditions of Southern Ukraine (case study: the production-experimental Dnipro sturgeon fish hatchery)"; M. Yu. Simon, on the topic "Growing of Russian sturgeon fingerlings (*Acipenser gueldenstaedtii* Brandt & Ratzenburg) by introducing inactivated baker's yeast into their diet"; M. M. Pashko, on the topic "Peculiarities of the combined technology of formation and exploitation of sterlet broodstocks (*Acipenser ruthenus* Linnaeus, 1758) in industrial conditions"; B. O. Hankevich, on the topic: "Fishing and biological features of the paddlefish *Polyodon spatula* (Walbaum, 1792) in the conditions of commercial fish

farming in the ponds of Polissia and the Forest Steppe of Ukraine." Currently, there are 2 graduate students in the Institute who are working on their dissertations and pursuing the scientific degree of PhD, namely: S. M. Pashko, research title: "Fisheries and biological characteristics of the Siberian sturgeon (*Acipenser baerii* Brandt) in the conditions of industrial technologies of spawning and commercial sturgeon farming"; and Yu. V. Onishchuk, research title: "Fisheries and biological evaluation of fingerlings of a sturgeon hybrid – bester – under the conditions of basin cultivation under different feeding rations" [4, 5, 6, 1, 7, 2].

In addition, since 2007, the Institute has been the founder and publisher of the specialized journal "Fisheries Science of Ukraine" (e-ISSN 2312-9581, r-ISSN 2075-1508, DOI: <https://doi.org/10.61976/fsu>). The latter has been included in the List of Professional Publications of Ukraine since 2009. That is, it publishes the results of dissertations for obtaining the degrees of doctor and candidate of sciences in biological and agricultural specialties. This publication meets all the international standards of scientific integrity, in particular, it introduces a double-blind peer review and the use of plagiarism detection programs, while the editorial board is made up of highly qualified specialists from different countries of the world, and all materials receive a digital DOI identifier and are freely accessible on the Internet. Despite the fact that the editorial staff of the magazine decided not to leave Ukraine at the time of the start of the full-scale war, starting from 2022 all of the magazine publications are translated into English free of charge by certified professional translators [8].

Also, since 2018, the Institute has been the key facilitator of the international conference "Modern problems of the rational use of water bioresources" every year, holding it online during the time of the COVID-19 pandemic and the full-scale invasion of Russia. Both the conference and the above-mentioned magazine devote a significant portion of the publications to the latest research papers in the field of sturgeon farming. The latter are grouped in categories similar to those used in the magazine, i.e. the current challenges and prospects; biological resources and ecology of water bodies; technologies in aquaculture; breeding, genetics and biotechnology; physiology and biochemistry; fodder and feeding; ichthyopathy; economy and organization of production [9].

The key figures entrusted with the management of the above-mentioned activities of the Institute are I.I. Hrytsyniak (doctor of agricultural sciences, professor, academician of the National Academy of Agrarian Sciences of Ukraine) and O. M. Tretyak (doctor of agricultural sciences, senior researcher), and they do their job at a consistently high level that is reflected both in the direct results of the activity and in numerous state awards. That is why, both in the years of the COVID-19 pandemic and during the full-scale invasion of Russia, the Institute continues to participate in the international

cooperation aimed at promotion of the development of sturgeon farming in Ukraine among other things. In particular, during the period of martial law alone, the management of the Institute signed agreements on scientific cooperation with institutions of Canada, the Republic of Lithuania, the Slovak Republic and the Czech Republic. The plans for the near future include expanding and deepening cooperation with European and Asian countries in order to improve scientific support for the development of sturgeon farming in Ukraine.

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