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ТА ЗДОРОВ'Я

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**ПРОФЕСІЙНИЙ УСПІХ У КОНТЕКСТІ  
СТРАТЕГІЇ СТАЛОГО РОЗВИТКУ:  
ОСВІТА, ЕКОНОМІКА, ЕКОЛОГІЯ**

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Видання є спільним міжвузівським проєктом, виконаним під егідою Міжнародної академії культури безпеки, екології та здоров'я. У монографічному дослідженні напрацювання фахівців в сфері освіти з різних країн: України, Польщі, Грузії. Актуалізовано питання підготовки майбутніх фахівців з різних галузей у закладах вищої освіти, питання здоров'я та самозбереження, реалізації освітньої парадигми, самовдосконалення, збереження біологічного різноманіття та ін.

Матеріали стануть у нагоді науковим працівникам, викладачам, здобувачам усіх освітніх та освітньо-наукових рівнів, учителям-практикам і керівникам закладів освіти.

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## *Розділ III.*

# **ЗБЕРЕЖЕННЯ БІОЛОГІЧНОГО І СОЦІАЛЬНОГО РІЗНОМАНІТТЯ ОТОЧУЮЧОГО СЕРЕДОВИЩА**

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## THE PROBLEM OF THE AQUATIC BIOLOGICAL RESOURCES EXPLOITATION IN THE CONTEXT OF FOOD SECURITY

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*У статті доведено, що раціональне використання рибних ресурсів є необхідною складовою успішної державної аграрної політики щодо збільшення рівня споживання населенням, та важливим стратегічним напрямом розвитку агробізнесу та розширення зайнятості сільського населення. Проаналізовано промисловий вилов водних біоресурсів в Азово-Чорноморському басейні та вилов риби у спеціальних товарних рибних господарствах, тенденції вилову водних біоресурсів по видах у Світовому океані та динаміка вилову риби і добування водних живих ресурсів. Розглянуто перспективи розвитку аквакультури в умовах трансформаційних процесів.*

*Проаналізовано сучасний стан виробництва риби та виокремлено проблеми галузі, обробки даних про виллов товарної риби та рибопосадкового матеріалу, поставлено наступні завдання для її розвитку. Запропоновано звернути увагу на поставки на підприємства вітчизняної сировини, що дозволить знизити собівартість своєї продукції і підвищити споживчий попит. Звернута увага на необхідність модернізації підприємств, матеріально-технічної модернізації бази шляхом залучення інвестицій. Запропоновано розробити програму для імпортозаміщення рибних продуктів. Україна не має ресурсної бази скумбрії, палтус, сьомги, оселедця і багатьох інших видів риб. Тож запропоновано ефективні умови для вирощування європейського камбалу, райдужна форелі, сигів, соми каналу, окуня, севрюги і веслоноса. Не тільки традиційні види риб можуть бути вироблені в Україні, але і ті, які в даний час імпортуються: дорада, ляц, лаврак, тіляпія.*

*Ключові слова: аквакультура, водні біоресурси, водоїми, рибальство, промислове рибальство, рибна продукція, аграрна політика.*

**Urgency of the research.** The proper process of integration of Ukraine into the European Economic Community is impossible without coordination of efforts to guarantee access to high-quality and safe food products. Population full balanced food supply is determining the direction of the State policy of any developed country. Fish and fish products are valuable and strategically important products. The crisis caused a system destabilization, current situation requires the implementation of measures, directed to restorations of aquaculture's role in the development of Ukraine's economy. Therefore, the main issues of the modern stage of aquaculture regulation are fish production increase, expansion of assortment and improvement of quality of goods, and on this basis – ensuring the population rational consumption of fish products, creation of favorable conditions for producers, rural areas social development improvement, decrease of the country's dependence on imported supplies. The necessity to supply the population with environmentally safe and affordable fish under the condition of seas

and oceans fishing reduction leads to the engagement in the production of fish and other aquatic products in the artificially created fully controlled aquaculture conditions. So it is important to analyze the production and consumption of fish and fish products in Ukraine to determine the main trends of development of the industry in general. These aspects determine the need to hold a deep research of the aquaculture functioning problems, to search for ways and methods to facilitate its development in Ukraine.

*Target setting.* A number of pending issues related to the specifics of the theoretical-methodological and applied aspects of legal regulation of aquaculture determines the focus of the topic of the article, the logic of its construction, target focus, its theoretical and practical value.

*Actual scientific researches and issues analysis.* The issues of effective fish processing industry development directions in Ukraine are met in the research of such scientists as Bahrov O., Zahorodniuk O. [1; 2], Stepanova V., Borshchevsky P., Stasyshen M. [3], Hrynzhhevskiy M. [5] and other researchers [6-21].

*The research objective.* The purpose of the article is a study of the main trends in the production of fish and fish products.

*The statement of basic materials.* In Ukraine there is a significant area of internal ponds, suitable for the cultivation of aquaculture objects (1 million hectares). By the available water fund Ukraine takes the second place in Europe, but over the years of independence, the share of national production of fish products on the domestic market dropped from 95 % to 20 %. Condition of the special usage of water biological resources in the inland waters and the Azov-Black Sea basins are shown in Fig. 1.

The special usage of water biological resources is carried out by their removal from the natural environment, which includes: industrial fishing; extraction of aquatic biological resources scientific, industrial and research purposes, and also to determine their sanitary and epidemiological conditions; control extraction of water biological resources to determine their conditions and stocks;

ameliorative extraction of water biological resources for determining their age and species composition; extraction of water biological resources for acquiring biological material for the artificial reproduction of stocks and carrying out aquaculture activities; recreational and sport fishing in the water bodies of common use, that exceeds the amount of free fishing. 432 stakeholders (users of water bioresources with different forms of ownership) are carrying out the commercial harvesting of water biological resources in the Azov-Black Sea basins.

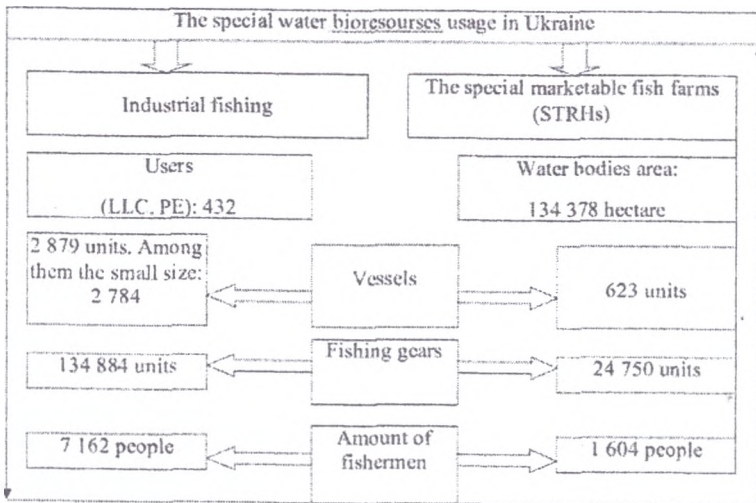


Figure 1. Water bioresources extraction by removing from an environment.

The analysis shows that the harvesting in 2015 mostly consists of the low-value fish species. They include: Black Sea sprat – 10.6 ths. tons; anchovy – 1.3 ths. tons; gobies – 18.2 ths. tons; silver Prussian carp – 1.1 ths. tons; bream – 0.5 ths. tons; common roach – 0.1 ths. tons; European sprat – 2.2 ths. tons. This is the result of the decrease of fish stocks and the annexation of Crimea. Also, compared to 2013, in 2015 the amount of catch of anchovy decreased 27 times, European sprat – 5.7 times, Black Sea sprat – 16.4 times. The analysis of fish catching indicators shows that the catches of the

Black Sea shrimp (*Palaemon adspersus*) are currently increasing: 0.243 ths. tons in 2015 comparing to 0.124 ths. tons in 2013. These are promising species which play a growing role in coastal fisheries of Ukraine.

The lack of fish accounting in recreational fishing is a problem. There are no general reports on fish that was caught by these fishermen, and there is no mechanism of accounting the amount of recreational fishermen and their catch in this segment for today.

Fish harvesting is conducted in the special marketable fish farms (STRHs) in the inland waters of Ukraine and is based on scientific and biological grounds.

The data that refers to the extraction of water bioresources is monthly submitted to the local territorial departments of the State Agency of Fisheries of Ukraine: the information of water bioresources extraction in special freight (trade) fisheries, the information of water bioresources extraction based on scientific-biological grounding, the information of water bioresources extraction in cultural fisheries is submitted not later than the 10<sup>th</sup> of the month, following the reporting (on accrual basis). In 2015 fishermen have caught 6,9 ths. tons of water biological resources in the special marketable fish farms (STRHs) according to statistics.

Analysis shows that catches in STRHs in 2015 mostly consist of herbivorous fish (Far Eastern carps) – 3.9 ths. tons; common carp – 0.9 ths. tons; silver Prussian carp – 1.1 ths. tons; pike-perch – 0.09 ths. tons; bream – 0.2 ths. tons. It's a result of fish stocking the water bodies at the expense of users who are engaged in fishing.

The fishing vessels operate in the following regions in the World Ocean.

Fish harvesting in the World Ocean amounts to 15.8 ths. tons. There are 2 Ukrainian fishing enterprises ARC «Prydunaiska Nyva», LLC «SRDK» that are carrying the fish harvesting in the World Ocean (table 1).

Antarctic krill (*Euphausia superba*), Patagonian toothfish (*Dissostichus eleginoides*), Antarctic toothfish (*Dissostichus*



mawsoni) are the most valuable species extracted from the oceans. The amount of Antarctic krill caught is 13.4 ths. tons in 2015, which is 4.2 ths. tons more than in 2014 and 8.7 ths. tons more than in 2013 (Fig. 2, 3).

Table 1

**Catch of water bioresources by Ukrainian fish-extraction enterprises in the World Ocean (According to data of The State Statistics Service of Ukraine)**

Name enterprises /vessel	2014	2015	Deviation (+; -)	%
1.ARC «Prydunaiska Nyva»				
LLC «Antarctica»				
RKS «More Sodruzhestva»	9197,0	13413,0	4216,0	145,8
2. LLC «SRDK»	9850,4	1032,2	-8818,2	10,5
JSC «Rybalka Sevastopolia»				
JSC «Kyivska Rus»	10412,2	1394,7	-9017,5	13,4
Total	29459,6	15839,9	-13619,7	53,8

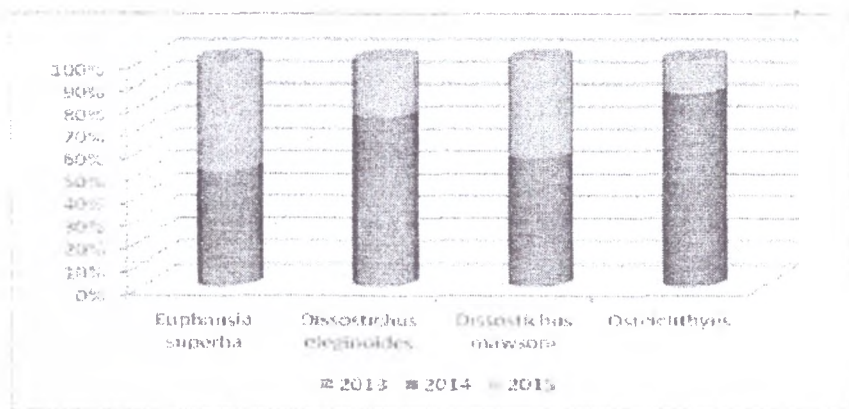


Fig. 2. Trends of catching water biological resources in the World Ocean (by species) (According to data of The State Statistics Service of Ukraine)

The dynamics of the fish catching and the extraction of water biological resources at 1990-2015 are shown in figure 3. One of the main fishing regions of Ukraine is Azov-Black Sea basin, where in 2014 – 22.2 ths. tons of fish was caught.



Fig. 3. Dynamics of the fish catching and the extraction of water biological resources (According to data of The State Statistics Service of Ukraine)

In particular, in the Zaporizhzhia region – 16.2 thousand tons, Odessa region – 3.3 thousand tons, Nikolaiev region – 1,4 thousand tons. The inland fisheries in 2014 occurred primarily in Cherkasy region (6.2 thousand tons), Odessa region (5.5 thousand tons) and Vynnytsia region (2.3 thousand tons).

The overall fish catch in inland waters in Ukraine in 2014 amounted to 39.6 thousand tons, and to 38.5 thousand tons in 2015. Because of the annexation of the Crimea Ukraine has lost about 65 % of the catch. In 2013 the volume of catches including the Crimea amounted to approximately 225.8 thousand tons, and in 2014 (without Crimea) – 91.2 thousand tons, in 2015 – 88.6 thousand tons. Aquaculture plays an important role in the production of planting material for putting fish into ponds except growing fish for food purposes. Fishery is a necessary component of State agricultural policy, which can increase the level of consumption of the

population, and is an important strategic direction of agribusiness rural population employment development. Economical efficacy of fishery is not only determined by the level of its cost, but also the market price, the producer's impact on which is much higher than for any other agricultural commodity. Fish farming is quite competitive and economically attractive in terms of investment attraction. One of the main fishing regions of Ukraine is the Azov-Black Sea basin where in 2014 22181 tons of fish were fished out. In particular, in the Zaporizhia Region – 16129 tons, in Odessa 3342 tons, Mykolaiv – 1484 tons. Catch in inland waters in 2014 fell primarily to the Cherkasy (6256 tons), Odessa (5552 tons) and Vinnytsia (2340 tons) Regions. The total catch of fish in inland waters of Ukraine in 2014 was 39 612 tons. In Ukraine, the demand for fish products is one of the least-implemented, and potential of the actual capacity of this market at 600-650 thousands of tons can be increased by 30-40 % due to the intensive development of pond fishery and other areas of aquaculture. Today, our country imports live, fresh or chilled fish 23,3 ktons valued at 149.4 million dol. USA, while fishing in inland waters is 45,7 ktons.

So, in order to reduce dependence on imports, the production volumes should be increased on average by 50 %.

Today fish and fish products' market developing dynamically, which is due to increased supply and choice of products. Concerned organizations organize the market of fish products with aim to harmonize supply and demand for the benefit of both producers and consumers. Even though fish is not a major product, still it is of significantly importance in nutrition of people. Wholesale and retail market of fish depends on the consumer demand, which increases due to transition from consumption of expensive meat to the cheaper healthy fish. Though the level of fish consumption in Ukraine has not reached the level of 1990 yet, it has increased significantly since 2005 compared to the period of 1992-1995. The average annual rate of fish and fish products consumption justified by the National Institute of Nutrition (NIN) under the Ministry of Health of Ukraine is 20 kg per

person. The increase in consumption of fish and seafood was caused by the epizootics such as chicken and swine flu. Increasing demand for fish might also be reasoned by promotion of fish as a healthier diet. The share of fish and fish products has increased four times from 0.13 % to 0.55 % between 1995 and 2015. Consumption of fish and fish products in Ukraine accounts to nearly 17 kg per person annually.

At the same time the consumption of meat products exceeds 45 kg per person per year. Consumption of dairy products is over 225 kg per person per year. Since 1990 the consumption of fish and fish products has decreased from 17.5 kg to 8.4 kg in 2000, and then increased to 14.9 kg in 2009. The lowest indicator was in 1994 amounting to 3.5 kg per person. The fish industry had to provided 922 800 tons of fish and fish products in 2009 for 46.1 million people but the indicator was only 211 200 tons, which is 4.4 times less than required. There is a recent fluctuation of consumption of fish and fish products. Since 2010 consumption of fish and fish products decreased to 14.5 kg which remained 9.9 kg per person in 2015.

It is explained by the fact that the purchasing power of population was very low in 2015. In order to save money the proportion of frozen fish, filleted and other fish meat, including minced; fresh and chilled fish have increased. Due to currency fluctuations and falling of population's solvency fish sales have slowed down by 50 %. Though fish products are important, their share in the nutrition and in the family budget expenses are low and demand for such products is directly influenced by market prices. Out of the different species common carp, bighead carp and grass carp have the biggest demand among the population.

The leaders among the fluvial fish are: common carp (10.6 %), bighead carp, grass carp (13.6 %) and Crucian carp (5.1 %). The increase of the consumption of freshwater fish was observed in 2014. Among these species there were: wels catfish – 75 %, zander – 36 %, common carp – 11 %, bighead carp, grass carp – 14 %, bream – 8 %, Crucian carp – 22 %. The most popular sea-fish in consumption,

captured in Ukraine in 2015, was scomber – 15.5 % from the total consumption of fish; gobies – for 13.3 %, clupeonella – 8.4 %, krill – 10.1 %. These years there is a direct relation between fish consumption and the density of urban population in any region of Ukraine. Thus, the average consumption ranges from 15 to more than 17 kg/person/year in densely populated regions (Donetsk, Zaporizhzhya and Mykolaiv).

Contrastingly, in other regions of Ukraine were consumption varies between 8.8 and 11.6 kg/person/year (Zakarpattya, Ivano-Frankivsk, Rivne and Ternopil). The exception is Kiev region, where the share of urban population is 60.4 %, whereas the fish and fish products consumption is nearly 19.5 kg, where consumption of fish and fish products has reached the required level, which is due to higher incomes and better supply of fish and fish products. The nutrition of rural settlers is more varied and characterized by high-energy, compared to the urban population. They consume more fresh fish, frozen fish, chilled fish, and while in rural regions dried, salted or smoked fish prevails, which is associated with traditions. The consumption of canned processed fish products is higher in the cities than in rural areas. The share of sea fish is more for urban (28 %) than for rural population (15 %).

The majority of consumers prefer; fresh fish (60 %), frozen fish (13 %), smoked fish (12 %), salted fish (8 %), canned fish and fish preserves (3 %), fish jerky (2 %). Frozen fish are consumed by 19 % of the population, while smoked fish by 18 %, salted fish by 16 %, canned fish by 8 %, fish jerky by 7 %, fish preserves by 4 %.

The difference in consumption between the population living in the cities and villages regarding frozen and smoked fish is 23–11 % and 24 – 15 % respectively. The difference for other types of fish products is only 1–2 %. Fish and seafood are often bought in specialized stores – 30 %; at the market – 29 % (in particular it's applies to fluvial fish); at the supermarkets – 15 %; retail sales – 6 %; wholesale – 4 %; in pop-up markets – 3 %.

Nearly 13 % of population prefers the self-caught fluvial fish.

To determine the frequency of consumption of different types of fish and seafood the following main types of fish have been selected: fresh fish, frozen fish, smoked fish, salted fish, jerky fish, canned fish, fish preserves, frozen seafood, seafood, crab sticks, luminaria. Among people who prefer fresh fish, 58 % consume it several times a month; 18 % – several times a week, 14 % – several times a year, 6 % – on holidays and 4 % – every day. Frozen fish is consumed several times a month by 54 % of respondents, 30 % – several times a year, 18 % – on holidays, 15 % – several times a week, 1 % – every day. Smoked fish is bought a couple of times in a month by 44 % of respondents, 39 % – several times a year, 29 % – on holidays, 19 % several times a week and 2 % – every day. Salted fish is eaten daily by 4 % of consumers; several times a week – 18 %, several times a month – 46 %, several times a year – 33 %; on holidays – 9 %.

Frequency of fish jerky, canned fish, fish preserves and seafood consumption is almost the same within each product group: daily consume 1–4 % of the population, several times a week – 13–14 %, several times a month – 36–40 % several times a year – 44–47 %, on holidays – 11–19 %.

Percentage of consumers who buy preserves and seafood on holidays is the highest among these products – amounts to 18 % and 19 % respectively, since the preserves do not require additional efforts from consumers, they are very convenient as a festive meal and as fish snacks often bought with beer.

Frozen seafood, which includes crustaceans and frozen premade fish products, is daily consumed by 4 % of the population, several times a week – 18 %, several times a month – 62 %, several times a year – 16 %, on holidays – 5 %. A peculiarity of this product group is due to the fact that the half-finished fish products are the supplement for daily family menu; frozen crustaceans are often bought for beer. Crab sticks is a product that has appeared on the Ukrainian market more than 10 years ago and has gained the wide popularity among consumers as a supplement for a festive table and

as a product that has replaced fish and seafood in the nutrition of consumers. It explains the high share of customers which buy crab sticks on holidays – 31 %. Crab sticks are daily consumed by 3 % of the population, several times a week – 22 % several times a month – 30 %, several times a year – 45 %.

Laminaria is daily consumed by 6 % of consumers, several times a week – 21 %, several times a month – 50 %, several times a year – 23 % on holidays – 47 %.

Ukrainian regions leading fish consumption are: Odessa region – 18,6 kg per person a year and Cherkasy region – 19,2 kg per person a year. The reason of leadership of the Cherkasy region is based on its location on the Kremenchuk storage reservoir, at the Dnipro River, the Ross River and the Sula River. Analysis of the statistics data shows that the consumption of animal products (meat and meat products) in Zhytomyr, Vinnytsya, Dnepropetrovsk, Kiev, Zaporizhzhya, Poltava, Kherson, Sumy, Chernihiv regions is two times more than that of fish products. In Volyn, Donetsk, Zakarpattia, Kirovohrad, Lviv, Luhansk, Ternopil, Kharkiv regions it exceeds the consumption of fish products three times more. Therefore, one should pay attention to the factors affecting the level of consumption of fish and fish products in terms of administrative units of Ukraine. The average highest monthly level of fish consumption per person statistics during the period from 1999–2015 years after processing official data is observed in Vinnytsia region (from 1,3 kg to 2,5 kg), Odessa region (from 1,7 kg to 2,6 kg), Kherson region (from 1,6 kg to 2,4 kg) regions and the lowest level of fish consumption – Volyn region (from 0,9 kg to 1,9 kg), Ternopil region (from 0,3 kg to 1,6 kg) Lviv region (from 0,7 kg to 1,7 kg).

There are 2 regions with the highest and the lowest fish consumption that are selected for analysis – Vinnytsya region (the highest fish consumption) and Lviv region (the lowest fish consumption). A unique situation have been discovered when Lviv region spent more expenses on food than Vinnytsya region, but consumption of fish were less. The water reservoirs have the same

situation in 2015. There are 52 reservoirs with water surface area of 9.6 ths. hectares in Vinnitsya region, and there are 20 reservoirs with water surface area of 3.2 ths. hectares in Lviv region, which is 22 reservoirs and 6.4 ths. hectares of water surface area less. At the same time, the capacity of reservoirs is 293.0 million m<sup>3</sup>, including useful – 136.0 million m<sup>3</sup> in Vinnytsya region, and 67.1 million m<sup>3</sup> and 56.7 million m<sup>3</sup> in Lviv region respectively. The prices of fish and fish products play also an important part in regionally changing consumption. Prices increased by 52.6 % in rural and 55.5 % in urban markets during 2015 (State Statistics Service of Ukraine 2016).

The increase of prices was especially considerable at sea products (186 %), canned fish in oil (176.7 %) and clupea (152.3 %).

In general, the increase of prices happened with sea products (186.0 %), canned fish in oil (176.7 %) and clupea (152.3 %). According to the local territorial departments of the State Agency of Fisheries of Ukraine an average price for fish and fish products in urban markets has increased by 55.5 %.

The domestic fresh fish is the only product of mass consumption now. At the same time a significant lack of national capacities for storage, primary processing (cleaning, gutting, cutting/fileting) and secondary processing (smoking, salting, marinating) and packaging of fish products as well as the lack of proper facilities for the cooked fish, which is the most indemand by the final consumer, are most obvious obstacles of the development of fish markets in Ukraine.

Currently, there is no mechanism for proper distribution of fish and fish products on Ukrainian domestic markets. Functioning of fish markets has been based on government funding. When budget reduced government tried to drastically reorient a mechanism to self-regulating. Today consumers get fish and fish products mostly through middlemen. This has a negative effect on the quality of fish and fish products, because of the lack of appropriate conditions for fish storage. Hence in the course of resales the quality of fish and fish products gradually decay. The current fish market is characterized



by: increased imbalance between demand and supply of fish products; misbalance between the products quality and consumers' demands; accelerated growth of retail prices for fish and fish products of lowering qualities. Ukrainian market of fish and fish products depends on the next factors: stability of the national currency; government policy on attitude to importers and exporters; inflation rates; increase of the minimum wage. There are two versions of presence at market of the Ukrainian companies: a) suppliers bring the fish directly to the store themselves. It is a good solution for cities, but it is not suitable for smaller towns and villages. Middlemen do not want to go for small orders; b) individual purchases at wholesale depots. Frozen fish come in boxes, so it is not difficult to take it and store.

There are several wholesale markets of fish and fish products in Ukraine, such as "Stolychnyi" in Kyiv, "Shuvar" in Lviv, and "Hospodar" in Donetsk.

For example, sector "Fish and Meat" in "Stolychnyi" market in Kyiv includes 6 pools for live fish; freezers capacity of 1224 m<sup>3</sup>, the number of trading places – 108 m<sup>2</sup> – 8.72 m<sup>2</sup> – 18.54 m<sup>2</sup> – 2.36 m<sup>2</sup> – 8. Fish producers have an opportunity to purchase a block of bonds at the "Fish and Meat" sector of a market which is 10 bonds to 1 m<sup>2</sup> area (10 000 UAN/m<sup>2</sup>). Bonds give their holders the right for a long-term usage of the specified commercial space according to the lease – up to 20 years with an option of extension; obtain incomes from bonds in the form of preferential rental rates (70 UAN/m<sup>2</sup> including VAT) during the first five years at the market; disposal of securities at own opinion as assets; obtain a bank loan secured by bonds and market collateral; limiting the growth of lease due to an official inflation rate.

Fisheries enterprises that are working in aquaculture and do not have bonds are able to rent a space for up to one year, followed by filling of vacant space based on competition i.e. bidding. Rent can be reviewed after the expiry of the lease in this case. There is a small number of specialized shops for fish and fish products. The research

of assortment of fish products on the example of supermarkets “Dary moria” and “NOVUS” has revealed the following: the dominant fish species are marine species and seafood. Among the kitchen ready products only marine species are represented. The level of dependence of the food market from import of fish and fish products is rapidly increasing. Ukraine has established a food market for foreign producers. The market of aquaculture production in our country has some structure, its own characteristics, scheme of trade and trade specifics (fig. 4).

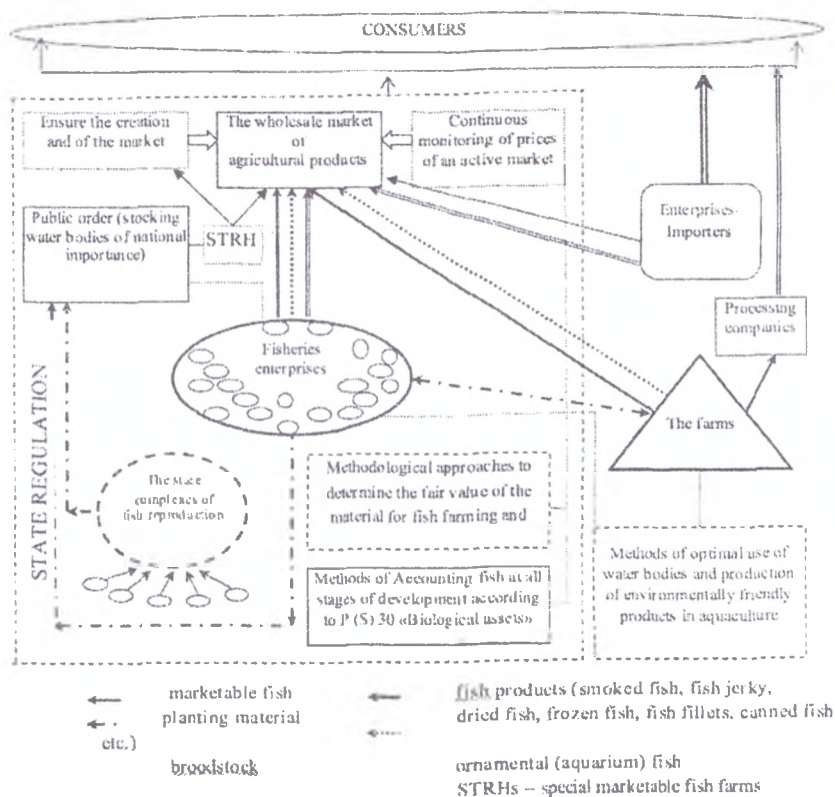


Fig. 4. Scheme of aquaculture products market regulation.

Fish production, including canned fish, was carried out by more than 150 companies in 2015 in Ukraine. The total assortment is around 3 thousand items. According to the statistics, 59.3 ths. tons of fish products, of which 55 % are canned fish, were produced in 2015 mainly from imported frozen fish or filleted fish and other fish meat (including minced). The amount of fish products amounted to 35.9 ths. tons in 2014, showed a decline in production of fish products by 22 %.

Production from Ukrainian fish mainly consists of the dried fish, fish jerky, smoked fish (marine fish: gobies, sprat, anchovy, sprattus; inland fish: bream, rutilus, Scardinius). Production of fish products in Ukraine in 2015 compared to 2013 has decreased almost 60 %. It's connect with an annexation of the Crimea, where the large fish processing enterprises were located such as LLC "Sevastopolsky"», LLC "Noviy", LLC "Proliv", LLC "Vostok", JSC "Trading House "Favorit". And the main power of the production of fish products were locates at the Crimea historically. The decrease in fish products production was affected by the Russian import ban on canned fish on 29<sup>th</sup> of July, 2014, which accounted for 80 % (28.3 ths. tons) of total Ukrainian exports of prepared or canned fish and fish products in 2013. Ukraine exported only 3.2 ths. tons of prepared or tinned fish in 2015 while this indicator was almost 35 ths. tons in 2013. Currently Ukrainian producers are engaged in capacity building in the mainland part of Ukraine and the progressive reorientation on the markets of the European Union, Asia and other countries. The level of dependence of food market from import of fish and fish products is rapidly increasing. By today Ukraine has established a food market for foreign producers. It is because the supply of fish to the domestic market from own production and catch is 20 % while the import is 80 %. Consequently the domestic market of fish and fish products is dependent on imports. By 2015 annual imports of fish and seafood to Ukrainian market showed a tendency for growth, in particular, regarding fresh fish, chilled fish, frozen fish and some of its kinds in processed form – excluding filleted and fish

meat, prepared or tinned fish; black caviar and its substitutes that are produced from other fish eggs. The decrease observed in certain product subgroups – live fish, dried fish, smoked fish, crustaceans. Because of the failing purchasing power of Ukrainians a significant decrease of fish and fish products imports can be observed in 2015.

In 2015 230.2 ths. tons of fish, fish products and other aquatic invertebrates (326.2 million USD), was imported. It is 35 % less than in 2014 and 50 % less than in 2013. Additionally the prices of imported fish products increased: sardinella and sardine (186 %), pink salmon (178 %) clupea (170 %). Prices for domestic fish (common carp, carassius, Far Eastern carps, bream, so-iuy mullet) have grown by 40 % – 50 %. The main reason for this increase is the economic situation and devaluation of Ukrainian currency.

The following imported frozen fish is a traditional product for the population of Ukraine: clupea, merluccius, scomber, sardine, sprat, sprattus. In 2015 181.5 ths. tons of frozen fish, fish fillets were imported to Ukraine, which is 85 % of the total imports of fish and other aquatic invertebrates and finished products. Also caviar and its substitutes import amounted to 15.5 ths. tons of worth 0,2 billion of USA dollars; the import of fish, fresh or chilled, except for the filleted and other fish meat – 10.7 ths. tons of worth about 0.5 billion of USA dollars, fish fillets and other fish meat (including minced), fresh, chilled or frozen 13.1 ths. tons of worth 0.3 billion of USA dollars were imported in 2015. The frozen fish was the most imported product in 2013 – 329,8 ths. tons, fish fillets and other fish meat (including minced), fresh, chilled or frozen – 48,6 ths. tons, canned fish, including caviar and its substitutes produced from caviar of other fish – 40,4 ths. tons, and chilled fish, fresh fish – 23.3 ths. tons worth nearly 0,9 billion dollars USA. That was 67.6 % more than in 2011. The structure of commodity circulation in fish and seafood imports to Ukraine in 2013 was dominated by frozen fish (58.9 %), chilled fish, fresh fish (15.6 %) and fish fillets and other fish meat (including minced), fresh, chilled or frozen (10.4 %), prepared or tinned fish, caviar and its substitutes that are produced

from caviar of other fish (9.7%). These segments together held 94.6% of the whole fish market. The structure of the commodity circulation in fish and seafood imports to Ukraine in 2015 was dominated by frozen fish (86.3%), chilled fish, fresh fish (0.5%) fish fillets and other fish meat (including minced), fresh, chilled or frozen (6.2%), prepared or tinned fish, caviar and its substitutes produced from caviar of other fish (6.3%). These segments together held 99.3% of total fish market.

In the last years frozen fish has increasingly dominated the import, but in absolute terms import of frozen fish has reduced by 48.64% in 2015. Imports of some fish species, by contrast, have grown especially of sprat, but import of clupea, scomber, and capelin has also increased. Though Ukraine does not import pike perch still 82% of consumed fish in Ukraine was imported in 2014. More than 90% of fish imported in 2015 are accounted for fish, which Ukraine does not have access to and which is extracted from waters of exclusively maritime economic zones of other states. Ukraine does not have the resource base of clupea, scomber, halibut, Atlantic salmon and many other types of fish which the buyers are looking for. Fish and seafood have been imported from more than 15 countries in 2013 and from more than 28 countries in 2015. Main importers are Norway (28.5% of its value), that supplies frozen fish, fresh fish and chilled fish, Iceland (11.3% of the total cost) with frozen fish, fish fillets and other fish meat (including minced). Imported fresh and chilled fish is by the most part from Norway (88.8%), frozen fish – from Norway (22%), USA (16.2%) and Iceland (16.2%) according to sub-segments of fish commodities.

93% of Norwegian exports to Ukraine consist of fish and seafood, especially clupea, scomber. There're, salmonidae are coming from Russia. The other part of the imported sprat is proportionally distributed between Argentina, the Baltic countries, Spain, Canada, Russia, Vietnam and other countries. The delicacy types of fish are supplied by France, Italy and China. The major producers that are supplying fish and seafood to Ukraine are from:

Norway (Marine Harvest AS Ice Seafood AS, Hallvard Leroy, Norway Royal Salmon, Nergard AS, Norway Pelagic AS, Egersund Fisk Group, CA Mordal Consulting); Scotland (Denholm Seafoods Ltd), Holland (Marine Foods BV); Iceland (Iceland Pelagic, Iceland Seafood ehf), USA (Pacific Seafood); Canada (Ocean Choice International Ltd); Russia (Flayfish, Rosrybtorh), Belarus (Santa Bremor); Lithuania (Benko Servisas). Main importers at 2015 were the European countries – 162.8 ths. tons (70.7 % of the total imported fish); America – 32.8 ths. tons (14.3 % of the total imported fish); Asia – 11.8 ths. tons (5.1 % of the total imported fish); CIS – 9.1 ths tons (4.0 % of the total imported fish); Africa – 8.4 ths. tons (3.7 % of the total imported fish); Australia and Oceania – 3.3 ths. tons (1.5 % of the total imported fish). The amount of imported salmon to Ukraine in 2014 comes down to 976 tons, which is 48 % less than in 2013. In 2015 a total of 3 624 800 tons of rainbow trout were imported to Ukraine. In 2015 rainbow trout from Norway was imported in the amount of 991.2 tons, 3374 tons – from Denmark, 132.1 tons – from Chile, 73.7 tons – from Turkey. Ukraine bought the filleted fish and other fish meat (including minced) for 25.8 million USD in 2015. It is 67.2 % less than in 2014. The top three importers with almost equal percentage were Vietnam (6.6 million USD 25.5 %), Norway (6.25 million USD 24.2 %) and Iceland (5.37 million USD 20.8 %). Ukraine has introduced a 10 per cent import duty in February, 2015; hence fish and fish products were included to the list of additional taxable goods. The introduction of an additional fee has not justified itself, since the budget revenues have declined. Ukrainian fish market has suffered the most. Even despite the fact that importers have changed approaches and started to import cheaper fish products instead of more expensive (the average price of imported fish for the half-year of 2014 is 2 USD/kg, but in 2015 it is was 1.3 USD/kg), the fish imports have still reduced by 40 % in 2015, even more than in 2014.

The present situation of imports fish and fish products is explained by the lack of specialized fishing fleet and the processing

industry, as well as by quotas in international waters and increased IUU in general and poaching particular. Besides, the cost price of Ukrainian fish import is higher than that of imported fish, which is why Ukrainian fish products are losing.

In 2015 a total of 8 600 tons of fish, crustaceans, fish products and other aquatic invertebrates were exported from Ukraine, in a total value 17.7 million USD. This is 31 000 tones less compared to 2014 year when it was 39 600 tons and 42 800 tons less compared to 2013 when the export was 51 400 tons.

The amount of exports of filleted fish and other fish meat (including minced) was 1.8 million USD in 2015. The largest importer of Ukrainian fish meat is Germany (4.7 million USD). The export of frozen fish was 247 200 USD; mainly to Latvia (57 tons), Turkmenistan (18 tons), Moldova (49 tons). It was 22.6 % less than in 2014.

Ukraine mainly exports fresh fish, chilled fish, canned fish to Russia and Kazakhstan (directly from fishing areas). The amount of exports in all the groups has declined in 2015. Export of fresh fish, chilled fish amounted of 2 400 tons at the cost of 2062 900 USD was made by "SRDK" directly from the area of fisheries (Atlantic region, near to Guinea-Bissau).

Ukraine exports only 98 tons of frozen fish to Europe excluding filleted fish and other fish meat at a price of 92 000 USD. In 2015 the production of trout was 247 tons out of which the export of trout was only 5.5 tons in a value of 62 900 USD.

Ukraine exports of perch to: Germany 90 % a total of 996.4 tons worth 4 126 100 USD; Denmark 151,8 tons worth 624 300 USD; Lithuania – 110.6 tons worth 488 500 USD; France – 90.8 tons worth 561 500 USD; Poland – 24.0 tons worth 159 60 USD; The Netherlands – 18,9 tons worth 58 100 USD.

Ukraine has conditions to grow European plaice, rainbow trout, Coregonus, channel catfish, perch, starry sturgeon, and American paddlefish. Not only traditional types of fish, but also those that are currently imported can be produced in the country. Among

them there are gilthead sea bream, European sea bass, and tilapia. The demand for aquaculture products has the least realization in Ukraine. An actual capacity of the market in 600-650 000 tons could be able to increase by 30-40 % if aquaculture and CBF intensively developed together with realistic, affordable and sustainable prices on fish and fish products.

*Conclusions.* Having the production of fish analyzed and problems of fish processing area identified we highlighted the following tasks for its development: first of all draw attention to the supplies of fish processing businesses with domestic raw material, which will help to reduce the cost of their products and improve consumer's demand, modernization of fish processing enterprises, material and technical base upgrade by way of attracting investments. And also need to:

a) develop a program for import phase-out of fish products. Ukraine does not have the resource base of clupea, scomber, halibut, Atlantic salmon and many other types of fish which the buyers are looking for. Besides, there are conditions to grow European plaice, rainbow trout, Coregonus, channel catfish, perch, starry sturgeon, and American paddlefish. Not only traditional types of fish can be produced, but also those that are currently imported (gilthead seabream, European seabass, tilapia);

b) focus in two fields: modern refrigerators and processing enterprises. The need for modern refrigeration storage capacity for today is about 100 ths. tons of simultaneous storage. Fishing in Ukraine is seasonal, that is why it needs the required freezing and refrigerating storage for increasing production capacity;

c) organize the advertising campaign including the assortment's range that has expanded and has deepened by yet unseen species of fish in recent years and provide an educational work with consumers through the media and TV;

d) reform the domestic fish market should pay attention on potential and demographic trends in a particular region, the distribution and level of regularly incomes, the business climate and



the level of regional competition; the main feature of aquaculture sector is that there are a lot of small-scale producers/enterprises with less than five workers. That kind of structure can be obstacle in the development of the market, since its competitiveness is pretty low.

The aquaculture sector is undiversified both in the area of species composition of aquaculture objects and in the area of products on the market. That is why investments for the introduction of new aquaculture objects are necessary, as is the increase the value of existing capacity on the national level. It is necessary to invest into already existing capacities for their modernization. But you need to make appropriate adjustments to collect information on fish production (table 2).

*Table 2*

**Recommendations for Ukrainian statistics development**

<i><b>OBJECTIVES</b></i>	<i><b>ACTIONS</b></i>
no reports of extracted fish from recreational fishing	- need to develop new rules for amateur fishermen, the mechanism of accounting amounts of amateur fishermen and amounts of their fish catch
an imperfect system of collection and submission of users (fishermen) reporting	- provide an electronic documents circulation for fish protection authorities which could keep a constant on-line communication with the users when the fish is catching
statistical information about marine aquaculture	- introduce the collection of statistical data of marine aquaculture; - to develop the reports for marine aquaculture, and special forms of primary documentation that enterprises of marine aquaculture have to fill
amounts of incomings aquaculture products into the market	- the full amount of revenues of aquaculture products to the domestic market from fish farms is not covered by official statistics
quality of reporting indicators of the production of fish and	- need to establish and maintain the list of entities that are engaged in the production of marketable fish and fish planting material in

fish products	<p>aquaculture;</p> <ul style="list-style-type: none"> <li>- introduce the licensing of aquaculture entities, which would include the commitments of providing correct reporting and observance of environmental requirements;</li> <li>- need legally register an article in the Administrative Code of Ukraine that would have strengthened the administrative responsibility for providing correct data from aquaculture entities;</li> <li>- low professional level of Fishery Patrol which is collecting the reporting data (lack of professional education)</li> </ul>
information on the amount of employees in fish economy	<ul style="list-style-type: none"> <li>- to develop a report form for collection an information on the employment of workers in fish economy;</li> <li>- need to develop a methodology and mechanism for collection and submission of such information (since this form for FAO also still haven't filled)</li> </ul>
Reports' improving	<ul style="list-style-type: none"> <li>- improving of the Form "The report № 1A – fish (ryba) (annually) "Producing of aquaculture" for getting an information about the types of fish, not about families. (For example, now the indicator of catching carp is shown as <i>Cyprinus Carpio</i> and <i>Carassius Auratus</i>. There are various components for their cultivation. It is advisable to separate them). A list of economic indicators for analysis that should by foreseen in the report: <ul style="list-style-type: none"> <li>– income (money for the realization, subsidies, other types of the income);</li> <li>personnel expenditures (fees and salaries);</li> <li>– cost of raw materials (fish planting materials and feed costs); operational costs and repairs;</li> <li>– capital expenditures (capital depreciation);</li> <li>– other operational costs; unbudgeted</li> </ul> </li> </ul>

	expenditure; – costs on basic means; investments; – debts; volume of realization of fish products; – employment (number of employees).
A new legislative basis should be founded for the data collection in fisheries, aquaculture and processing industry for acquiring more qualitative data.	

Special attention might be drawn to specific aspects, especially to the segment of commercial cultivation of carps for the investors to consider the possibility of investments into this segment. There appears to be the lack of investments because the issue of ownership right is still legally unregulated, especially when it concerns the land and the old once state aquaculture farms and buildings.

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