

Prospects for the development of commercial fish farming in the South of Russia

Gennady Matishov^{1,2}, *Besarion Meskhi*², *Anatoly Makoedov*¹, *Elena Ponomareva*^{1*}, *Vadim Grigoriev*¹, *Dmitry Rudoy*^{2,3}, and *Marina Sorokina*¹

¹Federal Research Centre the Southern Scientific Centre of the Russian Academy of Sciences (SSC RAS), Chekhov Street, 41, Rostov-on-Don, 344006, Russia

²Don State Technical University, Gagarin sq. 1, Rostov-on-Don, 344003, Russia

³FSBSI “ARC “Donskoy”, Nauchny Gorodok Str.3, Zernograd, 347740, Russia

Abstract. The article presents the analysis and prospects of commercial aquaculture in the southern regions of Russia. Rostov and Astrakhan region and Krasnodar Krai are the leaders in commercial fish production. Rostov region annually grows 23-24 thousand tons. In Krasnodar region in the period from 2018 to 2022 there was a 15% growth of avciculture production and in 2022 it was 23,3 thousand tons. In the Astrakhan region from 2018 to 2021 there was a decrease in this indicator by 13%, but in 2022 the volume of production in the region increased to 20.5 thousand tons. Absolute parameters in Stavropol Krai (11.8-12.3 thousand tons) Kabardino-Balkarian Republic (2.5-3.3 thousand tons) and Volgograd Oblast (2.3-2.5 thousand tons) remained almost unchanged. Significant growth of relative production parameters was noted in the Republic of Dagestan, the Republic of North Ossetia-Alania and the Republic of Crimea. The main objects of cultivation in the South of Russia are carp fish. A substantiation of creating a state-owned structure ensuring practical interaction between economic entities, executive bodies of state power, scientific and educational institutions is offered. **Key words:** Aquaculture, commercial fish farming, fish products, fish farms, prospects for aquaculture

1 Introduction

The fisheries complex has always played an important role in the economy of the country, but for a long time the provision of fish products was carried out through fisheries. The development of fish farming was not given such a significant role, which was the reason for the lag in development and does not correspond potential of the industry [1, 2]. The increased attention to aquaculture is not due to the state of traditional stocks, but to the economic advantages of commercial aquaculture over fisheries [3].

Southern regions of Russia are located in the most favorable for domestic commercial cultivation of aquatic bioresources 5-6 fish farming zones. It is with the South of Russia that further prospects for the development of freshwater and marine aquaculture are largely associated [4-7].

* Corresponding author: kafavb@mail.ru

The Russian Federation Government Order No. 2567-r of 08.09.2022 approved the "Strategy for the Development of the Agroindustrial and Fishery Complex of the Russian Federation for the period up to 2030" [8, 9]. It focuses the fish industry on increasing the volume of aquaculture products up to 618 thousand tons by the specified date.

The research objective is to assess the potential of the South of Russia to achieve the targets of the Strategy-2030.

2 Material and research methods

We analyzed the materials describing the state of global, domestic and regional aquaculture, presented on the official websites of FAO [10]. (fao.org), Federal State Statistics Service (rosstat.gov.ru) [11], Ministry of Agriculture of the Russian Federation [12], as well as scientific, technological and statistical literature.

3 Results and discussion

The South of Russia provides more than 30% of the total indicators of domestic commercial fish farming [13]. The progressive development of fish farming in the Southern and North Caucasian Federal Districts will largely determine the overall success of Strategy-2030.

According to the scientists' calculations [5], only in Krasnodar Region the basic technology of fish stocking can give 17-24 quintals per hectare, and intensive - 60 quintals per hectare of marketable products per year. Taking into account these values, the upper limit of commercial farming potential in freshwater and slightly saline water bodies is not less than 1 million tons of fish production. Sustainable stocking of Kuban estuaries for 4-5 years would increase the volume of fish production by about 10 times.

In the Russian Federation as a whole, the average annual growth of fish production in 2016-2022 was 11% [14-16]. This value is comparable with the global average growth rate of aquaculture production in the period of 1980-1990s, i.e. the period of the most rapid development of fish farming activities.

If the above trends persist, the target parameters of Strategy-2030 can theoretically be achieved as early as 2026, and by 2030 the production volume will exceed 0.9 million tons. The main role in achieving these parameters under such conditions will be played by no more than three or five subjects of the Russian Federation.

The prospects of aquaculture development in the overwhelming majority of Russian regions do not look too optimistic. Even the traditional leaders - Rostov Region (4th place in the country) and Krasnodar Region (5th place) - according to Federal Agency for Fisheries for the period from 2007 to 2021, the average growth rate of production was only 5 and 6%, respectively. In 2018- 2021 there was a decrease to 2 and 1%. In 2022, Rostov Region and Krasnodar Region increased their numbers [17], 24.6 thousand tons and 23.3 thousand tons, respectively, compared to 2021(Fig. 1).

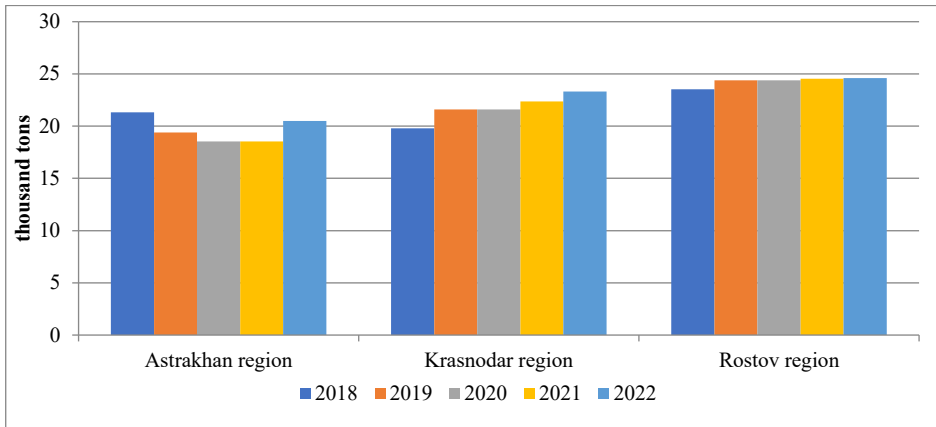


Fig. 1. Production of commercial aquaculture in the subjects with the highest indicators in the Southern Federal District.

From 2016 to 2021 reduced production in such a traditional fish farming area as the Astrakhan region (from 23.2 to 19.1 thousand tons), in 2022 the production volume of the region increased over 20 thousand tons. Absolute parameters almost changed in Stavropol Region (11.8-12.3 thousand tons) Kabardino-Balkarian Republic (2.5-3.3 thousand tons) and Volgograd Region (2.3-2.5 thousand tons) [18].

Significant growth of relative parameters of production was registered in the Republic of Dagestan (from 2.9 to 8.9 thousand tons), Republic of North Ossetia-Alania (from 0.2 to 3.6 thousand tons) and Republic of Crimea (from 1.6 to 4.6 thousand tons [19].

It is known that the main purpose of commercial aquaculture is to provide consumers with valuable live and fresh products [20] Directly for the consumption of the population, fish farms in Russia supply less than half of the volume of aquaculture products produced annually, according to statistical data [21].

Let's assess the prospects of Strategy-2030 implementation in the South of Russia. With a proportional distribution of the regional load the volume of fish production by 2030 should be brought here to 200 thousand tons. To achieve this level, the gross indicators should be increased annually by about 9%. The planned growth rate is almost 2.5 times higher than the actual one.

Judging by the growth rate of production, in the south of Russia there is a more or less stable balance of supply and demand for artificially bred carps. They form the basis of local aquaculture [22-25]. Sazan, common carp are traditional components of fish ration of population in many regions of the country. The production cost of carp corresponds to the purchasing power of the main mass of the population.

A serious competition to local aquaculture in the domestic market comes from fish products supplied from Southeast Asia. In some years up to 30 thousand tons of pangasius and tilapia fillets are imported to Russia. Such volume closes the opportunities for sales of about 100 thousand tons of Russian aquacultural products which are comparable in price but safer for people's health, first of all carps. The extra demand for 100 thousand tons of domestically produced carps, amur and bighead carp will help to increase the efficiency of aquaculture enterprises. By analogy with salmon fish aquaculture, additional demand for carp products can be formed by creating effective preferences for domestic producers in the domestic market.

Salaries in fish farming are noticeably lower than regional averages or other activities. In 2017-2021, the average monthly nominal accrued salary in Russian fish farming was 37 thousand rubles, and in fishery - 97 thousand rubles [26]. And to eliminate the noted

contradiction it is necessary to form an attractive level of wages. It is unlikely that such task can be realized in conditions when more than half of aquaculture farms in Russia produce less than 10 tons of products per year. And only 10% - more than 100 tons. Over 70% of the enterprises have a very low degree of industrialization.

For comparison, one average employee employed in salmon farming in Norway produces 250 tons of products. It is the high productivity in aquaculture that ensures wages 10% higher than the country's average [27].

More than 280 fish-farming enterprises engaged in fish farming in the Rostov region, on average, grow 100 tons of products per year. It is still difficult to assume that such enterprises have reserves and opportunities for doubling the volume of grown products by 2030.

It is even less realistic to double the number of fish farming units within the planned timeframe. It is difficult for potential fish farmers to count on comprehensive assistance as there are no organizations in Russia that provide practical, comprehensive (scientific, legal, economic, personnel, etc.) services at the stage of establishing aquaculture production. Today, many entrepreneurs, in principle, who are ready to engage in the commercial cultivation of hydrobionts, first of all, face just such a difficulty. Therefore, many potential investors, who could invest heavily in domestic aquaculture, are very reticent about projects starting from the "zero cycle", while demonstrating their willingness to buy a ready-made business [28].

Domestic aquaculture needs the introduction of knowledge-intensive technologies. This, in turn, implies enlargement of enterprises to the production of the full cycle from receiving planting material to marketable products, their processing and sale. There is very little demand for theoretical and practical developments in the use of recirculation aquatic system (RAS). An important prerequisite for profitable operation is the reduction of costs for maintaining an optimal water temperature regime.

Fish farming in warm discharge water of energy complex enterprises is the most promising direction of aquaculture in Russia [29-31]. Production yield at such enterprises averaged 100-120 kg/m³. State support of aquaculture could play a positive role - diversification of the energy complex in terms of creation of large industrial farms using warm discharge water from enterprises. For example, sturgeon farming on a large scale on warm water would make it possible to reduce its production cost and make it as mass and generally available fish as commercial trout. The Southern and North Caucasian Federal Districts are home to a unified energy system of the South (the UES of the South), comprising 240 power station.

The further progressive development of aquaculture in Russia's southern regions could be greatly facilitated by the creation of a state-owned structure that would ensure practical cooperation between economic entities, executive government bodies and scientific and educational institutions. Today, a whole set of problems is evident, related to solving the issues of coordinating the work of commercial farms, preparing the necessary documentation, introducing existing scientific developments, selecting personnel and partners to solve certain practical problems, and supporting the work of enterprises at all stages of their activities.

Within the framework of the State Center, it is possible to provide the following tasks:

- 1) Scientific, project, legal and personnel support and maintenance of aquaculture projects;
- 2) formation of interregional relations between aquaculture enterprises and search for investors interested in commercial fish farming;
- 3) Preparation of proposals on the development of the legal framework regulating the work of aquaculture enterprises and state programs in the field of aquaculture;
- 4) marketing research, analysis of the fish products market, and research of economic efficiency of aquaculture enterprises;

5) Consulting and methodical assistance to entrepreneurs, business structures, institutions and enterprises in organization of commercial sturgeon breeding and creation of commercial farms;

6) provision of monitoring of the sanitary and epidemiological well-being of fish farms (fish breeding products must be safe for consumers), struggle against possible epizootics, control over the content of heavy metals, water quality research, and environmental monitoring.

It is expedient to entrust such center with the tasks of practical formation of fish farms. After created, staffed commercial farms reached their design capacity, they could be offered to investors and put up for auction. With the state financing of such projects, the starting price should not be lower than the budgetary funds spent on construction and the initial period of production operation.

Acknowledgements

This publication was prepared within the framework of the State Order of SSC RAS, Grant No. 122020100328-1, using the Unique Scientific Installation "Modular Unit-Complex" and «Bioresource Collection of Rare and Endangered Fish Species No. 73602» of the SSC RAS This study was supported by the grant from the Russian Science Foundation RSF No.№ 23-76-30006.

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